No. 16-60118

In the United States Court of Appeals for the Fifth Circuit

State of Texas, Texas Commission on Environmental Quality, and Public Utility Commission of Texas,
Petitioners,

v.

United States Environmental Protection Agency and Gina McCarthy, in her official capacity as the Administrator of the United States Environmental Protection Agency,
Respondents.

On Petition for Review of an Action of the
United States Environmental Protection Agency

MOTION OF PETITIONERS STATE OF TEXAS, TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, AND PUBLIC UTILITY COMMISSION OF TEXAS FOR STAY OF FINAL RULE

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Respondents.

The undersigned counsel of record certifies that the following listed persons and entities as described in the fourth sentence of Rule 28.2.1 have an interest in the outcome of this case. These representations are made in order that the judges of this court may evaluate possible disqualification or recusal.

Petitioners

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Proposed Intervenors

Sierra Club and National Parks Conservation Association are each non-profit organizations that maintain an open membership invitation to organizations, businesses, individuals, and the public in general. Accordingly, Intervenor' memberships consist of many individual members.

Neither Sierra Club nor National Parks Conservation Association has parent companies, and no publicly-held company owns a 10% or greater interest in Sierra Club or National Parks Conservation.

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/s/ Lisa A. Bennett

LISA A. BENNETT

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Exhibit B — Declaration of Brian H. Lloyd, Executive Director, Public Utility Commission of Texas.

Exhibit C — Declaration of David Brymer, Air Quality Division Director, Texas Commission on Environmental Quality.

Exhibit D — Revisions to the State Implementation Plan (SIP) Concerning Regional Haze, Texas Commission on Environmental Quality (Feb. 25, 2009).

Exhibit E — Texas Commission on Environmental Quality and Public Utility Commission of Texas Comments on Proposed Rule (Apr. 20, 2015).

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Introduction

In accordance with Rule 18 of the Federal Rules of Appellate Procedure, petitioners the State of Texas, Texas Commission on Environmental Quality ("TCEQ"), and Public Utility Commission of Texas ("PUCT") (collectively, the "Texas Petitioners") move for a stay pending review of the final rule entitled "Approval and Promulgation of Implementation Plans; Texas and Oklahoma; Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan to Address Pollution Affecting Visibility and Regional Haze; Federal Implementation Plan for Regional Haze; Final Rule," 81 Fed. Reg. 296 (Jan. 5, 2016) (Exh. A) ("Final Rule")—and to toll all compliance deadlines in the rule pending adjudication of the petition for review. A stay motion with this Court is proper as EPA denied a request to administratively stay the Final Rule. *See* 81 Fed. Reg. at 315.

The Final Rule is an arbitrary and capricious exercise of the authority granted to EPA by the Clean Air Act ("CAA" or "Act"). Texas's 2009 revisions to its State implementation plan ("SIP") to address regional haze in designated national parks—termed Class I Federal areas—met all statutory and regulatory requirements. Yet the Final Rule rejects key aspects of the 2009 SIP Revision and imposes a Federal Implementation Plan ("FIP") that requires seven Texas coal-fired power plants to retrofit with new scrubbers by February 2021 and seven more coal-fired units to undergo upgrades to existing scrubbers by February 2019. By EPA's own estimates, the costs of the Final Rule total approximately $2 billion. In light of these immense costs, "it is probable that the units will shut down rather than incur the retrofit costs of new scrubbers." Lloyd Decl. ¶ 26-27 (Exh. B).

The Supreme Court has recognized that it is irrational "to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits." *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015). Yet here, EPA has acknowledged that Texas's Class I areas—Big Bend and Guadalupe Mountains National Parks—are *already meeting* the visibility goals EPA puts forward in its FIP *without* the costly measures imposed by the FIP. And any benefits that might be realized from emissions controls beyond the year 2018 were not appropriate for EPA to consider in this action because the time period Texas was required to consider in its 2009 SIP Revision extends only until 2018.

Further, EPA in this action upsets the cooperative federalism framework of the CAA. Instead of just reviewing SIP submittals for compliance with statutory and regulatory compliance, EPA seeks to substitute its own preferred policies in place of Texas's reasoned and well-supported approaches. For example, EPA contradicts its own prior statements and guidance by asserting that Texas should have considered costs and benefits to visibility on a *source-by-source* basis. And regardless of EPA's prior contrary position, Texas reasonably concluded that site-specific analyses were not necessary because visibility improvements from the group *as a whole* were not perceptible. Likewise, EPA attempts to force Texas to use EPA's selected default values for estimating natural visibility conditions, when EPA's own guidance allows for the use of "refined" estimates tailored by States and Texas demonstrated that the default values underestimated the contribution of naturally-occurring dust to visibility conditions in its national parks. The 2009 SIP Revision provided ample justification for Texas's chosen refinement. Moreover, EPA also contradicts its own past practice. In rejecting Texas's consultation process with Oklahoma (regarding the Wichita Mountains Class I area), the Final Rule holds Texas to a different standard than has been applied in other regional haze SIP submittals, and takes the unprecedented step of rejecting a State-to-State consultation.

Absent a stay, the Texas Petitioners will suffer irreparable injury. Texas faces significant reliability risks in light of the power plant retirements expected to result from the Final Rule, exacerbated by EPA's refusal to consider a reliability exception. Texas's citizens also face heightened electric costs as the electric market responds to the need for additional transmission infrastructure. Texas and its agencies will experience sovereign harms from the EPA's undercutting of the cooperative federalism framework laid out in the CAA. And on the other side of the ledger, there will be little to no resulting benefit from the Rule in the period covered by the 2009 SIP Revision. Finally, granting a stay pending litigation of the Final Rule is consistent with the actions in a number of other regional haze cases. *See* Order, *Oklahoma v. EPA*, Nos. 12-9526, 12-9527 (10th Cir. June 22, 2012); Order, *Wyoming v. EPA*, Nos. 14-9529, 14-9530, 14-9533, 14-9534 (10th Cir. Sept. 9, 2014); Order, *Cliffs Natural Res. Inc. v EPA*, Nos. 13-1758, 13-1761 (8th Cir. June 14, 2013).

Background

I. The Regional Haze Rule

Section 169A of the Act sets forth a national goal of preventing future, and remedying existing, man-made impairment of air visibility in designated national parks

(Class I Federal areas). 42 U.S.C. § 7491. The statute directs EPA to develop regulations that: (1) provide guidelines to the States on appropriate techniques and methods for implementing air visibility protection programs; and (2) require SIPs for States with Class I areas or sources that impact another State's Class I areas to contain emission limits, schedules of compliance, and other measures "as may be necessary to make reasonable progress toward meeting the national goal." *Id.* § 7491(b). EPA's regulations implementing Section 169A were promulgated in 1990 and are found in 40 C.F.R. Part 51. *See* 64 Fed. Reg. 35,714 (July 1, 1999) (the "Regional Haze Rule").

The CAA provides that, to address regional haze, SIPs must include a requirement that certain existing sources install "best available retrofit technology" ("BART") and include a long-term strategy for making reasonable progress toward the national goal. 42 U.S.C. § 7491(b)(2)(A)-(B). If the EPA disapproves a SIP in full or in part, it prepares a FIP. *See id.* § 7410(c). EPA's regulations require that, following the initial submittal, the States submit regional haze SIP revisions every ten years, with the first revision due by July 31, 2018. *See* 40 C.F.R. § 51.308(f). Under the Regional Haze Rule, a SIP must contain the following elements: (1) reasonable progress goals for each Class I area located within the State; (2) calculations of baseline and natural visibility conditions; (3) a long-term strategy for regional haze for Class I Federal areas located both within and outside the State if they may be affected by emissions from the State; (4) a monitoring strategy; and (5) BART requirements for regional haze visibility impairment. *Id.* § 51.308(d)(1)-(4), (e).

In setting reasonable progress goals, the CAA provides that States should "take[] into consideration" four factors: "the costs of compliance, the time necessary for compliance, and the energy and nonair quality environmental impacts of compliance, and the remaining useful life of any existing source subject to such requirements." 42 U.S.C § 7491(g)(1). EPA's regulations require the State to first determine the uniform rate of progress, which is the linear rate needed to move from baseline visibility conditions to natural visibility conditions by 2064; and where a State establishes a reasonable progress goal that is slower than the uniform rate, it must demonstrate (based on the four statutory factors) that its progress goal is reasonable. *See id.* § 51.308(d)(1)(i)(B), (ii). EPA has stressed that "the reasonable progress goal is a *goal* and not a mandatory standard which must be achieved by a particular date," and that "[a]ll that is 'enforceable' is the set of control measures which the State has adopted to meet that goal." 64 Fed. Reg. at 35,733.

The long-term strategy includes "enforceable emissions limitations, compliance schedules, and other measures as necessary to achieve the reasonable progress goals established by States having mandatory Class I Federal areas." 40 C.F.R. § 51.308(d)(3). Where a State's emissions are reasonably anticipated to contribute to visibility impairment in another State's Class I area, the emitting State must consult with the other State to develop coordinated emission strategies. *Id.* EPA's regulations provide that States may join Regional Planning Organizations and rely on jointly developed technical analyses approved by all State participants. *Id.* § 51.308(d)(3)(iii).

II. Texas's SIP Revision Process

Texas's 2009 SIP Revision represented the culmination of over 9 years of plan development, rulemaking, inventory development, modeling, stakeholder meetings, and consultations. *See* Revisions to the State Implementation Plan (SIP) Concerning Regional Haze, TCEQ (Feb. 25, 2009) (the "2009 SIP Revision") (Exh. D); Brymer Decl. ¶ 17 (Exh. C). TCEQ coordinated extensively with its Regional Planning Organization—the Central Regional Air Planning Association ("CENRAP")—as well as federal land managers, EPA, neighboring States, and the general public. Brymer Decl. ¶ 17. CENRAP included nine States—Texas, Louisiana, Oklahoma, Arkansas, Kansas, Minnesota, Missouri, Nebraska, and Iowa—and provided a means to confer on the regional haze issue. Brymer Decl. ¶ 16. Significant portions of Texas's 2009 SIP Revision were developed based on emissions inventory, modeling, and protocols developed through CENRAP. 2009 SIP Revision at 3-3; Brymer Decl. ¶ 18. CENRAP modeled projected 2018 visibility conditions for all participating States' Class I areas and compared them with the uniform rate of progress. 2009 SIP Revision at 8-1.

Texas calculated reasonable progress goals for its covered Big Bend and Guadalupe Mountains National Parks. Texas used reputable site monitoring data to calculate baseline visibility conditions for the 20% worst and 20% best days during the years 2000-2004, as well as CENRAP modeling to estimate likely visibility improvements resulting from all Federal and State emission control programs. *Id.* at 10-1-10-4. Texas then analyzed the four statutory factors, considered the costs of additional controls, and concluded that no perceptible visibility benefit would accrue from such controls. *Id* at 10-7. To develop its long-term plan, Texas consulted with neighboring States over the course of multiple years. Brymer Decl. ¶ 22. Texas acknowledged significant impact on Oklahoma's Class I area (the Wichita Mountains), but Oklahoma did not request further reductions from Texas beyond those Texas already planned to implement through various State and Federal emissions control programs—programs upon which CENRAP modeling studies relied. *See id.*

III. The Final Rule Partially Disapproving the Texas SIP Revision

The Final Rule partially approved and partially disapproved Texas's 2009 SIP Revision—just two years before the ten-year term covered by the 2009 SIP Revision will expire in 2018. The Final Rule imposes a FIP that requires seven Texas coal-fired units to retrofit with new scrubbers by February 2021 and seven more coal-fired units to undergo upgrades to existing scrubbers by February 2019. 81 Fed. Reg. at 305.

EPA disapproved Texas's reasonable progress goals for Big Bend and the Guadalupe Mountains based on EPA's conclusion that Texas "has not demonstrated that its reasonable progress goals provide for reasonable progress toward meeting the national visibility goal." 81 Fed. Reg. at 298. Specifically, EPA found that Texas did not reasonably consider the four statutory factors, because Texas should have evaluated the four factors on a source-by-source basis—rather than considering collective impacts. *Id.* at 298-99. Further, EPA found that Texas had not adequately justified reasonable progress goals less stringent than the uniform rate of progress, despite "agree[ing] with Texas that a rate of improvement necessary to attain natural visibility conditions by 2064 is not reasonable." *Id.* at 299. EPA also faulted Texas's estimation of natural visibility conditions for its Class I areas on the basis that Texas should have used EPA's "default" estimates of natural conditions for the best and worst visibility days. *But see id.* at 299-300 (acknowledging that EPA guidance permits States to use a "refined" approach); *see also* Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule, EPA (Sept. 2003) ("Natural Visibility Guidance"). EPA's substitution of these default values also led it to disapprove the portion of the 2009 SIP Revision calculating the degree to which baseline conditions exceed natural conditions for the best and worst visibility days at the Texas Class I areas, under 51.308(d)(2)(iv)(A). 81 Fed. Reg. at 300.

EPA also disapproved aspects of Texas's long-term strategy, finding that Texas "unreasonably determined that no additional controls were warranted for its sources during the first planning period to help achieve reasonable progress at the Wichita Mountains." *Id.* EPA also found that Texas "did not develop an adequate technical basis to inform consultations with Oklahoma in order to develop coordinated management strategies and to identify reasonable reductions from its sources." *Id.*[1]

IV. Texas's Electric Reliability Council of Texas ("ERCOT") Market

Texas is unique among all States in that 90% of the State operates in a competitive wholesale and retail electricity market (the ERCOT region)—a wholly intrastate grid with limited ties to other U.S. interconnections. Lloyd Decl. ¶ 11, 13 (Exh. B). With the exception of these limited ties, the ERCOT power region must independently ensure its own electric reliability. *Id.* Investor-owned utilities in ERCOT

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[1] EPA had also proposed to replace the Texas SIP's reliance on the Clean Air Interstate Rule as better than, and therefore meeting the requirements of, BART, with reliance on the Cross-State Air Pollution Rule, but elected not to finalize this in its FIP (as it did for other States) due the judicial invalidation of certain EPA emissions budgets for Texas under that program. *See EME Homer City Generation L.P. v. EPA*, 795 F.3d 118 (D.C. Cir. 2015).

have been separated into generation, transmission and distribution, and retail services companies—and only the transmission and distribution function is subject to traditional regulation. *See* Tex. Util. Code § 39.001; Lloyd Decl. ¶ 20. The Federal Energy Regulatory Commission ("FERC") has very limited jurisdiction over ERCOT: transmission occurring wholly within ERCOT is not subject to FERC's rate-setting authority, and the market rules in ERCOT are not subject to FERC approval or oversight. Lloyd Decl. ¶ 18. The ERCOT market is operated through unit-specific bidding and dispatch, with ERCOT using the generation with the lowest bids to serve load, subject to transmission constraints. Lloyd Decl. ¶ 25.

An independent organization, ERCOT Inc., has been certified by the PUCT to ensure reliability and adequacy of the regional electric network. *See* Tex. Util. Code § 39.151; Lloyd Decl. ¶ 14. The PUCT is statutorily required to adopt and enforce rules relating to the reliability of the ERCOT power region. *See* Tex. Util. Code § 39.151(d). One such rule permits ERCOT to enter into "reliability-must-run" contracts with power plant owners who have provided notice of plans to retire the plant, in the event that ERCOT determines that the plant is needed to maintain the reliability of the local transmission system. Lloyd Decl. ¶ 29. Such contracts provide compensation (including for capital investment) to keep the plant on-line until transmission system upgrades can be completed. *See* Lloyd Decl. ¶ 29.

Argument

The Court considers four factors when determining whether to grant a stay: (1) the likelihood that the movant will prevail on the merits; (2) the prospect of irreparable injury to the movant absent a stay; (3) the possibility of harm to other parties if relief is granted; and (4) the public interest. *See Nken v. Holder*, 556 U.S. 418, 434 (2009) (per curiam); *Ignacio v. INS*, 955 F.2d 295, 299 (5th Cir. 1992). Each factor favors a stay here.

I. Texas Petitioners Are Likely to Prevail on the Merits

A. The Final Rule Imposes Billions in Costs with No Visibility Benefit During the Relevant Period Covered by the 2009 SIP Revision.

Current monitored visibility in Texas's Class I areas is already *better* than the visibility that the Final Rule seeks to achieve in 2018. In EPA's own words, these areas have already achieved "better visibility conditions . . . than the numerical reasonable progress goals [EPA is] establishing for these Class I areas" for 2018. 81 Fed. Reg. at 341. Further, the difference between the FIP's 2018 reasonable progress goals and the State-established reasonable progress goals is imperceptible—only a small fraction of the increment, called the "deciview," that has been designated as perceptible to the human eye. *See* 81 Fed. Reg. at 322 n. 123.

By EPA's estimate, the FIP will impose approximately $2 billion in costs. *See* 79 Fed. Reg. 74,818, 74,876-77 (Dec. 16, 2014). And during the relevant period covered by the SIP submittal under review—ending in 2018—no discernible benefit would accrue. The imposition of such costs without any corresponding benefit is irrational and unlawful. *See* 42 U.S.C. § 7491(g)(1) (including "the costs of compliance" in determination of reasonable progress); *Michigan v. EPA*, 135 S. Ct. at 2707 ("One would not say that it is even rational . . . to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits.").

Measures that would be implemented beyond 2018 are not appropriate for inclusion in a FIP that is ostensibly filling a gap in the 2009 SIP Revision covering a period ending in 2018. The regional haze planning process is iterative, as provided by both the CAA and the Regional Haze Rule. *See* 64 Fed. Reg. at 35,734 (requiring "control strategies to cover an initial implementation period extending to the year 2018, with a reassessment and revision of those strategies, as appropriate, every 10 years."). Therefore, it was improper for EPA to prescribe scrubber upgrades that are not required until 2019 and new scrubbers that are not required until 2021. *See* 81 Fed. Reg. at 298. Texas was not required at the time of its 2009 SIP Revision to consider controls that might be implemented in later planning periods.

B. The Final Rule Ignores the Flexibility the CAA Provides to States in Crafting Regional Haze Plans

The CAA authorizes EPA to impose a FIP only if it corrects an error or is based on a failure of the State plan to meet the requirements of the CAA or the Regional Haze Rule. *See* 42 U.S.C. § 7410(c); *Train v. Nat. Res. Def. Council*, 421 U.S. 60, 79 (1975) ("The [CAA] gives the [EPA] no authority to question the wisdom of a State's choices of emission limitations if they are part of a plan which satisfies the standards of 110(a)(2)."). The 2009 SIP Revision satisfied all statutory and regulatory criteria. It included a detailed analysis of and support for each element required of a regional haze plan, including reasonable progress goals for Texas's Class I areas based on the four statutory factors and calculations of baseline and natural visibility conditions. It also included a long-term strategy based on extensive consultations with other States. EPA's substitution of its own preferred (but not legally-required) approach ignores the flexibility the CAA gives States in crafting regional haze plans. Because EPA overstepped its "ministerial function" of reviewing SIPs "for consistency with the Act's requirements," its Final Rule is arbitrary, capricious, and an abuse of discretion. *See Luminant Generation Co. LLC v. EPA*, 675 F.3d 917, 921 (5th Cir. 2012) (citing 42 U.S.C. § 7410(k)(3)). Two examples are discussed here, but this statutory overreach is evident throughout the Final Rule.

First, EPA determined that TCEQ's consideration of the four statutory factors, *see* 42 U.S.C. § 7491(g)(1), in developing reasonable progress goals for Texas's Class I areas was not "reasonable," because it grouped sources together instead of considering pollution controls on a source-by-source basis. But EPA itself has taken the position that the reasonable progress analysis does not require a source-specific analysis. *See WildEarth Guardians v. EPA*, 770 F.3d 919, 944 (10th Cir. 2014) (taking same position). The Tenth Circuit accepted this reasoning, highlighting that the language referring to a "source-specific" analysis appears in the BART analysis, *see* 40 C.F.R. § 51.308(e)(2)(i)(c)—but *not* in the subsection laying out the four factors governing the determination of reasonable progress. *Id.* ("Nothing in the Regional Haze Rule or the Clean Air Act required New Mexico to conduct a four-factor analysis of the [single] plant."). Texas conducted the four-factor analysis by grouping categories of sources, as allowed even by EPA's own 2007 guidance. *See* Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program, EPA, at 4-1 (June 2007) (suggesting that States "begin[] by concentrating on possible emissions reductions . . . from a few selected source sectors"). In evaluating man-made impacts to visibility, Texas reasonably concluded that site-specific analyses were not necessary because visibility improvements from the group as a whole were not perceptible, and therefore controls on a subset of the group could not result in more visibility improvement. The 2009 SIP Revision satisfies the CAA's requirement that reasonable progress goals be developed "tak[ing] into consideration" the four factors. *See* 42 U.S.C § 7491(g)(1). That EPA would have considered them in a different way than Texas does not form a valid basis for disapproving Texas's submittal. *See* 64 Fed. Reg. at 35,721 (acknowledging that Regional Haze Rule does not specify "specific control measures a State must implement in its initial SIP for regional haze.").

Second, EPA overstepped its authority by disapproving Texas's estimate of natural visibility conditions, substituting instead EPA's default values. The Regional Haze Rule uses flexible language in describing the mode of calculating natural conditions. *See* 40 C.F.R. § 51.308(d)(2)(iii) (requiring States to calculate natural conditions "by estimating the degree of visibility impairment existing under natural conditions for the most impaired and least impaired days, based on available monitoring information and appropriate data analysis techniques."). Texas's estimate was developed following EPA guidance, which does not require the use of EPA's default values and expressly allows for the use of State "refined" estimates of natural conditions. *See* Natural Visibility Guidance at 3-1. TCEQ provided specific evidence and analysis in its SIP revision demonstrating that it correctly calculated natural visibility conditions at Big Bend and Guadalupe Mountains in accordance with 40 C.F.R. § 51.308(d)(2)(iii) and EPA guidance. *See id.*; 2009 SIP Revision at 5-4. Texas relied on proven methodologies to reach its conclusion that the fine soil and coarse mass contributing to natural conditions for the worst visibility days was 100% caused by naturally occurring dust storm events. EPA is incorrect that the refined approach employed by Texas was "not adequately demonstrated." 81 Fed. Reg. at 300. EPA's disapproval of Texas's natural visibility estimate resulted in disapproval of several aspects of the 2009 SIP Revision.

By imposing EPA's preferred approaches where Texas's approaches were compliant with the CAA and the Regional Haze Rule, EPA has turned the Act's framework of "cooperative federalism" on its head. *See Dominion Transmission, Inc. v. Summers*, 723 F.3d 238, 240 (D.C. Cir. 2013). The SIP framework for addressing regional haze is designed to allow States to fashion programs that meet statutory and regulatory requirements while balancing costs and visibility improvements in a manner appropriate for the citizens and the economy of the State. *See* Brymer Decl. ¶ 30. EPA's action here flouts this framework.

C. EPA Ignored Reliability Impacts to the ERCOT Market.

EPA's refusal to account for the unique ERCOT market and address reliability concerns raised by TCEQ and PUCT in comments on the proposed rule is arbitrary and capricious. *See* 81 Fed. Reg. at 345; *see also* TCEQ and PUCT Comments on EPA-R06-OAR-2014-0754-0045 (Exh. E). The Final Rule responds to these concerns with conclusory statements that fundamentally misunderstand the unique ERCOT market and refuse to meaningfully address the real reliability threats raised. *See id.* Rather than respond to those reliability concerns, EPA dismissed the findings of a report prepared by ERCOT—an authority on electric reliability within the region—as "speculative." *Id.* Because the ERCOT region has only limited ties with other interconnections, *see* Lloyd Decl. ¶ 14, power plant retirements can pose significant threats to reliability, particularly when these retirements are forced suddenly by new regulations without adequate time for transmission planning by the PUCT to accommodate replacement capacity. And EPA's refusal to integrate a reliability exception into its Final Rule means that ERCOT will be unable to utilize its own protocols for ensuring reliability, including the use of reliability-must-run contracts. *See* Lloyd Decl. ¶ 29. These approaches will be unavailable because the Final Rule contains no provisions that would permit continued operation of the affected plants. Lack of a reliability safety valve presents similar reliability problems for the affected Texas utilities that operate outside of the ERCOT market. Lloyd Decl. ¶ 38.

D. EPA's Disapproval of Texas's Consultation with Oklahoma Is Unprecedented and Arbitrary.

Texas met the consultation requirements in 40 C.F.R. § 51.308(d)(3)(i) and (ii) for developing its long-term strategy. EPA's finding to the contrary ignores the voluminous and detailed consultation record contained in the 2009 SIP revision. The consultation process engaged in by Texas was extensive and consistent with EPA's encouragement of States to "work together" in regional planning organizations "to develop a common technical basis and apportionment for long-term strategies that could be approved by individual State participants." 64 Fed. Reg. at 35,732, 35,735; Brymer Decl. ¶¶ 17-19. TCEQ relied on CENRAP source apportionment modeling and its own supplemental analysis, available to all affected States, FLMs, and tribes, to evaluate and identify reasonable controls. For the Wichita Mountains of Oklahoma, additional controls were not deemed reasonable given that CENRAP modeling—agreed to by all the States—showed that the visibility impairment contributions from Texas *decrease* during the relevant planning period. *See* 2009 SIP Revision, page 11-16, tbl. 11-7. Oklahoma thus did not request additional controls from Texas.

In rejecting this consultation process, the Final Rule holds Texas to a different standard than has been applied in other regional haze SIP submittals, and takes an unprecedented step in rejecting the consultation. *See* 81 Fed. Reg. at 313 ("[W]e have not disapproved other states' reasonable progress/long-term strategy consultation processes"). For example, EPA approved Arkansas's regional haze SIP where Arkansas made no commitment to additional controls beyond those factored into CENRAP's modeling for 2018—despite the fact that the CENRAP data demonstrated that Arkansas sources were projected to *increase* visibility impairment in a Missouri Class I area during the relevant time period. There, all states including Missouri had agreed to this approach, and EPA approved the consultation with no further explanation. *See* 76 Fed. Reg. 64,186, 64,216 (Oct. 17, 2011). In contrast, EPA here rejected a consultation where Texas's contributions to visibility impairment in Oklahoma were projected to *decrease* during the relevant time period, and where no States including Oklahoma requested additional controls from Texas.

II. Absent a Stay, Texas Petitioners Will Suffer Irreparable Injury

Texas Petitioners will suffer various forms of irreparable injury absent a stay, harming Texas's citizens and impairing its economy and sovereignty. The costs imposed by the Final Rule on electric generation capacity within the State are substantial. *See* Lloyd Decl. ¶ 6; Brymer Decl. ¶ 6. Five coal-fired units within the ERCOT region and two outside of the ERCOT region (operated by Southwest Public Service Company) will be required to install new scrubbers by 2021. And, seven coal-fired units within the ERCOT region will be required to upgrade existing scrubbers by 2019. These costs—particularly for installation of new scrubbers—will likely challenge the economic viability of these units, and "it is probable that the units will shut down rather than incur the retrofit costs of new scrubbers." Lloyd Decl. ¶ 26-27; *see also* Impacts of Environmental Regulations in the ERCOT Region, ERCOT (Dec. 16, 2014) at 27. By EPA's own estimate, the FIP will impose approximately $2 billion in costs. *See* 79 Fed. Reg. at 74,876-77.

These expected retirements pose a significant risk to reliability in the ERCOT region. This is particularly so because, as discussed above, EPA has refused to adopt any reliability safety valve measures that would permit continued operation of the affected plants while new transmission infrastructure is built. Lloyd Decl. ¶ 33. If reliability-must-run contracts are not an option to address local transmission reliability issues, then grid reliability will be degraded, and ERCOT "will be forced to resort to emergency actions to preserve the system by reducing demand through the implementation of rotating outages in the affected areas." Lloyd Decl. ¶ 34.

Based on the locations of the plants affected by the Final Rule, PUCT expects that transmission system upgrades will be needed in order to alleviate transmission system overloads that will occur once the affected units are shut down rather than incur the substantial retrofit costs. Lloyd Decl. ¶ 30. Even accounting for planned unbuilt new generation resources that met planning criteria at the time of the study, ERCOT found that the Rule would have "a significant local and regional impact on the reliability of the ERCOT transmission system" and would require significant upgrades to the ERCOT transmission system. Lloyd Decl. ¶ 30; *see also* Transmission Impact of the Regional Haze Environmental Regulation, ERCOT (Oct. 15, 2015). Because it typically takes approximately four to five years to plan, study, obtain approvals, and construct new transmission lines, planning for new transmission would need to begin immediately in order for new transmission to be operational by the compliance dates in the Final Rule. Lloyd Decl. ¶ 31. Because transportation and distribution utilities in Texas are subject to traditional utility cost-of-service ratemaking, costs they incur in planning and constructing new transmission are generally recoverable in rates that are ultimately charged to electricity consumers in the state—additional costs that would become unnecessary if the Final Rule is overturned. Lloyd Decl. ¶ 32.

Further, EPA's partial rejection of the 2009 SIP Revision prevents Texas agencies from fulfilling their regulatory functions, and forces the immediate expenditure of resources implementing a rule that is likely to be overturned in the pending litigation. As described above, PUCT is charged with ensuring the reliability of the electric grid, but the Final Rule impairs PUCT's ability to use its typical statutory mechanisms to carry out this function. The TCEQ, too, is harmed in its ability to fulfil its regulatory function of fashioning a regional haze program meeting statutory and regulatory requirements while balancing costs and visibility improvements in a manner appropriate for the citizens and economy of the state. Brymer Decl. ¶ 30. The Final Rule imposes sovereign harm on Texas by displacing the system of cooperative federalism laid out in the CAA. Brymer Decl. ¶ 30.

All of these injuries are irreparable for at least three reasons. First, "it is not practicable to calculate damages to remedy this kind of harm." *Foodcomm Int'l v. Barry*, 328 F.3d 300, 304 (7th Cir. 2003). Second, damages would not be available in any event due to the federal government's sovereign immunity. *See, e.g.*, *Chamber of Commerce v. Edmondson*, 594 F.3d 742, 770-71 (10th Cir. 2010) ("Imposition of monetary damages that cannot later be recovered for reasons such as sovereign immunity constitutes irreparable injury"); *Patton v. Dole*, 806 F.2d 24, 28 (2d Cir. 1986) (finding irreparable harm where plaintiff likely would have no damages claim because of the Federal government's sovereign immunity). Third, the various expenditures required by the rule will interfere with the States' sovereign priorities. "Directing a priority expenditure from the state treasury 'may derange the operations of government, and thereby cause serious detriment to the public.'" *Barnes v. E-Sys., Inc. Grp. Hosp. Med. & Surgical Ins. Plan*, 501 U.S. 1301, 1304 (1991) (Scalia, J., in chambers) (quoting *Dows v. City of Chicago*, 78 U.S. (11 Wall.) 108, 110 (1870)).

III. The Remaining Factors Likewise Favor a Stay

The third stay factor looks to whether issuance of the stay will "substantially injure the other parties interested in the proceeding." *Nken*, 556 U.S. at 426. There has been no suggestion that any other party would be harmed at all, particularly given that the benefits from the Final Rule on visibility are imperceptible. The difference between the visibility improvements for the Texas SIP and the Final Rule for Big Bend, Guadalupe Mountains, and Wichita Mountains Class I areas, are projected to be 0.03, 0.04, and 0.14 deciviews respectively—far below the 1.0 deciview change in visibility perceptible to a typical person. And the current monitored visibility for each area is already better than the visibility that the Final Rule seeks to achieve in 2018.

The final factor is "where the public interest lies." *Id.* It lies in granting a stay. There is a broad public interest in maintaining the CAA's system of "cooperative federalism." *Dominion Transmission*, 723 F.3d at 240. State citizens have an interest in their legislators' and agencies' abilities to enact policies that meet their needs. Moreover, the public has a strong interest in reliable electricity. Sources "provide power to . . . homes, farms, businesses and industries. If [a source's] ability to do so is imperiled, so may be its ability to fulfill its mission to the public." *Hoosier Energy Rural Elec. Coop., Inc. v. John Hancock Life Ins. Co.*, 588 F. Supp. 2d 919, 934 (S.D. Ind. 2008). "[A] steady supply of electricity during the summer months, especially in the form of air conditioning to the elderly, hospitals and day care centers, is critical." *Sierra Club v. Ga. Power Co.*, 180 F.3d 1309, 1311 (11th Cir. 1999) (per curiam); *see Tri-State Generation & Transmission Ass'n v. Shoshone River Power, Inc.*, 805 F.2d 351, 357 (10th Cir. 1986) (finding the public interest threatened by customers losing their source of electricity). Particularly in the absence of any reliability safety valve included in the Final Rule, the power plant retirements expected to result from the rule pose a significant threat to grid reliability in Texas. *See* Lloyd Decl. ¶ 33-34, 38.

CONCLUSION

The Court should stay the Final Rule pending adjudication of the petition for review and toll all compliance deadlines in the Rule.

Respectfully submitted.

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Exhibit A

FEDERAL REGISTER

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Part II

Environmental Protection Agency

40 CFR Part 52

Approval and Promulgation of Implementation Plans; Texas and Oklahoma; Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan To Address Pollution Affecting Visibility and Regional Haze; Federal Implementation Plan for Regional Haze; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[EPA–R06–OAR–2014–0754; FRL–9940–21–Region 6]

Approval and Promulgation of Implementation Plans; Texas and Oklahoma; Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan to Address Pollution Affecting Visibility and Regional Haze; Federal Implementation Plan for Regional Haze

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is partially approving and partially disapproving a revision to the Texas State Implementation Plan (SIP) submitted on March 31, 2009, to address the regional haze requirements of the Clean Air Act (CAA). The EPA is partially approving this SIP revision as meeting certain requirements of the regional haze program, including the Best Available Retrofit Technology (BART) requirements for facilities other than Electric Generating Units (EGUs). The EPA is partially disapproving the Texas SIP revision for not adequately addressing other requirements of the regional haze program related to reasonable progress, the long-term strategy, and the calculation of natural visibility conditions. The EPA is promulgating a Federal Implementation Plan (FIP), which includes sulfur dioxide (SO_2) emission limits for fifteen EGUs located at eight coal-fired power plants, to address these deficiencies.

In a previous rulemaking, the EPA had issued a limited disapproval of the Texas regional haze SIP with regard to Texas' reliance on the Clean Air Interstate Rule (CAIR), without promulgating a FIP. The EPA is not taking final action to address this deficiency at this time. The EPA is also disapproving portions of several separate infrastructure SIP revisions submitted by Texas for the purpose of addressing the requirements of the CAA regarding interference with other states' programs for visibility protection (interstate visibility transport) triggered by the issuance of the 1997 fine particulate matter ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS), the 1997 ozone NAAQS, the 2006 $PM_{2.5}$ NAAQS, the 2008 ozone NAAQS, the 2010 Nitrogen Dioxide (NO_2) NAAQS, and the 2010 SO_2 NAAQS. The EPA is deferring action at this time on promulgating a FIP to address these deficiencies.

Finally, the EPA is finalizing its proposed partial disapproval of a revision to the Oklahoma SIP submitted on February 19, 2010, to address the regional haze requirements of the CAA. Specifically, the EPA is disapproving portions of the Oklahoma SIP related to reasonable progress and the establishment of reasonable progress goals for the Class I area located within the state. The EPA is promulgating a FIP to address these deficiencies.

The EPA takes seriously its disapproval of SIPs, or portions thereof, and stands ready to work with the States to develop SIPs that would replace the Federal plans the EPA is promulgating today.

DATES: This final rule is effective on February 4, 2016.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–EPA–R06–OAR–2014–0754. All documents in the docket are listed on the *http://www.regulations.gov* Web site. Although listed in the index, some information is not publicly available, *e.g.,* Confidential Business Information (CBI) or other information whose disclosure is restricted by statute therefore is not posted to regulations.gov. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy. Publicly available docket materials are available either electronically through *http://www.regulations.gov* or in hard copy at EPA Region 6, 1445 Ross Avenue, Suite 700, Dallas, Texas 75202–2733.

FOR FURTHER INFORMATION CONTACT: Joe Kordzi at 214–665–7186; or *Kordzi.joe@epa.gov.*

SUPPLEMENTARY INFORMATION: Throughout this document wherever "we," "us," or "our" is used, we mean the EPA. Also throughout this document, when we refer to the Oklahoma Department of Environmental Quality (ODEQ), or the Texas Commission on Environmental Quality (TCEQ), we mean Oklahoma and Texas, respectively.

Table of Contents

I. Introduction

The purpose of Federal and state regional haze plans is to achieve a national goal, declared by Congress, of restoring and protecting visibility at 156 Federal Class I areas across the United States, most of which are national parks and wilderness areas with scenic vistas enjoyed by the American public. The national goal, as described in CAA Section 169A, is "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from man-made air pollution." States are required to submit SIPs that ensure reasonable progress toward the national goal of remedying anthropogenic visibility impairment in Federal Class I areas, such as Big Bend National Park in Texas and the Wichita Mountains National Wildlife Refuge in Oklahoma.

In today's action, we are partially approving and partially disapproving portions of a SIP revision submitted by Texas to address the requirements of the regional haze program. Texas' regional haze SIP submittal included long-term strategies for making reasonable progress towards improving visibility at all Class I areas impacted by emissions from Texas sources and set reasonable progress goals for the two Class I areas located within the state, the Big Bend and the Guadalupe Mountains National Parks. Texas addressed a key element of the regional haze program, the BART requirements, in part through reliance on CAIR. Specifically, for its EGUs, Texas relied on CAIR, which was issued in 2005, to meet the BART requirements for emissions of SO_2 and oxides of nitrogen (NO_X). For particulate matter (PM) from its EGUs and for other categories of sources subject to the BART requirements, Texas concluded that no other BART controls were appropriate. Texas also considered whether additional measures beyond BART would be appropriate to ensure reasonable progress at its Class I areas and in Class I areas in nearby states, but concluded that no additional measures were needed to ensure reasonable progress. In its SIP submittal, Texas anticipated emissions reductions from CAIR, Federal mobile source standards, and other anticipated air pollution control requirements would adequately ensure reasonable progress toward improving visibility by 2018, the end of the first planning period.

We took partial action in 2012 on Texas' regional haze SIP submittal. In our 2012 action, we issued a limited disapproval of the SIP revision because of Texas' reliance on CAIR to satisfy SO_2 and NO_X BART and to meet the long-term strategy requirements for its EGUs.[1] As explained in that action, our limited disapproval of Texas' regional haze SIP (and the SIPs of thirteen other states addressed in the 2012 action) was the result of a decision by the D.C. Circuit remanding CAIR to the EPA.[2] We concluded that because CAIR had been remanded and would remain in place only temporarily, we could not fully approve regional haze SIP revisions that relied on temporary reductions from CAIR. By issuing a limited disapproval rather than a full disapproval, however, we allowed Texas and these states to rely on CAIR for so long as CAIR was in place.[3] We addressed the resulting deficiencies in the regional haze SIPs of a number of the fourteen states through FIPs that relied on CAIR's successor, the Cross State Air Pollution Rule (CSAPR), to achieve improvements in visibility. However, we did not finalize a FIP for Texas in that action.[4] As a result, the deficiencies in Texas' regional haze SIP associated with its reliance on CAIR have not been addressed.

We are also disapproving several SIP revisions submitted by Texas to address the requirements of CAA Section 110(a)(2)(D)(i)(II) with respect to visibility. This provision of the CAA requires that each state's SIP have adequate provisions to prohibit in-state emissions from interfering with measures required to protect visibility in any other state. To address this requirement, the SIP must address the potential for interference with visibility protection caused by the pollutant (including precursors) to which the new or revised NAAQS applies. In its SIP submittals addressing these requirements, Texas indicated that its regional haze SIP fulfilled its obligation for addressing emissions that would interfere with measures required to be included in the SIP for any other state to protect visibility.

Finally, we are taking action on an element of the Oklahoma regional haze SIP submitted in February 2010. We previously issued a partial approval, and partial disapproval of the Oklahoma SIP in 2011, and promulgated a FIP to address the deficiencies that we had identified in our partial disapproval.[5] Our FIP required the installation of scrubber retrofits at six units, located at three facilities in Oklahoma in order to meet BART requirements.[6] Due to the special interrelationship of the visibility impairing transport of pollution between Texas and Oklahoma, we delayed action on the reasonable progress goals for the Wichita Mountains until we could review and evaluate Texas' SIP submittal. In today's action, we address the reasonable progress goals established by Oklahoma for this Class I area.

A. Our Proposed Action

When we reviewed the Oklahoma regional haze SIP, we noted that sources in Texas had significant impacts on visibility in the Wichita Mountains. Given the magnitude of these interstate impacts, we determined that the Oklahoma and Texas regional haze SIPs were interconnected, especially considering the relationship between upwind and downwind states in the reasonable progress and long-term strategy provisions of the Regional Haze Rule. Although we were able to act on the majority of Oklahoma's SIP at that time, we deferred action on Oklahoma's reasonable progress goals for the Wichita Mountains until we could first assess whether Texas had reasonably considered the potential for controls on those of its sources that were impacting visibility at the Wichita Mountains.[7] Having now reviewed the Texas regional haze SIP, it is clear that both Texas and Oklahoma acknowledged in their SIP submittals that sources in Texas have a large impact on visibility at the Wichita Mountains; indeed, the visibility impacts at this Class I area from Texas point sources are several times greater than the impacts from Oklahoma's own point sources.

During the interstate consultation required by the Regional Haze Rule, Oklahoma and Texas discussed the significant contribution of sources in Texas to visibility impairment at the Wichita Mountains, but Texas concluded that no additional controls were warranted for its sources during the first planning period to ensure reasonable progress at the Wichita Mountains, or at its own Class I areas, the Big Bend and the Guadalupe Mountains National Parks. In reaching this conclusion, Texas relied on an analysis that obscured the benefits of potentially cost-effective controls on those sources or groups of sources with the largest visibility impacts in these Class I areas by inclusion of those controls with little visibility benefit, but which served to increase the total cost figures. This flawed analysis deprived Oklahoma of the information it needed to properly assess the reasonableness of controls on Texas sources during the consultation process and prevented Texas from properly assessing the reasonableness of controls to remedy visibility at Big Bend and the Guadalupe Mountains. As a result, Oklahoma established reasonable progress goals for the Wichita Mountains that did not reflect any emission reductions from Texas beyond those that will be achieved by compliance with other requirements of the CAA. Texas established reasonable progress goals for its own Class I areas based on a similar assessment.

Our proposed action on the Texas regional haze and interstate visibility transport SIP submittals and the Oklahoma regional haze SIP is discussed in detail in our notice of proposed rulemaking promulgated on

[1] 77 FR 33642 (June 7, 2012).

[2] *See North Carolina* v. *EPA*, 531 F.3d 896 (D.C. Cir. 2008) (modified by 550 F.3d 1176).

[3] 77 FR at 33647.

[4] 77 FR at 33654 (explaining that the EPA was not finalizing a FIP for Texas in order to allow more time for the EPA to assess the SIP submittal from Texas addressing regional haze and noting that extra time was needed given ''the variety and number of BART eligible sources and the complexity of the SIP'').

[5] 76 FR 81728.

[6] 76 FR 81728.

[7] 76 FR 16177 (''[W]e believe that to properly assess whether Oklahoma has satisfied the reasonable progress requirements of Section 51.308(d)(1), we must review and evaluate Texas' submittal. We will do this in the course of processing the Texas [regional haze] SIP.'')

December 16, 2014.[8] In brief, we proposed to partially approve portions of the Texas regional haze SIP, including the determination by Texas that none of its non-EGU BART-eligible sources are subject to BART. We proposed to find, however, that Texas did not satisfy a number of requirements related to establishment of its reasonable progress goals and long-term strategy. We therefore proposed to disapprove Texas' reasonable progress goals. We proposed to disapprove Texas' calculation of natural visibility conditions and the uniform rates of progress for its two Class I areas. We proposed to disapprove the portions of SIP revisions separately submitted by Texas to meet the interstate visibility transport requirements for the 1997 $PM_{2.5}$ and ozone NAAQS, the 2006 $PM_{2.5}$ NAAQS, the 2008 ozone NAAQS, the 2010 NO_2 NAAQS, and the 2010 SO_2 NAAQS. These submittals relied on the Texas regional haze SIP which, in turn, relied on CAIR to achieve the necessary emissions reductions. We proposed to find that as CAIR had been replaced by CSAPR, and CSAPR was scheduled to go into effect in 2015, Texas could not rely on its regional haze SIP to ensure that emissions from Texas do not interfere with the measures to protect visibility in nearby states. In addition, we proposed disapproval of these SIP submittals based on our proposed conclusion that additional control of SO_2 emissions in Texas is needed to prevent interference with measures required to be included in the Oklahoma SIP to protect visibility.

Finally, we also proposed to disapprove Oklahoma's reasonable progress goals for the Wichita Mountains because Oklahoma did not satisfy several of the requirements related to setting those goals. In assessing the measures necessary to achieve the uniform rate of progress, Oklahoma demonstrated that eliminating all emissions from Oklahoma sources would not be sufficient to meet the uniform rate of progress in 2018. Oklahoma realized that the efforts to meet natural visibility conditions would require emission reductions from other states. The work done by the Central Regional Air Planning Association (CENRAP) showed that SO_2 point sources in Texas were a significant contributor to haze at the Wichita Mountains. However, Oklahoma did not pursue this information in its consultations with Texas. As explained more fully in our proposed rule, we believe that the lack of development of critical information regarding reasonable reductions from Texas sources prevented Oklahoma from having adequate information to establish its reasonable progress goals for the Wichita Mountains. Oklahoma should have requested that Texas further investigate its sources, or requested additional reductions from Texas sources to ensure that all reasonable measures to improve visibility were included in Texas' long-term strategy and incorporated into the reasonable progress goals for the Wichita Mountains. We proposed to find that due to these flawed consultations, Oklahoma did not consider the emission reduction measures necessary to achieve the uniform rate of progress for the Wichita Mountains and did not adequately demonstrate that its reasonable progress goals were reasonable.

We proposed FIPs for Texas and Oklahoma to remedy these deficiencies. Our proposed Texas FIP included SO_2 emission limits on fifteen EGUs located at eight Texas facilities in order to make reasonable progress at the three Class I areas in Texas and Oklahoma. We estimate that our FIP will reduce the emissions of SO_2 from Texas sources by approximately 230,000 tons per year. We proposed that compliance with these emission limits be based on 30-Boiler-Operating-Day (BOD) averages.[9] The SO_2 emission limits were based on seven scrubber retrofits, seven scrubber upgrades, and the continued operation of an existing upgraded scrubber at the San Miguel power plant. We proposed that compliance with these limits be achieved within five years of the effective date of our final rule for the control assessments based on scrubber retrofits, and within three years of the effective date of our final rule for the control assessments based on scrubber upgrades. We proposed that compliance be achieved within one year for San Miguel.

We proposed new reasonable progress goals for 2018 for Big Bend and the Guadalupe Mountains in Texas and for the Wichita Mountains in Oklahoma that take into account the additional emission reductions required in our proposed FIP for Texas. We proposed new estimates of natural conditions for the two Class I areas in Texas and proposed new uniform rates of progress for these areas. We proposed to rely on CSAPR to satisfy the SO_2 and NO_X BART requirements for EGUs in Texas. Finally, we proposed to rely on CSAPR and the SO_2 emission limits in our proposed FIP to address the deficiencies identified in Texas' infrastructure SIP revisions. Our proposed FIP for Oklahoma did not include any additional requirements on emission sources within Oklahoma.

Our electronic docket at *www.regulations.gov* contains Technical Support Documents (TSDs) and other materials that supported our proposal. Some information is protected as CBI and thus is not available to the public or posted electronically. Due to several requests from the public and due to the complex nature of our proposal, we provided for an extended public comment period, which closed on April 20, 2015.

B. Summary of Our Final Decision

Below we present a summary of the major points of our final decision regarding the Texas regional haze SIP, the portions of Texas SIP submittals addressing interstate visibility transport, and those parts of the Oklahoma regional haze SIP that we have not previously acted upon. We summarize which parts of the Texas and Oklahoma regional haze SIPs and the interstate visibility transport portions of Texas' SIP submittals we are disapproving, which parts are cured by our FIP, and which parts we are deferring action upon.

1. Texas

In this action, we are partially approving and partially disapproving portions of the SIP revision submitted by Texas to address the requirements of the regional haze program. We are also disapproving portions of several SIP revisions addressing the requirements of the CAA that prohibit air pollutant emissions from interfering with measures required to protect visibility in any other state, as described below.

a. Reasonable Progress Goals

We are finalizing our disapproval of Texas' reasonable progress goals for Big Bend and the Guadalupe Mountains. We have determined that Texas has not demonstrated that its reasonable progress goals provide for reasonable progress towards meeting the national visibility goal. Specifically, we find that Texas did not satisfy several of the requirements of the regional haze rule at 40 CFR 51.308(d)(1) (hereinafter referred to as § 51.308(d)) with regard to setting reasonable progress goals, most notably the requirement to reasonably consider

[8] 79 FR 74818.

[9] We explained in our proposed rule that the BART Guidelines describe a boiler-operating-day "to be any 24-hour period between 12:00 midnight and the following midnight during which any fuel is combusted at any time at the steam generating unit." See 70 FR 39172 (July 6, 2005). To calculate a 30 day rolling average based on the boiler-operating-day, the average of the last 30 "boiler-operating-days" is used.

the four statutory reasonable progress factors under § 51.308 (d)(1)(i)(A) and the requirement to adequately justify reasonable progress goals that are less stringent than the uniform rate of progress under § 51.308 (d)(1)(ii).

At the outset and as we discussed in detail in our proposal, we find the set of potential controls identified by Texas and how it analyzed and weighed the four reasonable progress factors under § 51.308(d)(1)(i)(A) was inappropriate.[10] We are finalizing our determination that Texas' analysis was deficient and not approvable because the large control set it selected was not appropriately refined, targeted, or focused on those sources having the most significant and potentially cost-effective visibility benefits. We conclude this control set included controls on sources that would increase total cost figures, but would achieve very little visibility benefit. As discussed in our proposal, because Texas only estimated the visibility benefit of all the controls together, it was not able to assess the potential benefit of controlling those sources with the greatest visibility impacts, and potentially cost-effective controls. Therefore, the effects of those controls with the greatest visibility benefits were obscured by the inclusion of those controls with little visibility benefit. This only served to increase the total cost figure, making Texas' potential control set seem less attractive.[11] We therefore finalize our disapproval of the portions of the Texas regional haze SIP addressing the requirements of § 51.308 (d)(1)(i)(A), regarding Texas' reasonable progress four-factor analysis.[12]

We are also finalizing our disapproval of Texas' assessment of the emission reduction measures needed to achieve the uniform rate of progress for the period covered by the SIP, under § 51.308(d)(1)(i)(B). Although Texas correctly followed the procedures for analyzing and determining the rate of progress needed to attain natural visibility conditions by the year 2064, we find that Texas calculated this rate of progress on the basis of, and compared baseline visibility conditions to, a flawed estimation of natural visibility conditions for Big Bend and the Guadalupe Mountains.[13] As discussed in the section below, we are finalizing our disapproval of Texas' calculation of natural visibility conditions for Big Bend and the Guadalupe Mountains in this action.

We also find that Texas failed to adequately justify reasonable progress goals that are less stringent than the uniform rate of progress under § 51.308(d)(1)(ii).[14] Although we agree with Texas that a rate of improvement necessary to attain natural visibility conditions by 2064 is not reasonable, we do not find that the rate of improvement that Texas has selected is reasonable, because we have determined that Texas' four-factor analysis and the analysis of emission measures needed to meet the uniform rate of progress does not meet the requirements of the Regional Haze Rule. We therefore finalize our disapproval of the reasonable progress goals for Big Bend and the Guadalupe Mountains under § 51.308(d)(1)(ii). In so doing, we rely on the specific directive in § 51.308(d)(1)(iii) that in determining whether the State's goal for visibility improvement provides for reasonable progress towards natural visibility conditions, the Administrator will evaluate the demonstrations developed by the State pursuant to paragraphs (d)(1)(i) and (ii).

With regard to the requirement under § 51.308(d)(1)(iv) to consult with other states which may reasonably be anticipated to cause or contribute to visibility impairment at its Class I areas, we find that Texas appropriately identified those states with the largest impacts on Texas Class I areas and invited them for consultation. Based on our review of the CENRAP's source apportionment modeling and given the small modeled contributions from individual nearby states, especially when only considering anthropogenic sources that can be easily controlled in comparison with the size of impacts from Texas sources and international sources, we find that it was reasonable for Texas to have focused the analysis of additional controls on sources within Texas. We agree with Texas' determination that it was not reasonable to request additional controls from other states at this time. Therefore, we are finalizing our determination that Texas has satisfied the requirement under § 51.308(d)(1)(iv).

Under § 51.308(d)(1)(vi), Texas may not adopt a reasonable progress goal that represents less visibility improvement than is expected to result from implementation of other requirements of the CAA during the applicable planning period. As discussed in our proposal, we find that Texas' reasonable progress goals for 2018, based on the CENRAP model projections, represent at least as much visibility improvement as was expected to result from implementation of other requirements of the CAA (*i.e.,* requirements other than regional haze) during the applicable planning period.[15] In this action we are finalizing our approval of the portion of the Texas regional haze SIP addressing the requirement under § 51.308(d)(1)(vi).

b. Calculations of Baseline and Natural Visibility Conditions

As required by § 51.308(d)(2)(i) of the Regional Haze Rule, Texas calculated baseline/current conditions for its two Class I areas, Big Bend and the Guadalupe Mountains, on the most impaired and least impaired days. Texas calculated baseline visibility conditions for Big Bend and the Guadalupe Mountains using available monitoring data over the 2000–2004 period and the new IMPROVE equation, as discussed in our proposal.[16] We are finalizing our approval that Texas has satisfied the baseline visibility requirements of § 51.308(d)(2)(i).

Under § 51.308(d)(2)(iii), Texas must determine natural visibility conditions for the most impaired and least impaired days for the Class I areas in the state. Our guidance[17] provides default natural conditions for the 20% worst and 20% best days for each Class I area based on the original IMPROVE equation. As documented in our guidance, states are allowed to use a ''refined'' approach or alternative approaches to the guidance defaults to estimate the values that characterize the natural visibility conditions of their Class I areas.[18] The default natural

[10] 79 FR 74838.

[11] 79 FR 74838. Additionally, the analysis of potential controls in the Texas SIP did not include any consideration of the reasonableness of control upgrades or increased utilization of existing controls to reduce emissions at sources with large visibility impacts at nearby Class I areas. These controls were validated as especially cost-effective by the technical record for this FIP. At costs ranging from $368/ton to $910/ton, over 100,000 tpy of SO_2 emission reductions can be achieved from a small number of scrubber upgrades, resulting in very cost-effective visibility benefits at Texas Class I areas and Class I areas in other states.

[12] The ''four-factor analyses'' or the ''four factors'' refers to the requirement in § 51.308(d)(1)(i)(A) that in establishing a reasonable progress goal a state must consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, and include a demonstration showing how these factors were taken into consideration in selecting the goal.

[13] 79 FR 74833.

[14] 79 FR 74843.

[15] 79 FR 74833.

[16] 79 FR 74832.

[17] Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule, EPA–454/B–03–005, September 2003.

[18] States are ''free to develop alternative approaches that will provide natural visibility conditions estimates that are technically and scientifically supportable. Any refined approach should be based on accurate, complete, and unbiased information and should be developed using a high degree of scientific rigor.'' Guidance for Estimating Natural Visibility Conditions Under

Continued

conditions in our 2003 guidance were updated by the Natural Haze Levels II Committee utilizing the new IMPROVE equation and included some refinements to the estimates for the PM components.[19] These estimates are referred to as the ''NC II'' default natural visibility conditions. Texas chose to derive a ''refined'' estimate of natural visibility conditions rather than using the default NC II values. Texas started with this refined version of default natural visibility conditions, but further altered some of its parameters concerning the contributions of coarse mass and fine soil by assuming that 100% of the fine soil and coarse mass concentrations in the baseline period should be attributed to natural causes and that the corresponding estimates in the NC II values should be replaced. We are finalizing our determination that Texas has not adequately demonstrated that all coarse mass and fine soil measured in the baseline period can be attributed to 100% natural sources and we are therefore disapproving Texas' calculated natural visibility conditions under § 51.308(d)(2)(iii). We are also finalizing our disapproval of the portion of the Texas SIP that addresses the requirement to calculate the number of deciviews by which baseline conditions exceed natural conditions for the best and worst visibility days at the Texas Class I areas, under § 51.308(d)(2)(iv)(A). Because the calculation relies on the determination of natural visibility conditions, which we are disapproving, we must also disapprove Texas' calculation of the level of visibility impairment above natural conditions.

c. Long-Term Strategy

Section 51.308(d)(3)(i) requires that where Texas has emissions that are reasonably anticipated to contribute to visibility impairment in any mandatory Class I area located in another state, it must consult with that state in order to develop coordinated emission management strategies. Texas also must consult with any other state having emissions that are reasonably anticipated to contribute to visibility impairment in any mandatory Class I area within it (we have discussed this consultation requirement above). Texas and Oklahoma agreed that visibility impairment at the Wichita Mountains due to emissions from sources in Texas is significant and that the impacts from point sources in Texas are several times greater than the impact from Oklahoma point sources. Furthermore, the ODEQ asserted in its consultations with the TCEQ, and elsewhere in its regional haze SIP, that it would not be able to reach natural visibility by 2064 without additional reductions from Texas sources. Oklahoma and Texas discussed the significant contribution of sources in Texas to visibility impairment at the Wichita Mountains during the interstate consultation process required by the Regional Haze Rule. The results of the CENRAP analysis demonstrated that Texas point sources, and in particular EGUs in northeast Texas, have large visibility impacts at the Wichita Mountains and that cost-effective controls were potentially available for some of these sources. Ultimately, Texas unreasonably determined that no additional controls were warranted for its sources during the first planning period to help achieve reasonable progress at the Wichita Mountains. In analyzing whether additional controls should be required for some of its sources under the long-term strategy provisions of the Regional Haze Rule, Texas relied on the same flawed analysis discussed above that it relied on to evaluate additional controls under the reasonable progress provisions to address visibility impairment at Texas' own Class I areas. Texas' analytical approach obscured the contributions of individual sources that Texas' own analysis indicated could be cost-effectively controlled. This deprived Oklahoma of the information it needed to properly assess whether there were reasonable controls for Texas sources and to properly establish reasonable progress goals for the Wichita Mountains that included the resulting emission reductions. We are therefore finalizing our disapproval of the portion of the Texas regional haze SIP addressing the requirement in § 51.308(d)(3)(i) to ''consult with the other State(s) in order to develop coordinated emission management strategies.''

Section 51.308(d)(3)(ii) requires that if Texas emissions cause or contribute to impairment in another state's Class I area, it must demonstrate that it has included in its regional haze SIP all measures necessary to obtain its share of the emission reductions needed to meet the progress goal for that Class I area. Section 51.308(d)(3)(ii) also requires that since Texas participated in a regional planning process, it must ensure it has included all measures needed to achieve its apportionment of emission reduction obligations agreed upon through that process. As discussed in our proposal, we find that the technical analysis developed by CENRAP and supplemented by Texas did not provide the information needed to evaluate the reasonableness of controls on those sources with the greatest potential to impact visibility at the Wichita Mountains.[20] Texas' ''share of the emission reductions needed to meet the progress goal'' for the Wichita Mountains was not properly established because of the inadequacies in its technical analyses, which compromised its consultations with Oklahoma. We are finalizing our determination that Texas did not develop an adequate technical basis to inform consultations with Oklahoma in order to develop coordinated management strategies and to identify reasonable reductions from its sources. As a result, we find that Texas did not incorporate those reasonable reductions into its long-term strategy. For these reasons we are finalizing our determination that Texas did not adequately meet the requirement in § 51.308(d)(3)(ii).

Section 51.308(d)(3)(iv) requires that Texas identify all anthropogenic sources of visibility impairment considered by it in developing its long-term strategy. We proposed to find that Texas' 2002 and 2018 emission inventories are acceptable and that it satisfies § 51.308(d)(3)(iv) and today, we take final action to approve that finding. However, under § 51.308(d)(3)(iii), Texas must document the technical basis, including modeling, monitoring, and emissions information, on which it is relying to determine its apportionment of emission reduction obligations necessary for achieving reasonable progress in each mandatory Class I area it affects. Texas addressed this requirement mainly by relying on technical analyses developed by CENRAP and approved by all state participants, but it also performed an additional analysis building upon the work of CENRAP in order to evaluate additional controls under the reasonable progress and long-term strategy provisions of the Regional Haze Rule. As discussed in our proposal, we find that this additional analysis was inadequate because the large control set Texas selected was not appropriately refined, targeted, or focused on those sources having significant and potentially cost-effective visibility benefits and did not provide the information necessary to determine the reasonableness of controls at those

the Regional Haze Rule, EPA– 454/B–03–005, September 2003, p 1–11

[19] The second version of the natural haze level II estimates based on the work of the Natural Haze Levels II Committee is available at: *http://vista.cira.colostate.edu/Docs/IMPROVE/Aerosol/NaturalConditions/NaturalConditionsII_Format2_v2.xls.*

[20] 79 FR 74857.

sources in Texas that have the greatest visibility impacts at the Wichita Mountains.[21] Therefore, we are finalizing our disapproval of the portion of the Texas regional haze SIP that addresses the requirement in § 51.308(d)(3)(iii) to document the technical basis on which the state is relying to determine its apportionment of emission reduction obligations necessary for achieving reasonable progress at the Wichita Mountains.

In developing its long-term strategy, the state must consider a number of factors identified in § 51.308(d)(3)(v)(A)–(G). In this action, for the reasons discussed in our proposal,[22] we are approving several portions of the Texas regional haze SIP as adequately addressing the following provisions of § 51.308(d)(3)(v): (A) Emission reductions due to ongoing air pollution control programs, including measures to address RAVI (Reasonably Attributable Visibility Impairment); (B) measures to mitigate the impacts of construction activities; (D) source retirement and replacement schedules; (E) smoke management techniques for agricultural and forestry management purposes including plans as currently exist within the state for these purposes; (F) enforceability of emissions limitations and control measures; and (G) the anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions over the period addressed by the long-term strategy. However, we are disapproving the portion of the Texas regional haze SIP addressing paragraph (C) of § 51.308(d)(3)(v), the requirement to consider emissions limitations and schedules for compliance to achieve the reasonable progress goals. As discussed in depth elsewhere in this document and in our separate Response to Comment (RTC) document, we have determined that Texas' analysis is inadequate because it does not provide the information necessary to determine the reasonableness of controls at those sources in Texas that significantly impact visibility at the Wichita Mountains in Oklahoma, or the Texas Class I areas. Therefore, we find that Texas did not properly consider the emissions limitations and schedules for compliance necessary to achieve reasonable progress at its Class I areas or the Wichita Mountains Class I area in Oklahoma.

[21] 79 FR 74833.

[22] 79 FR 74862.

d. Monitoring Strategy and Other Requirements

Section 51.308(d)(4) requires that the Texas regional haze SIP contain a monitoring strategy for measuring, characterizing, and reporting of regional haze visibility impairment that is representative of all mandatory Class I areas within the state. This monitoring strategy must be coordinated with the monitoring strategy required in 40 CFR 51.305 for RAVI. Compliance with this requirement may be met through participation in the IMPROVE network. Since the monitors used for the Guadalupe Mountains and Big Bend are IMPROVE monitors, we have determined that Texas has satisfied this requirement.[23] Section 51.308(d)(4)(i) requires the establishment of any additional monitoring sites or equipment needed to assess whether reasonable progress goals to address regional haze for all mandatory Class I areas within the state are being achieved. We approve of Texas' determination under this section that the IMPROVE network monitors that are already in place are adequate to assess Texas' reasonable progress goals.

Section 51.308(d)(4)(ii) requires that Texas establish procedures by which monitoring data and other information are used in determining the contribution of emissions from within Texas to regional haze visibility impairment at mandatory Class I areas both within and outside the state. The monitors at Big Bend and the Guadalupe Mountains are operated through the IMPROVE monitoring program, which is national in scope, and other states have similar monitoring and data reporting procedures, ensuring a consistent and robust monitoring data collection system. Section 51.308(d)(4)(iv) requires that the SIP must provide for the reporting of all visibility monitoring data to the Administrator at least annually for each mandatory Class I area in the state. Section 51.308(d)(4)(vi) also requires that Texas provide for other elements, including reporting, recordkeeping, and other measures, necessary to assess and report on visibility. We are finalizing our determination that Texas has met these requirements through participation in the IMPROVE program.

Section 51.308(d)(4)(v) requires that Texas maintain a statewide inventory of emissions of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I area. The inventory must include emissions for a baseline year, emissions for the most recent year for which data are available, and estimates of future projected emissions. Texas must also include a commitment to update the inventory periodically. As discussed in the proposal, Texas has provided in the SIP a baseline emission inventory, estimates of future emissions, and emissions for the most recent year for which data was available at the time the SIP was developed.[24] We approve the portion of the Texas regional haze SIP that addresses this requirement.

[23] 79 FR 74863.

We also approve Texas' coordination with the Federal Land Managers (FLMs) under 40 CFR 51.308(i). As detailed in our proposal, Texas has satisfied these requirements through communications with the FLMs, providing for review of the draft Texas regional haze SIP by the FLMs, and describing how all FLM comments were addressed in the SIP. Texas also provided procedures for continuing consultations.[25]

e. Best Available Retrofit Technology

We approve Texas' BART determinations for non-EGUs under 40 CFR 51.308(e). We are approving Texas' determination of which non-EGU sources in the state are BART-eligible and the determination that none of the state's BART-eligible non-EGU sources are subject to BART because they are not reasonably anticipated to cause or contribute to visibility impairment at any Class I areas. We reviewed the various modeling techniques utilized by the TCEQ in evaluating and screening out the BART-eligible non-EGU sources and we concur with the results of analysis.[26] We are approving the provisions in Texas' BART rules at 30 Tex. Admin. Code (TAC) 116.1500–116.1540, with the exception of 30 TAC 116.1510(d), which contains regulatory language addressing EGUs' reliance on CAIR to meet the BART requirements.

However, we are not finalizing our proposed actions with regard to the state's BART-eligible EGU sources. As described above, we issued a limited disapproval of the Texas regional haze SIP in 2012 because of Texas' reliance on CAIR to meet certain requirements of the regional haze program. To address the deficiencies in Texas' plan arising from its reliance on CAIR to meet the SO_2 and NO_X BART requirements for its EGUs, we proposed to substitute reliance on CSAPR. We previously determined that CSAPR would provide for greater reasonable progress than BART and established regulations that

[24] 79 FR 74863.

[25] 79 FR 74864.

[26] 79 FR 74844.

allow certain states to rely on CSAPR to meet the SO_2 and NO_X BART requirements for EGUs.[27] CSAPR has been subject to extensive litigation, however, and on July 28, 2015, the D.C. Circuit Court issued a decision upholding CSAPR but remanding without vacating the CSAPR emissions budgets for a number of states.[28] Specifically, the court invalidated a number of the Phase 2 ozone-season NO_X budgets and found that the SO_2 budgets for four states resulted in over-control for purposes of CAA section 110(a)(2)(D)(i)(I)(i). Texas' ozone-season NO_X budget and SO_2 budget are both involved with this remand, and we are currently in the process of determining the appropriate response to the remand. Given the uncertainty arising from the remand of Texas' CSAPR budgets, we have concluded that it would not be appropriate to finalize our proposed determination to rely on CSAPR as an alternative to SO_2 and NO_X BART for EGUs in Texas at this time. We note that some of the sources for which we are finalizing SO_2 controls in this action are also potentially subject to the BART requirements. Should we determine in the future that it is necessary to perform source-specific BART determinations for these sources instead of relying on CSAPR, we anticipate that the SO_2 controls we are finalizing today, which are currently the most stringent available, will also be sufficient to satisfy the SO_2 BART requirement.

In addition, we note that we proposed to approve Texas' determination that for its EGUs no PM BART controls were appropriate, based on a screening analysis of the visibility impacts from just PM emissions and the premise in our proposal that EGU SO_2 and NO_X were covered separately by participation in CSAPR allowing consideration of PM emissions in isolation. Because of the CASPR remand and resulting uncertainty regarding SO_2 and NO_X BART for EGUs, we have also decided not to finalize our proposed approval of Texas' PM BART determination. We will address PM BART for EGUs in Texas in a future rulemaking as well.

f. Interstate Visibility Transport

The EPA is also disapproving portions of several separate infrastructure SIP revisions submitted by Texas for the purpose of addressing the requirements of the CAA regarding interference with other states' programs for visibility protection (interstate visibility transport). Section 110(a) of the CAA directs states to submit a SIP that provides for the implementation, maintenance, and enforcement of each NAAQS, which is commonly referred to as an infrastructure SIP. Among other things, CAA 110(a)(2)(D)(i)(II) requires that SIPs contain adequate provisions to prohibit interference with measures required to protect visibility in other states. We have concluded that to meet the requirements of CAA section 110(a)(2)(D)(i)(II): (1) Texas may not rely on its regional haze SIP, which relied heavily upon CAIR, to ensure that emissions from Texas do not interfere with measures to protect visibility in nearby states and (2) additional control of SO_2 emissions in Texas is needed to prevent interference with measures required to be included in the Oklahoma SIP to protect visibility. Because the Texas regional haze SIP does not ensure that Texas emissions would not interfere with measures required to be included in the SIP for any other state to protect visibility, as required by section 110(a)(2)(D)(i)(II) of the Act, we are taking final action to disapprove portions of the Texas SIP submittals that address CAA provisions for prohibiting air pollutant emissions from interfering with measures required to protect visibility in any other state for the 1997 $PM_{2.5}$, 2006 $PM_{2.5}$, 1997 ozone, 2008 ozone, 2010 NO_2, and 2010 SO_2 NAAQS. Specifically, we are disapproving portions of the following SIP submittals made by Texas for new or revised NAAQS:

- April 4, 2008: 1997 8-hour Ozone, 1997 $PM_{2.5}$ (24-hour and annual)
- May 1, 2008: 1997 8-hour Ozone, 1997 $PM_{2.5}$ (24-hour and annual)
- November 23, 2009: 2006 24-hour $PM_{2.5}$
- December 7, 2012: 2010 NO_2
- December 13, 2012: 2008 8-hour Ozone
- May 6, 2013: 2010 1-hour SO_2

We proposed to rely on CSAPR and the emission reductions required by our FIP for Texas to address these deficiencies in Texas' SIP submittals, but we have determined that it is not appropriate to finalize this determination at this time. Again, given the uncertainty following the D.C. Circuit Court's partial remand of the CSAPR budgets, we do not consider it appropriate to rely on CSAPR at this time to address the deficiencies on the Texas SIP, included those associated with interstate visibility transport obligation with respect to visibility. Therefore, this action does not finalize the portion of our proposed FIP addressing Texas' visibility transport obligations, as that portion of the FIP would have partially relied on CSAPR. We will address the visibility transport requirements for Texas in a future rulemaking, once the issues surrounding the partial remand are resolved.

2. Oklahoma Reasonable Progress Goals

We are taking final action to disapprove the reasonable progress goals established by Oklahoma, and we are approving one portion and disapproving the other portions of the Oklahoma regional haze SIP that address the requirements of § 51.308(d)(1). We find that Oklahoma's flawed consultation with Texas denied it the knowledge it needed—the extent to which cost-effective controls were available for those sources or groups of sources in Texas with the greatest potential to impact visibility at the Wichita Mountains—in order to properly construct its reasonable progress goal for the Wichita Mountains. Oklahoma and Texas discussed the significant contribution of sources in Texas to visibility impairment at the Wichita Mountains during the interstate consultation process required by the Regional Haze Rule. The results of the CENRAP analysis demonstrated that Texas point sources, and in particular EGUs in northeast Texas, have significant visibility impacts on the Wichita Mountains and that cost-effective controls were potentially available for some of these sources. However, Oklahoma did not pursue the point in its consultations with Texas under § 51.308(d)(1)(iv). Oklahoma did not have adequate information to establish its reasonable progress goal for the Wichita Mountains, and should have requested that the TCEQ further investigate these sources or requested additional reductions from Texas sources to ensure that all reasonable measures to improve visibility were included in Texas' long term strategy and incorporated into Oklahoma's reasonable progress goals for the Wichita Mountains. Furthermore, because of the flawed consultations with Texas, Oklahoma did not consider the emission reduction measures necessary to achieve the uniform rate of progress for the Wichita Mountains and did not adequately demonstrate that the reasonable progress goals it established were reasonable based on the four statutory factors under § 51.308(d)(1)(ii).[29] We therefore take final action to disapprove the reasonable progress goals as established by Oklahoma, and the portion of the Oklahoma regional haze SIP that addresses the requirements of

[27] 77 FR 33642.

[28] *EME Homer City Generation* v. *EPA,* 79 F.3d 118 (D.C. Cir.).

[29] 79 FR 74871, 74872.

§ 51.308(d)(1)(i) through (v) with respect to Oklahoma's establishment of its reasonable progress goals for the Wichita Mountains.

Under § 51.308(d)(1)(vi), Oklahoma may not adopt a reasonable progress goal that represents less visibility improvement than is expected to result from implementation of other requirements of the CAA during the applicable planning period. As discussed in our proposal, we find that Oklahoma's reasonable progress goals for 2018, based on the CENRAP model projections, represent at least as much visibility improvement as was expected to result from implementation of other requirements of the CAA (*i.e.,* requirements other than regional haze) during the applicable planning period.[30] In this action we are approving the portion of the Oklahoma regional haze SIP that addresses the requirement under § 51.308(d)(1)(vi).

3. Federal Implementation Plan

As explained above, we have identified a number of deficiencies in the SIP revisions submitted by Texas and Oklahoma to address the CAA's regional haze requirements and are finalizing partial disapproval of those plans. Accordingly, in this action we are also finalizing a FIP to address the deficiencies identified by our partial Texas SIP disapproval, except for those identified in our prior disapproval of the provisions in the Texas SIP addressing the EGU BART requirements. In this rulemaking, we are also disapproving those portions of the Texas SIP addressing the interstate visibility transport provisions of section 110(a)(2)(D)(i)(II), and are also not finalizing a FIP to address these deficiencies.

a. Four-Factor Analysis

During our review of the reasonable progress and long-term strategy provisions of the Texas regional haze SIP, we realized that a more in-depth analysis of Texas sources was needed to determine whether additional measures should be required to ensure reasonable progress. Although our technical approach is more fully described in our proposal [31] and in our TSDs,[32] it can be summarized as follows:

- We used an analysis known as Q/d (*i.e.,* annual emissions divided by the distance between the source and Class I area) as an initial screening test on over 1,600 facilities in Texas to determine which of these sources have the greatest potential to impact visibility at Class I areas. We identified 38 facilities (many facilities had multiple units) that were potentially the largest contributors to visibility impairment at downwind Class I areas.
- We realized that, due to the particular challenges presented by the geographic distribution and number of sources in Texas and the ability of a full photochemical model to assess visibility impacts on the 20% worst days, CAMx photochemical modeling [33] was better technically suited to our needs than the more widely used CALPUFF model.[34] We therefore contracted to have CAMx source apportionment modeling performed to determine which, if any, of these facilities had significant impacts.
- The CAMx modeling revealed that a relative handful of the point sources in Texas (less than 1%) were responsible for a large percentage of the visibility impairment at impacted Class I areas.
- Based on our consideration of these modeled visibility impacts, we determined that nine facilities (with 21 units) merited further modeling to assess what the visibility benefits might be from requiring emission reductions at these units. We modeled high and low emissions scenarios that spanned the available control scenarios for each unit.

After identifying the sources with the largest visibility impacts at the three Class I areas of interest, and modeling the estimated visibility benefits corresponding to a robust range of potential controls, we considered whether controls on these sources would be necessary to ensure reasonable progress. As required by the CAA and the Regional Haze Rule, we took into account the following factors: [35] (1) Time necessary for compliance, (2) energy and non-air quality environmental impacts of compliance, (3) remaining useful life, and (4) the costs of compliance. This analysis is commonly referred to as a ''four factor analysis.'' Our Reasonable Progress Guidance [36] notes the similarity between some of the reasonable progress factors and the BART factors and suggests that the BART Guidelines be consulted regarding the consideration of costs, energy and non-air quality environmental impacts, and remaining useful life. We therefore relied upon our BART Guidelines for assistance in assessing the reasonable progress factors, as applicable.

We noted that, with one exception,[37] the issues relating to three of these factors—compliance time, energy and non-air quality environmental impacts, and remaining useful life—were common to all of the units we analyzed. Specifically, with the exception of the two units at the Tolk facility, these three factors did not present any issues that would impact the selection of the controls we analyzed. As a result, we proceeded to analyze the remaining factor, the costs of compliance.

A number of the sources with the largest visibility impacts had units with no current SO_2 controls. For each of these units, we analyzed Dry Sorbent Injection (DSI) at both a 50% control level and at either a 80% or 90% control level (depending on the type of particulate controls employed at the unit), thus bracketing our analyses between moderate and maximum levels of control. We also analyzed Flue Gas Desulfurization (FGD or ''scrubbers'') at these units. For both Spray Dryer Absorption (SDA—a type of dry scrubber), and wet FGD scrubbers, we analyzed control levels slightly below the maximum level of control these technologies have been demonstrated as capable of achieving at other EGUs.[38] We then adapted our Integrated Planning Model (IPM) [39] cost algorithms that had been developed for DSI, SDA, and wet FGD and performed our cost analyses for potential controls on these units.

[30] 79 FR 74870.

[31] 79 FR 74873.

[32] See Cost TSD and FIP TSD for detailed discussion of our technical approach.

[33] CAMx is a photochemical grid model (Comprehensive Air Quality Model with Extensions). CAMx model code and user's guide can be found at *http://www.camx.com/download/default.aspx.* Model code used in our analysis is available with the modeling files.

[34] Note that our reference to CALPUFF encompasses the entire CALPUFF modeling system, which includes the CALMET, CALPUFF, and CALPOST models and other pre and post processors. The different versions of CALPUFF have corresponding versions of CALMET, CALPOST, etc. which may not be compatible with previous versions (*e.g.,* the output from a newer version of CALMET may not be compatible with an older version of CALPUFF). The different versions of the CALPUFF modeling system are available from the model developer at *http://www.src.com/verio/download/download.htm.*

[35] CAA Section 169A(g), Section 51.308(d)(1)(i)(A).

[36] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Policy Division, Geographic Strategies Group, Research Triangle Park, NC. See section 5.0.

[37] Our initial analysis of the Tolk facility indicated a potential shortage of water, meriting a special consideration of the energy and non-air quality environmental impacts of compliance.

[38] We analyzed SDA at 95% control with a floor of 0.06 lbs/MMBtu, and wet FGD at 98% control with a floor of 0.04 lbs/MMBtu.

[39] Documentation regarding our IPM Model can be found here: *http://www2.epa.gov/airmarkets/power-sector-modeling.*

Some of the units we analyzed were already fitted with underperforming[40] wet FGDs. For each of these units, we conducted control cost analyses for upgrading those scrubbers, using site-specific information obtained from the facilities under the authority provided by CAA section 114. Because the information we obtained was claimed as CBI, and our subsequent analyses that relied on it are also protected, we cannot share them with the public. However, our analyses were available for review by the affected facilities. Similarly, our responses to comments that incorporate information subject to CBI claims are in a separate document available to the CBI claimants that is part of the administrative record of this action but is not available for public review.

We also considered projected visibility benefits in our analysis. As we previously stated in proposing to take action on an Arizona regional haze SIP:[41]

> While visibility is not an explicitly listed factor to consider when determining whether additional controls are reasonable, the purpose of the four-factor analysis is to determine what degree of progress toward natural visibility conditions is reasonable. Therefore, it is appropriate to consider the projected visibility benefit of the controls when determining if the controls are needed to make reasonable progress.

Having identified the sources that have the greatest visibility impacts on the three Class I areas of interest, the visibility benefits that could be obtained by controlling those sources, and the costs of potential controls, we developed a strategy to determine which sources, if any, should be controlled under the reasonable progress and long-term strategy provisions of the CAA and Regional Haze Rule. To make this determination, we took into account the cost-effectiveness ($/ton of emissions removed) of the potential controls along with their projected visibility benefits. The ample precedent of other SIPs and FIPs has established a range of cost-effectiveness values within which controls have generally been required to meet provisions of the Regional Haze Rule. All of the new DSI, SDA, and wet FGD controls and upgraded scrubber controls we costed easily fell within this range. In fact, the highest cost-effectiveness value for the controls we analyzed was $3,221/ton for the Tolk Unit 172B SDA, a value that is less than the cost threshold adopted by Texas, after adjusting for the escalation of costs over time.[42] For sources other than Tolk, all of the controls we are requiring are more cost-effective than Texas' $2,700/ton threshold, even without an adjustment.

As explained above, due to the challenges presented by the geographic distribution and number of sources in Texas and the ability of a full photochemical model to assess visibility impacts on the 20% worst days, we determined that the CAMx photochemical model was best suited to our needs. While CALPUFF modeling was often used for assessing visibility benefits in other regional haze SIP actions, the large transport distances in Texas and our concerns about the technical capabilities of CALPUFF made the use of CALPUFF impractical.[43] As we have discussed in our FIP TSD and our separate RTC document, the results of our CAMx modeling cannot be directly compared to the results of CALPUFF modeling, which was used in the vast majority of other BART determinations and some reasonable progress determinations, because of differences between the models, model inputs, and metrics used.[44] Many of these differences result in CAMx modeled visibility impacts and benefits that are much lower than the CALPUFF modeled visibility impacts and benefits relied on in other actions. For a more thorough explanation of this complex issue, please refer to our FIP TSD and discussion in the RTC document. As a result, we were unable to rely on prior visibility analyses based on the use of CALPUFF in other actions as precedent for assessing the results of our CAMx visibility analysis in this action.[45]

To evaluate the projected visibility benefits of controls in our cost evaluation, we considered a number of metrics, such as change in deciviews under 2018 projected levels of air pollution at the three Class I areas and under estimated natural visibility conditions, change in light extinction, and change in the percentage of total light extinction.[46] We also considered the visibility benefit of emission reductions from recent actual emission levels versus CENRAP 2018 projected emission levels at these sources. As we discuss further in our FIP TSD and in responses in our RTC document, to provide context regarding the significance of individual source impacts, we compared the individual source impacts with CENRAP source apportionment modeling results for impacts from all emission sources within a state and impacts from all emission sources within a state within a specific source type. We also compared these individual source impacts to the impact levels used by the states for triggering consultation with another state about its overall impacts, and the estimated range of anticipated visibility benefits resulting from required controls in other actions.[47] Ultimately, after considering all four factors, we identified a set of reasonable controls for the first planning period for those sources with the largest visibility impacts that would provide for meaningful visibility improvements towards the goal of natural visibility conditions.

After extending our public comment period from the original date of February 17, 2015, to an extended date of April 20, 2015, we considered and responded to thousands of comments both for and against our proposal, the

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[40] By ''underperforming,'' we mean scrubber systems that are meeting their permit limits, but are capable of achieving greater levels of control through increased utilization and optimization.

[41] See 79 FR 9353 n.137. We also used the same reasoning in our final action on the Arizona regional haze SIP. See 79 FR 52420.

[42] Texas used a $2,700/ton cost-effectiveness threshold, without regard to visibility benefit. While we found flaws in the way Texas established and used this threshold, it is illustrative of the cost-effectiveness of the controls required in this rulemaking. Conservatively escalating the $2,700/ton value from when it was first developed for the CAIR rule, which was finalized on March 10, 2005, to the time of our analysis, which was conducted in 2014, results in a value of $3,322/ton (i.e., the Chemical Engineering Plant Cost Index for 2005 = 468.2, and that for 2014 = 576.1; $2,700 × 576.1/468.2 = $3,322).

[43] The TCEQ conducted BART screening modeling with CAMx for the majority of the BART-eligible sources in Texas. The TCEQ requested to use CAMx instead of CALPUFF because of the advantages of CAMx to evaluate many sources individually in one or two modeling runs and the technical advantages of CAMx over CALPUFF when large distances are involved. As discussed in a response to comment in the modeling section of this document, we approved the TCEQ's approach of using CAMx for BART screening in 2007.

[44] See the Modeling section of the RTC document and our FIP TSD, beginning on page A–35, in which we explain why key differences in CALPUFF for BART and CAMx modeling for RP preclude the comparison of their respective results. Some of the major differences are: (1) CALPUFF uses maximum 24-hour emission rates, while CAMx uses annual average emission rates; (2) CALPUFF focuses on the day with the 98th percentile highest visibility impact from the source being evaluated, whereas CAMx focuses on the average visibility impacts across the 20% worst days regardless of whether the impacts from a specific facility are large or small; and (3) CAMx models all sources of emissions in the modeling domain, which includes all of the continental U.S., whereas CALPUFF only models the impact of emissions from one facility without explicit chemical interaction with other sources' emissions.

[45] Many commenters alleging inconsistency with our previous actions failed to appreciate this point and attempt to compare directly CALPUFF results to CAMx modeled results.

[46] For a full discussion on our review of all the modeling results, and factors that we considered in evaluating and weighing all the results, precedents, and other policy concerns please see Appendix A of our FIP TSD.

[47] See our FIP TSD at A–75.

most significant of which we summarize in section II below. While these comments resulted in some adjustments to our cost-effectiveness estimates for our proposed scrubber upgrades, ultimately these changes were not so significant as to change our proposed control decision. After careful consideration of all of the comments and the information provided, we find that the units and the control levels should be finalized as proposed.

b. Final SO_2 Emission Limits

As discussed further in our FIP TSD,[48] our emission limits are based on the installation of scrubber retrofits, scrubber upgrades, and in the case of San Miguel, the continued operation of its already performed scrubber upgrade. Consistent with our proposal, the final FIP requires that the SO_2 emission limits contained in Table 1 below be met on a 30 BOD period basis.

TABLE 1—FINAL 30-BOILER-OPERATING-DAY SO_2 EMISSION LIMITS

Unit	Final SO_2 emission limit (lbs/MMBtu)
Scrubber Upgrades:	
Sandow 4	0.20
Martin Lake 1	0.12
Martin Lake 2	0.12
Martin Lake 3	0.11
Monticello 3	0.06
Limestone 2	0.08
Limestone 1	0.08
San Miguel *	0.60
Scrubber Retrofits:	
Big Brown 1	0.04
Big Brown 2	0.04
Monticello 1	0.04
Monticello 2	0.04
Coleto Creek 1	0.04
Tolk 172B	0.06
Tolk 171B	0.06

* As we noted in our proposal, we do not anticipate that San Miguel will have to install any additional control in order to comply with this emission limit.

As we discuss in our proposal,[49] we find that five years is an adequate amount of time to allow for the installation of scrubber retrofits, and three years is an adequate amount of time to allow for the installation of scrubber upgrades. We also find that one year is an adequate amount of time for compliance for San Miguel, for which we do not anticipate the need for the installation of any additional equipment. We are therefore finalizing our requirements as proposed providing that compliance with the limits in Table 1 be achieved within:

- Five years of the effective date of our final rule for Big Brown Units 1 and 2, Monticello Units 1 and 2, Coleto Creek Unit 1, and Tolk Units 171B and 172B.
- Three years of the effective date of our final rule for Sandow 4; Martin Lake Units 1, 2, and 3; Monticello Unit 3; and Limestone Units 1 and 2.
- One year of the effective date of our final rule for San Miguel.

c. Treatment of Potential Error in Scrubber Upgrade Efficiency Calculations

In the Cost TSD that accompanied our proposal, we discussed how we calculated the SO_2 removal efficiency of the units we analyzed for scrubber upgrades.[50] We noted that, due to a number of factors that we were unable to accurately quantify, our calculations of current removal efficiencies could contain some error. Based on the results of our scrubber upgrade cost analysis, however, we did not believe that any such errors, if present, would affect our proposed decision to require the scrubber upgrades because they were all cost-effective (low $/ton of emissions removed). In other words, were we to make reasonable adjustments in the additional tons removed under the FIP limits to account for any potential error in our calculation of current scrubber removal efficiencies, we would still propose to upgrade these SO_2 scrubbers. After considering comments and other information submitted by the facility owners in response to our proposal, and as discussed more fully in our responses to comments on cost in the RTC document and section III below, we continue to conclude that upgrading an underperforming SO_2 scrubber is one of the most cost-effective pollution control measures a coal-fired power plant can implement to improve visibility at Class I areas.

We also proposed that the units required to conduct scrubber upgrades must meet SO_2 emission limits based on 95% removal in all cases. This removal efficiency is below the upper end of what an upgraded wet SO_2 scrubber can achieve, which is 98–99%, as we noted in our Cost TSD. We also noted that a 95% removal efficiency assumption provides an adequate margin of error, such that all of the units should be able to comfortably attain the emission limits we proposed. However, for the operator of any unit that disagreed with us on this point, our proposal included a pathway for such operators to seek and for us to consider revised emission limits in this final action by submitting specific comments on the issue and taking other specific steps.[51] We did not receive any comments from an owner or operator that was interested in using this pathway to potentially obtain a modified SO_2 emission limit. While we remain open to discussions concerning this procedure, we are finalizing the emission limits and compliance schedule for the affected units as proposed.

Similarly, to ensure that San Miguel can meet our final FIP emission limitation, we are finalizing the following compliance option for the owner and operator of San Miguel as an alternative to the final emission limit of 0.60 lbs/MMBtu based on a 30 day BOD average:

- Install a CEMS at the inlet of the scrubber system. The 30 BOD SO_2 average from the existing outlet CEMS must read at or below 6.0% (94% control) of a 30 BOD SO_2 average from the inlet CEMS.

By no later than its compliance date, San Miguel must inform us in writing of its decision to select this option for compliance. The FIP provides automatically for this compliance option and therefore if San Miguel chooses it, no SIP revision submittal is required from Texas.

d. Natural Conditions for the Texas Class I Areas

Consistent with our proposal and as discussed further in our FIP TSD,[52] we are finalizing the natural conditions for the Guadalupe Mountains and Big Bend as follows:

TABLE 2—NATURAL CONDITIONS (NC II) FOR THE GUADALUPE MOUNTAINS AND BIG BEND

Class 1 Area	20% Best days (dv)	20% Worst days (dv)
Guadalupe Mountains	0.99	6.65
Big Bend	1.62	7.16

We recommend that the State of Texas re-evaluate the natural conditions for its Class I areas in its next regional haze SIP in consultation with us and the FLMs.

[48] See our FIP TSD, Section 4.4 and 4.5. Our Cost TSD develops the bases for the costs and emission limits.

[49] 79 FR 74823.

[50] See Section 6 of our Cost TSD.

[51] 79 FR 74885.

[52] See discussion beginning on 79 FR 74885, and section 10 of our FIP TSD.

e. Calculation of Visibility Impairment for the Texas Class I Areas

Consistent with our proposal and as discussed further in our FIP TSD,[53] our final recalculated natural visibility conditions, and our calculation of visibility impairment for the Guadalupe Mountains and Big Bend are found in the table below. We recalculated the number of deciviews by which baseline visibility conditions exceed natural visibility conditions for these Class I areas pursuant to § 51.308(d)(2)(iv)(A). Specifically, in our calculations, we replaced Texas' calculations of natural visibility conditions for its Class I areas with the adjusted default values (NC II), as discussed in our proposal. We then determined the amount the baseline visibility values exceeded the natural visibility conditions to calculate visibility impairment for each area. We are finalizing the following estimates of visibility impairment for the Guadalupe Mountains and Big Bend:

TABLE 3—REVISED VISIBILITY METRICS FOR THE CLASS I AREAS IN TEXAS

Class I Area	Most Impaired (dv)	Least Impaired (dv)
	Baseline Visibility Conditions, 2000–2004	
Big Bend	17.30	5.78
Guadalupe Mountains	17.19	5.95
	Natural Visibility Conditions	
Big Bend	7.16	1.62
Guadalupe Mountains	6.65	0.99
	Extent Baseline Exceeds Natural Visibility Conditions	
Big Bend	10.14	4.16
Guadalupe Mountains	10.54	4.96

f. Consideration of the Uniform Rates of Progress

Consistent with our proposal and as discussed further in our FIP TSD,[54] we are finalizing the uniform rates of progress for the 20% worst days for the Guadalupe Mountains and Big Bend contained in Table 4 below. Specifically, in our calculations, we replaced Texas' calculations of natural visibility conditions for its Class I areas with the adjusted default values (NC II), as discussed in our proposal, and we recalculated the uniform rates of progress as follows:

TABLE 4—CLASS I AREA UNIFORM RATES OF PROGRESS

Class I Area	Baseline conditions (dv)	Annual improvement needed to meet URP (dv)	Visibility at 2018 (dv)	Improvement needed by 2018 (dv)	Natural conditions at 2064 (dv)
Big Bend	17.30	0.17	14.93	2.37	7.16
Guadalupe Mountains	17.19	0.18	14.73	2.46	6.65

g. Revised Reasonable Progress Goals for the Guadalupe Mountains and Big Bend

We are finalizing our technical analysis that was lacking in Texas' development of its reasonable progress goals for the Guadalupe Mountains and Big Bend. As discussed in our proposal and FIP TSD,[55] we are establishing new reasonable progress goals based on our technical analysis. The new reasonable progress goals are as follows:

TABLE 5—REASONABLE PROGRESS GOALS FOR 2018 FOR THE GUADALUPE MOUNTAINS AND BIG BEND

Class I area	20% Best days (dv)	20% Worst days (dv)
Guadalupe Mountains	5.70	16.26
Big Bend	5.59	16.57

[53] See discussion beginning on 79 FR 74886, and section 11 of our FIP TSD.

[54] See discussion beginning on 79 FR 74886, and section 12 of our FIP TSD.

[55] See discussion beginning on 79 FR 74886, and section 13 of our FIP TSD.

Our new reasonable progress goals for 2018 reflect only the additional estimated visibility benefit from the required controls anticipated to be in place by 2018, which are the scrubber upgrades. While the required scrubber retrofits will provide for additional visibility improvement at the Class I areas[56] that we consider necessary for reasonable progress towards natural visibility conditions, we do not anticipate these controls to be implemented until after 2018. As we note above, these estimates of future visibility conditions presume that CSAPR continues to be implemented and is a viable alternative to source-specific BART. As discussed above, given the uncertainty arising from the remand of some of the state CSAPR budgets, we have determined it would not be appropriate to finalize the portion of our FIP relying on CSAPR as an alternative to SO_2 and NO_X BART for EGUs in Texas. Should additional BART controls be required for any of the BART-eligible EGUs and should those controls in combination with other requirements on EGUs achieve emission reductions as of 2018 that are materially different than the emission reductions considered in quantifying the reasonable progress goals in this action, these reasonable progress goals would have to be revised at the same time any additional BART controls are proposed.

h. Revised Reasonable Progress Goals for the Wichita Mountains

We are finalizing our technical analysis that was lacking in Oklahoma's development of reasonable progress goals for the Wichita Mountains, including appropriate consideration of emission reduction measures in Texas that Oklahoma should have asked Texas explicitly to obtain during its consultations with Texas. We are establishing new reasonable progress goals, as discussed in more detail in our proposal and FIP TSD,[57] based on our technical analysis and accounting for the emission reductions required in Texas that we anticipate being in place by 2018. Consistent with our action regarding the Texas reasonable progress goals discussed in the previous section, our recalculated reasonable progress goals for 2018 in the table below reflect only the additional estimated visibility benefits from the required controls anticipated to be in place by 2018, which are the scrubber upgrades. While the required scrubber retrofits will provide for additional visibility improvement at the Class I areas,[58] we do not anticipate these controls to be implemented until after 2018. As we note above, these estimates of future visibility conditions presume that CSAPR is a viable alternative to source-specific BART. As discussed earlier in this document, given the uncertainty arising from the remand of some of the state CSAPR budgets, we have determined it would not be appropriate to finalize the portion of our FIP relying on CSAPR as an alternative to source-specific SO_2 and NO_X BART for EGUs in Texas. Should additional BART controls in Texas ultimately be required for any of the BART-eligible EGUs and should those controls in combination with other requirements on EGUs achieve emission reductions as of 2018 that are materially different than the emission reductions considered in quantifying the reasonable progress goals for Oklahoma in this action, the reasonable progress goals would have to be revised at the same time any additional BART controls are proposed.

TABLE 6—REASONABLE PROGRESS GOALS FOR 2018 FOR THE WICHITA MOUNTAINS

Class I Area	20% Best days (dv)	20% Worst days (dv)
Wichita Mountains	9.22	21.33

II. Summary and Analysis of Major Issues Raised by Commenters

We received both written and oral comments at the public hearings we held in Austin and Oklahoma City. We also received comments by the Internet and the mail. The full text of comments received from these commenters, except what was claimed as CBI, is included in the publicly posted docket associated with this action at *www.regulations.gov.* The CBI cannot be posted to *www.regulations.gov,* but is part of the record of this action. Our RTC document, which is also included in the docket associated with this action, provides detailed responses to all significant comments received, with the exception of those responses that rely on CBI and is a part of the administrative record for this action. The responses that rely upon CBI are in a separate document that is part of the record of this action but is not available for public review. In total, we received approximately 2,500 pages of significant comments. Below we provide a summary of the more significant comments received and a summary of our responses to them. Our RTC document is organized similarly to the structure present in this section (*e.g.,* Cost, Modeling, etc.). Therefore, if additional information is desired concerning how we addressed a particular comment, the reader should refer to the appropriate section in the RTC document.

A. General Comments

Comment: We received 4,500 comments in support of our rulemaking, specifically regarding the requirements that Texas coal-fired EGUs reduce SO_2 emissions. These comments were from members representing various organizations, members of Congress, officials of government agencies, and members of the general public. At the public hearings in Austin, Texas, and Oklahoma City, Oklahoma, over 100 people expressed general support for the plan. The speakers at the public hearings included members of various organizations and members of the general public. Representatives of three Federal Land Management agencies also wrote comments in support of our action. Many of these same commenters also asked us to consider the impacts of NO_X pollution and to consider additional coal-fired EGUs for control.

Response: We thank the commenters for participating in the rulemaking and acknowledge their support of this action. We address NO_X emissions in our modeling section below. We address the inclusion of additional coal-fired EGUs in our cost and modeling sections below.

Comment: We received five comment letters and emails from citizens and a representative from one organization that stated general opposition.

Response: These comments were too general to give us a basis for a specific response. Please see our detailed responses in this action and additional

[56] Table 44 of our proposal (79 FR 74887) shows the additional visibility benefit anticipated from the scrubber retrofits. For Guadalupe Mountains, we estimate an additional 0.12 dv benefit on the 20% worst days based on 2018 projected background conditions resulting in a visibility goal of 16.14 dv if all required controls were in place by 2018. For Big Bend, we estimate an additional 0.09 dv benefit on the 20% worst days based on 2018 projected background conditions resulting in a visibility goal of 16.48 dv if all required controls were in place by 2018. We note that Table 45 provides the same visibility benefit estimates based on reducing recent actual emissions rather than 2018 CENRAP projected emission levels.

[57] See discussion beginning on 79 FR 74886, and section 13 of our FIP TSD.

[58] Table 44 of our proposal (79 FR 74887) shows the additional visibility benefit anticipated from the scrubber retrofits. For Wichita Mountains, we estimate an additional 0.30 dv benefit on the 20% worst days based on 2018 projected background conditions resulting in a visibility goal of 21.03 dv if all required controls were in place by 2018. We note that Table 45 provides the same visibility benefit estimates based on reducing recent actual emissions rather than 2018 CENRAP projected emission levels.

detail in our RTC document, in which we provide substantial explanations and reasons for disapproving elements of the Texas and Oklahoma SIPs and finalizing our FIP.

Comment: As a general matter, a number of commenters took issue with our usages of the terms ''reasonable'' and ''significant'' as used in our proposal and TSDs and contended they were inappropriate or extra-statutory terms.

Response: We consider the general use of ''reasonable'' and ''significant'' in this action to be appropriate. The word ''reasonable'' is not extra-statutory in this action because it is part of the statutory term ''reasonable progress,'' see CAA ection 169A(g). In turn, ''significant'' may be used according to its ordinary meaning (as in our reference above to ''significant comments''). This word is elsewhere employed consistent with our guidance and previous actions. See, *e.g.,* our Reasonable Progress Guidance at 3–2. These terms are generally used in rulemaking actions, including use by Texas and Oklahoma in their regional haze actions.[59] We use these terms appropriately throughout this rulemaking action, for example, when explaining it was ''reasonable'' to expect great variation in the effectiveness of emission reductions between two sources given the difference in distances between these two facilities and the Class I areas, or when describing CENRAP visibility modeling as demonstrating that a ''significant'' portion of the visibility impacts to Class I areas in a number of states on the worst 20% days for both 2002 and 2018 were attributable to Texas sources.[60]

B. State and Federal Roles in the Regional Haze Program

Some commenters argued that our proposal to disapprove Texas' and Oklahoma's regional haze SIPs disregarded the primary role of the states under the CAA, the Regional Haze Rule, and relevant case law. We do not agree. Congress designed the CAA to provide for states to take the lead in developing SIPs but also required EPA to review SIPs for compliance with statutory and regulatory requirements. We recognize that states have the primary responsibility of drafting a SIP to address the requirements of the regional haze program. We also recognize that we have the responsibility of ensuring that the state plans, including regional haze SIPs, conform to the CAA requirements. We have determined that the Texas and Oklahoma SIPs do not meet certain elements of these Federal requirements and are accordingly partially disapproving these SIPs.

Additionally, our review of SIPs is not limited to a ministerial review and approval of a state's decisions. Some commenters argued that the principles of cooperative Federalism in the CAA require EPA to defer to states in their development of SIPs, so long as necessary statutory requirements are met. Commenters stated that our proposal ignores such limits and would impose FIPs that ignore the primary implementation role given to Texas and Oklahoma. We disagree with the commenters' arguments regarding cooperative Federalism. Under this framework, the CAA directs us to act if a state fails to submit a SIP, submits an incomplete SIP, or submits a SIP that does not meet the statutory requirements. Thus, the CAA provides us with a critical oversight role in ensuring that SIPs meet the CAA's requirements.

Commenters stated that Texas' plan was complete by operation of law, met all requirements, and that we had no authority to impose a FIP. We disagree. The commenters confuse the action of merely submitting a SIP and having it deemed complete with the action of submitting a SIP that complies with the applicable Federal requirements. We agree that the CAA gives each state flexibility in developing a SIP, but in doing so, it must ensure the SIP meets Federal requirements. We must review the state's SIP and determine whether it meets such Federal requirements. If it does not, we must disapprove it (or portions thereof), and adopt a FIP to address the disapproved parts. In undertaking such a review, we do not ''usurp'' the state's authority arbitrarily, as some commenters stated, but rather we ensure that such authority is reasonably exercised. In this instance, portions of the states' SIPs were not approvable for reasons discussed elsewhere in this document, the responses to comments, and the proposed rulemaking.

Some commenters argued that the appropriate remedy for a substantially inadequate plan under our Regional Haze Rule is periodic updates, as opposed to a FIP. We disagree. The Regional Haze Rule's requirements for comprehensive periodic revisions (*see* 40 CFR 51.308(f)) and periodic progress reports (*see* 40 CFR 51.308(g)) are very different from the authority to impose a FIP when there is a determination that a SIP is not approvable. As we have stated elsewhere, we have the authority and obligation to impose a FIP to fill in such gaps. The provisions of the Regional Haze Rule regarding states' ongoing responsibility to periodically revise their regional haze SIPs do not override this responsibility.

C. Our Clarified Interpretation of the Reasonable Progress and Long-Term Strategy Requirements

Several commenters criticized the aspect of our proposal that provided potential commenters and states with clarification regarding our interpretation of the reasonable progress and long-term strategy provisions found at 40 CFR 51.308(d)(1) and (3). Some of these commenters alleged that our proposal did not clarify an existing interpretation, but rather outlined a new one that was being applied to Texas and Oklahoma after the fact. They argued that the provisions in question require upwind states to include in their long-term strategy only those measures necessary to achieve the reasonable progress goals set by downwind states, regardless of whether the goals were based on sound analyses and adequate interstate consultation or reflect all reasonable control measures. Some commenters argued that upwind states have no obligation to conduct four-factor analyses with respect to downwind Class I areas at all. In essence, these commenters asserted that the only obligation that the CAA and Regional Haze Rule impose upon upwind states is a requirement to consult with their neighbors and make good on any commitments made during the consultation process. They further argued that their preferred interpretation is mandated by the plain language of the Regional Haze Rule, such that the interpretation laid out in our proposal is plainly erroneous and not entitled to judicial deference. Other commenters asserted the opposite. They agreed with our clarifications and argued that our interpretation of the provisions found at 40 CFR 51.308(d)(1) and (3) is not only reasonable, but mandated by the CAA and the plain language of the provisions themselves.

After carefully considering these comments, we stand by our clarified interpretation as outlined in the proposal. The alternative interpretations offered by some of the commenters are not in accord with the plain language of CAA sections 169A(b)(2) and (g)(1),

[59] *See, e.g.,* our proposal at 79 FR 74844 (noting our agreement with ''Texas' determination that was not reasonable to request additional controls from other states at this time'') and 74823 (describing how Oklahoma's response to public comments on its regional haze SIP ''acknowledged that sources in Texas had significant impacts on visibility in Wichita Mountains, but maintained that it did not have the regulatory authority to require emission reductions in other states'').

[60] 79 FR 74841 and 74854.

which require both upwind and downwind states to include in their SIPs ''emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward the national goal'' and to determine what controls are necessary to make reasonable progress by considering the four statutory factors. The commenters' view that upwind states are not required to conduct four-factor analyses for downwind Class I areas is inconsistent with Texas' own view of the requirements of the CAA and the Regional Haze Rule. Texas itself conducted a four-factor analysis for downwind Class I areas (albeit a flawed one) and stated in its own response-to-comments document that it was required to do so.[61] Indeed, the commenters' alternative interpretations are premised largely on a fundamental misunderstanding of the regional haze planning process. The commenters seem to suggest that states set their reasonable progress goals first and then determine what controls are necessary to achieve them. In their view, if a downwind state sets a reasonable progress goal that does not assume emission reductions from an upwind state, then the upwind state has no obligation to include control measures in its long-term strategy. Such an interpretation is not consistent with the CAA, our regulations and guidance, or how such analyses are conducted in reality. To set their reasonable progress goals, states consider the anticipated visibility conditions at a Class I area in a future year. In order to do so, they must first determine the level of emission reductions that will result once the control measures necessary to make reasonable progress are installed and estimate the visibility benefit anticipated from those reductions. In determining the control measures necessary to make reasonable progress, states must conduct four-factor analyses, considering costs and other factors. If an upwind state were not required to participate or if emission reductions from upwind sources were not considered in this process, there would be no way for downwind states to set reasonable progress goals that account for all reasonable control measures.

D. Consideration of Visibility in the Reasonable Progress Analysis

Comment: Many commenters maintained that, unlike with BART, visibility is not one of the statutory or regulatory factors that states must consider in determining reasonable progress and setting reasonable progress goals. As a result, some commenters argued that EPA is not permitted to disapprove a state's four-factor analysis based on the manner in which a state considered visibility impacts or visibility benefits in determining reasonable progress. They argued that EPA's statutory role does not extend to dictating ''how'' a state considers the four factors, especially considering the flexibility states have when determining reasonable progress. Other commenters asserted that EPA placed too much weight on visibility, a non-statutory factor, in analyzing Texas' SIP and in promulgating a FIP. Some commenters alleged that states and EPA were barred from considering visibility in a reasonable progress analysis altogether. Several commenters suggested that, had we not considered visibility benefits when promulgating a FIP for Texas, we would not have required any SO_2 controls. One commenter cited to *WildEarth Guardians* v. *EPA*[62] to support its contention that neither the CAA nor the Regional Haze Rule requires source-specific analysis in the determination of reasonable progress. Other commenters cited to *American Corn Growers Ass'n* v. *EPA*[63] to support their assertion that we impermissibly isolated visibility as a factor and in so doing constrained authority Congress conferred on the states.

Response: We disagree with these comments. The commenters appear to be stating that states (or EPA when promulgating a FIP) either cannot or need not consider visibility in any way in determining reasonable progress and that we therefore must approve a state's reasonable progress goals and long-term strategy as long as all four mandatory reasonable progress factors are analyzed to some degree. This view is at odds with the overarching purpose of the CAA's visibility provisions. Congress declared as a national goal in CAA section 169A(a)(1) the ''prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution.'' CAA section 169A(b)(2) required the Administrator to promulgate regulations to assure ''reasonable progress toward meeting the national goal.'' Thus, the entire purpose of the reasonable progress mandate is to achieve the national goal of natural visibility conditions at each Class I area.

CAA section 169A(g)(1) goes on to state that, in determining ''reasonable progress,'' states must consider four factors: ''the costs of compliance, the time necessary for compliance, and the energy and nonair quality environmental impacts of compliance, and the remaining useful life of any existing source subject to such requirements.'' This consideration is commonly referred to as the ''four-factor analysis.''[64] The crux of the commenter's argument seems to be that, because this list of factors does not include visibility, states can ignore visibility altogether or, if they choose, consider it in any fashion they want.

While we agree that visibility is not one of the four mandatory factors explicitly listed for consideration in CAA section 169A(g)(1) or 40 CFR 51.308(d)(1)(i)(A), the term ''reasonable progress'' itself means reasonable progress towards the national goal of natural visibility conditions. The Supreme Court has stated that, ''[i]n determining whether Congress has specifically addressed the question at issue, a reviewing court should not confine itself to examining a particular statutory provision in isolation. The meaning—or ambiguity—of certain words or phrases may only become evident when placed in context. It is a 'fundamental canon of statutory construction that the words of a statute must be read in their context and with a view to their place in the overall statutory scheme.' A court must therefore interpret the statute 'as a symmetrical and coherent regulatory scheme' and 'fit, if possible, all parts into an harmonious whole.' ''[65]

To ensure a coherent regulatory scheme, we believe that states (or EPA when promulgating a FIP) can consider

[61] *See, e.g.,* Appendix 2–2 to the Texas Regional Haze SIP at 24 (''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.'') (emphases added) (''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.'') (emphasis added).

[62] *WildEarth Guardians* v. *EPA,* 770 F.3d 919 (10th Cir. 2014).

[63] *Am. Corn Growers Ass'n* v. *EPA,* 291 F.3d 1 (D.C. Cir. 2002).

[64] Correspondingly, under § 51.308(d)(1) of the Regional Haze Rule, promulgated in response to this mandate, states must ''establish goals (expressed in deciviews) that provide for reasonable progress towards achieving natural visibility conditions'' for each Class I area within a state. Reasonable progress goals are interim goals that represent measurable, incremental visibility improvement over time toward the goal of natural visibility conditions. Section 51.308(d)(1)(i)(A) requires states to consider the four statutory factors when establishing their reasonable progress goals.

[65] *FDA* v. *Brown & Williamson Tobacco Corp.,* 529 U.S. 120, 132–33 (2000) (quoting *Davis* v. *Michigan Dept. of Treasury,* 489 U.S. 803, 809 (1989), *Gustafson* v. *Alloyd Co.,* 513 U.S. 561, 569 (1995), and *FTC* v. *Mandel Brothers, Inc.,* 359 U.S. 385, 389 (1959)).

visibility when determining reasonable progress in at least two ways. First, states can consider the visibility impacts of sources when determining what sources to analyze under the four-factor framework. CAA section 169A(b)(2) does not provide any direction regarding which sources or source categories a state should analyze when determining reasonable progress. Similarly, CAA section 169A(g)(1) refers to ''any existing source subject to such requirements,'' but unlike the BART provisions, does not identify which existing sources or source categories should be subject to reasonable progress requirements. Given this statutory ambiguity, we believe that allowing states to consider visibility impacts when determining the scope of the reasonable progress analysis is a reasonable interpretation of the statute ''as a harmonious whole.'' Accordingly, states can develop screening metrics that target those sources with the greatest visibility impacts for further analysis. Our 2007 guidance advocated this approach, and nearly all states, including Texas, used metrics like Q/d to consider the potential visibility impacts of their sources and screen out those sources with low visibility impacts.[66] We followed this same approach in our FIP by using both Q/d and a second metric based on a source's modeled percent contribution to total visibility impairment at impacted Class I areas. If states or we could not consider visibility impacts as a way of identifying which sources should be considered for additional controls, then states would have no rational way to differentiate between hundreds of sources that vary in distance from Class I areas, emit different visibility impairing pollutants in varying amounts, and are subject to diverse meteorological conditions that affect the transport of visibility-impairing pollutants. The result would be a cumbersome analysis encompassing hundreds of sources (or in the case of Texas, well over a thousand), many of which may have little if any impact on visibility in Class I areas. Congress could not have intended such an incongruous result.

Second, once a universe of sources has been identified for analysis, we believe that states can consider the visibility improvement that will result from potential control options when weighing the four statutory factors. Allowing consideration of visibility improvement is appropriate for several reasons. Most importantly, it aligns with Congress' national goal, which is to remedy existing impairment of visibility in Class I areas. While section 169A(g)(1) of the CAA contains a list of factors states *must* consider when determining reasonable progress, we do not believe that list is exclusive. As the Eighth Circuit Court acknowledged in *North Dakota* v. *EPA,* states can take visibility improvement into account when evaluating reasonable progress controls so long as they do so in a reasonable way.[67] We have iterated this position in previous regional haze actions. For example, in our final rule on the Montana regional haze SIP, we stated, ''We agree that visibility improvement is not one of the four factors required by CAA section 169A(g)(1) and 40 CFR 51.308(d)(1)(i)(A), however, it (along with other relevant factors) can be considered when determining controls that should be required for reasonable progress.'' [68] Similarly, in our final rule on the Arizona regional haze SIP, we concluded that, ''while visibility is not an explicitly listed factor to consider when determining whether additional controls are reasonable, the purpose of the four-factor analysis is to determine what degree of progress toward natural visibility conditions is reasonable. Therefore it is appropriate to consider the projected visibility benefit of the controls when determining if the controls are needed to make reasonable progress.'' [69]

Further, allowing states to consider visibility improvement alongside the four statutory factors ensures that only those cost-effective controls that will achieve reasonable visibility benefits are required during each phase towards the national goal. If states were not permitted to consider visibility improvement when conducting their control determinations, then states arguably would have to require all cost-effective controls during the first planning period (assuming no limiting energy or non-air quality environmental impacts) regardless of whether some of those controls would be far more beneficial than others.[70] Oddly, some of the commenters appear to be suggesting that, if we had not considered visibility benefits in our analysis, we would not have controlled certain sources. On the contrary, we decided not to require certain cost-effective controls in this planning period because they would not achieve as much benefit as other controls. If these commenters are correct and the consideration of visibility benefits is impermissible in a four-factor analysis, then we would have required all cost-effective controls, including those at the Parish and Welsh facilities.

We also note that Congress did not provide any direction as to how states should consider ''the costs of compliance'' when determining reasonable progress. One permissible way a state could ''consider'' costs is to compare them to prospective benefits. In other words, we believe the first statutory factor is capacious enough to allow for a comparison of cost-effectiveness to visibility improvement. Finally, we note that our 2007 guidance explicitly permits states to consider other relevant factors when conducting a four-factor analysis,[71] and many states, including Texas, did so. In conclusion, we believe that states are permitted, but not required, to consider visibility improvement alongside the four statutory factors when making their reasonable progress determinations, with the important caveat that they must do so in a reasonable fashion.

Some commenters alluded that visibility improvement is irrelevant to a four-factor analysis because Congress did not include it as one of the four factors, but did include it as a factor to be considered in determining BART. We do not find this reasoning to be persuasive. The sources that Congress subjected to the BART requirement (*i.e.,* sources grandfathered from the PSD requirement) were not necessarily sources that would have an impact on visibility impairment. As such, Congress included specific language in CAA sections 169A(b)(2)(A) and 169A(g)(2) to ensure that only those grandfathered sources that cause or contribute to visibility impairment and that would

[66] For example, in VISTAS states, to select the specific point sources that would be considered for each Class I area, VISTAS first identified the geographic area that was most likely to influence visibility in each Class I area and then identified the major SO_2 point sources in that geographic area. The distance-weighted point source SO_2 emissions (Q/d) were combined with the gridded extinction-weighted back-trajectory residence times. The distance-weighted (Q/d) gridded point source SO_2 emissions were then multiplied by the total extinction-weighted back-trajectory residence times on a cell-by-cell basis and then normalized. VISTAS Area of Influence Analyses, 2007, is available in the docket for this action.

[67] *North Dakota* v. *EPA,* 730 F.3d 750, 766 (8th Cir. 2013).

[68] 77 FR 57864, 57899, 57901; *see also* Montana Proposed Rule, 77 FR 23988, 24062.

[69] 79 FR 9318 n.137 (finalized based on this same reasoning at 79 FR 52420); TX TSD at 7 n.6; FIP TSD at 12; 79 FR 74874.

[70] We also note that practical implementation concerns could arise if a state as large and source-numerous as Texas required all cost-effective controls at once.

[71] ''In determining reasonable progress, CAA Section 169A(g)(1) requires States to take into consideration a number of factors. However, you have flexibility in how to take into consideration these statutory factors and any other factors that you have determined to be relevant.'' 2007 Guidance at 2–3, 4–2, and 5–1.

result in visibility improvement if controlled would be required to install BART. On the other hand, the national goal of achieving natural visibility conditions is central to the notion of reasonable progress, so Congress had no need to include language regarding visibility improvement in CAA section 169A(g)(1).

We also disagree with the commenters that we cannot disapprove a state's SIP where the state has considered visibility improvement in an unreasonable fashion. As the Eighth Circuit explained in *North Dakota,* ''[a]lthough the state was free to employ its own visibility model and to consider visibility improvement in its reasonable progress determinations, it was not free to do so in a manner that was inconsistent with the CAA.'' [72] Like the State of North Dakota, Texas chose to evaluate visibility improvement alongside the four statutory reasonable progress factors, but did so in an unreasonable way. We discuss several ways that Texas' consideration of visibility improvement in its reasonable progress determinations was unreasonable elsewhere in this document, in our proposal, and in our Texas TSD.[73] One point worth mentioning here, however, is that Texas estimated the visibility improvement of potential controls by making comparisons to degraded background conditions instead of to natural background conditions, which is precisely the same mistake that North Dakota made.[74] The end result of this and other errors in Texas' analysis was that Texas unreasonably concluded that the total cost of additional controls was not worth the visibility benefits of those controls and that no additional controls were reasonable for this planning period.[75] We are appropriately disapproving this portion of Texas' SIP. The fact that Texas' decision to evaluate visibility improvement was ''discretionary'' does not mean that Texas was free to exercise that discretion in an unreasonable manner.

We note that the Tenth Circuit's decision in *WildEarth Guardians* v. *EPA* does not address the issues present in this case. There, the Tenth Circuit Court merely held that the CAA does not require a state to conduct a source-specific reasonable progress analysis. The Court did not hold that a state is free to conduct any type of analysis irrespective of whether or not the analysis is reasonable. Nor did the Court hold that the CAA prevents states or the EPA from conducting a source-specific analysis if that approach is determined to be appropriate.

Finally, we disagree with the commenter that we elevated visibility improvement to a place of primary importance, either in disapproving Texas' SIP or in promulgating our FIP. The flaws with Texas' consideration of visibility benefits were only one aspect of our disapproval. Moreover, we stated on multiple occasions in our proposal that we considered all four statutory factors in our analysis. Our analysis does not give greater weight to one factor over another; rather, we considered all four factors fully, revealing that the cost factor, which included visibility improvement consideration, was the most determinative in our decisions. The *American Corn Growers Ass'n* v. *EPA* case is inapposite. There, the D.C. Circuit Court faulted how EPA assessed the statutory fifth factor of visibility improvement in a BART determination (not a reasonable progress determination) by using a regional, multi-source, group approach to assessing the visibility improvement factor, while assessing the other four statutory BART factors on a source-specific basis. Here, not only is the analysis at issue not being performed under BART, but we did not give greater weight to our consideration of visibility improvement within the cost factor, or consider the cost factor in a different fashion from the other three reasonable progress factors.

Comment: Some commenters stated that regional haze is the contribution of numerous emission sources to visibility impairment and that, while the contribution from any single source may be ''insignificant,'' the aggregate impact from all sources is significant. These commenters argued that, by using the Q/d screening metric, the EPA already took potential visibility impacts (and benefits of control) into account. They argued that the EPA cannot use visibility again during the four-factor analysis as an ''off-ramp'' to not control a source. Furthermore, the EPA should not break a facility down into its constituent parts because doing so can diminish each individual impact to the point where it becomes relatively insignificant. Such a ''divide and exempt'' approach is contrary to Congress' goal that Class I areas eventually return to natural visibility conditions. One commenter stated that the EPA should have conducted four-factor analyses for all 38 facilities identified in the Q/d analysis.

Response: We agree that regional haze is, by definition, visibility impairment caused by numerous emission sources. We also agree that, while some sources may have very small visibility impacts, aggregate impacts can be significant. However, while there are undoubtedly thousands of sources within Texas that individually have small contributions to regional haze, there are also many sources that, even in isolation, have relatively large visibility impacts. In this first planning period, we identified the most significant sources that impact visibility, determined whether cost-effective controls were available for these sources, and balanced the costs of those controls against their visibility benefits. As we discussed in more detail above, if we had adopted the commenters' suggestion and controlled all large sources where cost-effective controls were available, we likely would have controlled many additional sources. Given the iterative nature of the regional haze program, we think that it was a reasonable approach to require only those cost-effective controls with the largest benefits this planning period. We expect that Texas will control additional sources, which by then will be the largest contributors to impairment, during future planning periods.

As we explain further in supporting documents, we also disagree with the commenter's suggestion that we should have screened only by using the Q/d metric. A Q/d analysis compares a source's emissions and distance to nearby Class I areas to provide an initial estimate of the potential visibility impacts of those sources. After conducting our Q/d analysis, we then used photochemical modeling to estimate the visibility impacts of this set of sources in a much more refined manner that accounts for chemistry, meteorological conditions, and stack parameters in addition to emissions and location. The results of our modeling indicated that a subset of 38 facilities were the primary contributors to visibility impairment at each Class I area. We then used the modeling results to narrow the group of sources further because it was reasonable to conduct a

[72] *North Dakota,* 730 F.3d at 766.

[73] *See* Section B.2 of the Texas TSD and Section V.C.3 of our proposal (79 FR 74818).

[74] In contrast, Texas conducted a proper visibility analysis using natural background conditions elsewhere in its SIP when the state assessed the visibility impacts of its BART sources. *See* Texas Regional Haze SIP, Appendix 9–5 at 2–11 (''The source's HI [haze index] is compared to natural conditions to assess the significance of the source's visibility impact. EPA guidance lists natural conditions (bnatural) by Class I area in terms of Mm^{-1} (EPA, 2003b) and assumes clean conditions with no anthropogenic or weather interference. The visibility significance metric for evaluating BART sources is the change in deciview (del-dv) from the source's and natural conditions haze indices.'').

[75] Texas concluded, ''At a total estimated cost exceeding $300 million and no perceptible visibility benefit, Texas has determined that it is not reasonable to implement additional controls at this time.'' Texas regional haze SIP at 10–7.

full four-factor analysis only for the subset of sources with the largest facility-and unit-level visibility impacts, as described in detail in our supporting documents.

E. Consultation Between Oklahoma and Texas

Comment: The regulations require that Texas' long-term strategy reflect the emission reductions requested and agreed to by the CENRAP states. EPA points to no flaws in the CENRAP regional planning process in which Texas and Oklahoma participated together. The EPA asserts that the TCEQ should have provided information necessary to identify reasonable reductions, which the Regional Haze Rule does not require. Oklahoma did not request additional controls on Texas sources or disagree with Texas' determination that no additional controls were warranted during the first planning period.

Nonetheless, the EPA arbitrarily disapproved the Texas consultation process with Oklahoma without reference to its rules, guidance, and prior SIP approvals. The proposal never details what information Oklahoma lacked in establishing its reasonable progress goals, and EPA must provide a more adequate explanation of how additional information would have changed Oklahoma's ultimate determination that additional controls on Texas sources would not move the Wichita Mountains perceptibly closer to its regional haze goals.

Response: We disagree that participation alone in a Regional Planning Organization (RPO) process (here CENRAP) will always be enough to meet the requirements for consultation under the Regional Haze Rule. The rule does not negate the requirement that a state have a complete and technically adequate analysis so that consultations are well informed. The RPOs, such as CENRAP, provided technical analyses, including emission inventory development and air quality modeling to project future visibility conditions and additional information on sources of visibility impairment to facilitate consultations and support the development of the states' regional haze SIPs.

Although Texas participated in CENRAP, it retained the duty to do whatever additional analysis was necessary to fully address the requirements of the Regional Haze Rule for addressing its long-term strategy and setting its reasonable progress goals. While the long-term strategy requirements allow a state to rely on the RPO technical analysis, that is true only to the extent it provides the necessary information. A state must address any gaps in that analysis. For Texas, inadequate information existed not only for the reasonable progress analysis for its own Class I areas, but also for the long-term strategy development for addressing significant impacts at the Wichita Mountains. CENRAP was not required, nor did it provide state-specific analyses and information on the cost-effectiveness and visibility benefits of potential control strategies under consideration by each state to address the specific sources or groups of sources within that state that have the largest visibility impacts. Rather, CENRAP provided more general information on overall projected visibility conditions, potential controls and associated costs for some sources and the potential benefit of regional emission reductions to inform the development of potential control strategies that may require additional analysis.[76] For example, while the CENRAP analysis identified that impacts from EGUs in Texas were significant, it did not provide a refined analysis to fully assess the cost-effectiveness and visibility benefits of controlling those sources, including not providing information on the cost-effectiveness of scrubber upgrades for those sources with existing, underperforming scrubbers. As Texas states in its regional haze SIP, ''While Texas participates in CENRAP and benefits from the technical work coordinated by the RPO, Texas has sole responsibility and authority for the development and content of its Regional Haze SIP.''[77]

Recognizing that the information made available by CENRAP indicated the significant impact of Texas emissions and potential for cost-effective controls, Texas used the CENRAP analysis as a starting point, and performed supplemental analysis for both its reasonable progress and long-term strategy demonstrations. However, that additional technical analysis performed by Texas was flawed and therefore did not provide the type of information necessary to fully evaluate the reasonableness of controls at Texas sources with the largest potential to impact visibility at its own Class I areas and the Wichita Mountains. Allowing this lack of adequate information to continue was a critical misstep for ODEQ in setting its reasonable progress goals, and a critical misstep for Texas when determining its fair share of emissions reductions under the long-term strategy requirement. The plain language of the CAA requires that states consider the four factors used in determining reasonable progress in developing the technical basis for the reasonable progress goals both in their own Class I areas and downwind Class I areas. Such documentation is necessary so that interstate consultations can proceed on an informed basis, and so that downwind states can properly assess whether any additional upwind emissions reductions are necessary to achieve reasonable progress at their Class I areas. Therefore, Texas had an obligation to provide appropriate information to Oklahoma so it could establish a proper progress goal for the Wichita Mountains. Further, Texas had an obligation to conduct an appropriate technical analysis, and demonstrate through that analysis (required under paragraph (d)(3)(ii)), that it provided its fair share of emissions reductions to Oklahoma. In summary, Texas was required through the consultation process to provide Oklahoma the information it needed to establish its reasonable progress goals for the Wichita Mountains, and it failed to do so.

Comment: Oklahoma possessed more than adequate information about impacts and potential controls but correctly decided it was not reasonable to request any further reductions from Texas sources during the first planning period. Oklahoma was in agreement with Texas on the goal and measures for the Wichita Mountains. EPA may disagree with that choice in hindsight and may wish Oklahoma's and Texas' agreement was different, but that is an unlawful basis for disapproving Oklahoma's reasonable progress consultation with Texas and disapproving Oklahoma's reasonable progress goals.

Response: While we agree that Oklahoma possessed more than adequate information from the CENRAP analyses about impacts from Texas sources at a certain level of aggregation, and some knowledge concerning potential controls for some of these sources, we do not agree that it was reasonable for Oklahoma to stop at this point. Despite the information it did have, Oklahoma never explicitly asked Texas for reductions even though there was clear evidence from the CENRAP analyses that Texas sources, particularly EGUs in northeast Texas, were

[76] CENRAP conducted a control sensitivity analysis to evaluate the impact of point source emission reductions across all CENRAP states given a maximum dollar per control level of $5,000/ton; however, the results ''were intended to be a starting point for control discussions that would require much greater refinement.'' Technical Support Document for CENRAP Emissions and Air Quality Modeling to Support Regional Haze State Implementation Plans, September 12, 2007 at 2–37).

[77] 2009 Texas Regional Haze SIP at 3–1.

significantly impacting the Wichita Mountains and that cost-effective controls were likely available on some of these sources.

The Regional Haze Rule required that Oklahoma use the consultation process under 40 CFR 51.308(d)(1)(iv) in the development of reasonable progress goals in tandem with Texas. Nevertheless, throughout the consultations, Oklahoma failed to explicitly request that Texas further investigate whether reasonable controls were available or that Texas reduce emissions from these significantly impacting sources to ensure that all reasonable measures to improve visibility were included in Texas' long-term strategy and incorporated into Oklahoma's reasonable progress goals for the Wichita Mountains. This failure resulted in the development of improper reasonable progress goals for the Wichita Mountains.

Comment: Even if EPA's disapproval of Oklahoma's reasonable progress goals were authorized and supported, that disapproval does not allow EPA to disapprove Texas' long-term strategy. Regardless of EPA's view of Oklahoma's reasonable progress goals for the Wichita Mountains, it is undisputed that Texas' SIP includes the measures necessary to secure Texas' agreed-to apportionment of emission reductions to meet the reasonable progress goals for the Wichita Mountains established by Oklahoma, and thus EPA must approve Texas' SIP.

Response: We disagree that disapproval of Oklahoma's reasonable progress goals for the Wichita Mountains does not allow us to disapprove Texas' long-term strategy. We are disapproving the Texas long-term strategy because the analysis underlying it is technically flawed. Because of these flaws, Texas' SIP submittal does not include all the measures necessary to secure its apportionment of the emission reductions needed to meet the progress goal that should account for all reasonable control measures for the Wichita Mountains, or its own Class I areas. We are disapproving the Oklahoma reasonable progress goals for the Wichita Mountains not because of the technically flawed Texas long-term strategy, but because Oklahoma's consultations with Texas were flawed, which prevented it from adequately developing its reasonable progress goals for the Wichita Mountains. Also, because Oklahoma's consultations with Texas were flawed, Oklahoma did not adequately consider the emission reduction measures necessary to achieve the uniform rate of progress for the Wichita Mountains and did not adequately demonstrate that the reasonable progress goals it established were reasonable based on the four statutory factors. See our previous responses concerning the comments on Texas allegedly meeting the ''agreed-to apportionment.''

Comment: EPA never raised any of the concerns it asserts and it never second-guessed the process or the data that the states were developing—as it does now, years after that process has been completed and on the eve of the next planning period. In truth, Texas and Oklahoma did exactly what EPA encouraged them to do.

Response: Our task under the CAA is to review a SIP once it is formally submitted by the state and determine if it meets the CAA and our rules. There is no requirement in the CAA that we must review, evaluate, and comment on a state's proposed SIP revision before it is formally submitted to us. Nevertheless, we note that we sent comment letters to Texas and Oklahoma during their public comment periods, raising many of the issues presented herein. We stated that Texas should specifically demonstrate that it included all measures necessary to obtain its share of the emission reductions necessary for achieving reasonable progress in the Wichita Mountains and document its technical basis. Furthermore, we stated that the Texas reasonable progress/long-term strategy technical analysis raised concerns about whether it appropriately evaluated whether there were additional reasonable controls available to help reduce its impact on the Wichita Mountains. For Oklahoma, we stated it did not appear that ODEQ actually requested reductions from Texas and we urged Oklahoma to ensure Texas was aware of its sources' impact and encourage reductions as necessary. In both letters, we stated that additional concerns would surface during the review of the final SIP submittals.

Comment: EPA's consultation disapprovals of Oklahoma and Texas are the first time EPA has disapproved a state regional haze consultation. This new approach of second-guessing regional agreements—years after they are reached and implemented—would undermine and chill the regional planning process, and discourage states from participating.

Response: We disagree that this is a new approach on the consultation requirements and we also disagree that our position undermines or chills the regional planning process. While our regulations allow states to work together in RPOs, like CENRAP, this is not a stopping point for states to fall back on as a rationale not to meet the CAA and Regional Haze Rule. We have not disapproved other states' reasonable progress/long-term strategy consultation processes because the particular facts of the situation for Texas and Oklahoma did not arise. We believe our clarification that upwind states have an obligation to reasonably assess potential control measures to address impacts in Class I areas in downwind states will encourage states to work together to address regional haze.

F. Source Category and Individual Source Modeling

Comment: EPA proposed to disapprove Texas' regional haze SIP because EPA determined that Texas was required to conduct a source-specific analysis of certain facilities to meet the reasonable progress requirements. EPA guidance and judicial precedent have stated that a source-specific analysis or source-by-source demonstration is not required to determine reasonable progress.

Response: We disagree with these comments as our proposal to disapprove the SIP was decidedly not based on the supposed use of a source category-based analysis by Texas. Therefore, these comments have not accurately described the proposed basis of disapproval. We understand many of these comments arose because our proposal included a statement that ''individual sources were not considered by the TCEQ.'' This statement was not offered to propose a basis for disapproval, but we understand it is susceptible to being taken out of context (particularly in consideration of the comments received). It is perhaps more plain to state that individual sources were not *effectively* considered by the TCEQ. As our proposal and the Texas SIP itself make clear, Texas did, in fact, partially evaluate controls for certain individual sources. In evaluating these controls, Texas employed a large, superficially refined control set consisting of a mix of large and small sources from a number of different source categories located within varying distances of Class I areas. It did assess individual source data for some factors such that we do not necessarily agree with commenters who brand it a ''source category analysis.''

Whatever its label, we proposed to disapprove Texas' reasonable progress analysis because it was flawed in several specific ways. A primary flaw was that the control set was over-inclusive. It included controls on sources that served to increase the total cost with little visibility benefit. As was noted in our proposal,[78] Texas adopted this approach despite evidence in the record of identified source-specific, cost-effective controls that would have resulted in large emission reductions on certain EGUs, and despite source apportionment modeling that identified large impacts from EGU sources in northeast Texas. Our proposal explained that this approach obscured benefits that might be obtained from individual sources and only considered aggregated costs. As we also explained, the submitted analysis failed to study or consider scrubber upgrade candidates. It was accordingly under-inclusive of large, highly cost-effective emissions reductions that would lead to significant improvements in visibility. These points are validated by the technical record for this FIP.

Therefore, whether the state's analysis is labelled a source category analysis, an analysis of multiple individual sources, or some hybrid, we conclude that it contained serious deficiencies that would materially affect the outcome of the state's SIP process. As a result, we conclude this component of the SIP requires disapproval.

Finally, it bears noting that the approach we have taken in our FIP to identifying appropriate controls does not dictate the approach that Texas or any other state must take to assess controls. Given Texas' size and the range of distances from point sources to Class I areas, the mix of controls at EGUs and other large point sources in the state, and the overall significance of the impacts from these point sources, we considered it appropriate to undertake a source specific analysis to avoid the potential for over-controlling sources.[79] In some circumstances, depending on the types of sources at issue, the impacts from these sources relative to other causes of visibility impairment, the types of controls under consideration, and other such factors, a source category approach can be appropriate. Ultimately, however, while there is flexibility in available analytical approaches, states cannot adopt an approach to reasonable progress, which by its nature overlooks cost-effective controls that would otherwise be viewed as being beneficial.

Comment: Because of guidance and precedent that ''source category'' analyses can be appropriate, individual sources or point sources cannot be subject to source-specific controls to meet reasonable progress. Individual sources can be subject to control for purposes of addressing BART or RAVI requirements but additional, source-specific controls may not lawfully be imposed.

Response: We disagree with the argument that, because a source category analysis may be appropriate in some circumstances, sources cannot be subject to source-specific controls to ensure reasonable progress toward improving visibility. It is unclear how a state would develop a SIP containing ''emission limits, schedules of compliance, and other measures may be necessary to make reasonable progress,'' as required by CAA section 169(A)(b)(2), without the option of source-specific controls going forward. There is nothing in the visibility provisions of the CAA or the Regional Haze Rule suggesting otherwise.

Comment: Information on FGD scrubber upgrades cannot be used to disapprove the SIP because that information was acquired through EPA's authority to obtain information under CAA section 114, but the state has no equivalent corresponding authority. EPA comment letters and communications in past years had not informed the state of the importance of analyzing scrubber upgrades.

Response: Neither of these observations would justify our approving a flawed component of a SIP revision—in this case an analysis within that SIP revision—that, among other things, had unreasonably overlooked the option of FGD upgrades. Our 2005 BART rule discussed the state evaluation of scrubber upgrades in several places.[80] The technical information in our proposal validates FGD upgrades as an option that should have been considered, and we consider this technical record to have been reinforced and further validated with additional information and comments provided in support of the proposal. Even as we acknowledge that the TCEQ does not have authority (or any present delegation of authority) to request information under CAA section 114, this is not any kind of determinative limitation on the state's technical and regulatory capacities and tools for producing and developing information on an air pollution control measure such as FGD upgrades. Texas has engaged in air quality control planning and air pollution prevention under the CAA for decades, and the Texas agency or agencies responsible for SIP adoption and implementation are required to possess the necessary legal authority under state law to adopt and implement all SIP measures.[81] Consequently, in this case, the TCEQ bore the responsibility of developing or requesting information needed to properly assess scrubber upgrades. Lastly, as we state above, any past EPA comment letters would be intended to be helpful to the improvement of any SIP revision that is under development, but they do not constitute agency action on that SIP revision or constitute any assurance of positive action on that revision upon submission and review. Instead and as always, EPA has to formally discharge its responsibilities to review any SIP submittal under the provisions of CAA section 110(k). Accordingly, the issue of TCEQ's knowledge, notice, or lack thereof on FGD scrubber upgrades cannot be resolved in any way that would shield the SIP revision from this basis for disapproval.

G. Constitutional Law

One commenter cited to the Commerce Clause, Fifth Amendment and Constitutional non-delegation principles in support of its contention that EPA should not be able to regulate sources under our regional haze program. We disagree with these comments. First, under the Commerce Clause, the commenter argues that we cannot regulate regional haze on the theory that regulated conduct—such as ''carbon emissions'' from coal-fired power plants—will have some effect on interstate commerce. We disagree with the comment because owners and operators of the Texas sources subject to this regional haze FIP are engaged in economic activities (the operation of coal-fired power plants) that cause haze-forming air pollution to travel into other states and substantially affect interstate commerce. Each of the Federal Class I areas receives substantial numbers of visitors, including those from out-of-state, each year. Our regulation of these sources of visibility impairing pollution pursuant to the CAA is squarely within the Federal government's Commerce Clause authority. Our regulation of emissions from coal-fired power plants, which cause and contribute to regional haze in multiple states, to fill a gap left by disapproval of a SIP seeks to fulfill

[78] 79 FR 74838 (''[W]e believe that individual benefits were masked by the inclusion of those controls with little visibility benefit that only served to increase the total cost figures.'')

[79] On this point, it also bears noting that Texas' EGUs operate within a state that is at least three times larger than 38 of the states and a full 60% larger than California, the next largest of the contiguous states.

[80] See for instance 70 FR 39171: ''You should evaluate scrubber upgrade options based on the 5 step BART analysis process.''

[81] CAA section 110(a)(2)(E); 42 U.S.C. 7410(a)(2)(E) (requiring assurances of ''. . . adequate, personnel, funding, and authority under State . . . law to carry out'' SIP requirements); Section 2.1(c) of appendix V to 40 CFR part 51.

the regional haze provisions of the CAA, which in turn are constitutional exercises of Congress's power under the Commerce Clause of the U.S. Constitution.

Second, the commenter contends that our Regional Haze Rule suffers from a non-delegation problem. We disagree. The CAA's visibility provisions provide extensive intelligible principles that guide our exercise of discretion. CAA section 169A, as well as other provisions, required us to promulgate regulations directing the states to revise their SIPs to include emission limits and other measures as necessary to make ''reasonable progress.'' [82] Congress defined reasonable progress to be the consideration of four statutory factors, including cost and energy impacts.[83] Congress also directed our regulations to require BART for a specific universe of older sources, and again provided a set of statutory factors states must consider when determining what control technology constitutes BART.[84] These two sets of statutory factors, among several other provisions and definitions in CAA section 169A that provide specific instructions to EPA and states, clearly constitute intelligible principles under the framework set forth in the case cited by the commenter. The Regional Haze Rule, which we promulgated pursuant to the statutory mandate in CAA section 169A, reflects these same intelligible principles and has been upheld by the D.C. Circuit Court.

Third, a commenter claims that the EPA has commandeered the states in violation of the Fifth Amendment of the Constitution. We disagree with this comment. The U.S. Supreme Court has held that, ''the Federal Government may not compel the states to implement Federal regulatory programs.'' [85] The CAA in no way compels a state to implement Federal regulatory programs. The CAA, instead, authorizes the EPA to promulgate and administer a FIP if a state fails to submit an adequate SIP.[86] The EPA will implement the FIP, with no actions required by any part of the government of Texas.

H. Stay of Effective Date, Consolidated Appropriations Act, and Executive Orders 13405 and 13211

Comment: Any final action should stay the effectiveness and effective date of the action or establish a delayed effective date to allow for ''judicial vetting'' of EPA's determinations.

Response: We have reviewed these requests and do not agree that taking these measures with our final rule would be appropriate. Our final rule initiates the effectiveness of the action to ensure the requirements of the CAA are carried into effect. This result is consistent with the CAA and with the regulatory rulemaking process more generally. We note that CAA section 307(d)(7)(B) allows, in limited fashion, for a stay of effectiveness of a rule during any proceeding for reconsideration, but this authority presupposes the rule's finalization, the rule's effectiveness, and the filing of an administrative petition for reconsideration. Making the rule effective also ensures the finality of the action ''for purposes of judicial review.'' *See* CAA section 307(b). Nothing in our response here limits or inhibits the filing of a petition for judicial review or the powers of a reviewing court.

Comment: EPA should update both its atmospheric modeling platforms as part of the upcoming Appendix W rewrite and the cost manual in order to support reasonable future assessments of visibility impacts and appropriate control strategies consistent with the Committee Report associated with the Consolidated Appropriations Act of 2014.

Response: As a general matter, wherever possible, we intend to follow the committee report instructions associated with the Consolidated Appropriations Act of 2014, even where not specifically incorporated by reference into the CAA itself. We are currently working to update our ''Guideline on Air Quality Models'' in appendix W to part 51 of title 40, Code of Federal Regulations, and we proposed updates on July 29, 2015. Also, as of the date of responding to this comment, we have proposed updates to chapters within our Control Cost Manual.

Comment: One commenter stated that if we change the final rule to not include SO_2 reductions at one of the affected facilities, we must conduct an analysis under Executive Order 13045—Protection of Children from Environmental Health Risks and Safety Risks. Another commenter suggested that polluters need to reconsider a business model that burdens low income communities, especially those with minority populations, with the effects of air pollution, and urged that EPA is accountable to low income, underserved, and vulnerable communities in Texas that are constantly being ignored.

Response: As explained more fully in a later section of this document and in our RTC document, Executive Order 13045 does not apply. To the extent our final rule limits emissions of SO_2, this will also increase the level of environmental protection and beneficial effect on human health for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population.

Comment: EPA has improperly avoided analyzing and evaluating potential energy-related impacts of the proposed rule on reliability and prices of electricity in Texas and the ERCOT region, despite Executive Order 13211 requiring such evaluation. The EPA is using a loophole in Executive Order 12866, despite meeting the cost and effect criteria and the order's purpose, to avoid evaluating the potential energy impacts of the proposed action as required by Executive Order 13211. Moreover, the proposed rule is inconsistent in claiming the rule is both of national scope and effect and not of general applicability. Additionally, CAA section 169A(g) requires that the state and the Administrator consider the energy and non-air quality environmental impacts of compliance when determining BART. Finally, citing ERCOT's recent report, the proposed FIP affects a significant portion of Texas' base load power generation fleet and the potential for adverse effects from the EPA's proposed rule is actually increased, not lessened, because the costs and impacts of the rule are focused within a smaller region. Therefore, regardless of Executive Order 13211 applicability, EPA should evaluate and consider the impacts of the proposed FIP on the reliability and price of electricity in Texas.

Response: As explained more fully in a later section of this document and our RTC document, Executive Order 13211 does not apply as this action is not a rule of general applicability under Executive Order 12866. Our determination regarding this is not inconsistent with our determination that the rule is of national scope and effect, as these are different determinations that we fully evaluated under their respective standards, and are not directly comparable. Additionally, we did consider the commenter's concerns regarding grid reliability and price of electricity, as discussed more fully in the Grid Reliability section of this document, so we did not ''utilize a loophole'' in the applicability provisions of Executive Order 12866 to

[82] 42 U.S.C. 7491(b)(2).

[83] *Id.* at 7491(g)(1).

[84] *Id.* at 7491(b)(2)(A) & (g)(2).

[85] *Printz* v. *United States,* 521 U.S. 898, 925 (1997).

[86] 42 U.S.C. 7410(c)(1)(A).

avoid consideration of the concerns raised in this comment.

I. Controls in Addition to CAIR/CSAPR, and CSAPR Better Than BART

Comment: Texas is the only state included in CSAPR for which EPA is issuing a FIP for reasonable progress. EPA proposed to issue a FIP that would replace Texas' reliance on CAIR to satisfy the BART requirement for EGUs with reliance on CSAPR. But EPA's proposal otherwise disregarded CSAPR's more stringent SO_2 and NO_X emission budgets for Texas, as compared to CAIR, as well as the additional trading restrictions imposed by CSAPR. For all other states that have relied on either CAIR or CSAPR, EPA found such participation to satisfy the states' reasonable progress obligation for the first planning period for those sources. EPA should not require controls beyond BART for BART sources because it is reasonable to conclude that no additional emissions controls are necessary for BART sources in the first planning period.

Response: As discussed elsewhere in this document, although we proposed to rely on CSAPR to address the BART requirements for EGUs in Texas, we are not finalizing that proposed action. On July 28, 2015, the D.C. Circuit Court issued its decision in *EME Homer City*[87] upholding CSAPR but remanding without vacating a number of the Rule's state emissions budgets, including Texas' budgets. We are currently in the process of determining the appropriate response to the remand, and the extent to which the SO_2 and NO_X CSAPR budgets for Texas will change is currently unknown. The uncertainties regarding the CSAPR SO_2 budgets are particularly relevant given our rule's focus on this pollutant.[88] Even assuming, however, that *EME Homer City* had not invalidated the CSAPR NO_X and SO_2 budgets for Texas and that we were taking final action to address the BART requirements through reliance on CSAPR, we do not agree that we are prohibited from requiring controls beyond CSAPR for purposes of reasonable progress. We noted in 2005 that the determination that CAIR provided for greater reasonable progress than BART did not answer the question of whether more than CAIR would be required in a regional haze SIP.[89]

Furthermore, such a simplistic comparison ignores the meaningful differences between Texas and the other states cited by commenters in which no controls on NO_X and SO_2 from EGUs beyond CSAPR were required. As explained in our proposed rulemaking, allowing Texas to rely on CSAPR to meet its reasonable progress obligations is not appropriate, considering the large impact of Texas sources on visibility at Big Bend, the Guadalupe Mountains, and the Wichita Mountains and the availability of cost-effective controls even after considering CAIR/CSAPR's previously projected reductions.

Comment: EPA should disapprove Texas' determination to exclude all BART-eligible sources from being subject to BART and EPA should do source by source BART for NO_X. Further, if EPA does not finalize the proposed controls for reasonable progress, then EPA should do source by source BART for SO_2. EPA's proposal to rely on CSAPR as an alternative to BART is unlawful for three reasons. First, EPA's proposal exempts sources from BART requirements without complying with the statutory prerequisites for such an exemption. Second, even if EPA could relieve the sources of the obligation to install BART controls, the ''Better than BART'' rule upon which EPA relies is flawed. Third, the ''Better than BART rule'' is no longer valid given the substantial changes in CSAPR allocations and compliance deadlines.

Response: As discussed above, we are not finalizing our proposed action to rely on CSAPR to address BART due to the partial remand of CSAPR in *EME Homer City.* We will address the question of appropriate SO_2 and NO_X BART limits for EGUs in Texas in a future rulemaking. Comments concerning the appropriateness of CSAPR as an alternative for BART in Texas are not relevant to this action. Additionally, we are finalizing the proposed controls for reasonable progress. Therefore, the comment that we should do source-by-source BART for SO_2 if the reasonable progress controls are not finalized is moot.

J. Installation of Controls Beyond the First Planning Period

Several comments assert that our FIP authority is limited to ''filling the gaps'' in a state's SIP submission. These commenters further contend that our FIP authority is limited by the scope of the SIP submission. Because the required reasonable progress goals should be met at the conclusion of the first planning period, the commenters' argument continues, our FIP authority is likewise limited to those controls that can be implemented by 2018. We disagree. Our authority to use a FIP to address a ''gap'' or ''inadequacy'' in a SIP refers to a ''gap'' in the plan's coverage of requirements contained in the statute and regulations, and is not limited to the specific ''gap'' left by the disapproved portions of the scope of action covered in the state's SIP submission, as commenters suggest.[90]

In this action, we are determining whether Texas has addressed the regional haze requirements set forth in the CAA and our implementing regulations. Our FIP determines that under a proper assessment of reasonable progress factors, additional controls for some sources in Texas are warranted for the first planning period. Regulatory delays created by a complex Texas submission and EPA actions regarding the state's regional haze requirements, including the time needed for EPA to assess the complex 2009 submission and the thousands of comments received on our proposed action, cannot provide an exemption from the CAA requirement to address regional haze. Nor can regulatory delays make additional delays excusable when the requisite CAA analysis concludes the controls are warranted at the earliest opportunity to make reasonable progress. Additionally, there is nothing in the CAA or the regional haze rules that constrains our FIP authority to only those controls that can be installed in the first planning period. While reasonable progress goals reflect that degree of visibility improvement attainable during the first planning period (which extends to 2018), as was indicated in our proposal, the long-term strategy requirements of the program by their very nature look beyond these interim goals to the state's ''long term'' approach to addressing regional haze and may include control measures and accompanying visibility improvements that extend beyond the first planning period.[91] The commenter's concerns center upon controls that are not accounted for in the numerical reasonable progress goals, but rather as we acknowledge, are part of the long-

[87] *EME Homer City Generation* v. *EPA,* 795 F.3d 118 (D.C. Cir. 2015).

[88] ''In short, EPA's 2014 SO_2 emissions budgets for Texas, Alabama, Georgia, and South Carolina require each of those States to reduce emissions by more than the amount necessary to achieve attainment in *every* downwind State to which it is linked. The reductions on those four States are unnecessary to downwind attainment *anywhere.* Those emissions budgets are therefore invalid.'' *EME Homer City,* at 129 (*citing EME Homer,* 134 S. Ct. 1584, 1608–9 (2014)) (internal quotations omitted).

[89] 70 FR 39104, 39143.

[90] See CAA Sections 110(c) and 303(y).

[91] 79 FR 74874, citing Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program, Section 5.2. By statute, the long-term strategy for making reasonable progress may extend ''ten to fifteen years.'' CAA Section 169A(b)(2)(B); 42 U.S.C. 7491(b)(2)(B).

term strategy and needed for reasonable progress.

Comments also asserted that our proposed FIP disregards the ''time necessary for compliance'' factor of the reasonable progress analysis. As we discuss in detail in the RTC document, we are required by regulation to ''*consider*'' time necessary for compliance when establishing reasonable progress goals, and we satisfied this requirement by proposing reasonable progress goals that account only for those controls that can be fully installed within the first planning period, as is consistent with our Reasonable Progress Guidance.[92] For the scrubber retrofits that may require up to five years to fully install, we exercised our authority to propose a long-term strategy including emission limits that require controls that may not be operational during the planning period and therefore are not included in the reasonable progress goals. We also note that we expect that design and construction of the scrubber retrofits will begin within the planning period, in order to meet the five-year compliance date. This approach is consistent with other FIPs issued by EPA and takes into account the time engagement required to promulgate a FIP within a planning period and the significance of the CAA's contemplated ten to fifteen year long-term strategy.

Other comments asserted that our requirement for controls outside of the planning period is inconsistent with previous FIPs. We disagree with this comment. First, we have proposed or promulgated FIPs requiring controls with compliance dates beyond the first planning period, including FIPs for Arkansas and Wyoming. The Oklahoma FIP includes requirements beyond the first planning period as the result of a stay during litigation. Further, we have applied the requirements of the regional haze program to ensure consistency in the requirements upon the sources subject to regulation. If we were to follow the commenters' arguments and fail to require application of necessary controls on Texas sources past the first planning period, those sources would be treated inconsistently with sources in other states that were required to apply the controls necessary to meet the CAA's requirement to address regional haze. We cannot agree to inconsistent application of necessary controls at Texas sources due to delays in promulgating a FIP or time-intensive installation schedules, but rather, we address these program requirements through the long-term strategy, which, as discussed above, allows for control strategies that can begin design and construction but cannot be completed within the planning period.

Several comments assert that our regulatory delays preclude EPA from imposing certain emission limitations that may not be achieved within the first planning period. Despite any delays in finalizing our action on the Texas SIP or in promulgating the FIP, we have a duty to act on the SIP and a duty to fulfill the regional haze requirements of the Act, including the authority to promulgate a FIP that imposes the controls required by the CAA where a SIP submission fails to do so. This duty and authority is not forfeited or constrained by delays, whatever their cause. We likewise disagree with commenters who consider it inappropriate for controls to be required after the planning period because corresponding visibility benefits may not be realized during the planning period. The fact that benefits of such controls may not be realized within the first planning period does not affect our determination that the controls are necessary nor deprive us of our authority to impose the requirements.

A commenter asserted that all of the controls required under the proposed FIP can be installed within the first planning period. We agree that in some cases scrubber retrofits can and have been installed in less than five years; however, we do not have the information necessary to make that determination for each specific facility included under the proposed FIP. Thus, we proposed an installation timeframe consistent with past successful BART-related scrubber retrofits that, while conservative, ensures the necessary time to install the controls.

K. Cost

We received numerous comments related to the cost analyses we performed to support the seven scrubber retrofits and the seven scrubber upgrades we proposed. These comments were received from both industry and environmental groups, and covered all aspects of our cost analyses.

Some of the comments we received from industry concerning our proposed scrubber retrofits were objections to our use of the IPM cost algorithms that were developed by Sargent and Lundy (S&L) under contract to us. As we discuss in our Cost TSD, we programmed the DSI, SDA, and wet FGD cost. algorithms, as employed in version 5.13 of our IPM model, into spreadsheets.[93] Industry stated these cost algorithms were not accurate enough to warrant their use in individual unit-by-unit cost analyses and that our use of them violated our Control Cost Manual. Others stated the IPM cost algorithms do not consider site-specific costs, or in the case of wet FGD, do not adequately consider wastewater treatment.

In summary, we disagree with these commenters and conclude that the IPM cost algorithms provide reliable, study-level, unit-specific costs for regulatory cost analysis such as required for BACT, BART, and reasonable progress.[94] We received other comments relating to our scrubber retrofit cost analyses, but none of them caused us to revise our scrubber retrofit cost-effectiveness basis. We also received a number of comments that our proposed emission limits were too stringent. We disagree with these comments and present several lines of evidence, including real-world data demonstrating that our proposed emission limits are not only achievable, but are in fact conservative in many cases.

As we discuss in our proposal,[95] our scrubber upgrade analyses were based on information we received in response to our requests under CAA section 114(c). This information was claimed as CBI under 40 CFR 2.203(b). As a consequence, we are obligated to protect the confidentiality of that information while it is subject to such claims, which precludes us from publicly posting this in our docket at regulations.gov. CBI information, while a part of our rulemaking docket, is protected from public disclosure under our CBI requirements. Although we received some public domain comments on our proposed scrubber upgrades, most were claimed as CBI. We analyzed that information, and as we discuss below in our comment response summary, we have modified certain aspects of our analyses. Like our proposed scrubber upgrade cost analyses, our revised scrubber upgrade cost analyses are similarly treated as CBI but are available

[92] See our Reasonable Progress Guidance, page 5–2: ''It may be appropriate for you to use this factor to adjust the RPG to reflect the degree of improvement in visibility achievable within the period of the first SIP if the time needed for full implementation of a control measure (or measures) will extend beyond 2018.''

[93] See discussion beginning on page 3 of our Cost TSD for more information concerning our use of the IPM cost algorithms.

[94] We believe that the IPM cost algorithms provide study level accuracy. See pdf page 17 of our Control Cost Manual: ''[a]''study'' level estimate [has] a nominal accuracy of ± 30% percent. According to Perry's Chemical Engineer's Handbook, a study estimate is '. . . used to estimate the economic feasibility of a project before expending significant funds for piloting, marketing, land surveys, and acquisition . . . [However] it can be prepared at relatively low cost with minimum data.' ''

[95] See discussion beginning on 79 FR 74876, and section 4.5 of our FIP TSD.

for review by the respective facilities. This prevents us from being able to publicly disclose the details of our analyses. Our revised scrubber upgrade analyses changed our proposed cost-effectiveness basis from where all scrubber upgrades were less than $600/ton, to where all scrubber upgrades ranged from between $368/ton to $910/ton. This is well within a range that we believe is cost-effective, given the visibility benefits that will result from the installation of those controls.

Below we present a summary of our responses to the more significant comments we received that relate to our proposed cost analyses.

Comment: We received information from Luminant and NRG claimed as CBI concerning our proposed scrubber upgrades. These companies hired S&L who alleged that we made various errors in our cost analyses and that our proposed SO_2 emission rates were too low. In related comments, Luminant stated that it hired S&L to review our scrubber upgrade cost analyses and, in so doing, it found multiple flaws. S&L states that many of our assumptions are not valid, especially those regarding the accuracy and scope of the CBI estimates we relied upon, our calculation of SO_2 baseline emissions, achievable efficiency, and our calculations of the operating costs. We also received comments from the TCEQ that we should have provided more detail about how we developed the costs for these scrubber upgrades. Earthjustice [96] submitted information concerning previous scrubber upgrades that supports the reasonableness of our assumed control level of 95%.

Response: As explained above, because Luminant and NRG claimed the above information as CBI, we were required to separate out such CBI and respond to it in a separate CBI protected document (organized by claimants). Although this information is a part of our record to this action, we cannot post it to our electronically posted public docket at *www.regulations.gov.* We disagree with the TCEQ that we should have provided more information concerning the cost of the scrubber upgrades we analyzed. Our scrubber upgrade cost information was based on information supplied under CBI claims by the affected facilities in response to requests for information under CAA section 114(a). Accordingly, although this information is still in our docket, and is being used to support our decision making, it cannot be included in our publicly posted docket at *www.regulations.gov* and can only be disclosed by us to the extent permitted by CAA section 114(c) and our regulations governing treatment of CBI as set out at 40 CFR part 2, subpart B.

We generally disagree that our analysis was flawed. We specifically used information provided by Luminant's and NRG's own independent contractors (*e.g.* S&L) whom they hired to assist in providing information responsive to our CAA section 114 requests. We have reviewed the scrubber upgrade cost analyses performed by S&L that were provided with separate comments from NRG and Luminant and adopted S&L's methodology, which mainly concerned operational costs. However, we noted many errors and undocumented cost figures in S&L's analyses. We corrected these errors and rejected some of S&L's undocumented assertions and/or costs. Nevertheless, in order to produce a conservative scrubber upgrade cost analysis and set many of the issues that Luminant raises aside, we incorporated many of Luminant's cost items. The resulting costs for Luminant's scrubber upgrades increased slightly, resulting in a range of $368/ton to $910/ton for all of the scrubber upgrades, but remained well within a range that we believe is cost-effective, given the visibility benefits that will result from the installation of those controls.

Comment: San Miguel stated that it should not be included in our FIP, but if it was included, its SO_2 emission limit should be increased and its emission averaging period should be changed from a monthly basis to an annual basis.

Response: We have reanalyzed the monthly emission data for San Miguel, including calculating the 30 BOD average for it since it completed its scrubber upgrades. We reaffirm our proposed conclusion that based on the coal that San Miguel has historically burned over the last several years, and its demonstrated ability to remove 94% of the sulfur from that coal, that it should be able to meet our proposed emission limit of 0.60 lbs/MMBtu based on a 30 BOD average. We also believe additional spare capacity exists in San Miguel's scrubber system. However, similar to what we discussed in our proposal,[97] and in section I.B.3.b, of this action, we offer San Miguel the opportunity to install a Continuous Emissions Monitoring System (CEMS) at its scrubber inlet and demonstrate that it maintain at least 94% control based on a 30 BOD average. Our RTC document has more details on these options.

Comment: The TCEQ summarized its approach to analyzing controls for reasonable progress and stated that its approach was adequate. In particular, the TCEQ defended its use of a $2,700/ton threshold for control, which it stated was used in CAIR, and its decision that the cost of the controls was not worth the improvement in visibility.

Response: As we note in our proposal,[98] we disagree with the TCEQ that its approach to reasonable progress was adequate. We note that to the extent that TCEQ's cost threshold was reasonable, our estimate of the costs of the controls required by our FIP fall below the $2,700/ton threshold used by Texas, with one exception. For the one source with estimated costs exceeding $2,700/ton, the costs of controls is less than the $2,700 threshold selected by Texas, after adjusting for the escalation of costs over time.[99] The TCEQ's potential control set consisted of a mix of large and small sources, located at various distances from Class I areas, with a large geographical distribution. Some controls would likely result in significant visibility benefits, but some would result in little to almost no visibility benefits. Because it only estimated the visibility benefit of all the controls together and weighed those benefits against the total cost of controlling the mix of sources under consideration, the TCEQ was not able to assess the benefit of controlling individual sources or the subset of sources with significant, and potentially cost-effective, visibility benefits. Larger individual benefits were obscured by the inclusion of those controls with little visibility benefit that only served to increase the total cost figures. As a result, despite its own conclusions that controls below $2,700/ton were available for a number of sources,[100] and CENRAP's modeling results that Texas point sources impact the visibility at the Wichita Mountains several times more than the impacts from Oklahoma's own point sources, Texas ultimately decided to not control these sources.

[96] When we refer to Earthjustice, we also mean the National Parks Conservation Association and the Sierra Club as these groups collectively submitted comments. These groups also contracted with independent technical experts including Ms. Victoria Stamper, Dr. H. Andrew Gray, and Dr. George D. Thurston.

[97] See discussion beginning on 79 FR 74885.

[98] 79 FR 74838.

[99] Conservatively escalating the $2,700/ton value from when it was first developed for the CAIR rule, which was finalized on March 10, 2005, to the time of our analysis, which was conducted in 2014, results in a value of $3,322/ton (*i.e.,* the Chemical Engineering Plant Cost Index for 2005 = 468.2, and that for 2014 = 576.1; $\$2,700 \times 576.1/468.2 = \$3,322$).

[100] See Appendix 10–1 of the Texas Regional Haze SIP. For example, the costs of scrubbers for Big Brown (Acct No F10020W) Units 1 and 2 were determined to be $1,573 and $1,540, respectively.

Furthermore, Texas' analysis did not include consideration of scrubber upgrades on key sources with large visibility impacts and potentially very cost-effective controls. Texas' flawed analysis prevented it from properly considering whether reasonable controls were available on the subset of sources or group of sources with the largest visibility impacts. Although our Regional Haze Rule and our Reasonable Progress Guidance provide states with latitude in approaching reasonable progress, states must still meet the requirements of the CAA and Federal requirements. We conclude that Texas' approach was flawed and this fundamental critical flaw in Texas' analyses cannot be approved.

Comment: Earthjustice agreed with our conclusion that Texas' approach to reasonable progress obscured potentially cost-effective controls. Earthjustice also generally supported our reasonable progress/long-term strategy analysis, concluded that in comparison with other actions our costs were conservative (high) but reasonable, but stated that additional units should have been proposed for control. Earthjustice criticized our emission baseline methodology of eliminating the high and low values from the 2009–2013 emission data and averaging the resulting three years of data. It reanalyzed our scrubber retrofit cost-effectiveness calculations for Big Brown, Monticello, Coleto Creek, Welsh Units, W. A. Parish, and Tolk Units 1 and 2, using a straight 5-year average of the 2009–2013 emissions, and concluded our costs were too high. Earthjustice generally stated our assumed DSI SO_2 removal efficiency was too high. Earthjustice believed we should have considered coal blending with low sulfur coal and lignite drying. Earthjustice also provided an analysis for Novel Integrated Desulfurization (NID). Earthjustice concluded that our calculated cost-effectiveness values were too high, and that NID was also a viable alternative to SDA and wet FGD and offered some advantages.

Response: We confirm that one of our intentions in performing our cost analyses was to conservatively estimate many of the individual cost parameters (tending toward a higher cost estimate) and demonstrate that even doing this, our proposed scrubber upgrade and scrubber retrofit cost analyses were cost-effective. We believe we have met that goal. We disagree with Earthjustice that we should have proposed additional units for control and respond to this comment in the Modeling section of this document and the RTC document. We continue to believe our five-year emission baseline methodology, with the elimination of the highest and lowest emission years, is appropriate. The BART Guidelines, which we drew upon for some of our reasonable progress/long-term strategy analyses, state that the emission baseline, "should represent a realistic depiction of anticipated annual emissions for the source. In general, for the existing sources subject to BART, you will estimate the anticipated annual emissions based upon actual emissions from a baseline period."[101] We eliminated the high low values from the 2009–2013 emission to better address issues such as variations in coal sulfur content, capacity usage, operations, etc., and make the baseline more representative of typical, recent plant operations. The difference between our baseline calculations and a straight 2009–2013 average is small and would not change our conclusion that the scrubber upgrades we proposed are very cost-effective. We also believe our DSI analysis strategy was appropriate. We analyzed DSI at both a 50% control level that is likely achievable for all the units, and the highest level of control the units were potentially capable of achieving, with design factors and costs adjusted accordingly, thus bracketing the problem.

We do not believe there is enough information concerning NID installations at this time to warrant an intensive analysis of that technology. Given the vendor advertised control efficiency of NID, the selection of NID technology rather than wet FGD would not change our proposed SO_2 limits. With the exception of Tolk, the non-air quality environmental impacts of a NID and wet FGD are similar and do not warrant eliminating either technology. We proposed that the units in question meet certain SO_2 emission limits, but we did not mandate a specific control technology in doing so. Consequently, any unit, including the ones discussed herein, may elect to use a NID to achieve our required SO_2 emission limits.

With respect to the comment that we should have considered blending the coal used at the units with low sulfur coal, we note that most of the units in question either burn lower sulfur Powder River Basin (PRB) coal or they blend it with lignite. We do not believe we have the necessary technical information (*e.g.,* fuel sulfur content, availability, cost, contractual information, etc.) to properly consider fuel blending or fuel switching. Nevertheless, the emission reductions achieved by switching to cleaner coal are much less than the emission reductions anticipated due to the implementation of the required controls. We agree that in some circumstances coal drying can be a viable technology for improving boiler efficiency and, in the process, reduce emissions because less coal is burned to achieve the same heat input to the boiler. However, we are not required to consider every potential technology under the reasonable progress and long-term strategy provisions of the Regional Haze Rule, which applies to the analysis in question. We considered both SDA and wet FGD, and the next most promising SO_2 removal control, DSI. Were we to have considered coal drying, it would have ranked below DSI in its ability to remove SO_2.

Comment: Luminant provided general objections to our cost analyses and stated our analysis relies entirely on a cost-per-ton metric but ignores what it considers the more meaningful cost-per-deciview metric.

Response: Luminant's general cost comments are addressed with specificity in the cost section of our RTC document. We reject Luminant's contention that we should have used the $/dv metric, a contention we also rejected and addressed in our Oklahoma FIP.[102] We note that to use the $/dv metric as the main determining factor would most likely require the development of thresholds of acceptable costs per deciview of improvement for both single and multiple Class I analyses. In *Oklahoma* v. *EPA,* the Tenth Circuit Court recognized our authority to use a different metric when promulgating a FIP.[103]

Comment: S&L cited to capital costs at Monticello 3 and Sandow 4, including spray headers and mist eliminators, that we mistakenly removed from our scrubber upgrade cost analyses.

Response: S&L is correct that we did in fact remove these capital costs from our scrubber upgrade cost analyses because we noted these costs were included in a 2013 Use Determination Application to the TCEQ, which identified that new replacement tower spray nozzles and mist eliminators had been installed. We wrongly assumed

[101] 70 FR 39167.

[102] Response to Technical Comments for Sections E. through H. of the **Federal Register** Notice for the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan, Docket No. EPA–R06–OAR–2010–0190, 12/13/2011, pdf 116.

[103] "When promulgating its own implementation plan, [EPA] did not need to use the same metric as Oklahoma. The guidelines merely permit the BART-determining authority to use dollar per deciview as an optional method of evaluating cost effectiveness." *Oklahoma* v. *EPA,* 723 F.3d 1201, 1221 (10th Cir. 2013).

that after having identified that its scrubber system could be upgraded cost-effectively, and having performed some of those modifications, Luminant had installed new upgraded spray headers and nozzles rather than replacing its worn out spray header and nozzles with the less efficient original design. However, based on the comment received on this, we added these costs back into our updated scrubber upgrade cost analyses and the result was a very minor increase in the cost-effectiveness value (higher $/ton). This did not affect our conclusion that upgrading the scrubbers for these units is very cost-effective.

Comment: S&L states that in escalating costs, we should have assumed its 2006 reports were in 2005 dollars and we should have escalated our costs out to 2015. S&L also objected to our use of a 10% increase to our escalation to account for escalation outside of the customary five-year window, our deletion of Allowance for Funds During Construction (AFUDC), and our deletion of owner's costs. S&L, GLCC, and CCP allege our use of a 30-year life for our scrubber retrofit and scrubber upgrades analyses is inconsistent with our Control Cost Manual. Earthjustice supported our 30-year assumed life.

Response: We agree with S&L that we should have assumed its 2006 reports were in 2005 dollars, and we have made the appropriate correction to our escalation calculations. We disagree that we should have carried our escalation costs forward to 2015, because we used the most recent emission data that was available, for both the cost analyses and modeling, which was 2013 data. As we explain in more detail in the Cost section of the RTC document, based on consideration of the CEPCI cost indices over the 2005–2013 period, we conclude that our approach of adding an additional 10% to our escalated cost is reasonable and likely conservative. As we have noted in a number of previous actions, AFUDC and owner's costs are not allowable under the Control Cost Manual overnight approach.[104] We refer S&L to our response to the scrubber life issue in our Oklahoma FIP in which we supported a 30-year life.[105] Because none of the facilities involved have entered into (or offered to enter into) enforceable commitments to shut down the applicable units earlier, we have continued to use a 30-year equipment life for scrubber upgrades, as we believe that is proper.

Comment: Xcel notes that in performing our dry scrubber cost analysis for Tolk, we failed to consider that there is a general water scarcity in the area with no surface water availability, and that to obtain the additional amount of water necessary to support the operation of dry scrubbers, Xcel would have to attempt to purchase water rights from existing farmers along with a gathering system or look at other costly alternatives. Based on the historical cost of water rights in the area, this is an additional capital cost of approximately $40 million that was not included in EPA's cost estimates. Earthjustice encouraged us to investigate Xcel's water rights, and estimated the cost to purchase additional water rights based on assumptions we used to assess this issue for the Gerald Gentleman facility in Nebraska.

Response: We have conducted an extensive investigation of the issue raised in Xcel's comments, including additional communication with Xcel and the High Plains Water District, in order to clarify some of Xcel's assertions.[106] We conclude that Xcel's asserted water requirements for dry scrubbing are much higher than other similar dry scrubbing installations, and the basis for the disparity is unsupported. As confirmed by our communications with the High Plains Water District and Xcel, we also conclude that Xcel has multiple lines of access to adequate supplies of water sufficient to supply the proposed dry scrubbers (SDA) without the need to buy additional water rights. First, we calculate that water already available at Tolk is almost enough to satisfy the additional water demand of our proposed dry scrubbers. Second, we note that Xcel receives blowdown water from nearby Plant X[107] and that Xcel offered testimony to the Public Utility Commission of Texas that two units in Plant X will retire in 2019 and 2020, which will free up additional water that could be used to satisfy the additional water demand of our proposed dry scrubbers. Third, we believe that Xcel has access to additional unexploited water rights that are more than adequate to supply our proposed dry scrubbers. Lastly, we acknowledge that Tolk's ultimate sources of water, the Ogallala Aquifer, continues to be depleted. However, considering the water needed by our proposed dry scrubbers is by Xcel's own account only approximately 9 to 12% of the total plant's needs, the aquifer's depletion will be a limiting factor on the operation of the plant itself, not on the operation of the scrubbers.

Comment: Xcel alleged that in our cost analysis we failed to consider that our proposed dry scrubbers would (1) end Tolk's sales of its fly ash or require the installation of additional baghouse capacity, and (2) require additional landfill capacity. Xcel also alleged that we did not adequately consider DSI and non-air environmental impacts, and that our assumption of a 30-year operating life is wrong.

Response: We disagree with these comments. Our cost analysis did include an additional baghouse that could be installed upstream of the dry scrubber which can preserve Tolk's existing fly ash sales. Also, our cost analysis included landfill costs, which based on Xcel's own information, are adequate to cover the additional disposal costs. We also believe our DSI cost methodology, in which we bounded the range of expected DSI performance, was adequate and demonstrated that DSI was not cost-effective when compared to the dry scrubber we costed for Tolk. Lastly, as we discuss in our responses to other comments, we believe our assumption of a 30-year life is proper, and we note that in testimony to the Public Utility Commission of Texas (PUCT), Tolk assumed similar equipment lives.

Comment: S&L states we overestimated SO_2 reductions (and thus our cost-effectiveness calculation was too low) for scrubber upgrades due to our SO_2 baseline methodology in which we eliminated the high and low annual average values from 2009–2013 and averaged the remaining three yearly values. Earthjustice stated we overestimated our cost-effectiveness calculations for our scrubber retrofits in part due to our SO_2 baseline methodology. Earthjustice stated it would have been more appropriate to use a five-year annual average emissions baseline, five-year annual average SO_2 rate in lb/MMBtu, and five-year average gross heat rate and MW-hrs generated, based on data from 2009 to 2013.

Response: We disagree with the commenters. As we note in our proposal, we used the BART Guidelines for some aspects of our analysis and believe our methodology is in agreement

[104] See for instance our ''Response to Technical Comments for Sections E. through H. of the **Federal Register** Notice for the Oklahoma RH and Visibility Transport Federal Implementation Plan,'' Docket No. EPA–R06–OAR–2010–0190, 12/13/2011.

[105] Response to Technical Comments for Sections E. through H. of the **Federal Register** Notice for the Oklahoma RH and Visibility Transport Federal Implementation Plan, Docket No. EPA–R06–OAR–2010–0190, 12/13/2011. See discussion beginning on page 36.

[106] Please see our docket for inclusion of this communication, which are in the form of emails transmitting letters and other information.

[107] ''Plant X'' is the actual name of a nearby EGU also owned by Xcel.

with the relevant language in that regard.[108] We calculated our baseline SO_2 emissions by first acquiring the 2009 to 2013 emissions as reported to us by the facilities in question. This is reflective of the actual emissions from the underperforming scrubber systems installed at the units in question. We then calculated the uncontrolled SO_2 emissions by acquiring U.S. Energy Information Agency coal usage data. We used these two figures to calculate the level of control for each year. In so doing, we eliminated the highest and lowest annual emission values from 2009–2013 to better address the issues S&L raises in its other comments (variations in coal sulfur content, capacity usage, operations, etc.) and to make the baseline more representative of typical, recent plant operations. The difference between our baseline calculations and a straight 2009–2013 average is small and does not change our proposed conclusion that the scrubber upgrades we proposed are very cost-effective.

Comment: S&L stated that our assumption that wet FGD retrofits can achieve 98% reduction or a controlled SO_2 emission rate of 0.04 lb/MMBtu is unrealistic and cannot be sustained on a continuous, long-term basis. Earthjustice stated that our assumed scrubber retrofit emission rates were not stringent enough.

Response: We disagree with S&L. First, we note that vendors routinely guarantee SO_2 emission limits at least as stringent as, or more stringent than, what we have proposed. We have also conducted extensive analysis of a number of SO_2 scrubber retrofits in which we have plotted their 30 BOD SO_2 emission limits.[109] Of the units we analyzed, 13 retrofit units have guaranteed control efficiencies of 95% to 99%, with eight of them guaranteed at 98% to 99%. With one exception, these eight units are achieving 98% to 99% SO_2 control, when calculated using a very conservative method we have adopted. We also demonstrate that units similar to the ones in question are able to continuously sustain SO_2 limits lower than what we have proposed for at least one year, and in some cases much longer. For instance, three of the units have achieved a maximum 30-day BOD equal to or less than our proposed SO_2 emission limit for scrubber retrofits of 0.04 lb/MMBtu:

- Scherer Unit 2: 0.01 lb/MMBtu based on 485 data points[110]
- Iatan Unit 1: 0.02 lb/MMBtu based on 2,004 data points
- Boswell Energy Center: 0.03 lb/MMBtu based on 1,881 data points

Our technical conclusions are also consistent with past judicial findings regarding achievable removal efficiencies and control rates, including conclusions in the already five years past case of United States v. Cinergy Corp., 618 F. Supp. 2d 942, 947 and 961–962 (S.D. Ind. 2009).[111] Thus, we disagree with S&L that our proposed scrubber retrofit SO_2 emission limits are not realistic or maintainable on a long-term basis. We agree with Earthjustice that it may be possible that many of the scrubber retrofit units can achieve greater control efficiencies than we proposed. Greater control efficiencies would result in a more favorable cost-effectiveness (lower $/ton) and more visibility improvement. This is another area in which we strove to be conservative in our analyses in order to demonstrate that even with many conservative cost assumptions the scrubber retrofits we proposed are cost-effective.

Comment: S&L stated that our use of the IPM cost algorithms was not in keeping with our Control Cost Manual and because of the limited number of site-specific inputs, the IPM cost algorithms provide order-of-magnitude control system cost estimates, but do not provide case-by-case project-specific cost estimates meeting the requirements of the BART Guidelines, nor do the IPM equations incorporate the cost estimating methodology described in the Control Cost Manual.

Response: We disagree with S&L. As we stated in our Cost TSD, we relied on the methods and principles contained within the Control Cost Manual, namely the use of the overnight costing method. In fact, the Control Cost Manual does not include any method for estimating the costs of any of the SO_2 control methods evaluated in this action. We note our strategy of relying on a publicly available control cost tool is similar to the strategy the states themselves employed in the development of their own SIPs. For instance, as explained in the Texas SIP, the TCEQ used the control strategy analysis completed by the CENRAP, which depended on the EPA AirControlNET tool[112] to develop cost per ton estimates. We have used IPM cost models to estimate BART costs in other similar rulemakings including our Arizona regional haze FIPs,[113] the Wyoming regional haze FIP,[114] and to supplement our analysis in the Oklahoma FIP.[115] S&L used real world cost data to construct its cost algorithms and confirm their validity. These cost models have been updated and maintained since their introduction in 2010 and have been continuously used by us since that time. These control costs are based on databases of actual control project costs and account for project specifics such as unit size, coal type, gross heat rate, and retrofit factor, and they require unit specific inputs such as reagent cost, waste disposal cost, auxiliary power cost, labor cost, gross load, and emission information. We believe that the IPM cost models provide reliable study-level, unit-specific costs for regulatory cost analysis such as required for BACT, BART, and reasonable progress. Lastly, we are confident in the basic methodology behind the S&L cost algorithms such that in our recent proposal for updating the SCR chapter of the Control Cost Manual,[116] we presented an example costing methodology that is based on the IPM S&L SCR algorithms, which were developed using a similar methodology to the wet FGD, SDA, and DSI cost algorithms discussed herein.

Comment: S&L stated that the IPM cost algorithms do not adequately consider site specific information and it cites to a number of possibilities including demolition and relocation of equipment, modifications that may be required to the existing ash handling systems, replacement of the existing induced draft fans or booster fan modifications, modifications/upgrades to the existing auxiliary power system, and labor productivity. S&L criticized our use of a retrofit factor of 1.0 for all units, and stated that the inlet temperature of Big Brown and Monticello units was 360–370 F, which

[108] 70 FR 39167. ''The baseline emissions rate should represent a realistic depiction of anticipated annual emissions for the source.'' See also 79 FR 74874.

[109] See our RTC document for much more detail on our analysis, and the file, ''Selected scrubber retrofit efficiencies.xlsx,'' which is in our docket and contains the plots discussed. The performance of each scrubber in our data set is summarized in the file, ''Selected scrubber retrofit efficiencies.xlsx.''

[110] Where ''data point'' represents a valid daily SO_2 monitored value.

[111] While the underlying expert report submitted by the Department of Justice in that case is protected from release under Court order, the testimony of the government expert witness that substantially accords with it, as well as our conclusions in responding to this comment, has been added to our docket.

[112] Our AirControlNET tool is out of date and no longer supported.

[113] 77 FR 42852 (July 20, 2012).

[114] Memorandum from Jim Staudt to Doug Grano, EPA, ''Review of Estimated Compliance Costs for Wyoming Electricity Generating Units (EGUs)—revision of previous memo'', February 7, 2013, EPA–R08–OAR–2012–0026–0086.

[115] 76 FR 81728 (December 28, 2011).

[116] 80 FR 33515.

is above the 300 F assumed value in the IPM algorithms, and would result in a flue gas volume increase of 10%, requiring additional costs.

Response: We note that the IPM cost algorithms, which are derived from real world costs, already have retrofit issues built into them. Our assumption of a retrofit factor of 1.0, which represents an average retrofit difficulty, likely overestimates the costs of some facilities (*e.g.,* Tolk) that have no retrofit issues. We solicited comments on all aspects of our scrubber retrofit cost analyses, but received little of the site-specific information to which S&L cites. Also, S&L provides no documentation for those it does cite. Regardless, these types of issues result in small increases in costs that are well within the required +/−30% accuracy [117] and do not affect cost-effectiveness conclusions due to the conservative nature of our estimates, as demonstrated elsewhere in these responses.

S&L does not provide any documentation to support its contention that the IPM wet FGD cost algorithms are based on a generic scrubber inlet temperature of 300 F. We have researched all available references on this issue and cannot find anything to support this conclusion. Rather, we conclude that the IPM cost algorithms estimate costs from regression equations based on actual completed projects. There are a number of factors other than temperature that affect the volume of gas flow that passes through a scrubber system. These include the amount of in-leakage in the system (which often increases due to inefficient or worn seals in the air preheater) and the type and characteristics of the coal that is being burned. This is made clear by examination of two of the scrubber retrofit reports for Big Brown (one of the units S&L cites), which were issued by S&L in 2004 and 2007, we received in response to our CAA Section 114 requests.[118] The 2004 report indicated that the design flue gas flow rate at the scrubber inlet was approximately 19.7% less than that in the 2007 report. However, both reports indicated that the reference temperature at the inlet was 370 °F—the same temperature S&L references in its comment—and both were at the same pressure. It is clear there are many variables that impact flow beyond temperature. We therefore conclude that S&L has not documented its temperature assertion, available information does not support it, and its temperature inference is too simple to properly characterize the situation. In any case, even assuming a 10% increase in gas flow rate, would not result in a significant enough increase in cost to impact our decision regarding these facilities.

Comment: S&L states the IPM cost module includes costs only for minor physical and chemical wastewater treatment. However, wastewater treatment standards proposed by EPA, and anticipated to be published as a final rule in 2015, will likely require significantly more advanced treatment of FGD wastewaters. S&L states this could add $30–$40 million to the cost of a retrofit wet FGD control system and we should have included these costs in our estimates.

Response: Because our wastewater treatment rules have not been finalized, and therefore we do not know with certainty whether any additional costs may be incurred, it is not appropriate for us to include those costs in our cost-effectiveness calculations. Even if those costs prove to be substantial, other options are available, including zero liquid discharge systems and the selection of a SO_2 control technology that achieves the emission limit without generating a wastewater stream, such as NID scrubbers, which we believe are capable of achieving our emission limits, and have been selected in some recent installations.[119] In addition, we believe that at least one of the studies that produced actual costs that were used to construct the IPM cost algorithms included wastewater treatment costs. Lastly, we did not receive any documentation from any facility to substantiate any wastewater treatment costs, including the figures that S&L cites.

Comment: Luminant and others allege we did not properly balance costs and visibility benefit and stated we should have used the dollar per deciview ($/dv) metric.

Response: We disagree that the $/dv metric is more meaningful than our use of the $/ton metric in conjunction with our consideration of the visibility benefit from the installation of controls. As we noted in our Oklahoma FIP,[120] use of the $/dv metric would most likely require the development of thresholds of acceptable costs per deciview of improvement for BART determinations for both single and multiple Class I analyses, and we have not developed such thresholds. This decision by EPA not to use this metric in a FIP was reviewed and upheld in *Oklahoma* v. *EPA* by the Tenth Circuit Court.[121] We see no reason to deviate from our view of the dollar per deciview metric in the reasonable progress context that applies here. We also note that the use of the dollar per deciview metric is further complicated in the present case due to our use of CAMx modeling. As we discuss in our proposal and elsewhere in the Modeling section of this document and in Modeling Sections of our RTC document, there is no way to directly compare the CAMx modeling we used in our proposed Texas/Oklahoma FIPs with previous CALPUFF modeling results because of differences in the models, model inputs, and metrics used.[122]

L. Cost Versus Visibility Benefit

Comment: Our proposed controls would not result in perceptible visibility improvements and thus should not be finalized. Commenters also stated that the required controls result in miniscule or insignificant visibility improvements.

Response: We disagree that the Regional Haze Rule requires that controls on a source or group of sources result in perceptible visibility improvement.[123] As we noted in our TSDs, we derived much of our approach to the analysis of control costs and visibility impacts from the BART Guidelines.[124] In a situation where the installation of BART may not result in a perceptible improvement in visibility, the visibility benefit may still be significant, as explained by the Regional Haze Rule: [125]

> Even though the visibility improvement from an individual source may not be perceptible, it should still be considered in setting BART because the contribution to haze may be significant relative to other source contributions in the Class I area.

We accordingly disagree that selection of control measures should be contingent upon perceptible visibility improvement. As we stated in our previous rulemaking addressing the BART determinations in Oklahoma: [126]

[117] Control Cost Manual, p. 2–3.

[118] LUMINANT_000277496.pdf and LUMINANT_REGHAZ_1–000001183 to –000001257.pdf.

[119] We recently proposed approval of NID as BART for the Flint Creek Unit 1 in Arkansas (80 FR 18944). Other recent installations include the Homer City Units 1 and 2, Boswell Unit 4, Brayton Point Unit 3, and Indian River Unit 4.

[120] Response to Technical Comments for Sections E. through H. of the **Federal Register** Notice for the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan, Docket No. EPA–R06–OAR–2010–0190, 12/13/2011, pdf 116.

[121] *Oklahoma* v. *EPA,* 723 F.3d 1201, 1221 (10th Cir. 2013).

[122] See our FIP TSD, page A–35 and modeling section of the RTC document.

[123] It is generally recognized that a change in visibility of 1.0 deciview is humanly perceptible.

[124] See the discussion in our FIP TSD, beginning on page 6.

[125] 70 FR 39129.

[126] 76 FR 81739.

Given that sources are subject to BART based on a contribution threshold of no greater than 0.5 deciviews, it would be inconsistent to automatically rule out additional controls where the improvement in visibility may be less than 1.0 deciview or even 0.5 deciviews. A perceptible visibility improvement is not a requirement of the BART determination because visibility improvements that are not perceptible may still be determined to be significant.

Thus, in our visibility improvement analysis, we have not considered perceptibility as a threshold criterion for considering improvements in visibility to be meaningful. Rather, we have considered visibility improvement in a holistic manner, taking into account all reasonably anticipated improvements in visibility and the fact that, in the aggregate, improvements from controls on multiple sources will contribute to progress towards the goal of natural visibility conditions. Visibility impacts below the thresholds of perceptibility cannot be ignored because regional haze is produced by a multitude of sources and activities which are located across a broad geographic area. In this action, as discussed below, we found that the required cost-effective controls reduce visibility impairment from those sources with the largest visibility impacts and result in meaningful visibility benefits towards the goal of natural visibility conditions.

As we have noted and discussed in a separate response to comment, the results of the CAMx modeling we have utilized in our proposal cannot be directly compared to the results of CALPUFF modeling, which has been utilized in the vast majority of other BART and reasonable progress/long-term strategy actions, because of differences in the models, model inputs, and metrics used.[127] Many of these differences result in CAMx modeled visibility impacts and benefits that are much lower than the CALPUFF modeled visibility impacts and benefits relied on in other actions. We disagree with commenters that the visibility benefits from the controls in our FIP are miniscule when the differences in modeling analyses are considered. We observe that several comments that are critical of the extent of the visibility benefits have cited only to benefits from the scrubber upgrades, omitting the total anticipated visibility benefit from all required controls. As we discuss in the FIP TSD and in separate responses to comments, we believe it is necessary to consider visibility benefits based on ''clean'' natural background conditions to assess the full potential for visibility benefits from controls. For example, we estimated that the required controls provide for over 3 dv improvement on 20% worst days at the Wichita Mountains when estimated using a ''clean'' background and result in improving projected visibility conditions by 0.45 dv over the visibility conditions projected by CENRAP and Texas for 2018 and an estimated 0.62 dv improvement in the visibility conditions in 2018 when considering recent actual emissions (values are for 20% worst days). The required controls result in a greater than 5% improvement in overall visibility conditions at the Wichita Mountains on the 20% worst days. We also estimate that the required controls significantly reduce the projected delay in meeting natural visibility, helping to achieve that goal 25 to 30-years earlier at Big Bend and the Guadalupe Mountain by our projections.

The CENRAP modeling showed that Texas sources have significant visibility impacts at the Wichita Mountains and the Texas Class I areas. Our analysis identified those point sources with the greatest contributions to visibility impairment at these Class I areas, and the required controls reduce visibility impairment from those sources with the largest impacts where controls were determined to be available and reasonable for this first planning period. For example, the Monticello and Big Brown facilities are projected to contribute approximately 1.3 Mm^{-1} and 1.2 Mm^{-1}, respectively, to visibility impairment on the 20% worst days at the Wichita Mountains in 2018 based on the CENRAP 2018 projected emissions for these facilities.[128] This is 1.7% and 1.5% of the total visibility impairment at the Wichita Mountains.[129] In our FIP TSD we noted that Texas used an impact extinction level threshold of 0.5 Mm^{-1} (a level less than half of the estimated impact from the Monticello or Big Brown facilities) from all sources in a state as a threshold for inviting another state to consult. Oklahoma selected a threshold of 1.0 Mm^{-1} to determine which states should consult in analyzing visibility impairment at the Wichita Mountains.[130] We also noted that the largest projected contribution from all point sources within a state at the Wichita Mountains after Texas (14%) is Oklahoma at 3.9%. In other words, elimination of all point sources in Oklahoma would result in less visibility benefit (3.9%) than the required controls (greater than 5%). As these facts demonstrate, the identified facilities have significant impacts on visibility conditions. Our technical record makes it equally plain that the required controls reduce impacts from these sources and result in meaningful visibility benefits towards the goal of natural visibility conditions.

Comment: Texas' choice of 0.5 deciview as a benchmark for total visibility improvement (from all sources) to use in its four-factor analysis was reasonable and consistent with EPA guidelines. Under the BART Guidelines, a source ''contributes to any visibility impairment,'' and thus becomes subject to BART, if it has an impact greater than 0.5 deciview at any Class I area. It is thus logical that a level of visibility improvement at a single Class I area that is less than the threshold at which a source becomes subject to BART in the first place would be deemed insignificant for all sources. Indeed, in other regional haze actions, EPA has ''defer[red]'' to states' consideration of the 0.5 deciview threshold. And given Congress's special emphasis on BART sources, Texas' reference to the BART 0.5 deciview threshold to evaluate reasonable progress for the first planning period was conservative, and Texas could reasonably determine that total visibility benefits below the BART threshold for an individual source should be deferred until a later planning period for reasonable progress.

Response: We disagree that Texas' choice of a 0.5 dv visibility threshold, including the manner in which it was applied, was proper in its analysis. First, the quote from our BART Guidelines was based on CALPUFF modeling and not CAMx modeling. Texas extrapolated results from CAMx modeling to estimate the visibility improvement due to all the identified controls in their analysis and then compared it to a threshold developed for CALPUFF modeling. As we state in the FIP TSD and discuss in detail in our response to comments, ''[a] common metric used in BART visibility modeling using CALPUFF is the BART screening level of 0.5 del-dv used by most states for screening out facilities from further BART consideration. However, there are a number of factors that make the two analyses different and not comparable, invalidating the use of the BART screening metric, or other such comparisons with modeled visibility impacts for reasonable progress with

[127] FIP TSD at A–35.

[128] Light extinction, in units of inverse megameters (Mm^{-1}), is the amount of light lost as it travels over one million meters. The haze index, in units of deciviews (dv), is calculated directly from the total light extinction, bext, as follows: HI = 10 ln(bext/10).

[129] We note that the impacts from Big Brown and other facilities are even larger when considering recent actual emissions rather than the CENRAP 2018 projected emissions.

[130] See Texas Regional Haze SIP Appendix 4–1: Summary of Consultation Calls and Section X.A. of the Oklahoma Regional Haze SIP.

CAMx or CMAQ.'' [131] In the FIP TSD and in separate responses to comments we discuss the differences in the models, model inputs, and metrics used. Many of these differences contribute to CAMx modeled visibility impacts and benefits for reasonable progress being much lower than the CALPUFF modeled visibility impacts and benefits for BART relied on in other actions. As detailed in the FIP TSD, these differences include the emission rates modeled, the metrics used and whether the deciview impacts are calculated based on ''clean'' natural background conditions or a ''dirty'' background based on degraded visibility conditions projected for 2018. The CALPUFF emissions modeled for BART are representative of maximum emission rates and are therefore usually significantly larger (often in the range of double) than average emission rates used in CAMx modeling for a reasonable progress analysis. One of the main metric differences is that the CALPUFF analysis for BART utilizes a clean background and compares the 8th highest daily maximum impact from the specific source modeled to compare against a 0.5 dv threshold to indicate significant impacts while the visibility benefit that was estimated by Texas to assess the benefit of additional controls for reasonable progress was based on a ''dirty'' or degraded background and average benefits over the 20% worst days observed by the monitor at the Class I area which may or may not be inclusive of the highest impact days from the specific source modeled with CALPUFF for BART. As we discuss in detail in the FIP TSD, because the deciview metric is a logarithmic function of extinction, visibility impacts and improvement calculated based on ''dirty'' conditions are substantially lower than those calculated based on natural ''clean'' conditions.[132] These differences were not considered in Texas' visibility analysis and selection of threshold. We note that Texas did calculate visibility impacts compared to natural visibility conditions and focused on the maximum impact from the modeled sources in their BART visibility analysis, which also relied on CAMx photochemical modeling, to determine the significance of visibility impacts from BART sources for BART screening purposes. However, in assessing the benefit of additional controls for reasonable progress, Texas only considered visibility benefits averaged over the 20% worst days based on a ''dirty'' or degraded background.

The difference between comparing visibility improvement on a ''clean'' and ''dirty'' background is analogous to comparing the change in sound volume that would occur if one person stopped singing loudly in an empty room (clean background) to the change that would occur if one person stops singing loudly in a room crowded with a 100 people singing loudly (dirty background). In both cases, to return the room to natural background sound level, the individual singers must be addressed, but there will be little or no perceptible difference in volume when one singer in the crowded room stops singing. To carry the analogy further, our analysis was designed to identify the Texas sources with the greatest visibility impact (the loudest singers) and address them in this first planning period.

Second, the 0.5 dv threshold in the context of BART is used to assess the maximum total visibility *impact* from all BART units at a facility. If the impact from all the BART sources at a facility is above the threshold, then each BART unit must be evaluated for controls, and therefore the visibility *improvement* anticipated from controls would be less than 0.5 dv on a facility basis, and much less than 0.5 dv on a unit specific basis for BART sources with multiple BART units. For these reasons, the BART threshold of 0.5 dv has no relation to the analysis Texas performed and is inappropriate. We also note that we discuss in the preamble to the final Regional Haze Rule and Guidelines for BART Determinations that a threshold less than 0.5 dv may be appropriate.[133]

Even setting aside Texas' approach of aggregating sources with varying impacts on visibility, the use of a 0.5 dv threshold as applied by Texas for determining the significance of visibility benefits of all controls combined would have ensured that little visibility improvement would occur during this planning period. Texas and Oklahoma acknowledged in their SIP submittals that sources in Texas have a large impact on visibility at the Wichita Mountains; indeed, the visibility impacts at this Class I area from Texas point sources are several times greater than the impacts from Oklahoma's own point sources. Based on CENRAP 2018 modeling, all point sources in Texas combined have a visibility impact in terms of light extinction of 10.58 Mm^{-1} at the Wichita Mountains, which based on ''dirty'' 2018 CENRAP projected background conditions equals a 1.34 dv impact for the 20% worst days. Therefore, adopting the 0.5 dv threshold, using Texas' approach to assessing reasonable progress measures, would require the identification of a control set large enough (and with a correspondingly large total cost) to address over one-third of the total impacts from all Texas point sources, before the visibility benefit would be considered significant. To put this into context, achieving the national goal at the Texas Class I areas will require just over ten deciviews of improvement (approximately a reduction in light extinction of 35 Mm^{-1}), a task that EPA has estimated could reasonably take until 2064. Given that the Regional Haze Rule recognizes that improving visibility is an iterative process that will take many years, declining to establish any additional measures to ensure reasonable progress until Texas could identify a combined set of cost-effective and affordable controls that could achieve 0.5 dv or more improvement is unreasonable, especially when there are cost-effective and affordable controls that result in meaningful visibility improvements towards the goal of natural conditions. We also note that delaying even incremental action during this first planning period pushes out the likely date of achieving natural conditions well past 2064.

Comment: Earthjustice stated that based on its analysis,[134] our proposed FIP would result in billions of dollars in public health benefits. According to Earthjustice, the same pollutants that cause visibility impairment also cause significant public health impacts. Nitrogen oxides are precursors to ground level ozone, which is associated with respiratory diseases, asthma attacks, and decreased lung function. Similarly, sulfur dioxide increases asthma symptoms, leads to increased hospital visits, and can form particulates that aggravate respiratory

[131] FIP TSD at A–35 and modeling section of the RTC document.

[132] FIP TSD at A–38. ''For example, see Figure A.3–5 which shows the del-dv change due to a 10 (1/Mm) change at both the 2018 projected extinction level [''dirty background''] and the 2064 natural visibility conditions [''clean background''] extinction level for the Wichita Mountains. In the 'dirty background' case the 10 (1/Mm) yields a 1.26 del-dv, whereas in the 'clean background' case the same 10 (1/Mm) yields a 3.86 del-dv improvement. In this example, the 'clean background' situation yields a del-dv improvement 3 times greater than the 'dirty background' for the same level of extinction improvement.

[133] ''. . ., if there were 100 sources each changing visibility by 0.1 deciviews, the total impact would be a 10-deciview change in visibility. In this hypothetical example, all 100 sources would be contributing, in equal amounts, to substantial visibility impairment . . . .'' 70 FR 39121.

[134] Written Report of George D. Thurston Regarding the Public Health Benefits of EPA's Proposed Rulemaking Regarding Texas And Oklahoma Regional Haze, April 18, 2015. Visibility And Health Modeling Technical Support Document to Comments Of Conservation Organizations, prepared by Dr. H. Andrew Gray, April 20, 2015.

and heart diseases and cause premature death. We received many additional comments from groups, private citizens, and a member of Congress that expressed similar public health, welfare, and economic benefits, including ecosystem and tourism benefits.

Response: We appreciate the commenters' concerns regarding the potential health benefits of air pollution controls to improve air quality In Class I areas. We generally agree that the same emissions that cause visibility impairment can also cause health related problems, such as respiratory ones. We agree that although our action addresses visibility impairment, our FIP requires emissions reductions that will result in co-benefits for public health, welfare, and economic benefits. However, for purposes of this action, we are not authorized to specifically consider these types of benefits under the regional haze program.

M. Natural Conditions

Comment: We received comments from the TCEQ and a number of facilities and trade organizations that we should have approved Texas' natural conditions calculations for Big Bend and the Guadalupe Mountains. These commenters state that Texas rightly discarded our default values in favor of its refined estimates in accordance with our guidance. In doing so, these commenters state Texas rightly assumed all the visibility impairment due to coarse mass and fine soil was due to natural causes. Earthjustice stated that Texas did not properly support its calculations. Earthjustice stated that because Carlsbad Caverns in New Mexico (approximately 40 miles from the Guadalupe Mountains) uses the same monitor and we previously approved New Mexico's use of our default natural conditions estimate, allowing Texas to use a different value is inconsistent.

Response: We agree with the commenters that the Regional Haze Rule and our guidance [135] do allow states to develop an alternate approach to estimate natural visibility conditions. However, in adopting an alternate approach, that approach must be fully supported and documented. The TCEQ's analysis and our own observations do support a conclusion that much of the contribution of coarse mass and fine soil to the visibility impairment at the Guadalupe Mountains and Big Bend is due to natural sources. They do not demonstrate that 100% of this contribution is due to natural sources. Like us, the FLMs did not agree with the assumption that 100% of the coarse mass and soil was natural, and pointed to human activity in the region. 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.'' [136] Although the TCEQ presented the FLM's suggestion in its SIP, it ultimately adopted its own estimate, based on its unproven 100% coarse mass and soil assumption. Another option that we noted in our proposal that was open to the states, and the one we used in proposing the natural conditions for the Texas Class I areas in our FIP, was the ''new IMPROVE equation'' that was adopted for use by the IMPROVE Steering Committee in December 2005.[137] This refined version of the IMPROVE equation provided more accurate estimates of some of the factors that affect the calculation of light extinction. The TCEQ started with this refined version of the IMPROVE equation, but further altered some of its parameters concerning the contributions of coarse mass and fine soil, without adequate documentation. We found that the TCEQ's documentation was flawed, but we are under no obligation to follow in the TCEQ's footsteps and make whole its methodology, when we had already provided guidance with default natural visibility conditions, which were further refined by the 2005 IMPROVE Steering Committee. We agree with Earthjustice that it is reasonable to expect that both Carlsbad Caverns and the Guadalupe Mountains should have the same or nearly the same natural conditions. We urge Texas and New Mexico to work together to resolve this issue in the next planning period. Even as we are disapproving Texas' natural conditions estimates, we conclude that our determinations for emissions limitations for EGUs in the FIP for the first planning period would be justified on the basis of natural conditions estimates at either levels in the SIP or the levels in the FIP, given the level of visibility impairment at each Class I area above the different estimates for natural conditions and the availability of cost-effective controls at those sources with the largest visibility impacts that result in meaningful progress towards the natural visibility goal. Furthermore, as we noted in our proposal, based on both our recalculated natural conditions and the Texas natural condition estimates that we are disapproving, Texas' Class I areas are not projected to meet the uniform rate of progress in 2018 according to the CENRAP modeling and are not projected to meet the goal of natural visibility conditions by 2064.[138]

Comment: Luminant's contractor AECOM noted that in developing its SIP, Texas found that some of the haziest days at its two Class I areas are the result of uncontrollable natural conditions such as windblown dust and wildfire emissions. AECOM developed a daily threshold percentage of total aerosol extinction [139] caused by CM, OMC, and soil species for each Texas Class I area. This threshold was developed by constructing histograms of the 20% worst days for a ''noticeable step-up in frequency'' of higher contributions of CM, OMC, and soil. AECOM then added this additional extinction to our default natural conditions extinctions, resulting in alternate natural conditions estimates that it suggests we adopt. AECOM states that with these new natural conditions, the uniform rates of progress will be met for Big Bend and the Guadalupe Mountains.

Response: Although AECOM restricts its assumption to specific days, it nevertheless assumes that all coarse mass, organic mass carbon and soil visibility impacts at Big Bend and the Guadalupe Mountains are 100% due to natural causes. AECOM provides no documentation to support this conclusion. Although we agree that much of those species contributions are due to natural sources, we do not believe that all of these contributions are due to natural sources. Fires, windblown CM and soil do have both anthropogenic and natural origins. As an initial matter, we believe that AECOM erred in assembling its histograms. We reconstructed these histograms and note they differ significantly from those AECOM presented. In fact, we believe the ''noticeable step-up in frequency of higher contributions of CM, OMC, and soil (*i.e.,* from right to left)'' that AECOM points to is more muted for

[135] Guidance for estimating natural visibility conditions under the Regional Haze Rule, EPA, September 2003, p 1–11.

[136] Appendix 2–2 of the Texas Regional Haze SIP.

[137] The IMPROVE program is a cooperative measurement effort governed by a steering committee composed of representatives from Federal agencies (including representatives from EPA and the Federal Land Managers) and regional planning organizations. See our proposal for additional information on the IMPROVE program and the new IMPROVE equation.

[138] 79 FR 74832

[139] Note that although natural conditions are ultimately expressed in deciviews (dv), the IMPROVE equation first calculates aerosol extinctions by contributions to extinction by all relevant species, of which coarse mass and fine soil are two. Total extinction is then converted to deciviews.

both Class I Areas when the histograms are assembled correctly, to the point it is essentially absent for the Guadalupe Mountains. We noted other problems that cause us to conclude that AECOM's methodology should not be used. Moreover, under the Regional Haze Rule, even if it were concluded that the uniform rate of progress will be met for Big Bend and the Guadalupe Mountains, this does not change the requirement that the reasonable progress goals be selected based on proper consideration of the four factors. As discussed in the proposal and the RTC document, the uniform rate of progress is not a ''safe harbor'' under the Regional Haze Rule.

N. Consistency With Our Other Regional Haze Actions

We received a number of comments alleging specific instances of inconsistency with our previous SIPs and FIPs, as well as with our regional consistency rules at 40 CFR 56.5(a)(1) and (2). We have extracted all of these alleged instances of inconsistency, and we address them in detail in a separate consistency section within our RTC document. We recognize that we have a duty to ensure our regional haze actions are carried out in accordance with the CAA, Federal regulations, and our policies, and are as consistent as reasonably possible with other regional haze actions as required under our regional consistency rules (40 CFR 56.5(a)(2)), recognizing the fact-specific nature of individual regional haze plans and determinations. As we discuss below, we believe that in this action, which is one of the last remaining regional haze SIP reviews of the first planning period, we have been as consistent with our previous actions as is reasonably possible. We disagree that our action is inconsistent with the reasonable progress requirements or our prior SIP actions. While our regional consistency regulations and policies require us to carry out our actions pursuant to the CAA in a consistent manner across EPA regions as reasonably as possible, they do not require uniformity between those actions in all circumstances and instead, ''allow for some variation'' in actions taken in different regions.[140] As explained in detail in the separate consistency section of our RTC document, we believe that we have acted consistently with the CAA and our regional haze regulations in taking these specific actions for Texas, and in accordance with 40 CFR 56.5, our final action is ''as consistent as reasonably possible''[141] with other actions given the specific facts presented in Texas and Oklahoma. We thus disagree with these comments. We note that staff from Region 6 have worked closely with EPA headquarters throughout the proposed and final actions regarding the Texas and Oklahoma regional haze requirements, including in the analysis and conclusions contained in the SIP and FIP determinations included in this final rule. As explained fully in our RTC document, we note that commenters' citation to the *National Environmental Development Association's Clean Air Project* v. *EPA* (*NEDA CAP*) case is distinguishable from our action here.[142]

Developing solutions to the complex problem of regional haze requires effective consultation among states. During the first planning period, the states worked together through RPOs to help develop their regional haze SIPs. To assist in this effort, we provided tens of millions of dollars to the RPOs following the issuance of the 1999 Regional Haze Rule to fund the development of the technical tools and analyses necessary to address regional haze and to facilitate consultation among the states. The states set up five RPOs to address visibility impairment from a regional perspective. The technical analyses done by the RPOs for the first round of regional haze SIPs greatly increased the understanding of the problem of visibility impairment at the Federal Class I areas, including that of the specific contribution of different species of pollutants.

Given the regional differences in the degree of visibility impairment, the pollutants of concern, and the impacts of fire and international emissions, we did not prescribe a one size fits all approach to reasonable progress. The RPOs accordingly adopted somewhat different approaches to recommending potential measures to ensure reasonable progress. However, the RPOs and the states all agreed that large stationary sources of SO_2 are the typically the primary cause or one of the primary causes of anthropogenic visibility impairment at this time. In addition, in some regions of the country, the RPOs and the states also recognized NO_X as a similarly important cause of visibility impairment.

In our review of the regional haze SIPs, we have attempted to take into account the differences among states in assessing the reasonableness of each state's SIP submittal. By its nature, each regional haze decision is a very fact specific determination requiring the consideration of multiple factors. After examining all instances of perceived inconsistency with other actions, we believe that when all of the factors are considered in their full context, the situation for Texas and Oklahoma differs sufficiently from these other actions cited as being inconsistent with this action to warrant the approach that we have taken. Furthermore, we found that in many instances some commenters reproduced incomplete quotes from our previous actions, or otherwise took those quotes out of their proper context, leading to an inaccurate characterization of the facts in some cases.[143] Often a sentence immediately preceding or following the reproduced quote in fact provided that context. In other cases, commenters called out a particular difference between some aspect of our technical analysis in comparison to what was used in a previous SIP or FIP, without providing the reasoning for those differences. In many other cases, the commenters simply misunderstood or otherwise misinterpreted the facts.[144]

Many commenters compared our CAMx modeled visibility impairments or improvements with those in other actions modeled using CALPUFF and concluded that our proposed visibility improvements were not enough to merit controls when compared to those other actions. These commenters universally failed to account for the differences between these two modeling platforms, the model inputs, and the metrics used.[145] Many of these differences result in CAMx modeled visibility impacts and benefits that are much lower than the CALPUFF modeled visibility impacts and benefits relied on in other actions. As we have noted and discussed in separate responses to comments and the FIP TSD, the results

[140] 80 FR 50258.

[141] 40 CFR 56.5(a)(2).

[142] *National Environmental Development Association's Clean Air Project* v. *EPA* (NEDA CAP), No. 13–1035 (D.C. Cir., May 30, 2014).

[143] See for example: (1) Our response to Luminant's comment concerning the ''contribution of coal combustion sources'' in the Alaska SIP, (2) Our response to CCP's comment concerning the consideration of visibility in the North Dakota SIP, or (3) Our response to CCP's comment concerning Texas' use of a $2,700/ton cost threshold.

[144] See for example: (1) The TCEQ's comment letter at page 14 concerning the Arkansas-Missouri consultations, (2) the AECT's comment letter at page 9 that we did not allow Texas to consider emissions from natural sources, such as wildfires and dust storms, in establishing natural visibility conditions, (3) The CCP's comment letter at page 8 concerning Texas' use of a $2,700/ton cost threshold.

[145] See our FIP TSD, beginning on page A–35, in which we explain why key differences in CALPUFF and CAMx preclude the comparison of their respective results and why CAMx results for RP are generally much less than CALPUFF results for BART for the same facility/emissions due to the model inputs and metrics used.

of the CAMx modeling we have utilized in our analysis cannot be directly compared to the results of CALPUFF modeling, which has been utilized in the vast majority of BART and other reasonable progress/long-term strategy actions.

Some commenters criticized us for disapproving the reasonable progress and long-term strategy consultations between Oklahoma and Texas, when other state-to-state consultations similarly failed to result in additional controls. Often these comparisons were made without regard to the specific facts, such as the magnitude of the visibility impacts that Texas sources have on the Wichita Mountains in Oklahoma in relation to the relative impact of the sources in those other actions, or the overlooked cost-effective controls that were available to Texas sources to address those impacts. Other commenters' comparisons simply focused on the result without regard to the substance: They noted instances where two other states consulted and neither required additional controls, and concluded that Texas was being treated unfairly.

Commenters also argued that our proposed disapproval of Texas' reasonable progress analysis was based on Texas' decision not to undertake a source-by-source analysis of emission controls. The commenters pointed to a number of other regional haze SIPs approved by EPA where states had relied on analyses of the reasonableness of controls for various source categories. The commenters claimed that these examples demonstrate that we accepted analyses of source categories in other states and that we should not, therefore, disapprove Texas' reasonable progress analysis on the grounds that it failed to look at controls on a source-by-source basis. These commenters ignore the fact that Texas' reasonable progress analysis was, in part, based on a source-by-source analysis. However, Texas set that analysis aside in favor of comparing the combined costs of all controls— not those for specific source categories— against its calculation of the total visibility benefit. More importantly, however, as we have explained elsewhere in this action, our objection to Texas' approach to evaluating potential reasonable progress controls was not grounded in whether it used a category or source-by-source analysis. Rather, our disapproval of Texas' reasonable progress analysis is based on the fact that its flawed methodology ignored cost-effective controls that, as we demonstrated in our proposal, would result in significant visibility benefits.

Commenters also raise questions concerning our approval of regional haze SIPs where states relied on implementation of CAIR or CSAPR to satisfy BART. The commenters argue we repeatedly found that participation in these trading programs also satisfied reasonable progress obligations for these states. One commenter claimed it would be illogical to find that CAIR or CSAPR was an appropriate substitute for BART but to then require controls for reasonable progress. We noted in 2005 that the determination that CAIR provided for greater reasonable progress than BART did not answer the question of whether more than CAIR would be required in a regional haze SIP.[146] As we have explained, we are not finalizing our proposal to rely on CSAPR to satisfy the BART requirements for EGUs in Texas, and at this point it is not certain what Texas' CSAPR budgets will be in the future. However, the remand of the CSAPR budgets for Texas aside, we do not agree that we have been inconsistent in our treatment of Texas. These commenters ignore the meaningful differences between Texas and the states cited. These include the significant impacts that point sources in Texas have on the visibility at the Wichita Mountains in Oklahoma, even after the projected reductions from CAIR/CSAPR, the availability of cost-effective controls that would address the largest visibility-impacting sources, the flaws in Texas' technical evaluation of the reasonable progress and long-term strategy provisions, and the flawed consultations between Texas and Oklahoma. We also note that Texas itself did not rely on its participation in CAIR to satisfy the reasonable progress requirements without further consideration of controls on its EGUs. Rather, Texas considered controls on a combination of EGUs and non-EGUs, but ultimately rejected them based on a flawed analysis of the reasonableness of such controls.

O. Modeling

Comment: We received comments that we should have prepared a modeling protocol and made it available for public/stakeholder review and comment. The commenters state that a modeling protocol is required by EPA modeling guidance.

Response: EPA is not required to develop a modeling protocol and take public comment on it. Our guidance and 40 CFR part 51 Appendix W do not require us to develop a modeling protocol for our technical work conducted to support review or rulemaking. We developed a workplan and consulted with national experts at EPA HQ as needed to develop the proposal that included modeling files, documentation of how the modeling was conducted and results. We included all this information in the materials for the proposal and took comment on all aspects of our analyses and techniques.

Comment: We received comments that our selection of the CAMx model rather than CALPUFF is inappropriate and unjustified. The commenters stated that we did not justify the use of CAMx to model visibility impacts from individual sources and at large distances, and our use of CAMx here is outside of the model's capabilities. Furthermore, these commenters assert that our concerns regarding using CALPUFF are not clear, and they have concerns that overprediction of impacts are also present in CAMx and therefore do not justify the use of CAMx. These commenters also state that we failed to consider and discuss bias and uncertainty in the modeling results and instead relied on the model predictions as definitive results.

Response: We did include a number of reasons in our proposal and Modeling TSD for our selection of the photochemical grid model CAMx over CALPUFF. One of the primary reasons is we evaluated the Texas SIP for reasonable progress and not BART, and the differences in the purposes of these analyses supports the use of different models when the resources are available to utilize a photochemical model. Reasonable progress requires the evaluation of changes in emissions from one or more facilities on visibility impairment at downwind Class I areas, in order to properly account for chemical transformations of those emissions, the model used must also include the other pollutants in the airshed, for which CALPUFF is not as well suited. Reasonable progress analyses typically look at the changes in visibility on the 20% worst days, and this evaluation was done by most states, including Texas and Oklahoma, by utilizing a photochemical grid model (PGM) such as CAMx or CMAQ and not CALPUFF. Therefore, our use of CAMx for evaluation of additional potential controls is consistent with the state's SIP submission.

We also discussed our selection of CAMx vs. CALPUFF and included in the Modeling TSD a number of references to performance analysis comparisons between the two models. There are also many comparisons available in journal articles and online that support using a photochemical grid model (most of these comparison

[146] 70 FR 39104, 39143.

studies are found in the Modeling TSD and the rest are in the docket). Some of the references we provided in the proposal raised concern that the use of CALPUFF could result in model over-prediction and other model performance issues at the distances at which we were evaluating most of the sources in our proposal. CALPUFF model results are used directly, whereas photochemical grid model results such as those achieved through use of CAMx are evaluated with Relative Response Factors (RRFs) to help remove potential bias concerns. While no model is free from bias issues, previous evaluations of the CENRAP databases we used for our analyses have been evaluated and the CENRAP CAMx model performance was considered adequate because the modeled outputs compared well to past measured conditions. As discussed in the following response, the only changes to the CENRAP basecase CAMx modeling we made were to update both the CAMx model version used and the chemical mechanism in order to use the best science and while ensuring model performance was still acceptable.[147]

In sum, there are many reasons for the selection of CAMx over CALPUFF for the purposes of this rule making. CAMx is better suited for evaluating the reasonable progress metric of improvement on the 20% worst days. It is also better suited for evaluating multiple sources in a complex airshed. In addition many references point to CALPUFF's potential overprediction at the distances at issue here. Any bias issues in CAMx are ameliorated by tethering the model to real monitoring data, through the use of relative response factors generated by modeling of base and future cases to predict future monitored values.

Comments: We received comments that we failed to perform a full model performance evaluation and instead compared model results to the CENRAP modeling results despite deviations from CENRAP's modeling protocol. These commenters also assert that we failed to update the modeled emission inventories or consider more recent emissions data, such as the 2011 NEI and EPA's recent projected 2018 emission inventory showing large reductions from the Mercury Air Toxics Standards Rule (MATS). They state that recent monitor data are representative and indicate that our modeling is not representative of anticipated future conditions and was not considered during model performance evaluation.

Response: We did not do a detailed model performance of the 2002 basecase because that had already been done by CENRAP. The only changes we made in the 2002 basecase was to use a newer version of the CAMx model and an updated chemical mechanism to utilize improvements in the science for our analysis and decisions. As we discussed in our proposal materials, these changes were not large and did not warrant a full model performance evaluation. We did compare model results with previous results and determined that model results were very similar and deemed acceptable. It is not uncommon in the modeling community to do some small updates such as we did and not perform a full updated model performance analysis.

With regard to comments that we should have performed a more complete update of the inventory, a full emission inventory update for all emission categories such as biogenic, mobile, non-road, area, and point sources for 2002 and 2018 was well beyond the scope of our review of the SIP submittal. Such an update was not necessary to evaluate whether the modeling and analyses submitted with the original SIP could have led to a conclusion that additional reasonable progress controls are appropriate. Once our evaluation concluded that it could be appropriate for some sources to be better controlled for reasonable progress, we did do minor updates to evaluate the most recent emission levels of EGUs in Texas for the ones being further evaluated for potential controls in our 2018 emissions. Because of the additional focus on these particular sources it was appropriate to use more up to date emissions. We also used the most recent CAMx model version and updated chemical mechanism that included improvements to the source apportionment of single point sources and plume in grid algorithms to use the most recent science for our evaluations.

We evaluated the existing CENRAP 2002 and 2018 emission inventories and whether to update parts of these emission inventories in 2018. After our initial modeling analyses, we did update emissions for the EGUs evaluated for potential controls to use recent actuals in the 2018 modeling, which were thought to better represent emissions from EGUs in Texas based on comments from Texas and EGU owners.[148] We also updated the 2018 emissions for two other sources based on permitting and additional controls. We considered updating the EGU inventory with the emissions inventory from the modeling performed for the MATS rulemaking. At the time of proposal, the best information available was that no other major controls were planned to be installed on EGUs in Texas for SO_2 emissions in response to MATS, therefore using the recent actuals that we used for 2018 emission rates (prior to any potential reasonable progress controls) was the most reasonable emission inventory to use in our further modeling.

Lastly, we disagree with the commenter that the SIP modeling and our further evaluation of 2018 expected levels are not representative. In fact, the recent ambient monitoring data at the IMPROVE sites in the three Class I areas (2011–2013) are influenced by meteorology that has lower than normal transport of pollution from sources in Texas when compared to the base period on which projections are based (2000–2004) and to the 30-year meteorology analysis of transport to the three Class I areas (1984–2013). Thus, examining the 2011–2013 time period overstates the progress that can be expected over long term. In response to comments and information provided we conducted further analysis to appropriately evaluate whether the base period was suited for projections to 2018 and also an analysis of how the meteorology accompanying the more recent monitoring data for 2011–2013 compared to normal meteorology conditions. We further note that 2014 also was not quite a normal year[149] and likely similarly biased low for visibility impacts at the Class I areas, but even so monitoring data in 2014 did increase compared to the 2011–13 data. Overall, we conclude that our evaluation of 2002 and 2018 levels and the controls needed for reasonable progress are based on representative periods and that recent monitoring trends are not as representative and not expected to continue if meteorology is more in line with 30-year climatological and transport norms.

Comment: We received comments that CAMx is not the approved model in 40 CFR part 51, appendix W for

[147] Additional information is also included in the Environ Memorandums for the 2002 and 2018 modeling, (*TX166–010–08 Memo_TXHAZE_2002CAMx_ENV_29July2013, TX166–010–09 Memo_TXHAZE_2018CAMx 16Sept13*), the FIP TSD, and in the modeling section of our RTC document.

[148] Texas comments on Draft IPM modeling conducted by EPA for potential national rule making platform provided on June 26, 2014. In this docket's materials as ''TCEQ comment letter to EPA on draft modeling platform dated June 24, 2014 2018 EMP signed.pdf''

[149] Some preliminary analyses of meteorology and pollution levels in 2014 indicated a higher frequency of cold fronts during the summer of 2014 that led to cleaner air from the arctic mixing with the air in the region and resulted in lower pollution build-up and transport of pollution to Class I areas in Oklahoma and Texas.

modeling long-range transport for visibility.

Response: Neither the regional haze regulations nor appendix W requires the use of a specific preferred model for photochemical grid modeling for visibility (regional haze), but we have approved the use of regional scale photochemical grid models such as REMSAD and CMAQ.[150] CAMx is another regional scale photochemical grid model that was utilized by the RPOs and states and approved by EPA. CENRAP conducted its final CAMx source apportionment modeling for the regional haze analysis to be utilized in consultations of its nine state members in development of their SIPs. We approved most of these SIPs that included modeling analyses using CAMx and CAMx is clearly acceptable for evaluating long range transport for visibility. Texas also used CAMx in its reasonable progress analysis. Furthermore, Texas used CAMx to screen small groups of sources and individual sources as part of its BART screening and we approved that approach in 2006/7,[151] based on modeling enhancements that Texas contracted to be developed to assist in assessing single point source visibility impacts on visibility at Class I areas. The visibility impact analysis we performed with CAMx is commensurate with the work originally done by Texas in 2006/7 for its BART screening. Overall, Appendix W gives us discretionary authority in the selection of what models to use for visibility assessments with modeling systems, and models such as CALPUFF, CMAQ, REMSAD, and CAMx that have all been used for that purpose. In this specific situation we determined that CAMx had the best scientific modeling approaches and tolls and was best suited for the complex analysis that we needed to perform.

Comment: We received comments that our CAMx modeling significantly overstates visibility impacts and improvements on which we based our proposal. Commenters describe the ETEX and CAPTEX tracer studies and conclude that the results of these studies prove that CAMx overestimates visibility impacts by a factor of 3. These commenters also claim that these results also show an overestimate in CALPUFF results by a factor of 6 (ETEX) or a factor of 3 to 4 (CAPTEX). When this factor of 3 over-prediction is taken into consideration, commenters state, using the over-prediction amount to scale down modeled visibility improvement from controls results in small improvements and controls should not be required.

Response: We disagree with the commenters' conclusion about the ETEX and CAPTEX tracer studies and the relevance of these tracer study analyses. The analysis provided allegedly indicating that CAMx overestimates visibility impacts by a factor of 3 is an incorrect interpretation and has flaws in the evaluation and conclusions. Details on our technical evaluation and conclusions on why the commenters' analysis is flawed is in the RTC document. We do not condone the calibration of model results to try to adjust for potential biases.[152] Furthermore, the bias amount indicated by the commenter is flawed and is based on limited sampling of model performance evaluations that exist. As stated in a response above, our CAMx modeling analysis utilized a technique called RRF that limits the potential impacts of modeling performance issues since the modeling results are used in a relative sense and absolute modeling values are not directly used. Due to this and other reasons, we do not think that the CAMx modeling overstates the impacts. In fact, several pieces of information indicate the impacts may be underestimated (see modeling section of the RTC document for full discussion and references). Some information indicates that using Plume-In Grid may result in underestimation of a source's impacts. As discussed previously, in particular in the Cost versus Visibility Benefit and Modeling sections, we also disagree that the impacts are small, and we do think the impacts are large enough and the benefits of lowering emissions to meet the FIP emission limits are great enough to require these reductions. As discussed in a separate response to comment in this section, the CALPUFF modeling submitted by the commenter had flaws and is not appropriate even before they did their inappropriate scaling of results.

Comment: Commenters provided back trajectory data (72 hours, 500m) using HYSPLIT[153] and monitored data for 2002 and 2011–2013 for the 20% worst days for Big Bend, the Guadalupe Mountains, and the Wichita Mountains. They conclude that these data show that only a small number of back trajectories[154] come from regions with sources being analyzed and considered for controls. For Big Bend, the back-trajectories submitted by the commenters show the majority of back-trajectories coming from Mexico. For the Guadalupe Mountains, back-trajectories also primarily came from Mexico and visibility impairment is mostly due to natural sources. Back-trajectories for the Wichita Mountains rarely come from sources that we are proposing to control.

Response: The commenters' back trajectory analysis for the base period and 2011–2013 is flawed and did not follow the NOAA draft guidance they cited and appropriate HYSPLIT modeling techniques.[155] In addition, our evaluation, discussed in the modeling section of the RTC document, shows that the 2011–13 time period is not representative of climatological norms regarding the transport wind flows to the three Class I areas. We also find that the base time period 2000–2004 was more representative of climatological norms.

We reached these conclusions by performing our own HYSPLIT modeling of a 30-year period (1984–2013) and concluded that in years with wind flow patterns consistent with the climatological norms over that period a significant number of days have back trajectories that did include areas where the sources proposed for additional controls are located. Furthermore our analysis of the 2011–13 period which was less representative of normal pollution transport patterns also showed a number of back trajectories went through or near the areas with the sources being considered for controls. Therefore these back trajectories do indicate the sources being considered

[150] 40 CFR part 51, appendix W, Section 6.2.1 (e&f).

[151] EPA, TCEQ, and FLM representatives verbally approved the approach in 2006 and in email exchange with TCEQ representatives in February 2007 (see email from Erik Snyder (EPA) to Greg Nudd of TCEQ Feb. 13, 2007 and response email from Greg Nudd to Erik Snyder Feb. 15, 2007).

[152] App. W, Section 7.2.9(a) ''. . . Therefore, model calibration is unacceptable.''

[153] HYSPLIT is a model developed by NOAA to utilize national meteorological modeling files to assess potential air transport.

[154] The HYSPLIT model is designed to utilize archived meteorological fields to generate back trajectories. The model user will pick a certain receptor (in this case one of the Class I Areas) and a specific time (in this case an hour on the day when monitoring indicated there was high visibility impairment) and then the model will assess the meteorological fields and use the wind speed and direction for previous hours to indicate a centerline trajectory of where the air that was monitored was in the hours before the day and time selected. In essence the product is usually a jagged curved line with hourly wind vectors that traces back a centerline for a number of hours (example 72 hours). The back trajectory is a centerline of the wind and the model user has to keep in mind that dispersion and mixing occur so there are areas on either side that can contribute as well and the further back in time the back trajectory is processed the wider the areas on either side of the centerline that could have contributed becomes.

[155] NOAA is National Oceanic and Atmospheric Administration. NOAA is the developer of HYSPLIT and has previously provided draft guidance on the use of the HYSPLIT model.

for control would be expected to reduce visibility impacts at the three Class I areas.

Our analysis of 30-years of back trajectories to assess whether the 2011–13 and 2000–2004 periods were within the climatological norm also indicated that the base period (2000–2004) was more similar to the climatological norm than the 2011–2013 period, so we conclude that using the base period is more representative for projecting 2018 levels.

In sum, the number of trajectories that go near the sources in Texas is large enough to not rule them out from consideration for potential control. In general, we have treated back trajectories as a tool to potentially screen an area out if no trajectories go through an area but if some trajectories go through an area then the area may be evaluated further or, as in this case, the full analysis may rely on more sophisticated tools such as CAMx.

The commenter indicated that a number of back trajectories went through Mexico but failed to mention that many of these also went through Texas. Therefore, sources in Mexico and Texas could contribute emissions to the visibility impairment at the Class I Areas. We have concluded that the back trajectory data provided by the commenter do not support their assertions that transport from the regions with those sources we are controlling is rare. The data they have provided are inconsistent with the guidance and general practices and are for years that are not representative of normal climatological patterns with respect to transport wind flow to the Class I areas. Furthermore, the back trajectories submitted by the commenter do in fact show transport from regions of Texas for some days. Our additional analysis identified the normal wind patterns over a 30-year period and determined that based on normal conditions, transport does occur from the regions in Texas with those sources we are controlling.

HYSPLIT is a meteorological transport model but does not assess the dispersion of and impacts from pollutants from differing sources and does not have chemistry to correctly assess the potential impacts of secondary particulate matter. We used the CAMx model, which does account for pollutants and utilizes atmospheric chemistry mechanisms to calculate changes in visibility impacts from the proposed emission reductions at specific sources. As discussed in a response to comment above in this section, photochemical grid models such as CAMx are best suited for this analysis and determination of the benefit of potential emission reductions.

Comment: Commenters submitted CALPUFF modeling for Coleto Creek Unit 1 for 2004–2006. Results indicate that visibility impacts from the facility are below the 0.5 dv subject to BART threshold. The commenter states that tracer studies suggest CALPUFF overestimates visibility impacts by a factor of 4.5 (on average) and adjusts the CALPUFF model results down by this factor. The commenter concludes that Coleto Creek's calibrated impacts are very small and any visibility benefit from controls would be even smaller.

Response: We have reviewed the CALPUFF modeling provided for Coleto Creek Unit 1 and do not concur with the conclusions that Coleto Creek's impacts are small. We have a number of concerns with the CALPUFF modeling provided: (1) It utilizes the wrong years for modeling; (2) the modeling does not comply with the original BART CALPUFF modeling protocol that Texas and EPA approved; and (3) it uses some inappropriate assumptions, including the calibrating of modeling results based on limited analyses using other databases and locations that are not directly comparable to assessing impacts from Coleto Creek's units. The 0.5 dv threshold was utilized as a BART threshold, but our action is for reasonable progress and the 0.5 dv threshold was not set as an applicable threshold in the Regional Haze Rules for reasonable progress (see response in the Cost versus Visibility Benefit section of this document). We used a photochemical grid model which is more scientifically robust than the CALPUFF modeling system and is more appropriate for longer transport distances, such as the distances between Coleto Creek and the Class I areas in Texas and Oklahoma. We performed a multi-tiered analysis in order to identify the Texas facilities with the largest impacts on visibility at Class I areas (in Texas and Oklahoma) and Coleto Creek's facility did rank as one of the largest impacting sources of the more than 1,600 sources considered in Texas. As discussed in another response in this section, we do not condone calibrating CALPUFF model output values. We discuss the commenters' use of the tracer studies in the RTC document but their analysis and conclusions are flawed and not representative of the larger collection of information available that also is discussed in more detail in the RTC document. In conclusion, based on our analysis with CAMx, we think both the visibility impacts of the sources and the benefits from the proposed emission reductions are large enough to be beneficial for reasonable progress.

Comment: Focusing on visibility impacts on the 20% worst days ignores larger impacts from these sources and other sources on other days. This approach is also inconsistent with CALPUFF modeling for BART of the maximum impact from a source for comparison with a 0.5 dv threshold. Consideration of impacts on other days will identify sources for control analysis that will result in visibility improvement on other days and make progress towards the goal of natural visibility conditions.

Response: Under the reasonable progress and long-term strategy requirements of the Regional Haze Rule, the state or EPA in promulgating a FIP must establish reasonable progress goals that provide for improvement on the most impaired days, demonstrate that the established goals are reasonable and develop coordinated emission management strategies to achieve those goals. The most impaired days are defined as the average visibility impairment for the 20% of monitored days in a calendar year with the highest amount of visibility impairment.[156] Because the rule focuses on improving visibility on the most impacted days, we believe it is reasonable and appropriate to focus our analysis on sources that significantly impact visibility on those 20% worst days. While we generally agree with the commenter that this may ignore visibility impacts from sources that impact visibility on days other than the most impaired days, visibility impairment on the current 20% worst days will be reduced as a result of controls implemented to address visibility impairment for this first planning period, and we believe that in the future the most impaired days may shift and be impacted by different sources. Analysis and development of future regional haze SIPs for future planning periods can aim to address those sources that impact any new set of most impaired days. Furthermore, targeted reductions at those sources that significantly impact the most impaired days will also result in improved visibility on days outside of the most impaired days.

CALPUFF modeling is used to provide estimates of the maximum visibility impacts from a source based on maximum emissions and simplified chemistry, irrespective of the relationship to the 20% worst days. It is

[156] This is the definition in the Regional Haze Rule, but it contains an obvious typographical error. It should be interpreted to mean that *visibility* on the most impaired days is defined as stated.

possible that CALPUFF modeling of some of the subset of the 38 sources identified based on Q/d that were not analyzed for additional controls could show significant impacts on the maximum or 98th percentile day, but our CAMx photochemical modeling (which includes all emissions sources and has a realistic representation of formation, transport, and removal processes of particulate matter that causes visibility degradation) provides additional information that allows for the identification of the sources with the greatest impacts on the 20% worst days.

Comment: EPA should have required additional controls on sources beyond what we proposed in our FIP to assure even greater reasonable progress. Certain controls are reasonable and consistent with the proposed controls when impacts at Class I areas other than the Texas Class I areas and the Wichita Mountains are considered. Some specific facilities, such as Oklaunion and H.W. Pirkey, fall above the 0.3% impact threshold for impacts at the Class I areas of interest and should have been evaluated for controls. EPA evaluated controls for Parish and Welsh but did not require controls despite significant visibility benefit and reasonable costs.

Response: We focused our control analysis on the Texas Class I areas and the Wichita Mountains. As discussed in more detail elsewhere in this action, we are disapproving portions of the Texas and Oklahoma regional haze SIPs, including the Texas long-term strategy consultation, the Oklahoma reasonable progress consultation, the Oklahoma established reasonable progress goal for Wichita Mountains and the Texas reasonable progress/long-term strategy analysis and consideration of reasonable controls at Texas sources necessary to establish the Texas and Oklahoma reasonable progress goals. In developing a FIP to address the deficiencies in the Oklahoma and Texas SIPs, we had to analyze the visibility impacts and the availability of reasonable progress controls at Texas sources that impact visibility at the two Texas Class I areas and the Wichita Mountains and establish reasonable progress goals including consideration of an appropriate reasonable progress control analysis for these areas. We expect New Mexico, Arkansas, Louisiana, and Missouri to consider remaining impacts from Texas sources on their Class I areas including the information on visibility impacts from specific sources provided by our analysis, as well as incorporate corrections and updates to emission reductions in consultations and development of their regional haze SIPs for the next planning period.

We disagree with commenters and we note, as further detailed in our RTC document, that when recent actual emissions and unit-level visibility impacts are considered, the units at the facilities identified by the commenters, such as Oklaunion and Pirkey, fall below the percent of visibility impairment threshold we established to identify units for additional control analysis. This threshold was established to identify a reasonable set of units that had the greatest visibility impacts for additional control analysis for this planning period. We note that any increases in actual emissions at these facilities in the future should be considered during development of the regional haze SIP for future planning periods. In future planning periods, as the facilities with the greatest impacts are controlled, the percent of total visibility impairment due to these lower impact facilities will increase and they in turn should be considered for additional control.

Considering the visibility benefits and costs, we disagree that we should have required controls on units at Parish and Welsh. In evaluating the cost of controls, we also weighed how effective the reductions were in achieving visibility benefits. We considered the anticipated visibility benefit in deciviews (for both a ''dirty background'' and a ''clean background'') as well as the reduction in extinction and the percentage of visibility impairment addressed by the controls. Based on our evaluation of these visibility metrics within the cost factor of the four-factor reasonable progress analysis, we determined that additional controls on Parish and Welsh were not required for reasonable progress for the first planning period. In the FIP TSD and the proposed FIP, we note lesser visibility improvement benefits at the three Class I areas for the W. A. Parish and Welsh units compared to the benefits at other facilities that mainly impact the Wichita Mountains. We also note that when considering the costs of controls and the relative visibility benefit, the Parish scrubber retrofits would be slightly more expensive with respect to $/ton but would be much less effective in improving visibility at the Wichita Mountains, when compared to the required controls at the Monticello or Coleto Creek units. For the Welsh scrubber retrofits, the costs ($/ton) would be approximately 50% greater than the cost of scrubber retrofits at Monticello or Coleto Creek and would result in approximately 50% less visibility improvement at the Wichita Mountains. We also considered comments on cumulative visibility benefits of these controls and determined that the cumulative visibility benefits of each new scrubber at the Parish and Welsh units would be less than those at each of the units where we proposed scrubber retrofits and less than that at each of the units with proposed scrubber upgrades with the exception of Limestone, at a cost significantly higher than the estimated cost of scrubber upgrades. Similarly, the total cumulative visibility benefit of controlling the three units at Welsh and the four units at Parish would be less than half the benefit from all the required scrubber retrofits or all the required scrubber upgrades, and at a greater average $/ton cost.[157] While controlling the Welsh and Parish units would result in some additional cumulative visibility improvement, based on our evaluation and weighing of the cost and consideration of the visibility benefits of these controls at the Wichita Mountains, we determined their individual projected visibility improvements do not merit the installation of scrubbers at this time. We encourage the State of Texas to re-evaluate this determination as part of its next regional haze SIP submittal and we note that as the required controls are implemented the significance of impacts and potential benefits from the Parish and Welsh units will increase in terms of percentage of extinction. As discussed in the modeling section of the RTC document, we disagree with comments that this determination is inconsistent with the determination to require controls at Tolk Station or with the determination of required controls in other states for the purpose of reasonable progress.

We agree with the commenter that on a $/ton basis, scrubber upgrades on Parish unit 8 are very cost-effective. However, the visibility benefit and reduction in emissions from this control would be very low when compared to all the other evaluated scrubber upgrades. The estimated visibility benefit from upgrading the scrubber would be an order of magnitude less than all the other evaluated scrubber upgrades and not large enough to require as reasonable progress for this planning period.

Comment: EPA should have analyzed oil and gas sources and NO_X controls for certain point sources in Texas.

Response: With regards to comments on additional controls for NO_X, as

[157] See *TX-116-007-_33_Vis_modeling_summary.xlsx* in the docket to this action for visibility benefits of controls.

discussed in the proposed FIP, we agree with Texas that the predominant anthropogenic emissions impacting visibility are nitrate and sulfate emissions, primarily from point sources.[158] As described in more detail in the FIP TSD, in our initial analysis we focused on point sources and we identified facilities with the greatest potential to impact visibility based on a Q/d analysis considering both SO_2 and NO_X emissions. We then used photochemical modeling to estimate the visibility impacts due to the emissions from these facilities, considering SO_2, NO_X, and all other emitted pollutants. Based on the results of that visibility modeling, we identified a subset of facilities for additional control analysis and determined that the visibility impacts due to these facilities was almost entirely due to their sulfate emissions. Therefore, we determined that to address the visibility impacts on the 20% worst days from these sources, it was only necessary to evaluate sulfate controls for this planning period. Our analysis identified those sources that had the greatest visibility impacts, which we then further analyzed for controls. This analysis did not identify any individual point sources (with the exception of the PPG Glass Works facility) with significant visibility impacts due to NO_X emissions among the group of sources with the greatest visibility impacts. We address our evaluation of NO_X controls for the PPG Glass Works in our RTC document.

Oil and gas emissions are the largest component of area source emissions but are only part of the total NO_X area source emissions. Oil and gas sources that fall within the point source category were considered in our initial Q/d analysis and photochemical modeling used to identify sources for additional control analysis. Similarly with regard to comments on controlling oil and gas sources, visibility impacts from NO_X emissions from area sources are relatively small compared to impacts from point sources of SO_2 and NO_X at the Class I areas impacted by Texas emissions. Focusing on point source emissions of NO_X and SO_2 captured those sources with the greatest impacts on visibility and was a reasonable approach for this planning period.

Comment: Visibility impairment from the ''Other 29'' sources not analyzed for controls are still significant and additional controls should be required. Furthermore, some of the ''1,600 +'' sources not further analyzed collectively contribute to total visibility impairment.[159]

Response: Our Reasonable Progress Guidance discusses the steps to follow in identifying reasonable controls and establishing reasonable progress goals. The key pollutants contributing to visibility impairment at each Class I area should be determined. ''Once the key pollutants contributing to visibility impairment at each Class I area have been identified, the sources or source categories responsible for emitting these pollutants or pollutant precursors can also be determined. There are several tools and techniques being employed by the RPOs to do so, including analysis of emission inventories, source apportionment, trajectory analysis, and atmospheric modeling'' (page 3–1). As discussed in more detail in our proposal and in a separate response to comment in the modeling section of the RTC document, we determined that it was reasonable to focus our analysis on point sources of SO_2 and NO_X.[160] This was based on review of emissions and source apportionment results indicating that these sources were most responsible for anthropogenic contributions to visibility impairment. We then used a Q/d analysis to identify those sources with the greatest potential to impact visibility based on emissions and distance. Additional analysis using photochemical grid modeling was then completed to estimate the visibility impact from those sources. Based on consideration of facility level and estimated contributions to visibility from units at the modeled facilities, we identified those sources that had the greatest visibility impacts to analyze for additional controls. We agree with the commenter that collectively the ''Other 29'' sources and ''1,600+'' sources contribute a sizeable percentage of the total visibility impairment. However, on an individual basis, these point sources have lower contributions and smaller potential for visibility improvements relative to the nine facilities evaluated for additional controls. For example, the proposed controls on only 7 facilities address 5.8% of the total visibility impairment at the Wichita Mountains, while controls on all of the ''Other 29'' sources would address 4.4% of the total visibility impairment. Consistent with our guidance, we identified those key pollutants and sources with the greatest impact on visibility impairment for this first planning period. We also note that the ''Other 29'' includes impacts from San Miguel and the PPG Glass Works facility that were considered for additional controls, and the JT Deely units that are scheduled to shutdown in 2018.

The Regional Haze Rule requires the identification of reasonable progress controls and the development of coordinated emission control strategies in order to make reasonable progress towards the goal of natural visibility conditions. Faced with a very large and unwieldy universe of sources, we followed our guidance and chose an approach that focused on the portion of the universe of Texas sources that contributed the greatest impact to visibility impairment, by establishing a threshold of 0.3% contribution to total visibility impairment on a unit basis for this planning period, thereby identifying a reasonable set of units at nine facilities to analyze for additional controls.[161] Our four-factor analysis concluded that controls on units at seven of the nine facilities analyzed for additional controls were required. As these controls are implemented, the percentage impact from those facilities not controlled will become larger (on a percentage basis) and will be analyzed in future planning periods. In other words, some of the ''Other 29'' will be identified as the greatest impacting sources and should in turn be analyzed for additional reasonable progress controls in a future planning period. This methodology can be used as a consistent procedure to identify facilities for additional control analysis in this and future planning periods and would ensure continuing progress towards the goal of natural visibility conditions. The USDA Forest Service commented that ''the methodology and metrics that EPA used are the most comprehensive seen to date for any SIP/FIP in the country that we have reviewed, and should serve as a model for future efforts to consider the contribution and/or potential benefits of individual sources to visibility.''

Comment: We received comments on the methodology used to identify sources for analysis. Commenters stated that our analysis, beginning with a Q/d analysis and the use of a 0.3% of total impairment threshold for identifying

[158] 79 FR 74838.

[159] ''Other 29'' refers to the facilities identified as having the greatest potential to impact visibility based on the Q/d analysis but were then eliminated from further analysis based on photochemical modeling results. ''1,600 +'' refers to all point sources in Texas from the TCEQ's 2009 point source inventory.

[160] 79 FR 74838.

[161] As discussed elsewhere, San Miguel has already upgraded its scrubber and therefore it was not included in our modeling analysis of additional controls and not included among the nine facilities discussed here. In our FIP, we are finalizing our determination that San Miguel maintains an emission rate consistent with recent monitoring data.

sources for additional analysis was arbitrary, capricious, or improper. In addition, commenters contend that the Q/d analysis selects the wrong sources because it does not consider stack parameters or meteorology. Other commenters suggested that all 38 facilities identified as having the greatest potential to impact visibility by the Q/d analysis should have undergone a four-factor analysis. We also received comments that a lower threshold should have been used, that the threshold was applied inconsistently, and that the 0.3% threshold screened out sources that have a significant visibility impact and should have been evaluated for controls.

Response: We disagree with the commenters' assertion that our analysis, beginning with a Q/d analysis, was arbitrary, capricious, or improper. As explained below and elsewhere in this document, our complete analysis identified those sources with the greatest visibility impacts at the Wichita Mountains and the Texas Class I areas based on consideration of a source's emissions, location, and modeled visibility impairment. Once identified, we performed additional control analysis on these sources to determine through the four-factor analysis if controls were available and cost-effective.

As we discuss at length in the FIP TSD and in our RTC document, we, states (including Texas) and RPOs (including CENRAP) have used a Q/d analysis to identify those facilities that have the most potential to impact visibility at a Class I area based on their emissions and distance to the Class I area. These identified facilities could then be considered for further evaluation to estimate visibility impacts, and then undergo the reasonable progress analysis for determination of reasonable progress controls. The BART guidelines [162] discuss identifying sources with the potential to impact visibility based on a Q/d approach consistent with the method followed in this action. Furthermore, this approach has also been recommended by the FLMs' Air Quality Related Values Work Group (FLAG) [163] as an initial screening test to determine if an analysis is required to evaluate the potential impact of a new or modified source on air quality related values (AQRV) at a Class I area. In the Texas regional haze SIP, the TCEQ relied on a Q/d approach as one of the initial steps to identify sources for additional analysis.[164] We used a similar Q/d approach to identify 38 sources, from the more than 1,600 point sources in Texas that had the most potential to impact visibility due to their location and size. In other words, we started by looking at every point source in Texas [165] and narrowed the field to a much smaller subset of sources with the most potential to impact visibility based on their emissions and location. This approach is a widely used method as an initial step to evaluate a facility's potential to impact air quality and identify those sources with large enough emissions close enough to a receptor to need additional analysis. Using this methodology, we considered every point source in Texas and narrowed the list to a much smaller list of facilities with the greatest potential visibility impacts based on just emissions and distance.

Following the Q/d analysis, we took the additional step of using photochemical modeling, utilizing CAMx with Plume-In-Grid (PiG) and Particulate Source Apportionment Tagging (PSAT). As the commenter states, the Q/d analysis does not take into account stack parameters, meteorological conditions, or chemistry. Given the large geographic distribution of sources and distances to the Class I areas, we recognized that it was highly likely that only a subset of these 38 facilities would have the greatest visibility impacts on downwind Class I areas once meteorology and transport conditions, atmospheric dispersion, chemistry, and stack parameters were taken into consideration, as CAMx with PiG and PSAT can do. We determined it was appropriate to use photochemical modeling to assess the visibility impact from those sources identified by our Q/d analysis. In the same way that Q/d is used as an estimate of the potential visibility impact due to emissions and distance, the photochemical modeling aims to estimate the visibility impacts albeit in a much more refined manner that accounts for chemistry and meteorological conditions. We also note that some RPOs and states used a combination of back trajectory analysis, source apportionment modeling results, and Q/d as a more refined approach to identify sources for additional control analysis for reasonable progress.[166] Our modeling results indicated that a subset of the 38 facilities were the primary contributors to visibility impairment at each Class I area. The results of this modeling were used to verify our initial identification of sources and further eliminate sources from a full four-factor analysis based on facility-level impacts and consideration of estimated unit level impacts, as described in detail in the FIP TSD.

There are a number of different approaches used by states in identification of sources for reasonable progress evaluation but these approaches usually centered around the general premise of evaluating the biggest sources and the biggest impacts on visibility. As we explain in the FIP TSD, we considered the visibility modeling results in a number of ways to determine a reasonable approach to identify those sources with the largest impacts for additional analysis for controls for this planning period. We examined the model results for extinction and percent extinction of the modeled facilities as well as estimated impacts based on more recent actual emissions. We considered both facility level and unit level impacts. We concluded that any unit with an estimated impact greater than 0.3% would be further evaluated. We believe that using a percent impacts approach is appropriate because of its linkage to the reasonable progress concept. For example, a source that has a smaller absolute impact on a relatively cleaner area but a higher percentage impact might be considered for control so that the cleaner area can potentially make progress. We used the 0.3% threshold only as a way to identify a reasonable

[162] See 40 CFR part 51, appendix Y, section III (How to Identify Sources "Subject to BART")

[163] Federal Land Managers' Air Quality Related Values Work Group (FLAG), Phase I Report—Revised (2010) Natural Resource Report NPS/NRPC/NRR—2010/232, October 2010. Available at *http://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf.*

[164] TX RH SIP Appendix 10–1. "The group of sources was further reduced to eliminate sources that are so distant from any of the ten Class I areas that any reduction in emissions would be unlikely to have a perceptible impact on visibility. The list was restricted to those sources with a ratio of estimated projected 2018 base annual emissions (tons) to distance (kilometers) greater than five to any Class I area."

[165] The Texas point sources are defined as industrial, commercial, or institutional sites that meet the reporting requirements of 30 Texas Administrative Code (TAC) § 101.10. Permitted point sources in Texas are required to submit annual emissions inventories. The data are drawn from TCEQ's computer-based State of Texas Air Retrieval System (STARS). Annual emission data from 2009 were utilized to calculate the Q/D value for all point sources with reported emissions in Texas. 2009 emissions data available in the docket as "2009statesum.xlsx"

[166] To select the specific point sources that would be considered for each Class I area, VISTAS first identified the geographic area that was most likely to influence visibility in each Class I area and then identified the major SO_2 point sources in that geographic area. The distance-weighted point source SO_2 emissions (Q/d) were combined with the gridded extinction-weighted back-trajectory residence times. The distance weighted (Q/d) gridded point source SO_2 emissions are multiplied by the total extinction-weighted back-trajectory residence times (Q/d * Bext-weighted RT) on a grid cell by grid cell basis and then normalized. See VISTAS Area of Influence Analyses, 2007 available in the docket for this action.

set of sources to evaluate further. At this point, the resulting reasonably broad set of sources served as a starting place from which to further analyze individual source impacts in the second round of modeling, and balance them against any cost-effective controls that could be identified.

In summary, our analysis properly identified the sources in Texas with the greatest individual visibility impacts for additional control analysis. Commenters are incorrect in their assertion that the visibility impacts from the identified sources are miniscule, or that we started our analysis with the wrong sources. Starting from the entire universe of Texas point sources, we systematically eliminated those facilities that had less potential to impact visibility based on careful consideration of emissions, location, and finally modeled visibility impacts. After identifying those facilities with the greatest visibility impacts, we performed the four-factor analysis to evaluate whether reasonable progress controls were available and cost-effective.

Comment: We received comments that EPA established the deciview as the required metric for establishing and tracking progress towards the reasonable progress goal. EPA's use of extinction or percent extinction and establishment of thresholds is arbitrary, capricious, illegal and without precedent.

Response: We disagree with the commenters that our use of metrics other than deciviews for certain purposes is contrary to regulations. The commenters fail to distinguish between the metrics used to describe overall visibility conditions at a Class I area and the metrics that can be used to describe the visibility impairment due to an individual source, group of sources, a state's sources, or some other portion of the visibility impairment at a Class I area. In describing the overall visibility conditions at a Class I area, we established the deciview as the principle metric. This applies to the calculation of current, baseline, and natural visibility conditions at a Class I area, as well as the reasonable progress goals established as the visibility condition goal for the Class I area at the end of the current planning period. We agree with the commenters that the use of the deciview metric is required in a number of places within the rule that discuss overall visibility conditions and assessing progress towards meeting the desired visibility conditions. Specifically, the state must (1) establish reasonable progress goals expressed in deciviews (40 CFR 51. 308(d)(1)); (2) determine the uniform rate of progress in deciviews (40 CFR 51.308(d)(1)(i)(B)); and (3) determine the baseline and natural visibility conditions expressed in deciviews and the number of deciviews by which baseline conditions exceed the natural conditions (40 CFR 51.308(d)(2)). Consistent with these requirements, we calculated the baseline and natural visibility conditions, the uniform rate of progress, and the number of deciviews by which baseline conditions exceed the natural conditions in deciviews for Big Bend and the Guadalupe Mountains, as well as established reasonable progress goals for the Wichita Mountains and the Texas Class I areas in deciviews.

The deciview metric provides a scale that relates to visibility perception and therefore is useful in assessing the overall visibility conditions that are being or will be perceived at the Class I area. The commenters cite to several actions and the Regional Haze Rule where the benefits of using the deciview metric are discussed, however this is only discussed in the context of overall visibility conditions, such as determining current or natural visibility conditions. This is very different from the fraction of visibility impairment attributable to a source or group of sources. We note that in the final Regional Haze Rule, we do in fact mention the use of light extinction as another metric that states may choose to use.

There is no requirement to use the deciview metric in describing the visibility impairment due to a source or group of sources as part of the analysis required for identifying reasonable controls under reasonable progress. In describing how to identify sources or source categories responsible for visibility impairment, our guidance [167] provides states with considerable flexibility to utilize various tools and techniques that would necessarily involve the use of various metrics other than deciviews. Many states and RPOs, including Texas and CENRAP, relied on a Q/d analysis, described and discussed in depth in separate responses to comments and in our proposed FIP, to identify sources for additional control analysis. The Q/d analysis relies on an annual emissions divided by distance metric, not deciviews. The VISTAS RPO relied on a metric derived from Q/d and residence-time, not deciviews.[168] Some states relied on a simple analysis of emissions to determine which sources should be analyzed.

[167] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program, U.S. EPA, OAQPS, June 1, 2007, page 3–1

[168] VISTAS Area of Influence Analyses, 2007, available in the docket for this action.

When assessing the various contributions to visibility impairment due to either source categories or pollutant species from other states and international sources, Texas routinely relied on light extinction and percent of total visibility impairment metrics. For example, Chapter 11 of the Texas regional haze SIP describes the contributions due to sulfate, nitrate, and other pollutants on the 20% worst and 20% best days at the Guadalupe Mountains and Big Bend in terms of light extinction (inverse megameters, Mm^{-1}). Similarly, the extinction metric is used by Texas (see section 11.2.3 of the Texas regional haze SIP) to assess the level of impact on other Class I areas from Texas sources. Texas also used the extinction metric to determine which states significantly impact the Texas Class I areas, applying an impact extinction level threshold of 0.5 Mm^{-1} from all sources in a state as a threshold for inviting a state to consult.[169] Source apportionment modeling performed by the RPOs was utilized by every state to assess the various contributions to visibility impairment at their Class I areas in terms of light extinction and percent contribution to total light extinction. The CENRAP PM source apportionment tool (CENRAP PSAT tool) utilized by all CENRAP states, including Texas and Oklahoma, to review the results of the source apportionment modeling provides results in two ways: Light extinction (inverse megameters) and percentage of total extinction. In our action, we also utilized the methodology and metrics used by the RPOs to evaluate the source apportionment results, the only difference being that our source apportionment modeling provided information on visibility impacts from individual sources instead of source categories, or regions/states. In the FIP TSD, we provide information on visibility impacts from the individual sources in terms of extinction, percentage of total extinction, and in deciviews.

We evaluated the information in terms of light extinction and percentage of total impact to identify a reasonable subset of sources with the largest visibility impacts to analyze for additional controls. Because the overall visibility conditions at different Class I areas can vary greatly, particularly Class I areas in the Eastern U.S. compared to Class I areas in the Western U.S., we determined that it is not enough to consider just the magnitude of extinction from a facility; we must also

[169] See Texas Regional Haze SIP Appendix 4–1: Summary of Consultation Calls

consider the percentage of total impairment metric at each Class I area. As we state in the FIP TSD, ''We believe that using a percent impacts approach is appropriate because of its linkage to the RP concept. For example, a source that has a smaller absolute impact [in terms of extinction] on a relatively cleaner area but a higher percentage impact might be considered for control so that the cleaner area can potentially make progress.'' Using the percentage of total visibility impairment metric allows us to somewhat normalize the extinction differences between Class I areas so that we can utilize the same approach at each Class I area and identify a reasonable set of sources to analyze that if controlled would result in meaningful visibility benefits towards meeting the goal of natural visibility at every Class I area. For every Class I area to have the opportunity to reach the natural visibility goals, it is necessary to identify the sources or source categories that significantly impact visibility, identify available controls and analyze whether those controls are reasonable. Had we established a strict threshold based on extinction, we would have had to establish a different threshold for each Class I area. Using a percentage approach, such as the 0.3% of total visibility impairment on a unit basis we used in this action, results in identification of a subset of sources that includes those sources with the greatest visibility impacts at each Class I area. As stated by the USDA Forest Service in its supportive comments, the use of this methodology and metrics, including the use of a small percentage threshold on the 20% worst days is linked to the concept of reasonable progress. We believe it could serve as the model for future efforts to consider the contribution and potential benefits of individual sources to visibility. After identifying which sources to analyze for additional controls based on the percentage impact on a unit basis, we determined which controls were reasonable based on consideration of the four factors, including comparison of cost to the anticipated visibility benefit (deciview improvement, extinction, percentage of total extinction, and the percentage of the total impact from Texas point sources addressed by the control).

Comment: We received comments on the method we used to adjust CAMx results. Commenters stated that we developed a linear relationship between emissions and extinction and then adjusted CAMx modeled extinction linearly with emissions to match proposed controlled emission levels. The commenters stated that the relationship between emissions and light extinction is not linear and that interactions between nitrate and sulfate create a complicated relationship. The commenters cited to the CAMx user guide which they claim supports that the relationship is non-linear. In contrast, Earthjustice said that our approach was reasonable.

Response: We disagree with the comments that the methodology used to estimate visibility benefits from control level emissions was unjustified or unreasonable, and agree with Earthjustice that our approach was reasonable. The linear relationship we developed to extrapolate extinction due to controlled emission rates was a reasonable approach in our technical analysis.

We agree with the commenters that, in general, the relationship between downwind concentrations and emissions can be complicated and non-linear due to complex chemistry, including the fact that reductions in sulfur emissions can result in an increase in ammonium nitrate. Each modeled emission scenario took this complex chemistry into account in estimating the visibility impacts for that scenario. We estimated control efficiencies for a high and low control case scenario that would span the range and give a reasonable approximation of emission reductions of potential controls and maximize the number of data points available to estimate the visibility benefit due to a reduction in emissions.[170] Using the unit level High and Low modeled visibility impacts and the 2018 facility level modeling described in the FIP TSD, we examined the relationship between the various levels of emissions from a modeled site and the modeled visibility impact at each Class I area. For each facility and Class I area, the available modeled data were linear with high correlation and the modeled emission levels were relatively close to the estimated control levels examined. Therefore we used the linear fit to extrapolate the anticipated visibility impact/benefit from a given level of emission/control.[171] We agree that small perturbations relative to the model inputs can be approximated as linear. However, as discussed in more detail in our response to this comment in the RTC document, we disagree with the commenters that we extended the linear treatment to large variations, and we note errors in the commenters' assessment of the differences between modeled and required control levels. The variations between the modeled High control levels and the control levels required in the FIP are relatively small. This is a small perturbation from the modeled levels, a small difference in estimated extinction benefit from the modeled and required control level, and does not impact our overall decisions on the significance of visibility benefits from the required controls. We agree with Earthjustice that the small level of uncertainty in the visibility benefit from these controls introduced by the linear extrapolation does not impact the overall conclusions. In every case, the required control level emissions are the same or less than the high control level modeled, and the visibility benefits from controls at the required control level will be the same or more than those modeled at the high control level. Therefore, the high level modeled visibility benefits can be seen as a lower bound and even these support our decision.

Comment: We also received comments on the calculation of a deciview impact or improvement based on natural ''clean'' background conditions and the estimated visibility impacts/improvement based on recent actual emissions rather than projected 2018 emissions. The commenters contend that the use of natural background overstates the estimated visibility benefit from the proposed controls and that these adjustments based on recent actual emissions and natural background artificially increase projected visibility improvement from the proposed controls. The commenter states that the use of ''natural conditions'' is contrary to the regulations, inconsistent with agency precedent, and arbitrary and capricious and that the analysis does not address the relevant legal issue and is not rationally connected to the final decision (*i.e.* what is a reasonable progress goal for 2018).

Response: We disagree with the commenter that the use of ''natural conditions'' is contrary to the regulations, inconsistent with agency precedent, and arbitrary and capricious. We disagree with the commenter that the analysis does not address the relevant legal issue and is not rationally connected to the final decision (*i.e.,* as defined by the commenter as what is a reasonable progress goal for 2018). The Regional Haze Rule requires that we identify reasonable controls based on consideration of the four statutory factors and establish a reasonable progress goal that reflects the

170 See FIP TSD at A–54 for a more detailed description

171 See the file, ''Vis modeling summary.xlsx'' in the docket for this action for our calculations and estimates of visibility benefits from the examined levels of controls.

anticipated amount of visibility improvement from implementation of those controls in additional to all other ''on the books'' controls. Specifically, § 51.308(d)(1)(i)(A) requires consideration of the four factors and a demonstration of how these factors were taken into consideration in selecting the visibility goal. We analyzed the time necessary for compliance, energy and non-air environmental impacts, the remaining useful life, and the costs of compliance including consideration of the anticipated visibility benefits of specific controls on individual units. As discussed in depth below, in considering the anticipated visibility benefits from individual controls, it was appropriate to consider estimated benefits on a ''clean'' or ''natural'' background.

In the FIP TSD, we discuss the need to estimate visibility benefits using both a ''clean'' and ''dirty'' background: [172]

> The deciview improvement based on the 2018 background conditions provides an estimate of the amount of benefit that can be anticipated in 2018 and the impact a control/emission reduction may have on the established RPG [reasonable progress goal] for 2018. However, this estimate based on degraded or ''dirty'' background conditions underestimates the visibility improvement that would be realized for the control options under consideration. Because of the non-linear nature of the deciview metric, as a Class I area becomes more polluted the visibility impairment from an individual source in terms of deciviews becomes geometrically less. Results based solely on a degraded background will rarely if ever demonstrate an appreciable effect on incremental visibility improvement in a given area. Rather than providing for incremental improvements towards the goal of natural visibility, degraded background results will serve to instead maintain those current degraded conditions. Therefore, the visibility benefit estimated based on natural or ''clean'' conditions is needed to assess the full benefit from potential controls.

In considering the visibility benefits of potential controls, we considered deciview improvements as well as the reduction in extinction and percent extinction. By definition, the ''clean'' background analysis using natural conditions eliminates the impact from all other anthropogenic sources, domestic and international. This approach is aimed at assessing the full potential visibility benefit of controls. It is not reasonable to only assess the visibility benefit of controls, the value of installing a control in the immediate future that will permanently reduce visibility impacts from a source, in such a manner that is dependent on the current level of emissions or impact from other sources or other countries. For example, in considering only the estimated visibility benefit from controlling Big Brown using a ''dirty'' background, an increase in visibility impacts from Mexico emissions or emissions from another Texas point source would result in a decrease in the visibility benefit in deciviews from installing controls on Big Brown, making controls appear less beneficial. By using a metric that is independent of all other emission sources (''clean''), we avoid this paradox that the dirtier the existing air, the less likely it would be that any control is required. This was also explained in the preamble to the final Regional Haze Rule and Guidelines for BART Determinations.[173] The use of ''clean'' background is necessary to assess the full potential benefit from controls and does not overstate the visibility benefit.

Our use of ''clean'' background is also consistent with the methodology used by Texas for BART visibility analysis, which also relied on CAMx photochemical modeling with source apportionment. The TCEQ utilized this approach in assessing the visibility impacts from individual sources and groups of sources to determine their significance for BART screening. As detailed in the screening analysis protocol developed by TCEQ and reviewed by us, ''The source's HI [haze index] is *compared to natural conditions* to assess the significance of the source's visibility impact. EPA guidance lists natural conditions ($b_{natural}$) by Class I area in terms of Mm^{-1} (EPA, 2003b) and assumes clean conditions with no anthropogenic or weather interference. The visibility significance metric for evaluating BART sources is the change in deciview (del-dv) from the source's and natural conditions haze indices.'' [174]

We disagree with the commenter that our use of the ''natural background'' metric is contrary to regulations. As we discuss in a separate response to comment concerning the legality of the extinction and percent extinction metrics, the commenter fails to distinguish between the required metric used to describe overall visibility conditions at a Class I area at a given point in time and the range of metrics that can be used to describe the visibility impairment due to an individual source, group of sources, a state's sources, or some other portion of the visibility impairment at a Class I area. As explained above, it is necessary to consider the visibility benefit of controls on a ''clean'' background basis to assess the full benefit from potential controls.

The use of natural background is also supported by our previous action on North Dakota's regional haze SIP and the associated Eighth Circuit Court decision. The full text of our determination in North Dakota is: [175]

> In addition to evaluating the four statutory factors, North Dakota also considered the visibility impacts associated with the control options for each RP source. However, in modeling visibility impacts, North Dakota used a hybrid cumulative modeling approach that is inappropriate for determining the visibility impact for individual sources. As with the modeling North Dakota conducted for its NO_X BART analysis for MRYS [Milton R. Young Station] Units 1 and 2 and LOS [Leland Olds Station] Unit 2, the approach fails to compare single- source impacts to natural background. While there is no requirement that States, when performing RP analyses, follow the modeling procedures set out in the BART guidelines, or that they consider visibility impacts at all, we find that North Dakota's visibility modeling significantly understates the visibility improvement that would be realized for the control options under consideration. Accordingly, we are disregarding the modeling analysis that North Dakota has used to support its RP determinations for individual sources.

The Eighth Circuit Court's decision affirmed our position that the use of degraded, or dirty background, was not consistent with the CAA. The relevant section of the 8th Circuit Court's decision on this point reads: [176]

> Although the State was free to employ its own visibility model and to consider visibility improvement in its RP

[172] See our FIP TSD, page A–39.

[173] Using existing conditions as the baseline for single source visibility impact determinations would create the following paradox: The dirtier the existing air, the less likely it would be that any control is required. This is true because of the nonlinear nature of visibility impairment. In other words, as a Class I area becomes more polluted, any individual source's contribution to changes in impairment becomes geometrically less. Therefore the more polluted the Class I area would become, the less control would seem to be needed from an individual source. We agree that this kind of calculation would essentially raise the ''cause or contribute'' applicability threshold to a level that would never allow enough emission control to significantly improve visibility. Such a reading would render the visibility provisions meaningless, as EPA and the States would be prevented from assuring ''reasonable progress'' and fulfilling the statutorily-defined goals of the visibility program. Conversely, measuring improvement against clean conditions would ensure reasonable progress toward those clean conditions. 70 FR 39124.

[174] Texas Regional Haze SIP, Appendix 9–5, ''Screening Analysis of Potential BART-Eligible Sources in Texas'' at 2–11, emphasis added.

[175] 76 FR 58627.

[176] *North Dakota* v. *EPA,* 730 F.3d 750, 766 (8th Cir. 2013).

determinations, it was not free to do so in a manner that was inconsistent with the CAA. Because the goal of section 169A is to attain natural visibility conditions in mandatory Class I Federal areas, see 42 U.S.C. 7491(a)(1), and EPA has demonstrated that the visibility model used by the State would serve instead to maintain current degraded conditions, we cannot say that EPA acted in a manner that was arbitrary, capricious, or an abuse of discretion by disapproving the State's RP determination based upon its cumulative source visibility modeling.

The use of natural background conditions to assess visibility benefits of individual controls, as we have done here in this action, is consistent with the goals of the CAA. As to the comment that we adjusted the modeled results by updating the baseline uncontrolled emissions for each unit based on SO_2 emissions data for 2009–2013, this was a necessary step to assess the visibility benefit of controls relative to the visibility impairment due to future anticipated emission levels at these units without the required controls. Comparison of 2018 CENRAP projected emissions to recent actual emissions showed that a number of facilities have actual emissions that are much higher than CENRAP 2018 modeled emissions.[177] For instance, Big Brown, Sandow, and Martin Lake actual emissions were all significantly higher than 2018 CENRAP modeled rates, with Martin Lake having over 90% more SO_2 emissions than projected by CENRAP for 2018. Both Pirkey and Oklaunion had much smaller actual SO_2 emissions than projected. As we discuss in the FIP TSD, we believe that recent actual emissions are more representative of anticipated future emissions at the sources evaluated than the CAIR projections developed in 2006 and adopted by CENRAP. The CENRAP modeling was based on an IPM (Integrated Planning Model) that estimated EGU future emissions in 2018 including reductions for CAIR across the eastern half of the United States. This analysis was conducted in 2006 and projected that Texas would be a purchaser of SO_2 credits, and that not much high level control would be placed on Texas EGU sources. Given the length of time between 2006 when the IPM analysis was conducted, and 2013 when we were conducting this analysis, we had some concern that these projections could be off for the EGUs in Texas. Information available also indicates that SO_2 credits are much cheaper than originally projected, therefore more credits may have been used in lieu of emission reductions. We also weighed the technique that Texas has used in estimating emissions from EGUs for future years (including 2018) in ozone attainment demonstration SIPs in DFW and HGB. For these photochemical modeling analyses with CAMx, Texas has relied upon the recent CEM data that is also included in CAMD's databases in conjunction with information on recently permitted EGUs for estimating the emissions to model for EGUs in Texas in 2018 as these overall EGU emission levels are already near levels projected under CAIR Phase II control such that further emission reductions are doubtful in the absence of some new requirements.

The actual SO_2 allowances for Texas under CSAPR are not much different than the CAIR Cap for Texas, so large additional reductions over current emission levels were not expected. However, because we had earlier projected with IPM that controls for MATS may generate the installation of additional scrubbers in Texas that could potentially result in further SO_2 reductions, we again investigated this possibility. Texas recently submitted comments to us on a more recent IPM projection that was at the time intended by EPA to be part of a new modeling platform for national rule making.[178] In these comments and comments from several EGU owners in Texas, the assertion was that no significant amount of additional SO_2 controls are expected due to compliance with MATS. The comments also pointed out that, as some of our cursory research had also indicated, no large SO_2 control projects were planned at most of the sources we were evaluating. Therefore, based on Texas' recent comments and other information, we concluded considerable uncertainty exists as to whether any further reductions of SO_2 will occur beyond current emission levels as a result of compliance with MATS or CSAPR. Overall this information supports looking at recent actual emissions to represent future emission levels in 2018.

In summary, this adjustment from CENRAP 2018 to the baseline calculated from recent actual emissions was not an ''artificial adjustment'' and was necessary to account for the large difference between specific unit-level emissions in the 2018 CENRAP emissions and a baseline more representative of anticipated future emission levels in 2018. We estimated and presented the estimated visibility benefit of controls based on both the CENRAP 2018 projected emission levels and emission levels consistent with recent actual emissions data. The results considering the 2018 CENRAP emissions baseline were also needed to provide a comparison with the Texas regional haze SIP and an estimate of the change from the 2018 CENRAP modeled reasonable progress goal to a new reasonable progress goal including the controls required in the FIP. The visibility benefit of individual controls calculated based on the CENRAP 2018 emissions baseline represents the additional level of visibility benefit from controlling individual units, consistent with the assumptions/emission projections in the Texas regional haze SIP.

Comment: EPA's methodology to estimate revised reasonable progress goals for Big Bend, the Guadalupe Mountains, and the Wichita Mountains is without precedent and is not supported by the record. The commenters also state that the revised reasonable progress goals are incorrect because they do not account for reductions in Oklahoma emissions.

Response: We disagree with the comment and believe we took a reasonable approach to estimate the change in overall visibility impairment anticipated due to the required controls and provided all calculations for review. We also disagree with the commenter's description of how the states estimated the reasonable progress goals. While our guidance suggests that reasonable progress goals should be established by modeling all existing and reasonable controls, in practice all RPOs including CENRAP completed the modeling early in the process. The 2018 CENRAP modeling was completed before any states had completed their BART and reasonable progress determinations. In many cases, the 2018 projection included an assumption of BART level controls and ''on the book'' controls. Once final BART determinations and reasonable progress determinations were completed, the RPO did not go back and remodel to reassess the reasonable progress goals. In our proposed action in Arkansas,[179] as well as our actions in Arizona[180] and Hawaii,[181] the modeled reasonable progress goals were adjusted based on a methodology of scaling of visibility extinction components in proportion to emission changes. We noted that although we recognize that this method is not refined, it allows us to translate

[177] See Table A.4–2 of the FIP TSD for a comparison of recent actual emissions to CENRAP 2018 projected emission levels.

[178] TCEQ comment letter to EPA on draft modeling platform dated June 24, 2014. '2018 EMP signed.pdf'.

[179] 80 FR 18944, 18997.

[180] 79 FR 52420, 52468.

[181] 77 FR 31692, 31708.

the emission reductions achieved through the FIP into quantitative reasonable progress goals, based on modeling previously performed by the RPOs. However, in this case, our analysis using CAMx modeling and source apportionment, provided a somewhat more refined means to estimate the visibility benefit from specific individual controls on the 20% worst days in 2018. While there is limited precedent for adjusting the RPO calculated reasonable progress goals to account for emission reductions achieved in a FIP or revised SIP, we took a reasonable approach based on the information available. We adjusted each reasonable progress goal established by Texas or Oklahoma for 2018 by the amount of visibility benefit anticipated from all scrubber upgrades estimated by our modeling analysis based on CAMx source apportionment modeling.[182] In estimating the deciview visibility benefit in 2018 compared to the CENRAP modeled 2018 reasonable progress goals, we considered reductions from 2018 CENRAP emissions levels and 2018 ''dirty'' background conditions. We believe that this is a reliable estimate of the amount of visibility benefit anticipated from controls (*e.g.,* 0.14 dv for the Wichita Mountains) beyond the projected 2018 CENRAP reasonable progress goals. We then simply adjusted the reasonable progress goals established by the state by the amount of visibility benefit anticipated from the additional controls.

As discussed above, we adjusted the CENRAP modeled reasonable progress goals to translate the emission reductions required in this FIP for Texas sources into quantitative reasonable progress goals. We note that the CENRAP modeling included an assumption for anticipated BART reductions for Oklahoma sources. We considered the comment concerning consideration of the reductions required by the BART FIP in Oklahoma in setting the 2018 reasonable progress goals and we believe these assumptions are a reasonable approximation of the anticipated BART reductions in Oklahoma at this time, considering the uncertainty of the timing of the reductions for some of the sources and the uncertainty in the final control scenario chosen by the operator to meet the requirements. The required enforceable emission limits in the Oklahoma and Texas FIPs remedy the deficiencies in the SIPs and our finalized reasonable progress goals properly consider the visibility benefits anticipated by those required emission reductions.

Unlike the emission limits that apply to specific reasonable progress sources, the reasonable progress goals are not directly enforceable. Rather, the reasonable progress goals are an analytical tool used by EPA and the states to estimate future visibility conditions and track progress towards the goal of natural visibility conditions.

Comment: EPA's proposal provides no basis for disapproving Texas' and Oklahoma's reasonable progress goals for the 20% best days and fails to provides analysis of the part of the reasonable progress goals addressing the ''best'' days.

Response: We disagree with the comment. Our basis for disapproving the relevant reasonable progress goals for the 20% best days arises, as was noted in our proposal, from our determination that the analysis developed by Texas to evaluate reasonable progress controls was flawed and additional controls are necessary for the first planning period. Finalizing requirements for additional controls, as we now accomplish with our final rule, makes ''visibility on these days better than Texas projects,'' as we noted in our proposal.[183] [184] The submitted reasonable progress goals for the 20% best days did not consider reductions from the reasonable controls, so they cannot be approved. We understand the comment to request a quantitative assessment of the projected visibility conditions for the 20% best days. These calculations have been completed and add to our position that visibility will be better than Texas projects. These numbers, following the same methodology that we employed with the 20% worst days, are summarized in the table provided in the introduction section of the document.

P. Interstate Visibility Transport

We received comments opposing our proposed disapproval of the visibility protection portion of the interstate transport requirements in Texas infrastructure SIP submittals for the ozone, $PM_{2.5}$, NO_2, and SO_2 NAAQS (CAA 110(a)(2)(D)(i)(II)). Among the adverse comments were the following: The requirements for infrastructure SIPs in CAA section 110(a)(2)(D)(i)(II) only contain structural, rather than substantive, requirements. Disapproving Texas' infrastructure SIPs conflicts with the differing deadlines for NAAQS SIP submittals and regional haze SIP submittals. Texas submitted separate SIPs to address the visibility prong of interstate transport for the 1997 ozone, the 2006 $PM_{2.5}$, the 2008 ozone, the 2010 SO_2, and the 2010 NO_2 standards and EPA failed to evaluate these submittals in its proposed disapproval. CAA section 110(a)(2)(D)(i)(II) is pollutant specific, and, because EPA finds that Texas' SIP is inadequate to protect visibility only because it does not contain certain limitations on SO_2 emissions, EPA should not disapprove for the other NAAQS at issue. The CAA's visibility protection requirement is narrower than the requirement for reasonable progress and requires only provisions necessary to prevent interference with control measures included in another state's plan to achieve a visibility standard. The CAA limits EPA's authority to require one state to adopt binding emission limits for the benefit of another state, citing *EME Homer City.*

We disagree with the comments for several reasons. Section 110(a)(2) specifies the *substantive elements* that infrastructure SIP submissions need to address, as appropriate, for EPA approval.[185] EPA has disapproved portions of such SIPs for failure to comply with the interstate visibility transport requirements section 110(a)(2)(D)(i)(II) for various other states. *See* 78 FR 46142, July 30, 2013 (Arizona); 77 FR 14604, March 12, 2012 (Arkansas); 76 FR 52388, August 22, 2011 (New Mexico); 76 FR 81728, December 28, 2011 (Oklahoma). By contrast, in many other SIP actions across the country, we have allowed states to rely on their approved regional haze plan to meet the substantive requirements of the visibility component of section 110(a)(2)(D)(i)(II) because the regional haze plan achieved at least as much emissions reductions as projected by the RPO modeling. *See* 76

[182] As discussed elsewhere in this document, while the required scrubber retrofits will provide for additional visibility improvement at the Class I areas that we consider necessary for reasonable progress towards natural visibility conditions, we do not anticipate these controls to be implemented until after 2018.

[183] 79 FR 74843.

[184] ''No degradation,'' as distinctly needed for the 20% best days, is ensured because added controls do not significantly impact the 20% best days and would serve only to improve visibility on these days. Even so, what we provide as the 20% best day reasonable progress goals for 2018 (*i.e.,* the ''least impaired days'') for Big Bend, Guadalupe Mountains and Wichita Mountains numerically differ from the numbers that Texas had submitted by very small amounts. By the design of 40 CFR 51.308(d)(1), improvements for the most impaired days provide a more vital benchmark for progress that may be made.

[185] *See* September 13, 2013 EPA guidance memo ''Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)'', *http://www3.epa.gov/airquality/urbanair/sipstatus/docs/Guidance_on_Infrastructure_SIP_Elements_Multipollutant_FINAL_Sept_2013.pdf.*

FR 34608, June 14, 2011 (California); 79 FR 60985, October 9, 2014 (New Mexico); 76 FR 36329, June 22, 2011 (Idaho); and 76 FR 38997, July 5, 2011 (Oregon). We gave limited disapproval to the Texas regional haze SIP based on its reliance on CAIR. CAIR provided limits on emissions of SO_2 and NO_X. SO_2 is a precursor for $PM_{2.5}$. NO_X is a precursor for ozone and for $PM_{2.5}$. NO_2 is a component of NO_X. With CAIR no longer in effect, Texas may not rely on its regional haze SIP to ensure that emissions from Texas do not interfere with measures to protect visibility in nearby states. We recognize that CAA section 110(a)(2)(D)(i)(II) is pollutant specific; nevertheless, ozone, $PM_{2.5}$, NO_2, and SO_2 or their precursors could interfere with visibility protection. Because Texas has not demonstrated that its SIP submittals ensure that Texas emissions would not interfere with measures required to be included in the SIP for any other state to protect visibility, we are disapproving these SIP submittals.

As discussed in this action, the D.C. Circuit Court in *EME Homer City* recently issued a decision upholding CSAPR but remanding without vacating a number of the Rule's state emissions budgets, including those for Texas. The CSAPR remand did not affect our reasons for proposing to disapprove portions of Texas' SIP submittals that address CAA provisions for prohibiting air pollutant emissions from interfering with measures required to protect visibility in any other state for the 1997 $PM_{2.5}$, 2006 $PM_{2.5}$, 1997 ozone, 2008 ozone, 2010 NO_2, and 2010 SO_2 NAAQS. However, the remand did affect our proposal to rely on CSAPR to help address our FIP obligation for interstate transport of air pollution and visibility protection. Therefore, today's action does not finalize the portion of our proposed FIP that would have relied on CSAPR to satisfy Texas' visibility transport obligations with respect to the aforementioned NAAQS. We will address the visibility transport requirements for Texas in a future rulemaking once the issues surrounding the partial remand are resolved.

Q. Disapproval of the Oklahoma and Texas Reasonable Progress Goals

We received numerous comments on our proposed disapproval of the reasonable progress goals selected by Texas and Oklahoma for their respective Class I areas and the recalculated reasonable progress goals we proposed. Some comments were in support of our proposed disapproval of the state's reasonable progress goals and our proposed recalculated reasonable progress goals. However, a majority of the comments raised objections to our proposed action on the reasonable progress goals. These commenters raised numerous issues in support of their objections to our proposal, including that recent monitoring data from IMPROVE monitors indicates the Class I areas are already meeting the new reasonable progress goals we proposed without the need for the additional controls we proposed, that there have been significant SO_2 and NO_X emissions reductions in Texas since the baseline period, that our proposed disapproval of the state's reasonable progress goals had no technical or legal basis, and that we inappropriately recalculated the new reasonable progress goals we proposed.

Below we present a summary of our responses to the more significant comments we received that relate to our proposed action on the reasonable progress goals for Texas and Oklahoma Class I areas. See our RTC document for a more in-depth presentation of the comments we received and our responses to them.

Comment: Our proposed disapproval of Oklahoma's reasonable progress goals for the Wichita Mountains is proper and required by the CAA, as the record is clear that control measures satisfying the four reasonable progress factors are available for some of the largest sources of visibility impairment at the Wichita Mountains. Our proposed finding that Oklahoma and Texas did not adequately consult with each other regarding the impact of Texas sources on Oklahoma's Class I area is also proper because in order to engage in meaningful consultation, an upwind state such as Texas must provide impacted states with sufficient technical information detailing the visibility impacts of individual sources and the feasibility and cost-effectiveness of control measures on those sources. A downwind state such as Oklahoma should request the adequate information when it is not provided by the upwind state and must take a hard look at this information and request that upwind states require the control measures that satisfy the four factors laid out in the statute for making reasonable progress. We support the EPA's conclusions as to what constitutes a proper and meaningful consultation under the regional haze program and support the EPA's proposed disapproval of Oklahoma's reasonable progress goals and finding that the consultations between Oklahoma and Texas were inadequate.

Response: We appreciate the commenter's support of our interpretation of what constitutes an adequate consultation that satisfies the Regional Haze Rule requirements. We also appreciate the commenter's support of our proposed disapproval of Oklahoma's reasonable progress goals for the Wichita Mountains and our finding that the consultations between Oklahoma and Texas to address the impacts of Texas sources on the Wichita Mountains were not adequate and did not meet the regional haze requirements. We are finalizing as proposed our disapproval of several of the requirements with regard to Oklahoma's establishing of reasonable progress goals for the Wichita Mountains, including our finding that the consultations between Texas and Oklahoma to address Texas' impacts on the Wichita Mountains were not adequate and did not meet the Regional Haze Rule requirements.

Comment: EPA should withdraw its proposed FIP and instead fully approve the regional haze SIPs submitted by Texas and Oklahoma because the SIP submitted by Texas fully complies with the statute and all regulatory standards and therefore there is no legal or technical basis for EPA's proposed FIP. On every level, EPA's proposal exceeds the agency's authority under the CAA and EPA's regional haze regulations.

Response: We disagree with the commenter that there is no legal or technical basis for our proposed FIP, that the proposed FIP exceeds our authority under the CAA and the regional haze regulations, and that the SIP submitted by Texas fully complies with the statute and regulatory requirements. The CAA and § 51.308(d)(1) provide how to determine what constitutes reasonable progress for each planning period and specify the requirements related to establishment of the reasonable progress goals for each Class I area. In particular, both the CAA and the Regional Haze Rule require states to consider four factors when setting reasonable progress goals: The costs of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and the remaining useful life of potentially affected sources.[186] The Regional Haze Rule also requires that in establishing the reasonable progress goals, states must consider the uniform rate of progress and the emission reduction measures needed to achieve it for the period covered by the implementation plan. In addition, because the reasonable progress goals selected by Texas and Oklahoma provide for a rate of improvement slower than the

[186] CAA Section 169A(g)(1), 42 U.S.C. 7491(g)(1). 40 CFR 51.308(d)(1)(i)(A).

uniform rate of progress, the Regional Haze Rule requires the states to demonstrate why their reasonable progress goals are reasonable and why a rate of progress leading to natural visibility conditions by 2064 is not reasonable.[187] As discussed in more detail in our proposal and in the RTC document associated with this final action, Texas did not satisfy several of the requirements at § 51.308(d)(1) with regard to setting reasonable progress goals for its own Class I areas, most notably the requirement to reasonably consider the four statutory reasonable progress factors and the requirement to adequately consider the emission reduction measures needed to meet the uniform rate of progress. Texas also did not satisfy the consultation requirements at § 51.308(d)(3)(i) to address its impacts on the Wichita Mountains. Oklahoma also did not satisfy certain requirements under § 51.308(d)(1) with regard to setting reasonable progress goals for the Wichita Mountains, including the requirement to adequately consult with other states that may reasonably be anticipated to cause or contribute to visibility impairment at the Wichita Mountains and the requirement to adequately consider the emission reduction measures needed to meet the uniform rate of progress. Therefore, we disagree that the Texas and Oklahoma SIPs fully comply with the statutory and regulatory requirements and that our FIP exceeds our authority under the CAA. We are finalizing our proposed disapproval of Texas' and Oklahoma's reasonable progress goals and the controls we proposed under reasonable progress for sources in Texas.

Comment: EPA does not take issue with Oklahoma's four-factor analysis, but nevertheless proposes to reset Oklahoma's reasonable progress goals based on its reasonable progress analysis for Texas sources. EPA also finds it necessary to disapprove Oklahoma's reasonable progress goals because they did not include the emission reductions from the Oklahoma SO_2 BART FIP and the revised BART SIP for the AEP units that were subsequently promulgated. However, EPA's proposed SIP does not correct this error either.

Response: The comment that we disapproved the reasonable progress goals for the Wichita Mountains because they do not include the emission reductions from the SO_2 BART FIP and the revised BART SIP for the AEP units that have subsequently been promulgated is taken out of context and does not fully capture the rationale for our disapproval. We are disapproving the reasonable progress goals for the Wichita Mountains because they do not account for emission reductions from reasonable measures at Texas sources. We stated in the proposal that the reasonable progress goals selected by Oklahoma for the Wichita Mountains do not include the level of reductions necessary to meet the requirements under 40 CFR 51.308(e) for BART. We further explain that ''BART is a component of developing the reasonable progress goals, and the reasonable progress goals are inadequate because BART controls were not adequately considered. We note this deficiency is addressed by our Oklahoma BART FIP and the revised Oklahoma BART SIP.'' [188] The visibility modeling developed for CENRAP and used by Oklahoma in support of its SIP revision submittal assumed SO_2 reductions from the six BART sources that Oklahoma subsequently did not secure when making its BART determinations for these sources. We believe that the BART limits in our Oklahoma BART FIP [189] have adequately addressed the deficiency. We also provide in our proposal additional reasons for disapproving the reasonable progress goals, stating ''Oklahoma's consultations with Texas were flawed, which prevented Oklahoma from adequately developing its reasonable progress goals for the Wichita Mountains,'' and, because Oklahoma's consultations with Texas were flawed, Oklahoma did not adequately demonstrate that the reasonable progress goals it established were reasonable based on the four statutory factors under § 51.308(d)(1)(ii).[190] Comments regarding how we calculated the reasonable progress goals for the Wichita Mountains, Big Bend, or the Guadalupe Mountains, and our consideration of emission reductions from BART requirements in Oklahoma are addressed in a separate response to comment.

Comment: EPA's proposed disapproval of Texas' reasonable progress goals and its substitution with new reasonable progress goals in the proposed FIP is based on EPA's flawed interpretation of what the CAA requires for ''reasonable progress goals.'' This action is based on the EPA's conclusion that ''reasonable progress'' must be determined based on source-specific cost of controls even though such a requirement did not exist in the statute, the Regional Haze Rule, or the guidance available in 2009. The Texas 2009 regional haze SIP established reasonable progress goals for both Big Bend and the Guadalupe Mountains that provide for visibility improvement for the most impaired days over the period of the SIP and ensure no degradation in visibility for the least impaired days over the same period. The EPA agrees the SIP meets these requirements and also agrees that the TCEQ considered the four statutory factors in establishing the reasonable progress goals for its Class I areas in accordance with the Regional Haze Rule. Furthermore, the four statutory factors in and of themselves do not determine the reasonableness of the goals for the planning period. The Regional Haze Rule, in 40 CFR 51.308(d)(1)(iii), requires the EPA to evaluate whether the state's goal for visibility improvement provides for reasonable progress based on a demonstration of which the four statutory factors are only one element. Therefore, EPA's proposed disapproval of Texas' reasonable progress goals and its proposed new reasonable progress goals is flawed.

Response: We disagree that our proposed disapproval of Texas' reasonable progress goals is based on a flawed interpretation of what the CAA requires for reasonable progress goals. As we discuss in our responses to other similar comments, we believe that our evaluation of cost, including visibility benefits, on a source-specific basis was an appropriate and reasonable interpretation of the analysis required in this instance, in order to determine what, if any, level of control for Texas sources constituted reasonable progress for this planning period.

We agree that § 51.308(d)(1) requires more than just the consideration of the four factors in the establishment of the reasonable progress goals. Also, although we agree Texas conducted an evaluation of the four reasonable progress factors, we determined that that evaluation was flawed. Texas did not fully satisfy the requirements under § 51.308(d)(1) related to the evaluation of the four reasonable progress factors and establishment of the reasonable progress goals for the two Texas Class I areas. We note that § 51.308(d)(1)(iii) provides that in determining whether the State's goal for visibility improvement provides for reasonable progress towards natural visibility conditions, the Administrator will evaluate the demonstrations developed by the State pursuant to paragraphs (d)(1)(i) and (ii). Thus, we are specifically directed to judge the quality of a state's submission of these key parts

[187] 40 CFR 51.308(d)(1)(ii).

[188] 79 FR 74871, 74872.

[189] 76 FR 81728.

[190] 79 FR 74872.

of its reasonable progress goals development, which we found to be flawed. In particular, as we discussed in detail in our proposal, we disagree with the set of potential controls identified by Texas and how it analyzed and weighed the four reasonable progress factors under § 51.308(d)(1)(i)(A)[191] and we further proposed to disapprove Texas' reasonable progress goals under § 51.308(d)(1)(ii).[192] For the reasons given in the proposal and affirmed in this final action, we cannot approve Texas' reasonable progress goals. In this action, we are finalizing our disapproval of Texas' reasonable progress goals for Big Bend and the Guadalupe Mountains and we are establishing new reasonable progress goals for these Class I areas, as discussed in our proposal.

Comment: EPA fails to take into consideration the TCEQ's 2014 Five-Year Regional Haze SIP Revision or the effects of early action or emission reduction accomplished or to be accomplished by other EPA programs before imposing additional requirements beyond the state submitted SIPs. Considering that the visibility improvements of these programs have not yet been quantified, and the gradual progress anticipated in establishing such a long-term goal, EPA should be patient and not take such aggressive action in overriding reasonable state SIPs and imposing additional controls.

Response: We stated in our proposal that the TCEQ submitted the first five-year report in March 2014, but we are not including our analysis of that SIP revision within this action.[193] The five-year progress report is a requirement that is separate from the regional haze SIP required for the first planning period, and it has separate content and criteria for us to review. We therefore believe we are not obligated to consider or take action on the five-year progress report at the same time we take action on the regional haze SIP for the first planning period. Even so, we acknowledge that recent monitoring data from IMPROVE monitors indicate that the more recent five-year average measurements of visibility extinction at Texas and Oklahoma Class I areas on the 20% worst days contained in the progress report are lower (*i.e.,* indicate better visibility conditions) than the numerical reasonable progress goals we are establishing for these Class I areas. This issue is addressed in detail elsewhere in this final action and in the RTC document.

We disagree with the commenter's contention that we should not impose additional controls on Texas sources and instead approve the Texas regional haze SIP and the remaining portion of the Oklahoma regional haze SIP because there may be potential visibility improvements that have not yet been quantified, resulting from early actions and emission reductions accomplished or expected to be accomplished through other EPA programs. If it is determined based on the demonstrations developed pursuant to § 51.308(d)(1)(i) and (ii) that there are reasonable and cost-effective controls available that would provide for reasonable progress, the statute and regional haze regulations do not allow for a delay in requiring these controls to allow time for the quantification and consideration of possible future visibility improvements. Therefore, we are finalizing our proposed disapproval of Texas' and Oklahoma's reasonable progress goals and are finalizing the control requirements we proposed for Texas sources under the reasonable progress and long-term strategy reasonable progress requirements.

Comment: The regional haze program tasks states with determining what is reasonable progress toward elimination of man-made visibility impairment, along with specific progress milestones (10-year planning and SIP revisions, with program reviews in the middle of the 10-year planning periods). The regional haze program contemplates gradual visibility improvements along a ''glide path'' that considers the 2064 goal, and does not require immediate reductions that exceed ''reasonable progress'' as determined by the state based on the four statutory factors. Thus, it neither requires nor authorizes the frontloading of extensive control requirements.

Response: The commenter's contention concerning reasonable progress is premised on the assumption that the emissions reductions that are part of the state's long-term strategy and upon which its reasonable progress goals are based do in fact constitute reasonable progress. The determination of what constitutes reasonable progress must be made pursuant to § 51.308(d)(1). Based on its analyses under § 51.308(d)(1), a state (or EPA in the context of a FIP) may determine that a greater or lesser amount of visibility improvement than what is needed to get on the glide path is what constitutes reasonable progress.[194] As discussed in our proposal and within this action, we disagree with the set of potential controls identified by the TCEQ as having the greatest impact on visibility on the three Class I areas and how it analyzed and weighed the four reasonable progress factors in a number of key areas.[195] Therefore, we proposed to disapprove Texas' reasonable progress goals for its Class I areas and conducted our own analysis of the four reasonable progress factors to fill in the regulatory gap that would be created by our disapproval action. We are replacing Texas' flawed reasonable progress analysis with our own and are finalizing the cost-effective reasonable progress controls we proposed on the small number of Texas point sources that have the greatest visibility impacts on the Class I areas of interest.

Comment: Texas' four-factor analysis and its reasonable progress goals were reasonable and within the state's broad discretion, and are supported by recent monitoring data showing the reasonable progress goals will be met for Oklahoma and Texas Class I areas without the additional controls EPA proposed for Texas sources. The most recent five-year (2009–2013) averages of visibility monitoring data from IMPROVE monitors indicates that visibility impairment at the Guadalupe Mountains, Big Bend, and the Wichita Mountains, are lower than both the 2018 reasonable progress goals proposed by the states and the more stringent 2018 reasonable progress goals proposed by EPA. The Texas five-year regional haze progress report issued in 2014 includes a projection of further reductions of haze-forming SO_2 and NO_X emissions from point sources through 2018. Therefore, the commenter concludes that it is expected that visibility improvements observed through 2013 for Big Bend, the Guadalupe Mountains, and the Wichita Mountains will continue and that the 2018 reasonable progress goals that EPA proposes will be met without the further emission controls EPA proposes. These current data also show that Wichita Mountains is projected to meet the EPA approved uniform rate of progress for Oklahoma, and the Guadalupe Mountains is projected to meet the EPA-proposed uniform rate of progress by 2018, without the emission controls that EPA is proposing. Yet EPA ignores these actual conditions in developing its reasonable progress goals and in concluding that its reasonable progress goals are more reasonable. EPA has no authority to require further controls from Texas sources and should

[191] 79 FR 74838.

[192] 79 FR 74843.

[193] 79 FR 74864.

[194] 64 FR 35732.

[195] 79 FR 74838.

withdraw its FIP and approve the Texas SIP.

Response: These comments are predicated on two false tests: (1) If a Class I area meets its uniform rate of progress, or (2) if subsequent monitoring shows a Class I area meets its reasonable progress goals, it is automatically relieved of any obligation to address the reasonable progress and long-term strategy requirements in § 51.308(d)(1) and (3).

We discuss elsewhere in this final action that, while we agree that the Regional Haze Rule requires states to consider the uniform rate of improvement in visibility when formulating reasonable progress goals, we disagree that a state's consideration of the uniform rate of progress and establishment of reasonable progress goals that provide for a slightly greater rate of improvement in visibility than would be needed to attain the uniform rate of progress is all that is needed to satisfy the reasonable progress goal requirements in the Regional Haze Rule. We also disagree that the Regional Haze Rule requires additional analysis only when a state establishes reasonable progress goals that provide for a slower rate of improvement than the uniform rate of progress. Even when recent data from IMPROVE monitors indicate that visibility conditions in the Class I area are better than the established reasonable progress goals and/or that the area may be projected to meet the uniform rate of progress by 2018, the state must still address the requirements under § 51.308(d)(1) and (d)(3)(i) in evaluating controls for additional sources and in establishing reasonable progress goals for its Class I areas.

With regard to the assertion that Texas' five-year regional haze progress report projects SO_2 and NO_X emissions from point sources to continue to decline through 2018 (with corresponding visibility improvement trends at the three Class I areas), Texas' five-year regional haze progress report is pending evaluation as a SIP revision, and we intend to take action on it in a future rulemaking. We note that the portion of the Texas' five-year regional haze progress report referred to by the commenters[196] compares actual annual emissions from 2002 through 2011 against a linear change between 2002 actual emissions and the 2018 CENRAP modeled emissions and concludes that emissions from 2002 to 2011 have trended downward better than or as predicted in the CENRAP modeling projections. However, we noted in our proposal that the CENRAP projected visibility impacts in 2018 from Texas point sources, and EGUs in particular, are significant. As noted in our proposed rulemaking, based on information provided by the TCEQ in materials other than the progress report, we do not expect large additional emission reductions of SO_2 in Texas between 2013 and 2018 under Federal programs and the SIP as submitted.[197] We have not seen evidence in support of something different. Furthermore, emissions from some of the Texas EGUs that we are requiring controls for and that impact visibility at the three Class I areas the most, are still above the emission level projected in the 2018 CENRAP modeling. We are not aware of any upcoming controls or changes in operation to suggest that future actual emissions at these specific sources will decrease to those predicted levels.

We also remind the commenters that even with the controls we are requiring for Texas EGUs under our FIP, additional reductions would be needed for visibility conditions to meet or exceed every uniform rate of progress goal in 2018 as calculated by us in our proposal. For example, current conditions at the Wichita Mountains (based on 2009–2013) is 21.2 dv. Additional reductions would be needed for the area to meet the uniform rate of progress goal of 20.01 dv in 2018.

Comment: The SO_2 emissions from Luminant's units, for which EPA proposed controls, have steadily trended downward over the first planning period, further underscoring the effectiveness of the measures relied on in Texas' SIP and the unreasonableness of EPA's proposed FIP. From 2009 to 2014, SO_2 emissions from Luminant's Big Brown, Martin Lake, Monticello, and Sandow Unit 4 were reduced by 27%. The SO_2 emissions for the first quarter of 2015 are sharply lower—approximately 57% lower than the first quarter of 2009 and about 44% lower than the first quarter of 2014. The data unequivocally show that SO_2 emissions at Luminant's units are trending down, and thus there is no basis for EPA's proposal.

Response: The annual and quarterly SO_2 emissions data for Luminant's facilities for 2009–2015 demonstrate that, although there has been an overall downward trend in annual SO_2 emissions during this time period, there has not been a downward trend in SO_2 emissions during Quarter 3 for the six-year period for which full data are available. Except for the years 2011 and 2012, when total SO_2 emissions for Quarter 3 were either sizably higher or lower compared to the other years during the 2009–2014 time period, emissions for Quarter 3 remained relatively unchanged during this six year period. This is significant because Quarter 3 corresponds to the summer months and many of the 20% worst days, which is what the reasonable progress goals are based on, typically occur during the summer months. Emissions reductions during the fall and/or winter months reduce annual emissions, but will not lead to improved visibility during the 20% worst days. The majority of the decline in total annual SO_2 emissions from the Luminant sources is driven by seasonal operation of Monticello units 1 and 2.[198] Furthermore, as we discuss in more detail elsewhere, we do not anticipate any significant reductions at these sources in the near future, and information provided by Texas indicates it agrees.[199] We also note, as discussed above, NO_X emissions for many of these units were updated in our modeling to better reflect the recent actual emissions. Therefore, we disagree that the observed trend in SO_2 emissions at Luminant's units in recent years demonstrates that there is no basis for EPA's proposal.

Comment: To the extent Texas and industry are arguing that the current visibility conditions meet the reasonable progress goals EPA is proposing, that is largely a result of the fact that EPA has not updated the majority of the 2018 projections that CENRAP and Texas relied on. Goals based on the controls EPA has proposed and also on more updated projections would likely be lower than the reasonable progress goals EPA is proposing. The recent improvement is due to a variety of factors, which EPA discusses in the proposed rule, 79 FR 74843, most of which are not enforceable limitations or are beyond the state's control and, therefore, may be temporary. The argument made by Texas and industry does not show that the proposed controls themselves are unnecessary or unreasonable. Further, the argument by Texas and industry reflects a misunderstanding of how reasonable progress goals are set. Reasonable progress goals are set to reflect controls that are reasonable; controls are not required in order to meet pre-set reasonable progress goals. Congress

[196] 2014 Texas Five-Year Reasonable Progress Report, p 4–10, figure 4–2.

[197] TCEQ comment letter to EPA on draft modeling platform dated June 24, 2014.

[198] See Luminant CAMD emissions.xlsx in the docket for this action.

[199] See TCEQ comment letter to EPA on draft modeling platform dated June 24, 2014 available in the docket for this action.

defined reasonable progress as the amount of progress that could be made after consideration of four factors. 42 U.S.C. 7491(g)(1). After the four-factor analysis defines reasonable progress, each haze SIP must include the enforceable measures necessary to make reasonable progress. *Id.* section 7491(b)(2). The reasonable progress goal for 2018 is calculated as the baseline visibility condition minus the amount of reasonable progress (which is established based on consideration of the four statutory factors).

Response: We generally agree with the commenter and agree that these comments provide support of our FIP.

Comment: EPA fails to even consider the four statutory factors with respect to non-BART sources in Oklahoma that are impacting visibility at the Wichita Mountains and to determine whether all existing and reasonable controls on Oklahoma sources, including BART, are sufficient to attain a reasonable rate of progress for the Wichita Mountains for the first planning period. EPA does not explain why it failed to conduct the modeling and perform the statutory analysis that it would expect a state to conduct in determining a reasonable progress goal.

EPA failed to consider the visibility benefit from imposing the same levels of control on these sources as it is proposing to impose on the targeted Texas sources. EPA is applying a different standard to Texas sources than it is to sources in other states. EPA's ''reset'' reasonable progress goal is unlawful; and EPA has no basis for disapproving Oklahoma's reasonable progress goal, no basis for issuing a FIP with a substitute reasonable progress goal for the Wichita Mountains, no basis for disapproving Texas' long-term strategy, and no basis for imposing additional SO_2 limits on Texas sources.

Response: We disapproved Texas' long-term strategy because it was technically flawed and we were under a statutory obligation to evaluate Texas sources and propose a FIP for those facilities where we determined that reasonable emission controls could be installed for improved visibility benefit.

Oklahoma's lack of adequate information from Texas prevented it from properly developing its reasonable progress goals for the Wichita Mountains, and we disagree that we are applying a different standard to Texas sources than we are sources in other states. We note that we were not required to do a four-factor analysis for Oklahoma's non-BART sources because, as discussed in our proposal [200] and OK TSD, we reviewed Oklahoma's four-factor analysis for Oklahoma's non-BART sources, and agree with Oklahoma that it has demonstrated that it is not reasonable to require additional emission reductions for those sources for this planning period. We agree with Oklahoma's reasonable progress analysis for sources within Oklahoma and its assessment that the Wichita Mountains would not meet the uniform rate of progress without significant reductions from Texas sources. Because the reasonable progress goals Oklahoma established for the Wichita Mountains does not include appropriate consideration of reductions at Texas sources, we were required by the Regional Haze Rule to disapprove Oklahoma's reasonable progress goals. We recalculate new reasonable progress goals for 2018 for the Wichita Mountains based on the results of our technical analysis that additional controls at Texas sources were reasonable to meet the reasonable progress/long-term strategy requirement for reasonable progress and accounting for the visibility benefit of the required controls anticipated to be in place by 2018.

[200] 79 FR 74871.

R. International Emissions

Comment: EPA acknowledged it failed to account for international sources of emissions, which Texas cannot control. This renders its proposal ineffective in improving visibility to meet the uniform rate of progress and 2064 goal. EPA's action would require over-control of Texas sources to compensate for international emissions. If the TCEQ cannot meet the glide path without ''large emission reductions from international sources,'' it is unreasonable for EPA to require additional controls from Texas without making any effort to seek emissions reductions from international sources.

Response: We agree with the commenters that international emissions significantly impact visibility conditions at Big Bend and the Guadalupe Mountains. However, as we discussed in the preamble to the Regional Haze Rule, ''the States should not consider the presence of emissions from foreign sources as a reason not to strive to ensure reasonable progress in reducing any visibility impairment caused by sources located within their jurisdiction.'' While the goal of the regional haze program is to restore natural visibility conditions at Class I areas by 2064, the rule requires only that reasonable progress be made towards the goal during each planning period, and in cases where it is not reasonable to meet the rate of progress needed to attain the goal in 2064, that the state demonstrate that it is not reasonable and that the selected rate of progress is reasonable for that planning period. We recognize that it may not be possible to attain the goal by 2064, or at all, because of impacts from new or persistent international emissions sources or impacts from sources where reasonable controls are not available. However, states are still required to demonstrate that they are establishing a reasonable rate of progress that includes implementation of reasonable measures within the state to address visibility impairment in an effort to make progress towards the natural visibility goal during each planning period. Nothing in the Regional Haze Rule or our FIP is calculated to hold Texas accountable for emissions from Mexico. We agree those international emissions should be addressed to achieve natural visibility, but our agreement on this point does not in any way relieve Texas of the obligation to make reasonable progress, including through controls on its own sources, and particularly through the emissions addressed with controls through our FIP.

Comment: EPA is not doing enough to seek emission reductions from international sources. Commenters noted that we committed to address international emissions in our 1999 Regional Haze Rule when we stated, ''EPA will work with the governments of Canada and Mexico to seek cooperative solutions on transboundary pollution problems (64 FR 35714, 35736),'' but have thus far done little.

Response: We acknowledge that Texas requested in its SIP that we initiate and pursue Federal efforts to reduce impacts from international transport. There are efforts underway to address public health problems related to air emissions along the United States-Mexico border. Given that emissions contributing to health effects and those contributing to visibility impairment are generally the same, the border studies and continuing emissions inventory development will aid in identifying solutions that we would expect to also address visibility impairment. The Border 2020 program aims to, among other things, reduce air pollution to help meet the NAAQS and reduce emission through the use of energy efficiency and/or alternative/renewable energy projects. We expect that recent commitments from Mexico to reduce its carbon dioxide and black carbon emissions will have ancillary benefits to improve visibility at Class I areas in the future.

Comment: It is not possible for Texas to achieve the uniform rate of progress because of the contribution from

Mexico. An analysis shows that if every point source in Texas were shut down, it would have only a marginal impact on visibility in the Guadalupe Mountains. Further, the exclusion of all of Texas and other United States elevated point sources resulted in a modeled haze index value of 14.88 dv, meaning that Mexican sources and natural contributions are projected to account for 92%, or all but 1.48 deciviews, of visibility impairment in the Guadalupe Mountains.

Response: The commenter erroneously overstates the size of the visibility impacts from Mexico relative to Texas. As we stated in our proposal, efforts to meet the goal of natural visibility by 2064 ''would require further emissions reductions *not only within Texas,* but also large emission reductions from international sources'' (emphasis added).[201] The commenter's analysis fails to account for impacts from mobile and area sources within Texas and other states, and fails to differentiate Mexican sources from other international sources. The analysis also fails to consider that deciviews are a logarithmic function of extinction, resulting in the underestimation of the percent contribution from Texas and U.S. point sources. Overall impacts from all sources in Texas are larger than all sources in Mexico and the boundary conditions (which represent external sources) combined. As we discuss in our proposal and elsewhere in our response to comments, Texas and we agreed that it was reasonable to focus on impacts from point sources for this planning period. The visibility impairment from Texas point sources is significant, and as our analysis shows, a significant portion of this impairment can be addressed by controlling a small number of sources. Controls on just four units at Tolk and Big Brown are estimated to reduce visibility impairment due to all Texas point sources at the Guadalupe Mountains by approximately 13%. All required controls combined are estimated to reduce visibility impairment at the Guadalupe Mountains from all Texas point sources by approximately 22%.

Comment: CCP (through its contractor, AECOM) stated that back trajectories for 2011–2013 indicate that approximately 77% of the 20% worst day trajectories at the Guadalupe Mountains passed through Mexico. For Big Bend, this percentage increases to about 96%. Mexican point sources, particularly Carbon I and Carbon II, are only about 230 km away from Big Bend, while the nearest Texas facility with a proposed new emission limit is about 500 km away. Emissions from these large power plants are noteworthy—Carbon II emitted 162,329 tons of SO_2 in 2008, according to the draft EPA 2011 modeling platform, which is an increase from 1997 (129,341 tons at Carbon II). In addition to international point sources, smoke plumes from agricultural fires in Central America travel northward into the U.S. and contribute to haze. Modeling shows that the sources that cause haze in Big Bend and the Guadalupe Mountains are rarely in the area where most of the emission sources targeted by EPA are located. The effect of controlling emissions at a plant like Big Brown would be dwarfed by the massive impact of the international emissions. CCP reasons that since the emissions from its facility, Coleto Creek, are even lower than Big Brown's emissions, it would have a smaller impact. This component of haze must be accounted for in regional haze SIPs in the development of reasonable progress goals and/or natural conditions because these emissions from agricultural burns, power plants, or wildfires from international sources are beyond the jurisdiction of state agencies.

Response: We have reviewed the back trajectories provided and have noted several flaws in the analysis and conclusions. In general, back trajectories are tools that may be used for analyzing potential upwind contribution areas to a monitored value of concern. In this case we generally agree that many back trajectories do pass through upwind areas in Mexico for the 20% worst monitored days at Big Bend and the Guadalupe Mountains. What the commenter fails to point out or conclude is that a very large percentage of the trajectories that the commenter attributes to Mexico also cross over or near areas of Texas, thus indicating that Texas is also a potential contributor to the high monitored values at Big Bend and the Guadalupe Mountains. We do agree that impacts from Mexico are significant and must be addressed to achieve natural visibility, but our agreement on this point does not in any way relieve Texas of the obligation to make reasonable progress, including through controls on its own sources, and particularly through the emissions addressed with controls through our FIP. Past analyses have indicated that impacts from Texas on Big Bend and the Guadalupe Mountains are as large as impacts from Mexico and that reducing impacts from sources in Texas is also necessary to achieve natural visibility.[202] We disagree that impacts from Coleto Creek would be smaller than impacts from Big Brown because it has fewer emissions. The comment failed to consider the location of the source and the meteorology/transport conditions. Coleto Creek is closer to Big Bend and our source apportionment modeling shows that the one unit at Coleto Creek has a larger impact on the 20% worst days at Big Bend than the impact from the two units at Big Brown.

The comment presents a comparison between the visibility impact from one facility *to the visibility impact from all sources around the world that lie outside of the modeling domain,* including long range transport from fires, windblown dust, and significant anthropogenic emissions. The commenter states that annual average visibility impairment from Big Brown is approximately 10% of the annual average contribution from those sources captured by the boundary conditions. This is a significant fraction of the total visibility impairment that can be addressed through the installation of controls on merely two emission units. We also note that visibility impairment on the 20% worst days at each Class I area from Big Brown is larger; and as can be seen by the data submitted by the commenter, on some days, the visibility impairment due to Big Brown's emissions approaches or exceeds that from all emissions sources captured by the boundary conditions. For the Wichita Mountains, controls on just Big Brown address almost 12% of the total visibility impairment due to Texas point sources and 1.63% of the total visibility impairment from all sources. In summary, the visibility impairment from the individual sources analyzed is significant, and controls on these sources provide for meaningful progress towards the goal of natural visibility conditions at one or more Class I areas. This is not inconsistent with the understanding that significant impacts from international emissions and other sources exist and should also be addressed.

Lastly, we agree with CCP that the sources it cites, Carbon I and Carbon II, are responsible for significant levels of pollution. Carbon I is a 1,200 MW power plant and Carbon II is a 1,400 MW coal-fired power plant. These two power plants, less than 1.5 miles apart, are less than 20 miles from the U.S.-Mexico border. Together, these power plants comprise one of the largest

[201] 79 FR 74843.

[202] See FIP TSD pages A–30–32 and A–65–66 and Conclusions of BRAVO study source apportionment techniques (*TX166.017 BravoFactSheet20040915.pdf and BRAVOFinalReportCIRA.pdf*).

uncontrolled sources of SO_2 and NO_X in North America.[203] It has been demonstrated for some time that they are significant contributors to visibility impairment at Big Bend.[204] However, addressing international emissions can be complex. For instance, Texas has recently issued water discharge and mining permits to a coal mine in Maverick County, near the Texas border town of Eagle Pass, to allow the Mexican company Dos Republicas to begin mining coal that will reportedly be sent to these facilities.[205] Prior to our delegation of the National Discharge Elimination System (NPDES) permitting authority to Texas, we issued a NPDES permit for the operation of this mine, and in the process issued an Environmental Impact Statement (EIS).[206] In our EIS, we stated that ''. . . EPA does not have the authority to prohibit export of U.S. resources which will cause the country environmental harm . . . EPA believes that the U.S. policy should be to take actions which will generate the investment capital needed to directly solve the Carbon I/II problem'' [207] Subsequent to that, we attempted to work with the government of Mexico specifically on the problem of installing controls on these sources through a technical work group composed of EPA and SEMARNAP (now SEMARNAT, the Mexican Environment and Natural Resources Secretariat) staff. Unfortunately, these discussions did not result in any control of Carbon I and II. However, EPA is committed to explore opportunities for further discussions with Mexico concerning this subject.

S. Grid Reliability

Comment: The TCEQ recommended that we withdraw the proposed FIP; however, if we do finalize the FIP, it believed we should include an electric reliability safety valve provision in the final rule. The TCEQ stated that we have not evaluated any potential impacts of our proposed FIP to reliability and prices of electricity in Texas. It included a 2014 ERCOT study of the impacts that environmental regulations have in the ERCOT Region. While the ERCOT report included a number of other environmental regulations, such as the MATS rule, Clean Power Plan, and CSAPR, ERCOT also included our proposed regional haze FIP for Texas in its analysis. The TCEQ incorporated the ERCOT report into its comments and encouraged us to consider its findings.

Response: First, we note that controls achieving the level of control that we are requiring are highly cost-effective, are in wide use in the industry, and thus should not require a source to shut down to comply. In response to the TCEQ's comments, however, we contracted with Synapse Energy Economics, Inc., a nationally recognized firm with particular expertise in the subject area. (Synapse).[208] Synapse assessed the information in the ERCOT report and we reproduce its findings below:

1. ERCOT's perspective of market operations is short-sighted. ERCOT raises concerns that reliability could be impacted if numerous coal units choose to retire simultaneously with little notice to either ERCOT or other market participants. Unlike other competitive market regions, ERCOT's rules do not require meaningful notice. ERCOT's charge as a reliability coordinator may obligate it to implement rules requiring reasonable notice for economic retirements.

2. ERCOT's assumptions about new gas turbine capacity are not realistic. While the FIP, along with other environmental regulations ERCOT included in its study, will strain the economic viability of coal plants and likely lead to less coal capacity, ERCOT has not considered new resources that will be available to help address potential reliability challenges. Specifically, ERCOT does not include approximately 4,500 MW of additional gas-fired capacity coming online in Texas in the upcoming years. This represents 7.5 percent of current gas capacity, and would double the modeled baseline gas capacity additions through 2029.

3. The set of regulatory scenarios modeled is both incomplete and (now) outdated. Despite an overall thorough analysis ERCOT excluded a critical scenario that would have modeled the impact of the Regional Haze Program FIP by itself. This limits inferences we can make about impacts. Additionally, since ERCOT finalized its study, EPA finalized the Clean Power Plan. The final rule includes substantive changes that are likely to affect all of the CO_2 limit and price-inclusive scenario modeling results.

4. Electric Generating Unit owners' compliance ''burdens'' with the regional haze FIP may be over-stated. Of the 15 coal-fired units subject to regional haze compliance requirements, eight require upgrades to their existing scrubbers rather than new scrubbers. ERCOT assumed that all of the scrubbers would be priced at the cost of a new retrofit, thereby substantially increasing the cost of the regulation.

We reviewed and accept our contractor's finding and adopt its conclusion that ERCOT's report contained significant flaws. In sum, ERCOT's report cannot support a determination that there is likely to be any significant, adverse effect on the supply, distribution, or use of energy. During our comment period, we received no non-speculative information to validate claims that sources would retire rather than install demonstrably cost-effective controls. Commenters who have alleged grid reliability concerns in response to our proposed controls have not provided adequate documentation for their assertions.

T. Determination of Nationwide Scope and Effect

Several commenters disagreed with our proposed determination of ''nationwide scope and effect,'' which would require all petitions for judicial review to be filed in the U.S. Court of Appeals for the District of Columbia Circuit Court. These commenters argued that our proposed action did not have nationwide scope and effect because it applied only to two states. They further argued that the control requirements in the FIP applied only to sources in Texas. The commenters acknowledged that the proposed action involved our interpretation of our regulations, but asserted that the same is true for many SIP actions. The commenters went on to cite several regional haze SIP actions where we did not make a finding of nationwide scope and effect as evidence that our proposal to do so in this instance was unlawful. Ultimately, these commenters concluded that our proposed action was ''locally or regionally applicable'' and that any future petitions for review must be filed in the appropriate regional circuit. Some commenters suggested that judicial review would only be appropriate in the Fifth Circuit.

We disagree with these comments. The commenters are conflating two distinct portions of the CAA's judicial review provision. Under CAA section 307(b)(1), ''[a] petition for review of . . . nationally applicable regulations promulgated, or final agency action taken, by the Administrator . . . may be filed only in the United States Court of Appeals for the District of Columbia.'' Contrary to the commenter's assertions, we did not assert at proposal, nor do we

[203] Commission for Environmental Cooperation of North America, ''North American Power Plant Air Emissions,'' *http://www.cec.org/storage/56/4876_powerplant_airemission_en.pdf.* TCEQ may keep this in consideration in future studies on the impacts of sources from Mexico on Class I areas or otherwise.

[204] Big Bend Regional Aerosol and Visibility Observational Study (BRAVO), Final Report, September 2004.

[205] *http://www.epbusinessjournal.com/2015/11/dos-republicas-coal-partnership-coal-mine-expanded-water-discharge-permit-application-to-be-heard-november-16th/.*

[206] Authorization to Discharge Under the National Pollutant Discharge Elimination System. Permit No. TX0109011.

[207] Final Environmental Impact Statement on Dos Republicas Resource Company, Inc.'s Proposed Eagle Pass Mine in Maverick County, Texas, December 30, 1994. Page C–51.

[208] Synapse's report, ''ERCOT_Report_Review_Memo_20150908.pdf'' is in our docket to this rulemaking action.

assert now, that our FIP for Texas and Oklahoma is a ''nationally applicable'' regulation. CAA section 307(b)(1) next provides that ''[a] petition for review of the Administrator's action in approving or promulgating any implementation plan under section 7410 . . . or any other final action of the Administrator . . . which is locally or regionally applicable may be filed only in the United States Court of Appeals for the appropriate circuit.'' The commenters cite this sentence, but ignore the following sentence, which states ''[n]otwithstanding the preceding sentence a petition for review of any action referred to in such sentence may be filed only in the United States Court of Appeals for the District of Columbia if such action is based on a determination of nationwide scope or effect and if in taking such action the Administrator finds and publishes that such action is based on such determination.''

In other words, a final agency action that is locally or regionally applicable, such as a FIP, is appealable only in the D.C. Circuit Court if two conditions are met: (1) The action is based on a determination of nationwide scope or effect, and (2) we find and publish our determination. Both conditions are met here. First, we proposed to find and have confirmed our finding in this final rule that our action on the Texas and Oklahoma regional haze SIPs, which includes the promulgation of a partial FIP for each state, is based on a determination of nationwide scope and effect. Second, we have published that finding in the **Federal Register**.

While the CAA does not provide any guidance regarding the phrase ''nationwide scope and effect,'' the legislative history indicates that a determination of nationwide scope and effect is appropriate if a local or regional action encompasses two or more judicial circuits. The commenters made no effort to explain why this legislative history should not be taken into account. Instead, the commenters cited to other EPA actions on regional haze SIPs where we did not make a determination of nationwide scope and effect. However, the commenters failed to mention that all of these actions involved a single state and thus did not implicate multiple judicial circuits. We have routinely made determinations of nationwide scope and effect when more than one circuit is involved. Last year, for instance, we made a determination of nationwide scope and effect in a SIP approval action that involved the States of Florida and North Carolina, which reside in separate judicial circuits.[209] We have made many other such determinations over the years.

We also determined that this action has nationwide scope and effect because at the core of this rulemaking is our interpretation of the requirements of sections 110(a)(2)(D)(i)(II) and 169A(b)(2) of the CAA and multiple complex provisions of the Regional Haze Rule. Many commenters disagreed with our interpretation of these provisions, with some providing alternative interpretations that would substantially eviscerate the Regional Haze Rule. Congress intended for such issues of national importance to be decided by the D.C. Circuit.

III. Final Action

For the reasons discussed more fully in section II, above and detailed in our proposal and its accompanying TSDs, in this action, we are partially approving and partially disapproving a revision to the Texas SIP received from the State of Texas on March 31, 2009, that intended to address regional haze for the first planning period from 2008 through 2018. We also are disapproving the interstate visibility transport portions of the Texas SIP that address CAA provisions for prohibiting air pollutant emissions from interfering with measures required to protect visibility in any other state. We also are partially disapproving a revision to the Oklahoma SIP submitted in February 19, 2010, that addresses regional haze for the first planning period. We are finalizing a FIP to remedy certain of the deficiencies and not acting on others. Below is a list of the specific actions we are finalizing in this rulemaking.

A. Texas Regional Haze

We are approving the portions of the Texas regional haze SIP submitted on March 31, 2009, except for the following Regional Haze Rule requirements contained in 40 CFR part 51:

- Section 51.308(d)(1)(i)(A), regarding Texas' reasonable progress four-factor analysis for the Guadalupe Mountains and Big Bend.
- Section 51.308(d)(1)(i)(B), regarding Texas' calculation of the emission reductions needed to achieve the uniform rates of progress for the Guadalupe Mountains and Big Bend.
- Section 51.308(d)(1)(ii), regarding Texas' reasonable progress goals for the Guadalupe Mountains and Big Bend.
- Section 51.308(d)(2)(iii), regarding Texas' calculation of natural visibility conditions.
- Section 51.308(d)(2)(iv)(A), regarding Texas' calculation of the number of deciviews by which baseline conditions exceed natural visibility conditions.
- Section 51.308(d)(3)(i), regarding Texas' long-term strategy consultations with Oklahoma.
- Section 51.308(d)(3)(ii), regarding Texas securing its share of reductions necessary to achieve the reasonable progress goals at Big Bend, the Guadalupe Mountains, and the Wichita Mountains.
- Section 51.308(d)(3)(iii), regarding Texas' technical basis for its long-term strategy for Big Bend, the Guadalupe Mountains the Wichita Mountains.
- Section 51.308(d)(3)(v)(C), regarding Texas' emission limitations and schedules for compliance to achieve the reasonable progress goals for Big Bend and the Guadalupe Mountains and Wichita Mountains.

We are also approving the Texas' BART Rules, 30 TAC 116.1500–116.1540, except for the 30 TAC 116.1510(d) which relies on CAIR and is disapproved.

We are not taking action on 40 CFR 51.308(e) concerning Texas EGU BART.

B. Oklahoma Regional Haze

We are disapproving the portion of the Oklahoma regional haze SIP that addresses the requirements of 40 CFR 51.308(d)(1) with respect to reasonable progress goals, with the exception of § 51.308(d)(1)(vi), which we are approving.

C. Interstate Visibility Transport

We are disapproving portions of Texas SIP submittals that address CAA provisions for prohibiting air pollutant emissions from interfering with measures required to protect visibility in any other state for the 1997 $PM_{2.5}$, 2006 $PM_{2.5}$, 1997 ozone, 2008 ozone, 2010 NO_2, and 2010 SO_2 NAAQS. Our final FIP does not cure these defects as that portion of the FIP would have partially relied on CSAPR. We will address the visibility transport requirements for Texas in a future rulemaking, once the issues surrounding the CSAPR partial remand are resolved.

D. Federal Implementation Plan

Our final FIP requires the following SO_2 emission limits for specific emission units in Texas:

[209] See 79 FR 29362.

TABLE 7—FINAL 30-BOILER-OPERATING-DAY SO_2 EMISSION LIMITS

Unit	SO_2 Emission limit (lbs/MMBtu)
Sandow 4	0.20
Martin Lake 1	0.12
Martin Lake 2	0.12
Martin Lake 3	0.11
Monticello 3	0.06
Limestone 2	0.08
Limestone 1	0.08
Big Brown 1	0.04
Big Brown 2	0.04
Monticello 1	0.04
Monticello 2	0.04
Coleto Creek 1	0.04
Tolk 172B	0.06
Tolk 171B	0.06
San Miguel	0.60

Compliance with these emission limits is based on a 30 BOD period. We are finalizing requirements providing that compliance with these limits be achieved within:

- Five years of the effective date of our final rule for Big Brown Units 1 and 2, Monticello Units 1 and 2, Coleto Creek Unit 1, and Tolk Units 171B and 172B.
- Three years of the effective date of our final rule for Sandow 4; Martin Lake Units 1, 2, and 3; Monticello Unit 3; and Limestone Units 1 and 2.
- One year of the effective date of our final rule for San Miguel. San Miguel may elect an alternative compliance method by doing the following:
- Install a CEMS at the inlet of the scrubber system. The 30 BOD SO_2 average from the existing outlet CEMS must read at or below 6.0% (94% control) of a 30 BOD SO_2 average from the inlet CEMS. San Miguel must inform us in writing of its decision to select this option for compliance by no later than their compliance date.

Based on our technical analysis, we have calculated the following in Tables 8 and 9 for Texas and Oklahoma:

TABLE 8—NATURAL VISIBILITY CONDITIONS, NUMBER OF DECIVIEWS BY WHICH BASELINE CONDITIONS EXCEED NATURAL VISIBILITY CONDITIONS, AND UNIFORM RATE OF PROGRESS FOR TEXAS

Class I area	Natural visibility conditions		Number of deciviews by which baseline conditions exceed natural visibility conditions		Uniform rates of progress at 2018
	20% Worst	20% Best	20% Worst	20% Best	
Guadalupe Mountains	6.65 dv	0.99 dv	10.54 dv	4.96 dv	14.73 dv.
Big Bend	7.16 dv	1.62 dv	10.14 dv	4.16 dv	14.93 dv.

TABLE 9—REASONABLE PROGRESS GOALS FOR TEXAS AND OKLAHOMA

Class I area	Reasonable progress goals	
	20% Worst	20% Best
Guadalupe Mountains	16.26 dv	5.70 dv.
Big Bend	16.57 dv	5.59 dv.
Wichita Mountains	21.33 dv	9.22 dv.

IV. Incorporation by Reference

In this rule, we are finalizing regulatory text that includes incorporation by reference. In accordance with the requirements of 1 CFR 51.5, we are finalizing the incorporation by reference of the revisions to the Texas regulations as described in the Final Action section above and the amendments to 40 CFR part 52 set forth below. We have made, and will continue to make, these documents generally available electronically through *http://www.regulations.gov* and/or in hard copy at the EPA Region 6 office.

V. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is exempt from review by the Office of Management and Budget (OMB) because it is not a rule of general applicability. This action finalizes a source-specific FIP for that applies to eight coal-fired power plants in Texas (Big Brown; Monticello; Coleto Creek; Tolk; Sandow; Martin Lake; Limestone; and San Miguel).

B. Paperwork Reduction Act (PRA)

This action does not impose an information collection burden under the provisions of the PRA, 44 U.S.C. 3501 *et seq.* Under the PRA, a ''collection of information'' is defined as a requirement for ''answers to . . . identical reporting or recordkeeping requirements imposed on ten or more persons . . . '' 44 U.S.C. 3502(3)(A). Because the FIP applies to only eight facilities, the Paperwork Reduction Act does not apply. See 5 CFR 1320.3(c).

C. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. This action will not impose any requirements on small entities. This FIP will apply to eight facilities, none of which are small entities. The final partial approval of the SIP merely approves state law as meeting Federal requirements and does not impose additional requirements.

D. Unfunded Mandates Reform Act (UMRA)

Title II of the UMRA, 2 U.S.C. 1531–1538, establishes requirements for Federal agencies to assess the effects of their regulatory actions on state, local, and Tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to state, local, and Tribal governments, in the aggregate, or to the private sector, of $100 million or more (adjusted for inflation) in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 of UMRA do not apply when they are inconsistent with applicable law. Moreover, section 205 of the UMRA allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including Tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that Title II of the UMRA does not apply to this rule. In 2 U.S.C. 1502(1) all terms in Title II of UMRA have the meanings set forth in 2 U.S.C. 658, which further provides that the terms ''regulation'' and ''rule'' have the meanings set forth in 5 U.S.C. 601(2). Under 5 U.S.C. 601(2), ''the term 'rule' does not include a rule of particular applicability relating to . . . facilities.'' Because this rule is a rule of particular applicability relating to eight named facilities, EPA has determined that it is not a ''rule'' for the purposes of Title II of the UMRA.

E. Executive Order 13132: Federalism

This action does not have Federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. The final rule does not impose significant economic costs on state or local governments. Thus, Executive Order 13132 does not apply to the final rule.

F. Executive Order 13175: Coordination With Indian Tribal Governments

This action does not have tribal implications as specified in Executive Order 13175. This action applies to eight facilities in Texas and to Federal Class I areas in Oklahoma and Texas. This action does not apply on any Indian reservation land, any other area where EPA or an Indian tribe has demonstrated that a tribe has jurisdiction, or non-reservation areas of Indian country. Thus, Executive Order 13175 does not apply to this action.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks applies to any rule that: (1) Is determined to be economically significant as defined under Executive Order 12866; and (2) concerns an environmental health or safety risk that we have reason to believe may have a disproportionate effect on children. This action is not subject to Executive Order 13045 because the EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. Moreover, ''regulation'' or ''rule,'' is defined in Executive Order 12866 as ''an agency statement of general applicability and future effect.'' E.O. 12866 does not define ''statement of general applicability,'' but this term commonly refers to statements that apply to groups or classes, as opposed to statements, which apply only to named entities. The FIP therefore is not a rule of general applicability because its requirements apply and are tailored to only eight individually identified facilities. Thus, it is not a ''rule'' or ''regulation'' within the meaning of E.O. 12866. However, as this action will limit emissions of SO_2, it will have a beneficial effect on children's health by reducing air pollution.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution or Use

This action is not subject to Executive Order 13211 because it is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer and Advancement Act

This action involves technical standards. Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.,* materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This rule would require the eight affected facilities to meet the applicable monitoring requirements of 40 CFR part 75. Part 75 already incorporates a number of voluntary consensus standards. Consistent with the Agency's Performance Based Measurement System (PBMS), part 75 sets forth performance criteria that allow the use of alternative methods to the ones set forth in part 75. The PBMS approach is intended to be more flexible and cost-effective for the regulated community; it is also intended to encourage innovation in analytical technology and improved data quality. At this time, EPA is not recommending any revisions to part 75; however, EPA periodically revises the test procedures set forth in part 75. When EPA revises the test procedures set forth in part 75 in the future, EPA will address the use of any new voluntary consensus standards that are equivalent. Currently, even if a test procedure is not set forth in part 75, EPA is not precluding the use of any method, whether it constitutes a voluntary consensus standard or not, as long as it meets the performance criteria specified; however, any alternative methods must be approved through the petition process under 40 CFR 75.66 before they are used.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

The EPA believes the human health or environmental risk addressed by this action will not have potential disproportionately high and adverse human health or environmental effects on minority, low-income, or indigenous populations because it increases the level of environmental protection for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population. This FIP limits emissions of SO_2 from eight facilities in Texas.

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this action and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2). This rule will be effective on February 4, 2016.

VI. Judicial Review

The scope and effect of this rulemaking extend to Texas and Oklahoma, which are located in two judicial circuits. In addition, EPA's clarified interpretation of its regulations as set forth in this final action, including the accompanying RTC and TSD documents, is applicable to regional haze actions in all states, not just the specific actions we are taking here with regard to the regional haze obligations for Texas and Oklahoma. Accordingly, the Administrator determines that this is a rulemaking of nationwide scope or effect and any petitions for review must be filed in the U.S. Court of Appeals for the District of Columbia Circuit in accordance with CAA section 307(b)(1). Petitions for judicial review of this action must be filed in the U.S. Court of Appeals for the District of Columbia Circuit by March 7, 2016.

In addition, pursuant to CAA section 307(d)(1)(B), this action is subject to the requirements of CAA section 307(d) because it promulgates a FIP under CAA section 110(c). Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this action for the purposes of judicial review, extend the time within which a petition for judicial review may be filed, or postpone the effectiveness of the rule. Per CAA section 307(b)(2), this action may not be challenged later in proceedings to enforce its requirements.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Incorporation by reference, Intergovernmental relations, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur dioxides, Visibility, Interstate transport of pollution, Regional haze, Best available control technology.

Dated: December 9, 2015.

Gina McCarthy,

Administrator.

Title 40, chapter I, of the Code of Federal Regulations is amended as follows:

PART 52—APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS

■ 1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

Subpart LL—Oklahoma

■ 2. Section 52.1920(e) is amended by revising the entry for ''Regional haze SIP'' in the table titled ''EPA-Approved Nonregulatory Provisions and Quasi-Regulatory Measures in the Oklahoma SIP'' to read as follows:

§ 52.1920 Identification of plan.

* * * * *

(e) * * *

EPA-APPROVED NONREGULATORY PROVISIONS AND QUASI-REGULATORY MEASURES IN THE OKLAHOMA SIP

Name of SIP provision	Applicable geographic or non-attainment area	State submittal date	EPA approval date	Explanation
* *	*	*	*	* *
Regional haze SIP: (a) Determination of baseline and natural visibility conditions. (b) Coordinating regional haze and reasonably attributable visibility impairment. (c) Monitoring strategy and other implementation requirements. (d) Coordination with States and Federal Land Managers (e) BART determinations except for the following SO_2 BART determinations: Units 4 and 5 of the Oklahoma Gas and Electric (OG&E) Muskogee plant; and Units 1 and 2 of the OG&E Sooner plant	Statewide	2/17/2010	3/7/2014, 79 FR 12953.	Core requirements of 40 CFR 51.308. Initial approval 12/28/2011, 76 FR 81728. Approval for § 51.308(d)(1)(vi) 1/5/2016 [Insert **Federal Register** citation].
* *	*	*	*	* *

* * * * *

■ 3. Section 52.1928 is amended by revising paragraphs (a)(3) and (4) and adding paragraph (a)(5) to read as follows:

§ 52.1928 Visibility protection.

(a) * * *

(3) ''Greater RP Alternative Determination'' (Section VI.E);

(4) Separate executed agreements between ODEQ and OG&E, and ODEQ and AEP/PSO entitled ''OG&E RH Agreement, Case No. 10–024, and ''PSO RH Agreement, Case No. 10–025,'' housed within Appendix 6–5 of the RH SIP; and

(5) The reasonable progress goals for the first planning period and the reasonable progress consultation with Texas for the Wichita Mountains Class I area.

* * * * *

Subpart SS—Texas

■ 4. Section 52.2270 is amended by:

■ a. In paragraph (c), adding center heading ''Subchapter M: Best Available Retrofit Technology (BART)'' and the sections 116.1500, 116.1510, 116.1520, 116.1530 and 116.1540 under ''Chapter 116 (Reg 6)—Control of Air Pollution by Permits for New Construction or Modification''; and

■ b. In paragraph (e), adding an entry for ''Texas Regional Haze SIP'' at the end of the table titled ''EPA Approved Nonregulatory Provisions and Quasi-Regulatory Measures in the Texas SIP''.

The additions read as follows:

§ 52.2270 Identification of plan.

* * * * *

(c) * * *

EPA APPROVED REGULATIONS IN THE TEXAS SIP

State citation	Title/subject	State approval/ submittal date	EPA approval date	Explanation
* * *	*	*	*	* *
Chapter 116 (Reg 6)—Control of Air Pollution by Permits for New Construction or Modification				
* * *	*	*	*	* *
Subchapter M: Best Available Retrofit Technology (BART)				
Section 116.1500	Definitions	2/25/2009	1/5/2016 [Insert **Federal Register** citation].	
Section 116.1510	Applicability and Exemption Requirements.	2/25/2009	1/5/2016 [Insert **Federal Register** citation].	116.1510(d) is NOT part of the approved SIP.
Section 116.1520	Best Available Retrofit Technology (BART) Analysis.	2/25/2009	1/5/2016 [Insert **Federal Register** citation].	
Section 116.1530	Best Available Retrofit Technology (BART) Control Implementation.	2/25/2009	1/5/2016 [Insert **Federal Register** citation].	
Section 116.1540	Exemption from Best Available Retrofit Technology (BART) Control Implementation.	2/25/2009	1/5/2016 [Insert **Federal Register** citation].	
* * *	*	*	*	* *

* * * * *

(e) * * *

EPA APPROVED NONREGULATORY PROVISIONS AND QUASI-REGULATORY MEASURES IN THE TEXAS SIP

Name of SIP provision	Applicable geographic or non-attainment area	State submittal date/ effective date	EPA approval date	Comments
*	*	*	*	*
Texas Regional Haze SIP.	Statewide	3/19/2009	1/5/2016 [Insert **Federal Register** citation].	The following sections are not approved as part of the SIP: The reasonable progress four-factor analysis, reasonable progress goals and the calculation of the emission reductions needed to achieve the uniform rates of progress for the Guadalupe Mountains and Big Bend; calculation of natural visibility conditions; calculation of the number of deciviews by which baseline conditions exceed natural visibility conditions; long-term strategy consultations with Oklahoma; Texas securing its share of reductions necessary to achieve the reasonable progress goals at Big Bend, the Guadalupe Mountains, and the Wichita Mountains; technical basis for its long-term strategy and emission limitations and schedules for compliance to achieve the RPGs for Big Bend, the Guadalupe Mountains and Wichita Mountains.

■ 6. Section 52.2302 is added to read as follows:

§ 52.2302 Federal implementation plan for regional haze.

(a) Requirements for Martin Lake Units 1, 2, and 3; Monticello Units 1, 2, and 3, Limestone Units 1 and 2; Sandow Unit 4; Big Brown Units 1 and 2; Coleto Creek Unit 1; Tolk Units 1 and 2; and San Miguel affecting visibility.

(1) *Applicability.* The provisions of this section shall apply to each owner or operator, or successive owners or operators, of the coal burning equipment designated as: Martin Lake Units 1, 2, and 3; Monticello Units 1, 2, and 3, Limestone Units 1 and 2; Sandow Unit 4; Big Brown Units 1 and 2; Coleto Creek Unit 1; Tolk Units 1 and 2; and San Miguel.

(2) *Compliance dates.* Compliance with the requirements of this section is required by February 4, 2019 for Martin Lake Units 1, 2, and 3; Monticello Unit 3, Limestone Units 1 and 2; and Sandow Unit 4. Compliance with the requirements of this section is required by February 4, 2021 for Big Brown Units 1 and 2; Monticello Units 1 and 2; Coleto Creek Unit 1; and Tolk Units 1 and 2. Compliance with the requirements of this section is required by February 4, 2017 for San Miguel. These compliance dates apply unless otherwise indicated by compliance dates contained in specific provisions.

(3) *Definitions.* All terms used in this part but not defined herein shall have the meaning given them in the Clean Air Act (CAA) and in 40 CFR parts 51 and 60. For the purposes of this section:

24-hour period means the period of time between 12:01 a.m. and 12 midnight.

Air pollution control equipment includes selective catalytic control units, baghouses, particulate or gaseous scrubbers, and any other apparatus utilized to control emissions of regulated air contaminants which would be emitted to the atmosphere.

Boiler-operating-day means any 24-hour period between 12:00 midnight and the following midnight during which any fuel is combusted at any time at the steam generating unit.

Daily average means the arithmetic average of the hourly values measured in a 24-hour period.

Heat input means heat derived from combustion of fuel in a unit and does not include the heat input from preheated combustion air, recirculated flue gases, or exhaust gases from other sources. Heat input shall be calculated in accordance with 40 CFR part 75.

Owner or Operator means any person who owns, leases, operates, controls, or supervises any of the coal burning equipment designated in paragraph (a) of this section.

Regional Administrator means the Regional Administrator of EPA Region 6 or his/her authorized representative.

Unit means one of the coal fired boilers covered under paragraph (a) of this section.

(4) *Emissions limitations—SO_2 emission limit.* The individual sulfur dioxide emission limit for a unit shall be as listed in the table in this paragraph (a)(4) in pounds per million British thermal units (lb/MMBtu) as averaged over a rolling 30-boiler-operating-day period.

Unit	SO_2 Emission limit (lbs/MMBtu)
Sandow 4	0.20
Martin Lake 1	0.12
Martin Lake 2	0.12
Martin Lake 3	0.11
Monticello 3	0.06
Limestone 2	0.08
Limestone 1	0.08
Big Brown 1	0.04
Big Brown 2	0.04
Monticello 1	0.04
Monticello 2	0.04
Coleto Creek 1	0.04
Tolk 172B	0.06
Tolk 171B	0.06
San Miguel	0.60

(i) For each unit, SO_2 emissions for each calendar day shall be determined by summing the hourly emissions measured in pounds of SO_2. For each unit, heat input for each boiler-operating-day shall be determined by adding together all hourly heat inputs, in millions of BTU. Each boiler-operating-day of the thirty-day rolling average for a unit shall be determined by adding together the pounds of SO_2 from that day and the preceding 29-boiler-operating-days and dividing the total pounds of SO_2 by the sum of the heat input during the same 30-boiler-operating-day period. The result shall be the 30-boiler-operating-day rolling average in terms of lb/MMBtu emissions of SO_2. If a valid SO_2 pounds per hour or heat input is not available for any hour for a unit, that heat input and SO_2 pounds per hour shall not be used in the calculation of the 30-boiler-operating-day rolling average for SO_2.

(ii) In lieu of paragraph (a)(4)(i) of this section, and if San Miguel meets paragraph (a)(5)(i) of this section, it may install a CEMS at the inlet of the scrubber system. The 30 BOD SO_2 average from the existing outlet CEMS must read at or below 6.0% (94% control) of a 30 BOD SO_2 average from the inlet CEMS.

(5) *Testing and monitoring.* (i) No later than the compliance date as set out in paragraph (a)(2) of this section, the owner or operator shall install, calibrate, maintain and operate Continuous Emissions Monitoring Systems (CEMS) for SO_2 on the units listed in paragraph (a)(1) of this section in accordance with 40 CFR 60.8 and 60.13(e), (f), and (h), and appendix B of part 60 of this chapter. No later than the compliance date as set out in paragraph (a)(2), San Miguel must submit a letter to the Regional Administrator that informs the EPA which compliance option it elects, as specified in paragraph (a)(4) of this section. San Miguel must then adhere to the compliance method set forth in that letter to the Regional Administrator. All owners or operators shall comply with the quality assurance procedures for CEMS found in 40 CFR part 75. Compliance with the emission limits for SO_2 shall be determined by using data from a CEMS.

(ii) Continuous emissions monitoring shall apply during all periods of operation of the coal burning equipment, including periods of startup, shutdown, and malfunction, except for CEMS breakdowns, repairs, calibration checks, and zero and span adjustments. Continuous monitoring systems for measuring SO_2 and diluent gas shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period. Hourly averages shall be computed using at least one data point in each fifteen minute quadrant of an hour. Notwithstanding this requirement, an hourly average may be computed from at least two data points separated by a minimum of 15 minutes (where the unit operates for more than one quadrant in an hour) if data are unavailable as a result of performance of calibration, quality assurance, preventive maintenance activities, or backups of data from data acquisition and handling system, and recertification events. When valid SO_2 pounds per hour, or SO_2 pounds per million Btu emission data are not obtained because of continuous monitoring system breakdowns, repairs, calibration checks, or zero and span adjustments, emission data must be obtained by using other monitoring systems approved by the EPA to provide emission data for a minimum of 18 hours in each 24 hour period and at least 22 out of 30 successive boiler-operating-days.

(6) *Reporting and recordkeeping requirements.* Unless otherwise stated all requests, reports, submittals, notifications, and other communications to the Regional Administrator required by this section shall be submitted, unless instructed otherwise, to the Director, Multimedia Planning and Permitting Division, U.S. Environmental Protection Agency, Region 6, to the attention of Mail Code: 6PD, at 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202–2733. For each unit subject to the emissions limitation in this section and upon completion of the installation of CEMS as required in this section, the owner or operator shall comply with the following requirements:

(i) For each emissions limit in this section, comply with the notification, reporting, and recordkeeping requirements for CEMS compliance monitoring in 40 CFR 60.7(c) and (d).

(ii) For each day, provide the total SO_2 emitted that day by each emission unit. For any hours on any unit where data for hourly pounds or heat input is missing, identify the unit number and monitoring device that did not produce valid data that caused the missing hour.

(7) *Equipment operations.* At all times, including periods of startup, shutdown, and malfunction, the owner or operator shall, to the extent practicable, maintain and operate the unit including associated air pollution control equipment in a manner consistent with good air pollution control practices for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Regional Administrator which may include, but is not limited to, monitoring results, review of operating and maintenance procedures, and inspection of the unit.

(8) *Enforcement.* (i) Notwithstanding any other provision in this implementation plan, any credible evidence or information relevant as to whether the unit would have been in compliance with applicable requirements if the appropriate performance or compliance test had been performed, can be used to establish whether or not the owner or operator has violated or is in violation of any standard or applicable emission limit in the plan.

(ii) Emissions in excess of the level of the applicable emission limit or requirement that occur due to a malfunction shall constitute a violation of the applicable emission limit.

(b) [Reserved]

■ 7. Section 52.2304 is amended by adding paragraphs (d) and (e) to read as follows:

§ 52.2304 Visibility protection.

* * * * *

(d) Portions of SIPs addressing noninterference with measures required to protect visibility in any other state are disapproved for the 1997 $PM_{2.5}$, 2006 $PM_{2.5}$, 1997 ozone, 2008 ozone, 2010 NO_2 and 2010 SO_2 NAAQS.

(e) The following portions of the Texas regional haze SIP submitted March 19, 2009 are disapproved: The reasonable progress four-factor analysis, reasonable progress goals and the calculation of the emission reductions needed to achieve the uniform rates of progress for the Guadalupe Mountains and Big Bend; calculation of natural visibility conditions; calculation of the number of deciviews by which baseline conditions exceed natural visibility conditions; long-term strategy consultations with Oklahoma; Texas securing its share of reductions necessary to achieve the reasonable progress goals at Big Bend, the Guadalupe Mountains, and the Wichita Mountains; technical basis for its long-term strategy and emission limitations and schedules for compliance to achieve the reasonable progress goals for Big Bend, the Guadalupe Mountains and Wichita Mountains.

[FR Doc. 2015–31904 Filed 1–4–16; 8:45 am]

BILLING CODE 6560–50–P

Exhibit B

DECLARATION OF BRIAN H. LLOYD, EXECUTIVE DIRECTOR, PUBLIC UTILITY COMMISSION OF TEXAS

I, Brian H. Lloyd, declare as follows:

1. I am the Executive Director of the Public Utility Commission of Texas ("PUCT"). As Executive Director, I am responsible for the daily operations of the PUCT and the management of the PUCT's employees.

2. The PUCT is composed of three commissioners, appointed by the Governor, with the advice and consent of the Texas Senate, for staggered six-year terms. The commissioners are the policymaking part of the agency and issue final decisions on contested cases and rulemakings. The Executive Director is hired by the commissioners and is responsible for the day to day operations and management of the agency.

3. As explained more fully herein, the PUCT is the principal regulatory authority over electricity markets in Texas. The PUCT's jurisdiction over electricity markets is outlined in the Texas Utilities Code. The PUCT's authority includes comprehensive regulation over the retail and wholesale electricity markets within the Electric Reliability Council of Texas ("ERCOT") and retail electric utilities in parts of the state outside of ERCOT.

4. I earned a Bachelor's of Arts Degree in economics at Louisiana State University and graduated from the University of Texas at Austin with a Master of Science in Economics Degree. I have extensive experience in both the electric and

energy industries, and I have extensive experience testifying on electricity regulatory and policy issues before various Texas legislative committees, the Federal Energy Regulatory Commission ("FERC"), federal courts, and the PUCT.

5. I am providing this declaration in support of the State of Texas' motion to stay the regional haze rule issued by the U.S. Environmental Protection Agency on January 5, 2016. *See Approval and Promulgation of Implementation Plans; Texas and Oklahoma; Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan To Address Pollution Affecting Visibility and Regional Haze; Federal Implementation Plan for Regional Haze* , 81 Fed. Reg. 296 (Jan. 5, 2016) ("Final Rule"). This declaration is based on my professional judgment, knowledge, experience, and expertise.

6. The Final Rule seeks to impose substantial costs on a significant amount of electric generation capacity within state of Texas – predominantly within the ERCOT region. Specifically, the Final Rule will require five coal-fired units (Big Brown 1 and 2, Monticello 1 and 2, and Coleto Creek 1) within the ERCOT region to be retrofit with new scrubbers by February 2021 and seven coal-fired units (Sandow 4, Martin Lake 1, 2, and 3, Monticello 3, and Limestone 1 and 2) within the ERCOT region to undergo upgrades to existing scrubbers by February 2019.[1]

[1] Final Rule at pp. 38-39. Note that the Final Rule would also require two additional units located in Texas, but outside of ERCOT (Tolk units 171B and 172B) to be retrofitted with new scrubbers by February 2021. The Final Rule also imposes new SO2 emissions limits on San Miguel. The San Miguel unit is located in ERCOT, but is not expected to have to install additional controls in order to comply with its emission limit.

7. As stated by the PUCT and Texas Commission on Environmental Quality (TCEQ) in our comments submitted to EPA on April 21, 2015, regarding this rule, the benefits from the Final Rule on visibility are non-existent given that the difference between the visibility improvements for the Texas plan and the Final Rule for Big Bend National Park, Guadalupe Mountains National Park, and Wichita Mountains Wilderness are projected by EPA to be 0.03, 0.04, and 0.14 deciviews respectively – levels far below the 1.0 deciview change in visibility improvement able to be perceived by a typical person.[2] Additionally, the current monitored visibility for each area is *better* than the visibility that the Final Rule seeks to achieve.[3]

8. The Final Rule will impose several irreparable harms to the PUCT and electricity consumers of Texas. These harms include the likely increase in cost to Texans, as well as the potential for degraded reliability.

A. Overview of Texas's Unique Electricity Markets

9. Texas is unique among all states in that the majority of the state operates in a vibrant and extremely successful competitive wholesale and retail electricity market (the ERCOT power region), while other portions of the state operate within three distinct competitive wholesale markets that are overseen by the FERC.

10. For the remainder of this declaration, I will use the term "ERCOT power region" or "ERCOT power grid" to describe the geographic area that exists solely

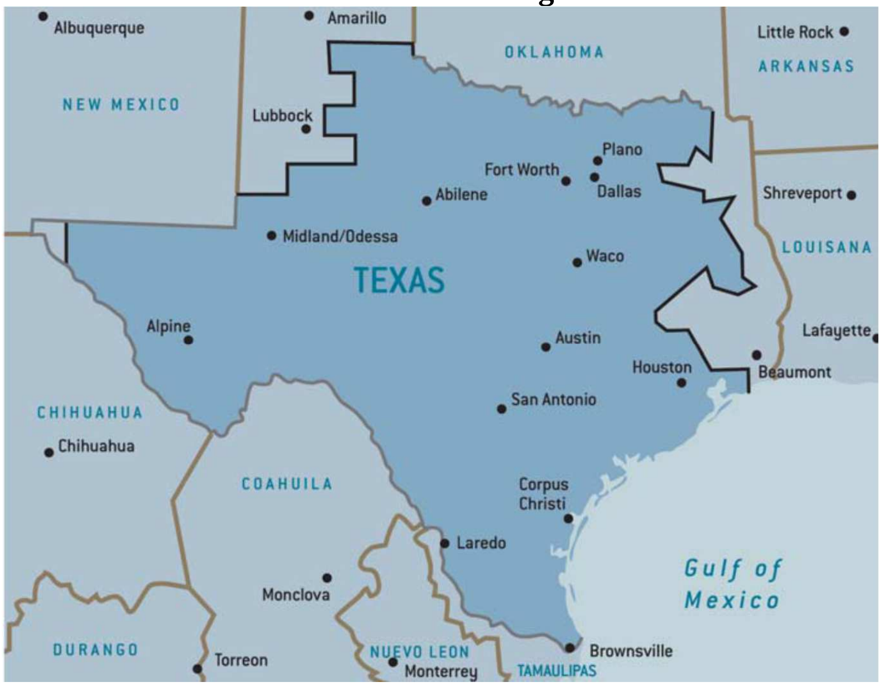
[2] Comments at page 3
[3] Comments at page 4

within Texas for which the PUCT is solely responsible for overseeing the operation of wholesale and retail electricity markets. I will use the term "ERCOT, Inc." to describe the membership-based 501(c)(4) nonprofit corporation that has been designated by the PUCT as the Independent System Operator ("ISO") that administers the markets in this region.

11. Approximately 90% of Texas electricity consumption occurs within the ERCOT power region. ERCOT, Inc. is the only ISO in the continental United States that operates an electricity market that is wholly contained within one state and is not synchronously interconnected to the remainder of the country. The remaining 10% of electric consumption in Texas takes place in areas outside of the ERCOT power region.

12. The ERCOT power region, identified in the map below, covers most of Texas and includes the major load centers of Houston, Dallas, Fort Worth, San Antonio, Austin, Corpus Christi, and the Rio Grande Valley.

ERCOT Power Region



13. The ERCOT power region is unique in the United States in that it is wholly intra-state and is not directly (also referred to as synchronously) connected to the two other U.S. grid interconnections (the Western and the Eastern Interconnections). Import and export of power from the ERCOT power region is limited to the capacity of five asynchronous ties linking ERCOT and other interconnections: two between the ERCOT power region and the Eastern Interconnection (with a combined capacity of 820 megawatts), and three between the ERCOT power region and the electrical grid in Mexico (with a combined capacity of 430 megawatts). Flows on these asynchronous ties are scheduled in advance of real-time operations by market participants; however, support from neighboring power regions can be received across these ties during grid emergency events. Aside from

these limited asynchronous ties, from an electrical standpoint, the ERCOT power region is an island that must independently ensure its own electric reliability.

14. Under *Tex. Util. Code Ann.* § 39.151, the PUCT is required to certify an independent organization[4] to ensure the reliability and adequacy of the regional electrical network to ensure a reliable supply of electricity to Texas consumers. The PUCT certified ERCOT, Inc. as the independent organization responsible for overseeing the reliable operation of the electric grid for the ERCOT power region of Texas.

15. ERCOT, Inc. is a membership-based 501(c)(4) nonprofit corporation, governed by a board of directors and subject to oversight by the PUCT and the Texas Legislature. ERCOT, Inc.'s mission is to serve the public by ensuring a reliable grid, efficient electricity markets, open access, and retail choice. ERCOT, Inc. is responsible for overseeing the reliable operation of the electric grid for the ERCOT power region of Texas. ERCOT, Inc. manages the flow of electric power to approximately 24 million Texas customers—representing approximately 90 percent of Texas's electric load (i.e., demand for electricity) and approximately 75 percent of Texas's land area. As the ISO for the ERCOT power region, ERCOT, Inc. schedules and dispatches power on a grid that connects approximately 43,000 miles of transmission lines and more than 550 power generation units. ERCOT, Inc. also administers and maintains a forward-

[4] The terms "Independent Organization" and "ISO" are often used interchangeably within the Texas Utilities Code.

looking open market to provide affordable and reliable electricity to consumers in Texas. It manages financial settlement for the competitive wholesale bulk-power market and administers customer switching for seven million premises in competitive choice areas. Existing market policies and investments in transmission in the ERCOT power region have incentivized market participants to maximize the efficiency of the generation fleet and develop new technologies including renewable generation.

16. Under *Tex. Util. Code Ann.* § 39.151(d), the PUCT has complete authority to oversee and investigate ERCOT, Inc.'s organization to ensure that the organization adequately performs its functions and responsibilities. This oversight and regulation comprises a significant portion of the PUCT's work.

17. Ensuring reliable electrical power is critical to economic stability as well as human health and safety. The Federal Energy Policy Act of 2005 recognized the importance of ensuring reliability of electric grids by creating an Electric Reliability Organization ("ERO"). The ERO function for North America is performed by the North American Electric Reliability Corporation ("NERC"), which oversees a vast set of reliability standards that are designed to ensure the reliability of the bulk power system. NERC has delegated portions of its oversight to regional reliability monitors; this delegation is approved by FERC. FERC has delegated this oversight to the Texas Reliability Entity ("TRE") as the reliability monitor for the ERCOT power region. ERCOT, Inc. is thus subject to TRE, NERC, and FERC for federal reliability standards.

As explained in more detail below, ERCOT, Inc. is also accountable to the PUCT for state reliability standards.

18. ERCOT, Inc. and the ERCOT power region are also unique among the nation's ISOs and regional transmission organizations and electricity markets in that they are subject to very limited and specific jurisdiction by FERC under the FPA. The transmission of electric energy occurring wholly within the ERCOT power region is not subject to FERC's rate setting authority under FPA Sections 205 or 206, nor is it subject to FERC's sale, transfer and merger authority under Section 203 of the FPA.[5] ERCOT, Inc.'s market rules and protocols are also not subject to FERC approval or oversight. Pursuant to Section 215 of the FPA, FERC does have jurisdiction to establish and enforce reliability standards for users of the bulk power system within the ERCOT power region. Finally, under FPA Sections 210, 211, and 212, FERC has limited jurisdiction to order certain entities within the ERCOT power region to interconnect and provide transmission service. Historically, FERC orders issued under FPA Section 212 that are applicable to entities operating in the ERCOT power region have expressly stated that the utilities in the ERCOT power region that are not currently considered public utilities under the FPA will not become public utilities and therefore subject to FERC jurisdiction for any purpose other than carrying out the provisions of

[5] *See* FERC, *ERCOT*, http://www.ferc.gov/industries/electric/indus-act/rto/ercot.asp (last visited Oct. 12, 2015).

FPA sections 210, 211 and 212. See e.g., Kiowa Power Partners, LLC, 99 FERC ¶ 61,251 (May 31, 2002).

19. Under *Tex. Util. Code Ann.* §39.151(d), the PUCT is required to adopt and enforce rules relating to the reliability of the ERCOT power region. The PUCT may delegate to ERCOT, Inc. the responsibility for adopting and enforcing such rules, but any rules adopted by ERCOT, Inc. are subject to PUCT oversight and review. While power plants in Texas are also subject to reliability standards promulgated under § 215 of the FPA, the PUCT's authority to promulgate rules related to reliability within the ERCOT power region is independent of and predated those authorities.

20. Under *Tex. Util. Code Ann.* § 39.001, as added in 1999, the Texas Legislature concluded "that the production and sale of electricity is not a monopoly warranting regulation of rates, operations, and services and that the public interest in competitive electric markets requires that, except for transmission and distribution services and for the recovery of stranded costs, electric services and their prices should be determined by customer choices and the normal forces of competition." Thus the Texas Legislature has declared that competitive wholesale and retail electricity markets are the preferred mode of operating electricity markets in the state, and state policy has conformed to this goal since 1999.

21. Inside the ERCOT power region, investor-owned electric utilities were required to separate into generation, transmission and distribution, and retail services companies as part of the transition to retail electric choice. The only service which is

still subject to traditional regulation is the transmission and distribution function. The companies providing transmission and distribution service within the ERCOT power grid are known as transmission and distribution utilities ("TDUs"). Notably, as a result of this separation, electric generation units ("EGU's") within the ERCOT power region now bear the entirety of the risk of owning and operating their assets without guaranteed recovery of their costs or profit through regulated utility rates.

22. A TDU operating inside the ERCOT power region may not provide service to the public without a certificate of convenience and necessity ("CCN") and a TDU must obtain approval from the PUCT to amend their CCN prior to constructing a new transmission line. The PUCT is also authorized to require utilities to construct new transmission facilities if needed to ensure safe and reliable service for the state's electric markets and consumers. Electric transmission CCN regulation by the PUCT is governed by Chapter 37 of the Texas Utilities Code.

23. Electric utilities and TDUs are also subject to cost of service rate regulation by the PUCT under Chapter 36 of the Texas Utilities Code and service quality regulation under Chapter 38 of the Texas Utilities Code.

24. Within the ERCOT power region, ERCOT, Inc. is responsible for ensuring open access to the transmission system, including managing the dispatch of power plants. ERCOT, Inc. largely performs this task through the operation of real-time and day-ahead markets that provide for security constrained economic dispatch.

25. Security constrained economic dispatch operates through ERCOT, Inc., dispatching power plants based upon their bids into ERCOT, Inc.'s administered markets, subject to transmission constraints. Thus, the inherent design of the markets motivates EGUs to bid at a level reflective of their short-run marginal costs, ensuring that in every interval that the power plant operates, its costs are at or below the market clearing price. In the short-run, a plant will not operate if the market clearing price is consistently below a power plant's marginal costs of operating; therefore regulations (such as the Final Rule[6]) that increase those marginal costs will, all other things equal, mean that the power plant will, at a minimum, operate at a reduced profit and the plant may also operate less frequently. Over the long run, a power plant must earn not only sufficient revenues to cover its marginal cost, but must also be able to pay for the capital costs associated with building the plant, as well as any subsequent investments, including those needed to comply with environmental regulations such as the Final Rule.

B. Absent a Stay, the Final Rule Causes a Timing Problem that Creates the Unenviable Choice for the PUCT of Imposing Irreversible Costs to Electricity Consumers in Texas or Allowing Degraded Reliability

[6] See EPA, Technical Support Document for the Cost of Controls Calculations for the Texas Regional Haze Federal Implementation Plan (Nov. 2014) for a discussion of the Final Rule's impacts on the affected power plants' marginal (referred to as variable) costs.

26. The Final Rule imposes significant costs on the affected power plants, particularly the five units that are required to install, maintain and operate new scrubbers. As stated in other declarations filed in this proceeding, these costs challenge the economic viability of these units such that it is probable that the units will shut down rather than incur the retrofit costs of the new scrubbers. The units that are required to upgrade their existing scrubbers face lower retirement risk than the units that must install new scrubbers. However, the upgrades must be completed two years earlier than the units requiring new scrubbers and should the plant owners decide not to upgrade their scrubbers, there would be much less time to plan for and implement any transmission upgrades required by these plant retirements.

27. The likelihood of these units retiring is consistent with studies conducted by ERCOT, Inc. that found that a lower bound of approximately 3,000 MW of coal fired capacity faced a risk of retirement due to the imposition of the Final Rule.[7]

28. While other recent environmental regulations promulgated by the EPA are also imposing costs on power plants, the Final Rule is distinguishable from these other regulations[8] because of the sheer magnitude of the capital costs for those plants that

[7] *"Impacts of Environmental Regulations in the ERCOT Region",* Electric Reliability Council of Texas, December 16, 2014, p. 27, http://www.ercot.com/content/news/presentations/2014/Impacts%20of%20Environmental%20Regulations%20in%20the%20ERCOT%20Region.pdf

[8] The "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units" rule is also significantly distinguishable from other environmental regulations for the reasons I stated in my declaration

are required to install new scrubbers and the lack of alternative compliance mechanisms. For example, ERCOT, Inc.'s report estimated potential compliance costs for the Final Rule at a capital cost of $450-$573 per kW of capacity.[9] In contrast, no other regulation studied in the ERCOT Report had projected capital costs that exceeded $50 per kW of capacity, and in some cases, those costs could be avoided through the procurement of emissions allowances or temporary reductions in operation. EPA has not allowed the use of such options for the power plants affected by the Final Rule.

29. When a power plant owner decides to retire a power plant, they are required by PUCT rules to notify ERCOT, Inc. at least ninety days before the unit is retired. ERCOT, Inc. then assesses whether the power plant is needed to ensure the reliability of the local transmission system. If ERCOT, Inc. determines that a power plant is needed to maintain the reliability of the local transmission system, ERCOT, Inc. has the authority to enter into a Reliability Must-Run ("RMR") contract that provides adequate compensation (including compensation for capital investment) to keep the power plant on-line until transmission system upgrades can be planned and completed.

provided to the United States Court of Appeals for the District of Columbia Circuit in *State of West Virginia, State of Texas et. Al v. United States Environmental Protection Agency.*

[9] *"Impacts of Environmental Regulations in the ERCOT Region",* Electric Reliability Council of Texas, December 16, 2014, pp. i and 6.
http://www.ercot.com/content/news/presentations/2014/Impacts%20of%20Environmental%20Regulations%20in%20the%20ERCOT%20Region.pdf

30. Because of the location of the power plants affected by the Final Rule, the PUCT expects that retirement of these plants will result in a need for transmission system upgrades. Specifically, in October 2015, ERCOT, Inc. performed an analysis of the transmission system impacts of potential retirements of power plants caused by the rule.[10] Even after accounting for planned, but not yet built, new generation resources that met certain planning criteria at the time of the study, ERCOT, Inc. found that the "Regional Haze requirement would have a significant local and regional impact on the reliability of the ERCOT transmission system"[11] and would require significant upgrades to the ERCOT transmission system.

31. It typically takes a TDU four to five years to plan, study, obtain approvals, and construct new transmission lines. Therefore, TDUs would need to begin this process immediately or within the next 12 months in order for any new transmission to be operational by the February 2019 and February 2021 compliance dates, respectively, even though final resolution of the legal challenges to the Final Rule are unlikely to be completed until 2017 at the earliest.

32. As mentioned above, because TDUs are subject to traditional utility cost-of -service ratemaking, costs that a TDU incurs in planning and constructing new

[10] ERCOT, "Transmission Impact of the Regional Haze Environmental Regulation", (October 15, 2015), http://www.ercot.com/content/wcm/key_documents_lists/76860/Transmission_Impact_of_the_Regional_Haze_Environmental_Regulation__Oct_RPG.pdf

[11] Id, pg. 9

transmission are generally recoverable in rates that are ultimately charged to electricity consumers in the state. If the Final Rule is ultimately overturned and power plant retirements do not occur, then these irreversible costs would have been unnecessary.

33. If the PUCT, ERCOT, Inc. and TDUs wait to conduct transmission planning until the legality of the Final Rule is ultimately determined, then new transmission will not be in service by the compliance dates, and the regular option of implementing an RMR contract until the transmission can be constructed will not be available. This is because installation of scrubbers on power plants typically requires substantial lead time similar to that required to build new transmission. This has been described in other declarations provided to the court, and I agree with these assessments due to the need to do extensive engineering, permitting, and construction work. As discussed above, EPA has not provided for alternative compliance options that would enable continued operation by the facilities pending the permitting and installation of the new scrubbers nor has EPA provided a compliance option that would permit continued operation of non-upgraded plants until the necessary transmission upgrades are completed.

34. If RMR contracts are not an option to address local transmission reliability issues, then grid reliability will be degraded, and ERCOT, Inc. will be forced to resort to emergency actions to preserve the system by reducing demand through the implementation of rotating outages in the affected areas. These actions will further

increase the cost of compliance with the Final Rule. Such a scenario could have been avoided had the final rule included a "Reliability Safety Valve" mechanism as suggested by the PUCT and TCEQ, however EPA refused to provide for such a mechanism.

35. Absent a stay, the PUCT is therefore harmed by being forced into a choice between two unenviable options: begin planning transmission upgrades and have TDUs incur costs that Texas electricity consumers will be forced to bear even though such costs would be unnecessary should the Final Rule be overturned, or accept the prospect of degraded reliability because of the impossibility of using the traditional short-term RMR scheme to fill the gap until transmission can be constructed should the Final Rule be upheld. Only a stay and tolling of the compliance deadlines pending the conclusion of litigation solves this harm.

C. In addition to the impacts on the ERCOT portion of Texas, the Final Rule, if not stayed, will also cause harm to Southwestern Public Service Company ("SPS") and potentially impose additional costs and harm on the PUCT.

36. As noted above, the Final Rule would also require two additional units located in Texas, but outside of ERCOT (Tolk units 171B and 172B) to be retrofitted with new scrubbers by February 2021. These units are operated by SPS, and provide power to their customers in Texas and New Mexico.

37. SPS is an electric utility that operates primarily in the Panhandle region of Texas, remains fully bundled[12] and regulated by the PUCT, and is a member of the Southwest Power Pool ("SPP"), which has been approved by the FERC as the Regional Transmission Organization that performs a similar role to that described above for ERCOT, Inc. in a 14 state region in the central United States.

38. Under the Final Rule, SPS faces a similar conundrum as discussed above for the ERCOT power region. In order to maintain its reserve obligations to the SPP, SPS must soon begin the process of either installing scrubbers at the Tolk units, or begin the process of determining whether to replace the Tolk units with new generation capacity. To the extent that SPS determines the most economical choice for new generation capacity is to build new generation or purchase power plants from others, SPS will need to take the additional step of obtaining a Certificate of Convenience and Necessity ("CCN") from the PUCT, as required by *Tex. Util. Code Ann.* § 37.051.

39. Absent a stay of the rule, SPS will be forced to begin to make decisions and expend costs to either begin the process of installing scrubbers on the Tolk units, or replace the capacity from Tolk before the conclusion of the litigation process.

[12] Unlike ERCOT, retail competition and the associated business separation discussed above have been delayed for the SPS region. As such, SPS remains the monopoly provider of electricity service in its certificated service area, and all aspects of the business – generation, transmission and distribution, and retain service – are fully regulated by the PUCT.

40. Like TDUs, SPS is subject to traditional utility cost-of -service ratemaking, and costs that SPS incurs in planning and constructing new generation are generally recoverable in rates that are ultimately charged to electricity consumers served by SPS. If the Final Rule is ultimately overturned, then these irreversible costs would have been unnecessary. Similarly, if SPS had determined a need to build or buy a new power plant, the time and resources that the PUCT needed to expend in processing the requisite CCNs would have also been unnecessary and irreversible.

41. I declare, under penalty of perjury, that the foregoing is true and correct. Executed on ____March 15______________________, 2016.

Brian H. Lloyd
Executive Director
Public Utility Commission of Texas

Exhibit C

DECLARATION OF DAVID BRYMER, AIR QUALTIY DIVISION DIRECTOR, TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

I, David Brymer, declare as follows:

1. I am the Director of the Air Quality Division at the Texas Commission on Environmental Quality (TCEQ). As Director, I am responsible for the daily operations of the Air Quality Division and the management of the division's employees.
2. TCEQ is composed of three commissioners, appointed by the Governor, with the advice and consent of the Texas Senate, for staggered six-year terms. The TCEQ is the state agency charged with implementing and enforcing the State's various environmental regulatory programs. The Air Quality Division Director oversees the State Implementation Plan (SIP) development including regional haze implementation plans as required by § 169A of the Federal Clean Air Act (CAA or the Act).
3. I have held the title of Division Director of the Air Quality Division at the TCEQ for over six years. I have a Bachelor's Degree in Wildlife and Fisheries Science and a Master's Degree of Agriculture in Fisheries Science as well as over 30 years of air quality experience in the private and public sector performing air monitoring, air quality policy review and development, project management, as well as managing air quality monitoring and policy staff and programs.

4. I am providing this declaration in support of the State of Texas's motion to stay the rule issued by the U.S. Environmental Protection Agency (EPA) on January 5, 2016, partially disapproving Texas's 2009 revisions to its SIP for regional haze and imposing a Federal Implementation Plan (FIP). *See Approval and Promulgation of Implementation Plans; Texas and Oklahoma; Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan To Address Pollution Affecting Visibility and Regional Haze; Federal Implementation Plan for Regional Haze,* 81 Fed. Reg. 296 (Jan. 5, 2016) (Final Rule). This declaration is based on my professional judgment, knowledge, experience, and expertise. I also supervise (and receive regular briefings from) multiple staff that developed comments on EPA rules, proposed disapprovals, and the TCEQ SIP revisions regarding Regional Haze. I also have reviewed EPA rules, proposed disapprovals, and the TCEQ SIP revisions regarding Regional Haze. Accordingly, I have personal knowledge and experience to understand the impacts of the Regional Haze FIP on TCEQ, including TCEQ obligations under the FIP.

5. The Final Rule addresses the regional haze requirements of sections 169A and B of the Act requiring EPA to reduce visibility impairment in federal Class I areas. These requirements are expressed in terms of visibility and not emission limits or air quality standards. Two Class I areas are affected by the

rule in Texas: Big Bend National Park and Guadalupe Mountains National Park.

6. The Final Rule imposes substantial costs on a significant amount of electric generation capacity within the State of Texas. Specifically, the Final Rule will require seven coal-fired electric generating units (Big Brown 1 and 2, Monticello 1 and 2, Tolk 171B and 172B, and Coleto Creek 1) in Texas to be retrofitted with new scrubbers by February 2021 and seven coal-fired units (Sandow 4, Martin Lake 1, 2, and 3, Monticello 3, and Limestone 1 and 2) to undergo upgrades to existing scrubbers by February 2019.[1]

7. EPA's Final Rule disapproves several elements of Texas's Regional Haze SIP, submitted to EPA in March 2009. Specifically, the Final Rule stated that the Texas SIP did not demonstrate reasonable progress towards the national visibility goal for Texas Class I areas, improperly calculated natural conditions on the 20% worst and best visibility days, and did not appropriately determine the impact of Texas emissions contributing to haze in other Class I areas or sufficiently evaluate measures to reduce haze as part of the long term strategy.

[1] Final Rule at p 305, Table 1. The Final Rule also imposes new Sulfur Dioxide emissions limits on San Miguel. The San Miguel unit is not expected to have to install additional controls in order to comply with its emission limit.

8. Texas's Regional Haze SIP relied on the determination that participation in the Clean Air Interstate Rule (CAIR) was better than, and thus met the obligations of, a Best Available Retrofit Technology (BART) determination for certain electric generation units consistent with EPA's 2005 amendments to the Regional Haze Rule (RHR).[2] However, CAIR was subsequently vacated by the D.C. Circuit Court of Appeals in 2008.[3] In 2012, EPA issued a limited disapproval to Texas and several states on the basis that those SIPs relied on CAIR as better than BART.[4] EPA proposed to replace TCEQ's rule that established the (now vacated) CAIR as better than BART, with the Cross-State Air Pollution Rule. Although EPA implemented that change on other states, in the Final Rule EPA elected not to implement that same change in its FIP for Texas.

9. Texas did demonstrate reasonable progress towards the national visibility goal in the SIP revision. Texas did conduct the four factor analysis by grouping categories of sources, as allowed by EPA in its 2007 guidance, and did look at the cost of control measures at individual units.[5] Because a number of sources, considered together, did not significantly impact visibility at Class I areas, a unit-by-unit determination would impact visibility

[2] 70 Fed. Reg. 39104 (July 6, 2005)
[3] *North Carolina v. EPA*, 531 F.3d 896, modified by 550 F.3d 1176 (D.C. Cir. 2008)
[4] 77 Fed. Reg. 33642 (June 7,2012)
[5] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (EPA 2007)

even less. The use of reasonable costs for this exercise consistent with EPA's CAIR program costs was also consistent with EPA's guidance on other programs and reasonable at the time of SIP development.

10. TCEQ, following EPA guidance[6] on calculating natural conditions, did the calculations for its Class I areas, Big Bend and Guadalupe Mountains National Parks using the revised Interagency Monitoring of Protected Visual Environments (IMPROVE) algorithm and analyses of independent third-party dust storm studies of the Chihuahuan Desert. Based on this information, TCEQ estimated natural conditions for the 20 percent worst days included 100% natural fine soil and coarse mass caused by naturally occurring dust storm events. At the request of the Federal Land Managers (FLMs), the SIP also contains natural condition values consistent with nation-wide default natural condition values prepared by the Natural Conditions II Committee (NC II), which the EPA prefers. The estimates of NC II substantially underestimate the levels of natural fine soil and coarse mass on the most impaired days at the Big Bend and Guadalupe Mountains Class I areas. The EPA disapproved the Texas estimates that 100% fine soil and coarse mass particulates in this area are natural and impact the 20%

[6] Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program (EPA 2003)

worst days without supplying data to demonstrate that the 100% assumption used by Texas was inaccurate.

11. As part of the long term strategy in Texas's Regional Haze SIP submittal, there was an evaluation of the impact of Texas emissions on haze in neighboring Class I areas. The impact of an aggregation of sources did not indicate an impact at reasonable control costs and therefore any subset of the aggregated sources also would logically not have a significant impact. In consultation with Oklahoma on Texas's impact on visibility at the Wichita Mountains National Wildlife Refuge Class I area in Oklahoma, Texas provided full information from the Central States Regional Air Planning Association (CENRAP) modeling on Texas's total impact on Wichita Mountains. Even knowing the full impact of Texas emissions on haze at Wichita Mountains, Oklahoma chose not to request further reductions beyond those already contained in Texas proposed Regional Haze SIP.

12. EPA conducted a four factor analysis on specific units in Texas for the unit impact on Wichita Mountains Class I area as part of its FIP. But the full four factor analysis was only required to be conducted by Texas for its sources on the impact on Texas Class I areas. Neither Oklahoma nor any other state requested additional emission reductions beyond those proposed by Texas during the SIP development process.

13. As stated by TCEQ and the Public Utility Commission of Texas (PUCT) in comments submitted to EPA on April 21, 2015 regarding this rule, the benefits from the Final Rule on visibility are imperceptible, given that the difference between the visibility improvements for the Texas SIP and the Final Rule for Big Bend , Guadalupe Mountains, and Wichita Mountains are projected by EPA to be 0.03, 0.04, and 0.14 deciviews respectively – a level far below the 1.0 deciview change in visibility improvement able to be perceived by a typical person.[7] Additionally, the current monitored visibility for each area is already better than the visibility that the Final Rule seeks to achieve in 2018.[8] The EPA regional haze SIP guidance for setting reasonable progress goals explicitly says, "You would then consider whether any additional control scenarios are reasonable based on consideration of the [four] statutory factors and any other factors you have determined are relevant."[9] TCEQ determined that production of perceptible improvement in visibility is relevant.

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[7] Comments by the Texas Commission on Environmental Quality and the Public Utility Commission of Texas, on EPA Docket ID No. EPA-R06-OAR-2014-0754, submitted April 20, 2015 ("Comments"), page 3

[8] Comments at page 4

[9] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (EPA 2007); p. 4 – 2, Section 4 – 2, ¶ 2

Regional Haze Rule

14. Section 169A of the CAA sets forth a national goal calling for remedying existing anthropogenic impairment of visibility and prevention of future visibility impairment in Class I areas. This section directed EPA to develop rules to assure reasonable progress toward meeting the national goal, provide guidance to states on appropriate techniques and methods for implementing visibility protection programs, and develop rules requiring each state with a Class I area, or sources that impact visibility at another state's Class I area, to develop an implementation plan containing emission limits, schedules of compliance, and other measures as may be necessary to make reasonable progress toward meeting the national goal.

15. EPA adopted the RHR in 40 Code of Federal Regulations (CFR) Part 51, Subpart P, on July 1, 1999,[10] and adopted amendments to Subpart P and a new Appendix Y (BART guidelines) to Part 51 on July 6, 2005.[11] The rule requires states to implement plans containing specific statutory requirements: BART controls on subject sources; tracking and establishing criteria to meet Reasonable Progress Goals (RPG) to achieving natural visibility conditions in each Class I area in the state; long-term strategies for addressing regional haze visibility impairment at each Class I area in the

[10] 64 Fed. Reg. 35714
[11] 70 Fed. Reg. 39104

relevant state; and areas located outside the state which may be affected by emissions from the relevant state; and monitoring strategies for measuring, calculating and reporting regional haze visibility impairment.

16. Long Term Strategies address point and area source impacts on Class I areas both inside the state and for each Class I area outside the state that may be affected by emissions from the state. The Long Term Strategies must contain enforceable limits, compliance schedules, and other measures necessary to meet the RPGs for each Class I area. States must consult with other states impacted by in-state emission sources to develop strategies. States are encouraged to work together in regional partnerships or Regional Planning Organizations to reduce haze. Texas coordinated with the states in CENRAP, which included nine states: Texas, Louisiana, Oklahoma, Arkansas, Kansas, Minnesota, Missouri, Nebraska, and Iowa. A chief purpose of the Regional Planning Organizations is to provide a means for states to confer on all aspects of the regional haze issue, including consultation on RPGs and Long Term Strategies.

Overview of the Regional Haze SIP Development Process

17. It is my understanding that the Texas Regional Haze SIP revision submitted in 2009 was the culmination of over 9 years and 6,000 hours of rulemaking, inventory development, modeling, stakeholder meetings, consultations, and

plan development. TCEQ staff coordinated extensively with the regional planning organization, CENRAP, FLMs, EPA, neighboring states, other states with Class I areas affected by Texas's emissions, and the general public.

18. The CENRAP regional haze planning process began as far back as 1999 with TCEQ participating from the beginning and as co-chair of the emissions inventory workgroup from early 2002 through 2005. In the RHR, EPA acknowledged the key role of regional pollutant transport in contributing to regional haze in Class I areas and the value of multi-state coordination for planning and implementing regional haze programs. TCEQ staff participated in the modeling, emissions inventory, monitoring, and implementation and control strategies committee meetings, and workgroups. Significant portions of Texas's regional haze SIP were developed based on emissions inventory, modeling, and SIP protocols created by CENRAP and its contractors. TCEQ provided data to CENRAP in order to produce emissions inventory and modeling that states used in developing their SIPs.

19. In order to make reasonable progress toward the goal of natural conditions at Class I areas, states must assess both baseline and current visibility conditions at these areas, as well as calculate natural conditions. For the first planning period, baseline and current conditions are the same. Natural conditions are those conditions existing in the absence of human-induced

(anthropogenic) visibility impairment. Texas and other CENRAP states elected to perform these projections using the revised Interagency Monitoring of Protected Visual Environments (IMPROVE) algorithm.

20. Following the RHR and EPA guidance,[12] TCEQ calculated baseline visibility conditions for Big Bend and Guadalupe Mountains for the 20 percent worst and 20 percent best visibility days during the years 2000 through 2004. The baseline visibility conditions were based on sampling data collected at IMPROVE monitoring sites located at each Texas Class I area. In its Final Rule, EPA approved Texas's calculation of the baseline visibility conditions for Texas's Class I areas.

21. In developing the reasonable progress goals for Big Bend and Guadalupe Mountains, TCEQ consulted with FLMs, EPA, states, tribes and several environmental stakeholder groups. By using CENRAP's particulate matter source apportionment technology (PSAT) modeling, TCEQ determined that emissions from four states: New Mexico, Oklahoma, Kansas, and Louisiana contribute to visibility impairment at Big Bend and Guadalupe Mountains. TCEQ held several consultation calls with relevant stakeholders in 2007 to discuss TCEQ staff developed technical papers, including natural condition calculations at Big Bend and Guadalupe Mountains, impacts of dust storms,

[12] Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program (EPA 2003)

the Integrated Planning Model emission projections, glide path, and RPGs developed by TCEQ staff. TCEQ staff gathered input from stakeholders on these papers through open dialogue, taking written comments, and continued commitments to ongoing consultations. Texas did not request additional emission reductions from contributing states beyond those reductions already required through compliance with state rules and CAA programs.

22. Texas participated in regional planning efforts to develop its Long Term Strategies to reach the RPGs for Texas Class I areas and those areas impacted by emissions from Texas. Through CENRAP and cooperation with states, tribes, and FLMs, TCEQ participated in developing base period 2002 visibility impairment, projections of 2018 emissions and visibility impairment considering all current emission reduction requirements in Texas and federal rules. Along with other neighboring states, TCEQ reviewed CENRAP modeling to assess which Class I areas in other states might be impacted by Texas emissions. For more than four years, TCEQ dedicated time to monthly technical workgroup conference calls. This regional planning resulted in no further emissions reductions required from Texas on Class I areas in Arkansas, Missouri, and Louisiana. After numerous conference calls over several months, all three states accepted Texas's planned emission and regional haze impact reductions as adequate for their

Class I areas for the initial planning period ending in 2018. Texas did acknowledge significant impact on Wichita Mountains in Oklahoma; although both states chose to work on their own state emissions for the first planning period to give state and federal programs— for example CAIR and the Texas Emission Reduction Plan— time to reduce emissions.

23. In August and September 2007, Oklahoma invited Texas to consult about its Class I area, Wichita Mountains. TCEQ participated in three consultation calls. Oklahoma requested by letter that it be able to comment on BACT determinations for Prevention of Significant Deterioration sources that significantly impact Wichita Mountains and requested Class I visibility impact reviews be required for all proposed Prevention of Significant Deterioration sources within 300 kilometers of a Class I area. Texas agreed to notify Oklahoma and the relevant FLM whenever modeling indicates a proposed source significantly impacts Wichita Mountains.

24. In response to comments from EPA and FLMs, TCEQ sent consultation letters to Oklahoma, Louisiana, Missouri, Arkansas, Colorado, and New Mexico. These letters included a thorough discussion and data from the CENRAP PSAT modeling determining the contribution from each Texas source area and from Texas as a whole to visibility impairment at Class I areas in the given state. TCEQ participated fully in the analysis of this data, base period visibility impairment, natural visibility condition estimates, and

2018 projections based on current and anticipated future state and federal controls. The PSAT modeling indicated that the projected impact of Texas sources would be reduced by 2018 in all the affected Class I areas due to the emissions reductions from current and planned controls, including sulfur compound emission rules, Prevention of Significant Deterioration permitting requirements, grandfathered source permitting requirements, nitrogen oxide (NO_X) SIP limits, CAIR, Texas Emissions Reduction Plan, and the EPA refinery consent decrees affecting Texas's sources. Also included with the consultation letter, where applicable, were area of influence maps for each Class I area in the CENRAP states. These maps showed the portions of Texas that are in the sulfate and nitrate areas of influence for the given Class I area. Also included was a table of sources of particular interest to the affected Class I areas due to their emissions and positions within the area of influence.

25. As a result of the extensive consultations, on May 12, 2008, Oklahoma notified Texas that its goal for Wichita Mountains did not anticipate emission reductions beyond those relied upon by the CENRAP modeling and those reductions that TCEQ already planned to implement. In fact, during development of the Texas Regional Haze SIP revision, none of the neighboring states that Texas notified, including Oklahoma, requested that

Texas make any additional reductions from Texas sources in order to meet their respective RPGs.

26. The RHR requires each state to show reasonable progress toward the national goal by the end of the relevant planning period, which in this case is 2018. EPA guidance states that the uniform rate of progress (URP) is a straight line between base period conditions on the worst 20% days and the estimated natural visibility conditions in 2064. The URP is a tool for comparing RPGs set by the state with the visibility improvement that would need to be reached in 2018 to be on a straight line toward reaching natural conditions by 2064. Texas's RPGs for Big Bend and Guadalupe Mountains were developed after considering the four statutory factors: cost, time of compliance, energy and non-air quality impacts of compliance, and the remaining useful life of existing sources.[13] The RPGs were derived from the CENRAP modeling and reflect emission reductions programs already in place, including, for example, refinery consent decrees. TCEQ focused its control strategy analysis on point source emissions of sulfur dioxide (SO_2) and NO_X, the main anthropogenic pollutants that result in visibility impairment at Class I areas in Texas and neighboring states. The SO_2, point sources evaluated represent over 80 percent of the projected 2018 statewide

[13] 42 U.S.C. § 7491(g)(1)

emissions. The NO_X sources evaluated represent 10.6% of all NO_X emissions, however most of the state-wide NO_X emissions are from mobile sources.

27. The RPGs contained in the SIP reflect visibility improvements from emission reductions associated with the CAA, Texas Clean Air Act, Texas's ozone SIP revision and rules, new source review controls, and agreements between EPA and oil refineries and sulfuric acid plants in Texas for SO_2 reductions. TCEQ also determined that, given the four-factor analysis, the imperceptible effect of additional controls, and the continuing significant international sources of visibility impairment, it was not reasonable to require additional controls during the first planning period ending in 2018 to reduce the impact on Guadalupe Mountains and Big Bend.

28. Following the RHR and EPA guidance,[14] TCEQ staff used the control strategy analysis completed by the CENRAP as the starting point for the analysis of additional controls. Using EPA's AIRControlNET tool to develop cost per ton estimates for the relevant pollutants, TCEQ's analysis focused on moderate cost controls for sources that were likely to contribute to visibility impairment. TCEQ then looked at groups of sources that were within the area of influence and met an emissions-over-distance threshold to

[14] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (EPA 2007)

determine likely impact to Class I areas. At an estimated cost of over $300 million and no perceptible visibility benefit,[15] TCEQ determined that it was not reasonable to implement additional controls during this planning period. The TCEQ conducted a further analysis to estimate the additional controls necessary to meet the URPs for Big Bend and Guadalupe Mountains in 2018. The TCEQ calculated these additional reductions to cost $1,900,000,000 to reach the URP at Guadalupe Mountains. For Big Bend the additional cost to reach the URP was calculate to be $6,500,000,000. Based on these costs, the TCEQ reasonably determined that it was unreasonable to meet the URP for either national park in Texas and EPA agreed with this interpretation.[16]

29. Beginning in February 2006, TCEQ initiated rule development to implement BART for Texas sources. TCEQ staff compiled a list of over 300 potentially BART-eligible sources, based on the criteria established in the CAA, the RHR and the 2005 BART rule and guidelines. Staff identified approximately 125 sources as BART-eligible based on surveys sent to relevant sources. The modeling results for several sources demonstrated that they did not contribute to visibility impairment at Texas or neighboring Class I areas modeled through TCEQ group screen modeling using the

[15] Per EPA's BART rule, less than 1.0 deciview (70 Fed. Reg. at 39118); "The proposal also stated that 'A one deciview change in haziness is a small but noticeable change in haziness under most circumstances when viewing scenes in Class 1 areas.'" (64 Fed. Reg. at 35725)

[16] 81 Fed. Reg. at 299

Comprehensive Air Quality Model with extensions (CAMx) PSAT technology. Under the Texas BART rule, adopted in January 2007, those sources that did not demonstrate any impact through screening analysis were required to model using CALPUFF. Several sources chose to use enforceable limits through permits or shut down BART-eligible units to avoid BART determinations and controls. Unit shut-downs resulted in reductions of over 14,000 tons per year of SO_2 and 4,400 tons per year of NO_X. Per the EPA RHR and BART guidelines determining that regional transport trading programs are 'better than BART', the TCEQ BART rule allowed certain electric generating units to use participation in the Clean Air Interstate Rule (CAIR) for compliance with BART.

Absent a Stay, the Final Rule Forces TCEQ to Forfeit Decision-Making Authority over Future Regional Haze SIP Revisions

30. The CAA designates the state, and by extension, TCEQ, as the principal decision-maker for regional haze programs. EPA's disapproval of TCEQ's plan and the FIP deprive Texas of the ability to fashion a regional haze program that meets CAA and Rule requirements and balances costs and visibility improvement in a manner that is appropriate for the citizens and economy of this state. EPA's disapproval and FIP, if it remains effective during pendency of these proceedings, forecloses the use of any reasonable-

progress-goal analysis that does not conform to EPA's choice. This is despite neither the RHR nor EPA guidance prohibiting a state taking a different path toward compliance, as long as visibility improvement occurs. Compelling the utility companies to proceed with costly controls while the court reviews EPA's actions here usurps the state's authority and damages the ability of Texas and TCEQ to fulfill its regulatory functions as created under the CAA and the RHR.

31. There is no harm in staying the FIP because 1) the visibility improvement that EPA sought has already occurred in the absence of such costly controls and 2) the visibility improvements that EPA calculated for 2018, the end of the current planning period, are not perceptible. Therefore, no actual harm would occur during a stay.

32. Texas is harmed by the arbitrary nature of EPA's action. EPA both held Texas to a different standard of review than other similarly-situated states and faulted Texas for not requiring additional emission reductions to reduce Texas impact on visibility at Wichita Mountains Wildlife Refuge even though Oklahoma did not request such reductions as part of the EPA mandated consultation process. Only in Texas did EPA require the reasonable-progress-four-factor analysis to be conducted on a source-by-source basis to a small group of facilities, and the visibility benefit to be determined by

adding individual controls at individual facilities.[17] These EPA approval criteria were not in place in either the RHR or agency guidance when TCEQ submitted its plan. EPA disallowed the Texas SIP on that basis[18] and, in the FIP, replaced TCEQ's analysis with EPA's preferred, but not legally required, source-by-source analysis. In adopting its SIP, the TCEQ did look at all sources on a source-by-source basis to determine a population of sources that could potentially be controlled on a cost effective basis of $2,700 per ton. Certain sources were grouped for determining if the entire group of sources would potentially contribute to visibility impairment at perceptible limits at Texas's Class I areas. The grouping of categories of sources was allowed by EPA's Guidance Document,[19] and it makes sense that an analysis of a group of sources that shows an imperceptible impact on a Class I area would not need to be individually analyzed to demonstrate an even smaller impact on the same Class I area. Additionally, EPA judged the Texas plan's consultation element on statements from Oklahoma that were

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[17] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (EPA 2007), page 5-1 (... we believe that the cost of compliance factor can be interpreted to encompass the cost of compliance for individual source *or source categories, and more broadly the implication of compliance costs to the health and vitality of industries within a state*."); page 5-2 (For example, if you anticipate that constraints on the availability of construction labor will preclude the installation of controls at all sources of a particular category by 2018 ... .)

[18] 79 Fed. Reg at 74,838 ("[B]ecause the TCEQ did not evaluate controls on a source-by-source basis, source-specific factors related to the evaluation of the reasonable progress four factor analysis could not be considered.").

[19] Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (EPA 2007).

not made to Texas during SIP development. But Texas justifiably relied upon only the timely consultations and letters as documented in the SIP.

33. EPA's disapproval of Texas's RPGs forecloses Texas's subsequent use of the source category approach used in the SIP, and allowed under the RHR and EPA guidance. As long as the FIP RPG limits remain effective, TCEQ must take these reductions into account as it begins modeling the next planning period to determine the rate of progress of visibility improvement. In 2018, Texas is currently required to submit its next full Regional Haze SIP revision, including an analysis of any new controls for emission reductions that may be necessary for visibility improvement. Texas is harmed because it cannot use the controls it legally chose.

34. EPA's Final Rule imposes unnecessary and costly controls on several electric generating units in the state. Current monitored visibility conditions at Big Bend, Guadalupe Mountains, and Wichita Mountains are better than EPA's projected conditions with their RPG controls.[20] Therefore, the additional controls required by the FIP are unnecessary and unjustified to reach EPA's 2018 visibility improvement goals associated with the FIP.

[20] TCEQ/PUCT comments, page 3; and 79 Fed. Reg. 84887, Table 43

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on March 17th, 2016.

David Brymer
Director, Air Quality Division
Texas Commission on Environmental Quality

Exhibit D

REVISIONS TO THE STATE IMPLEMENTATION PLAN (SIP) CONCERNING REGIONAL HAZE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. BOX 13087
AUSTIN, TEXAS 78711-3087

PROJECT NO. 2007-016-SIP-NR

Adopted

February 25, 2009

SECTION VI. CONTROL STRATEGY

A. Introduction (No change.)

B. Ozone (No change.)

C. Particulate Matter (No change.)

D. Carbon Monoxide (No change.)

E. Lead (No change.)

F. Oxides of Nitrogen (No change.)

G. Sulfur Dioxide (No change.)

H. Conformity with the National Ambient Air Quality Standards (No change.)

I. Site Specific (No change.)

J. Mobile Source Strategies (No change.)

K. Clean Air Interstate Rule (No change.)

L. Transport (Proposed.)

M. Regional Haze (New.)

EXECUTIVE SUMMARY

The Federal Clean Air Act (FCAA) and United States Environmental Protection Agency (EPA) regulations require states to submit State Implementation Plans (SIPs) to make "reasonable progress" in reducing visibility impairment at Federal Class I areas resulting from anthropogenic pollution. FCAA, 169A(a)(1), "declares as a national goal the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Federal Class I areas which impairment results from man-made air pollution." Class I areas are national parks over 6,000 acres and wilderness areas over 5,000 acres. These SIPs must "contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal" including requiring installation, operation, and maintenance of Best Available Retrofit Technology (BART), "as determined by the State" on certain existing stationary sources.

The EPA Regional Haze Rule strongly encourages states to work together in regional partnerships to reduce haze. There are five regional planning organizations in the United States. Texas is a member of the Central Regional Air Planning Association (CENRAP), which includes nine states, Texas, Louisiana, Oklahoma, Arkansas, Kansas, Missouri, Nebraska, Iowa, and Minnesota. CENRAP provides analysis, modeling results, and informational exchange among states, but each state submits its own regional haze SIP.

The FCAA, Section 169A and B require the EPA to adopt regulations to reduce visibility impairment resulting "from man-made air pollution" in 156 Federal Class I areas. The regulations require each state SIP to contain control measures, including BART, to make reasonable progress toward the national goal of natural visibility conditions by 2064 in all Class I areas. The two Class I areas in Texas are Big Bend and Guadalupe Mountains National Parks. Each state bordering Texas has one or more Federal Class I areas designated for visibility protection. Where Texas' emissions impact visibility in Federal Class I areas in other states, the Texas SIP must include plans to reduce Texas' visibility impacts in those areas too.

The EPA adopted Regional Haze regulations in 40 Code of Federal Regulations (CFR) Part 51, subpart P, on July 1, 1999, and adopted amendments to Subpart P and a new Appendix Y (BART guidelines) to Part 51 on July 6, 2005.

The 1990 FCAA Amendments together with EPA's Regional Haze Rule set the goal of reducing "man-made" impacts on visibility in Class I areas to zero (i.e., to "natural" conditions) by 2064 for the worst 20 percent visibility days and preventing any degradation for the best 20 percent visibility days. CENRAP and other Regional Air Planning Organizations have cooperated to calculate the base period (2000-2004) worst 20 percent and best 20 percent visibility for each Class I area. CENRAP has developed projections of visibility impairment in 2018, the initial year for which each state's long-term strategy is to be evaluated. The state must reduce its visibility impairment impact at all Class I areas it impacts by as much as is reasonable. The format of this SIP revision follows a prescribed template developed by the CENRAP states.

The TCEQ used a refined estimate of natural conditions for Class I areas in Texas as permitted by EPA guidance. These refined estimates account for natural dust storms, which explain a significant number of impaired days at the Texas Class I areas.

The Clean Air Interstate Rule (CAIR) program was designed to reduce interstate transport of emissions that affect fine particulate matter and ozone. Because these precursor emissions affect visibility, the CAIR program is also an integral part of reducing regional haze. Following the legislature's statutory direction, the TCEQ adopted CAIR requirements applicable to electric generating units in Texas. On July 11, 2008, the United States Court of Appeals for the District of Columbia Circuit vacated CAIR in its entirety. Upon a motion for rehearing, the appeals court issued a decision remanding CAIR to EPA to initiate rulemaking consistent with its opinion, but the court did not vacate CAIR, allowing it to remain in effect until replaced by EPA rule. The

TCEQ expects that a replacement program will be in place that makes comparable reductions in pollutants causing regional haze prior to 2018.

The commission has also adopted the requirements of the BART program, which requires certain older sources with a visibility impairment impact on a Class I area to apply BART to the source to reduce its impact on a nearby Class I area. This SIP revision contains a list of BART-eligible sources and another list of BART modeling outcomes. The appendix contains modeling summaries of sources that were reasonably anticipated to contribute to visibility impairment; however, after modeling, these sources were below the EPA threshold.

Each state must evaluate and determine if additional emissions reductions are necessary. The statute and EPA rules and guidance set criteria for determining whether additional reductions are reasonable. These criteria are based on the cost of controls and other related factors. The TCEQ has determined that no additional controls will be implemented with this SIP revision.

Reductions at Big Bend are dependent upon reducing emissions from Mexico and Central America. The TCEQ specifically asks the EPA for federal efforts to reduce the international transport impacts on regional haze coming into the United States across Texas' southern border. CENRAP modeling estimates of the base period visibility impairment at the two Texas Class I areas from the United States and foreign contributions indicate 52 percent of the visibility impairment at Big Bend National Park and 20 percent of the visibility impairment at Guadalupe Mountains National Park on the worst 20 percent of regional haze days comes from international transport. The preamble to the July 1, 1999, issuance of the Regional Haze Rule clearly says that states are not required to carry out compensatory overcontrol to make up for the lack of progress in reducing the impacts of international transport. The TCEQ expects that the EPA will pursue international emission reductions to improve visibility at Texas' Class 1 areas.

In conclusion, the TCEQ has implemented rules that limit and minimize emissions causing both Texas and regional visibility impairment. The Texas SIP includes numerous rules that minimize emissions that cause or contribute to Texas and regional visibility impairment. The TCEQ plans to continue to implement all these rules that protect visibility at Class I areas in Texas and other states.

SECTION V: LEGAL AUTHORITY

A. General

The TCEQ has the legal authority to implement, maintain and enforce the National Ambient Air Quality Standards (NAAQS) and to control the quality of the state's air, including maintaining adequate visibility.

The first air pollution control act, known as the Clean Air Act of Texas, was passed by the Texas Legislature in 1965. In 1967, the Clean Air Act of Texas was superseded by a more comprehensive statute, the Texas Clean Air Act (TCAA), found in Article 4477-5, Vernon's Texas Civil Statutes. The Legislature amended the TCAA in 1969, 1971, 1973, 1979, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003 and 2005. In 1989, the TCAA was codified as Chapter 382 of the Texas Health & Safety Code.

Originally, the TCAA stated that the Texas Air Control Board (TACB) is the state air pollution control agency and is the principal authority in the state on matters relating to the quality of air resources. In 1991, the Legislature abolished the TACB effective September 1, 1993, and its powers, duties, responsibilities and functions were transferred to the Texas Natural Resource Conservation Commission (TNRCC). With the creation of the TNRCC, the authority over air quality is found in both the Texas Water Code and the TCAA. Specifically, the authority of the TNRCC is found in Chapters 5 and 7. Chapter 5, Subchapters A - F, H - J, and L, include the general provisions, organization and general powers and duties of the TNRCC, and the responsibilities and authority of the Executive Director. This Chapter also authorizes the TNRCC to implement action when emergency conditions arise and to conduct hearings. Chapter 7 gives the TNRCC enforcement authority. In 2001, the 77th Texas Legislature continued the existence of the TNRCC until September 1, 2013, and changed the name of the TNRCC to the Texas Commission on Environmental Quality (TCEQ).

The TCAA specifically authorizes the TCEQ to establish the level of quality to be maintained in the state's air and to control the quality of the state's air by preparing and developing a general, comprehensive plan. The TCAA, Subchapters A - D, also authorize the TCEQ to collect information to enable the commission to develop an inventory of emissions; conduct research and investigations; enter property and examine records; prescribe monitoring requirements; institute enforcement proceedings; enter into contracts and execute instruments; formulate rules; issue orders taking into consideration factors bearing upon health, welfare, social and economic factors, and practicability and reasonableness; conduct hearings; establish air quality control regions; encourage cooperation with citizens' groups and other agencies and political subdivisions of the state as well as with industries and the Federal Government; and establish and operate a system of permits for construction or modification of facilities.

Local government authority is found in Subchapter E of the TCAA. Local governments have the same power as the TCEQ to enter property and make inspections. They also may make recommendations to the commission concerning any action of the TCEQ that affects their territorial jurisdiction, may bring enforcement actions, and may execute cooperative agreements with the TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances for the control and abatement of air pollution not inconsistent with the provisions of the TCAA or the rules or orders of the commission.

Subchapters F, G, and H of the TCAA authorize the TCEQ to establish low emission vehicle requirements for mass transit authorities, local government fleets, and private fleets; create a mobile emissions reduction credit program; establish vehicle inspection and maintenance programs in certain areas of the state, consistent with the requirements of the Federal Clean Air Act; establish gasoline volatility and low emission diesel standards; and fund and authorize participating counties to implement low-income vehicle repair assistance, retrofit and accelerated vehicle retirement programs.

B. Applicable Law

The following statutes and rules provide necessary authority to adopt and implement the SIP. The rules listed below have previously been submitted as part of the SIP.

Statutes

TEXAS HEALTH & SAFETY CODE, Chapter 382	September 1, 2005
TEXAS WATER CODE	September 1, 2005

All sections of each subchapter are included, unless otherwise noted.

Chapter 5: Texas Natural Resource Conservation Commission
Subchapter A: General Provisions
Subchapter B: Organization of the Texas Natural Resource Conservation Commission
Subchapter C: Texas Natural Resource Conservation Commission
Subchapter D: General Powers and Duties of the Commission
Subchapter E: Administrative Provisions for Commission
Subchapter F: Executive Director (except §§ 5.225, 5.226, 5.227, 5.2275, 5.232, and 5.236)
Subchapter H: Delegation of Hearings
Subchapter I: Judicial Review
Subchapter J: Consolidated Permit Processing
Subchapter L: Emergency and Temporary Orders (§§ 5.514, 5.5145 and 5.515 only)

Chapter 7: Enforcement
Subchapter A: General Provisions (§§ 7.001, 7.002, 7.0025, 7.004, 7.005 only)
Subchapter B: Corrective Action and Injunctive Relief (§ 7.032 only)
Subchapter C: Administrative Penalties
Subchapter E Criminal Offenses and Penalties: §§ 7.177, 7.179-7.181

Rules

All of the following rules are found in Title 30, Texas Administrative Code, as of the following effective dates:

Chapter 7, Memoranda of Understanding, §§ 7.110 and 7.119	May 2, 2002
Chapter 35, Subchapters A-C, K: Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions	December 10, 1998
Chapter 39, Public Notice, §§ 39.201; 39.401; 39.403(a) and (b)(8)-(10); 39.405(f)(1) and (g); 39.409; 39.411 (a), (b)(1)-(6) and (8)-(10) and (c)(1)-(6) and (d); 39.413(9), (11), (12) and (14); 39.418(a) and (b)(3) and (4); 39.419(a), (b),(d) and (e); 39.420(a), (b) and (c)(3) and (4); 39.423 (a) and (b); 39.601; 39.602; 39.603; 39.604; and 39.605	August 15, 2002
Chapter 55, Request for Contested Case Hearings; Public Comment, §§ 55.1; 55.21(a) - (d), (e)(2), (3) and (12), (f) and (g); 55.101(a), (b), (c)(6) - (8); 55.103; 55.150; 55.152(a)(1), (2) and (6) and (b); 55.154; 55.156; 55.200; 55.201(a) - (h); 55.203; 55.205; 55.206; 55.209 and 55.211	August 29, 2002
Chapter 101: General Air Quality Rules	August 16, 2007

Chapter 106: Permits by Rule, Subchapter A	June 30, 2004
Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter	July 19, 2006
Chapter 112: Control of Air Pollution from Sulfur Compounds	July 12, 2001
Chapter 113: Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants	June 15, 2005
Chapter 114: Control of Air Pollution from Motor Vehicles	July 19, 2007
Chapter 115: Control of Air Pollution from Volatile Organic Compounds	July 19, 2007
Chapter 116: Permits for New Construction or Modification	March 15, 2007
Chapter 117: Control of Air Pollution from Nitrogen Compounds	June 14, 2007
Chapter 118: Control of Air Pollution Episodes	March 5, 2000
Chapter 122, § 122.122: Potential to Emit	December 11, 2002
Chapter 122, § 122.215: Minor Permit Revisions	June 3, 2001
Chapter 122, § 122.216: Applications for Minor Permit Revisions	June 3, 2001
Chapter 122, § 122.217: Procedures for Minor Permit Revisions	December 11, 2002
Chapter 122, § 122.218: Minor Permit Revision Procedures for Permit Revisions Involving the Use of Economic Incentives, Marketable Permits, and Emissions Trading	June 3, 2001

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LIST OF ACRONYMS

AEO	Annual Energy Outlook, forecasts by Department of Energy
AOI	Area of influence
B20%	Best 20 percent (days of visibility)
BACT	Best Available Control Technology
BADL	Badlands Wilderness Area
BAND	Bandelier Wilderness Area
BART	Best Available Retrofit Technology
BC	Boundary conditions
BEIS3	Biogenic Emissions Inventory System Version 3
Bext	Light extinction
BIBE	Big Bend National Park
bnatural	Clean natural conditions
BOAP	Bosque del Apache Wilderness Area
BOWA	Boundary Waters Canoe Area Wilderness
BRAVO	Big Bend Regional Aerosol and Visibility Observational study
BRET	Breton Wilderness Area
bsource	Total light extinction due to a source
CACR	Caney Creek Wilderness Area
CAIR	Clean Air Interstate Rule
CALPUFF	California Puff Model
CAMx	Comprehensive Air Quality Model with extensions
CENRAP	Central Regional Air Planning Association
CFR	Code of Federal Regulations
CM	Coarse mass
CMAQ	Community Multiscale Air Quality Modeling System
DRI	Desert Research Institute
dv	deciviews
EC	Elemental carbon
EGAS	Economic Growth Analysis System
EGU	Electric generating unit
ENVIRON	ENVIRON International Corporation
EPA	United States Environmental Protection Agency
ERCOT	Electric Reliability Council of Texas
f(RH)	Relative Humidity adjustment factor
FCAA	Federal Clean Air Act
FIPS	Federal Information Processing Standard
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
FS	United States Forest Service
FWS	United States Fish and Wildlife Service
FR	Federal Register
GEOS-Chem	Goddard Earth Observing System - Chemistry model
GICL	Gila Wilderness Area
GRSA	Great Sand Dunes Wilderness Area
GUMO	Guadalupe Mountains National Park
HEGL	Hercules-Glades Wilderness Area
HI	Haze Index

IC	Initial conditions
IDNR	Iowa Department of Natural Resources
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPM	Integrated Planning Model
ISLE	Isle Royale National Park
JPROC	Photolysis Rates Processor
km	kilometers
LAER	Lowest Achievable Emission Rate
LOST	Lostwood Wilderness Area
LTS	Long-term strategy
MACA	Mammoth Cave National Park
MATS	Modeled Attainment Test Software
mb	millibars
MEVE	Mesa Verde National Park
MING	Mingo Wilderness Area
Mm^{-1}	Inverse Megameters
MM5	Mesoscale Meteorological Model, 5^{th} Generation (developed by Pennsylvania State University / National Center for Atmospheric Research PSU/NCAR)
MMS	Minerals Management Service
MOBILE5	MOBILE Vehicle Emission Modeling Software Version 5
MOZI	Mount Zirkel Wilderness Area
MPE	Model performance evaluation
MPI	Message passing interface
MRPO	Midwest Regional Planning Organization
NAAQS	National ambient air quality standards
NARSTO	North American Research Strategy for Tropospheric Ozone
NH_4	Ammonium
NO_3	Nitrate
NO_x	Nitrogen oxides
non-EGU	Non-electrical generating units
NPS	National Park Service, United States Department of the Interior
NSPS	New source performance standards
NSR	New Source Review
OC	Organic carbon
OMC	Organic mass carbon
PGM	Photochemical Grid Model
PiG	Plume-in-Grid
PLUVUE	Plume Visibility Model
PM	Particulate matter
PM_{10}	Particulate matter with aerodynamic diameters less than 10 microns
$PM_{2.5}$	Particulate matter with aerodynamic diameters less than 2.5 microns
POA	Primary organic aerosol
PPM	Piecewise-Parabolic Method
PSAT	Particulate Matter Source Apportionment Technology
PSD	Prevention of significant deterioration
PTE	Potential to emit

Q/D	Emissions over distance (to Class I area)
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Program Plan
RH	Relative Humidity
ROMO	Rocky Mountain National Park
RPG	Reasonable progress goal
RPO	Regional Planning Organization
RRF	Relative response factor
SACR	Salt Creek Wilderness Area
SAPE	San Pedro Parks Wilderness Area
SIP	State Implementation Plan
SIPS	Sipsey Wilderness Area
SMOKE	Sparse Matrix Operator Kernel Emissions
SO_2	Sulfur dioxide
SO_4	Sulfate
SOA	Secondary organic aerosol
SOAA	Secondary organic aerosols anthropogenic (human-made)
SOAB	Secondary organic aerosols biogenic (from plants)
TAC	Texas Administrative Code
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality
TEOM	Tapered Element Oscillating Microbalance
TERP	Texas Emissions Reduction Program
THRO	Theodore Roosevelt National Park
TIP	Tribal Implementation Plan
TOMS	Total Ozone Mapping Spectrometer satellite data
tpy	tons per year
TSD	Technical Support Document
TUV	Tropospheric Ultraviolet and Visible (Radiation Model)
UCR	University of California at Riverside
UPBU	Upper Buffalo Wilderness Area
URP	Uniform rate of progress
VIEWS	Visibility Information Exchange Web System
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile organic compounds
VOYA	Voyageurs National Park
W20%	Worst 20 percent (days of visibility)
WEMI	Weminuche Wilderness Area
WHIT	White Mountain Wilderness Area
WHPE	Wheeler Peak Wilderness Area
WHRI	White River National Forest
WICA	Wind Cave National Park
WIMO	Wichita Mountains Wilderness Area
WRAP	Western Regional Air Partnership

CHAPTER 1. BACKGROUND AND OVERVIEW OF THE FEDERAL REGIONAL HAZE REGULATION

1.1 GENERAL BACKGROUND

Regional haze is visibility impairment that is produced by a multitude of sources and activities. These emission sources and activities are located across a broad geographical area. The emissions consist of fine particles and their precursors. Visibility impairment caused by air pollution occurs virtually all of the time at most Class I visibility protected national park and wilderness area monitoring stations (VIEWS 2007). A significant factor in visibility impairment is regional transport of fine particles that contribute to elevated particulate matter (PM) levels.

Haze-forming pollution comes from both human and natural sources. Windblown dust and soot from wildfires contribute to haze, as do motor vehicles, electric generating facilities, industrial fuel burning, and manufacturing operations. PM and PM precursor emissions are the major cause of reduced visibility (haze) in the United States and at many of our national parks and wilderness areas. Some haze-forming particles are directly emitted into the air. The usual term for directly emitted particles is primary particles. Secondary particles, created when emitted gases form particles downwind of the emission sources, usually dominate the causes of regional haze. Nitrates and sulfates, which result from NO_2 and SO_2 emissions, are examples of secondary particles that contribute to regional haze.

In many scenic areas, haze substantially reduces visual range. In eastern Class I areas, haze from human activity reduces average visual range from the natural condition of approximately 90 miles to 15-to-25 miles. In the West, haze from human activity reduces visual range from the natural condition of approximately 140 miles to 35-to-90 miles. Visibility impairment is expressed in deciviews (dv). A deciview is a unit of visibility impairment proportional to the logarithm of the atmospheric light extinction. One deciview is approximately the minimum amount of change in visibility that a human observer can detect.

1.2 VISIBILITY-IMPAIRING EMISSIONS

The Central Regional Air Planning Association (CENRAP) and the Texas Commission on Environmental Quality (TCEQ) data analysis and modeling show that several types of emissions are involved in reducing visibility, including sulfur dioxide (SO_2), nitrogen oxides (NO_X), and particulate matter (PM). Table 1-1: *Visibility-Impairing Pollutants* and Table 1-2: *Comparison of Ambient Fine Particles (Ultrafine plus Accumulation-Mode) and Coarse Particles* discuss some of the emissions, different variations of the molecules in the atmosphere, and various sources of the emissions. Unlike pollutants like ozone, $PM_{2.5}$, and carbon monoxide, visibility is not a measurable concentration for which a standard, like the national ambient air quality standard (NAAQS) could be set. Instead, the Regional Haze Rule sets out procedures states must follow to decide how much emissions reductions are reasonable to move toward the national goal that Congress has established under the Federal Clean Air Act (FCAA): returning Class I areas to natural visibility conditions. The United States Environmental Protection Agency (EPA) has set 2064 as the target date to reach the goal set by Congress to reach natural conditions at all Class I areas. To accomplish this goal, a state must first determine what “natural conditions” are and then plan how to reach those conditions.

Table 1-1 provides information about particulate matter components that contribute to regional haze.

Table 1-1: Visibility-Impairing Pollutants

Major Components of Particles	Symbol	Directly Emitted?	Formed in the Air?	Formed From	In which Size Range? micrometers (µm)	Major Sources
Sulfates	SO_4	(Yes)*	Yes	SO_2	$PM_{2.5}$	Coal-fired power plants, oil fields and refineries, paper mills
Nitrates	NO_3	(No)*	Yes	NO_2	$PM_{2.5}$	All combustion
Secondary Organic Carbon	OC	No	Yes	VOC**	$PM_{2.5}$	Gasoline, organic solvents, biogenics
Primary Organic Carbon	OC	Yes	No	--	$PM_{2.5}$	Incomplete combustion
Elemental Carbon (i.e., black carbon)	EC	Yes	No	--	$PM_{2.5}$	Incomplete combustion
Fine Soil Dust	FS	Yes	No	--	$PM_{2.5}$	Wind blowing over loose soil, motor vehicles running on paved and unpaved roads
Coarse Mass, which is normally ~ 100% Coarse Soil Dust	CM	Yes	No	--	PM_{COARSE}, i.e. $PM_{10-2.5}$	Wind blowing over loose soil, motor vehicles running on paved and unpaved roads

*There are few significant, direct sulfate sources; direct nitrate sources are rare.
**Volatile organic compounds

Table 1-2 provides additional information about particles. The table breaks down the fine particles into ultrafine particles that are less than 0.1 µm in diameter and accumulation mode particles that are generally between 0.1 and 1.0 µm in diameter. Ultrafine particles agglomerate to form accumulation mode particles. Some of the accumulation mode particles, most notably sulfates, grow above 1.0 µm in diameter, as the humidity becomes high. A relatively small percentage of the soil and dust particles are smaller than 2.5 µm in aerodynamic diameter, so samplers collect them with the fine particles. Table 1-1 lists only typical, major sources of each component. Table 1-2 provides a more inclusive listing of sources.

Table 1-2: Comparison of Ambient Fine Particles (Ultrafine plus Accumulation-Mode) and Coarse Particles

	Ultrafine	Accumulation	Coarse
Formation Processes:	Combustion, high-temperature processes, and atmospheric reactions		Break-up of large solids/droplets
Formed by:	• Nucleation • Condensation • Coagulation	• Condensation • Coagulation • Reactions of gases in or on particles • Evaporation of fog and cloud droplets in which gases have dissolved and reacted	• Mechanical disruption (crushing, grinding, abrasion of surfaces) • Evaporation of sprays • Suspension of dusts • Reactions of gases in or on particles
Composed of:	• Sulfate • Elemental carbon • Metal compounds • Organic compounds with very low saturation vapor pressure at ambient temperature	• Sulfate, nitrate ammonium, and hydrogen ions • Elemental carbon • Large variety of organic compounds • Metals: compounds of Pb, Cd, V, Ni, Cu, Zn, Mn, Fe, etc. • Particle-bound water	• Suspended soil or street dust • Fly ash from uncontrolled combustion of coal, oil, and wood • Nitrates/chlorides/sulfates from HNO_3,/HCI/SO_2 reactions with coarse particles • Oxides of crustal elements (Si, Al, Ti, Fe) • $CaCO_3$, $CaSO_4$, NaC1, sea salt • Pollen, mold, fungal spores • Plant and animal fragments • Tire, brake pad, and road wear debris
Sources:	• Combustion • Atmospheric transformation of SO_2 and some organic compounds • High temperature processes	• Combustion of coal, oil, gasoline, diesel fuel, wood • Atmospheric transformation products of NO_x, SO_2, and organic compounds, including biogenic organic species (e.g., terpenes) • High-temperature processes, smelters, steel mills, etc.	• Resuspension of industrial dust and soil tracked onto roads and streets • Suspension from disturbed soil (e.g., farming, mining, unpaved roads) • Construction and demolition • Uncontrolled coal and oil combustion • Ocean spray • Biological sources
Atmospheric half-life:	Minutes to hours	Days to weeks	Minutes to hours
Atmospheric Removal Processes:	• Grows into accumulation mode • Diffuses to raindrops	• Forms cloud droplets and rains out (Organic carbon and elemental carbon particles may not take up water until they have aged.) • Dry deposition	• Dry deposition by fallout • Scavenging by falling rain drops
Travel distance:	<1 to 10s of km	100s to 1000s of km	<1 to 10s of km (small size tail, 100s to 1000s in dust storms)

Source: Adapted from Wilson and Suh (1997), CD, p. 2-52.

1.3 HISTORY OF FEDERAL REGIONAL HAZE RULE

In the FCAA amendments of 1977, Congress added §169 (42 United States Code (USC), §7491), setting forth a national visibility goal of restoring natural conditions in certain national parks and wilderness areas. The EPA designated national parks and wilderness areas meeting certain criteria and containing vistas as an important feature, as Class I areas for visibility protection under regional haze state implementation plan (SIP) provisions.

In response to the 1977 FCAA amendments, the EPA required control measures to address plume blight and reasonably attributable visibility impairment. These plume blight and reasonably attributable visibility impairment control measures did little to address regional haze throughout the contiguous 48 states.

When Congress amended the FCAA again in 1990, it added §169B (42 USC, §§7492) requiring further research and regular assessments of the progress made toward visibility goals. In 1993, the National Academy of Sciences concluded that "current scientific knowledge is adequate and control technologies are available for taking regulatory action to improve and protect visibility" (NRC 1993).

In addition to authorizing the creation of visibility transport commissions and setting forth their duties, §169B(f) of the FCAA specifically mandated the creation of the Grand Canyon Visibility Transport Commission (GCVTC) to make recommendations to the EPA for the region affecting visibility in Grand Canyon National Park. After four years of research and policy development, the GCVTC submitted its report to the EPA in June 1996 (GCVTC 1996). This report, as well as other research reports prepared by the GCVTC, contributed information to the EPA's development of the federal Regional Haze Rule.

The EPA promulgated the Regional Haze Rule on July 1, 1999 (Appendix 1-1: *EPA Regional Haze Rule 1999)*. The federal rule's objective is to achieve the national visibility goal of restoring natural visibility conditions to Class I areas by 2064. Generally, the EPA's default estimates of natural conditions are 8 deciviews for the western states and 12 deciviews for the eastern states. States may calculate the natural conditions for each Class I area instead of using the default goal. Chapter 5: *Assessment of Baseline and Current Conditions and Estimate of Natural Conditions in Class I Areas* discusses natural conditions in more detail. The rulemaking addressed the combined visibility effects of sources over a broad geographic region, meaning that many states, including all those without Class I areas, must participate in haze reduction efforts.

The EPA designated five Regional Planning Organizations (RPOs) to assist with the coordination and cooperation needed to address visibility and haze issues. Those states and tribes that make up the midsection of the contiguous United States, including Texas, were designated as the CENRAP.

1.4 CLASS I AREAS

Texas has two Class I areas within its borders, both located in West Texas (Figure 1-1: *Regional Class I Areas*). Big Bend National Park (Big Bend), in Brewster County, borders the Rio Grande and Mexico. Guadalupe Mountains National Park (Guadalupe Mountains), in Culberson County, borders New Mexico. Chapter 11: *Long-Term Strategies* addresses Texas' impacts and long-term strategies for Class I areas outside of Texas.

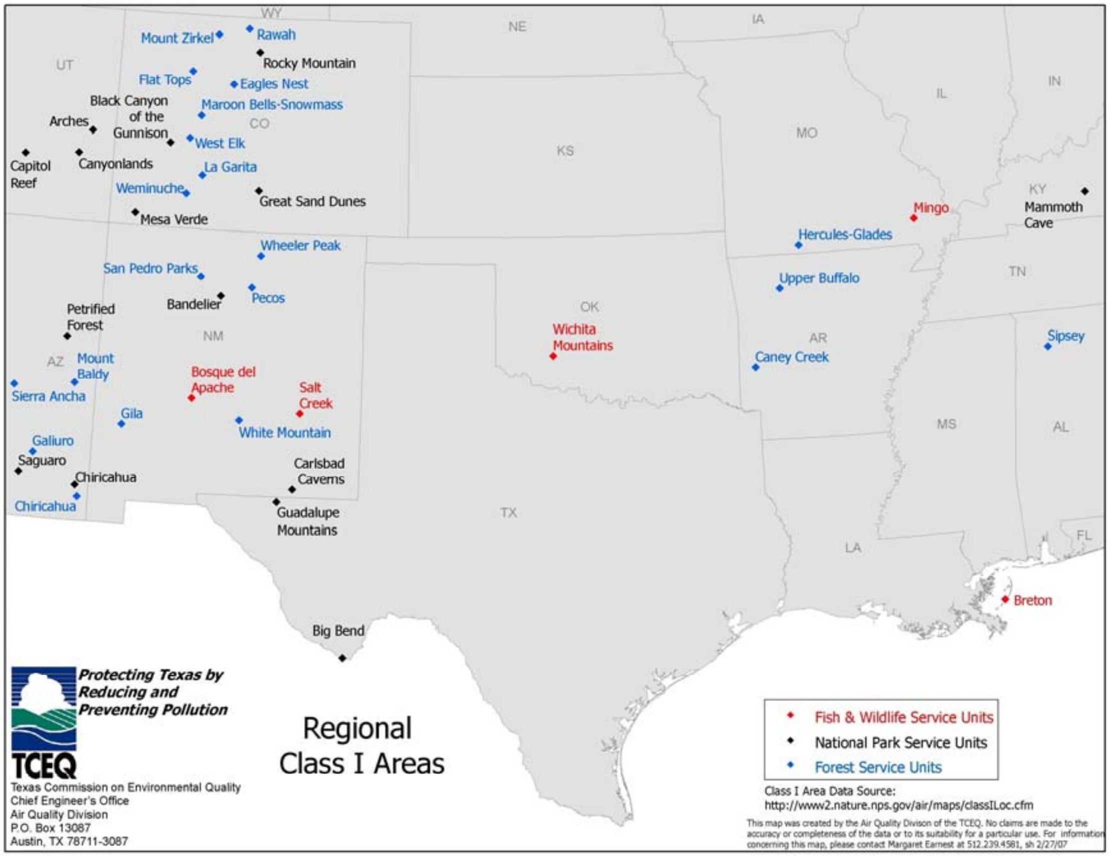


Figure 1-1: Regional Class I Areas

Big Bend National Park

Big Bend was authorized as a national park on June 20, 1935, and then established and signed into law on June 12, 1944, as the nation's 27th national park. The park gets its name from the course of the Rio Grande, which makes a great bend from a southeasterly to a northerly direction in the western portion of Texas. Big Bend receives approximately 350,000 visitors annually.

The park is slightly larger than Rhode Island and comprises more than 801,000 acres (1,252 square miles). The boundary includes 118 miles of the Rio Grande, which is also the international border between the United States and Mexico. In 1978, Congress designated a 196-mile portion of the Rio Grande, from the Chihuahua and Coahuila state line to the Terrell and Val Verde county line, as a Wild and Scenic River. The upper 69 miles are within the boundaries of Big Bend.

The park exhibits dramatic contrasts; its climate is one of extremes. As a result of the range in altitude from 1,700 feet along the river to 7,800 feet in the Chisos Mountains, a wide variation in available moisture and in temperatures exists throughout the park. These variations contribute to the great diversity in plant and animal habitats.

Big Bend has national significance as the largest protected area of Chihuahuan Desert in the continental United States. The park's river, desert, and mountain environments support an extraordinary richness of biological diversity and provide unparalleled recreation opportunities. Few areas exceed the park's values for the protection and study of geologic and paleontologic resources. Archeologists have discovered artifacts estimated to be 9,000 years old, and historic buildings and landscapes offer graphic illustration of life along the international border at the turn of the century. Big Bend is rich in economic, cultural, and military history from its extensive use by the Comanches, miners, farmers, ranchers, United States cavalry units, and Poncho Villa's revolutionaries.

Big Bend was designated a Biosphere Reserve in 1976, under the Man and the Biosphere Program. Big Bend is one of only 250 such areas in the world whose ecosystems are particularly well preserved (National Park Service (NPS) 2007).

Guadalupe Mountains National Park

Guadalupe Mountains was established on September 30, 1972, and contains Guadalupe Peak, the highest point in Texas at 8,749 feet (2,667 meters) in elevation, as well as the next three highest peaks in the state. The park covers 86,416 acres and is in the same mountain range as Carlsbad Caverns National Park, which is located about 40 miles to the northeast in New Mexico. The park also contains a congressionally designated wilderness of 46,850 acres called the Guadalupe Mountains Wilderness. The terrain is rough and natural with mountain peaks steeply rising up to 3,000 feet above the canyon floors.

The mountains are a “sky island” rising more than a mile above the floor of the Salt Basin on the west. The slopes extend through three major ecological zones from desert to remnants of a high altitude forest. Ponderosa pine, Douglas fir, white pine, and quaking aspen grow side by side with desert species such as agaves and cacti. The altitude encourages relatively high amounts of rainfall that quickly drain into the porous limestone bedrock and recharge the Capitan Aquifer.

The Guadalupe Mountains preserve the 2,000-foot thick limestone layer of the Capitan Reef, one of the finest examples of an ancient marine fossil reef on earth. Outcrops in the park expose rocks from the entire range of associated depositional environments from shallow lagoon to reef, forereef debris slopes, and deep basin deposits. The park contains the world standard section that represents the middle part of the Permian Period of geologic time. Geologists from around the world study the 280 to 260 million year old rocks preserved there (NPS 2007).

CHAPTER 2. GENERAL PLANNING PROVISIONS

2.1 INTRODUCTION

In accordance with 40 CFR §51.308(a) and (b), the TCEQ submits this state implementation plan (SIP) revision to meet the requirements of the EPA's Regional Haze Rule. This plan addresses the core requirements of 40 CFR §51.308(d) and the Best Available Retrofit Technology (BART) components of 40 CFR §50.308(e). In addition, this SIP revision addresses coordination with regional planning groups, states and tribes, and the Federal Land Managers (FLMs). Texas also commits to plan revisions and adequacy determinations as outlined in this SIP.

2.2 PUBLIC HEARING AND COMMENT INFORMATION

The TCEQ provided notice to the public of the opportunity to comment on the proposed Regional Haze SIP after the commission approval for publication on December 5, 2007. The TCEQ announced and held a public hearing. Notice of both the public hearing and the comment period were published in newspapers around the state (Appendix 2-1: *Public Participation Process*). The public comment period began December 21, 2007, and ended February 22, 2008. The public hearing was held in Austin on February 19, 2008. The length of the comment period was longer to give sufficient time for the FLMs to provide recommendations on the proposed SIP revision that could be provided to the general public, as well as meet the requirement that FLMs are consulted at least 60 days prior to the public hearing on the SIP revision. The FLM comment period was November 16, 2007, through January 16, 2008. The TCEQ web site provided the complete FLM comments 30 days prior to the hearing date.

The TCEQ accepted comments electronically through the eComments system, fax, and mail. All comments referenced the "Regional Haze SIP" and project number 2007-016-SIP-NR. Comments went to:

Margaret Earnest
MC 206
State Implementation Plan Team, Chief Engineer's Office
Texas Commission on Environmental Quality
P. O. Box 13087
Austin TX 78711-3087
Fax: (512)-239-5687

Public Hearing

City	Date	Time	Location
Austin	February 19, 2008	2:00 PM	Texas Commission on Environmental Quality 12100 Park 35 Circles, Austin TX 78753 Building E, Room 201S

Public comments, including those made by staff of federal agencies, were summarized and addressed in Appendix 2-2: *Public Comments and Responses on SIP Draft*. The final SIP incorporated public comments as appropriate.

CHAPTER 3. REGIONAL PLANNING

3.1 OVERVIEW

In the preamble to the Regional Haze Rule, the EPA acknowledged the key role of regional pollutant transport in contributing to haze in federal Class I areas and recognized the value of multi-state coordination for planning and implementing regional haze programs (EPA 1999). The EPA established grant funding for five RPOs as follows:

- Central Regional Air Planning Association
- Western Regional Air Partnership
- Midwest Regional Planning Organization
- Visibility Improvement State and Tribal Association of the Southeast
- Mid-Atlantic/Northeast Visibility Union.

Figure 3-1: *Map of the Regional Planning Organizations* shows the geographic areas of the five RPOs. Texas is a member of CENRAP, as are Oklahoma, Louisiana, Arkansas, Missouri, Kansas, Nebraska, Iowa, and Minnesota. Some tribes, including the Alabama Coushatta of eastern Texas, also participate in CENRAP.

The CENRAP's planning process was initiated in late 1999 with the first in a series of workshops held to develop the organization's charter and bylaws, to conduct initial long-range planning, and to prepare its first grant application. The organization's charter can be found at CENRAP's web site: <www.cenrap.org>.

The CENRAP defines the purposes of the organization as follows.

- Identify regional, common air management issues, and develop and identify strategies to address these issues.
- Promote policies that ensure fair and equitable treatment of all participating members.
- Coordinate science and technology to support air quality policy issues in the central states.
- Promote the implementation of federal visibility rules.
- Recommend strategies on regional haze and other air quality issues for use by member states and tribes in developing implementation programs, regulations, and laws.
- Conduct research and undertake other activities as necessary to provide the membership with information to support the development of sound state and tribal air pollution policies.

In concurrence with EPA policy, the CENRAP's bylaws state that "the CENRAP has no regulatory authority and recognizes that its members, in accordance with existing law, retain all legal authority" (CENRAP 2000). While Texas participates in CENRAP and benefits from the technical work coordinated by the RPO, Texas has sole responsibility and authority for the development and content of its Regional Haze SIP.

Figure 3-1: Map of the Regional Planning Organizations

The Policy Oversight Group (POG) is the governing body for CENRAP. The POG establishes internal policies, protocols, strategies, and budgets and provides guidance to the various CENRAP workgroups. Voting membership on the POG includes:

- designee of governor or environmental commissioner from each member state; and
- one tribal representative for each of the EPA Regions V, VI, and VII.

Ex-officio membership on the POG includes the following:

- United States Secretary of the Interior or designee;
- United States Secretary of Agriculture or designee;
- Administrator of the EPA or designee;
- two representatives from local programs that are members of the Central States Air Resources Agencies (CenSARA); and
- additional tribal representatives designated in accordance with the bylaws

The POG established five CENRAP workgroups that work in particular disciplines and facilitate the development of the regional haze implementation plans. The workgroups are as follows.

- Modeling
- Emissions Inventory
- Monitoring
- Implementation and Control Strategies
- Communications

The Communications workgroup establishes internal communication protocols, assists with contract development, manages the CENRAP web site, and conducts public outreach. The other four workgroups conduct strategic planning for their subject matter areas and conduct and document the work of contractors or the in-kind services of CENRAP participants.

A Technical Steering Committee comprised of representatives from the states, tribes, and other stakeholder groups discusses complex technical issues and provides technical guidance to the workgroups. Also, representatives from CENRAP participate in discussions with other RPOs about issues that affect some or all of the RPOs and that require close communication among these organizations.

The POG and workgroups meet quarterly or biannually, depending on the need. The technical steering committee meets biannually. The POG usually holds conference calls once per month. The frequency of workgroup and steering committee conference calls varies.

The CENRAP may remain active following the initial submission of implementation plans by the states, since the Regional Haze Rule requires periodic progress reports and implementation plan revisions. The extent to which the CENRAP remains active will depend on the usefulness of the organization to its members and the availability of continuing, adequate funding to cover the organization's expenses.

3.2 HISTORY OF TEXAS PARTICIPATION

The TCEQ has participated in the planning process for regional haze since December 1999, when a workshop was convened by CenSARA to begin developing the charter, bylaws, and initial long-range plan for the CENRAP. After workgroups were formed, the TCEQ participated in the Modeling, Emissions Inventory, Monitoring, and Implementation and Control Strategies workgroups. The TCEQ designated appropriate workgroup representatives based on their areas of expertise. For approximately three years, a TCEQ staff member dedicated time as co-chair of the Emissions Inventory workgroup. For more than two years, four TCEQ staff members have dedicated time to monthly CENRAP conference calls with four of the technical workgroups and dedicated additional time to activities that include analyzing modeling changes, participating in quality control checks, and more. In addition, the TCEQ has one SIP coordinator dedicated solely to regional haze issues. The TCEQ has represented the state on the POG and technical steering committee from their inceptions.

Significant portions of this SIP were developed based on emissions inventories, modeling, and SIP protocols created by the CENRAP and its contractors. Through its participation, the TCEQ provided data to the CENRAP in order to produce emissions inventories and modeling that the states could use when drafting their Regional Haze SIPs.

The Regional Haze Rule does not require states and tribes to participate in RPOs. However, Texas will continue participation in the CENRAP as necessary to fulfill the state's legal obligations in meeting the requirements of the rule. Texas' continued participation is contingent on CENRAP's receiving continued, adequate funding from the EPA.

CHAPTER 4. STATE, TRIBE, AND FEDERAL LAND MANAGER CONSULTATION

4.1 INTRODUCTION

Title 40 CFR §51.308(i) requires each state to consult with identified FLMs prior to the proposal of the Regional Haze SIP. In development of this plan, the FLMs were consulted in accordance with the provisions of §51.308(i)(2). In developing its reasonable progress goals (RPGs), states are required to consult with other states reasonably anticipated to cause or contribute to visibility impairment in their Class I areas. If a state determines it has emissions that are reasonably anticipated to contribute to visibility impairment in any Class I area in another state, that state must consult with the other states when developing its long-term strategy. The TCEQ provided other states, tribes, FLMs, and other stakeholders an opportunity for consultation through teleconference calls and notified the FLMs of their opportunity to consult in person at least 60 days prior to holding public hearings.

During the consultation process, the states, FLMs, and stakeholders were given the opportunity to address the assessment of the visibility impairment in any Class I areas, materials presented to stakeholders prior to the consultation calls, recommendations on the development of RPGs, and recommendations on the development of strategies to address visibility impairment. Throughout the consultation calls, the TCEQ encouraged participants to continue coordination and consultation during the development of the SIP prior to adoption. The FLMs must be consulted in the following instances: development and review of implementation plan revisions; review of five-year progress reports; and development and implementation of other programs that may contribute to impairment of visibility in Class I areas.

4.2 CONSULTATION ON CLASS I AREAS IN TEXAS

The TCEQ held Regional Haze SIP consultation meetings by conference call with FLMs for the Class I visibility areas in Texas, Big Bend and Guadalupe Mountains, other states that impact the Texas Class I areas, the EPA, and stakeholders such as industry and environmental representatives. Table 4-1: *Consultation Calls* contains the dates and times of the consultation calls.

Table 4-1: Consultation Calls

Call	Date	Time
1st Consultation call	July 11, 2007	2:30-4:00 p.m.
2nd Consultation call	July 18, 2007	10:00-11:30 p.m.
3rd Consultation call	July 31, 2007	10:00-11:30 p.m.

The first consultation call primarily addressed four technical papers. These papers discussed natural conditions, the impacts of dust storms in Big Bend and Guadalupe Mountains, Integrated Planning Model (IPM) emission projections, and glide path and RPGs. A summary paper of these technical papers was provided to consultation participants.

The second and third consultation calls consisted of open dialogue between the states and FLMs to gather input on the content of the technical papers. Additionally, the FLMs suggested that the TCEQ revise the prevention of significant deterioration (PSD) permit process to include FLM notification provisions. Texas has committed to further consultations with the FLMs aimed at a mutually agreeable set of procedures to address their concerns about the Texas PSD program.

More detailed summaries from all three calls are provided in Appendix 4-1: *Summary of Three Texas Consultation Calls*.

A list of persons or entities contacted to participate in the consultation process is provided in Appendix 4-2: *Contact List for Consultation Calls*. Chapter 11 of this SIP also discusses the consultation process regarding development of the long-term strategy.

The TCEQ has determined which states contribute to visibility impairment at the Texas Class I area by using the results from the CENRAP particulate matter source apportionment technology (PSAT) modeling. These states are New Mexico, Oklahoma, Kansas, and Louisiana. Appendix 8-1: *Technical Support Document for CENRAP Emissions and Air Quality Modeling to Support Regional Haze State Implementation Plans* shows the pertinent modeling results. Texas is not requesting additional reductions from other states at this time.

4.3 CONSULTATIONS ON CLASS I AREAS IN OTHER STATES

The TCEQ has participated in the CENRAP since its inception in 1999. The TCEQ has cooperated with all CENRAP states, tribes, and FLMs that participated in:

- developing information on base period 2002 visibility impairment;
- developing projections of 2018 emissions and visibility impairment considering all adopted emissions reductions required in Texas and federal rules; and
- developing estimates of 2064 natural conditions.

Texas and federal rules that specifically reduce visibility-impairing pollutants include the Clean Air Interstate Rule (CAIR), BART requirements, the emissions reductions from the federal motor vehicle emission control program (FMVCP), the EPA refinery consent decrees, and the EPA requirements for cleaner non-road diesel and gasoline-powered engines.

The TCEQ participated in the Modeling, Emissions Inventory, Monitoring, and Implementation and Control Strategies workgroups of CENRAP. The TCEQ designated appropriate workgroup representatives based on their areas of expertise. For more than two years, the TCEQ has dedicated time to monthly technical workgroups through CENRAP conference calls. Since 1999, Texas has actively participated in regional planning (Chapter 3). The TCEQ also participated in inter-regional planning organization calls related to modeling. The FLMs, EPA, tribes, states, and industry were encouraged to participate in workgroup calls, workshops, and meetings.

The TCEQ reviewed CENRAP modeling to assess which Class I areas in other states might be impacted by Texas' emissions. Modeling indicated that Texas impacts Breton Wilderness Area in Louisiana, the Great Sand Dunes in Colorado, and several Class I sites in New Mexico. The TCEQ also consulted the adjacent states in which the modeling data indicated no significant impact by Texas, including Arkansas, Missouri, and Oklahoma.

Through conference calls, Arkansas and Missouri consulted with Texas about the impact of Texas' emissions on regional haze at the Class I areas in those states. They accepted Texas' planned emissions and regional haze impact reductions as adequate for their Class I areas for this initial SIP (Appendix 4-3).

Oklahoma invited Texas to consult about Oklahoma's Class I area, the Wichita Mountains National Wildlife Refuge. The TCEQ attended Oklahoma's three consultation calls held in August and September 2007. In August 2007, the TCEQ received a letter from Oklahoma regarding visibility improvements in the Wichita Mountains National Wildlife Refuge. The letter requested that Oklahoma be able to comment on best available control technology determinations for PSD sources that significantly impact Wichita Mountains and a request that Class I impact reviews by required for all proposed PSD sources within 300 kilometers of a Class I area. In an October 2007, response letter the TCEQ has agreed to notify Oklahoma, along with the relevant

FLM, whenever modeling indicates that a proposed source significantly impacts Wichita Mountains. In regards to the 300 kilometer request, the TCEQ is urging the EPA to adopt significant impact levels for Class I reviews so that there is a standard review process across the country. During the interim, the TCEQ is committed to working with the FLMs on mutually acceptable criteria for determining when a proposed PSD source should conduct a Class I review. Appendix 4-3: *Additional Consultation with States* contains a copy of these letters.

In response to comments from the EPA and FLMs in March 2008, the TCEQ sent consultation letters to Oklahoma, Louisiana, Missouri, Arkansas, Colorado and New Mexico. Included with the letters were a discussion and data of the CENRAP Particulate Matter Source Apportionment Technology (PSAT) modeling determining the contribution from each Texas source area to visibility impairment at Class I areas in the given state. The TCEQ participated fully in the analysis of this data, base period visibility impairment, natural visibility condition estimates, and 2018 projections based on current and anticipated future state and federal controls. The PSAT modeling indicates that the probable impact of Texas sources will be reduced by 2018 in all of the affected Class I Areas due to the expected emissions reductions from current and planned controls. Also included with the consultation letter, where applicable, were area of influence maps for each Class I area in the CENRAP states. For reference purposes, the map showed the portions of Texas that are in the first and second order sulfate and nitrate areas of influence for the given Class I Area. The sulfur dioxide and nitrogen oxide sources shown on the map are Texas sources the TCEQ identified as high priority due to the fact that they have an emissions over distance equal to or greater than five ($q/d \geq 5$) for one or more Class I areas. Also included was a table of sources of particular interest to the affected Class I Area(s) due to their emissions and their positions within the area of influence. The TCEQ also requested recipients of the letters to confirm they are not expecting any additional emission reductions. These letters and associated documents are included in Appendix 4-3.

In an April 21, 2008, letter, Missouri's Department of Natural Resources responded that no further emissions reductions were requested of Texas (Appendix 4-3). In a June 10, 2008, letter, Arkansas' Department of Environmental Quality responded that no further emissions reductions were requested of Texas (Appendix 4-3). In a June 24, 2008 letter, Colorado's Department of Public Health and Environment responded that no further emissions reductions were requested of Texas at this time (Appendix 4-3). Louisiana sent confirmation that "the Louisiana Department of Environmental Quality has determined that emissions form the State of Texas do not contribute to visibility impairment at Breton Wilderness Class I Area." New Mexico has not responded to the letter as of December 2008.

CHAPTER 5. ASSESSMENT OF BASELINE AND CURRENT CONDITIONS AND ESTIMATE OF NATURAL CONDITIONS IN CLASS I AREAS

5.1 VISIBILITY REQUIREMENTS

The goal of the Regional Haze Rule is to restore natural visibility conditions to the 156 Class I areas identified in the 1977 Federal Clean Air Act Amendments. Title 40 Code of Federal Regulations (CFR) §51.301 defines natural conditions as including “naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration.” State regional haze plans must contain measures that make “reasonable progress” toward this goal by reducing anthropogenic emissions that cause haze. Three metrics of visibility are part of the determination of progress toward this goal:

- baseline conditions, i.e., conditions observed during the baseline period, 2000 through 2004;
- natural conditions, i.e., those conditions existing in the absence of human-induced visibility impairment; and
- current conditions, i.e., conditions observed during the current period, which is the same as the baseline, for this initial period.

To calculate these metrics the concentrations of visibility-impairing pollutants are included as distinct terms in a light extinction algorithm with respective extinction coefficients and relative humidity factors. Total light extinction when converted to a haze index in deciviews is calculated for the average of the best 20 percent and worst 20 percent visibility days. Title 40 CFR §51.301 defines a deciview as “a haze index derived from calculated light extinction, such that uniform changes in haziness correspond to uniform incremental changes in perception across the entire range of conditions, from pristine to highly impaired.”

Texas and other CENRAP states have elected to perform their primary visibility projections using the new Interagency Monitoring of Protected Visual Environments (IMPROVE) algorithm to calculate visibility metrics for developing RPGs because this algorithm is based on more recent science and the updated algorithm better fits the observed light extinction values. Appendix 5-1: *Discussion of the Original and Revised IMPROVE Algorithms* provides a discussion on the choice of the IMPROVE algorithm comparing the old and new equations. For more detailed documentation on the original (old) and revised (new) algorithm changes, please visit the IMPROVE web site at <http://vista.cira.colostate.edu/improve>.

Baseline visibility, the starting point for the improvement of visibility conditions, is the average obtained by using monitoring data for 2000 through 2004 and represents current visibility conditions for this initial period. Comparison of initial baseline conditions to natural visibility conditions shows the improvement necessary to attain natural visibility by 2064. Natural visibility is determined by estimating the natural concentrations of visibility-impairing pollutants and then calculating total light extinction with the chosen light extinction algorithm (Figure 5-1: *Generic Glide Path to Achieve Natural Conditions in 60 Years*). Each state must estimate natural visibility levels for Class I areas within its borders in consultation with FLMs and other states that impact the Class I areas (40 CFR §51.308(d)(2)). Current conditions are assessed every five years as part of the plan review where actual progress in reducing visibility impairment is compared to reduction commitments in the plan.

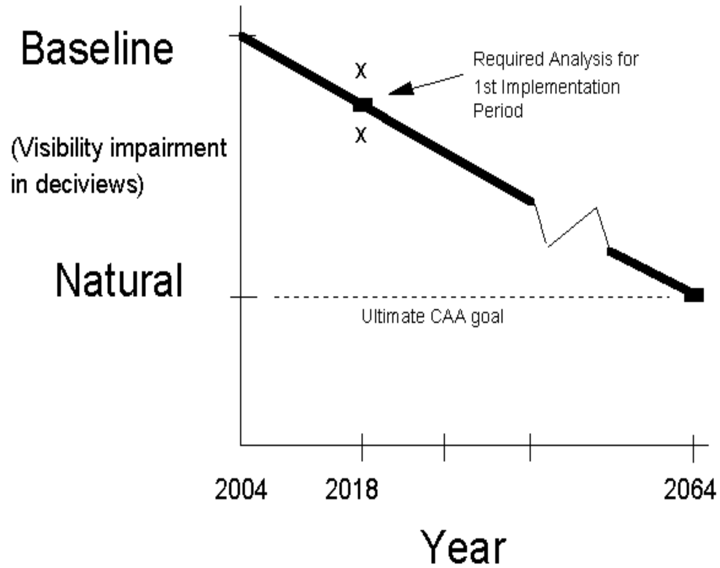


Figure 5-1: Generic Glide Path to Achieve Natural Conditions in 60 Years
Source: EPA

5.1.1 Default and Refined Values for Natural Visibility Conditions

The EPA's *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program* (EPA 2003) provides states a "default" estimate of natural visibility. The default values of concentrations of visibility pollutants are based on a 1990 National Acid Precipitation Assessment Program report (Trijonis, 1990). In the EPA's guidance, the United States is divided into East and West regions approximately along the western boundary of the states one tier west of the Mississippi River. This division divides the CENRAP states into its own East region (Arkansas, Iowa, Louisiana, Minnesota, and Missouri), containing seven Class I areas, and West region (Kansas, Nebraska, Oklahoma, and Texas), containing three Class I areas. In comparing the two regions, only sulfate (SO_4) and organic carbon have different values, but the calculated deciview difference is significant.

However, the ultimate responsibility for calculating natural conditions lies with each state (40 CFR §51.308(d)(2)). The TCEQ determined that the default estimates were insufficiently accurate and that data and methods were available to improve these estimates. Therefore, TCEQ chose to develop its own refined estimates.

5.1.2 Consultation Regarding the Visibility Metrics

Consultation among states is required by the Regional Haze Rule. As part of a long-term strategy for regional haze, a state whose emissions are "reasonably anticipated" to contribute to impairment in other states' Class I areas must consult with those states (40 CFR §51.308(d)(3)). Likewise, states with Class I areas are to consult with any states whose emissions affect their Class I areas. Consultation among states is facilitated through RPOs, though some required consultations cross RPO boundaries. For example, Texas and New Mexico must collaborate on planning for the Guadalupe Mountains, though the two states participate in different RPOs.

A chief purpose of the RPOs is to provide a means for states to confer on all aspects of the regional haze issue, including consultation on RPGs and long-term strategies, which are based on the baseline, current, and natural visibility determinations. This process is described in Chapter 3: *Regional Planning*. The CENRAP provides a forum for member states and tribes to consult on determinations of baseline and natural visibility conditions in subject Class I areas. States in the CENRAP have also conferred with neighboring Class I area states outside CENRAP, both individually and by way of the appropriate RPO.

Title 40 CFR §51.308(i) requires Class I area states to coordinate with the FLMs, including consultation on implementation, assessment of visibility impairment, and recommendations regarding RPGs and strategies for improvement. This consultation requirement is discussed in Chapter 4: *State, Tribe, And Federal Land Manager Consultation*. Through participation in the CENRAP and individually, Texas has completed this regulatory requirement.

5.2 BASELINE VISIBILITY CONDITIONS

For the five-year baseline period, 2000 through 2004, sites are required to have three valid years of data from which baseline conditions can be constructed. The Visibility Information Exchange Web System (VIEWS) <http://vista.cira.colostate.edu/views/> has posted haze index values, based on the revised IMPROVE algorithm, for the 20 percent worst and best days for each complete year of the baseline period. From these values, the baseline haze index is calculated by averaging over the baseline period. Table 5-1: *Baseline Haze Indices* shows this calculation for both Big Bend and Guadalupe Mountains using the VIEWS summary data updated August 2007.

Baseline visibility for the Big Bend Class I area is 5.78 deciviews for the best 20 percent of the sample days and 17.30 deciviews for the worst 20 percent of the sample days. This baseline visibility is based on sampling data collected at the Big Bend IMPROVE monitoring site.

Baseline visibility for the Guadalupe Mountains Class I area is 5.95 deciviews for the best 20 percent of the sample days and 17.19 deciviews for the worst 20 percent of the sample days. This baseline visibility is based on sampling data collected at the Guadalupe Mountains IMPROVE monitoring site.

Table 5-1: Baseline Haze Indices

Class I Area	Site ID	Year	Haze Index (deciviews)	
			Most Impaired	Least Impaired
Big Bend*	BIBE1	2001	17.31	7.09
		2002	18.21	5.68
		2003	17.18	5.74
		2004	16.51	4.62
		Average	17.30	5.78
Guadalupe Mountains	GUMO1	2000	17.14	6.26
		2001	16.61	6.34
		2002	18.12	6.38
		2003	18.50	5.91
		2004	15.57	4.83
		Average	17.19	5.95

* The fourth quarter of 2000 for Big Bend was not sufficiently complete for use in calculating a baseline average for regulatory purposes: The fourth quarter had only ten complete days.

5.3 NATURAL VISIBILITY CONDITIONS

Using the revised IMPROVE algorithm and the methodology detailed in Appendix 5-2: *Estimate of Natural Visibility Conditions*, the TCEQ has determined, subject to significant uncertainties in natural concentrations of organic carbon, that natural visibility conditions for the Big Bend Class I area are best represented by 10.09 deciviews for the worst 20 percent days. The Guadalupe Mountains Class I area is best represented by 12.26 deciviews for the worst 20 percent days. Appendix 5-2 provides calculations, methodologies, a discussion of the reasons for the selection of the methodology, and a demonstration of the appropriateness of these values for both Class I areas. Table 5-2: *Visibility Metrics for the Class I Areas in Texas* reports the visibility metrics computed for Big Bend and Guadalupe Mountains.

Table 5-2: Visibility Metrics for the Class I Areas in Texas

Estimate of Natural Visibility Conditions		
Class I Area	Haze Index (deciviews)	
	Most Impaired	Least Impaired
Big Bend	10.09	2.19
Guadalupe Mountains	12.26	2.10
Baseline Visibility Conditions, 2000–2004		
Class I Area	Haze Index (deciviews)	
	Most Impaired	Least Impaired
Big Bend	17.30	5.78
Guadalupe Mountains	17.19	5.95
Estimate of Extent Baseline Exceeds Natural Visibility Conditions		
Class I Area	Haze Index (deciviews)	
	Most Impaired	Least Impaired
Big Bend	7.21	3.59
Guadalupe Mountains	4.93	3.85

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, Gill, et al. conclude that "Field campaigns revealed that … the vast majority of source points were natural desert landscapes" (Gill et al. 2005).

The times when human-caused dust is likely to be more important at these sites are on days with less visibility impairment than on the worst dust impaired days, since the most dust impaired days are dominated by dust storms and other blowing dust from the surrounding desert landscape. As shown in the dust storm paper of Appendix 5-2a, there are enough dust storm days at Guadalupe Mountains to make a reasonable estimate of the worst 20 percent natural visibility conditions. In other words, there were enough dust storms documented at Guadalupe Mountains to account for all of the worst 20 percent days. This lends credence to the assumption that natural dust dominates on those days and that human-caused dust is of minimal importance for the low visibility days.

The situation at Big Bend is a little more uncertain because the dust impact is less from major dust storms and more from "locally"[1] windblown dust, as shown by the studies by Kavouras, et al. (2006 and 2007). However, the area of the park is approximately 801,000 acres, and broad restrictions on human use of the park are in place to minimize human impact on its desert environment. Additionally, the Big Bend IMPROVE monitoring site is surrounded by the park, with the closest park boundary approximately ten miles away, while land use and soil erodibility indicates the landscape surrounding Big Bend (and even Guadalupe Mountains) is overwhelmingly dominated by highly erodible soils in scrub/scrubland areas.

As explained in Appendix 5-2: *Estimate of Natural Visibility Conditions*, the estimates for what portion of each visibility component is to be considered as natural, at least for the estimation of natural visibility values for Texas' Class I areas, is taken to be essentially the same as used by the Natural Conditions II (NC II) committee (Pitchford, et al. 2006), with the exception of fine soil (FS) and course mass (CM). As justified within that appendix and within the other referenced

[1] Note that "local" as used in the Kavouras work does not correspond with any distance measure, but with how well the dust dominated days in the 20 percent worst measured visibility days correlated with local wind speed and direction.

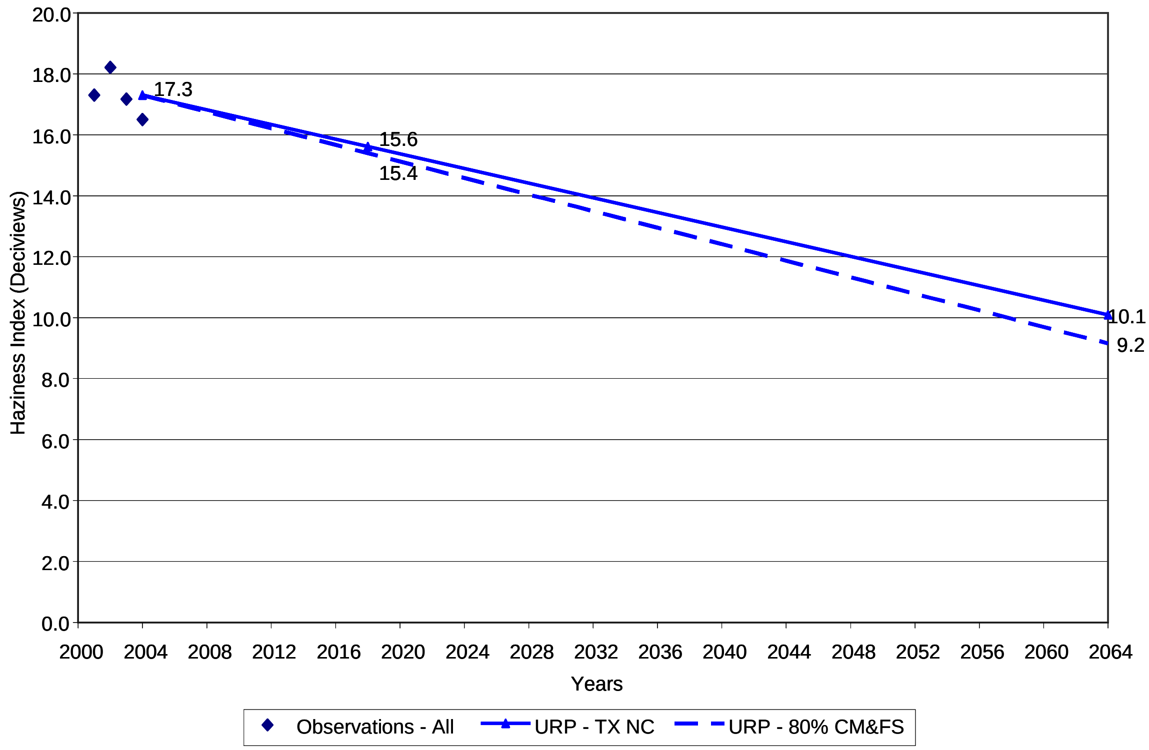


Figure 5-2: Big Bend Uniform Rate of Progress (URP)
TX NC is Texas' estimate of natural conditions.
80 % CM&FS is a comparison where 80 percent of fine soil and course mass is taken as natural.

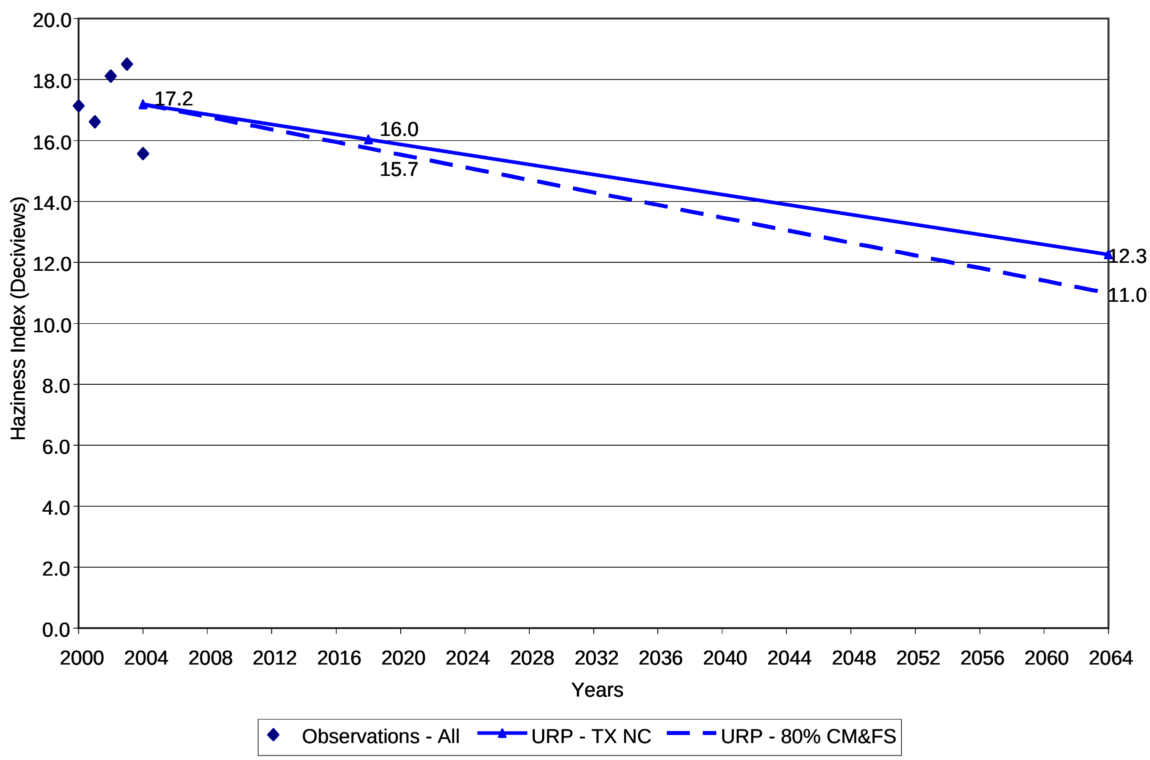


Figure 5-3: Guadalupe Mountains Uniform Rate of Progress

work, the TCEQ estimate takes essentially all fine soil and course mass concentrations to be approximated as natural, at least for the estimation of the least and most impaired natural visibility values for Texas' Class I areas. (The actual computations are carried out using each area's own data.)

Since the estimate has some degree of uncertainty, just as there is uncertainty in the estimates used by the NC II, the TCEQ provides in Figure 5-2: *Big Bend Uniform Rate of Progress (URP)* and Figure 5-3: *Guadalupe Mountains Uniform Rate of Progress* graphs of the Uniform Rate of Progress (URP) for the worst 20 percent days both with the estimate approximating 100 percent fine soil and course mass as natural (TX NC) along with a calculation treating only 80 percent fine soil and course mass as natural (80% CM&FS), for both Texas Class I areas. This 80 percent calculation is displayed due to a request from some Federal Land Managers to illustrate how sensitive this natural visibility estimate is to approximating 100 percent of the fine soil and course mass as natural; there is no other significance to this 80 percent calculation for this SIP.

5.4 NATURAL VISIBILITY CONDITIONS, AN ONGOING EFFORT

Because natural visibility estimates are calculated from complex environmental chemistry, require significant assumptions in the calculation and are ultimately calculated without a directly observable measurement, there remains considerable potential for improvement in estimation. Since the natural concentrations and statistics of all components important for Regional Haze have significant uncertainties, the TCEQ will be continuing to evaluate data, modeling, and any other sources of information, as well as potentially devising additional monitoring, sampling and/or analysis schemes, in order to further improve these estimates. Furthermore, the TCEQ plans to work with the EPA, FLMs, and other experts and researchers to refine natural conditions estimates for future five-year reports and major regional haze SIP revisions.

At this point, the component that most likely needs improved estimation is organic carbon.[2] Improved sampling and/or analysis techniques are likely methods in the pursuit of an improved characterization of the natural contributions to this component. However, the application of such methods will depend upon available resources and estimates of potential benefits.

[2] Additionally, there is significant regulatory uncertainty with regard to what prescribed fires should or should not be considered as "natural." When the EPA revises the *Interim Air Quality Policy on Wildland and Prescribed Fires*, it is expected such issues will be clarified.

CHAPTER 6. MONITORING STRATEGY

6.1 INTRODUCTION

Title 40 CFR §51.308(d)(4) of the Regional Haze Rule requires a monitoring strategy for measuring, characterizing, and reporting regional haze visibility impairment that is representative of all mandatory Class I areas within Texas. The monitoring strategy relies upon data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. A steering committee with representatives from federal, regional, and state organizations governs the program. These organizations include the United States Environmental Protection Agency (EPA), the National Park Service (NPS), the United States Fish and Wildlife Service (FWS), the United States Forest Service, the Bureau of Land Management (BLM), the National Association of Clean Air Agencies, and other entities. The IMPROVE Steering Committee allocates IMPROVE monitoring resources, which come from a number of agencies including the EPA, NPS, FWS, and BLM. The IMPROVE program arranges for the operation of IMPROVE monitors, the analysis of samples from the monitors, and the validation and internet posting of the IMPROVE data as well as maintenance of the Visibility Information Exchange Web System (VIEWS) web site <http://vista.cira.colostate.edu/views>, which makes the data easily available to states, regional planning organizations, and the public. The state regional planning organizations (RPOs) contribute financial support to the VIEWS program and web site.

6.2 MONITORING AT CLASS I AREAS IN TEXAS

Currently, the IMPROVE program provides an IMPROVE monitor at each of the two Class I areas in Texas, Big Bend and Guadalupe Mountains. Because of their location, the monitors are appropriate for determining progress in reducing visibility impairment in the Texas Class I areas. The monitoring strategy relies on continuation of IMPROVE monitoring at these sites. The Texas Commission on Environmental Quality (TCEQ) plans to continue to participate in the IMPROVE network through the financial support of the EPA. The TCEQ also plans to continue supporting the VIEWS work and the VIEWS web site by urging CENRAP to continue its funding of VIEWS. No additional monitoring beyond the IMPROVE network is required or necessary for assessing visibility conditions at the two Class I areas in Texas or at the Class I areas that Texas' emissions affect in other states.

The IMPROVE program reviewed its aerosol monitoring sites in 2006 to set priorities for maintaining the sites, in the event of federal budget cuts affecting the IMPROVE program. This review determined that the IMPROVE aerosol samplers at Texas' two Class I areas represent conditions different from the conditions at the nearest Class I area IMPROVE monitors. Texas' two Class I IMPROVE monitors are not candidates for discontinuation since other IMPROVE monitors cannot represent conditions at Big Bend or Guadalupe Mountains.

The TCEQ considers that continued IMPROVE monitoring at all current Class I IMPROVE sites that Texas' emissions impact and continued VIEWS services are all centrally important to the effort to monitor reductions in anthropogenic haze impacts at these sites. If funding for these IMPROVE sites or the VIEWS program is threatened, the TCEQ plans to work closely with the EPA, the FLMs, and neighboring states to attempt to find the funding to continue the current Class I IMPROVE monitoring and VIEWS services for these sites.

6.3 ASSESSMENT OF VISIBILITY IMPROVEMENT AT CLASS I AREAS

Future assessments of visibility impairment and progress in reducing visibility impairment at Texas' two Class I areas, and at Class I areas in other states that Texas' emissions affect, will use the new IMPROVE equation and will use data as prescribed in the EPA's Regional Haze Rule (40 CFR Part 51, Subpart P). The assessment will follow, as appropriate, the EPA's official guidance including *Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone,* $PM_{2.5}$*, and Regional Haze* (EPA 2007).

6.4 REPORTING VISIBILITY MONITORING DATA TO THE ADMINISTRATOR

The TCEQ does not directly collect or handle IMPROVE data. The TCEQ plans to continue to participate in VIEWS through CENRAP. The TCEQ considers VIEWS to be a core part of the overall IMPROVE program. The TCEQ plans to continue to report IMPROVE data from the two Class I areas in Texas to the EPA by continuing to support its posting on the VIEWS web system. The TCEQ's support will be through continuing membership in CENRAP and through requesting that both the EPA and this multi-state organization continue to support VIEWS.

If Texas collects any visibility monitoring data through the state's air quality monitoring networks, the TCEQ will report those data to the EPA as specified under the Performance Partnership Grant agreement negotiated with the EPA Region 6. All validated data and data analysis results from any TCEQ visibility-related special studies are public information. TCEQ plans to continue its practice of sharing the data and information with the EPA, the Federal Land Managers, and the public.

The TCEQ currently has a TEOM (tapered element oscillating microbalance) continuous monitor for $PM_{2.5}$, an every-sixth-day chemical speciation monitor, and meteorological equipment operating at Big Bend. The data from these monitors is available from the TCEQ. Additionally, the TCEQ hosts the National Park Service's Big Bend ozone data on the TCEQ web site.

6.5 ASSESSING THE IMPACT OF EMISSIONS FROM TEXAS ON CLASS I AREAS

Chapters 5, 8, 10, and 11 describe the procedures used in developing this SIP revision. These chapters include the procedures to assess the quantitative impact of emissions from Texas on Class I areas in Texas and on Class I areas that Texas' emissions affect in other states.

Chapter 7 describes the procedures used for this SIP revision to produce the statewide emissions inventory of pollutants reasonably anticipated to cause or contribute to visibility impairment in all the mandatory Class I areas that Texas' emissions affect. Chapter 12 describes the plans for the five-year implementation plan review and for the 2018 regional haze SIP revision.

The Performance Partnership Grant agreement negotiated with the EPA Region 6 and the quality assurance procedures for collecting and reporting periodic emissions inventories to the EPA describe the collection, quality assurance, record keeping, maintenance, availability, and reporting of emissions and monitoring data to the EPA.

CHAPTER 7. EMISSIONS INVENTORY

Title 40 CFR §51.308(d)(4)(v) requires a statewide emissions inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any Class I area. As specified in this section, the pollutants to be inventoried include volatile organic compounds (VOC), nitrogen oxides (NO_X), fine particulate matter ($PM_{2.5}$), particulate matter less than ten microns in diameter (PM_{10}), ammonia (NH_3), and sulfur dioxide (SO_2). In accordance with the EPA guidance, the TCEQ developed a baseline Texas inventory for the year 2002, and submitted the inventory to the Central Regional Air Planning Association (CENRAP) for use in photochemical modeling supporting the Regional Haze SIP. A summary of the CENRAP developed 2002 Texas inventory is provided in Table 7-1: *CENRAP's 2002 Base Year Emissions Inventory Summary for Texas*. Details for the 2002 emissions inventory are provided in Appendix 7-1: *Texas Emissions Inventory Development: Base Year 2002 and Projected Year 2018.*

Table 7-1: CENRAP's 2002 Base Year Emissions Inventory Summary for Texas

Category	CO (tpy)	NO_X (tpy)	SO_2 (tpy)	TOG* (tpy)	$PM_{2.5}$ (tpy)	PM_{10} (tpy)	NH_3 (tpy)
Area	908,407	280,811	111,853	1,163,549	347,490	1,552,824	380,057
Point	498,467	600,725	821,961	207,695	46,789	80,947	2,609
Non-Road	1,210,158	242,551	21,828	148,952	15,089	15,556	56
On-Road	4,098,391	664,163	18,814	309,707	11,275	15,476	21,599
Total	6,715,423	1,788,250	974,457	1,829,902	420,642	1,664,803	404,321

*TOG is total organic gas, which includes total hydrocarbons.

The 2002 baseline inventory is composed of several different categories. The point sources are defined as industrial, commercial, or institutional sites that meet the reporting requirements of 30 Texas Administrative Code (TAC) §101.10. Area sources include commercial, small-scale industrial, and residential categories of sources that use materials or operate processes that can generate emissions. These sources of emissions fall below the point source reporting levels and are too numerous or too small to identify individually. The area source fires inventory is also included in the area source category. This category includes agricultural burning, prescribed burning of forests, and prescribed burning of rangeland. The fugitive dust inventory includes dust from construction, mining, quarrying, bulk materials storage (such as coal and gravel), and feedlots.

The area source SO_2 emissions used by the CENRAP in their modeling are significantly higher than the 15,633 tons per year (tpy) reported by the TCEQ. The difference is industrial and residential coal combustion which was erroneously included in the CENRAP inventory. The TCEQ has been working with CENRAP to correct this error for future modeling, but there was not sufficient time to remodel with the more accurate TCEQ-supplied inventory. CENRAP's modeled emissions estimate is not expected to significantly impact visibility estimates for 2018 because of the relatively small contribution from these Texas sources on Class I areas.

Non-road mobile sources include aircraft operations, marine vessels, recreational boats, railroad locomotives, and a broad category of non-road equipment that include everything from 600-horsepower engines mounted on construction equipment to one-horsepower string trimmers.

On-road mobile sources of emissions consist of automobiles, trucks, motorcycles, and other motor vehicles traveling on public roadways. On-road mobile source emissions are usually categorized as either combustion-related emissions or evaporative hydrocarbon emissions. Combustion-related emissions are estimated for vehicle engine exhaust. Evaporative hydrocarbon emissions are estimated for the fuel tank and other evaporative leak sources on the vehicle.

Biogenic sources include hydrocarbon emissions from crops, lawn grass, and trees as well as a small amount of NO_X emissions from soils. These emissions are listed in Table 7-2: *Statewide Biogenic Emissions*.

Table 7-2: Statewide Biogenic Emissions

Biogenic	**Nitrogen Oxide (tpy)**	**Carbon Monoxide (tpy)**	**Volatile Organic Compounds (tpy)**
	184,896	755,941	4,033,760

Methodologies used in developing the 2002 emissions inventory are documented in Appendix 7-1. The technical support documents are available in Appendix 8-1: *Technical Support Document for CENRAP Emissions and Air Quality Modeling to Support Regional Haze SIP*.

The CENRAP projected the 2002 base year emissions for Texas and other central states to the 2018 future planning year primarily using the Economic Growth Analysis System (EGAS5) for non-electric generating unit point sources, area sources, and non-road mobile sources; MOBILE6 for on-road mobile sources; and the Integrated Planning Model Version (IPM) 2.19 for electric generating units (Appendix 7-2: *Integrated Planning Model Projections of Electric Generating Unit Emissions for the Regional Haze State Implementation Plan).* Emissions from recently permitted electric generating units were incorporated into the IPM file. Only the units that will be shut down under enforceable actions are removed from the future inventory.

From 2002 to 2018, the CENRAP projected point source emissions increases in the organic compounds, CO, and particulate matter (PM) categories. For non-EGU industrial sources, CENRAP predicted increases in all contaminant categories (ranging from slight increases in NO_X and SO_2 to significant increases in CO and organic compounds). The increases predicted by CENRAP's inventory are contra-indicated by the actual decreases represented in the annual inventory data collected between 2002 and 2005. See Appendix 7-2 for a summary of the 2005 inventory. Between 2002 and 2005, the historical data indicate actual source emissions have decreased or held approximately constant for the point sources in all categories except CO from EGUs. Based on historical decreases in emissions, CENRAP's predicted increase is considered conservative and likely over predicts Texas point source emissions for 2018. Statewide point source emissions have declined every year in Texas in an environment of significant economic growth. A summary of Texas emissions projected to 2018 is provided in Table 7-3: *CENRAP's 2018 Emissions Inventory Summary for Texas*.

Table 7-3: CENRAP's 2018 Emissions Inventory Summary for Texas

Category	CO (tpy)	NO_X (tpy)	SO_2 (tpy)	TOG (tpy)	$PM_{2.5}$ (tpy)	PM_{10} (tpy)	NH_3 (tpy)
Area	899,497	274,663	114,138	1,420,681	354,712	1,557,089	562,379
Point	542,128	525,174	625,068	283,290	80,577	121,733	6,790
Non-Road	1,921,674	167,451	6,988	119,855	10,588	11,498	239
On-Road	2,710,631	148,387	2,925	125,234	5,337	5,337	32,191
Total	6,073,930	1,115,676	749,119	1,949,060	451,214	1,695,657	601,598

*TOG is total organic gas, which includes total hydrocarbons

Methodologies used by the CENRAP in developing the 2018 emissions inventory are documented in Appendix 7-1. Technical support documents detailing the inventory development are available in Appendix 8-1. These documents are available at <www.tceq.state.tx.us/implementation/air/sip/bart/haze_appendices.html>. A comparison of the change in emissions by source category is shown in Figure 7-1: *Comparison of Base and Projected Annual Emissions by Source Category*. Even though $PM_{2.5}$ is a subcategory of PM_{10}, both are shown for purposes of comparison.

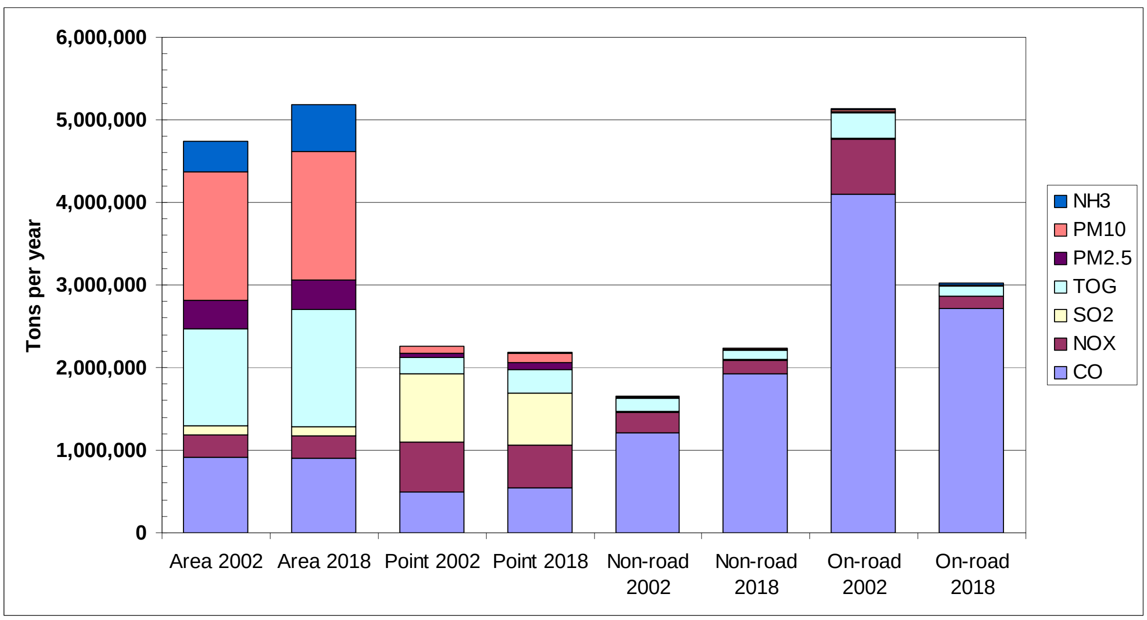


Figure 7-1: Comparison of Base and Projected Annual Emissions by Source Category

CHAPTER 8. MODELING ASSESSMENT

8.1 OVERVIEW

The Texas Commission on Environmental Quality (TCEQ) participated in the Central Regional Air Planning Association (CENRAP) regional planning process, as described in Chapter 3: *Regional Planning* and is using the technical work conducted by CENRAP in support of this state implementation plan (SIP) revision (Table 8-1: *Federal Mandated Class I Areas in the CENRAP States*). The CENRAP 2002 and projected 2018 annual emissions and air quality modeling was performed by the CENRAP modeling team. Where necessary, the TCEQ also conducted analyses specific to Texas. For instance, the TCEQ conducted Best Available Retrofit Technology (BART) screening modeling analyses independently from CENRAP, but used the databases developed by CENRAP as the basis for the analyses. The BART screening modeling analyses are described further in Chapter 9: *Best Available Retrofit Technology*.

This chapter describes CENRAP regional emissions and air quality modeling that was conducted to support the central states' regional haze SIPs. The information contained in this chapter draws from the Technical Support Document (TSD) developed by the CENRAP modeling team. The TSD, contained in Appendix 8-1: *Technical Support Document for CENRAP Emissions and Air Quality Modeling to Support Regional Haze SIP,* provides further detail on the modeling analyses. Chapter 1 of the TSD presents the background, an overview of the approach, and a summary of the results of the CENRAP meteorological, emissions, and air quality modeling. Appendix A of the TSD contains more details on the meteorological model evaluation. Details on the emissions modeling are provided in Chapter 2 and Appendix B of the TSD. The model performance evaluation is presented in Chapter 3 and Appendix C of the TSD. The 2018 visibility projections and comparisons with the 2018 uniform rate of progress (URP) point are provided in Chapter 4 of the TSD, with more details given in Appendix D. Chapter 5 of the TSD contains additional supporting analysis with details on the particulate matter (PM) source apportionment modeling and alternative projections provided in Appendices E and F of the TSD, respectively. Chapter 6 lists the references cited in TSD.

8.2 BACKGROUND

The 1977 Federal Clean Air Act (FCAA) amendments added the protection of visibility in Federal Class I areas and established the national goal for visibility protection. The FCAA requires states to submit SIPs containing emission limits and schedules of compliance. In response to these mandates, the United States Environmental Protection Agency (EPA) promulgated the Regional Haze Rule requiring states to establish goals that provide for reasonable progress towards achieving natural visibility conditions at Class I areas. CENRAP has used regional air quality models to determine the level of visibility improvement expected by 2018.

The CENRAP Emissions and Air Quality Modeling Team consists of staff from ENVIRON and University of California at Riverside (UCR), with assistance and coordination from the CENRAP states, tribes, federal agencies, and stakeholders. The team performed the emissions and air quality modeling simulations for states and tribes within the CENRAP region, which provided analytical results used in developing implementation plans under the Regional Haze Rule. The CENRAP team performed emissions and air quality modeling used by the TCEQ to determine the 2018 reasonable progress goals (RPGs).

Table 8-1: Federal Mandated Class I Areas in the CENRAP States

Class I Area	Acreage	Federal Land Manager	Public Law
Arkansas			
Caney Creek Wilderness Area	14,460	USDA-FS	93-622
Upper Buffalo Wilderness Area	12,018	USDA-FS	93-622
Louisiana			
Breton Wilderness Area	5,000+	USDI-FWS	93-632
Minnesota			
Boundary Waters Canoe Area Wilderness	810,088	USDA-FS	99-577
Voyageurs National Park	114,964	USDI-NPS	99-261
Missouri			
Hercules-Glades Wilderness Area	12,314	USDA-FS	94-557
Mingo Wilderness Area	8,000	USDI-FWS	95-557
Oklahoma			
Wichita Mountains Wilderness Area	8,900	USDI-FWS	91-504
Texas			
Big Bend National Park	708,118	USDI-NPS	74-157
Guadalupe Mountains National Park	76,292	USDI-NPS	89-667

8.3 CENRAP MODELING TEAM

The CENRAP goals included support to states and tribes to meet the requirements of the Regional Haze Rule and development of scientifically supportable, cost-effective control strategies that the states and tribes may adopt to reduce anthropogenic effects on visibility impairment at Class I areas. One component of CENRAP's support to states and tribes as part of compliance with the Regional Haze Rule is performing emissions and air quality modeling. The CENRAP implemented modeling projects to:

- obtain a better understanding of the causes of visibility impairment;
- identify potential mitigation measures for visibility impairment at Class I areas;
- evaluate the effects of alternative control strategies for improving visibility; and
- project future-year air quality and visibility conditions.

The CENRAP Emissions and Air Quality Modeling Team performed the following activities:

- emissions processing and modeling;
- air quality and visibility modeling simulations;
- analysis, display, and reporting of modeling results; and
- storage and quality assurance of the modeling input and output files.

The team performed work for the CENRAP Modeling Workgroup under the supervision from the CENRAP technical director, the CENRAP executive director, and the chair of the Modeling Workgroup.

8.4 THE 2002 ANNUAL EMISSIONS AND AIR QUALITY MODELING

The CENRAP 2002 annual emissions and air quality modeling started on October 16, 2004. The effort involved the preparation of numerous databases, model simulations, presentations, and reports. Many of the modeling analyses are posted on the CENRAP modeling website at: <http://pah.cert.ucr.edu/aqm/cenrap/index.shtml>. The TCEQ also has many of these modeling analyses available on request only, as these are very large files <http://www.tceq.state.tx.us/implementation/air/sip/sipcontact.html>.

8.4.1 Modeling Protocol

A modeling protocol following EPA guidance was prepared at the outset of the study to serve as an outline for performing the CENRAP emissions and air quality modeling and to communicate the modeling plans to the CENRAP participants. The modeling protocol took into account CENRAP's long-term plan (CENRAP 2003) and the modeling needs of the regional haze SIPs. This modeling protocol is included in this SIP revision as Appendix 8-2: *Modeling Protocol for the CENRAP 2002 Annual Emissions and Air Quality Modeling.*

8.4.2 Quality Assurance Project Plan (QAPP)

A QAPP was prepared for the CENRAP emissions and air quality modeling study (Appendix 8-3: *Quality Assurance Project Plan for Central Regional Air Planning Association Emissions and Air Quality Modeling*) and describes the quality management functions performed by the modeling team. The QAPP is based on the national consensus standards for quality assurance (ANSI/ASQC 1994). It follows EPA's guidelines for quality assurance project plans for modeling (EPA 2002) and for QAPPs (EPA 2001), and takes into account the recommendations from the North American Research Strategy for Tropospheric Ozone (NARSTO) Quality Handbook for modeling projects (NARSTO 1998). The EPA and NARSTO guidance documents were developed specifically for modeling projects, which have different quality assurance concerns than environmental monitoring data collection projects. The work performed in this project involved modeling at the basic research level and for regulatory and planning applications. In order to use model outputs for these purposes, the modeling team must establish that each model is scientifically sound, robust, and defensible by following a project planning process that incorporates the following elements as described in the EPA modeling guidance document.

- A systematic planning process including identification of assessments and related performance criteria.
- Peer-reviewed theory and equations.
- A carefully designed life-cycle development process that minimizes errors.
- Documentation of any changes from original plans.
- Clear documentation of assumptions, theory, and parameterization.
- Input data and parameters that are accurate and appropriate for the analysis.
- Output data.

A key component of the CENRAP emissions and air quality modeling QAPP is the graphical display of model inputs and outputs and multiple peer review of each step of the modeling process. Work products (e.g., emissions plots, model outputs, etc.) have been displayed on the CENRAP modeling website for review by the CENRAP modeling team, modeling workgroup, and others. This website is at: http://pah.cert.ucr.edu/aqm/cenrap/index.shtml.

8.4.3 Model Selection

The selection of the meteorological, emissions, and air quality models for the CENRAP regional haze modeling was based on a review of previous regional haze modeling studies performed in the CENRAP region (e.g., Pitchford et al. 2004; Pun, Chen, and Seigneur 2004; Tonnesen and Morris 2004) as well as elsewhere in the United States (e.g., Morris et al 2004a; Tonnesen et al. 2003; Baker 2004). The CENRAP emissions and air quality modeling protocol (Morris et al.

2004a) provides details on the justification for model selection and the formulation of the different models.

Based on previous work by other Regional Planning Organizations (RPOs) and EPA, CENRAP selected the following models for use in modeling PM and regional haze in the central states:

- **MM5:** The Pennsylvania State University/National Center for Atmospheric Research (PSU/NCAR) Mesoscale Meteorological Model (MM5 Version 3.6 Massively Parallel Processing (MPP)) is a non-hydrostatic, prognostic meteorological model routinely used for urban- and regional-scale photochemical, fine particulate, and regional haze regulatory modeling studies (Anthes and Warner 1978; Chen and Dudhia 2001; Stauffer and Seaman 1990, 1991; Xiu and Pleim 2000).
- **SMOKE:** The Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system is an emissions modeling system that generates hourly gridded speciated emission inputs of mobile, non-road, area, point, fire, and biogenic emission sources for photochemical grid models (Coats 1995; Houyoux and Vukovich 1999). As with most "emissions models," SMOKE is principally an *emission processing system* and not a true *emissions modeling system*. With the exception of mobile and biogenic sources, the purpose of SMOKE is to provide an efficient tool for converting existing base emissions inventory data into the hourly, gridded, speciated, and formatted emission files required by an air quality model.
- **CMAQ:** EPA's Models-3/Community Multiscale Air Quality (CMAQ) modeling system is a "One-Atmosphere" photochemical grid model capable of simulating ozone, PM, visibility, and acid deposition at a regional scale for extended periods of time (Dennis, et al. 1996; Byun et al. 1998a; Byun and Ching 1999; Pleim et al. 2003).
- **CAMx:** ENVIRON's Comprehensive Air Quality Model with Extensions (CAMx) modeling system is also a state-of-science "One-Atmosphere" photochemical grid model capable of simulating ozone, PM, visibility, and acid deposition at a regional scale for extended periods of time. (ENVIRON 2006).

8.4.4 MM5 Meteorological Model Configuration

The Iowa Department of Natural Resources (IDNR) performed the 2002 annual MM5 modeling on a 36 kilometer (km) grid for the continental United States (Johnson 2007). The TCEQ and EPA Region VII carried out MM5 modeling on a 12 km grid covering the central states for portions of 2002.

The MM5 Version 3.63 configuration used in the generation of the meteorological modeling datasets consists of the following (see Table 8-2: *MM5 34 Vertical Layer Definitions for more details*):

- 36 km grid with 34 vertical layers;
- 12 km nested grid for episodic modeling;
- Two-way nesting (without feedback) within the 36 km grid for 12 km runs;
- Initialization and boundary conditions were established using analysis fields generated by the Eta model. The Eta model is a hydrostatic mesoscale model that uses a pressure-based coordinate system, allowing for easier solutions to the equations of motion. The Eta model excels in capturing small-scale meteorological phenomena, especially those induced by terrain, thus improving precipitation forecasts compared to previous mesoscale models (Black 1994);
  - Eta 3D and surface analysis data (ds609.2);
  - NCEP global tropospheric SST data (ds083.0) not used;
  - Observational enhancement (LITTLE_R);
    - NCEP ADP surface obs (ds464.0);
    - NCEP ADP upper-air obs (ds353.4);
- Pleim-Xiu (P-X) land-surface model (LSM);

- Pleim-Chang Asymmetric Convective Mixing (ACM) PBL model;
- Kain-Fritsch 2 cumulus parameterization;
- Mixed phase (Reisner 1) cloud microphysics;
- Rapid Radiative Transfer Model (RRTM) radiation;
- No shallow convection (ISHALLO=0);
- Standard 3D FDDA analysis nudging outside of PBL; and
- Surface nudging of the winds only.

8.4.5 SMOKE Emissions Model Configuration

SMOKE supports area, mobile, fire, and point source emission processing and includes biogenic emissions modeling through a rewrite of the Biogenic Emission Inventory System, Version 3 (BEIS3) (see <http://www.epa.gov/ttn/chief/software.html#pcbeis>). SMOKE has been available since 1996, and has been used for emissions processing in a number of regional air quality modeling applications. In 1998 and 1999, SMOKE was redesigned and improved with the support of the EPA, for use with EPA's Models-3/CMAQ <http://www.epa.gov/asmdnerl/models3>. The primary purposes of the SMOKE redesign were support of: (a) emissions processing with user-selected chemical mechanisms; and (b) emissions processing for reactivity assessments.

As an emissions processing system, SMOKE has far fewer "science configuration" options compared with the MM5 and CMAQ models. Appendix 8-1 summarizes the version of the SMOKE system used and the sources of data used in constructing the required modeling inventories.

8.4.6 CMAQ Air Quality Model Configuration

CENRAP used CMAQ Version 4.5 with the "SOAmods enhancement," or modifications to the secondary organic aerosol (SOA) chemical mechanism as described below, and used the model configuration as shown in Table 8-4. The model was set up and exercised on the same 36 km RPO national grid that Western Regional Air Partnership (WRAP) and Visibility Improvements State and Tribal Association of the Southeast (VISTAS) used. CENRAP performed 12 km CMAQ sensitivity tests and found little change in model performance with a large penalty in computation time. Consequently, on February 7, 2006, the CENRAP Modeling Workgroup decided to proceed with the CENRAP emissions and air quality modeling using just the 36 km national RPO grid (Morris et al. 2006a).

Initial CMAQ 2002 simulations that VISTAS ran found that the model greatly underestimates organic mass carbon (OMC) concentrations, especially in the summer. A review of the CMAQ formulation found that it failed to treat SOA formation from sesquiterpenes and isoprene and also failed to account for the fact that SOA can become polymerized so that it is no longer volatile and stays in the particle form. Thus, VISTAS updated the CMAQ SOA module to include these missing processes and found much improved OMC model performance (Morris et al. 2006c). CENRAP tested the CMAQ Version 4.5 with SOA modification enhancement and found it performed much better for OMC than the standard versions of CMAQ Version 4.5. Therefore, CENRAP adopted CMAQ Version 4.5, with the enhanced SOA modifications (Morris et al. 2006c). CMAQ Version 4.5 is available from the CMAS center <www.cmascenter.org>.

8.4.7 CAMx Air Quality Model Configuration

The CENRAP used CAMx Version 4.40 options similar to those used for CMAQ. The CENRAP initially ran CAMx in side-by-side comparisons with CMAQ. The CENRAP reviewed comparative model performance results and other factors for CAMx Version 4 and CMAQ Version 4.4 with SOA modifications presented at the February 7, 2006, CENRAP Modeling Workgroup meeting. The results indicated that:

- No one model consistently performed better than the other over all species and averaging times;
- Both models performed well for sulfate;
- CMAQ's winter nitrate over-prediction tendency was not as large as CAMx's;
- CAMx performed slightly better than CMAQ for elemental carbon (EC);
- CMAQ performed much better than CAMx for OMC;
- Both models over-predicted fine soil and under-predicted coarse mass (CM);
- CMAQ ran faster than CAMx due to message passing interface (MPI) multi-processing capability;
- CAMx required much less disk space than CMAQ (Morris et al. 2006b).

Based on these factors, the CENRAP selected CMAQ as the lead air quality model for the CENRAP regional haze modeling with CAMx as the secondary corroborative model. However, CAMx also contained a PM Source Apportionment Technology (PSAT) capability that was used widely in the CENRAP modeling. CMAQ does not have this capability. Appendix 8-1 lists the main CAMx configuration for the annual modeling. The CENRAP selected it, in part, to be consistent with the CMAQ model configuration. One exception was that the CAMx PSAT simulations used the Bott advection solver rather than the Piecewise-Parabolic Method (PPM) advection solver. The PPM advection solver is typically used in the standard CAMx and CMAQ runs. However, the Bott advection solver is more computationally efficient and the high computational requirements of the CAMx PSAT runs dictated this choice.

8.4.8 Modeling Domains

The CENRAP conducted emissions and air quality modeling on the 36 km national RPO domain as depicted in Figure 8-1: *National Inter-RPO Modeling Domain*. This domain consists of a 148 by 112 array of 36 km by 36 km grid cells covering the continental United States. Sensitivity simulations were also performed for episodes on a 12 km modeling domain covering the central states; however, the results were very similar to the 36 km results so CENRAP elected to proceed with the 2002 annual modeling using the 36 km domain for computational efficiency (Morris et al. 2006a).

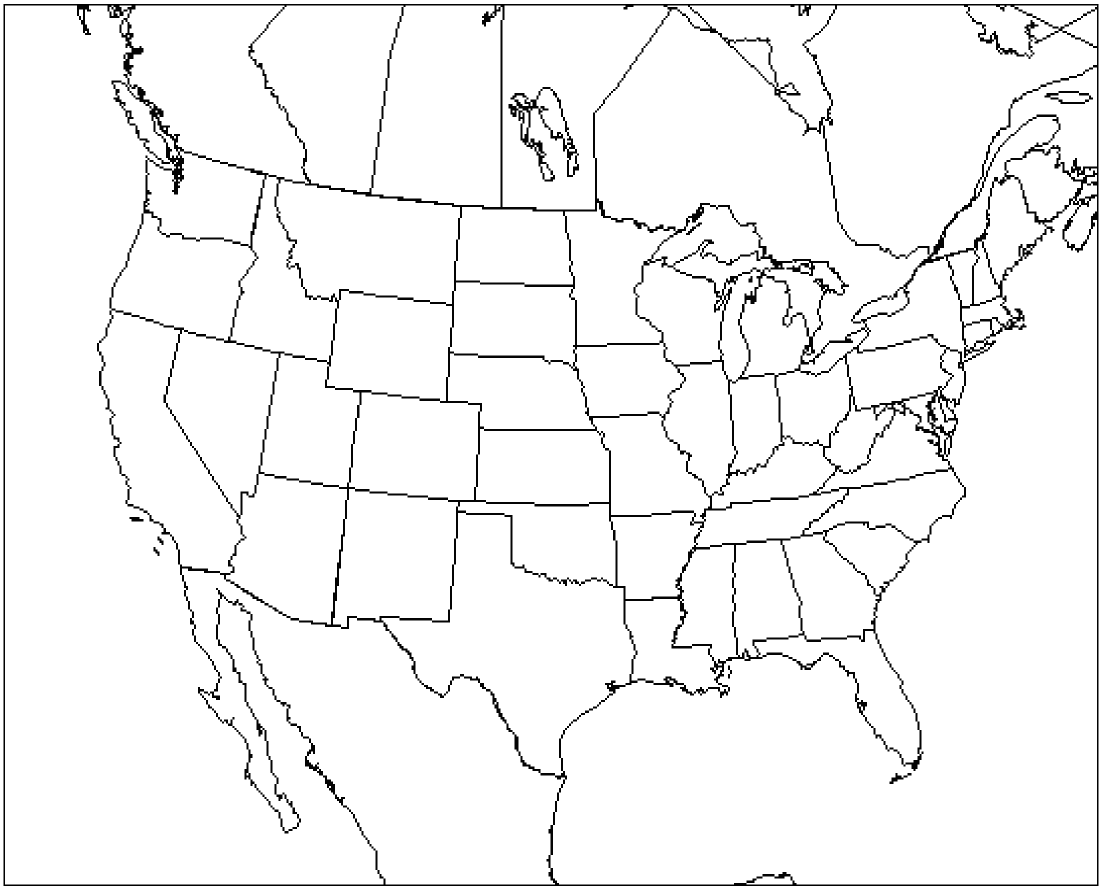


Figure 8-1: National Inter-RPO Modeling Domain
Note: 36 km grid used for the CENRAP 2002 annual SMOKE, CMAQ, and CAMx modeling

8.4.9 Vertical Structure of Modeling Domain

The MM5 meteorological model ran using 34 vertical layers from the surface to a pressure level of 100 millibars (mb) (approximately 15 km above ground level). Both the CMAQ and CAMx air quality models can employ layer collapsing in which vertical layers in the MM5 are combined in the air quality model, which improves computational efficiency. WRAP and VISTAS evaluated the sensitivity of the CMAQ model estimates to the number of vertical layers (Tonnesen et al. 2005, 2006; Morris et al. 2004a). CMAQ model simulations were performed with no layer collapsing (i.e., the same 34 layers as used by MM5) and with various levels of layer collapsing. These studies found that using 19 vertical layers up to 100 mb (i.e., same model top as MM5) and matching the eight lowest MM5 vertical layers near the surface produced nearly identical results as with no layer collapsing. They also found that very aggressive layer collapsing (e.g., 34 to 12 layers) produced results with substantial differences compared to no layer collapsing. Therefore, based on the WRAP and VISTAS sensitivity analysis, CENRAP adopted the 19 vertical layer configuration up to the 100 mb model top. Figure 8-2 displays the definition of the 34 MM5 vertical layers and how they collapsed to 19 vertical layers in the CENRAP air quality modeling.

Table 8-2: MM5 34 Vertical Layer Definitions

MM5					CMAQ 19L				
Layer	Sigma	Pres(mb)	Height(m	Depth(m)	Layer	Sigma	Pres(mb)	Height(m)	Depth(m)
34	**0.000**	**100**	**14662**	**1841**	**19**	**0.000**	**100**	**14662**	**6536**
33	0.050	145	12822	1466		0.050	145		
32	0.100	190	11356	1228		0.100	190		
31	0.150	235	10127	1062		0.150	235		
30	0.200	280	9066	939		0.200	280		
29	**0.250**	**325**	**8127**	**843**	**18**	**0.250**	**325**	**8127**	**2966**
28	0.300	370	7284	767		0.300	370		
27	0.350	415	6517	704		0.350	415		
26	0.400	460	5812	652		0.400	460		
25	**0.450**	**505**	**5160**	**607**	**17**	**0.450**	**505**	**5160**	**1712**
24	0.500	550	4553	569		0.500	550		
23	0.550	595	3984	536		0.550	595		
22	**0.600**	**640**	**3448**	**506**	**16**	**0.600**	**640**	**3448**	**986**
21	0.650	685	2942	480		0.650	685		
20	**0.700**	**730**	**2462**	**367**	**15**	**0.700**	**730**	**2462**	**633**
19	0.740	766	2095	266		0.740	766		
18	**0.770**	**793**	**1828**	**259**	**14**	**0.770**	**793**	**1828**	**428**
17	0.800	820	1569	169		0.800	820		
16	**0.820**	**838**	**1400**	**166**	**13**	**0.820**	**838**	**1400**	**329**
15	0.840	856	1235	163		0.840	856		
14	**0.860**	**874**	**1071**	**160**	**12**	**0.860**	**874**	**1071**	**160**
13	0.880	892	911	158	**11**	**0.880**	**892**	**911**	**158**
12	**0.900**	**910**	**753**	**78**	**10**	**0.900**	**910**	**753**	**155**
11	0.910	919	675	77		0.910	919		
10	**0.920**	**928**	**598**	**77**	**9**	**0.920**	**928**	**598**	**153**
9	0.930	937	521	76		0.930	937		
8	**0.940**	**946**	**445**	**76**	**8**	**0.940**	**946**	**445**	**76**
7	**0.950**	**955**	**369**	**75**	**7**	**0.950**	**955**	**369**	**75**
6	**0.960**	**964**	**294**	**74**	**6**	**0.960**	**964**	**294**	**74**
5	**0.970**	**973**	**220**	**74**	**5**	**0.970**	**973**	**220**	**74**
4	**0.980**	**982**	**146**	**37**	**4**	**0.980**	**982**	**146**	**37**
3	**0.985**	**986.5**	**109**	**37**	**3**	**0.985**	**986.5**	**109**	**37**
2	**0.990**	**991**	**73**	**36**	**2**	**0.990**	**991**	**73**	**36**
1	**0.995**	**995.5**	**36**	**36**	**1**	**0.995**	**995.5**	**36**	**36**
0	**1.000**	**1000**	**0**	**0**	**0**	**1.000**	**1000**	**0**	**0**

Note: Scheme for collapsing the 34 layers down to 19 layers for the CENRAP CMAQ, and CAMx 2002 annual modeling.

8.4.10 2002 Calendar Year Selection

The CENRAP selected the calendar year 2002 for regional haze annual modeling as described in the modeling protocol (Morris et al. 2004a). The EPA's applicable guidance on $PM_{2.5}$ and regional haze modeling at that time (EPA 2001) identified specific goals to consider when selecting modeling periods for use in demonstrating reasonable progress in attaining the regional haze goals. Since there is much in common with the goals for selecting episodes for annual and episodic $PM_{2.5}$ attainment demonstrations as well as regional haze, EPA's current guidance addresses all three in a common document (EPA 2007). At the time of the modeling period selection, EPA had also published an updated summary of $PM_{2.5}$ and Regional Haze Modeling Guidance (Timin 2002) that served, in some respects, as an interim placeholder until issuance of the final guidance as part of the $PM_{2.5}$ and regional haze National Ambient Air Quality Standards implementation process published in April 2007 (EPA 2007). The interim EPA modeling guidance for episode selection (EPA 2001; Timin 2002) was consistent with the final EPA regional haze modeling guidance (EPA 2007).

EPA recommends that the selection of a modeling period derive from three principal criteria:

- a variety of meteorological conditions should be covered that include the types of meteorological conditions that produce the worst 20 percent and best 20 percent visibility days at Class I areas in the CENRAP states during the 2000 through 2004 baseline period;
- to the extent possible, the modeling data base should include days for which enhanced databases (i.e., beyond routine aerometric and emissions monitoring) are available; and
- sufficient days should be available such that relative response factors (RRFs) can be based on several (i.e., >15) days.

For regional haze modeling, the guidance goes further by suggesting that the preferred approach is to model a full, *representative* year (EPA 2001, pg. 188). Moreover, calculations of the required RRF values should be based on model results averaged over the 20 percent worst and 20 percent best visibility days determined for each Class I area based on monitoring data from the 2000 through 2004 baseline period. More recent EPA guidance (Timin 2002) suggests that states should model at least the 10 worst and 10 best visibility days at each Class 1 area. EPA also lists several "other considerations" to bear in mind when choosing potential PM and regional haze episodes including:

- choose periods that have already been modeled;
- choose periods that are drawn from the years upon which the current design values are based;
- include weekend days among those chosen; and
- choose modeling periods that meet as many episode selection criteria as possible in the maximum number of nonattainment or Class I areas as possible.

Due to limited available resources, CENRAP modeled a single calendar year. The Regional Haze Rule uses the five-year baseline period of 2000 through 2004 as the starting point for projecting future-year visibility. Thus, the modeling year should be selected from this five-year baseline period. The CENRAP selected the 2002 calendar year, which lies in the middle of the 2000 through 2004 baseline, for the following reasons.

- Based on available information, 2002 appears to be a fairly typical year in terms of meteorology for the five-year baseline period of 2000 through 2004.
- 2003 and 2004 appeared to be colder and wetter than typical in the eastern United States.
- The enhanced Interagency Monitoring of Protected Visual Environments (IMPROVE) and IMPROVE protocol sites and supersites PM monitoring data were fully operational by 2002. Much less IMPROVE monitoring data was available during 2000 through 2001, especially in the CENRAP region.
- IMPROVE data for 2003 and 2004 were not yet available at the time that the CENRAP modeling was initiated.
- The other RPOs were using 2002.

8.4.11 Initial Concentrations and Boundary Conditions

The CMAQ and CAMx models were operated separately for each of four quarters of the 2002 year using an approximate 15-day spin-up period (i.e., the models started approximately 15 days before the first day of interest in each quarter to limit the influence of the assumed initial concentrations, e.g., start June 15 for the third quarter, whose first day of interest is July 1). Sensitivity simulations demonstrated that with fifteen initialization days, the influence of initial concentrations was minimal using the 36 km Inter-RPO continental United States modeling domain. Consequently, clean initial concentrations were specified in the CMAQ and CAMx modeling using a 15-day spin-up period.

Boundary conditions (i.e., the assumed concentrations along the later edges of the 36 km modeling domain, see Figure 8-1) used the results from a 2002 simulation by the GEOS-Chem global circulation/chemistry model. GEOS-Chem is a three-dimensional global chemistry model driven by assimilated meteorological observations from the Goddard Earth Observing System (GEOS) of the NASA Global Modeling and Assimilation Office. Research groups around the world apply it to a wide range of atmospheric composition problems, including future climates and planetary atmospheres using general circulation model meteorology to drive the model. The Atmospheric Chemistry Modeling Group at Harvard University provides central management and support of the model.

VISTAS coordinated a joint RPO study in which Harvard University applied the GEOS-Chem global model for the 2002 calendar year (Jacob, Park, and Logan 2005). The University of Houston was retained to process the 2002 GEOS-Chem output into boundary conditions for the CMAQ model (Byun 2004).

There were several quality assurance (QA) checks of the boundary conditions generated from the 2002 GEOS-Chem output. The first QA check was a range check to assure reasonable values. The boundary conditions were compared against the GEOS-Chem outputs to assure the mapping and interpolation were performed correctly. The University of Houston supplied the code to map the GEOS-Chem output to the CMAQ boundary conditions format. Environ reviewed the code and duplicated generation of the boundary conditions for several time periods during 2002.

8.4.12 Emission Input Preparation

The CENRAP SMOKE emissions modeling used updated 2002 emissions data for the United States (Pechan 2005c,e; Reid et al. 2004a,b), 1999 emissions data for Mexico (ERG 2006), and 2000 emissions data for Canada. These data were used to generate a final 2002 Base G Typical (Typ02G) annual emissions database. Numerous iterations of the emissions modeling were conducted using interim databases before arriving at the final Base G emission inventories (e.g., Morris et al. 2005). The 2018 Base G base case emissions (Base18G) for most source categories in the United States were based on projections of the 2002 inventory assuming growth and control (Pechan 2005d). 2018 EGU emissions were based on the run 2.1.9 of the Integrated Planning Model (IPM) updated by the CENRAP states. Canadian emissions for the Base18G scenario were based on a 2020 inventory. The Mexican 1999 inventory was held constant for 2018.

The Typ02G and Base18G emission inventories represent significant improvements to the preliminary emissions modeling CENRAP performed (Morris et al. 2005). While the preliminary 2002 modeling served to develop the infrastructure for modeling large emissions data sets and producing annual emissions simulations, much of the input data (both as inventories and ancillary data) were placeholders for actual 2002 data being prepared through calendar year 2005. As actual 2002 data sets became available, they were integrated into the SMOKE modeling and QA system that was developed during the preliminary modeling, to produce a high-quality emissions data set for use in the final CMAQ and CAMx modeling. The addition of entirely new inventory categories, like marine shipping, added complexity to the modeling. By the end of the emissions data collection phase, there were 23 separate emissions processing streams covering a variety of source categories necessary to generate model-ready emission inputs for the 2002 calendar year. Details on the emissions modeling are in Chapter 2 and Appendix B of the TSD (Appendix 8-1).

8.4.13 Meteorological Data Input Preparation
The IDNR conducted the 2002 36 km MM5 meteorological modeling and also performed a preliminary model performance evaluation (Johnson, 2007). CENRAP performed an additional MM5 evaluation of the CENRAP 2002 36 km MM5 simulation that included a comparative evaluation against the final VISTAS 2002 36 km MM5 and an interim WRAP 2002 36 km simulation (Kemball-Cook et al. 2004). Kemball-Cook and co-workers (2004) found the following in the comparative evaluation of the CENRAP, WRAP, and VISTAS 2002 36 km MM5 simulations (details in Appendix A of the TSD):

Surface Meteorological Performance within the CENRAP Region
- The three MM5 simulations (CENRAP, VISTAS, and WRAP) obtained comparable model performance for winds and humidity that were within model performance benchmarks.
- The WRAP MM5 simulation obtained better temperature model performance than the other two simulations due to the use of surface temperature data assimilation.
    - In the final WRAP MM5 simulation the use of surface temperature assimilation was dropped because it introduced instability in the vertical structure of the atmosphere.
- For all three runs, the northern portion of CENRAP domain (e.g. Minnesota) had a cold bias in winter and a warm bias in summer.

Surface Meteorological Performance outside the CENRAP Region
- All three runs had similar surface wind model performance in the western United States that was outside the model performance benchmarks.
- For temperature, the WRAP MM5 simulation had the best performance overall due to the surface temperature data assimilation that was dropped in the final WRAP run.
- The three runs had comparable humidity performance, although WRAP exhibited a larger wet bias in the summer and in the southwestern United States.

Upper-Air Meteorological Performance
- The VISTAS and CENRAP MM5 simulations were better able to reproduce the deep convective summer boundary layers compared to the WRAP MM5 simulations, which exhibited a smoother decrease in temperature with increase in altitude.
- CENRAP and VISTAS MM5 simulations better simulated the surface temperature inversions than WRAP.
- WRAP was better able to simulate the surface temperature.
- All three models exhibited similar vertical wind profiles.

Precipitation Performance
- In winter, all three MM5 simulations exhibited similar, fairly good performance in reproducing the spatial distribution and magnitudes of the monthly average observed precipitation.
- In summer, all runs had a wet bias, particularly in the desert southwest where the interim WRAP run had the largest wet bias.

In conclusion, the VISTAS simulation appeared to perform best, and the CENRAP MM5 model performance was generally between the VISTAS and WRAP performance, with performance more similar to VISTAS than WRAP. Although the interim WRAP MM5 simulation performed best for surface temperature due to the surface temperature data assimilation, the surface temperature assimilation degraded the MM5 upper-air performance including the ability to assimilate surface inversions and was ultimately dropped from the final WRAP MM5 simulations (Kemball-Cook et al. 2005).

The IDNR 12 km MM5 simulations were also evaluated and compared with the performance of the 36 km MM5 simulation (Johnson et al. 2007). The IDNR 36 km and 12 km MM5 model performance was similar (Johnson 2007), which supported the findings of the CMAQ and CAMx 36 and 12 km sensitivity simulations that there was little benefit of using a 12 km grid for simulating regional haze at rural Class I areas (Morris et al. 2006a). However, as noted by Tonnesen and co-workers (2005; 2006) and EPA modeling guidance (1991; 1999; 2001; 2007) this finding does not necessarily hold for eight-hour ozone and $PM_{2.5}$ modeling that is characterized by sharper concentration gradients and frequently occurs in the urban environment as compared to the more rural nature of regional haze.

8.4.14 Photolysis Rate Model Input

Several chemical reactions in the atmosphere are initiated by the photodissociation of various trace gases. To accurately represent the complex chemical transformations in the atmosphere, accurate estimates of these photodissociation rates must be made. The Models-3/CMAQ system includes the JPROC processor, which calculates a table of clear-sky photolysis rates (or J-values) for a specific date. JPROC uses default values for total aerosol loading and provides the option to use default ozone column data or to use measured total ozone column data. These data come from the Total Ozone Mapping Spectrometer (TOMS) satellite data. TOMS data that is available at 24-hour averages was obtained from http://toms.gsfc.nasa.gov/eptoms/ep.html. Day-specific TOMS data was used in the CMAQ radiation model (JPROC) to calculate photolysis rates. The TOMS data were missing or erroneous for several periods in 2002: August 2-12, June 10, and November 18-19. Thus, the TOMS data for August 1, 2002, was used for August 2-7 and TOMS data for August 13 was used for August 8-12. Similarly, TOMS data for June 9 was used for June 10 and data for August 17 was used for August 18-19. Note that the total column of ozone in the atmosphere is dominated by stratospheric ozone, which has very little day-to-day variability, so the use of TOMS data within a week or two of an actual day introduces minimal uncertainties in the modeling analysis.

JPROC produces a "look-up" table that provides photolysis rates as a function of latitude, altitude, and time (in terms of the number of hours of deviation from local noon, or hour angle). In the current CMAQ implementation, the J-values are calculated for six latitudinal bands (10º, 20º, 30º, 40º, 50º, and 60º N), seven altitudes (0 km, 1 km, 2 km, 3 km, 4 km, 5 km, and 10 km), and hourly values up to plus or minus 8 hours of deviation from local noon. During model calculations, photolysis rates for each model grid cell are estimated by first interpolating the clear-sky photolysis rates from the look-up table using the grid cell latitude, altitude, and hour angle, followed by applying a cloud correction (attenuation) factor based on the cloud inputs from MM5.

The photolysis rates input file was prepared as separate look-up tables for each simulation day. Photolysis files are ASCII files that were visually checked for selected days to verify that photolysis rates are within the expected ranges.

The Tropospheric Ultraviolet and Visible (TUV) Radiation Model (http://cprm.acd.ucar.edu/Models/TUV/) is used to generate the photolysis rates input file for CAMx. TOMS ozone data and land use data were used to develop the CAMx Albedo/Haze/Ozone input file for 2002. As for CMAQ, the missing TOMS data period in the fall of 2002 was filled in using observed TOMS data on either side of the missing period using the same procedures as described above for CMAQ. Default land use specific albedo values were used and a constant haze value used, corresponding to rural conditions over North America.

8.4.15 Air Quality Data Input Preparation

Air quality data used with the CMAQ and CAMx modeling systems include: (1) initial concentrations that are the assumed initial three-dimensional concentrations throughout the modeling domain; (2) the boundary conditions that are the concentrations assumed along the lateral edges of the RPO national 36 km modeling domain; and (3) air quality observations that are used in the model performance evaluation (MPE). The MPE is discussed in Chapter 3 and Appendix C of the TSD.

As previously noted, CMAQ default clean initial concentrations were used along with an approximately 15-day spin up (initialization) period to eliminate any significant influence of the initial concentrations on the modeled concentrations for the days of interest. The same initial concentrations were used with CAMx. Both CMAQ and CAMx were run for each quarter of the year. Each quarter's model run was initialized 15 days prior to the first day of interest (e.g., for the third quarter, July-August-September, the model was initialized on June 15, 2002, with the first modeling day of interest July 1, 2002). The CMAQ boundary conditions for the inter-RPO 36 km continental United States grid (Figure 8-1) were based on day-specific three-hour averages from the output of the GEOS-Chem global simulation model of 2002 (Jacob, Park, and Logan 2005). The 2002 GEOS-Chem output was mapped to the species and vertical layer structure of CMAQ and interpolated to the lateral boundaries of the 36 km grid shown in Figure 8-1 (Byun 2004).

Table 8-3 summarizes the surface air quality monitoring networks and the number of sites available in the CENRAP region that were used in the model performance evaluation. Data from these monitoring networks were also used to evaluate the CMAQ and CAMx models outside of the CENRAP region.

Table 8-3: Ground-level Ambient Data Monitoring Networks and Stations for 2002

Monitoring Network	Chemical Species Measured	Sampling Frequency; Duration	Approximate Number of Monitors
IMPROVE	Speciated $PM_{2.5}$ and PM_{10}	1 in 3 days; 24 hr	11
CASTNET	Speciated $PM_{2.5}$ and Ozone	Hourly, Weekly; 1 hr, 1 Week	3
NADP	Wet SO_4, Wet NO_3, and Wet NH_4	Weekly	23
EPA-STN	Speciated $PM_{2.5}$	Varies; Varies	12
AIRS/AQS	CO, NO, NO_2, NO_X, and Ozone	Hourly; Hourly	25

Note: Available in the CENRAP states for calendar year 2002 and used in the model performance evaluation.

8.4.16 2002 Base Case Modeling and Model Performance Evaluation

CENRAP's modeling contractors evaluated the CMAQ and CAMx modeling results against ambient measurements of PM species, gas-phase species, and wet deposition. Table 8-6 summarizes the networks used in the model evaluation, the species measured, and the averaging times and frequency of the measurements. CENRAP carried out numerous iterations of CMAQ and CAMx 2002 base case simulations and model performance evaluations during the course of the CENRAP modeling study. Most of them are posted on the CENRAP modeling website (http://pah.cert.ucr.edu/aqm/cenrap/cmaq.shtml), and summaries of the work are in previous reports and presentations for CENRAP (e.g., Morris et al. 2005; 2006a, b). Chapter 3 and Appendix C of the TSD provide details on the final 2002 Base F 36 km CMAQ base case modeling performance evaluation. Because of the similarity between 2002 Base F and 2002 Base G and resource constraints, CENRAP did not repeat the model evaluation for Base G. In general, the model performance of the CMAQ and CAMx models for sulfate (SO_4) and elemental carbon (EC) was good. Model performance for nitrate (NO_3) was variable, with a summer underestimation and winter overestimation bias. Performance for organic carbon mass (OMC) was also variable, with the inclusion of the SOA modification enhancement in CMAQ Version 4.5 greatly improving the CMAQ summer OMC model performance (Morris et al., 2006c). Model performance for soil and CM was generally poor. Part of the poor performance for fine soil and coarse mass appear to be due to measurement-model incommensurability. The

IMPROVE measured values are due, in part, to local blowing dust sources that are not captured in the model's emission inputs and the 36 km grid resolution is not conducive to modeling localized events. Also, the model usually fails to simulate locally high winds creating dust clouds in one part of the Chihuahuan Desert that later move with lower speed winds to affect Guadalupe Mountains National Park or other Class I areas. Figures 8-2 and 8-3 show the observed light extinction compared to the modeled light extinction at Big Bend National Park and Guadalupe Mountains National Park.

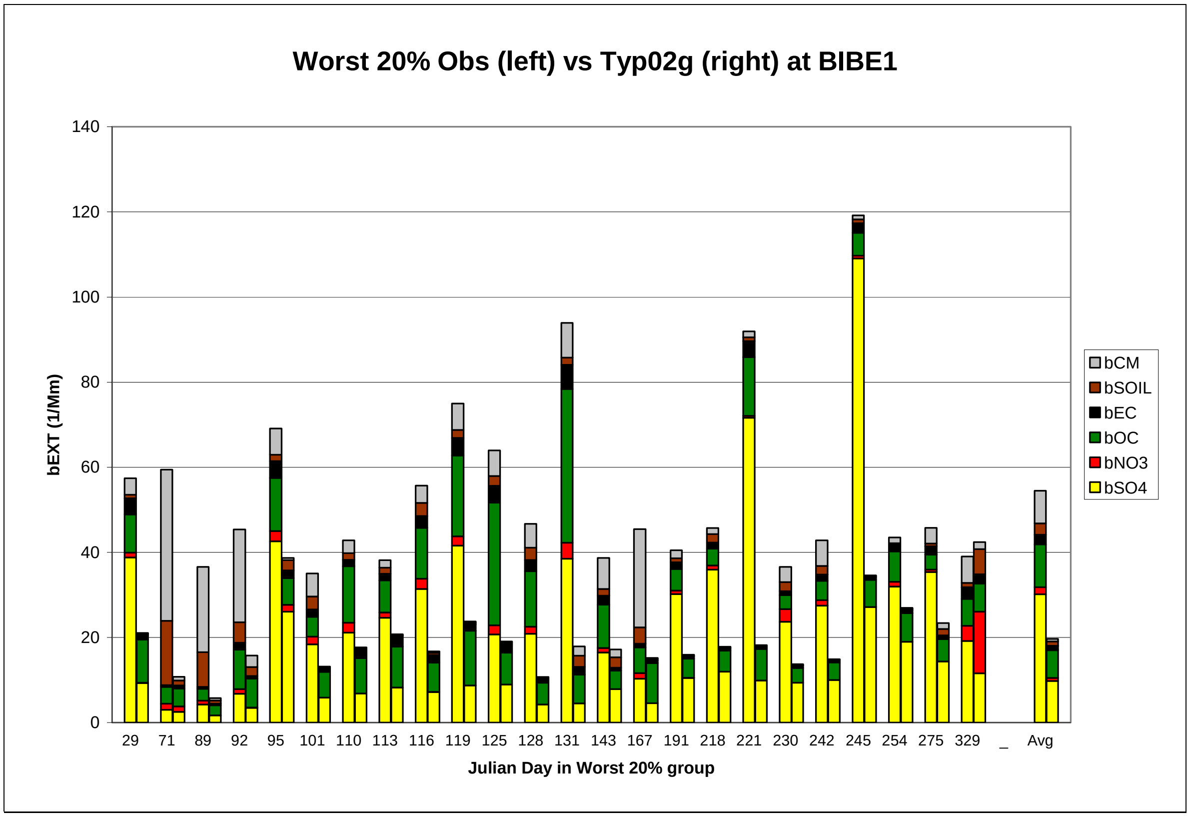


Figure 8-2: Observed and Base Case Modeled Concentrations at Big Bend
Note: Extinction calculated using the new IMPROVE equation using observed concentrations and base case modeled concentrations at Big Bend National Park. The new IMPROVE equation calculations relied on 2002 IMPROVE data for the worst 20 percent of monitored days and the modeling used the 2002 Base F emission inventory.

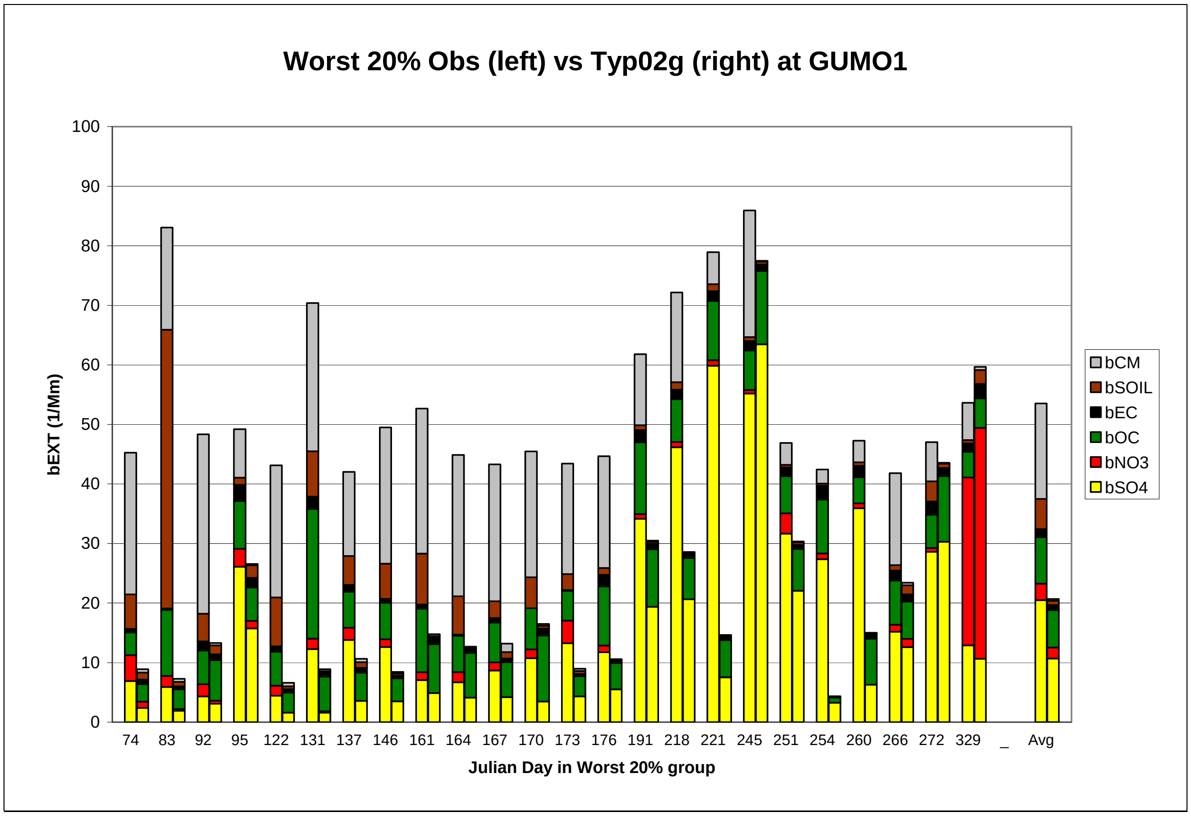


Figure 8-3: Observed and Base Case Modeled Concentrations at Guadalupe Mountains
Note: Extinction calculated using the new IMPROVE equation using observed concentrations and base case modeled concentrations at Guadalupe Mountains National Park. The new IMPROVE equation calculations relied on 2002 IMPROVE data for the worst 20 percent of monitored days and the modeling used the 2002 Base F emission inventory.

8.4.17 2018 Modeling and Visibility Projections

Emissions for the 2018 base case were generated following the procedures discussed in Chapter 2 of the TSD. Emissions in 2018 for electrical generating units (EGUs) were based on simulations of the Integrated Planning Model (IPM) that took into account the effects of the Clean Air Interstate Rule (CAIR) on emissions from EGUs in CAIR states using an IPM realization of a CAIR cap and trade program. For the purposes of this SIP revision, the TCEQ is assuming that the federal appellate court remand of CAIR to EPA will result in a replacement program providing comparable emissions reductions at EGUs before 2018. Emissions for on-road and non-road mobile sources were based on activity growth and emissions factors from the EPA MOBILE Vehicle Emission Modeling Software Version 6 (MOBILE6) and NONROAD models, respectively. Area sources and non-EGU point sources were grown to 2018 levels using Economic Growth Analysis System (EGAS) (Pechan 2005d). The Canadian year 2000 emissions inventory was replaced by a Canadian 2020 emissions inventory for the 2018 CMAQ/CAMx simulations.

The following sources were assumed to remain constant between the 2002 and 2018 base case simulations:

- biogenic VOC and NO_X emissions from the Biogenic Emissions Inventory System Version 3 (BEIS3) model;
- wind-blown dust associated with non-agricultural sources (i.e., natural wind-blown fugitive dust);

- off-shore emissions associated with off-shore marine and oil and gas production activities;
- emissions from wildfires;
- emissions from Mexico; and
- global transport (i.e., emissions due to boundary conditions from the 2002 GEOS-Chem global chemistry model).

The results from the 2002 and 2018 CMAQ and CAMx simulations were used to project 2018 PM levels from which 2018 visibility estimates were obtained. The 2002 and 2018 modeling results were used in a relative sense to scale the observed PM concentrations from the 2000 through 2004 baseline and the IMPROVE monitoring network to obtain the 2018 PM projections. The modeled scaling factors are called relative response factors (RRFs) and are constructed as the ratio of modeling results for the 2018 model simulation to the 2002 model simulation. Two important regional haze metrics are the average visibility for the worst 20 percent and best 20 percent days from the 2000 through 2004 five-year baseline. For the 2018 visibility projections, EPA guidance recommends developing Class I area and PM species specific RRFs using the average modeling results for the worst 20 percent days during the 2002 modeling period and the 2002 and 2018 emission scenarios. The results of the CENRAP 2018 visibility projections following EPA guidance procedures (EPA 2007a) are provided in Chapter 4 and Appendix D of the TSD in Appendix 8-1 of this SIP revision. CENRAP has also developed alternative procedures for visibility projections that are discussed in Chapter 5 and Appendix D of the TSD. For example, much of the CM impact at Class I area IMPROVE monitors are believed to be natural and primarily from local sources that are subgrid-scale to the modeled 36 km grid so are not represented in the modeling. Thus, one alternative visibility projection approach is to set the RRF for CM to 1.0. That is, the CM impacts in 2018 are assumed to be the same as in the observed 2000-2004 baseline. Similarly, the soil impacts at IMPROVE monitors are likely mainly due to local dust sources so another alternative approach is to set the RRFs for both CM and soil to 1.0.

The 2018 visibility projections for the worst 20 percent days are compared against a 2018 point on the uniform rate of progress (URP) glide path or the “2018 URP point.” The 2018 URP point is obtained by constructing a linear visibility glide path in deciviews from the observed 2000 through 2004 baseline (EPA 2003a) for the worst 20 percent days to the 2064 natural conditions (EPA 2003b). Where the linear glide path crosses the year 2018 is the 2018 URP point. States may use the modeled 2018 visibility to help define their 2018 RPG in their Regional Haze SIPs. The 2018 URP point is used as a benchmark to help judge the 2018 modeled visibility projections and the state’s RPG. However, as noted in EPA’s RPG guidance, “The glide path is not a presumptive target, and states may establish a RPG that provides for greater, lesser, or equivalent visibility improvement as that described by the glide path” (EPA 2007b). Chapter 4 and Appendix D of the TSD present the 2018 visibility projections for the CENRAP Class I areas and their comparisons with the 2018 URP point using EPA default visibility projection procedures (EPA 2007a) and EPA default URP glide paths (EPA 2003a,b; 2007b).

Various techniques have been developed to display the 2018 visibility modeling results including “DotPlots” that display the 2018 visibility projections as a percentage of meeting the 2018 point on the URP glide path. A value of 100 percent on the DotPlot indicates that the Class I area is predicted to meet the 2018 point on the URP glide path. Over 100 percent means the 2018 visibility projection obtains more visibility improvements (reductions) than required to meet the 2018 point on the URP glide path (i.e., projected value is below the glide path). Less than 100 percent indicates that fewer visibility improvements are projected than are needed to meet the 2018 point URP on the glide path (i.e., above the glide path). Figure 8-4 displays a DotPlot that compares the 2018 visibility projections from the CENRAP 2018 Base G CMAQ simulation with the 2018 URP point using the EPA default RRFs and alternative RRFs that set the CM and soil RRFs to unity (i.e., assume CM and soil are natural so remain unchanged from the 2000-2004 baseline). For these results, the 2018 visibility projections at the Hercules Glades (HEGL1) Class I area meets the 2018 point on the URP glide path (100 percent), whereas the 2018 visibility projections at Caney Creek (CACR), Mingo (MING), and Upper Buffalo (UPBU) achieve more visibility improvements than needed to meet the 2018 URP point so are below the 2018 URP glide path. However, the 2018 visibility projections at Breton come up slightly short (approximately 5 percent) of meeting the 2018 point on the URP glide path and Wichita Mountains (WIMO) comes up approximately 40 percent short of meeting the 2018 point on the URP glide path. Class I areas at the northern (e.g., VOYA, BOWA, and ISLE) and southern (e.g., BIBE and GUMO) boundaries of the United States also fall short of achieving the 2018 URP point.

High contributions of international transport and/or natural sources (e.g., windblown dust) affect the ability of these Class I areas to be on the URP glide path calculated using the default estimates produced by the Natural Conditions II Committee (NC-II). Chapters 4 and 5 of the TSD in Appendix 8-1 discuss these issues in more detail.

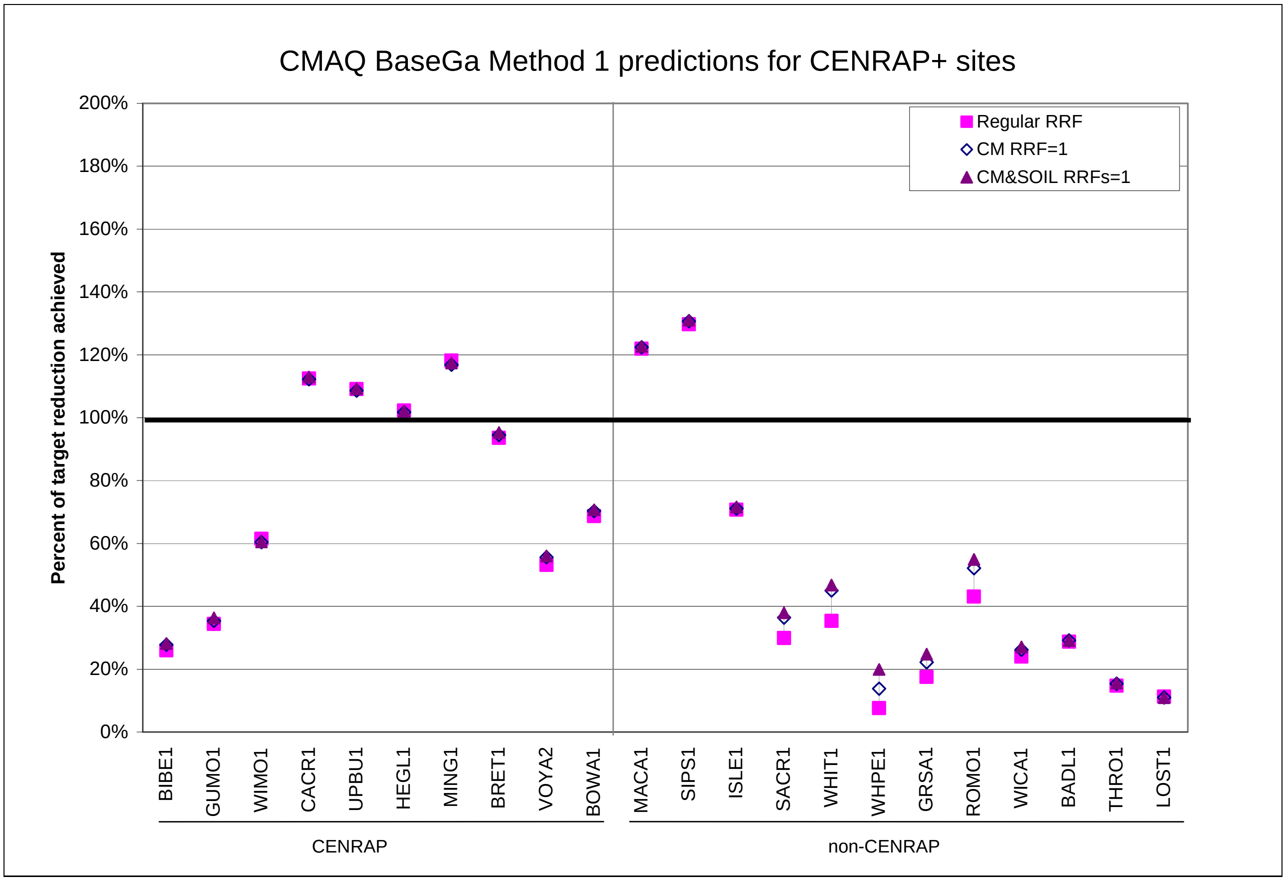


Figure 8-4: 2018 Visibility Projections Expressed as Percent of Meeting the 2018 URP Point
Note: Using the default NC-II estimates of natural conditions.

BADL Badlands Wilderness Area
BOWA Boundary Waters Canoe Area Wilderness
CACR Caney Creek Wilderness Area
HEGL Hercules-Glades Wilderness Area
ISLE Isle Royale National Park
LOST Lostwood Wilderness Area
MACA Mammoth Cave National Park
SIPS Sipsey Wilderness Area
THRO Theodore Roosevelt National Park
UPBU Upper Buffalo Wilderness Area
VOYA Voyageurs National Park
WICA Wind Cave National Park

8.4.18 Additional Supporting Analysis

CENRAP performed numerous supporting analyses of its modeling results including analyzing alternative glide paths and 2018 projection approaches and performing confirmatory analysis of the 2018 visibility projections. Details on the additional supporting analysis are contained in Chapter 5 of the TSD, which include:

- The CENRAP 2018 visibility projections were compared with those generated by VISTAS and MRPO. There was close agreement between the CENRAP and VISTAS 2018 visibility projections at almost all common Class I areas, with the exception of Breton Island where the CENRAP's projections were slightly more optimistic than VISTAS'. The MRPO 2018 visibility projections were less optimistic than CENRAP's at the four Arkansas-Missouri Class I areas. This difference may have been due to CENRAP's BART emission controls in CENRAP states that were not included in the 2018 MRPO inventory.
- Extinction based glide paths were developed and the CENRAP 2018 visibility projections were shown to produce nearly identical estimates of achieving the 2018 URP point when using total extinction glide paths as when the linear deciview glide paths were used. With the extinction based glide paths the analysis of 2018 URP could be made on a PM species-by-species basis where it was shown that 2018 extinctions due to SO_4 and, to a lesser extent, NO_3 and EC, achieve the URP, but the other species do not and, in fact, extinction due to soil and CM is projected to get worse.
- 2018 visibility projections were made using EPA's Modeled Attainment Test Software (MATS) and the CENRAP Typ02G and Base18G modeling results. The CENRAP 2018 visibility projections agreed with those generated by MATS with three exceptions: Breton, Boundary Waters, and Mingo Class I areas. At these three Class I areas MATS did not produce any 2018 visibility projections due to insufficient observed 2000-2004 data in the raw IMPROVE database to produce a valid baseline. CENRAP used filled data for these three Class I areas.
- PM PSAT modeling was conducted to estimate the contributions to visibility impairment at Class I areas by source region (e.g., states) and major source category. Source contributions were obtained for a 2002 and 2018 base case and the PSAT modeling results were implemented in a PSAT Visualization Tool that was provided to CENRAP states and others. Major findings from the PSAT source apportionment modeling include the following:
    - Sulfate from elevated point sources was the highest source category contribution to visibility impairment at CENRAP Class I areas for the worst 20 percent days.
    - International transport contributed significantly to visibility impairment at CENRAP Class I areas on the southern (BIBE and GUMO) and northern (BOWA and VOYA) borders of the United States and to a lesser extent at WIMO.
- Alternative visibility projections were made, assuming that CM alone, and CM and soil were natural in origin.
- Visibility projections were made using an alternative model (CAMx) that verified the projections made by CMAQ.
- The effects of international transport were examined several ways indicating that the inability of the 2018 visibility projections to achieve the 2018 URP point at the northern and southern border Class I areas was due to high contributions due to International Transport.

Visibility trends for the worst 20 percent days, best 20 percent days, and all monitored days were analyzed at CENRAP Class I areas using the period of record IMPROVE observations. At most Class I areas there were insufficient years of data to produce a discernable trend. In addition, there was significant year-to-year variability in visibility impairment with episodic events (e.g., wildfires and windblown dust) confounding the analysis.

CHAPTER 9. BEST AVAILABLE RETROFIT TECHNOLOGY

On July 6, 2005, the EPA published final amendments to its 1999 Regional Haze Rule including Appendix Y, the final guidance for Best Available Retrofit Technology (BART) determinations in the Federal Register (70 FR 39104-39172). The BART rule requires the installation of BART on emission sources that fit specific criteria and "may reasonably be anticipated to cause or contribute" to visibility impairment in any Class I area (Appendix 9-1: U.S. EPA BART Rule).

9.1 BART-ELIGIBLE SOURCES IN TEXAS

The Texas Commission on Environmental Quality's (TCEQ) BART rule adopted on January 10, 2007, identifies potentially affected sources as those:

- belonging to one of 26 industry source categories;
- having the potential to emit (PTE) 250 tons per year (tpy) or more of any visibility-impairing pollutant; and
- not operating prior to August 7, 1962, and in existence on August 7, 1977 (Appendix 9-2: *Texas BART Rule*).

The state is not required to make a determination of BART for SO_2 or NO_X if a BART-eligible source has the PTE less than 40 tons per year of such pollutant(s) or less than 15 tons per year for PM_{10}.

Texas has made the determination that participation in CAIR is equivalent to BART. This exempts EGUs impacted by CAIR from a BART analysis for SO_2 and NO_x. As of the date of this SIP revision, CAIR remains in effect until replaced by EPA rule consistent with the D.C. Circuit Court of Appeals' remand of CAIR back to EPA. As a result, EGUs subject to the cap and trade system established by CAIR have not been evaluated for BART for SO_2 and NO_x. The TCEQ will take appropriate action if CAIR is not replaced with a system that the US EPA considers to be equivalent to BART.

The TCEQ has also adopted the model plants, or option 2, developed by the EPA; this is an approach for using model plants to exempt individual sources with common characteristics (70 FR 39162-3). Sources which meet this model plant exemption are considered not to be negatively impacting visibility at Class I areas and are therefore not required to complete a BART analysis.

The TCEQ manages emissions and emissions-related data in the State of Texas Air Reporting System (STARS). The STARS was used to determine which sources were potentially BART-eligible. This database does not store any permit related information such as build dates or permitted allowable emission levels. As a result of these database limitations the TCEQ surveyed companies regarding their potential to emit and construction dates in order to complete the initial BART determination (Appendix 9-3: *A Sample Survey*).

Texas Source Survey

Each of the 26 BART source categories were addressed for Texas. The Standard Industrial Codes (SIC) as well as the applicable Source Classifications Codes (SCC) were identified by TCEQ staff using the 26 applicable source categories listed in Section III(H) of the 40CFR Part 51, Regional Haze Regulations. This list was compared with other states and regional planning organization lists for completeness. The initial survey population was based on this SIC/SCC list only.

As provided for in the EPA guidance document for BART, the TCEQ chose to adopt a model plant analysis to reasonably eliminate smaller sources of NO_X and SO_2 emissions which were distant from a Class I area. The EPA guidance provides exemption of sources from consideration if their actual emission of NO_X or SO_2 (or combination of NO_X and SO_2) were less than 500 tpy as long as they were located more than 50 kilometers (km) from any Class I area; sources were also exempted if their 2002 emissions of NO_X or SO_2 (or combination of NO_X and SO_2) were less than 1,000 tpy as long as they were located more than 100 km from any Class I area. The TCEQ reduced the emission threshold to 750 tpy for sources greater than 100 km and 375 tpy for sources greater than 50 km to capture sources that might not have met EPA's threshold based only on their 2002 emissions levels. Given their distance from Class I areas, the relatively low emissions from the screened out sources are unlikely to significantly impact visibility at those areas.

Based on an estimate by TCEQ staff, the actual emissions are typically 80 percent of the permitted amount. Using this estimate, staff assumed that companies with actual volatile organic compounds (VOC) emissions of 200 tpy would reasonably have a permitted potential to emit of 250 tpy. Companies with the applicable source categories and actual emissions at their sites of 200 tpy or more of VOC or PM_{10} were also asked to complete the survey. In 2002, $PM_{2.5}$ data were collected but a review of the database indicated that some companies did not fully report fine particulate matter until later inventories. As allowed by the BART guidelines, PM_{10} was used as a surrogate in order to fully capture sources of particulate matter.

A county level distance screen was employed to avoid removing sources that barely exceeded distance calculations. If any portion of the county was within the applicable distance to the nearest Class I area, then all the sites within that county were considered within the applicable distance. Additionally, all BART category sites within counties within 50 km of a Class I area were surveyed. The Class I areas considered for the Texas screening included the Guadalupe Mountains, Big Bend, Carlsbad Caverns, Wichita Mountains, Caney Creek, Breton Island, and Salt Creek.

As a result of the screening analysis, 254 sites (approximately 12 percent of the 2,165 sources in the 2002 emissions inventory) were identified as potentially BART-eligible based on distance and actual emissions. A survey was sent to these sites to ask for site representatives to help in identifying construction or reconstruction dates and whether the PTE of the BART-eligible equipment exceeded 250 tpy.

The emissions represented by the surveyed sites are summarized in Table 9-1: *Emissions from Companies Surveyed as a Percentage of State Total Point Source Emissions*. Sources emitting a large percentage of the actual emissions in the state were in the survey population. Emissions covered in the survey ranged from 61.7 percent of the 2002 VOC inventory to 97.7 percent of the SO_2 inventory.

Table 9-1: Emissions from Companies Surveyed as a Percentage of State Total Point Source Emissions

Source	Emissions (tpy)			
	PM_{10}	SO_2	NO_X	VOC
BART Survey	49,638	786,274	467,534	95,442
2002 State Total	66,064	805,133	601,447	154,665

Surveys were sent to 254 companies. The survey was a two step process. Companies were first asked to identify if they have any equipment built or reconstructed during the applicable time period or if the PTE of their site were less than 250 tpy. Companies that did not have BART applicable equipment based on low emissions or construction dates were not asked to supply any further information and were considered not BART-eligible.

If the site did possibly have BART applicable equipment, they were asked to complete a detailed survey of all operating and idle equipment at each site. The detailed survey asked whether each piece of equipment at the site was built or reconstructed between the applicable dates. The companies were asked if the PTE of their BART-eligible equipment exceeded the 250 tpy threshold for the applicable emissions. Any source with a PTE from equipment built during the applicable period was considered BART-eligible.

Based on results from the surveys completed by potentially BART-eligible sources and submitted to the TCEQ in 2005, over 100 sources were identified as BART-eligible. Table 9-2: *BART-Eligible Sources Based on Results of TCEQ Survey* presents the sources that were determined to be BART-eligible.

Table 9-2: BART-Eligible Sources Based on Results of TCEQ Survey

No.	Account	Source	Regulated Entity	SIC
1	AC0017B	ABITIBI CONSOLIDATED CORP	RN100220110	2621
2	TG0044C	AEP TEXAS	RN101531226	4911
3	CD0013K	AEP TEXAS CENTRAL COMPANY	RN102560687	4911
4	NE0024E	AEP TEXAS CENTRAL COMPANY	RN100642040	4911
5	NE0026A	AEP TEXAS CENTRAL COMPANY	RN100552181	4911
6	JI0030K	AEP TEXAS NORTH COMPANY	RN100215557	4911
7	CB0003M	ALCOA ALUMINA & CHEMICALS	RN100242577	2819
8	MM0001T	ALCOA INC	RN100221472	3334
9	HT0011Q	ALON USA LP	RN100250869	2911
10	ED0034O	ASH GROVE (formerly NORTH TEXAS CEMENT)	RN100225978	3241
11	HG0558G	ATOFINA CHEMICALS INC	RN100209444	2869
12	BL0021O	BASF CORPORATION	RN100218049	2869
13	GB0001R	BP AMOCO CHEMICAL COMPANY	RN102536307	2869
14	GB0004L	BP PRODUCTS NORTH AMERICA IN TEXAS	RN102535077	2911
15	GH0003Q	CABOT CORPORATION	RN100221761	2895
16	BG0045E	CAPITOL CEMENT DIV CAPITOL	RN100211507	3241
17	GH0004O	CELANESE CHEMICAL	RN101996395	2869
18	MH0009H	CELANESE LIMITED	RN100258060	2869
19	ED0011D	CHAPARRAL STEEL MIDLOTHIAN	RN100216472	3312
20	BJ0001T	CHEMICAL LIME LTD	RN100219856	3274
21	HG0310V	CHEVRON PHILLIPS CHEMICAL	RN103919817	2869
22	BL0758C	CHEVRON PHILLIPS CHEMICAL	RN100825249	2869
23	HW0013C	CHEVRON PHILLIPS CHEMICAL CO	RN102320850	2869
24	NE0027V	CITGO REFINING & CHEMICALS	RN102555166	2911
25	BG0057U	CITY PUBLIC SERVICE	RN100217975	4911
26	BG0186I	CITY PUBLIC SERVICE	RN100217835	4911
27	HW0018P	CONOCO PHILLIPS (formerly PHILLIPS 66)	RN102495884	2911
28	CR0020C	COPANO PROCESSING LP	RN101271419	1321
29	AB0012W	DCP (formerly DUKE ENERGY FIELD SERVICES)	RN100218684	1321
30	HW0008S	DEGUSSA ENGINEERED CARBONS	RN100209659	2895
31	HGA005E	DOW	RN104150123	2869
32	HG0126Q	DOW	RN100227016	2869

33	CI0022A	DYNEGY MIDSTREAM SERVICES	RN100222900	1321
34	HH0042M	EASTMAN CHEMICAL COMPANY	RN100219815	2869
35	HG0218K	EI DUPONT	RN100225085	2869
36	OC0007J	EI DUPONT DENEMOURS & CO	RN100542711	2869
37	EE0029T	EL PASO ELECTRIC CO	RN100211309	4911
38	TH0004D	ELECTRIC UTILITY DEPT	RN100219872	4911
39	CG0012C	ENBRIDGE PIPELINES	RN102166964	1321
40	MQ0009F	ENTERGY GULF STATES INC	RN100226877	4911
41	OC0013O	ENTERGY GULF STATES INC	RN102513041	4911
42	BL0113I	EQUISTAR	RN100218601	2869
43	BL0268B	EQUISTAR CHEMICALS LP	RN100237668	2821
44	HG0033B	EQUISTAR CHEMICALS LP	RN100542281	2869
45	HG0228H	EXXON CHEMICAL CO	RN102212925	2869
46	JE0065M	EXXON MOBIL CHEMICAL CO	RN100211903	2821
47	HG0229F	EXXONMOBIL CHEMICAL CO	RN102574803	2869
48	HG0232Q	EXXONMOBIL CORP	RN102579307	2911
49	JE0067I	EXXONMOBIL OIL CORP	RN102450756	2911
50	NE0120H	FLINT HILLS RESOURCES	RN102534138	2911
51	NE0122D	FLINT HILLS RESOURCES LP	RN100235266	2911
52	JE0052V	HUNTSMAN CORPORATION	RN100219252	2869
53	JE0135Q	HUNTSMAN PETROCHEMICAL CORP	RN100217389	2869
54	EB0057B	HUNTSMAN POLYMERS	RN101867554	2869
55	BL0002S	INEOS OLEFINS & POLYMERS	RN100238708	2869
56	CG0010G	INTERNATIONAL PAPER CO	RN100543115	2621
57	OCA002B	INVISTA	RN104392626	2869
58	VC0008Q	INVISTA (formerly DU PONT DE NEMOURS)	RN102663671	2869
59	WE0005G	LAREDO POWER	RN100213909	4911
60	MB0123F	LEHIGH CEMENT COMPANY	RN100218254	3241
61	NE0025C	LON C HILL POWER	RN100215979	4911
62	BC0015L	LOWER COLORADO RIVER AUTHORITY	RN102038486	4911
63	FC0018G	LOWER COLORADO RIVER AUTHORITY	RN100226844	4911
64	HG1575W	LYONDELL CHEMICAL	RN100633650	2869
65	HG0048L	LYONDELL CITGO REFINING	RN100218130	2911
66	GB0055R	MARATHON ASHLAND PETROLEUM	RN100210608	2911
67	HH0019H	NORIT AMERICAS INC	RN102609724	2819
68	GB0037T	NRG TEXAS (formerly TEXAS GENCO LP)	RN101062826	4911
69	ED0051O	OWENS CORNING	RN100223585	3296
70	HG1451S	OXYVINYLSLP	RN102518065	2821
71	HG0175D	PASADENA REFINING	RN100716661	2911
72	JE0042B	PREMCOR REFINING GROUP	RN102584026	2911
73	MC0002H	REGENCY TILDEN GAS (formerly ENBRIDGE)	RN100216621	2819
74	HG0697O	RHODIA INC	RN100220581	2819
75	HG0632T	ROHM & HAAS TEXAS	RN100223205	2869
76	HG0659W	SHELL OIL CO	RN100211879	2911
77	HW0017R	SID RICHARDSON CARBON	RN100222413	2895
78	HT0027B	SID RICHARDSON CARBON CO	RN100226026	2895
79	BL0038U	SOLUTIA INC	RN100238682	2869
80	TF0012D	SOUTHWESTERN ELECTRIC POWER	RN100213370	4911
81	GJ0043K	SOUTHWESTERN ELECTRIC POWER	RN102156916	4911
82	ME0006A	SOUTHWESTERN ELECTRIC POWER	RN100542596	4911
83	PG0040T	SOUTHWESTERN PUBLIC SERVICE	RN100224641	4911
84	PG0041R	SOUTHWESTERN PUBLIC SERVICE	RN100224849	4911

85	LN0081B	SOUTHWESTERN PUBLIC SERVICE	RN100224765	4911
86	JE0091L	SUN MARINE TERMINAL	RN100214626	4226
87	WN0042V	TARGA	RN102552387	1311
88	CY0019H	TARGA (formerly DYNEGY MIDSTREAM)	RN102551785	1311
89	OC0019C	TEMPLE-INLAND	RN100214428	2621
90	CI0012D	TEXAS GENCO LP	RN100825371	4911
91	FG0020V	TEXAS GENCO LP	RN100888312	4911
92	HK0014M	TEXAS LEHIGH CEMENT CO	RN102597846	3241
93	HG0562P	TEXAS PETROCHEMICALS LP	RN100219526	2869
94	BL0082R	THE DOW CHEMICAL CO	RN100225945	2869
95	JE0039N	THE GOODYEAR TIRE AND RUBBER CO	RN102561925	2822
96	NE0022I	TICONA POLYMERS INC	RN101625721	2869
97	JE0005H	TOTAL PETROCHEMICALS	RN102457520	2911
98	ED0066B	TXI OPERATIONS LP	RN100217199	3241
99	FI0020W	TXU BIG BROWN COMPANY LP	RN101198059	4911
100	DB0251U	TXU ELECTRIC COMPANY	RN101559854	4911
101	FB0025U	TXU GENERATION COMPANY LP	RN102285855	4911
102	HQ0012T	TXU GENERATION COMPANY LP	RN100664812	4911
103	MB0116C	TXU GENERATION COMPANY LP	RN102566494	4911
104	MM0023J	TXU GENERATION COMPANY LP	RN102147881	4911
105	MO0014L	TXU GENERATION COMPANY LP	RN102285848	4911
106	RL0020K	TXU GENERATION COMPANY LP	RN102583093	4911
107	TA0352I	TXU GENERATION COMPANY LP	RN100693308	4911
108	WC0028Q	TXU GENERATION COMPANY LP	RN102183969	4911
109	YB0017V	TXU GENERATION COMPANY LP	RN102563426	4911
110	TF0013B	TXU GENERATION COMPANY LP	RN102285921	4911
111	GB0076J	UNION CARBIDE CORP	RN100219351	2869
112	CB0028T	UNION CARBIDE CORPORATION	RN102181526	2869
113	HR0018T	VALENCE MIDSTREAM LTD	RN100213685	1321
114	GB0073P	VALERO REFINING CO TEXAS	RN100238385	2911
115	NE0043A	VALERO REFINING COMPANY	RN100211663	2911
116	MR0008T	VALERO MCKEE	RN100210517	2911
117	WH0014S	VETROTEX WICHITA FALLS PLANT	RN100218601	3229
118	VC0003D	VICTORIA POWER	RN100214980	4911
119	JB0016M	VINTAGE PETROLEUM INC	RN100214592	1311
120	JC0003K	WESTVACO	RN102157609	2631

9.2 DETERMINATION OF SOURCES SUBJECT TO BART

Under the EPA's BART guidelines, the state has two options regarding its BART-eligible sources:

- make BART determinations for all sources; or
- consider exempting some sources from BART because they do not cause or contribute to visibility impairment in a Class I area.

The TCEQ chose the second option that considers exempting some sources.

When exempting sources from BART because they do not cause or contribute to visibility impairment in a Class I area, the guidelines suggest three sub-options for determining that certain sources are not subject to BART:

- the use of model plants to exempt sources with common characteristics (70 FR 39162-3);
- a cumulative modeling analysis to show that groups of sources are not subject to BART;
- and finally; an individual source attribution approach.

The TCEQ exercised all three sub-options above to determine which sources were subject to BART. These options are explained further below, in the order in which the TCEQ and the sources performed the analyses.

Section 9.2.1 describes the cumulative modeling analyses that the TCEQ performed for the sources identified as BART-eligible. Since there was such a large number of BART-eligible sources in Texas, the TCEQ performed cumulative modeling analyses using CAMx PSAT technology. Once the TCEQ had completed the CAMx modeling analysis, several BART-eligible sources were determined to be insignificant (screened out) and several remained potentially BART-eligible (did not screen out). Screening out is a process that further examines and evaluates sources for inclusion or exclusion in the BART program. Sources that did not screen out through the cumulative modeling analysis were required to perform source-specific screening modeling analyses using either the CALPUFF or the CAMx model setup developed by the TCEQ. These source-specific modeling analyses are described in Section 9.2.2. BART-eligible sources that did not screen out in any of the modeling analyses had the option of reducing the emissions from their BART-eligible units using an enforceable mechanism, such as a permit, or performing an engineering analysis. The BART-eligible sources that chose to reduce potential emissions are discussed in Section 9.3. The emission reductions are presented in Section 9.5.

9.2.1 Cumulative Modeling Using CAMx PSAT

The TCEQ conducted screening modeling analyses as described in the CAMx modeling protocol, *Screening Analysis of Potentially BART-Eligible Sources in Texas,* and the final CAMx modeling report, *Final Report, Screening Analysis of Potential BART-Eligible Sources in Texas,* presented in Appendixes 9-3 and 9-4, respectively. In addition to the CAMx modeling, the TCEQ developed Texas model plants based on the CAMx modeling results. The model plants are discussed in the addendums to the CAMx modeling report, Addendum I, *BART Exemption Screening Analysis,* and Addendum II, *BART Exemption Screening Analysis.* Both addendums are contained in Appendix 9-5. Sources that successfully screened out in the CAMx screening modeling analyses or by using the Texas model plants were required to review the modeling analysis and data used and to certify that they agree with the screening modeling analyses and inputs. Copies of these certifications are contained in Appendix 9-6. Table 9-3 shows the BART-eligible sources that successfully screened out in the cumulative modeling analyses. BART-eligible sources that did not screen out of the cumulative modeling were required to conduct their own screening modeling analysis using either the CALPUFF or the CAMx modeling setup developed by the TCEQ. The single source modeling analyses are outlined in Section 9.2.2.

Table 9-3: BART-Eligible Sources Screened Out Using Cumulative CAMx Modeling

No.	Account	Source	Regulated Entity	SIC
1	TG0044C	AEP TEXAS	RN101531226	4911
2	CD0013K	AEP TEXAS CENTRAL COMPANY	RN102560687	4911
3	NE0024E	AEP TEXAS CENTRAL COMPANY	RN100642040	4911
4	NE0026A	AEP TEXAS CENTRAL COMPANY	RN100552181	4911
5	JI0030K	AEP TEXAS NORTH COMPANY	RN100215557	4911
6	CB0003M	ALCOA ALUMINA & CHEMICALS	RN100242577	2819
7	HG0558G	ATOFINA CHEMICALS INC	RN100209444	2869
8	BL0021O	BASF CORPORATION	RN100218049	2869
9	GB0001R	BP AMOCO CHEMICAL COMPANY	RN102536307	2869
10	MH0009H	CELANESE LIMITED	RN100258060	2869
11	ED0011D	CHAPARRAL STEEL MIDLOTHIAN	RN100216472	3312
12	BJ0001T	CHEMICAL LIME LTD	RN100219856	3274
13	BL0758C	CHEVRON PHILLIPS CHEMICAL	RN100825249	2869
14	HG0310V	CHEVRON PHILLIPS CHEMICAL	RN103919817	2869
15	HW0013C	CHEVRON PHILLIPS CHEMICAL	RN102320850	2869
16	BG0057U	CITY PUBLIC SERVICE	RN100217975	4911
17	BG0186I	CITY PUBLIC SERVICE	RN100217835	4911
18	CR0020C	COPANO PROCESSING LP	RN101271419	1321
19	CI0022A	DYNEGY MIDSTREAM SERVICES	RN100222900	1321
20	HG0218K	EI DUPONT	RN100225085	2869
21	EE0029T	EL PASO ELECTRIC CO	RN100211309	4911
22	TH0004D	ELECTRIC UTILITY DEPT	RN100219872	4911
23	MQ0009F	ENTERGY GULF STATES INC	RN100226877	4911
24	OC0013O	ENTERGY GULF STATES INC	RN102513041	4911
25	BL0113I	EQUISTAR	RN100218601	2869
26	BL0268B	EQUISTAR CHEMICALS LP	RN100237668	2821
27	HG0228H	EXXON CHEMICAL CO	RN102212925	2869
28	JE0065M	EXXON MOBIL CHEMICAL CO	RN100211903	2821
29	HG0229F	EXXONMOBIL CHEMICAL CO	RN102574803	2869
30	NE0120H	Flint Hills Resources	RN102534138	2911
31	NE0122D	FLINT HILLS RESOURCES LP	RN100235266	2911
32	JE0052V	HUNTSMAN CORPORATION	RN100219252	2869
33	JE0135Q	HUNTSMAN PETROCHEMICAL	RN100217389	2869
34	BL0002S	Ineos Olefins & Polymers	RN100238708	2869
35	WE0005G	LAREDO POWER	RN100213909	4911
36	MB0123F	LEHIGH CEMENT COMPANY	RN100218254	3241
37	NE0025C	LON C HILL POWER	RN100215979	4911
38	BC0015L	Lower Colorado River Authority	RN102038486	4911
39	FC0018G	Lower Colorado River Authority	RN100226844	4911

No.	Account	Source	Regulated Entity	SIC
40	HG1575W	Lyondell Chemical	RN100633650	2869
41	HG1451S	OXYVINYLSLP	RN102518065	2821
42	JE0042B	PREMCOR REFINING GROUP	RN102584026	2911
43	HG0632T	ROHM & HAAS TEXAS	RN100223205	2869
44	BL0038U	SOLUTIA INC	RN100238682	2869
45	GJ0043K	SOUTHWESTERN ELECTRIC POWER	RN102156916	4911
46	LN0081B	SOUTHWESTERN PUBLIC SERVICE (FORMERLY XCEL)	RN100224765	4911
47	ME0006A	SOUTHWESTERN ELECTRIC POWER	RN100542596	4911
48	PG0040T	SOUTHWESTERN PUBLIC SERVICE	RN100224641	4911
49	PG0041R	SOUTHWESTERN PUBLIC SERVICE	RN100224849	4911
50	JE0091L	SUN MARINE TERMINAL	RN100214626	4226
51	WN0042V	TARGA	RN102552387	1311
52	CI0012D	TEXAS GENCO LP	RN100825371	4911
53	FG0020V	TEXAS GENCO LP	RN100888312	4911
54	HG0562P	TEXAS PETROCHEMICALS LP	RN100219526	2869
55	BL0082R	THE DOW CHEMICAL CO	RN100225945	2869
56	NE0022I	TICONA POLYMERS INC	RN101625721	2869
57	FI0020W	TXU BIG BROWN COMPANY LP	RN101198059	4911
58	DB0251U	TXU ELECTRIC COMPANY	RN101559854	4911
59	FB0025U	TXU GENERATION COMPANY LP	RN102285855	4911
60	HQ0012T	TXU GENERATION COMPANY LP	RN100664812	4911
61	MB0116C	TXU GENERATION COMPANY LP	RN102566494	4911
62	MM0023J	TXU GENERATION COMPANY LP	RN102147881	4911
63	MO0014L	TXU GENERATION COMPANY LP	RN102285848	4911
64	RL0020K	TXU GENERATION COMPANY LP	RN102583093	4911
65	TA0352I	TXU GENERATION COMPANY LP	RN100693308	4911
66	WC0028Q	TXU GENERATION COMPANY LP	RN102183969	4911
67	YB0017V	TXU GENERATION COMPANY LP	RN102563426	4911
68	GB0076J	UNION CARBIDE CORP	RN100219351	2869
69	CB0028T	UNION CARBIDE CORPORATION	RN102181526	2869
70	GB0073P	VALERO REFINING CO TEXAS	RN100238385	2911
71	VC0003D	VICTORIA POWER	RN100214980	4911
72	JB0016M	VINTAGE PETROLEUM INC	RN100214592	1311

Distances from the BART-eligible sources to Class I areas were determined and are shown in Table 9-4 that follows.

Table 9-4: BART-Eligible Source Distance to Each Class I

Regulated Entity	Company	Distance to Class I (km)									
		Big Bend	Breton Isle	Caney Creek	Carls-bad Caverns	Guada-lupe Mtns	Salt Creek	Upper Buffalo	Wheeler Peak	White Mtn	Wichita Mtns
RN100220110	ABITIBI CONSOLIDATED CORP	851	580	343	937	968	946	514	1148	1070	533
RN102560687	AEP TEXAS CENTRAL CO	652	957	979	945	953	1054	1152	1374	1132	962
RN100642040	AEP TEXAS CENTRAL CO	608	862	815	860	874	951	988	1255	1041	805
RN100552181	AEP TEXAS CENTRAL CO	590	865	797	838	852	926	970	1229	1018	780
RN100215557	AEP TEXAS NORTH CO	497	1071	556	460	495	455	681	688	579	257
RN101531226	AEP TEXAS NORTH CO	351	1125	684	393	420	442	821	733	549	408
RN100221472	ALCOA INC	609	792	510	731	758	769	679	1022	884	490
RN100242577	ALCOA WORLD ALUMINA LLC	652	759	680	859	878	927	854	1209	1030	708
RN100250869	ALON USA LP	373	1223	720	295	329	316	837	604	431	372
RN100225978	ASH GROVE TEXASLP	693	827	342	710	744	700	496	893	827	294
RN100209444	ATTOFINA CHEMICALS INC	780	609	526	932	957	972	698	1217	1086	647
RN100219872	AUSTIN ENERGY	553	843	563	690	715	738	731	1005	849	505
RN100218049	BASF CORPORATION	760	641	613	942	965	996	785	1258	1105	711
RN102536307	BP AMOCO CHEMICAL CO	804	590	566	969	993	1014	736	1264	1127	697
RN102535077	BP PRODUCTS NORTH AMERICA	805	562	564	970	994	1014	735	1264	1127	696
RN100221761	CABOT CORPORATION	721	1296	642	497	535	377	686	414	494	225
RN100211507	CAPITOL CEMENT DIV	466	924	677	652	672	724	843	1017	824	579
RN101996395	CELANESE CHEMICAL	717	1297	645	492	531	373	689	413	489	226
RN100258060	CELANESE LTD	702	703	642	894	915	955	816	1227	1061	703
RN100216472	CHAPARRAL STEEL	687	828	348	707	741	699	503	894	825	299
RN100219856	CHEMICAL LIME LTD	603	858	443	658	689	672	601	901	793	354
RN103919817	CHEVRON PHILLIPS CHEMICAL	805	584	515	953	979	990	686	1231	1106	654
RN102320850	CHEVRON PHILLIPS CHEMICAL	733	1332	676	494	531	365	715	379	477	261
RN100825249	CHEVRON PHILLIPS CHEMICAL	726	673	612	908	930	964	785	1229	1072	690
RN102555166	CITGO REFINING & CHEMICALS	557	866	798	837	852	926	971	1229	1018	781
RN100217975	CITY PUBLIC SERVICE	475	917	693	673	692	748	861	1044	847	606
RN100217835	CITY PUBLIC SERVICE	470	923	701	671	689	748	868	1045	845	611
RN102495884	CONOCO PHILLIPS	732	1333	677	492	530	363	716	378	475	262
RN101271419	COPANO PROCESSING LP	640	751	598	813	835	868	771	1138	977	619
RN100218684	DCP MIDSTREAM LP	350	1355	837	167	204	198	943	519	303	457

Regulated Entity	Company	Distance to Class I (km)									
		Big Bend	Breton Isle	Caney Creek	Carls-bad Caverns	Guada -lupe Mtns	Salt Creek	Upper Buffalo	Wheeler Peak	White Mtn	Wichita Mtns
RN100209659	DEGUSSA ENG CARBONS	728	1337	683	486	524	357	722	373	469	266
RN100227016	DOW CHEMICAL CO	791	600	539	947	972	988	710	1235	1102	665
RN104150123	DOW CHEMICAL CO	796	598	536	951	975	987	717	1238	1113	668
RN100222900	DYNEGY MIDSTREAM SERVICES	807	583	513	954	980	991	684	1231	1107	653
RN100219815	EASTMAN CHEMICAL COMPANY	886	623	224	927	960	915	397	1084	1042	452
RN100225085	EI DUPONT DE NEMOURS & CO	794	596	530	947	972	987	701	1232	1102	660
RN100542711	EI DUPONT DE NEMOURS & CO	918	472	484	1053	1080	1080	646	1303	1199	699
RN100211309	EL PASO ELECTRIC CO	428	1689	1178	178	146	260	1273	518	175	778
RN102166964	ENBRIDGE PIPELINES LP	940	647	135	952	987	924	308	1067	1053	428
RN100226877	ENTERGY GULF STATES INC	753	643	461	878	906	908	634	1143	1026	565
RN102513041	ENTERGY GULF STATES INC	907	484	487	1043	1070	1071	650	1295	1190	695
RN100210574	EQUISTAR	777	619	582	948	971	996	753	1252	1108	694
RN100237668	EQUISTAR CHEMICALS LP	777	618	582	948	972	997	754	1252	1108	695
RN100542281	EQUISTAR CHEMICALS LP	787	603	517	935	961	973	688	1216	1088	643
RN100211903	EXXON MOBIL CHEMICALS	889	501	482	1024	1051	1053	647	1279	1171	680
RN102212925	EXXONMOBIL CHEMICAL CO	796	594	524	947	972	986	695	1229	1101	655
RN102574803	EXXONMOBIL CHEMICAL CO	795	594	525	947	972	986	696	1229	1101	656
RN102579307	EXXONMOBIL CORP	796	598	526	944	970	982	697	1236	1112	658
RN102450756	EXXONMOBIL OIL CORP	888	502	482	1023	1050	1052	647	1278	1170	679
RN102534138	FLINT HILLS RESOURCES LP	590	865	798	838	852	927	971	1230	1018	781
RN100235266	FLINT HILLS RESOURCES LP	580	874	800	829	843	918	972	1222	1009	777
RN100219252	HUNTSMAN CORP	899	491	492	1037	1064	1067	656	1293	1185	694
RN100217389	HUNTSMAN CORP	897	493	501	1038	1065	1069	666	1297	1187	700
RN101867554	HUNTSMAN POLYMERS CORP	293	1303	819	212	241	277	936	600	373	467
RN100238708	INEOS USA LLC	779	617	584	951	974	1000	756	1255	1111	698
RN100543115	INTERNATIONAL PAPER CO	974	619	128	988	1023	960	296	1099	1089	460
RN104392626	INVISTA	918	472	484	1053	1080	1080	646	1303	1199	700
RN102663671	INVISTA S.A.R.L.	614	797	693	824	842	896	866	1182	996	696
RN100213909	LAREDO WLE LP	411	1069	918	703	710	818	1086	1145	890	802
RN100218254	LEHIGH CEMENT COMPANY	623	820	438	694	725	712	601	942	832	388
RN100215979	LON C HILL LP	571	882	802	820	834	911	974	1216	1001	774

Regulated Entity	Company	Distance to Class I (km)									
		Big Bend	Breton Isle	Caney Creek	Carls-bad Caverns	Guada -lupe Mtns	Salt Creek	Upper Buffalo	Wheeler Peak	White Mtn	Wichita Mtns
RN102038486	LCRA	583	810	559	727	752	775	729	1040	886	529
RN100226844	LCRA	630	760	558	783	807	831	730	1094	942	568
RN100633650	LYONDELL CHEMICAL CO	787	603	518	936	962	975	690	1218	1090	645
RN100218130	LYONDELL CITGO REFINING	775	615	529	928	953	969	703	1216	1083	648
RN100210608	MARATHON PETROLEUM	806	587	564	971	995	1015	734	1265	1128	697
RN102609724	NORIT AMERICAS INC	915	603	209	954	988	940	381	1104	1067	470
RN101062826	NRG TEXAS LP	799	593	552	960	984	1003	723	1251	1117	682
RN100223585	OWENS-CORNING	701	811	336	724	758	717	494	910	843	310
RN102518065	OXY VINYLS LP	789	601	528	941	966	981	699	1226	1096	654
RN100716661	PASADENA REFINING SYSTEM	777	613	528	930	955	971	703	1217	1085	649
RN102584026	PREMCOR REFINING GROUP	897	493	505	1039	1066	1070	669	1299	1188	703
RN100216621	REGENCY FS (FIELD SERVICES)	468	953	788	711	725	804	957	1113	892	705
RN100223205	RHODIA, INC.	797	593	524	948	973	987	695	1230	1102	657
RN100223205	ROHM & HAAS TEXAS	788	602	528	940	965	980	699	1225	1095	654
RN100211879	SHELL OIL CO	785	604	530	938	964	979	701	1224	1093	654
RN100222413	SID RICHARDSON CARBON	727	1337	683	486	524	357	722	373	468	266
RN100226026	SID RICHARDSON CARBON	218	1407	945	142	153	275	1063	618	329	590
RN100238682	SOLUTIA INC	777	618	582	948	972	997	754	1252	1108	695
RN102156916	SOUTHWESTERN ELEC POWER	888	616	231	932	965	921	403	1092	1048	461
RN100542596	SOUTHWESTERN ELEC POWER	915	632	178	941	975	921	351	1077	1049	440
RN100213370	SOUTHWESTERN ELEC POWER	900	668	165	914	949	890	338	1041	1019	404
RN100224641	SOUTHWESTERN PUBLIC SERV	679	1346	705	435	473	308	754	362	423	281
RN100224849	SOUTHWESTERN PUBLIC SERV	681	1347	705	436	474	309	754	361	424	282
RN100224765	SOUTHWESTERN PUBLIC SERV	490	1282	712	304	344	248	803	477	377	309
RN100214626	SUN MARINE TERMINAL	896	494	505	1038	1065	1070	670	1299	1188	703
RN102551785	TARGA MIDSTREAM SERVICES	251	1327	859	196	219	288	979	621	370	513
RN102552387	TARGA MIDSTREAM SERVICES	684	925	361	647	684	617	488	786	745	182
RN100214428	TEMPLE-INLAND	921	471	466	1050	1077	1074	628	1293	1194	687
RN100888312	TEXAS GENCO	736	656	565	901	925	949	738	1205	1060	653
RN100825371	TEXAS GENCO	804	585	523	955	980	993	694	1236	1109	660
RN102597846	TEXAS LEHIGH CEMENT CO	525	867	599	678	701	734	767	1009	841	528

Regulated Entity	Company	Distance to Class I (km)									
		Big Bend	Breton Isle	Caney Creek	Carls-bad Caverns	Guada-lupe Mtns	Salt Creek	Upper Buffalo	Wheeler Peak	White Mtn	Wichita Mtns
RN100219526	TEXAS PETROCHEMICALS LP	772	617	534	927	952	968	706	1216	1083	649
RN102561925	THE GOODYEAR TIRE & RUBBER	874	516	492	1013	1040	1044	659	1273	1161	679
RN101625721	TICONA POLYMERS INC	562	911	839	824	836	920	1011	1230	1006	803
RN102457520	TOTAL PETROCHEMICALS USA	904	485	493	1043	1070	1072	657	1298	1190	698
RN100217199	TXI OPERATIONS LP	688	827	347	708	742	700	503	895	826	299
RN101198059	TXU BIG BROWN CO LP	741	719	340	802	833	806	511	1010	930	409
RN101559854	TXU GENERATION COMPANY	720	841	312	716	751	695	459	871	823	257
RN102285855	TXU GENERATION COMPANY	809	822	227	781	818	745	366	887	874	250
RN100664812	TXU GENERATION COMPANY	630	886	402	645	678	640	550	846	765	277
RN102566494	TXU GENERATION COMPANY	651	797	413	719	750	733	578	957	854	389
RN102147881	TXU GENERATION COMPANY	610	791	509	732	758	770	679	1022	884	490
RN102285848	TXU GENERATION COMPANY	403	1178	674	343	376	355	793	627	473	336
RN102583093	TXU GENERATION COMPANY	889	604	242	939	972	930	414	1104	1057	474
RN100693308	TXU GENERATION COMPANY	680	865	352	680	715	665	498	852	792	256
RN102285921	TXU GENERATION COMPANY	885	685	170	897	932	872	342	1024	1001	387
RN102183969	TXU GENERATION COMPANY	255	1360	884	162	186	261	1001	599	339	528
RN102563426	TXU GENERATION COMPANY	612	991	441	567	603	541	563	730	669	180
RN102181526	UNION CARBIDE CORP	634	783	702	848	867	921	876	1208	1021	718
RN100219351	UNION CARBIDE CORP	802	591	565	967	991	1012	735	1262	1125	695
RN100213685	VALENCE MIDSTREAM	842	717	204	853	888	831	372	990	959	356
RN100210517	VALERO MCKEE	751	1387	728	490	527	350	760	326	453	316
RN100238385	VALERO REFINING CO TEXAS	806	588	565	971	995	1015	735	1265	1128	697
RN100211663	VALERO REFINING CO TEXAS	559	867	798	836	851	925	971	1229	1017	780
RN100218601	VETROTEX AMERICA	671	1019	419	587	625	539	521	690	668	99
RN100214980	VICTORIA WLE LP	607	799	682	813	832	883	855	1169	985	682
RN100214592	VINTAGE PETROLEUM LLC	646	761	669	847	867	914	842	1195	1017	693
RN102157609	WESTVACO	891	503	451	1016	1044	1040	617	1260	1160	656

9.2.2 Individual Source Attribution Approach

One of the air quality modeling approaches suggested by the EPA in the BART guidance is an individual source attribution approach. Specifically, this entails modeling source-specific BART-eligible units and comparing modeled impacts to a particular deciview threshold.

CALPUFF

The CALPUFF modeling protocol, *Best Available Retrofit Technology (BART) Modeling Protocol to Determine Sources Subject to BART in the State of Texas*, developed by the TCEQ for determining which sources are subject to BART is included in Appendix 9-7: *CALPUFF Modeling Guidelines*. Appendix 9-7 also contains a summary report for each modeling demonstration. Table 9-5: *BART-Eligible Sources Exempt Based on CALPUFF Modeling Results* lists the BART-eligible sources that are exempt from BART based on CALPUFF modeling results.

Table 9-5: BART-Eligible Sources Exempt Based on CALPUFF Modeling Results

Regulated Entity	Account	Source	SIC
RN100221472	MM0001T	ALCOA INC	3334
RN100250869	HT0011Q	ALON USA LP	2911
RN100225978	ED0034O	ASH GROVE (formerly NORTH TEXAS CEMENT)	3241
RN100221761	GH0003Q	CABOT CORPORATION	2895
RN101996395	GH0004O	CELANESE CHEMICAL	2869
RN102495884	HW0018P	CONOCO PHILLIPS (formerly PHILLIPS 66 CO)	2911
RN100218684	AB0012W	DCP (formerly DUKE ENERGY FIELD SERVICES)	1321
RN100209659	HW0008S	DEGUSSA ENGINEERED CARBONS	2869
RN100219815	HH0042M	EASTMAN CHEMICAL COMPANY	2869
RN100542281	HG0033B	EQUISTAR CHEMICALS LP	2869
RN102579307	HG0232Q	EXXONMOBIL CORP	2911
RN102450756	JE0067I	EXXONMOBIL OIL CORP	2911
RN101867554	EB0057B	HUNTSMAN POLYMERS	2869
RN100543115	CG0010G	INTERNATIONAL PAPER CO	2621
RN104392626	OCA002B	INVISTA	2869
RN102663671	VC0008Q	INVISTA (formerly DU PONT DE NEMOURS)	2869
RN101062826	GB0037T	NRG TEXAS (formerly TEXAS GENCO LP)	4911
RN100223585	ED0051O	OWENS CORNING	3296
RN100220581	HG0697O	RHODIA INC	2819
RN100211879	HG0659W	SHELL OIL CO	2911
RN100222413	HW0017R	SID RICHARDSON CARBON	2895
RN100226026	HT0027B	SID RICHARDSON CARBON CO	2895
RN100213370	TF0012D	SOUTHWESTERN ELECTRIC POWER	4911
RN100214428	OC0019C	TEMPLE-INLAND	2621
RN102597846	HK0014M	TEXAS LEHIGH CEMENT CO	3241
RN102457520	JE0005H	TOTAL PETROCHEMICALS INC (formerly ATOFINA PETROCHEMICALS INC)	2911
RN100217199	ED0066B	TXI OPERATIONS LP	3241
RN102285921	TF0013B	TXU GENERATION COMPANY LP	4911
RN102157609	JC0003K	WESTVACO	2631

CAMx

The CAMx modeling guideline, *Guidance for the Application of the CAMx Hybrid Photochemical Grid Model to Assess Visibility Impacts of Texas BART Sources at Class I Areas*, developed by the TCEQ is in Appendix 9-8. This appendix also contains the modeling summary reports for each modeling demonstration. Table 9-6 presents the BART-eligible sources that screened out on an individual basis using CAMx.

Table 9-6: BART-Eligible Sources Screened Out on Individual Basis Using CAMx

Reference Number	Reference Number	Nearest Class I Area	Distance to Nearest Class I area (km)	Emission Rate Data Source	Highest Impact (dv)	Class I Area with Highest Impact
RN102535077	BP Products North American	BRET	562	Permit Allowables	0.28	CACR
RN102555166	CITGO Corpus Christi Refinery	BIBE	557	Permit Allowables	0.16	BIBE
RN104150123	Dow Chemical Company	CACR	536	Permit Allowables	0.21	BRET
RN100218130	Houston Refining LP	CACR	529	PTE, Permit Allowables	0.10	UPBU/ CACR
RN100716661	Pasadena Refining System Inc.	CACR	528	Permit Allowables	0.42	CACR
RN100211663	Valero Corpus Christi East Plant	BIBE	554	Facility Wide Emission Cap	0.11	BIBE/ CACR

9.3 SITES REMOVED FROM FURTHER BART CONSIDERATION

The TCEQ BART rule was published January 10, 2007. Companies requested removal from further BART consideration per the exemptions in the rule or based on updated information on the site. To be removed from the list, a site had to be exempted for all potential haze causing pollutants, NO_X, SO_2, and fine particulate matter. A site may be exempted if the combined NO_X and SO_2 potential to emit are less than 1,000 tpy, and the site is greater than 100 km from a Class I area. Some sites may be exempted if the combined NO_X and SO_2 potential to emit are less than 500 tpy, and the site is greater than 50 km from a Class I area. Several sites requested exemption for combined SO_X and NO_X limits and certified that the TCEQ-sponsored modeling adequately represented particulate emissions. One site requested $PM_{2.5}$ exemption due to de minimis levels of emissions.

Updated site information included construction dates and potential emission rates of equipment. Two sites requested removal because the operating equipment did not meet a BART category. The results of granted exclusions are also shown in Table 9.7: *Sites Removed From BART Due to Exemption Requests*.

Table 9-7: Sites Removed From BART Due to Exemption Requests

No.	Regulated Entity	Company	Reason	Account	SIC
1	RN100220110	ABITIBI CONSOLIDATED CORP	PTE*<1,000, de minimis PM	AC0017B	2621
2	RN102559291	BMC HOLDINGS INC	PTE<1,000, PM certification	JE0343H	2869
3	RN100211507	CAPITOL CEMENT	Shut down kiln	BG0045E	3241
4	RN100227016	CELANESE	PTE<250	HG0126Q	2869
5	RN100825249	CHEVRON PHILLIPS CHEMICAL	met TCEQ model plant	BL0758C	2869
6	RN100542711	EI DUPONT DENEMOURS & CO	PTE<1,000, PM certification	OC0007J	2869
7	RN102166964	ENBRIDGE PIPELINES	PTE<250	CG0012C	1321
8	RN104579487	INEOS USA	PTE<250	GBA007G	2869
9	RN100212018	J.L. DAVIS GAS PROCESSING	No BART sources	CA0011B	1321
10	RN100213719	JOHNS MANVILLE INTERNATIONAL	PTE<250	JH0025O	3296
11	RN100633650	LYONDELL PETROCHEMICAL	PTE<1,000, PM certification	HG1575W	2869
12	RN100210608	MARATHON ASHLAND PETROLEUM	PTE<250	GB0055R	2911
13	RN102609724	NORIT AMERICAS INC	PTE<1,000, PM certification	HH0019H	2819
14	RN102643327	PUEBLO MIDSTREAM GAS CORP	recheck dates, not BART	AG0024G	1321
15	RN100211408	REGENCY GAS SERVICES	No BART equip	PE0024Q	1321
16	RN100216621	REGENCY TILDEN GAS	PTE<1,000, PM certification	MC0002H	2819
17	RN102551785	TARGA	Shut down	CY0019H	1311
18	RN102561925	THE GOODYEAR TIRE AND RUBBER CO	PTE<250	JE0039N	2822
19	RN100213685	VALENCE MIDSTREAM LTD	plant shut down	HR0018T	1321
20	RN100210517	VALERO MCKEE REFINERY	PTE<1,000, PM certification	MR0008T	2911
21	RN100219310	VALERO REFINING TEXAS LP	PTE<1,000, PM certification	HG0130C	2911
22	RN100218601	VETROTEX AMERICA ST. GOBAIN	PTE<500, PM certification	WH0014S	3229

Note: *PTE is potential to emit

9.4 DETERMINATION OF BART FOR SOURCES SUBJECT TO BART

Upon conclusion of all BART screening analyses and review of exclusion requests, no Texas sources remained subject to BART. Some EGUs may become subject to BART pending resolution of CAIR at the federal level. Table 9-8: *Summary of BART-Eligible Source Determination* summarizes where a determination was made for all sources in the BART determination process. Several sources were added to the process after the BART survey, either at the site's request or as a result of recent activity at the site. Their status is reflected in this table. Site activity included transfer of equipment or corporate reorganization resulting in site splits. Although not used thus far for any sources, the TCEQ's Engineering Analysis Guidance and forms are in Appendix 9-9.

Table 9-8: Summary of BART-Eligible Source Determinations

Account	Company	BART-eligible[1]	Reason for Removal			
			Cum. Model CAMx	CAL-PUFF	Single Source CAMx	Exemp-tion Request
TG0044C	AEP TEXAS	y	y			
CD0013K	AEP TEXAS CENTRAL COMPANY	y	y			
NE0024E	AEP TEXAS CENTRAL COMPANY	y	y			
NE0026A	AEP TEXAS CENTRAL COMPANY	y	y			
JI0030K	AEP TEXAS NORTH COMPANY	y	y			
CB0003M	ALCOA ALUMINA & CHEMICALS	y	y			
BL0002S	INEOS OLEFINS & POLYMERS	y	y			
HG0558G	ATOFINA CHEMICALS INC	y	y			
BL0021O	BASF CORPORATION	y	y			
GB0001R	BP AMOCO CHEMICAL COMPANY	y	y			
MH0009H	CELANESE LIMITED	y	y			
ED0011D	CHAPARRAL STEEL MIDLOTHIAN	y	y			
BJ0001T	CHEMICAL LIME LTD	y	y			
HG0310V	CHEVRON PHILLIPS CHEMICAL	y	y			
HW0013C	CHEVRON PHILLIPS CHEMICAL CO	y	y			
BG0057U	CITY PUBLIC SERVICE	y	y			
BG0186I	CITY PUBLIC SERVICE	y	y			
CR0020C	COPANO PROCESSING LP	y	y			
CI0022A	DYNEGY MIDSTREAM SERVICES	y	y			
WN0042V	TARGA	y	y			
HG0218K	EI DUPONT	y	y			
EE0029T	EL PASO ELECTRIC CO	y	y			
TH0004D	ELECTRIC UTILITY DEPT	y	y			
MQ0009F	ENTERGY GULF STATES INC	y	y			
OC0013O	ENTERGY GULF STATES INC	y	y			
BL0113I	EQUISTAR	y	y			
BL0268B	EQUISTAR CHEMICALS LP	y	y			
HG0033B	EQUISTAR CHEMICALS LP	y			y	
HG0228H	EXXON CHEMICAL CO	y	y			
JE0065M	EXXON MOBIL CHEMICAL CO	y	y			
HG0229F	EXXONMOBIL CHEMICAL CO	y	y			
NE0122D	FLINT HILLS RESOURCES LP	y	y			
JE0052V	HUNTSMAN CORPORATION	y	y			
JE0135Q	HUNTSMAN PETROCHEMICAL	y	y			

Account	Company	BART-eligible[1]	Reason for Removal			
			Cum. Model CAMx	CAL-PUFF	Single Source CAMx	Exemp-tion Request
	CORP					
EB0057B	HUNTSMAN POLYMERS	y		y		
GBA007G	INEOS					y
NE0120H	FLINT HILLS RESOURCES LP	y	y			
WE0005G	LAREDO POWER	y	y			
MB0123F	LEHIGH CEMENT COMPANY	y	y			
NE0025C	LON C HILL POWER	y	y			
BC0015L	LOWER COLORADO RIVER AUTHORITY	y	y			
FC0018G	LOWER COLORADO RIVER AUTHORITY	y	y			
HG1575W	LYONDELL CITGO REFINING	y	y			y
HG1451S	OXYVINYLSLP	y	y			
JE0042B	PREMCOR REFINING GROUP	y	y			
HG0632T	ROHM & HAAS TEXAS	y	y			
BL0038U	SOLUTIA INC	y	y			
GJ0043K	SOUTHWESTERN ELECTRIC POWER	y	y			
ME0006A	SOUTHWESTERN ELECTRIC POWER	y	y			
PG0040T	SOUTHWESTERN PUBLIC SERVICE	y	y			
PG0041R	SOUTHWESTERN PUBLIC SERVICE	y	y			
JE0091L	SUN MARINE TERMINAL	y	y			
CI0012D	TEXAS GENCO LP	y	y			
FG0020V	TEXAS GENCO LP	y	y			
GB0037T	NRG Texas	y		y		
HG0562P	TEXAS PETROCHEMICALS LP	y	y			
BL0082R	THE DOW CHEMICAL CO	y	y			
NE0022I	TICONA POLYMERS INC	y	y			
ED0066B	TXI OPERATIONS, L.P.	y		y		
FI0020W	TXU BIG BROWN COMPANY LP	y	y			
DB0251U	TXU ELECTRIC COMPANY	y	y			
FB0025U	TXU GENERATION COMPANY LP	y	y			
HQ0012T	TXU GENERATION COMPANY LP	y	y			
MB0116C	TXU GENERATION COMPANY LP	y	y			
MM0023J	TXU GENERATION COMPANY LP	y	y			
MO0014L	TXU GENERATION COMPANY LP	y	y			
RL0020K	TXU GENERATION COMPANY LP	y	y			
TA0352I	TXU GENERATION COMPANY LP	y	y			
WC0028Q	TXU GENERATION COMPANY LP	y	y			
YB0017V	TXU GENERATION COMPANY LP	y	y			
GB0076J	UNION CARBIDE CORP	y	y			
CB0028T	UNION CARBIDE CORPORATION	y	y			
GB0073P	VALERO REFINING CO TEXAS	y	y			
VC0003D	VICTORIA POWER	y	y			
JB0016M	VINTAGE PETROLEUM, INC.	y	y			
LN0081B	SOUTHWESTERN PUBLIC SERVICE	y	y			
AC0017B	ABITIBI CONSOLIDATED CORP	y				y

Account	Company	BART-eligible[1]	Reason for Removal			
			Cum. Model CAMx	CAL-PUFF	Single Source CAMx	Exemp-tion Request
TF0012D	SOUTHWESTERN ELECTRIC POWER	y		y		
MM0001T	ALCOA INC	y		y		
HT0011Q	ALON USA LP	y		y		
ED0034O	ASH GROVE	y		y		
JE0343H	BMC HOLDINGS INC					y
GB0004L	BP PRODUCTS NORTH AMERICA IN TEXAS	y			y	
GH0003Q	CABOT CORPORATION	y		y		
BG0045E	CAPITOL CEMENT DIV CAPITOL	y				y
GH0004O	CELANESE CHEMICAL	y			y	
BL0758C	CHEVRON PHILLIPS CHEMICAL	y				y
NE0027V	CITGO REFINING & CHEMICALS	y			y	
HW0018P	CONOCOPHILLIPS	y		y		
AB0012W	DCP	y		y		
HW0008S	DEGUSSA ENGINEERED CARBONS	y		y		
MR0008T	DIAMOND SHAMROCK REFINING	y				y
HGA005E	DOW	y			y	
HG0126Q	DOW	y				y
HH0042M	EASTMAN CHEMICAL COMPANY	y		y		
OC0007J	EI DUPONT DENEMOURS & CO	y				y
MC0002H	ENBRIDGE PIPELINE					y
CG0012C	ENBRIDGE PIPELINES	y				y
HG0033B	EQUISTAR CHEMICALS LP			y		
HG0232Q	EXXONMOBIL CORP - Baytown	y		y		
JE0067I	EXXONMOBIL OIL CORP - Beaumont	y		y		
EB0057B	HUNTSMAN POLYMERS			y		
CG0010G	INTERNATIONAL PAPER CO	y		y		
OCA002B	INVISTA	y		y		
VC0008Q	INVISTA	y		y		
JH0025O	JOHNS MANVILLE INTERNATIONAL					y
HG0048L	LYONDELL CITGO REFINING	y			y	
GB0055R	MARATHON ASHLAND PETROLEUM	y				y
HH0019H	NORIT AMERICAS INC	y				y
GB0037T	NRG Texas			y		
ED0051O	OWENS CORNING	y		y		
HG0175D	PASADENA REFINING	y		y		
AG0024G	PUEBLO MIDSTREAM GAS CORP					y
PE0024Q	REGENCY GAS SERVICES					y
HG0697O	RHODIA, INC.	y		y		
HG0659W	SHELL OIL CO	y		y		
HW0017R	SID RICHARDSON CARBON	y		y		
HT0027B	SID RICHARDSON CARBON	y		y		
CY0019H	TARGA	y				y
OC0019C	TEMPLE-INLAND	y		y		
HK0014M	TEXAS LEHIGH CEMENT CO	y		y		

Account	Company	BART-eligible[1]	Reason for Removal			
			Cum. Model CAMx	CAL-PUFF	Single Source CAMx	Exemp-tion Request
JE0039N	THE GOODYEAR TIRE AND RUBBER CO	y				y
JE0005H	TOTAL PETROCHEMICALS	y		y		
ED0066B	TXI OPERATIONS, L.P.			y		
TF0013B	TXU GENERATION COMPANY LP	y		y		
HR0018T	VALENCE MIDSTREAM LTD	y				y
NE0043A	VALERO REFINING COMPANY	y			y	
HG0130C	VALERO REFINING TEXAS LP					y
WH0014S	VETROTEX WICHITA FALLS PLANT	y				y
JC0003K	WESTVACO	y		y		

Note:
1. Some sources were added to the determination process after the BART survey, either by their request or as a result of equipment transfers. These are indicated with a blank.

9.5 POST-BART EMISSIONS REDUCTIONS

Subsequent to the 2002 base year inventory, some BART-eligible sources reduced their permitted emissions. Documentation of the emission reductions is in Appendix 9-11: *Documentation of Emission Reductions*. The sources and the estimated reductions are presented in Table 9-9. Reduction estimates are conservative because they are from the 2002 actual emissions level to a potential to emit level. Capitol Cement shut down their BART units. The final list of all BART-eligible sources is in Appendix 9-13: *BART-Eligible List*.

Table 9-9: Post-BART Emissions Reductions at Texas Sources

No.	Regulated Entity	Source	Account*	NO_X Reduced from Baseline 2002 (tpy)	SO_2 Reduced from Baseline 2002 (tpy)	PM Reduced from Baseline 2002 (tpy)
1	RN100211507	CAPITOL CEMENT DIV	BG0045E	1,328	1,193	100
2	RN100227016	DOW	HG0126Q	694	0	0
3	RN102450756	EXXONMOBIL OIL***	JE0067I	2.7	290	0
4	RN102609724	NORIT AMERICAS INC	HH0019H**	16.6	+5.4	0
5	RN100216621	REGENCY TILDEN GAS (FORMERLY ENBRIDGE PIPELINE)	MC0002H	2	2,276	0.2
6	RN102551785	TARGA (FORMERLY DYNEGY MIDSTREAM SERVICES)	CY0019H	336	0.3	0.5
7	RN102561925	THE GOODYEAR TIRE AND RUBBER CO	JE0039N	89.1	+11.3	2.9
8	RN100213685	VALENCE MIDSTREAM LTD	HR0018T	247.1	2,743.5	5.6
9	RN100218601	VETROTEX AMERICA ST. GOBAIN	WH0014S	62.6	16.4	59.0
Total estimated reductions in haze emissions = 9,485.2 tpy				2,778.1	6,535.9	168.2

*The first two letters in account number are the abbreviation for the source's county location. See Appendix 9-11 for the list of county abbreviations.

**Company has permit limiting combined SO_2 and NO_X to 841 tpy on previously grandfathered BART sources. This limit is lower than actual emissions in previous years. For example, the facility emitted 1,266 tpy of NO_X and SO_2 in 1990.

***ExxonMobil numbers are preliminary and subject to change. These estimates are based on reductions from the 2002 EI and pre- and post-BART hourly emissions rates submitted. (Emission reductions as a result of the completion of permit 49138 (FCCU) will be updated when they become available.)

CHAPTER 10. REASONABLE PROGRESS GOALS

10.1 INTRODUCTION

The national goal for regional haze is to achieve natural visibility levels at Class I areas by 2064. The Texas Commission on Environmental Quality (TCEQ) must show reasonable progress toward the national goal by 2018. The uniform rate of progress (URP) named in the United States Environmental Protection Agency (EPA) guidance (described as uniform rate of improvement in 40 Code of Federal Regulations (CFR) §51.308(d)(1)(i)(B)) is a straight line between base period conditions on the worst 20 percent days and estimated natural visibility conditions. Chapter 5: *Assessment of Baseline and Current Conditions and Estimate of Natural Conditions in Class I Areas* details the calculation of base period conditions and estimations of 2064 natural conditions. The URP is a tool for comparing the reasonable progress goals (RPGs) set by the state with the visibility improvement that would be needed to reach natural conditions by 2064. Table 10-1: *Uniform Rate of Progress for Class I Areas in Texas (Worst 20 Percent Days)* shows the URP 2018 deciview values for the two Texas Class I areas.

Table 10-1 shows Texas' calculation of natural conditions using the approximation that 100 percent of the dust (coarse mass and fine soil) at both Big Bend and Guadalupe Mountains National Parks is natural. As Chapter 5 discusses in more detail, analysis indicated that the approximation that all the dust is natural is a better approximation than an estimate using any substantively lower percentage.

The TCEQ plans to work with the EPA, Federal Land Managers (FLMs), and other experts and researchers as Texas continues to refine natural condition estimates for future five-year reports and ten-year Regional Haze SIP revisions.

Table 10-1: Uniform Rate of Progress for Class I Areas in Texas (Worst 20 Percent Days)

Class I Area	Improvement Needed by 2018 Assuming URP (dv)	Annual Progress Needed to Meet URP (dv)	Improvement Needed by 2064 (dv)
Big Bend	1.7	0.12	7.2
Guadalupe Mountains	1.2	0.08	4.9

10.2 REASONABLE PROGRESS GOALS FOR TEXAS CLASS I AREAS

The TCEQ has determined that the rate of visibility improvement by 2018, shown in Table 10-2: *Reasonable Progress Goals for Class I Areas (Worst 20 Percent Days)*, is reasonable and will be implemented as the RPGs for the listed Class I areas.

Table 10-2: Reasonable Progress Goals for Class I Areas (Worst 20 Percent Days)

Class I Area	Improvement Projected by 2018 using RPG (dv)	Improvement by 2018 at URP (dv)	Projected Improvement by 2064 (dv)	Date Natural Visibility Attained at RPG Rate
Big Bend	0.7	1.7	2.9	2155
Guadalupe Mountains	0.9	1.2	3.8	2081

These RPGs are derived from the CENRAP modeling and reflect emissions reductions programs already in place, including CAIR and additional refinery SO_2 reductions as a result of the EPA refinery consent decrees. These RPGs assume that either CAIR will remain in place or will be replaced by a comparable program to reduce visibility impairing pollution from EGUs in Texas and in the eastern United States. As Chapter 11: *Long-Term Strategy to Reach Reasonable Progress Goals* details, the TCEQ's emissions reduction requirements have often gone beyond the Federal Clean Air Act (FCAA) requirements for the past 35 years and continue to go beyond many federal requirements today. Texas programs include:

- opacity limits on grandfathered facilities;
- Best Available Control Technology (BACT) requirements that typically go beyond EPA's New Source Performance Standards (NSPS) for new and modified sources;
- extensive NO_X emission limits on existing and new sources including major, minor, and area sources including some on a statewide basis;
- Texas Emissions Reduction Program (TERP), which provides financial incentives to accelerate the implementation of new, cleaner diesel engine technologies in on-road and non-road applications; and
- Air Check Texas Repair and Replacement Assistance Program, which provides financial incentives for scrappage of older gasoline-powered on-road vehicles.

The reasonable progress goals were developed after considering the statutory factors: cost and time of compliance, the energy and non-air quality impacts of compliance, and the remaining useful life of existing sources. Appendix 10-1: *Analysis of Control Strategies and Determination of Reasonable Progress Goals* provides an analysis showing that these goals are reasonable.

The TCEQ focused its control strategy analysis on point source emissions of SO_2 and NO_X. Chapter 11: *Long-Term Strategy to Reach Reasonable Progress Goals* demonstrates that these are the main anthropogenic pollutants that affect visibility at Class I areas in Texas and in neighboring states. For SO_2, point sources make up over 90 percent of the projected 2018 statewide emissions. Point sources are clearly the issue for this pollutant. For NO_X, point sources comprise over 45 percent of the projected statewide emissions. This is the largest single component. The next largest is area sources. Of that, the greatest component also has the greatest uncertainty: emissions from upstream oil and gas production. Working with CENRAP, the TCEQ plans to refine its understanding of those emissions and options for controls over the next few years. Nevertheless, Texas is moving aggressively to reduce those emissions through the $4 million grant program to pay for retrofits on rich burn compressor engines. Texas is going beyond federal requirements in an effort to reduce NO_X emissions from on-road and non-road mobile sources through the Texas Emissions Reduction Program (TERP). As a result, the TCEQ elected to focus the control strategy analysis on point sources.

Figures 10-1: *Glide Path for Big Bend Worst 20 Percent Days* and 10-2: *Glide Path for Guadalupe Mountains Worst 20 Percent Days* graphically illustrate how these RPGs compare to the URP or the glide path for the Texas Class I areas.

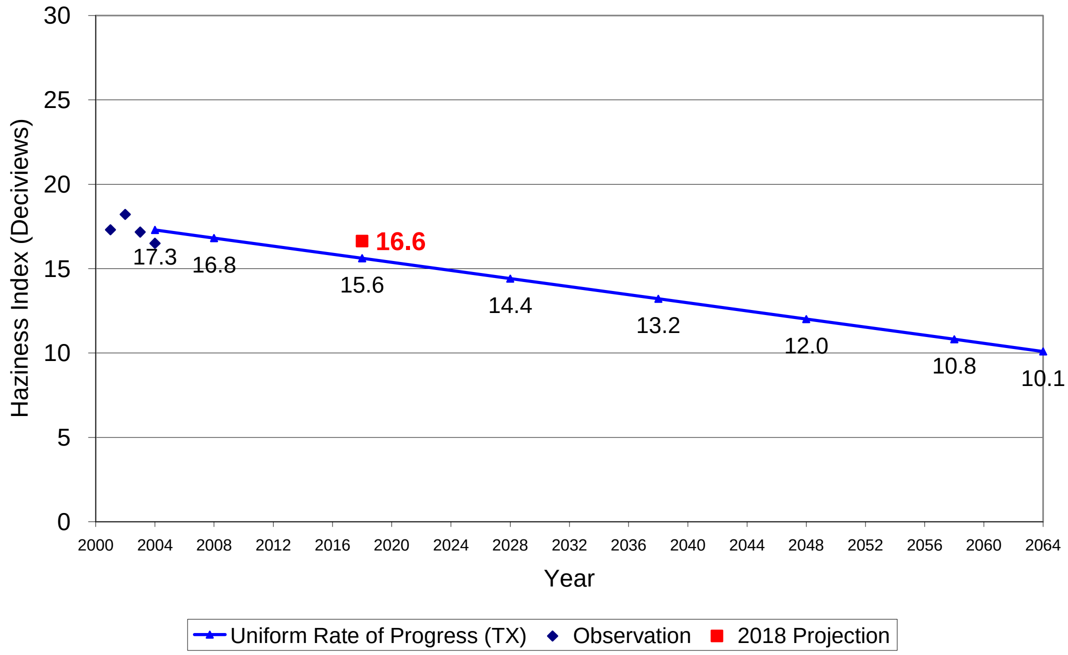


Figure 10-1: Glide Path for Big Bend Worst 20 Percent Days

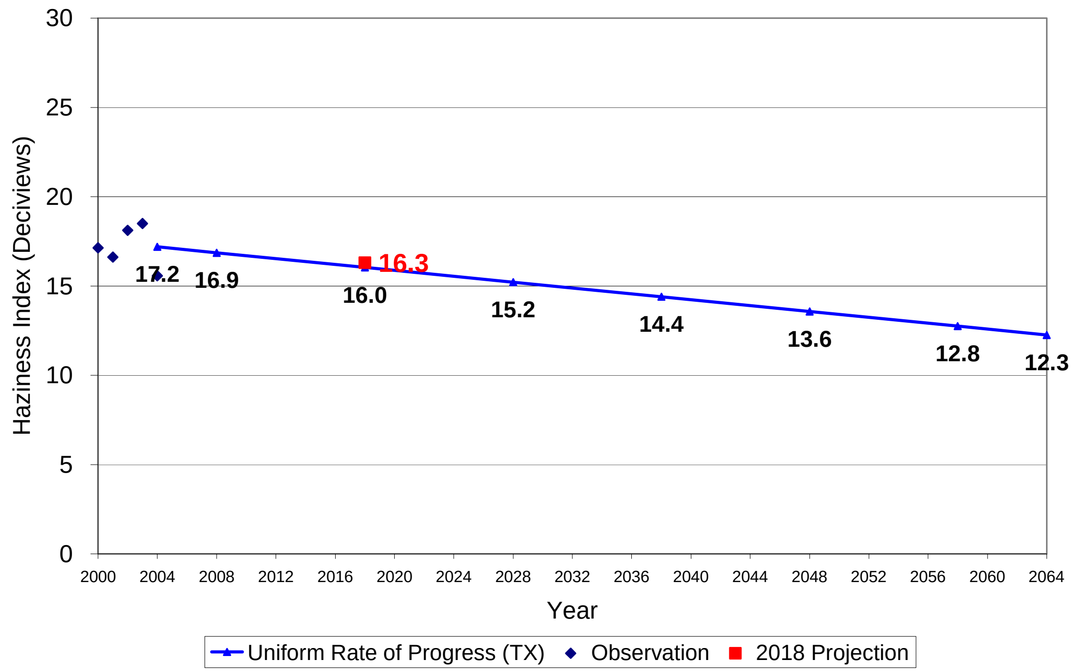


Figure 10-2: Glide Path for Guadalupe Mountains Worst 20 Percent Days

The figures and tables above address the TCEQ's RPGs for the worst 20 percent days at Big Bend and Guadalupe Mountains. These figures use the TCEQ's refined estimate for natural conditions, rather than the EPA default values. Appendix 10-3: *Uniform Rate of Progress Curves Using Default Natural Conditions Estimates* shows the glide paths using the EPA default values. The natural condition estimate was not a factor in setting the RPG. Table 10-3:

Reasonable Progress Goals for Class I Areas (Best 20 Percent Days) provides the state's RPGs for the 20 percent days with the best visibility at the Texas Class I areas.

Table 10-3: Reasonable Progress Goals for Class I Areas (Best 20 Percent Days)

Class I Area	Baseline Visibility (dv)	Projected 2018 Visibility (RPG) (dv)	Improvement by 2018 at RPG (dv)
Big Bend	5.8	5.6	0.2
Guadalupe Mountains	5.9	5.7	0.2

These RPGs reflect visibility improvements from emissions reductions associated with the FCAA, the Texas Clean Air Act, Texas' ozone SIP revisions and rules, and agreements between EPA and oil refineries for SO_2 emissions reductions. These RPGs do not include additional emissions reductions from implementing the Texas BART rule and new rules adopted in the recent May 23, 2007, Dallas-Fort Worth eight-hour ozone attainment demonstration SIP revision. The TCEQ considered additional controls beyond those already adopted. Given the cost and imperceptible effect of additional controls, and significant international sources of visibility impairment (all discussed in the following section), it is not reasonable to require additional controls at this time to reduce the impact of Texas' emissions on the two Class I areas in Texas.

10.3 CONSIDERATION OF ADDITIONAL POLLUTION CONTROL

Development of Area of Influence (AOI) Based Cost Data

The TCEQ participated in its regional air planning organization, CENRAP, to develop emission inventories for 2002 and 2018, model the results of the emission reductions for each state, and draw areas of influence for each Class I area in the CENRAP domain. To draw the areas of influence CENRAP combined results from three techniques: 1) residence time difference plots for each pollutant that has a substantial effect on visibility impairment at each Class I area, 2) a combination of backward trajectory analysis, emissions information, and monitored concentrations, and 3) tagged species source apportionment within reactive photochemical grid modeling. Appendix 10-1: *Analysis of Control Strategies RPG* provides more detailed information about CENRAP's work to define areas of influence.

For the Class I areas that emissions from Texas affect, the main visibility impairing pollutants resulting from human activity are sulfate and nitrate. The emissions that react to form these pollutants are, respectively, sulfur dioxide and nitrogen oxides. Because of the differences between conditions that lead to high sulfate and high nitrate conditions, the areas of influence for sulfur dioxide and nitrogen oxides are substantially different for several Class I areas that Texas emissions affect.

The TCEQ used the control strategy analysis completed by the CENRAP as the starting point for the analysis of additional controls. The CENRAP analysis used the EPA AirControlNET tool to develop cost per ton estimates for the relevant pollutants. The TCEQ reviewed this information and made changes based on knowledge of the particular facilities and agency experience with implementing ozone control strategies. The analysis focused on moderate cost controls for sources that were likely to contribute to visibility impairment at Class I areas.

Texas assessed the costs of potential controls and reductions for Texas sources at ten Class I areas. These are Big Bend, Breton Island, Caney Creek, Carlsbad Caverns, Guadalupe Mountains, Salt Creek, Upper Buffalo, Wheeler Peak, White Mountain, and Wichita Mountains.

Texas used the second level area of influence for each Class I area to determine sources that met the emissions over distance threshold and were within that Class I area's AOI. The cost associated with potential controls for each Class I area are listed in Table 10-4: *Cost of Controls for Class I Areas*. The significant point sources within each AOI are in Appendix 4-3: *Additional Consultation Letters to Adjacent States*. A master list of potential additional control costs associated with these units for each Class I area were determined and are in Appendix 10-1.

Table 10-4: Cost of Controls for Class I Areas

Class 1	**Big Bend**	**Breton Isle**	**Caney Creek**	**Carlsbad Caverns**	**Guadalupe Mountains**
NOx	$ 24,100,000	$ 27,000,000	$ 28,600,000	$ 24,100,000	$ 33,800,000
SO_2	$215,900,000	$231,000,000	$245,900,000	$255,500,000	$254,900,000
Class 1	**Salt Creek**	**Upper Buffalo**	**Wheeler Peak**	**White Mountain**	**Wichita Mountains**
NOx	$ 27,000,000	$ 24,100,000	$ 22,700,000	$ 23,000,000	$ 28,100,000
SO_2	$251,900,000	$233,800,000	$229,500,000	$244,500,000	$269,500,000

Many of these controls are in more than one area of influence. The total cost of all state-wide point source controls are summarized in Table 10-5: *TCEQ Point Source Control Strategy Summary*.

Table 10-5: TCEQ Point Source Control Strategy Summary

Pollutant	**Tons Per Year (tpy) Reduced**	**Estimated Cost**
Sulfur Dioxide (SO_2)	155,873	$270,800,000
Nitrogen Oxides (NO_X)	27,132	$53,500,000
Total Costs		$324,300,000

The TCEQ used the CENRAP modeling to estimate the impact that the control strategy would have on the Class I areas impacted by Texas' emissions. The CENRAP conducted a modeling analysis presuming an aggressive set of additional controls above and beyond CAIR and BART Texas used the results of this modeling analysis to determine an effectiveness ratio for NO_x and SO_2 reductions. The effectiveness ratio provides an estimate of improvement in visibility for every ton of NO_X and SO_2 reduced. Using these ratios, the TCEQ was able to develop an order-of-magnitude estimate of the likely visibility improvements resulting from the point source control strategy (see Table 10-6: *Estimated Haze Index Improvements for Affected Class I Areas*). This analysis can be found in Appendix 10-2: *Estimating Visibility Impacts from Additional Point Source Controls* and in Appendix 10-4: *Detailed Calculations for Estimating Visibility Impacts*.

Table 10-6: Estimated Haze Index Improvements for Affected Class I Areas

Class 1	Big Bend	Breton Isle	Caney Creek	Carlsbad Caverns	Guadalupe Mountains
Haze Index Improvement (dv)	0.16	0.05	0.33	0.22	0.22
Class 1	**Salt Creek**	**Upper Buffalo**	**Wheeler Peak**	**White Mountain**	**Wichita Mountains**
Haze Index Improvement (dv)	0.18	0.16	0.04	0.24	0.36

As Tables 10-5 and 10-6: *Estimated Haze Index Improvements for Affected Class I Areas* show, the analysis identified controls costing well over $300 million, yet the projected benefit of those controls on each Class I is not perceptible. A single (1.0) deciview is the smallest perceptible improvement in visibility. In the TCEQ's Best Available Retrofit Technology (BART) rule, the state considered 0.5 deciviews as the threshold under which a facility was not considered to meaningfully contribute to visibility impairment. A difference improvement of 0.05 deciviews is well within the uncertainty of the modeling techniques and is much lower than perceptible.

10.4 FOUR FACTOR ANALYSIS

The Federal Regional Haze Rule requires states to set reasonable progress goals (RPGs) toward meeting a national goal of natural visibility conditions in Class I areas by the year 2064. The first RPG is to be established for the planning period 2008 to 2018. The State of Texas worked with CENRAP to develop RPGs for Texas Class I areas.

The Federal Regional Haze Rule (§51.308(d)(1)(i)(A)) requires states to consider the factors listed in section 169A(g)(1) of the FCAA when setting reasonable progress goals. These factors are the cost of compliance, the time for compliance, the energy and non-air quality impacts of compliance, and the remaining useful life of any potentially affected sources (EPA 1999).

- **Cost of Compliance**
  The cost of compliance is a factor used to determine whether compliance costs for sources are reasonable compared to the emission reduction and visibility improvement they will achieve.

- **Time Necessary for Compliance**
  The time necessary for compliance factor may be used to adjust the reasonable progress goals to reflect the degree of improvement achievable within the first planning period, as opposed to the improvement expected at full implementation of a control measure.

- **Energy and Non-Air Quality Environmental Impacts of Compliance**
  The energy and non-air quality environmental impacts of compliance factor is meant to consider whether the energy requirements of the control technology result in energy penalties or benefits, or whether there are non-air quality impacts such as water quality and solid waste impacts resulting from the technology.

- **Remaining Useful Life of the Source**
  The remaining useful life of the source factor is applicable only to those measures which would require retrofitting of control devices (or possibly production changes) at *existing* sources. Shutdowns of sources were only counted if the shutdowns were enforceable.

10.4.1 Applying the Statutory Factors

Because the pollutants of primary concern were determined to be SO_2 and NO_X from point sources, the 2018 emissions inventory was assessed to determine the sources that would have the most impact on Class I areas from these pollutants. All units in the inventory were assessed. An emissions over distance to any Class I area analysis ratio with a threshold of five or greater ($Q/d \geq 5$ in tpy/kilometers) was applied to the projected 2018 emissions for both SO_2 and NO_X to eliminate sources so far away from a Class I area that any reduction in emissions would be unlikely to have a perceptible impact on visibility. Also, any source with predicted 2018 emissions less than 100 tpy was excluded, since the regulatory and logistical overhead associated with controlling these small sources would not be justified by the likely benefit.

The TCEQ also excluded additional NO_X controls on cement kilns from consideration since Texas has already required all the measures determined to be reasonable to control NO_X emission from these sources in the latest Dallas-Fort Worth ozone SIP revision. See Appendix 10-1: *Analysis of Control Strategies and Determination of Reasonable Progress Goals* for further discussion of Texas cement kilns.

Determination of Proposed Controls

The 2018 inventory included the on-the-books controls for each of the states in the CENRAP region. The list of proposed controls is for controls beyond those already included in the baseline level used in the modeling. This is necessary to provide a frame of reference to estimate the amount of emissions available for additional control and estimate the effect of control measures. Additionally, the progress toward the RPG with only on-the-books controls can also be assessed.

CENRAP used the latest revised version of the EPA AirControlNET model (Alpine 2007) to analyze potential add-on control device strategies. AirControlNET is a control technology analysis tool developed to support the EPA in analyses of air pollution policies and regulations. The tool provides data on emission sources, potential pollution control measures and emission reductions, and the costs of implementing those controls. Every available SO_2 and NO_X control strategy in AirControlNET was run against the electric generating units (EGUs) and non-EGU point source inventories to develop a master list of available incremental control strategies for the entire CENRAP 36 kilometer domain.

Texas reviewed the resulting data curves and some additional individual sources were selected from source-types that were not part of the CENRAP AirControlNET dataset. The analyses of these facilities were designed to ensure that opportunities for cost-effective visibility improvements were not overlooked. The first step in the technical evaluation of control measures for a source category was to establish the future emissions baseline with on-the-books regulations. This baseline was used to assess the potential emissions reductions with the proposed control. The TCEQ added flue gas desulfurization at nine carbon black units based on this analysis.

10.4.2 Four Factor Analysis Process

Cost of Compliance

At a total estimated cost exceeding $300 million and no perceptible visibility benefit, Texas has determined that it is not reasonable to implement additional controls at this time. All units in Texas that met the emissions over distance threshold were assessed. The cost per ton of controls from EPA CAIR and existing TCEQ control programs were used as a threshold value for determining a proposed set of controls. The EPA estimated the cost of implementing CAIR was up to $2,700 per ton. This limiting threshold was used to limit the proposed controls group to cost effective measures. The annualized cost values, additional emissions reductions based on proposed efficiency, as listed in the AirControlNET files, were used. Modifications for Texas included the consideration of flue gas desulfurization for carbon black units.

Time Necessary for Compliance
The time necessary for compliance was not a critical factor for the determination of applicable additional controls for Texas sources. The focus of the time necessary for compliance analysis for on-the-books controls will be to quantify the magnitude of emissions reductions that will occur prior to 2018. The EPA in its CAIR regulatory impact statement estimated that approximately 30 months is required to design, build, and install SO_2 scrubbing technology for a single EGU boiler. The total time for a single facility to comply with one of the NO_X caps would be about five years. Shortage of skilled labor as a result of increased design and construction of pollution control units required to meet deadlines in CAIR or its eventual replacement could increase times for some construction but completion by 2018 would still be anticipated.

For mobile sources, MOBILE and NONROAD model runs were completed for the 2018 emissions inventory. These model runs incorporate the degree of fleet and expected engine replacement prior to 2018. The completion of other proposed controls are anticipated by 2018.

Energy and Non-Air Quality Environmental Impacts of Compliance
To the extent energy impacts are quantifiable for a particular control, they have been included in the cost estimates. Including impacts on a source-by-source basis would have added further weight against finding that the potential additional controls were reasonable to apply.

Scrubbers, Selective Catalytic Reduction (SCR) systems, and Selective Non-Catalytic Reduction (SNCR) systems installed under the EGU control strategies would require electricity to operate fans and other ancillary equipment. In addition, steam would be required for some scrubbers and SCR systems. Additional fuel will be consumed at the utilities to produce this electricity and steam, resulting in the lowering of the energy efficiency of the plant. Estimates have given the electricity and steam required by controls installed to meet SO_2 and NO_X emission caps would be less than 1 percent of the total electricity and steam production of EGUs (EPA 1999).

Source-by-source review of the non-air quality impacts of the potential controls would possibly have lead to a different determination about the unreasonableness of the set of potential additional controls. Scrubbers, coal washing, and spray dryers will require additional safeguards for fuel handling and waste handling systems to avoid additional non-air environmental impacts such as increased effluents in waste water discharges and storm water runoff. Solid waste disposal and wastewater treatment costs are expected to be less than five percent of the total operating costs of pollution control equipment. These factors will need to be considered specific to individual sources.

Pilot testing of SNCR on wet and dry kilns in 2006 demonstrated that 30 to 40 percent reductions were achievable without hazardous by-product formation. In July 2006, ERG submitted a report to TCEQ entitled *Assessment of NO_X Emissions Reduction Strategies for Cement Kilns - Ellis County: Final Report* (ERG 2006).

Some low-NO_X combustion technologies require electricity for turbo charging, or steam for steam injection. Systems that require only modifications to alter fuel-air mixing and combustion temperatures are not expected to produce any additional electricity or steam demands, or generate wastewater or solid waste.

Remaining Useful life
CENRAP considered remaining useful life in modeling for mobile sources that assumes reduced emissions per vehicle mile traveled due to the turnover of the on-road mobile source fleet. For sources with a relatively short remaining useful life, this consideration would have weighed more heavily against a determination that controlling those sources would have been reasonable. In general, this factor is not critical for sector analyses for the 2018 timeline. For the purposes of

initial analyses, no limited useful equipment life was assumed. A site-specific analysis would be needed to determine any units with limited useful life. Only units that were scheduled for shutdown under enforceable decrees were eliminated from the 2018 inventory and further analysis.

10.5 UNCERTAINTY IN THE REASONABLE PROGRESS GOALS

The majority of the emissions reductions underlying the predicted visibility improvements are from the CAIR program or its eventual replacement. The TCEQ presumes that any eventual replacement for CAIR will include interstate trading of emissions allowances. Although CAIR or its replacement program should result in substantial reductions in SO_2 and NO_X emissions from EGUs, there is uncertainty regarding how visibility will be improved at individual Class I areas because of trading of emissions allowances. Because emission allowances can be purchased by EGUs relatively close to the Texas Class I areas from EGUs far from the Texas Class I areas, the visibility improvement may not be as great as predicted by the CENRAP's modeling. Conversely, nearby EGUs may elect to control beyond their emission caps and sell emission allowances out of state, resulting in reduced emissions closer to the Texas Class I areas.

CENRAP used the Integrated Planning Model (IPM) that the EPA employed to predict the emissions reductions expected from CAIR in 2018. This SIP revision presumes that those results would be comparable under any program to replace CAIR. The IPM model predicts the effect of emission trading programs considering economics, logistics, and the specific regulatory environment for each EGU. Table 10-7: *Comparison of Sulfur Dioxide Emissions* compares current emissions of SO_2 to the CAIR caps and the IPM results for the 2018 planning year.

Table 10-7: Comparison of Sulfur Dioxide Emissions

SO_2 Emissions	Texas SO_2 Emissions (tpy)*
Current (2002 base case)	550,000
EPA's CAIR budget for Texas EGUs for 2015	225,000
IPM projection CENRAP modeled for 2018	350,000

Sources: EPA, CENRAP
*Rounded to the nearest thousand

The CAIR cap is the total allowable emissions of SO_2 from EGUs in Texas under CAIR. The IPM model analysis used by CENRAP predicts that by 2018 EGUs in Texas will purchase approximately 125,000 tpy of emissions allowances from out of state. The TCEQ requested that key EGUs in Texas review and comment on the predictions of the IPM model. However, no EGU made an enforceable commitment to any particular pollution control strategy and preferred to retain the flexibility offered by the CAIR program.

In the five-year periodic progress report required by 40 CFR §51.308(g), the TCEQ plans to review emissions inventory and permit information to evaluate the accuracy of the predicted emissions used in the CENRAP modeling.

10.6 INTERNATIONAL SOURCES OF VISIBILITY IMPAIRMENT

The Texas Class I areas are close to Mexico, and international transport of emissions from Mexico and Central America significantly influence regional haze at these areas. CENRAP conducted a Particulate Matter Source Apportionment Technology (PSAT) analysis on the modeling conducted for the 2018 projections. The PSAT modeling apportioned all the particulate pollutant contributions to extinction except for secondary organic aerosol. The pollutants apportioned by geographic areas are sulfate, nitrate, primary organic carbon, elemental carbon, fine soil, and coarse mass. Table 10-8: *Contributions to Visibility in the Texas Class I Areas on Worst 20 Percent Day* summarizes the contribution from these areas to visibility impairment at the Texas Class I areas.

Table 10-8: Contributions to Visibility in the Texas Class I Areas on Worst 20 Percent Days

Contribution by Area	Big Bend (%)	Guadalupe Mountains (%)
Texas	24.8	34.8
Mexico	26.7	16.5
Boundary Conditions	25.7	8.7
Other US	11.9	18.9
Miscellaneous	5.8	9.6
Neighboring States	5.1	11.5

Boundary conditions are the conditions at the model's geographic boundaries. These are visibility-impairing emissions from Central Mexico and further south into Central America. The analysis indicates that 52 percent of the impairment at Big Bend and 25 percent of the impairment at Guadalupe Mountains is from Mexico and further south. The national goal of natural visibility at these Class I areas cannot be met without substantial reductions in emissions from outside of the United States.

10.7 REDUCTIONS REQUIRED TO MEET THE UNIFORM RATE OF PROGRESS

The TCEQ's analysis of point source reductions can be extrapolated to estimate the amount of reductions that would be required for the RPG to meet the URP for the Texas Class I areas.

Table 10-9: Emissions Reductions Required to Meet Uniform Rate of Progress

Class I Area	Additional Improvement Needed to Meet URP (dv)	Approximate Additional Pollutant Reductions SO_2 and NO_X (tpy)	Estimated Cost of Additional Reductions
Big Bend	1.0	3,700,000	$6,500,000,000
Guadalupe Mountains	0.3	1,100,000	$1,900,000,000

Table 10-9: *Emissions Reductions Required to Meet Uniform Rate of Progress* assumes that all of the reductions needed to meet the URP would come from Texas. These additional reductions would require significant over-control in order to compensate for the impacts of international pollution. The preamble to the July 1, 1999, issuance of the Regional Haze Rule clearly says that states are not required to carry out compensatory over-control to make up for the lack of progress in reducing the impacts of international transport.

Table 10-9 illustrates that to meet the goal of natural visibility at Big Bend a better understanding of how pollutants are brought into the area is needed so that the correct sources can be addressed. This also reinforces the point that progress at the Texas Class I areas, especially at Big Bend, is dependent upon reducing emissions from Mexico and Central America. In Chapter 11: *Long-Term Strategy to Reach Reasonable Progress Goals*, the TCEQ specifically asks the EPA for federal efforts to reduce the international transport impacts on regional haze coming into the United States across Texas' southern border.

Given the significant impact from international emissions, the uncertainty in the impact of CAIR and the poor cost-effectiveness of additional, reasonable point source controls, the TCEQ has determined that additional controls for regional haze are not appropriate at this time.

10.8 CONSULTATION

In determining a reasonable progress rate for each Class I area discussed previously, the TCEQ has consulted with the other states and tribes that are reasonably anticipated to cause or contribute to visibility impairment in each of the Texas Class I areas. Similarly, the TCEQ has consulted with other states whose Class I areas are impacted by pollution sources in Texas. The TCEQ invited tribes in the CENRAP states to the consultation calls, but no tribes participated in the consultation on Big Bend and Guadalupe Mountains. A full description of the consultation process is in Chapter 4: *State, Tribe, and Federal Land Manager Consultation*.

10.9 REPORTING

The TCEQ will report progress to the EPA Administrator every five years in accordance with 40 CFR §51.308(g). Chapter 12: *Comprehensive Periodic Implementation Plan Revisions and Adequacy of the Existing Plan*, provides more detail on five-year reporting and ten-year SIP submittal requirements.

CHAPTER 11. LONG-TERM STRATEGY TO REACH REASONABLE PROGRESS GOALS

11.1 INTRODUCTION

The long-term strategy for the Regional Haze SIP revision incorporates planning for the next ten years, from 2008 through 2018. Title 40 CFR §51.308.308(d)(3) specifies the requirements for the long-term strategy for regional haze (Appendix 1-1).

The main anthropogenic emissions that affect visibility in Class I areas in Texas and neighboring states are SO_2 and NO_X. There is a much smaller anthropogenic particulate matter (PM) impact in Texas from stack, engine exhaust, and fine soil emissions compared to SO_2 and NO_X. Although the contribution of anthropogenic VOC to the formation of secondary organic carbon PM is small, there is a contribution. The impact of coarse mass and fine soil at the two Texas Class I areas comes primarily from natural dust storms and dust blowing from the Chihuahuan Desert, which the modeling does not represent well. Chapter 5: *Assessment of Baseline and Current Conditions and Estimate of Natural Conditions in Class I Areas* discusses and documents the predominance of these natural impacts. The modeled impact of wild fire and prescribed burning emissions on primary organic carbon is uncertain because of questions about the accuracy of fire emission inventories. However, the modeled projections show that fires are the main source of the impacts.

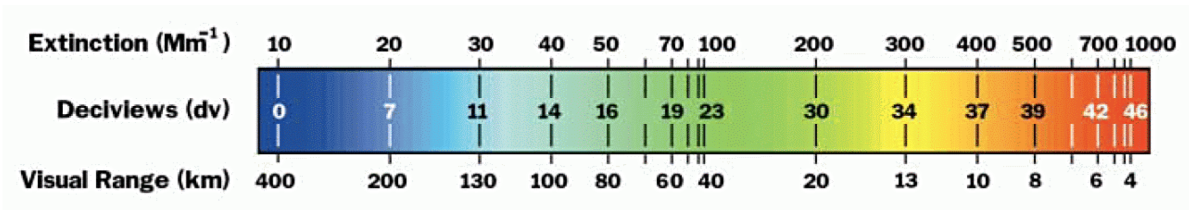
Bar charts in this chapter show the apportioned impact of different areas and pollutants to visibility impairment at Big Bend and Guadalupe Mountains National Parks and at the Class I areas Texas emissions impact in other states (Figures 11-2 through 11-31). There are separate graphs to show the impacts of different source areas on the worst 20 percent of monitored days and on the best 20 percent of monitored days in 2002. The apportioned impacts shown in the figures use the modeling results scaled to measured pollutant concentrations according to the EPA's modeling guidelines as detailed in Chapter 8: *Modeling Assessment*. As Chapter 5 explains, the projections for 2018 set the relative response factors (RRFs) for coarse mass (dust) and fine soil equal to one based on analysis showing that dust storms and wind blown desert dust are the dominant cause of the coarse mass and fine soil pollution at Big Bend and Guadalupe Mountains National Parks. Since the dominant source of these pollutants is natural, the TCEQ does not expect that to change between the base period and 2018.

The primary organic carbon and elemental carbon (i.e., black carbon) captured in the modeling are largely from fire. The term "primary" refers to a pollutant emitted directly to the atmosphere. The term "secondary" refers to a pollutant formed in the atmosphere by reaction, condensation, or both. The modeling indicates that primary organic carbon and black carbon at Big Bend on the worst 20 percent days come overwhelmingly from boundary conditions, which include the areas of southern Mexico, the Yucatan, and Central America with extensive agricultural burning and sometimes wildfire emissions each April and May. The TCEQ's air pollution meteorologists have documented many of these episodes over the past decade. The data and satellite images of the smoke moving into Texas confirm the large impact of smoke from the fires in southern Mexico, the Yucatan, and Central America.

The haze pollutants shown in the bar graphs and tables include: sulfate (SO_4), nitrate (NO_3), primary organic aerosols (POA), elemental carbon (EC), other inorganic fine particulate matter (soil), coarse mass (CM), anthropogenic secondary organic aerosols (SOAA) , which result from human activity, and biogenic secondary organic aerosols (SOAB), which form from hydrocarbon emissions from vegetation. Initial conditions (IC) are the assumed initial three-dimensional concentrations throughout the modeling domain. Except on the first few days of the model runs, the contribution of initial conditions is vanishingly small. Boundary conditions (BC) are the concentrations imported into the modeling domain along the lateral edges and the top of the

CENRAP modeling domain. These boundary conditions come from a year-long run of the global model GEOS-Chem.

Figures 11-2 through 11-31 also refer to extinction (abbreviated as B_{ext}) and Rayleigh. In the case of visibility, extinction or B_{ext} refers to the loss of image-forming light as it passes from an object to the observer. Rayleigh scattering is the scattering of light by air molecules (Malm 1999). Figure 11-1 compares extinction to deciviews (dv) and visual range (in kilometers).



Source: William Malm, *Introduction to Visibility*, 1999, National Park Service

Figure 11-1: Comparison of Extinction, Deciviews and Visual Range

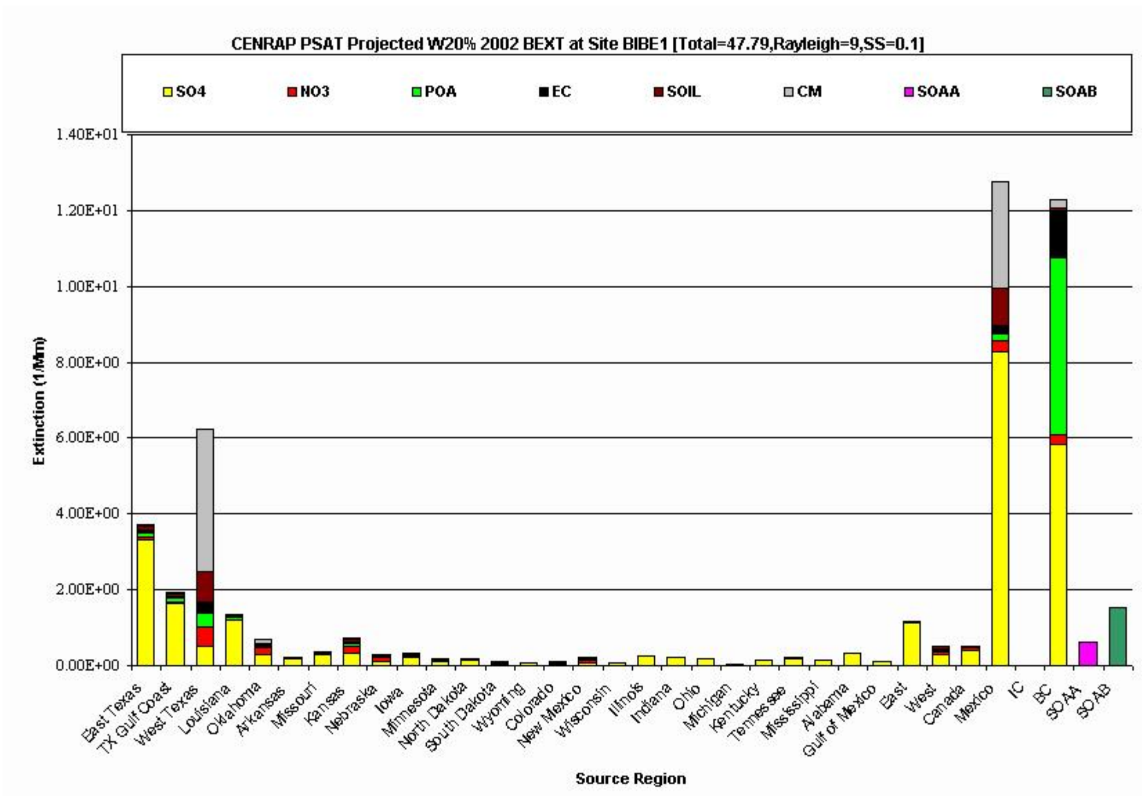


Figure 11-2: Areas and Pollutants Causing Regional Haze at Big Bend (BIBE) on Worst 20 Percent Days in 2002

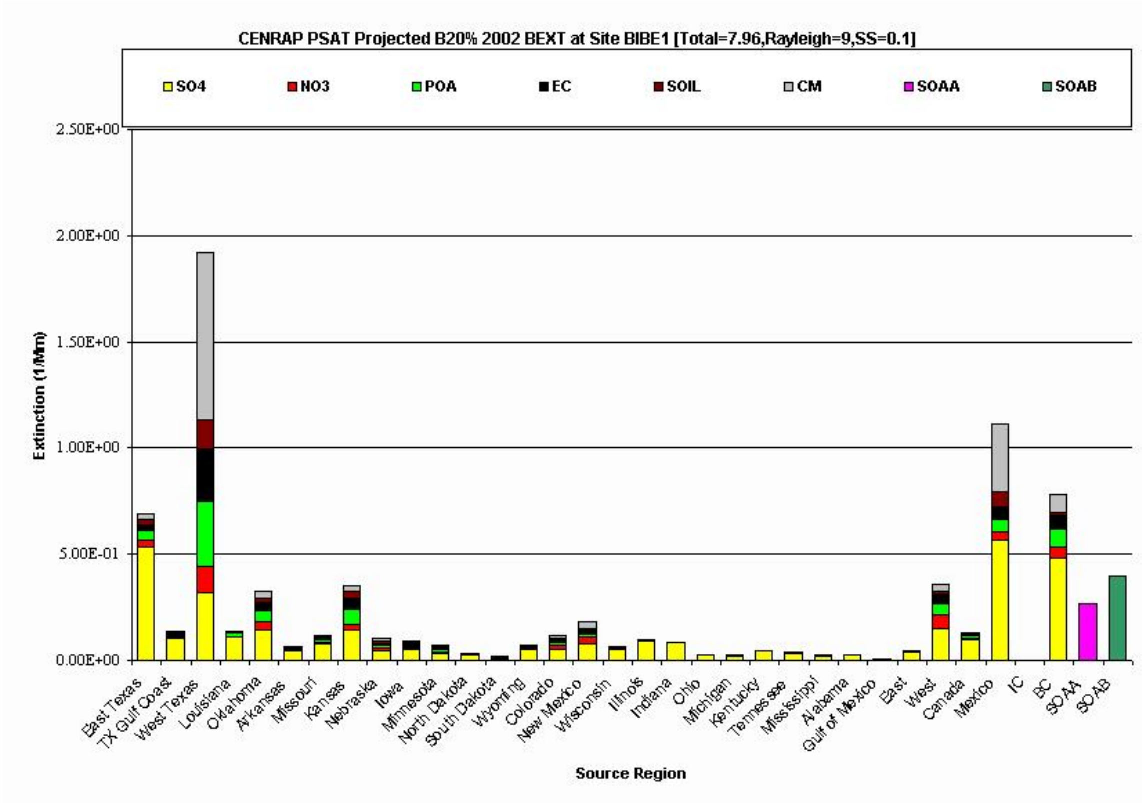


Figure 11-3: Areas and Pollutants Causing Regional Haze at Big Bend (BIBE) on Best 20 Percent Days in 2002

Note the change in scale on the y-axis.

Table 11-1: Pollutant Contributions to Extinction at Big Bend from Texas and from All Areas on Worst 20 Percent Days in 2002 and 2018

Particulate Matter Constituent	2002 Impacts at Big Bend (inverse megameters)		2018 Impacts at Big Bend (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	5.50	26.10	3.95	23.00
Nitrate	0.59	2.05	0.56	1.99
Primary Organic Aerosol	0.55	5.81	0.41	5.61
Elemental Carbon	0.42	2.12	0.20	1.81
Fine Soil	0.99	2.54	0.98	2.54
Coarse Mass	3.82	7.03	3.87	7.03
Secondary Organic Aerosol, Anthropogenic	not available1	0.64	not available1	0.59
Secondary Organic Aerosol, Biogenic	not available1	1.52	not available1	1.49
Total	11.87	47.79	9.97	44.06

[1] The CENRAP PSAT modeling did not apportion either the anthropogenic or the biogenic secondary organic aerosol (SOA). The reasons are (1) that sulfate and nitrate are generally the main causes of visibility impairment resulting from human activity and (2) that tracking the multiple volatile organic compound constituents and reaction products necessary to apportion SOA would have extended the modeling run times far beyond the time that was available for the modeling.

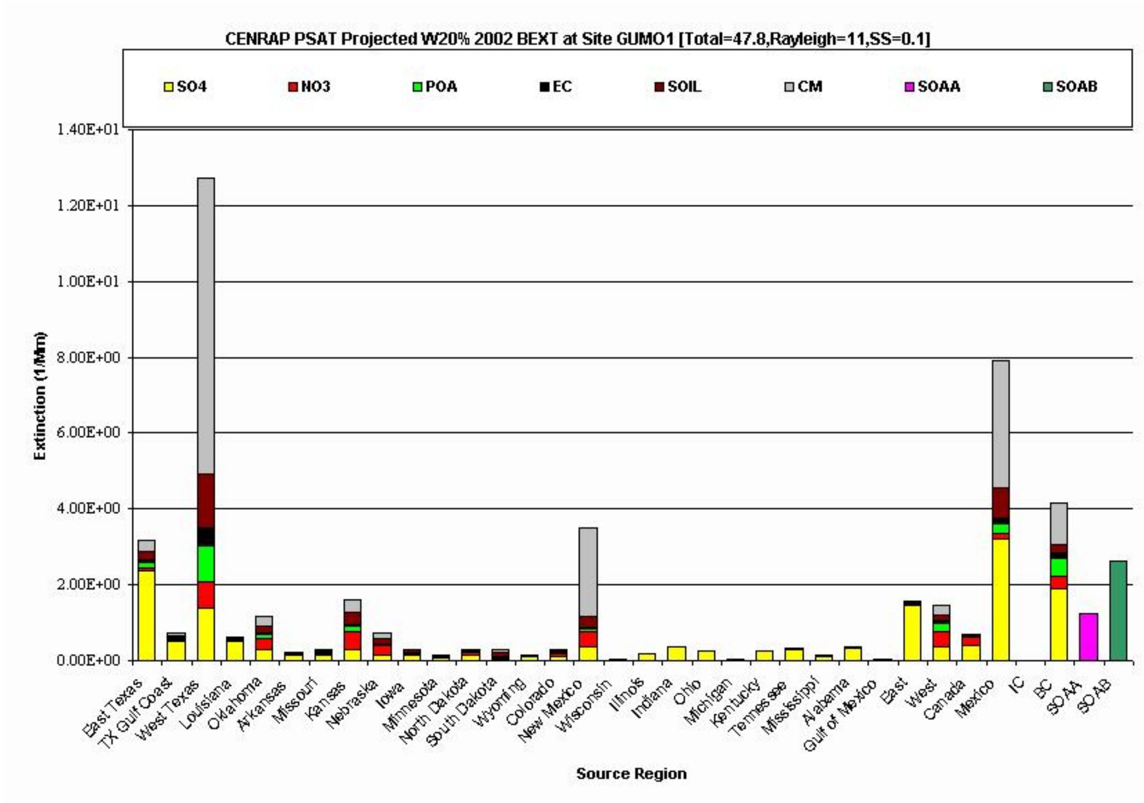


Figure 11-4: Areas and Pollutants Causing Regional Haze at Guadalupe Mountains (GUMO) on the Worst 20 Percent Days in 2002

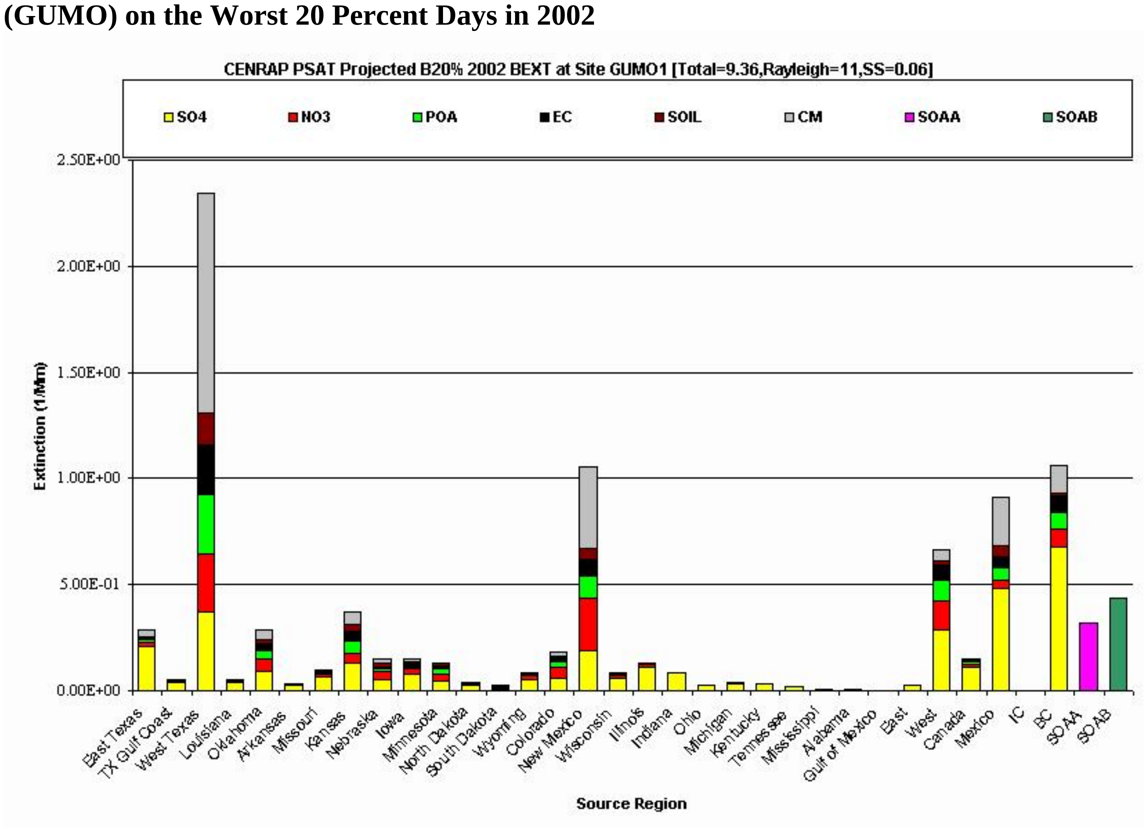


Figure 11-5: Areas and Pollutants Causing Regional Haze at Guadalupe Mountains (GUMO) on Best 20 Percent Days in 2002
Note the change on the y-axis.

Table 11-2: Pollutant Contributions to Extinction at Guadalupe Mountains from Texas and from All Areas on Worst 20 Percent Days in 2002 and 2018

Particulate Matter Constituent	2002 Impacts at Guadalupe Mountains (inverse megameters)		2018 Impacts at Guadalupe Mountains (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	4.28	15.94	3.65	13.65
Nitrate	0.78	3.67	0.68	3.32
Primary Organic Aerosol	1.16	2.75	0.87	2.38
Elemental Carbon	0.53	1.19	0.28	0.86
Fine Soil	1.71	4.37	1.66	4.37
Coarse Mass	8.16	16.04	8.19	16.02
Secondary Organic Aerosol, Anthropogenic	not available1	1.23	not available1	1.16
Secondary Organic Aerosol, Biogenic	not available1	2.61	not available1	2.56
Total	16.62	47.80	15.33	44.32

11.1.1 Reasonably Attributable Visibility Impairment

Reasonably attributable visibility impairment (RAVI) is a specifically defined term from EPA's early efforts to protect visibility at Class I areas. Limitations in RAVI requirements for improving visibility at many Class I areas led to provisions in the 1990 Clean Air Act Amendments that added the broader requirements for to reduce regional haze impacts at Class I areas. The EPA implemented these provisions in the Regional Haze Regulations first issued July 1, 1999.

The FLMs for Big Bend and Guadalupe Mountains National Parks have not identified any reasonably attributable visibility impairment from Texas or other United States sources. The FLMs for the Class I areas that Texas' emissions impact in other states have not identified any reasonably attributable visibility impairment caused by Texas sources. For these reasons, the TCEQ does not have any measures in place or a requirement to address reasonably attributable visibility impairment.

11.2 CONSULTATION

The TCEQ has participated in the CENRAP since its inception in 1999. The TCEQ has cooperated with all CENRAP states and tribes through participation in the process of developing information on base period emission inventories and visibility impairment, estimates of 2064 natural conditions, and projections of 2018 emissions and visibility impairment considering all emission reduction requirements in Texas, including state and federal rules. These rules include the Clean Air Interstate Rule (CAIR), BART requirements, emission reductions from the Federal Motor Vehicle Emission Control Program (FMVCP), EPA refinery consent decrees, and EPA requirements for cleaner non-road diesel and gasoline-powered engines. Detailed information on consultation is in Chapter 3: *Regional Planning* and Chapter 4: *State, Tribe, and Federal Land*

Manager Consultation. Information on base period emissions inventory development is in Chapter 7: *Emissions Inventory*, and information on modeling is in Chapter 8: *Modeling Assessment*.

11.2.1 Consultation on Class I Areas in Texas

The TCEQ used CENRAP Particulate Matter Source Apportionment Technology (PSAT) modeling to determine that the states contributing to visibility impairment at Texas' Class I areas are Kansas, Louisiana, New Mexico, and Oklahoma. Each of these states has adopted or is in the process of adopting emissions reductions it has determined to be reasonable under the factors listed in 40 CFR §51.308(d)(1), Reasonable Progress Goals. Based on their plans and commitments elicited through the consultation process, the commission has determined that the emissions reductions these states are projecting are reasonable for contributing to progress in reducing their contributions to visibility impairment at the two Class I areas in Texas. Chapter 4 discusses consultations with these states in detail.

11.2.2 Consultation on Class I Areas Impacted by Emissions from Texas

Arkansas, Missouri, and Oklahoma have each included Texas in consultations concerning regional haze impacts on the Class I areas in these states. The TCEQ reviewed CENRAP PSAT modeling to assess how Texas' emissions might affect other states' Class I areas. Pursuant to this review, Texas has written to Arkansas, Missouri, Oklahoma, New Mexico, Louisiana, and Colorado to ask whether emission reductions projected in Texas by 2018 are sufficient to meet Texas' apportionment of the impact reduction needed to meet the reasonable progress goal for each Class I area in each state. Texas has completed its consultation with Louisiana, Arkansas, Missouri, Oklahoma, and Colorado, and none of these states has asked Texas for further emission reductions to help the state meet its reasonable progress goals for its Class I area(s). Chapter 4 discusses these consultations in more detail. Appendix 4-3 contains the official communications from these states to Texas.

11.2.3 Texas' Impacts and 2018 Impact Reduction for Class I Areas Outside Texas

The TCEQ's review of the CENRAP PSAT modeling results to assess how Texas' emissions might affect other states' Class I areas in 2002 indicated that Texas' emissions affect one or more Class I areas in New Mexico, Oklahoma, Colorado, Arkansas, Missouri, and Louisiana. This subsection presents the results of this review.

11.2.3.1 New Mexico

Emissions from the western portion of Texas account for most of Texas' impact on the Class I areas in New Mexico. The following graph in Figure 11-6 shows the impacts of the western portion of Texas on the Class I areas in New Mexico that are included in the CENRAP PSAT modeling. The graph provides the basis for choosing the New Mexico Class I areas for more detailed examination of Texas' impacts. Carlsbad Caverns National Park is not included in this graph since it has no regional haze monitor; instead, it uses data measured at Guadalupe Mountains National Park to assess the impact of regional haze on the park.

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*).

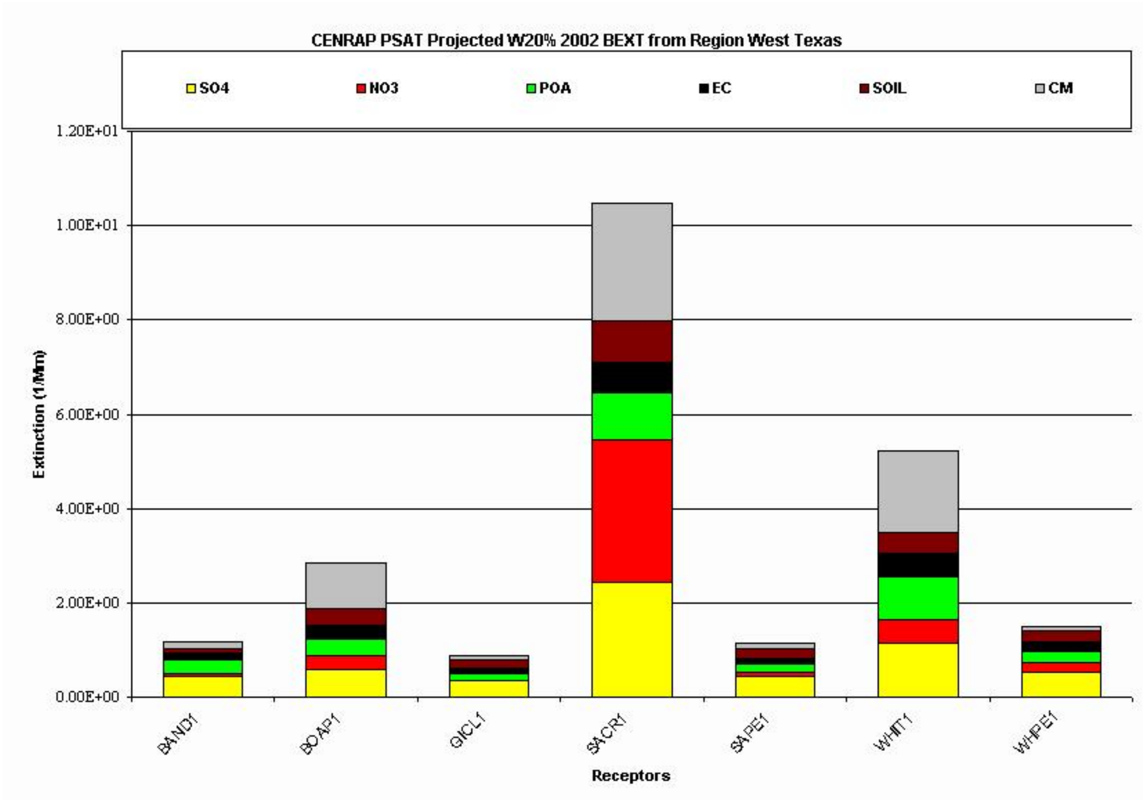


Figure 11-6: Calculated Regional Haze Impacts of Emissions from Western Areas of Texas at Class I Areas in New Mexico on Worst 20 Percent Days in 2002

BAND1 - Bandelier National Monument
BOAP1 - Bosque del Apache Wilderness Area
GICL1 - Gila Wilderness Area
SACR1 - Salt Creek Wilderness Area
SAPE1 - San Pedro Parks Wilderness Area
WHIT1 - White Mountain Wilderness Area
WHPE1 - Wheeler Peak Wilderness Area

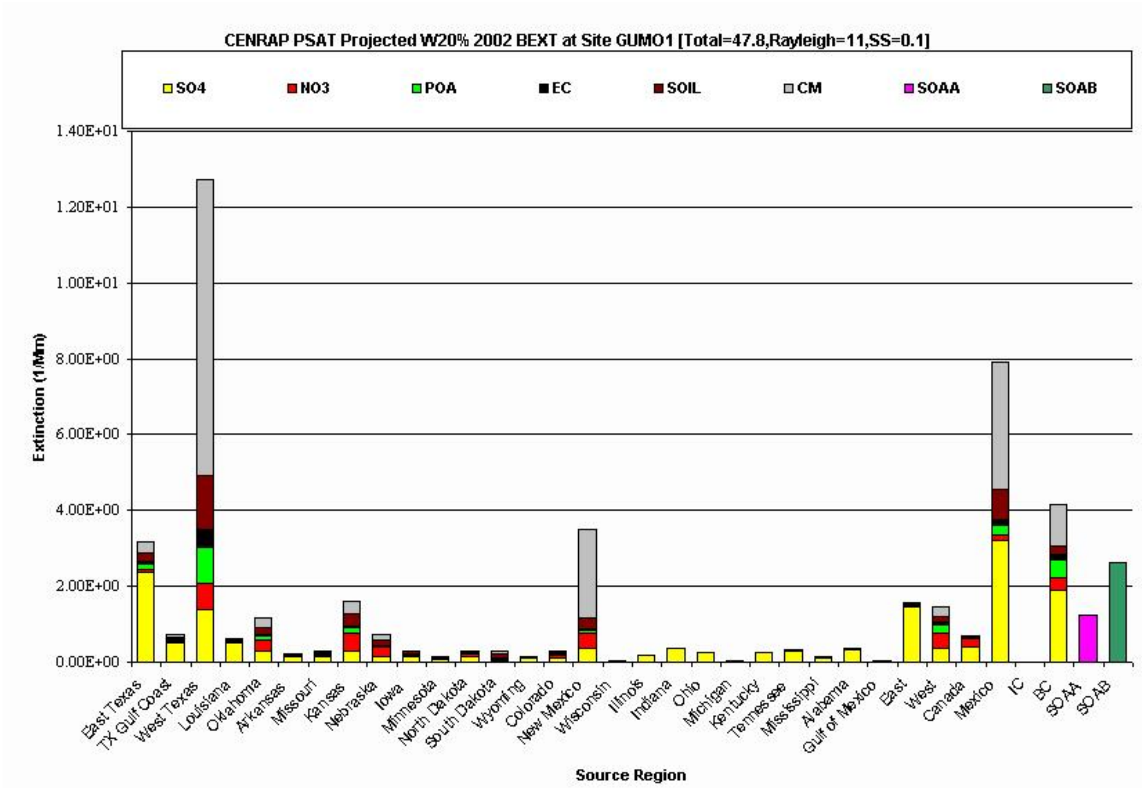


Figure 11-7: Areas and Pollutants Causing Regional Haze at Carlsbad Caverns National Park on Worst 20 Percent Days in 2002

Note: The impacts at Carlsbad Caverns National Park are calculated using the CENRAP PSAT tool for Guadalupe Mountains but using the EPA guidance for applying relative response factors (RRFs) since New Mexico is using modeled apportionment of coarse mass (CM) and fine soil (soil or FS). These calculations do not use the Texas assumptions for Guadalupe Mountains and Big Bend National Parks that the RRFs for CM and FS both equal one.

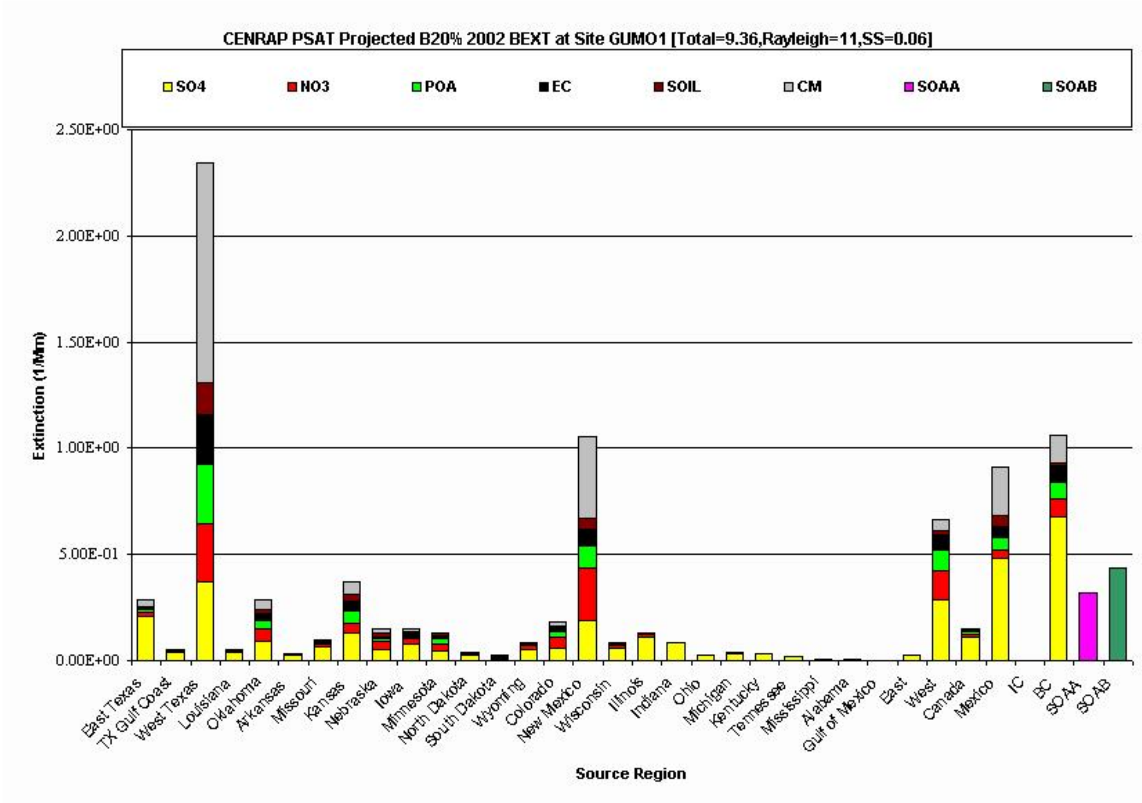


Figure 11-8: Areas and Pollutants Causing Regional Haze at Carlsbad Caverns National Park on Best 20 Percent Days in 2002

Note the change on the y-axis.

Table 11-3: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Carlsbad Caverns National Park on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Carlsbad Caverns[2] (inverse megameters)		2018 Impacts at Carlsbad Caverns[2] (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	4.28	15.94	3.65	13.65
Nitrate	0.78	3.67	0.68	3.32
Primary Organic Aerosol	1.16	2.75	0.87	2.38
Elemental Carbon	0.53	1.19	0.28	0.86
Fine Soil	1.71	4.37	1.66	4.37
Coarse Mass	8.16	16.04	8.24	16.13
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.23	not available[1]	1.16
Secondary Organic Aerosol, Biogenic	not available[1]	2.61	not available[1]	2.56
Total	16.62	47.80	15.39	44.43

[1] The CENRAP PSAT modeling did not apportion either the anthropogenic or the biogenic secondary organic aerosol (SOA). The reasons are (1) that sulfate and nitrate are generally the main causes of visibility impairment resulting from human activity and (2) that tracking the multiple volatile organic compound constituents and reaction products necessary to apportion SOA would have extended the modeling run times far beyond the time that was available for the modeling.

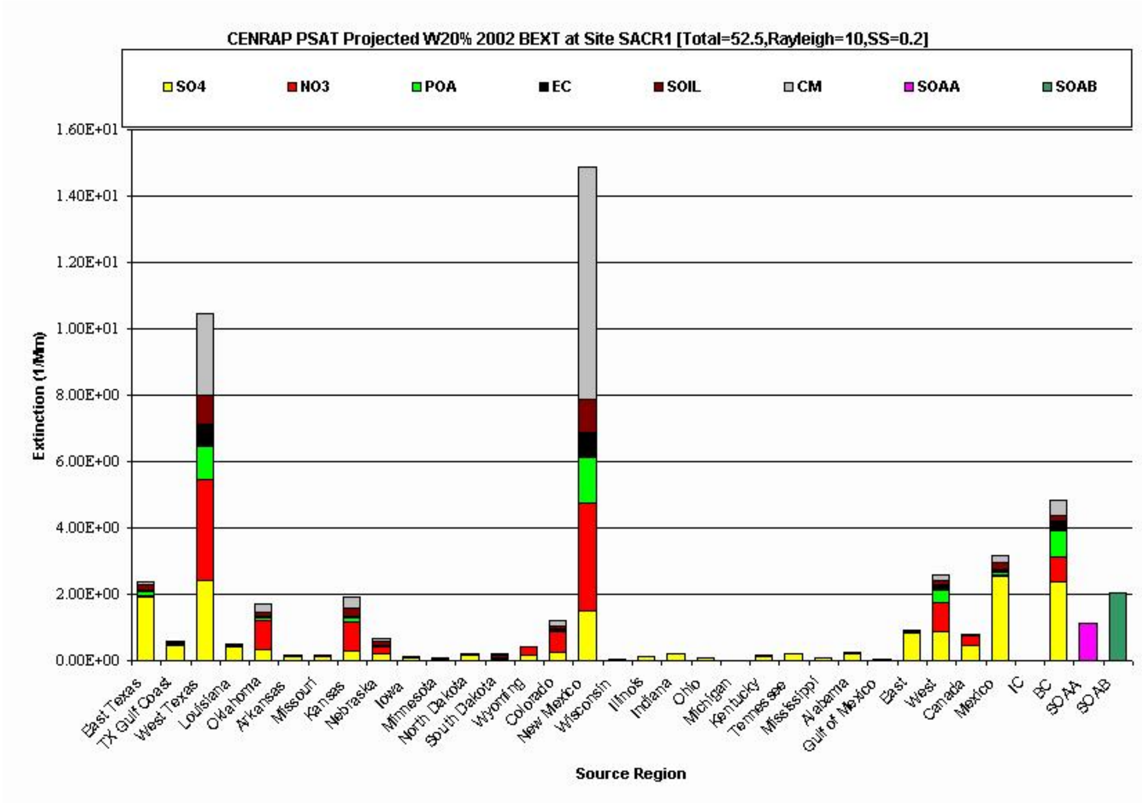


Figure 11-9: Areas and Pollutants Causing Regional Haze at Salt Creek (SACR) in New Mexico on Worst 20 Percent Days in 2002

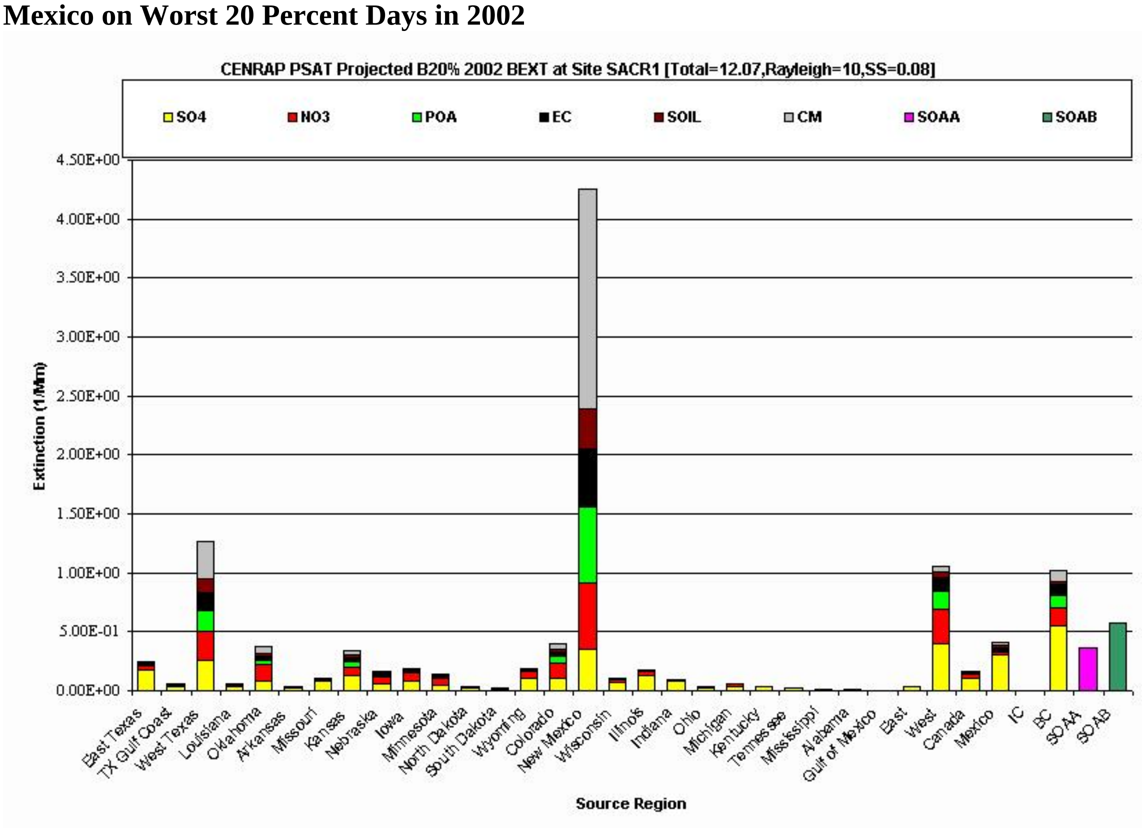


Figure 11-10: Areas and Pollutants Causing Regional Haze at Salt Creek (SACR) in New Mexico on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-4: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Salt Creek Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Salt Creek (inverse megameters)		2018 Impacts at Salt Creek (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	4.79	16.75	3.50	13.75
Nitrate	3.05	11.15	2.43	9.81
Primary Organic Aerosol	1.17	4.31	0.69	2.99
Elemental Carbon	0.76	2.31	0.30	1.23
Fine Soil	1.06	3.34	0.96	3.41
Coarse Mass	2.58	11.47	2.36	12.52
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.12	not available[1]	1.00
Secondary Organic Aerosol, Biogenic	not available[1]	2.06	not available[1]	1.95
Total	13.41	52.50	10.24	46.67

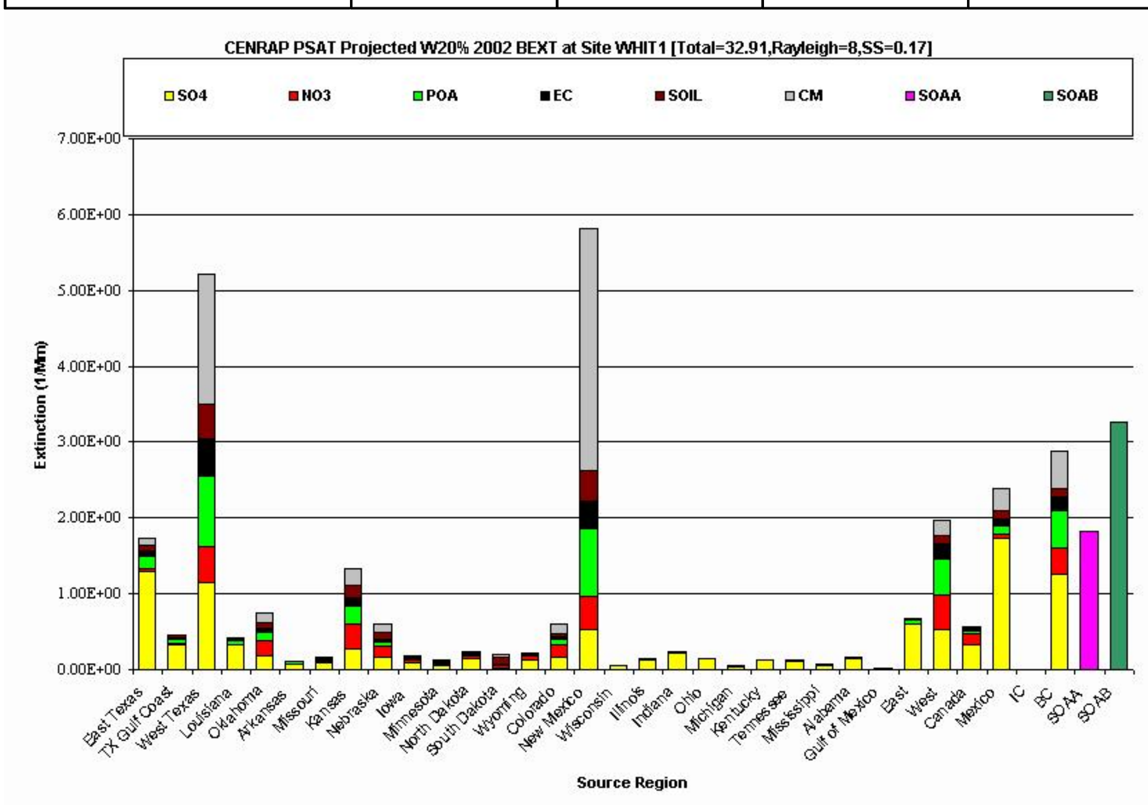


Figure 11-11: Areas and Pollutants Causing Regional Haze at White Mountain (WHIT) in New Mexico on Worst 20 Percent Days in 2002

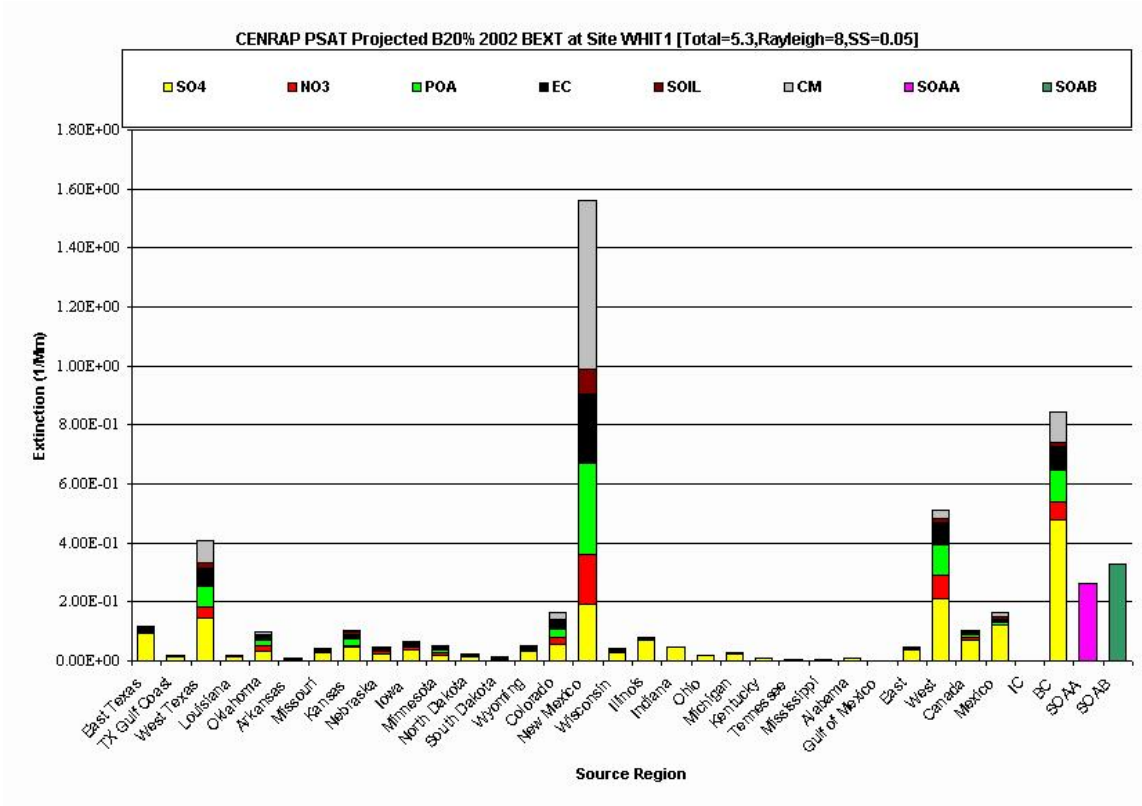


Figure 11-12: Areas and Pollutants Causing Regional Haze at White Mountain (WHIT) in New Mexico on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-5: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at White Mountain Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at White Mountain (inverse megameters)		2018 Impacts at White Mountain (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	2.78	10.51	2.37	8.92
Nitrate	0.53	3.05	0.47	2.68
Primary Organic Aerosol	1.14	3.87	0.78	3.13
Elemental Carbon	0.59	1.82	0.27	1.08
Fine Soil	0.55	1.89	0.53	1.95
Coarse Mass	1.81	6.68	1.80	7.29
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.83	not available[1]	1.64
Secondary Organic Aerosol, Biogenic	not available[1]	3.27	not available[1]	3.11
Total	7.40	32.91	6.22	29.80

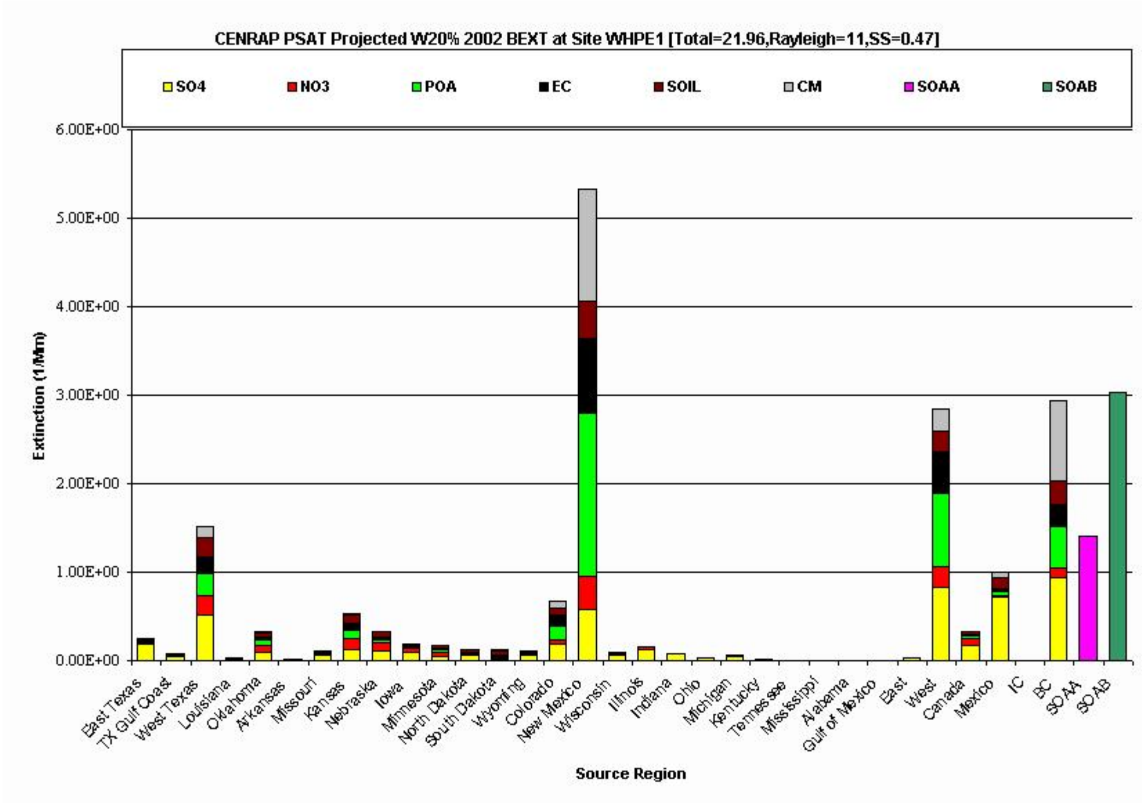


Figure 11-13: Areas and Pollutants Causing Regional Haze at Wheeler Peak Wilderness Area on Worst 20 Percent Days in 2002

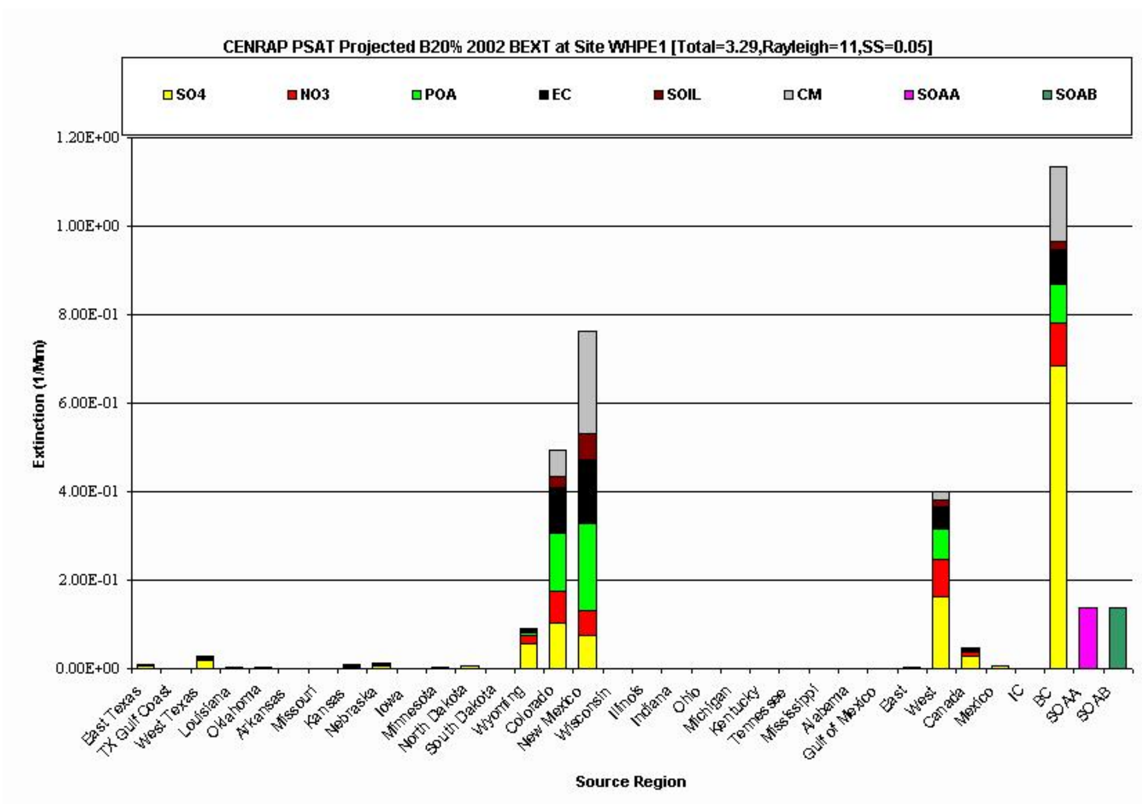


Figure 11-14: Areas and Pollutants Causing Regional Haze at Wheeler Peak Wilderness Area on Best 20 Percent Days in 2002

Note the change in scale on the y-axis.

Table 11-6: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Wheeler Peak Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Wheeler Peak (inverse megameters)		2018 Impacts at Wheeler Peak (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	0.76	5.27	0.79	5.00
Nitrate	0.22	1.64	0.19	1.48
Primary Organic Aerosol	0.28	3.93	0.18	3.64
Elemental Carbon	0.21	2.18	0.08	1.48
Fine Soil	0.25	1.75	0.23	1.88
Coarse Mass	0.12	2.77	0.12	3.09
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.41	not available[1]	1.28
Secondary Organic Aerosol, Biogenic	not available[1]	3.03	not available[1]	2.96
Total	1.85	21.96	1.59	20.80

11.2.3.2 Oklahoma

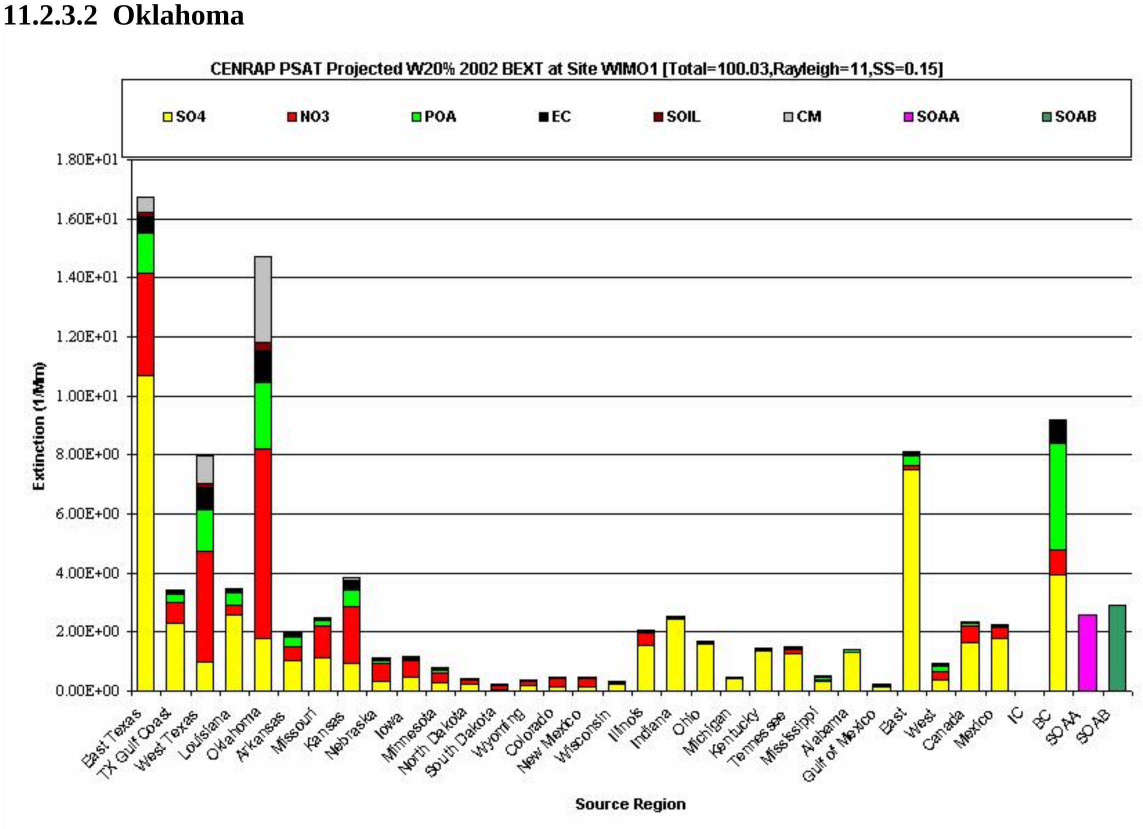


Figure 11-15: Areas and Pollutants Causing Regional Haze at Wichita Mountains (WIMO) in Oklahoma on Worst 20 Percent Days in 2002

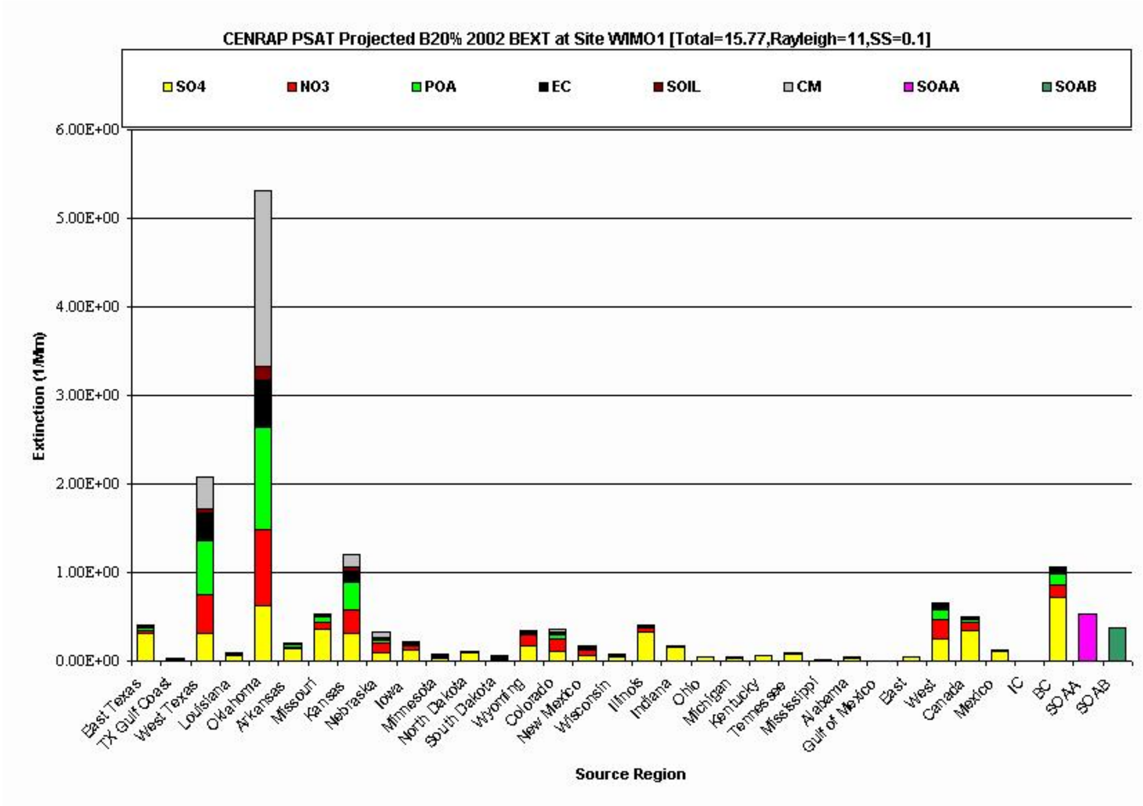


Figure 11-16: Areas and Pollutants Causing Regional Haze at Wichita Mountains (WIMO) in Oklahoma on Best 20 Percent Days in 2002

Note the change in scale on the y-axis.

Table 11-7: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Wichita Mountains Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Wichita Mountains (inverse megameters)		2018 Impacts at Wichita Mountains (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	13.98	49.12	9.68	33.33
Nitrate	7.89	23.72	6.08	18.10
Primary Organic Aerosol	3.05	11.81	2.57	10.92
Elemental Carbon	1.42	4.47	0.68	3.00
Fine Soil	0.29	0.79	0.30	0.79
Coarse Mass	1.51	4.64	1.49	4.35
Secondary Organic Aerosol, Anthropogenic	not available[1]	2.57	not available[1]	2.22
Secondary Organic Aerosol, Biogenic	not available[1]	2.91	not available[1]	2.84
Total	28.15	100.03	20.79	75.56

11.2.3.3 Colorado

Emissions from the western portion of Texas account for most of Texas' impact on the Class I areas in Colorado. The following graph in Figure 11-17 shows the impacts of the western portion of Texas on the Class I areas in Colorado that are included in the CENRAP PSAT modeling. The graph is to show the basis for choosing Great Sand Dunes as the Colorado Class I area for more detailed examination of Texas' impacts.

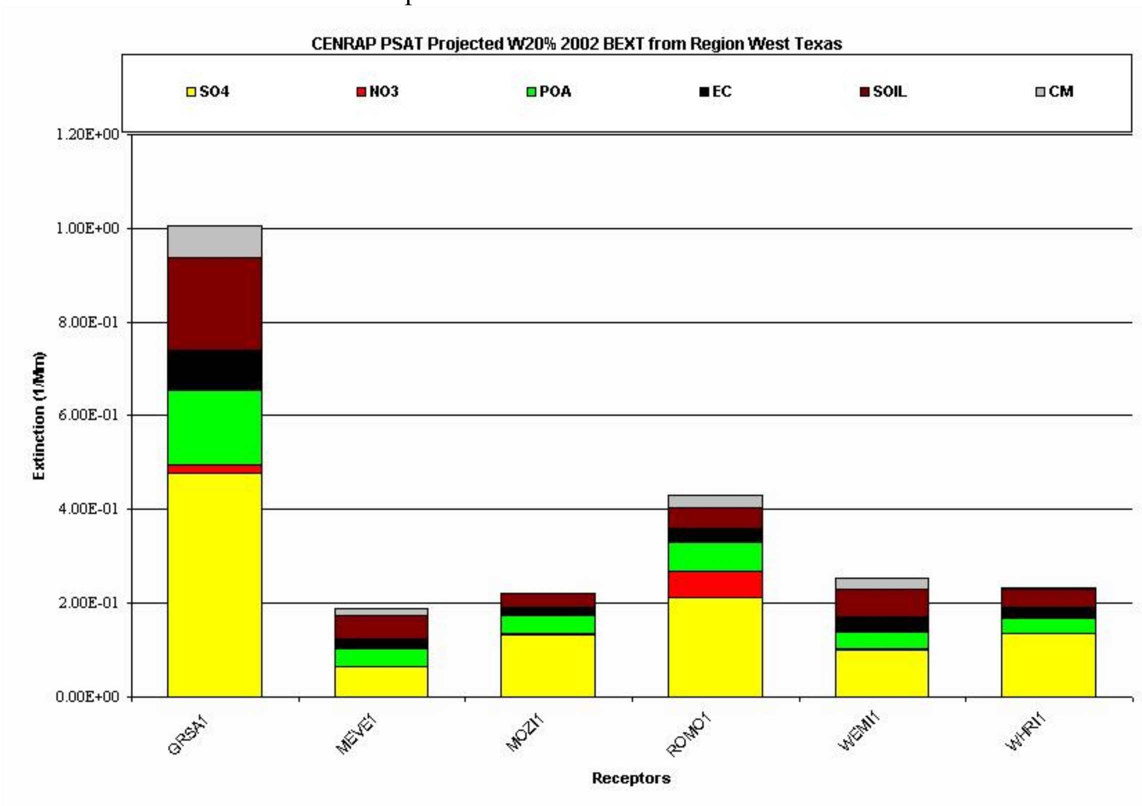


Figure 11-17: Calculated Regional Haze Impacts of West Texas Emissions at Each Class I Area in Colorado Included in CENRAP PSAT Modeling on Worst 20 Percent Days in 2002

GRSA - Great Sand Dunes National Park
MEVE - Mesa Verde National Park
MOZI - Mount Zirkel Wilderness Area
ROMO - Rocky Mountain National Park
WEMI - Weminuche Wilderness Area
WHRI - White River National Forest

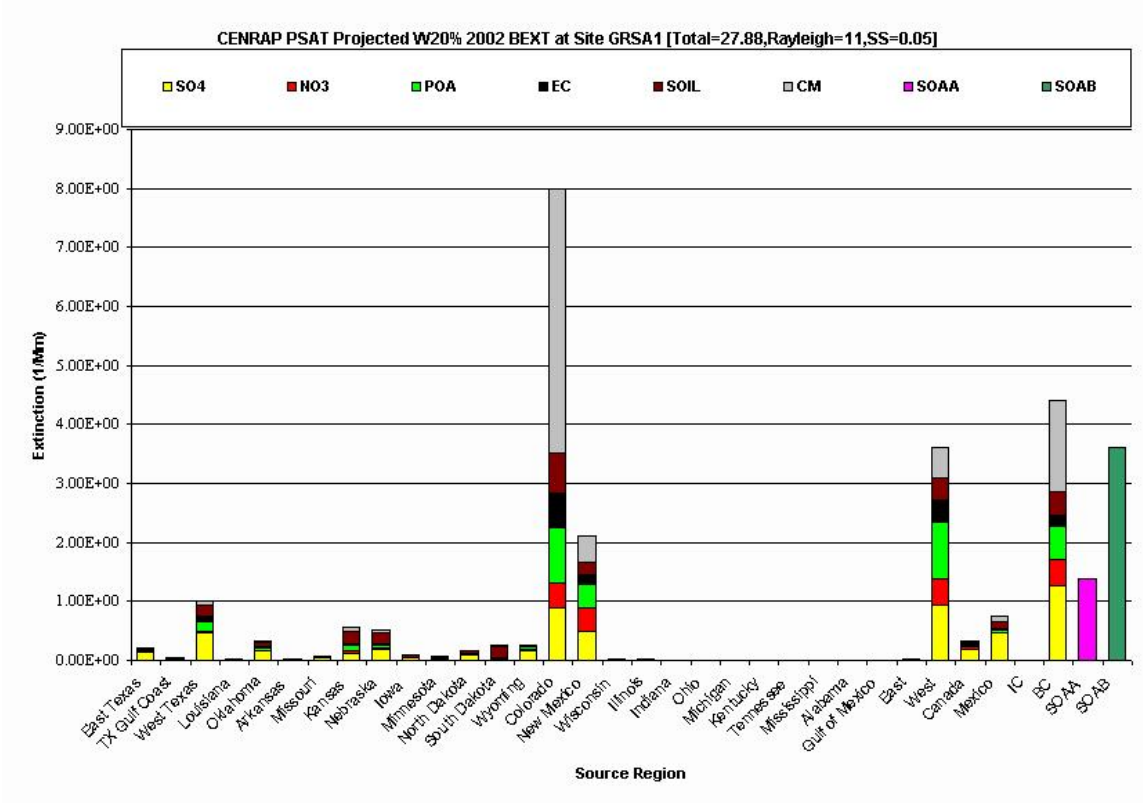


Figure 11-18: Areas and Pollutants Causing Regional Haze at Great Sand Dunes (GRSA) in Colorado on Worst 20 Percent Days in 2002

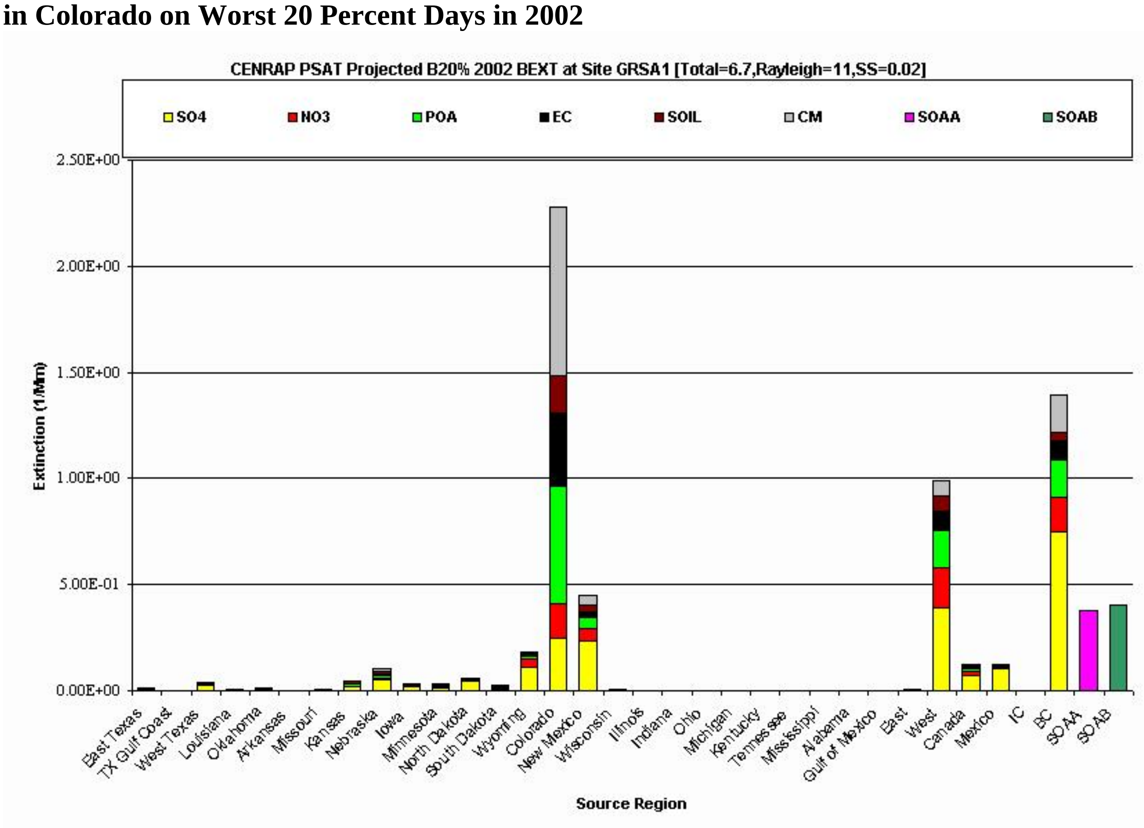


Figure 11-19: Areas and Pollutants Causing Regional Haze at Great Sand Dunes (GRSA) in Colorado on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-8: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Great Sand Dunes Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Great Sand Dunes (inverse megameters)		2018 Impacts at Great Sand Dunes (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	0.66	5.84	0.65	5.32
Nitrate	0.02	1.94	0.02	1.83
Primary Organic Aerosol	0.18	3.34	0.12	3.07
Elemental Carbon	0.10	1.57	0.04	1.08
Fine Soil	0.23	2.84	0.21	2.95
Coarse Mass	0.07	7.36	0.07	7.69
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.38	not available[1]	1.28
Secondary Organic Aerosol, Biogenic	not available[1]	3.61	not available[1]	3.56
Total	1.25	27.88	1.11	26.77

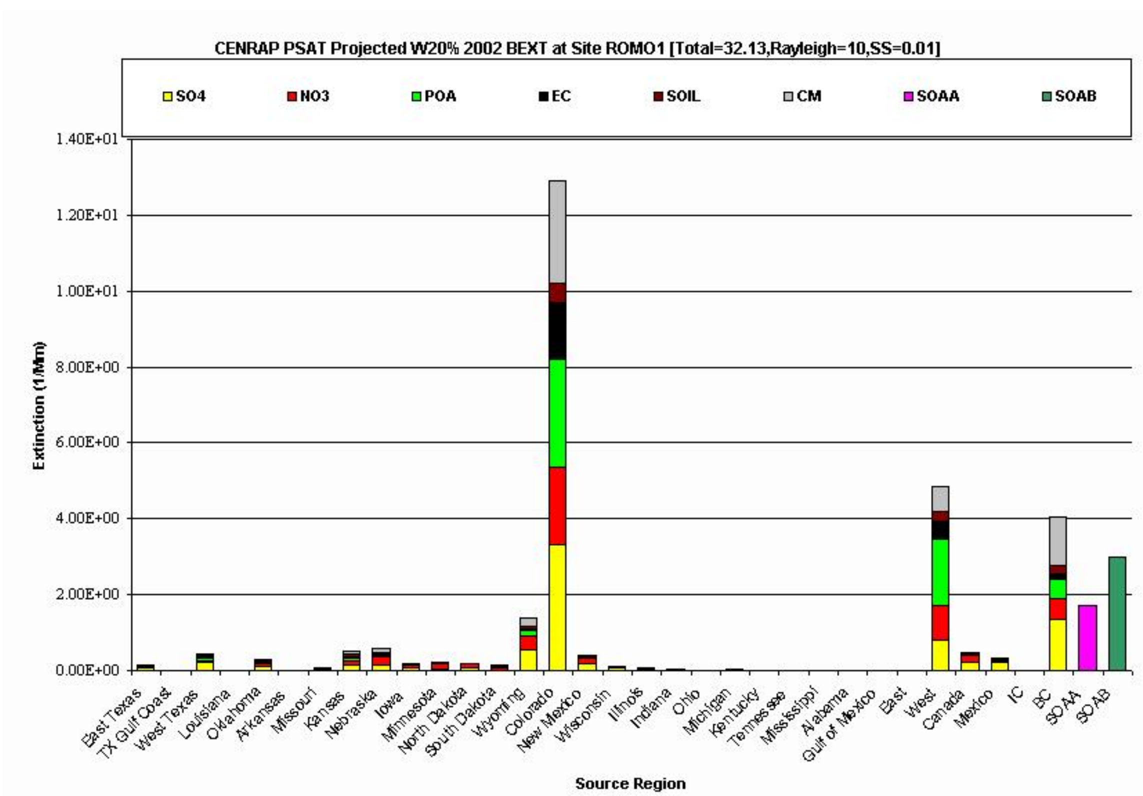


Figure 11-20: Areas and Pollutants Causing Regional Haze at Rocky Mountains National Park (ROMO) in Colorado on Worst 20 Percent Days in 2002

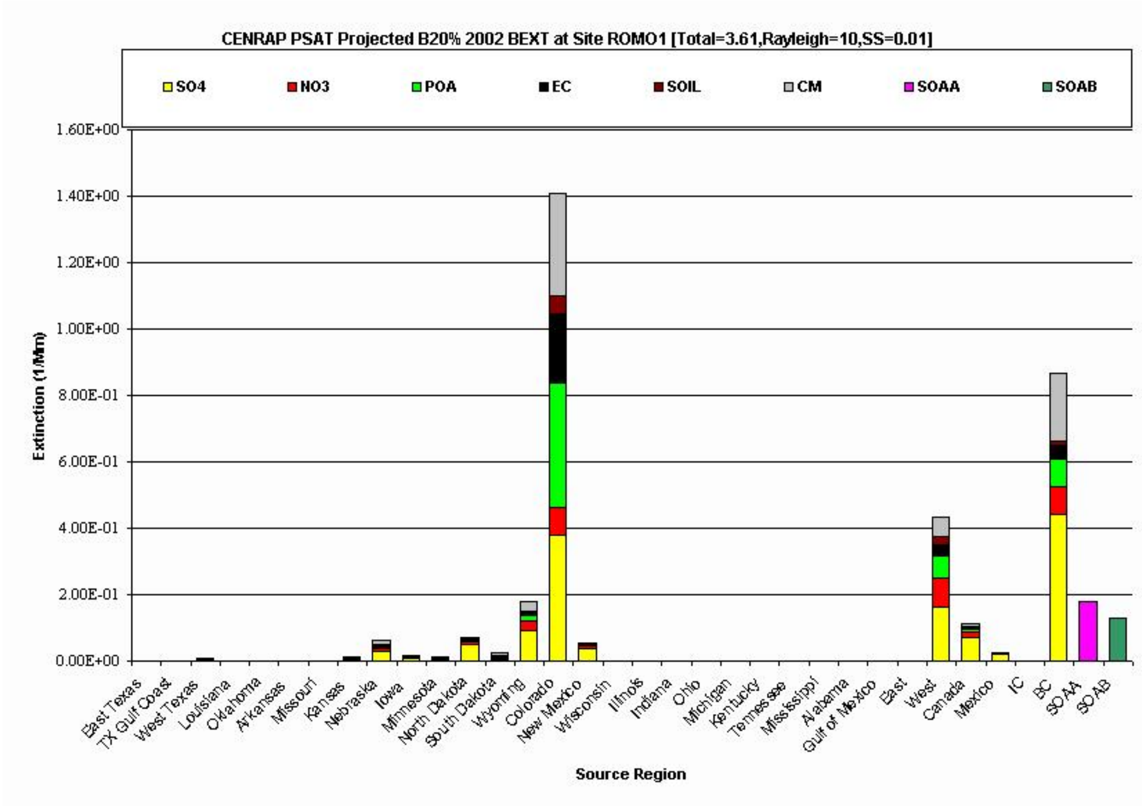


Figure 11-21: Areas and Pollutants Causing Regional Haze at Rocky Mountains National Park (ROMO) in Colorado on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-9: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Rocky Mountain National Park on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Rocky Mountain National Park (inverse megameters)		2018 Impacts at Rocky Mountain National Park (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	0.30	7.69	0.30	6.52
Nitrate	0.08	5.17	0.06	4.28
Primary Organic Aerosol	0.07	5.65	0.05	5.37
Elemental Carbon	0.03	2.33	0.02	1.54
Fine Soil	0.06	1.39	0.05	1.52
Coarse Mass	0.03	5.17	0.03	5.66
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.73	not available[1]	1.60
Secondary Organic Aerosol, Biogenic	not available[1]	3.00	not available[1]	2.91
Total	0.58	32.13	0.51	29.41

11.2.3.4 Arkansas

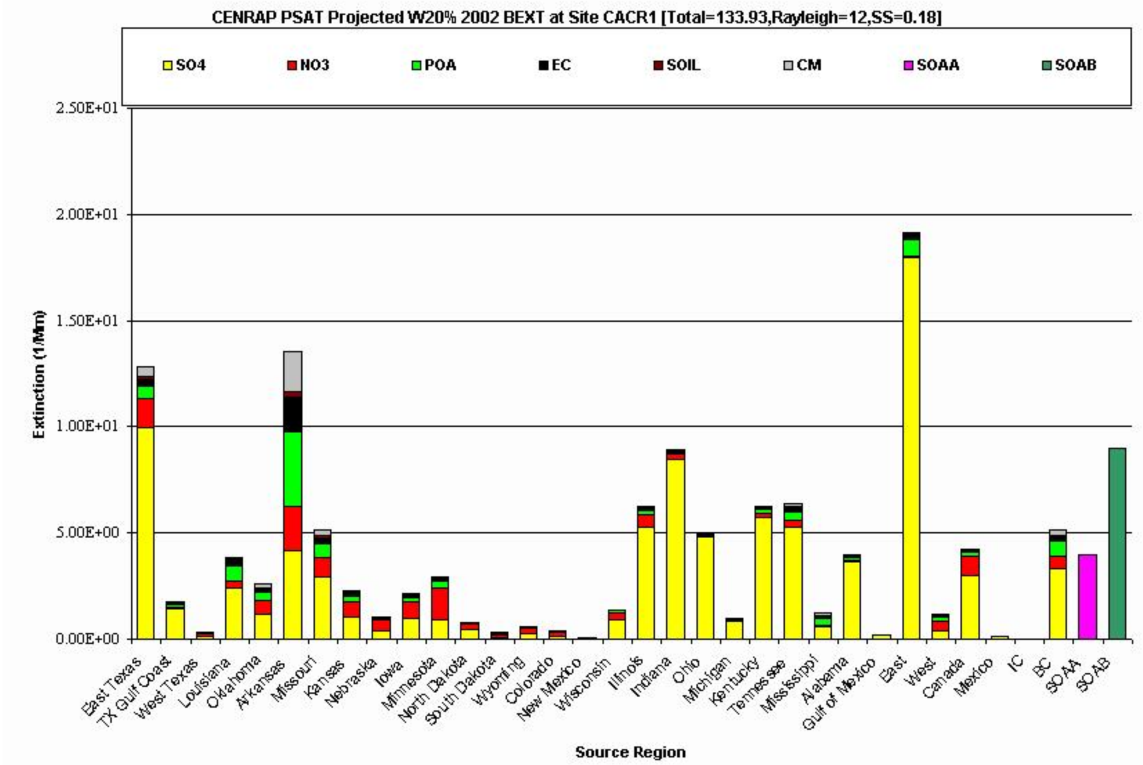


Figure 11-22: Areas and Pollutants Causing Regional Haze at Caney Creek (CACR) in Arkansas on Worst 20 Percent Days in 2002

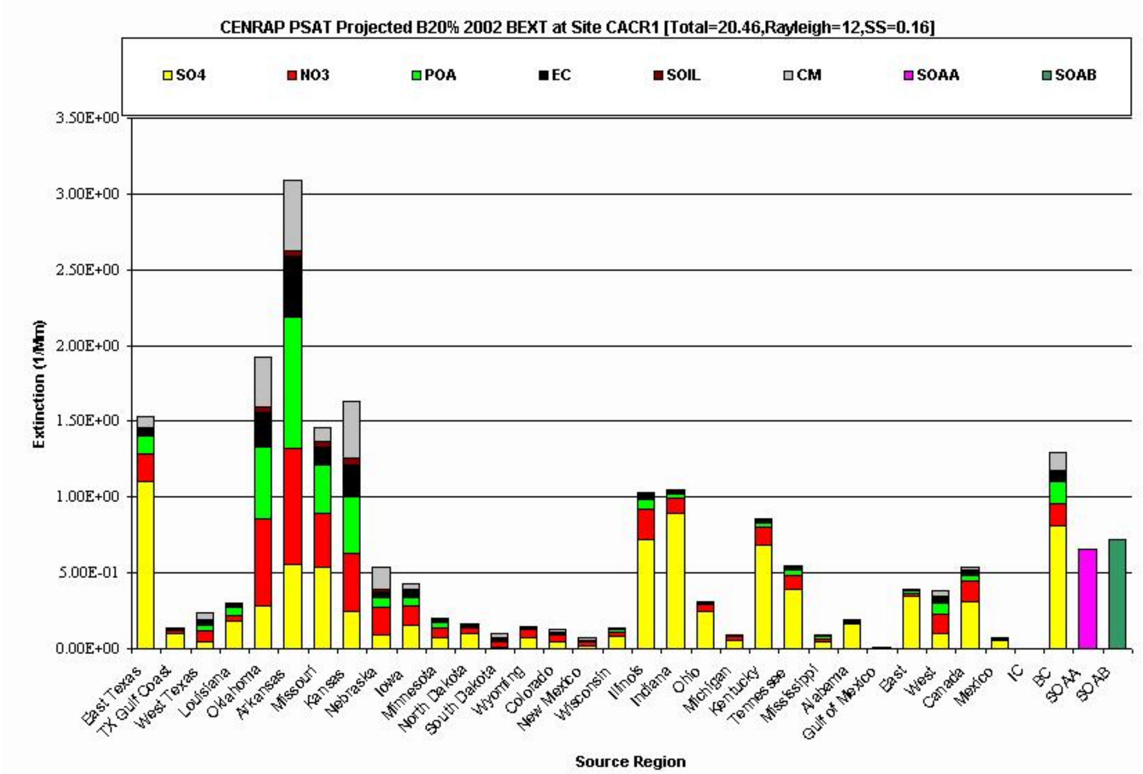


Figure 11-23: Areas and Pollutants Causing Regional Haze at Caney Creek (CACR) in Arkansas on Best 20 Percent of Days in 2002

Note the change in scale on the y-axis.

Table 11-10: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Caney Creek Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Caney Creek (inverse megameters)		2018 Impacts at Caney Creek (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	11.55	87.05	7.24	48.95
Nitrate	1.49	13.78	0.83	7.57
Primary Organic Aerosol	0.83	10.50	0.83	9.93
Elemental Carbon	0.36	4.80	0.20	3.17
Fine Soil	0.15	1.12	0.17	1.29
Coarse Mass	0.50	3.73	0.47	3.58
Secondary Organic Aerosol, Anthropogenic	not available[1]	3.94	not available[1]	3.21
Secondary Organic Aerosol, Biogenic	not available[1]	9.00	not available[1]	8.14
Total	14.89	133.93	9.74	85.84

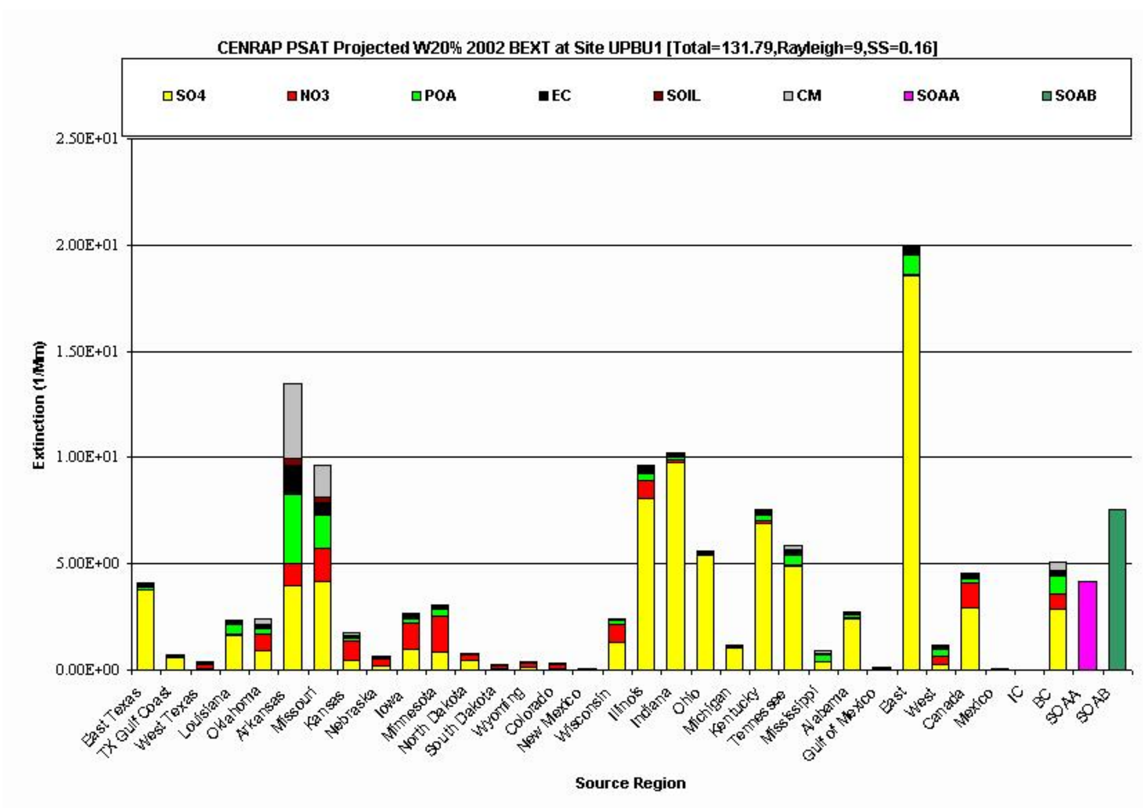


Figure 11-24: Areas and Pollutants Causing Regional Haze at Upper Buffalo (UPBU) in Arkansas on Worst 20 Percent Days in 2002

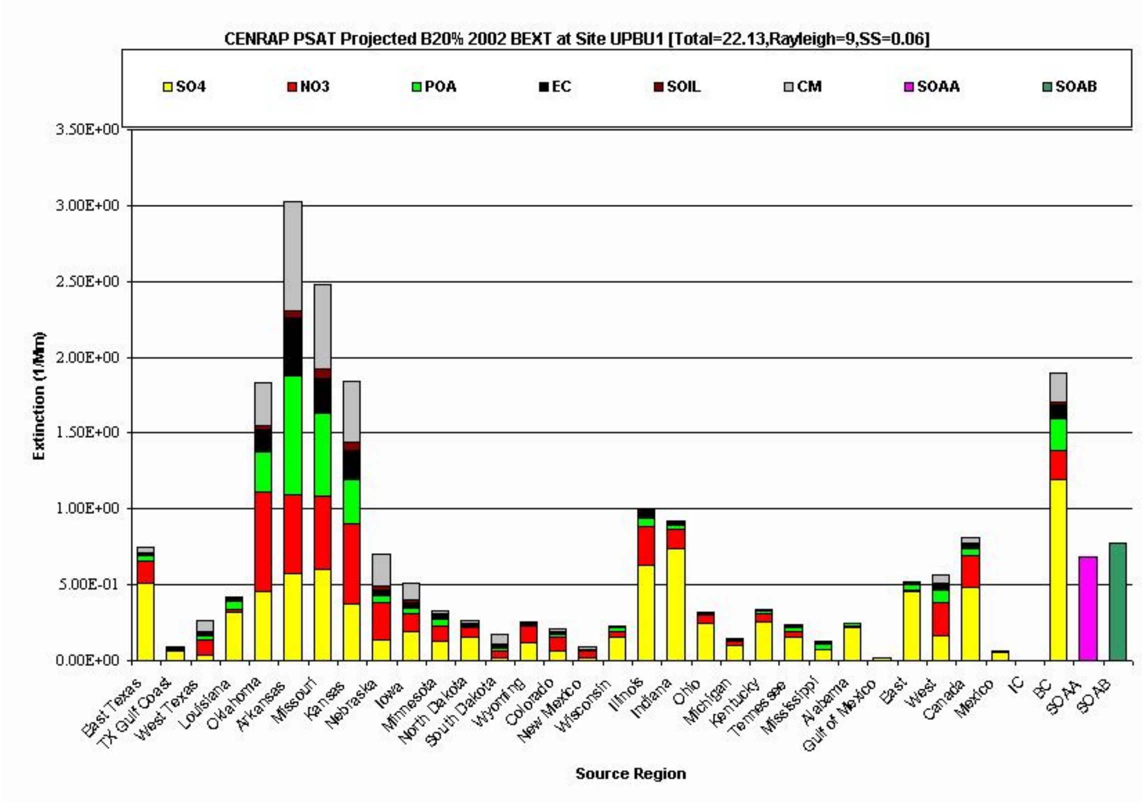


Figure 11-25: Areas and Pollutants Causing Regional Haze at Upper Buffalo (UPBU) in Arkansas on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-11: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Upper Buffalo Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Upper Buffalo (inverse megameters)		2018 Impacts at Upper Buffalo (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	4.41	83.18	2.74	45.38
Nitrate	0.27	13.30	0.18	9.22
Primary Organic Aerosol	0.24	10.85	0.24	10.17
Elemental Carbon	0.10	4.72	0.05	3.07
Fine Soil	0.04	1.21	0.05	1.40
Coarse Mass	0.12	6.85	0.11	6.53
Secondary Organic Aerosol, Anthropogenic	not available[1]	4.14	not available[1]	3.36
Secondary Organic Aerosol, Biogenic	not available[1]	7.55	not available[1]	7.02
Total	5.19	131.79	3.38	86.16

11.2.3.5 Missouri

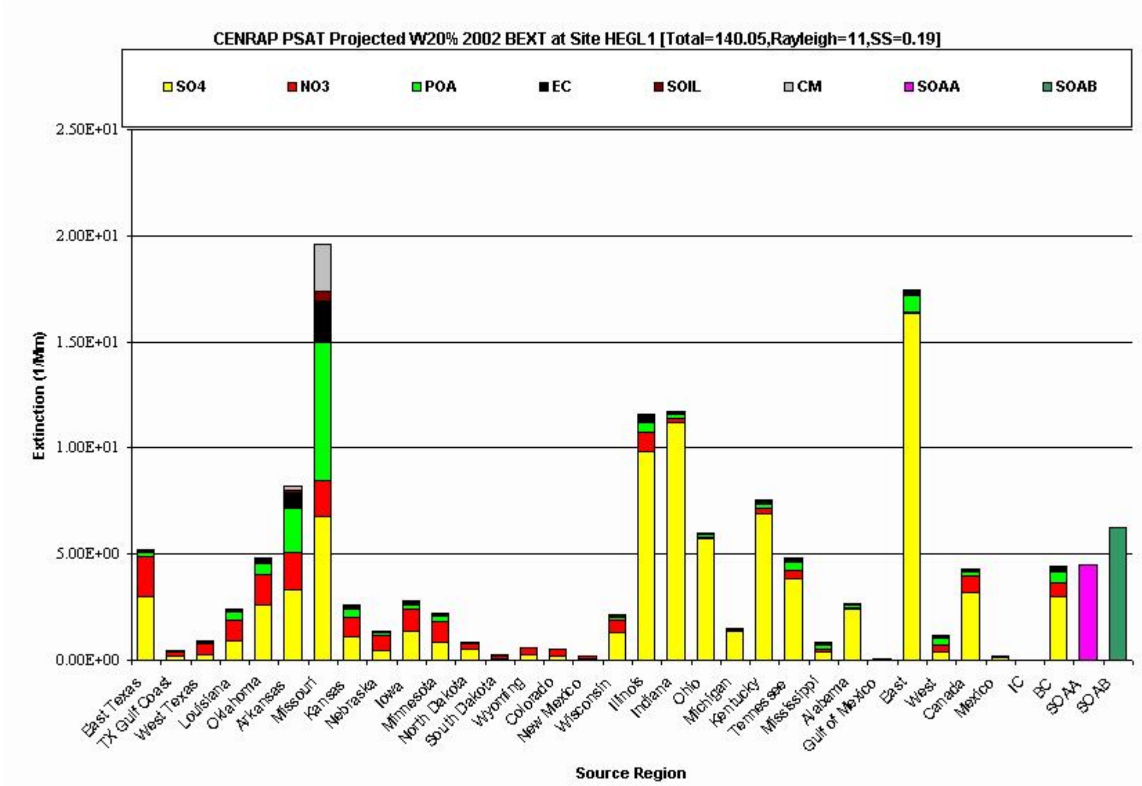


Figure 11-26: Areas and Pollutants Causing Regional Haze at Hercules-Glades (HEGL) in Missouri on Worst 20 Percent Days in 2002

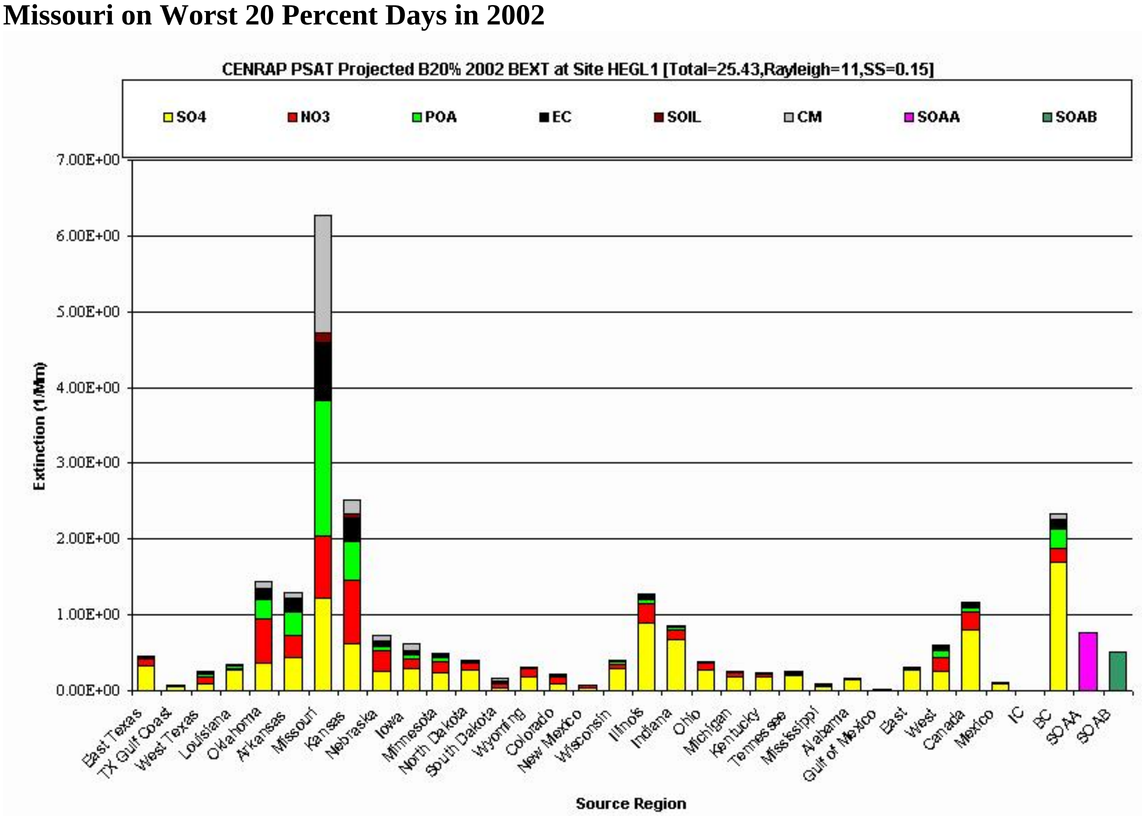


Figure 11-27: Areas and Pollutants Causing Regional Haze at Hercules-Glades (HEGL) in Missouri on the Best 20 Percent of Days 2002

Note the change in scale on the y-axis.

Table 11-12: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Hercules-Glades Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Hercules-Glades (inverse megameters)		2018 Impacts at Hercules-Glades (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	3.48	87.94	2.51	50.63
Nitrate	2.56	17.91	1.51	12.35
Primary Organic Aerosol	0.33	14.55	0.28	12.95
Elemental Carbon	0.12	5.22	0.06	3.51
Fine Soil	0.03	0.92	0.03	1.00
Coarse Mass	0.06	2.78	0.06	2.48
Secondary Organic Aerosol, Anthropogenic	not available[1]	4.50	not available[1]	3.76
Secondary Organic Aerosol, Biogenic	not available[1]	6.22	not available[1]	5.83
Total	6.59	140.05	4.45	92.49

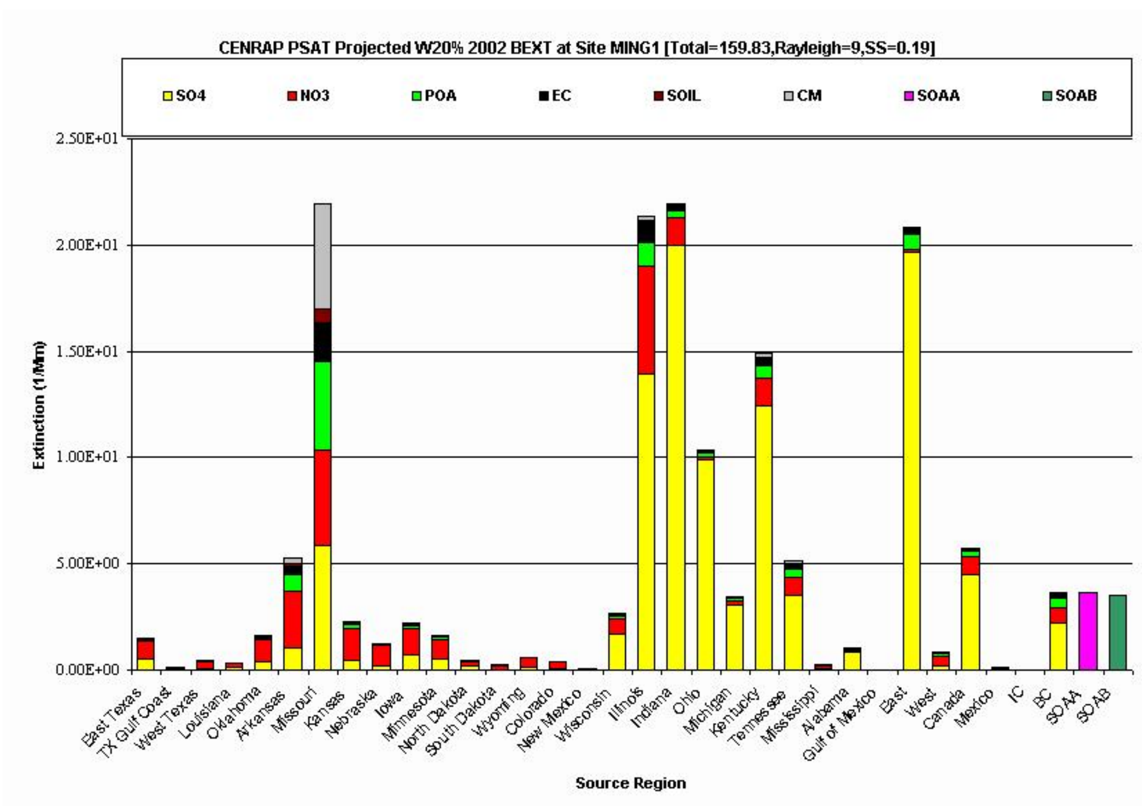


Figure 11-28: Areas and Pollutants Causing Regional Haze at Mingo (MING) in Missouri on Worst 20 Percent Days in 2002

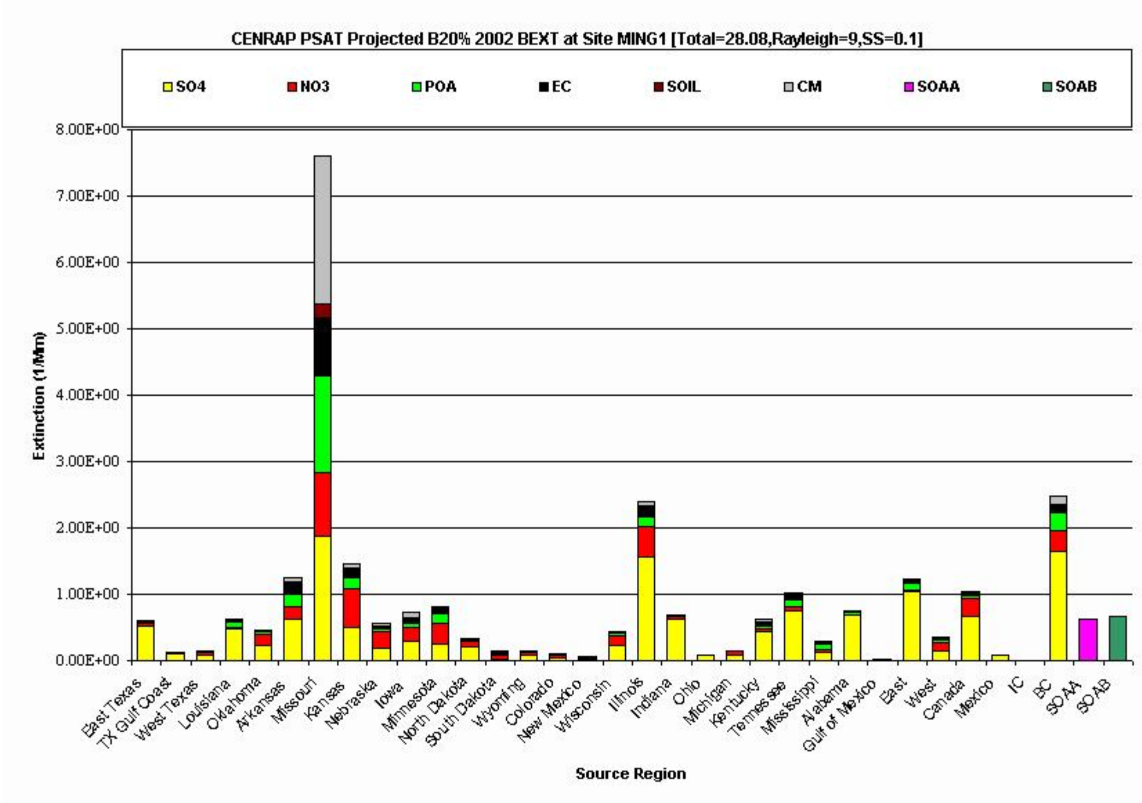


Figure 11-29: Areas and Pollutants Causing Regional Haze at Mingo (MING) in Missouri on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-13: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Mingo Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Mingo (inverse megameters)		2018 Impacts at Mingo (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	0.69	102.52	0.53	54.45
Nitrate	1.18	27.24	0.64	19.14
Primary Organic Aerosol	0.07	10.21	0.06	9.09
Elemental Carbon	0.03	5.49	0.02	3.53
Fine Soil	0.01	1.26	0.01	1.44
Coarse Mass	0.02	5.95	0.02	5.31
Secondary Organic Aerosol, Anthropogenic	not available[1]	3.66	not available[1]	3.04
Secondary Organic Aerosol, Biogenic	not available[1]	3.50	not available[1]	3.25
Total	2.01	159.83	1.28	99.24

11.2.3.6 Louisiana

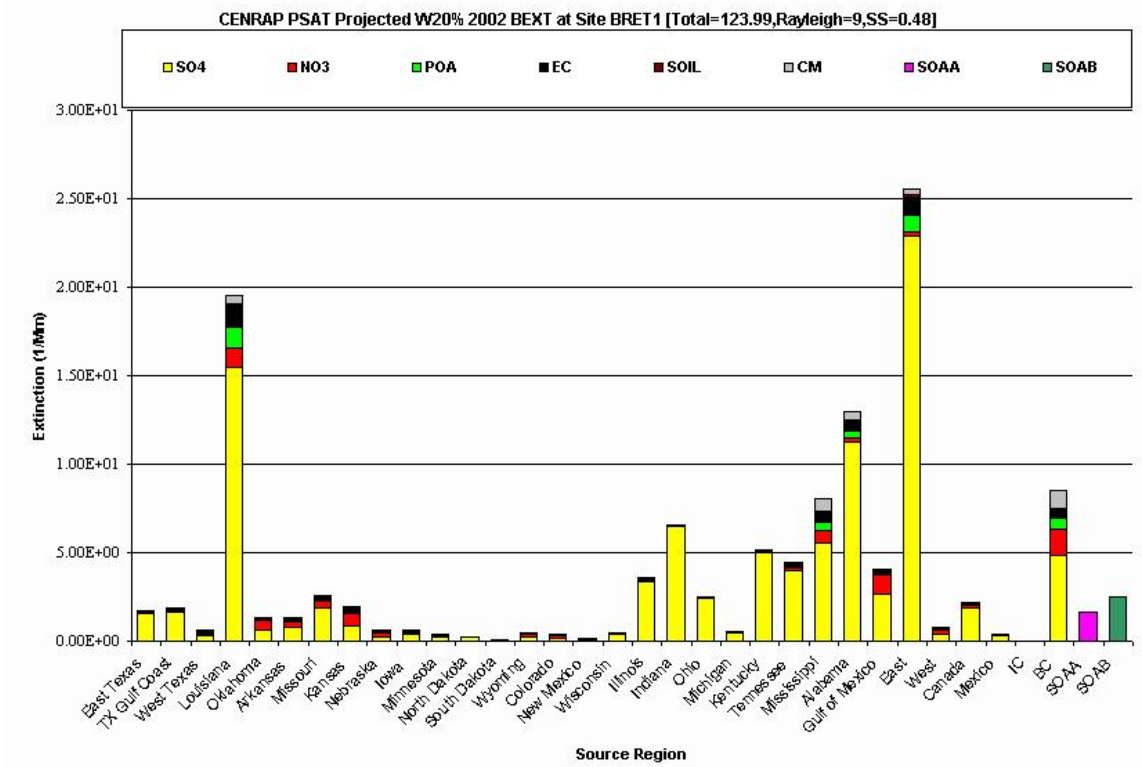


Figure 11-30: Areas and Pollutants Causing Regional Haze at Breton Wilderness Area (BRET) in Louisiana on Worst 20 Percent Days in 2002

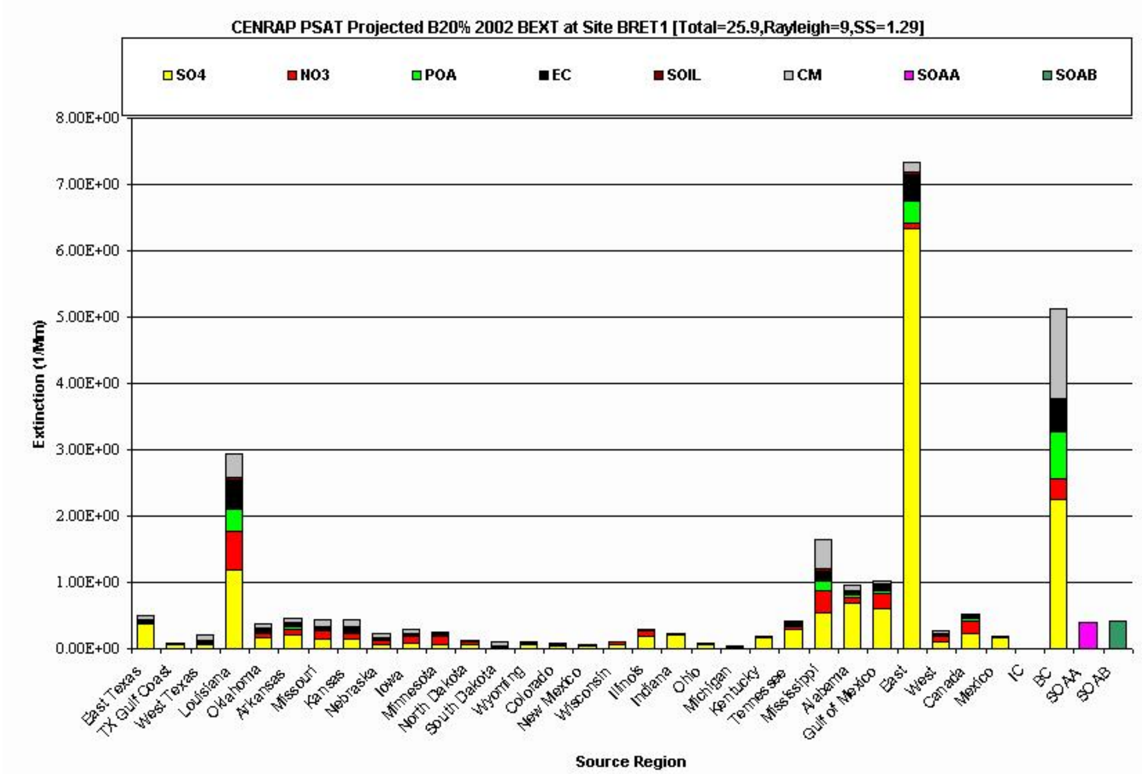


Figure 11-31: Areas and Pollutants Causing Regional Haze at Breton Wilderness Area (BRET) in Louisiana on Best 20 Percent Days in 2002
Note the change in scale on the y-axis.

Table 11-14: Texas' Apportioned Contribution to the Measured 2002 and Projected 2018 Total Visibility Extinction at Breton Wilderness Area on Worst 20 Percent Days

Particulate Matter Constituent	2002 Impacts at Breton Wilderness Area (inverse megameters)		2018 Impacts at Breton Wilderness Area (inverse megameters)	
	Texas Total	Total, All Source Areas	Texas Total	Total, All Source Areas
Sulfate	3.55	96.83	2.66	68.63
Nitrate	0.15	8.29	0.16	8.20
Primary Organic Aerosol	0.12	4.71	0.11	4.37
Elemental Carbon	0.14	5.40	0.06	3.92
Fine Soil	0.05	0.95	0.05	1.16
Coarse Mass	0.19	3.70	0.18	3.95
Secondary Organic Aerosol, Anthropogenic	not available[1]	1.63	not available[1]	1.38
Secondary Organic Aerosol, Biogenic	not available[1]	2.48	not available[1]	2.46
Total	4.20	123.99	3.23	94.06

11.3 REQUEST FOR FEDERAL EFFORTS TO REDUCE INTERNATIONAL TRANSPORT

Figures 11-2 and 11-4 show the CENRAP PSAT results apportioning the causes of 2000-2004 regional haze on the worst 20 percent visibility days at Big Bend and Guadalupe Mountains, based on the 2002 base period modeling. The figures show large contributions from anthropogenic sources categorized as from Mexico and from the boundary conditions outside the CENRAP modeling domain. The boundary conditions domain includes some of central Mexico, all of southern Mexico, most of the Mexican Yucatan, and all of Central America. Chapter 8: *Modeling Assessment* describes the modeling in more detail. These results are directionally consistent with federal studies that have previously found substantial international pollutant transport impacts on regional haze at Big Bend. These studies include the Big Bend Regional Aerosol and Visibility Observational (BRAVO) study of regional haze impacts at Big Bend and a number of National Park Service (NPS) studies in the 1990s that relied on back trajectory analysis to determine where air accumulated regional haze on its way to Big Bend (NPS et al. 2004). Figure 11-4 shows that the CENRAP PSAT modeling calculates that international transport contributes over 25 percent of the regional haze on the worst 20 percent of days during the base period at Guadalupe Mountains. Figures 11-9 and 11-15 show that international transport contributes over ten percent of the regional haze on the worst 20 percent of days at Salt Creek and Wichita Mountains. At Caney Creek, the international transport contribution to regional haze on the worst 20 percent of days is over five percent of the total (after discounting coarse mass, which the model does not represent reliably) (ENVIRON 2007).

CENRAP modeling estimates of the base period visibility impairment at Big Bend from the United States and foreign contributions indicate 52 percent of the light extinction at Big Bend on the worst 20 percent of regional haze days comes from international transport. The concentrations are adjusted to match the visibility extinction measured for the 2000 through 2005 base period.

Due to the large impact of international transport on anthropogenic regional haze in Texas, it will be impossible to reach natural conditions at the two Class I areas in Texas without reductions in international impacts to parallel the reductions in United States anthropogenic regional haze impacts on Texas' two Class I areas. Although the impact of international transport on Class I areas in the states bordering Texas is approximately ten percent or less of the total impairment, reductions in international transport of anthropogenic regional haze will also be needed for the Class I areas in these states to reach the natural conditions goal.

The TCEQ requests that the EPA initiate and pursue federal efforts to reduce international transport of visibility impairing pollutants into Texas.

11.4 MINIMIZING VISIBILITY IMPAIRMENT FROM TEXAS EMISSIONS

The TCEQ has implemented rules that limit and minimize emissions causing both local and regional visibility impairment. The Texas SIP includes numerous rules that minimize emissions that cause or contribute to local and regional visibility impairment. The TCEQ plans to continue to implement all these rules that protect visibility at Class I areas in Texas and other states (Appendices 11-2 and 11-3).

11.4.1 Opacity Limitations

Title 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, limits visible emissions and mass emissions from industrial and power plant stacks, motor vehicles, and incinerators. Together with opacity limits in many preconstruction permits, these rules limit the emissions of PM from a wide variety of sources. The TCEQ continues to enforce both the rule and permit limits on opacity and PM emissions from electric generating units (EGUs) and other sources.

11.4.2 Sulfur Emission Limitations

Title 30 TAC Chapter 112 Control of Air Pollution from Sulfur Compounds limits sulfur dioxide, hydrogen sulfide, total reduced sulfur compounds, and sulfuric acid from a variety of sources including EGUs, sulfuric acid plants, smelters, and sulfur recovery units. These rules, together with many lower limitations in permits for new and modified sources, limit the impacts of ammonium sulfate from Texas on the Class I areas in Texas and at the Class I areas in other states that Texas' emissions impact.

11.4.3 Best Available Control Technology (BACT) Requirements

BACT requirements have been in effect since 1972 for new and modified sources of air pollution for SO_2, NO_X, PM, and VOC. While federal new source review (NSR) rules requiring BACT apply only to major new sources or modifications, Texas law requires BACT for all emissions increases at new or modified units. The basic requirement is that each new and modified source of air pollution built in Texas use BACT to minimize or eliminate emissions of all pollutants subject to the national ambient air quality standards (NAAQS). This includes all the emissions from human activity that contribute to regional haze, including NO_X, SO_2, PM, and VOC. Title 30 TAC Chapter 116: Control of Air Pollution by Permits for New Construction or Modification contains these requirements.

Each applicable source must obtain a construction permit before beginning construction. Issuance of a construction permit can occur only after an engineering determination that the facility will use BACT. In some cases, the BACT requirements apply through permits by rule or standard permits rather than through case-by-case review of each new or modified source of air pollution.

11.4.4 Programs to Manage Smoke Impacts on Class I Areas

The Texas Forest Service (TFS) coordinates fire and smoke management issues in Texas. The 34th Texas Legislature created the TFS in 1915. The legal mandate of the TFS includes the responsibility to "assume direction of all forest interests and all matters pertaining to forestry within the jurisdiction of the state." The TFS has developed a voluntary approach called the Texas Forest Service Smoke Management System, under which all land managers in Texas, including the NPS, inform the TFS before performing prescribed burns. The TFS dispatch office maintains communications with the TCEQ.

Examination of the data and modeling for the worst 20 percent visibility days at both Big Bend and Guadalupe Mountains indicates that smoke from agricultural burning and wildfires in Texas is not a large contributor to visibility impairment in Texas. There is no indication that agricultural burning and wildfires in Texas are significant contributors to regional haze on the worst 20 percent days at Class I areas that Texas impacts outside the state. For these reasons, the current rules, policies and plans listed below, along with the NPS smoke management plans, and the smoke management plans of other federal agencies responsible for Class I areas that Texas impacts, are adequate to meet the long-term strategy requirements. Appendix 11-1 contains documents in the following list. The TCEQ provides the documents as examples of the fire management plans that the responsible agencies maintain. This SIP revision does not incorporate the non-TCEQ documents. The outdoor burning rules are currently approved in to the Texas SIP.

- Texas Wildfire Protection Plan (TFS 2007)
- Texas Forest Service Smoke Management System (TFS 1995)
- 30 TAC Chapter 111, Subchapter B: Outdoor Burning (TCEQ 2006)
- Big Bend National Park Fire Management Plan (NPS 2005a)
- Guadalupe Mountains National Park Fire Management Plan (NPS 2005b)
- Big Thicket National Preserve Fire Management Plan (NPS 2004a)
- Lyndon B. Johnson National Historical Park Fire Management Plan (NPS 2005c)
- Padre Island National Seashore Fire Management Plan (NPS 2004b)
- San Antonio Missions National Historical Park Fire Management Plan (NPS 2004c).

A significant component of preventing wildfires is the authority that Texas counties have to prohibit open burning in times of drought. The counties get their authority from §352.081 and §352.082 of the Texas Local Government Code, relating to outdoor burning. Another component in reducing wildfire hazards is the red flag warnings that the National Weather Service issues in times of drought, low humidity, and windy conditions. The broadcast media routinely publicize these warnings, especially during times of drought and outdoor burning bans.

Because of the relatively low contribution of smoke from Texas to worst 20 percent day visibility impairment at Texas' Class I areas and the Class I areas Texas' emissions affect in other states, the TCEQ is not certifying a smoke management plan as part of this SIP revision.

11.4.5 Program to Lower the Impact of Construction Activity on Air and Water Quality

The main regulatory requirements that the TCEQ uses to minimize the air and water quality impacts of dust and soil from construction activity in Texas are under water pollution control requirements to prevent pollution from storm water runoff and mud and dirt tracked from construction sites. The reduction in silt-bearing runoff on paved roads and in mud and dirt tracked onto paved roads around construction sites reduces the amount of fine soil material suspended in the air from traffic in these areas.

The TCEQ's Texas Pollutant Discharge Emission System (TPDES) General Permit TXR150000 regulates activities at construction sites one acre or larger. The size threshold applies to single projects or multiple projects as part of a larger development plan. The TCEQ issued this permit March 5, 2003, pursuant to §26.040 of the Texas Water Code and §402 of the Clean Water Act.

State rule 30 TAC §111.145, Construction and Demolition, provides additional authority and states:

"For the purpose of this section, the following restrictions apply if the area of land affected by the listed activities is more than one acre in size, except for the City of El Paso, where restrictions shall apply regardless of the size of the area of land affected. No person may cause, suffer, allow, or permit a structure, road, street, alley, or parking area to be constructed, altered, repaired, or demolished, or land to be cleared without taking at least the following precautions to achieve control of dust emissions:

(1) Use of water or of suitable oil or chemicals for control of dust in the demolition of structures, in construction operations, in work performed on a road, street, alley, or parking area, or in the clearing of land."

11.5 FEDERAL PROGRAMS THAT REDUCE EMISSIONS

The Federal Motor Vehicle Control Program (FMVCP) has produced and is continuing to produce large reductions in motor vehicle emissions of NO_X, PM, and VOCs. The increasingly lower federal limits on sulfur content for gasoline and diesel fuel are continuing to reduce the sulfur input to total sulfur emissions from internal combustion engines. They are enabling lower NO_X, PM, and VOC emission limits for on-road motor vehicles, both diesel and gasoline, as well as for non-road engines. The lower sulfur fuel content is also enabling implementation of lower emission limits on new on-road and non-road engines.

The following lists several significant programs:

Federal On-Road Measures

- Federal Phase II reformulated gasoline (RFG) Dallas-Fort Worth (DFW) and Houston-Galveston-Brazoria (HGB)
- Tier 2 vehicle emission standards and federal low-sulfur gasoline
- National low emissions vehicle standards (NLEV)
- Heavy-duty diesel standards

Federal Non-Road Measures

- Lawn and garden equipment
- Tier 2 heavy-duty diesel equipment
- Locomotive engine standards
- Compression ignition standards for vehicles and equipment
- Recreational marine engine standards

Appendix 11-2: *Federal and Texas Programs Related to On-Road and Non-Road Mobile Sources* lists the federal and state rules and programs in considerable detail.

11.5.1 Texas Vehicle Inspection and Maintenance Programs

Motor vehicle inspection and maintenance programs are in place to maintain the effectiveness of the FMVCP in the HGB, DFW, Austin, and El Paso areas. The Department of Public Safety administers the programs and TCEQ maintains oversight of the programs including collecting and analyzing data directly from the equipment at the inspection stations.

11.5.2 Air Check Texas Repair and Replacement Assistance Program

In 2002, the TCEQ established a financial assistance program for qualified owners of vehicles that fail the emissions test. The Low Income Vehicle Repair Assistance, Retrofit, and Accelerated Vehicle Retirement Program (LIRAP) provisions of House Bill 2134, 77th Texas Legislature 2001, created the program. House Bill 1611 passed in the 79th Legislature 2005, modified the program. The LIRAP applies only to counties that implement a vehicle inspection and maintenance program and have elected to implement LIRAP provisions.

By enacting Senate Bill 12, the 80th Texas Legislature expanded the LIRAP program and appropriated $45 million for LIRAP for fiscal year 2008 and an additional $45 million for fiscal year 2009. The purpose of this voluntary program is to remove older, more polluting vehicles from Texas roadways in certain counties with high ozone. Under Senate Bill 12, residents of certain Texas counties who meet income criteria and whose vehicles meet certain registration criteria may be eligible to receive vouchers for up to $3,500 toward the purchase of a new or no more than three-year-old qualifying vehicle from participating auto dealers. A motor vehicle scrappage facility must certify that the engine from a retired vehicle has been destroyed for the vehicle owner to be eligible for the voucher. Accelerated retirement of older, higher polluting vehicles will reduce NO_X, fine PM, and VOC emissions.

11.6 EMISSION REDUCTIONS SINCE ISSUANCE OF THE REGIONAL HAZE RULE

Since July 1, 1999, the TCEQ has implemented substantial programs that reduce Texas' regional haze impact at Class I areas in Texas and in surrounding states. Appendix 11-3: *Major Point Source NO_X Rules and Reductions Promulgated in Texas Since 2000* provides a detailed list of the TCEQ rule provisions that regulate NO_X and PM emissions .

11.6.1 NO_X Emission Reduction Requirements in the Texas Ozone SIP Revisions

Texas' SIP revisions from 2000 forward include required NO_X emission reductions for the following regions: HGB, DFW, Beaumont-Port Arthur, Austin, and Northeast Texas as well as one for East Texas. In addition, the SIP includes the Texas low emission diesel requirements for East and Central Texas in 30 TAC Chapter 114. The rules for control of NO_X emissions from stationary sources for the Texas ozone SIP are included in Chapter 117. Recent NO_X control measures adopted in Chapter 117 address a wide range of point and area sources at major and minor sources of NO_X. Some of these rules implemented the NO_X reduction requirements of Senate Bill 7, for grandfathered EGUs, as discussed in more detail in Section 11.6.2 The TCEQ has submitted all of the Chapter 117 NO_X limitations and requirements as well as the Chapter 114 low emission diesel fuel requirements to the EPA as revisions to the Texas SIP.

11.6.2 SO_2 and NO_X Reduction Requirements under Senate Bill 7

Senate Bill 7 required the following emission reductions from grandfathered EGUs: for $NO_{X,}$ a 50 percent reduction of the 1997 emission level by May 1, 2003, and for SO_2, a 25 percent reduction of the 1997 emission level by May 1, 2003, accompanied by an in-state emissions cap and trade program. Grandfathered EGUs are the EGUs built before Texas' BACT emission control requirements for new and modified sources of air pollution went into effect in 1972. These requirements produced reductions approximately a decade before the BART emissions reductions will be effective in states without CAIR requirements. They were effective approximately six and seven years before the Phase I CAIR requirements will be effective in states that implement CAIR NO_X and SO_2 emission reductions. Phase I of CAIR becomes effective in 2009 for NO_X and in 2010 for SO_2. Phase II of CAIR will become effective in 2015, at which time it will become the limiting requirement for SO_2 and NO_X for most EGUs in Texas. This SIP revision presumes that either CAIR will be finally upheld by the courts or will be replaced with a federal program that achieves comparable reductions in emissions. On December 23, 2008, the U.S. Circuit Court of Appeals for the District of Columbia Circuit issued a decision remanding CAIR to EPA to initiate rulemaking consistent with its opinion, but the court did not vacate CAIR.

11.6.3 CAIR Reductions for NO_X and SO_2

On March 10, 2005, the EPA issued the CAIR, requiring reductions in SO_2 and NO_X emissions from EGUs in 28 states and the District of Columbia (70 FR 25162-25405). These include states in the Northeast, the South, and along the Mississippi River plus Texas, the only largely western state subject to the CAIR emissions reductions requirements. Figure 11-32 shows that the CAIR emissions reductions requirements in Texas apply more than 480 miles west of the areas where

CAIR requirements apply in other states. The map also shows that Texas is the only state where CAIR applies in the next tier of states west of the states that border the Mississippi River.

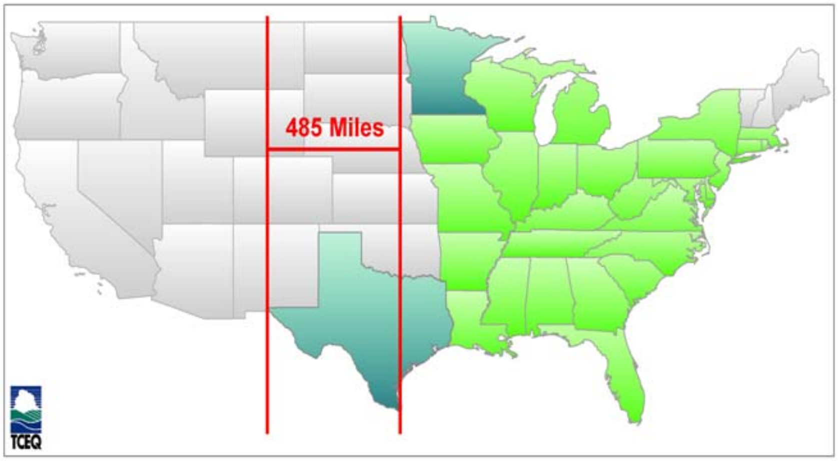


Figure 11-32: CAIR Emission Reduction States
Note: States shown in green have CAIR emission reductions requirements
Source: TCEQ 2007

CAIR applies to SO_2 in all CAIR areas except in Arkansas, Delaware, New Jersey, and New England. In states where CAIR applies to SO_2, CAIR will reduce SO_2 emission allowances by over 60 percent from 2003 federal acid rain cap levels. In all CAIR states, the program will reduce NO_X emission allowances by over 60 percent from 2003 federal acid rain cap levels. CAIR establishes an EPA-administered cap-and-trade program for EGUs in which states may participate as a means of meeting these requirements. The Texas Legislature directed the TCEQ to participate in this interstate cap-and-trade system. SO_2 and NO_X reductions will occur in two phases under a cap-and-trade system established by the EPA. SO_2 emission caps will be lowered in 2010 and again in 2015. NO_X emission allowables will decrease in 2009 and again in 2015. Table 11-15 shows the emission allowances for EGUs in Texas under the CAIR program.

Table 11-15: EGU Emission Allowances in Texas under the CAIR Program

Annual NO_X Cap (tons)			
State	2003 Acid Rain Emissions Inventory	2009 CAIR Phase I Budget	2015 CAIR Phase II Budget
Texas	211,000	181,014	150,845
Annual SO_2 Cap (tons)			
State	2003 Acid Rain Emissions Inventory	2010 CAIR Phase I Budget	2015 CAIR Phase II Budget
Texas	578,000	320,946	224,662

Source: EPA

The TCEQ has submitted to the EPA as a revision to the Texas SIP its rules that implement the CAIR requirements. The following links provide further information on the CAIR SIP revisions and CAIR requirements for Texas.

The Texas CAIR SIP -
<http://www.tceq.state.tx.us/assets/public/implementation/air/sip/cair-camr/05048CAIRSIP_adoption_final.pdf>
The Texas CAIR Rule -
<http://www.tceq.state.tx.us/assets/public/implementation/air/sip/cair-camr/05046101_ado_clean.pdf>
The Texas CAIR/CAMR Web Page -
<http://www.tceq.state.tx.us/implementation/air/sip/caircamr.html>

11.6.4 Best Available Retrofit Technology (BART) Requirements

The commission adopted the final BART Rule (30 TAC Chapter 116, Subchapter M) January 10, 2007. It is available at: <http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=5&ti=30&pt=1&ch=116&sch=M&rl=Y>. Because most sources reviewed under the BART rule are a long distance from the nearest Class I federal area, a large percentage fell below the *de minimis* level for impacting all Class I areas, so they did not have to proceed to a BART engineering analysis. Chapter 9: *Best Available Retrofit Technology* details the implementation of the BART program in Texas in Table 9-7.

11.6.5 Comparison of the NO_X Emission Limits for EGUs with CAIR Limits
The following table shows the relationship among the requirements.

Table 11-16: Texas Electric Generating Utility NO_X Control Strategies Compared to CAIR

Facility Type	State Emission Rate Requirements	CAIR 2009	CAIR 2015
Utility Electric Generation in Ozone Nonattainment Areas Emission Specifications for Attainment Demonstrations			
Houston-Galveston-Brazoria	Pounds of NO_X/MMBtu	Pounds of NO_X/MMBtu	Pounds of NO_X/MMBtu
Gas-Fired Utility Boilers	0.030 lb	0.15 lb	0.125 lb
Coal-Fired Utility Boilers	0.050 lb (wall-fired) 0.045 lb (tangential-fired)	0.15 lb	0.125 lb
Oil-Fired Utility Boilers	0.050 lb (wall-fired) 0.045 lb (tangential-fired)	0.15 lb	0.125 lb
Auxiliary Steam Utility Boilers	0.030 lb	0.15 lb	0.125 lb
Stationary Gas Turbines	0.032 lb	0.15 lb	0.125 lb
Dallas-Fort Worth			
Large Utility Boilers	0.033 lb	0.15 lb	0.125 lb
Small Utility Boilers	0.06 lb	0.15 lb	0.125 lb
Beaumont-Port Arthur			
All Utility Boilers	0.10 lb	0.15 lb	0.125 lb
Utility Electric Generation in East and Central Texas			
Gas-Fired Utility Boilers	0.14 lb	0.15 lb	0.125 lb
Coal-Fired Utility Boilers	0.165 lb	0.15 lb	0.125 lb
Senate Bill 7			
East Texas Region Grandfathered Facilities	0.14 lb	0.15 lb	0.125 lb
West Texas and El Paso Region Grandfathered Facilities	0.195 lb	0.15 lb	0.125 lb

Source: TCEQ, current as of February 23, 2007

11.6.6 Sulfur Dioxide Reductions under the EPA Refinery Consent Decrees

The EPA refinery consent decrees cover both SO_2 and NO_X. The NO_X reductions are generally company-wide reduction requirements, and the details of which emission points will have reductions and the amount of the reductions are not yet available.

The EPA has provided specifics of the SO_2 reductions by emission point for refineries. In addition, information is available regarding SO_2 emission reductions at a large sulfuric acid plant at the western end of the Houston Ship Channel. The following table combines these SO_2 emission reduction data. The projected growth from 2002 to 2018 are estimates from CENRAP's emission inventory contractor (Pechan 2005). Since the TCEQ's new and modified source permitting requirements prohibit an increase in allowable emissions without a construction permit, which requires use of BACT, the projected emission increases between 2002 and 2018 may be substantially over estimated.

Table 11-17: Annual SO_2 Emissions at Consent Decree Impacted Sources

SO_2 Emissions	2002 (tpy)	2018 (tpy)
Pre-decree levels	48,868	62,229
Reduction estimate*	45,453	56,433
Difference (remaining emissions)	3,415	5,796

*Reductions estimate applied to 2002 actual emissions to show theoretical impact.
Controls will be in place before 2018.
Source: EPA 1999

11.6.7 Texas Low Emissions Diesel (TxLED) Program

The goal of the TxLED program is to lower emissions of NO_X and other pollutants from diesel-powered motor vehicles and non-road equipment. It applies to diesel fuel producers, importers, common carriers, distributors, transporters, bulk terminal operators, and retailers. The rules cover 110 counties in eastern Texas, including the ozone nonattainment areas of Beaumont-Port Arthur, DFW, and HGB. The rules require that diesel fuel as defined under 30 TAC §114.6 produced for delivery and ultimate sale to the consumer for both on- and non-road use must contain less than 10 percent by volume of aromatic hydrocarbons and have a cetane number of 48 or greater. The rules, which took effect October 1, 2005, allow some compliance options (30 TAC 114, Subchapter A, §114.6 and Subchapter H, Division 2, §§114.312 - 114.319).

11.6.8 The Texas Emission Reduction Plan (TERP)

TERP is a comprehensive set of incentive programs aimed at improving air quality in Texas. The TCEQ administers TERP grants and other TERP financial incentives. The Texas Legislature established the TERP in 2001 through enactment of Senate Bill 5. The TERP includes a number of voluntary financial incentive programs, as well as other assistance programs, to help improve the air quality in Texas. The goals of the TERP are to:

- assure that the air in this state is safe to breathe and meets minimum federal standards established under the FCAA (42 USC §7407);
- develop multi-pollutant approaches to solving the state's environmental problems; and
- adequately fund research and development that will make the state a leader in new technologies that can solve its environmental problems while creating new business and industry in the state.

The primary objective of the TERP has been to reduce NO_X emissions to aid in attaining the NAAQS for ozone. By encouraging replacement of older on-road and non-road engines with newer engines, the TERP has also decreased fine PM emissions from the motor vehicles and equipment using these engines. As of January 2007, the TCEQ had approved over $406 million in grants under the TERP since the program started in 2001.

The Texas Legislature approved over $143 million for fiscal year 2008 and $146 million for fiscal year 2009 to increase TERP grants aimed at NO_X emission reductions in Texas. The program also reduces fine PM emissions by accelerating the replacement of older diesel engines with newer engines that have much lower PM emission rates.

CHAPTER 12. COMPREHENSIVE PERIODIC IMPLEMENTATION PLAN REVISIONS AND ADEQUACY OF THE EXISTING PLAN

Title 40 CFR §51.308(f) requires states to revise and submit to the EPA a comprehensive regional haze implementation plan revision every 10 years until 2064. In addition, 40 CFR §51.308(g) requires periodic reports in the form of a SIP revision that evaluates progress towards the reasonable progress goals established for each Class I area. In accordance with the requirements, the TCEQ plans to submit a report to the EPA on reasonable progress every five years following the initial submittal of the Regional Haze SIP. The report will be in the form of a SIP revision and will evaluate the progress made towards the reasonable progress goal for each Class I area located within Texas, and in each Class I area located outside of Texas that may be affected by emissions from within Texas. The TCEQ will consult with the Federal Land Managers during the SIP revision development process. All requirements listed in 40 CFR §51.308(g) will be addressed in the SIP revision for demonstrating reasonable progress.

Depending on the findings of its five-year progress report, the TCEQ will examine the actions listed in 40 CFR §51.308(h). The findings of the five-year progress report may determine which action the state may choose as appropriate.

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Due to the public interest in Appendix 10, only this appendix will be directly attached to this Regional Haze SIP. Appendix 10-4 has a large spreadsheet that is not easily printed and will be available on line with all the other appendixes.

All appendixes are available on the web site
<http://www.tceq.state.tx.us/implementation/air/sip/bart/haze_appendices.html>.
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Appendix 10-1: Analysis of Control Strategies And Determination of Reasonable Progress Goals

APPENDIX 10-1: ANALYSIS OF CONTROL STRATEGIES AND DETERMINATION OF REASONABLE PROGRESS GOALS

10-1.1 IDENTIFICATION OF KEY POLLUTANTS

Chapter 11: *Long-Term Strategy to Reach Reasonable Progress Goals* demonstrates that NO_x and SO_2 are the main anthropogenic pollutant emissions that affect visibility at Class I areas in Texas and in neighboring states. Table 1 summarizes the percentage contribution of various pollutants at the Texas Class I areas and those Class I areas in other states that PSAT modeling indicates receive more than 20 percent of their visibility impairing haze from Texas emissions in the 2002 base case modeling.

Table 1: Pollutant Impacts on Visibility at the Class I Areas with a 20 Percent or Greater Impact from Texas Emissions

Source	BIBE*	GUMO*	WIMO*	SACR*	WHIT*
SO_4	49.7	57.7	54.7	43.2	52.9
NO_3	4.4	10.2	22.5	26.1	14.7
POA	16.4	6.1	6.2	8.2	7.1
EC	9.1	6.6	5.3	7.4	7.4
Soil	6.7	6.8	4.6	6.0	6.8
CM	7.1	4.0	3.8	2.9	1.8
SOAA	1.9	2.7	1.4	2.2	3.4
SOAB	4.6	5.8	1.5	4.1	5.9

* Big Bend, Guadalupe Mountains, Wichita Mountains, Salt Creek, and White Mountain areas

As the table indicates, sulfur dioxide (SO_2) emissions, which form sulfate (SO_4), are clearly the most important contributor to visibility impairment at these Texas-impacted Class I areas. In every case except for Big Bend, nitrate (NO_3), which forms from NO_X emissions is the second most important pollutant.

The situation at Big Bend is less clear, as shown in Table 2 shows.

Table 2: Source Categories Contributing to Regional Haze at Big Bend National Park

Source	Elevated Point	Low Level Point	Natural	On Road	Non Road	Area	IC	BC	SOAA	SOAB	total
SO_4	32.0	1.3	0.0	0.5	0.8	3.4	0.0	11.5			49.7
NO_3	1.1	0.1	0.7	0.8	0.5	0.6	0.0	0.6			4.4
POA	0.3	0.0	0.2	0.1	0.3	2.5	0.0	13.0			16.4
EC	0.0	0.0	0.1	0.4	1.4	1.9	0.0	5.2			9.1
SOIL	0.7	0.1	3.0	0.0	0.0	2.7	0.0	0.3			6.7
CM	0.0	0.0	5.6	0.0	0.1	1.2	0.0	0.2			7.1
SOAA									1.9		1.9
SOAB										4.6	4.6

After sulfur, Primary Organic Aerosols (POA) constitutes the next biggest source of impairment at Big Bend; however, the vast majority of POA is from the model's boundary conditions (BC), which include southern Mexico and Central and South America. Therefore, this source is not controllable by Texas. Elemental carbon (EC) is also dominated by the boundary conditions. The next two sources, soil and coarse mass (CM), are most likely from natural dust storm events. For these reasons, even at Big Bend, NO_3 becomes the second most important pollutant for Texas to consider in its regional haze SIP.

10-1.2 IDENTIFICATION OF SOURCES FOR CONTROL

Once the main types of pollutants affecting visibility in Texas-impacted Class I areas have been determined, the next step is to determine what kinds of sources emit these pollutants. That is, should the control strategy focus on point sources only or should area sources and mobile sources be considered as well? Table 3 shows the sources of these pollutants in the 2002 base case PSAT modeling for the two Class I areas in Texas. The numbers are in percentages. For example, 67.1 percent of the SO_4 impacting Big Bend can be attributed to point sources.

Table 3: Source Category Contributions to SO_4 and NO_3 at the Five Class I Areas Texas Affects the Most (by percent)

	Big Bend			Guadalupe Mountains		
	Point	Mobile	Area	Point	Mobile	Area
SO_4	67.1	2.8	6.9	75.6	3.5	8.5
NO_3	26.6	28.6	14.3	29.2	36.5	13.9

	Wichita Mountains			Salt Creek			White Mountain		
	Point	Mobile	Area	Point	Mobile	Area	Point	Mobile	Area
SO_4	78.2	3.7	9.2	73.8	3.9	8.1	75.2	4.1	8.1
NO_3	28.1	44.7	13.4	35.8	29.9	17.1	27.9	40.3	12.0

As Table 3 shows, sulfur emissions affecting visibility in the Class I areas are clearly dominated by point sources. The mobile source contribution will be reduced as much as feasible through federal fuel sulfur rules already on the books. As for area source sulfur, the TCEQ has significant concerns about the emissions inventory accuracy. For example, the CENRAP inventory for area source sulfur compound emissions is more than seven times higher than the TCEQ estimate for that category. For this reason, our control strategy analysis will focus on point sources of sulfur compounds.

Nitrogen oxide emissions are more evenly distributed among point, mobile, and area sources. As described in Chapters 10 and 11, Texas is already going well beyond the federal requirements to reduce both on-road and non-road mobile emissions. Furthermore, the states have very limited authority to reduce mobile source emissions. Control of mobile source NO_X emissions is principally a federal responsibility. Area source NO_X is of concern to Texas both for our ozone SIP and for the Regional Haze SIP. The biggest source of area source NO_X is upstream oil and gas production. The TCEQ is taking all steps it has determined are reasonable at this time to control these sources in the Dallas-Fort Worth ozone SIP. In addition, the State of Texas is investing $4,000,000 in a grant program to assist with the retrofitting of gas-fired, rich burn compressor engines[1]. The TCEQ will continue its research analysis of emissions from oil and gas production. We will re-examine these sources in the five-year update of the Regional Haze SIP. By that time, we expect to have much improved information on the inventory and the economic and technical feasibility of additional controls. Given these considerations, the TCEQ decided to focus on point sources of NO_X when considering additional controls to improve visibility at Class I areas. It is important to note that Texas has already implemented substantial controls on point source NO_X as part of its ozone SIPs. These are described in more detail in Chapter 11: Long Term Strategy.

10-1.3 SELECTION OF SOURCES FOR POSSIBLE ADDITIONAL CONTROLS

Having narrowed the scope of the review to point sources of SO_2 and NO_X, the next step is to develop a high-level estimate of the costs and reductions associated with a set of potentially reasonable additional controls to reduce regional haze. The TCEQ developed a set of possible controls focusing on sources that had the potential to affect visibility at Class I areas and that had the least costly available controls on a cost per ton basis. The CENRAP conducted a large-scale study of control options using the EPA's AirControlNet Model. This study served as the basis for the Texas analysis.

[1] http://www.tceq.state.tx.us/implementation/air/sip/sb2003.html

The CENRAP used the latest revised version of the U.S. EPA's AirControlNet model to analyze potential add-on control device strategies for appropriate emissions generating units (Alpine 2007). AirControlNet is a PC-based database tool for conducting pollutant emissions control strategy and cost analysis. The study overlaid a detailed EPA control measure database on CENRAP's emissions inventories to compute source- and pollutant-specific emission reductions and associated costs at various geographic levels. For Texas, the 2002 Texas point source emissions inventory was the basis for the analysis.

The potential strategies, estimated capital costs, and costs per ton reduced were summarized and distributed to each of the CENRAP states. In many cases more than one strategy was proposed for a type of unit. In these cases, the least costly control, on a dollar per ton cost basis, was assumed to be implemented first, with the incremental cost of adding the additional strategy included. In addition to the CENRAP proposed controls, TCEQ added flue gas desulfurization as a potential control for nine units at three carbon black plants.

The best candidate sources for proposed control strategies were identified with a two step process. First, sources with potential control strategy costs greater than $2,700 per ton SO_2 for NO_X were initially screened out to limit the population to potential sources with relatively cost effective control strategies. The group of sources was further reduced to eliminate sources that are so distant from any of the ten Class I areas that any reduction in emissions would be unlikely to have a perceptible impact on visibility. The list was restricted to those sources with a ratio of estimated projected 2018 base annual emissions (tons) to distance (kilometers) greater than five to any Class I area. Also, any source with predicted 2018 emissions less than 100 tons per year was excluded. The regulatory and logistical overhead associated with controlling these small sources would not be justified by the likely benefit.

The TCEQ also excluded additional NO_X controls on cement kilns from consideration since the TCEQ has already required all the measures it has determined are reasonable to control NO_X emissions from these sources in the latest Dallas-Fort Worth ozone SIP revision. A study performed for the SIP (July 2006, a report entitled "Assessment of NO_X Emissions Reduction Strategies for Cement Kilns) evaluated the applicability, availability and cost effectiveness of potential NO_X 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. One modeling sensitivity assumed a range of 35 to 50 percent NO_X 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 TCEQ determined that the 35 to 50 percent control range was the most appropriate control level. The TCEQ develop a source cap that will require a reduction of approximately 9.69 tpd of NO_X 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 NO_X emission reductions from all cement kilns in the area. In most cases, the commission anticipates that the limitations will be attainable with SNCR and will not require costly and time consuming research and development of other technologies. Pilot testing of SNCR on wet and dry kilns in 2006 demonstrated that 30 to 40 percent reductions were achievable without hazardous by-product formation. Finally, before an increase in NO_X emissions from a change in operation from one unit of the installation of new kiln could occur, a corresponding and equivalent decrease in NO_X emissions would be required from another existing unit.

This analysis relied on the CENRAP estimates of control costs and feasibility. The costs presented in this study are estimates based on categories of units. A site-specific analysis would be necessary to determine actual costs and whether a particular control device is not feasible at a particular unit due to physical or process constraints.

10-1.4 PROPOSED CONTROLS

The types of industry and controls considered are listed below. These controls would go beyond what is already expected due to the Clean Air Interstate Rule (CAIR), BART controls planned for ozone SIPs.

- SO_2 control at 24 facilities from 15 sites
  - Natural Gas Transmission - flue gas desulfurization (FGD)
  - Crude Petroleum - Sulfur recovery and/or tail gas treatment
  - Inorganic chemical plants - coal washing and spray dryer absorber (SDA) on boilers, increase efficiency of sulfuric acid plants
  - Electric Generating Units (EGU) - coal washing and FGD wet scrubbing
  - Carbon black – FGD

- NO_X control for 24 facilities at 15 sites
  - Natural Gas Transmission- Low NO_X burners (LNB), SCR + LNB
  - EGU - LNB with close coupled over-fired air (LNC1), and with both close-coupled and separated over-fired air (LNC3)
  - Flat Glass - LNB, SCR
  - Paper Mills SNCR and oxygen trim (OT) with water injection
  - Chemical Plant Boiler - selective catalytic reduction (SCR)

Tables 6 through 10 provide details on the sources, costs, and control results expected from the set of point source controls considered to determine whether they are reasonable. Table 4 below summarizes the cost and emissions reductions expected from this analysis. Table 5 provides the estimated visibility improvement for each Class I. The basis for this estimate is provided in Appendix 10-2.

Table 4: Summary of Additional Point Source Controls Considered for Reasonableness

Pollutant	Tons Per Year Reduced	Estimated Annualized Cost ($2005)
Sulfur Dioxide	155,873	$270,800,000
Nitrogen Oxides	27,132	$53,500,000
Total Costs		$324,300,000

Table 5: Estimated Haze Index Improvements for Affected Class I Areas From Additional Controls

Class 1	**Big Bend**	**Breton Isle**	**Caney Creek**	**Carlsbad Caverns**	**Guadalupe Mountains**
HI Improvement (deciview)	0.16	0.05	0.33	0.22	0.22
Class 1	**Salt Creek**	**Upper Buffalo**	**Wheeler Peak**	**White Mountain**	**Wichita Mountains**
HI Improvement (dv)	0.18	0.16	0.04	0.24	0.36

As explained in Chapter 10, the TCEQ has determined that it is not reasonable to pursue additional controls at this time. The control set defined in this appendix yielded too little benefit for the cost.

10-1.5 Area of Influence Determination

To determine Texas' apportioned contribution to measured 2002 and predicted 2018 visibility extinction and impact of proposed controls, the area of influence (AOI) curves developed for CENRAP were used as a starting point. Working at CENRAP's direction, Alpine Geophysics (Alpine, 2006) used Residence Time Difference plots (DRI, 2005c), the Probability of Regional Source Contribution to Haze (PORSCH) plots (Raffuse *et al.*, 2005), the Tagged Species Source Apportionment (TSSA) results (Tonnesen and Wang, 2004; UCR, 2006), and engineering judgment to construct a consistent set of AOIs for each area.

The Residence Time Difference (RTD) plots are based on the Back Trajectory Residence Time (BTRT) plots. Back trajectory analyses use meteorological fields to estimate the geographical path an air mass traversed to end at a particular receptor. The Desert Research Institute (DRI) (2005b) developed the BTRT estimates used in this study by employing the NOAA HYSPLIT back trajectory model (Draxler and Hess, 1997; NOAA, 2006). BTRT plots give the fraction of total hours that an air parcel resided over each specific geographical area. The RTD plots for each pollutant come from by subtracting the map for all days at a site from the map for the 20 percent worst days for the respective pollutant pollutant. This process produced RTD plots for the twenty percentile worst sulfate, nitrate, organic carbon, elemental carbon, fine soil, and coarse mass days for each area CENRAP considered. The RTD maps show the areas that air was over more frequently (positive numbers) on worst case days compared to all days.

The PORSCH system is a suite of GIS tools that combines modeled backward wind trajectories, monitored concentrations, meteorological conditions, and emissions estimates to estimate probable regions of influence. PORSCH combines ensemble backward trajectories with chemically speciated emissions data to estimate the trajectory-emissions density-weighted area that is likely to affect a receptor site. PORSCH can do this for a single day or a suite of days. This study used only data relevant to the 20 percent worst haze days.

As the name implies Tagged Species Source Apportionment (TSSA) uses "Tagged Chemical Species," or tracers, to track chemical transformations and transport of each chemical species or precursor species during an air quality model run. Key chemical species are identified. These tagged chemical species for specific emissions source regions and source categories are tracked during all phases of the air quality modeling run. The end results show the sources contributing to the final chemical species for any grid cell in model domain.

Because RTD plots were available for the entire suite of twenty-one areas, they served as the primary basis from which Alpine produced the AOIs. Alpine examined the RTD plots for each area and each pollutant to identify “break points” between the most significant and lower level areas of influence contributing to the high concentrations of each pollutant. Alpine examined the PORSCH and TSSA results to refine the area of influence contours. Alpine then compared the Level 1 areas of influence for the different pollutants for each area and for nearby areas to determine whether the Level 1 areas of influence could be combined for pollutants and for nearby areas. Alpine repeated the process for Level 2 and further level AOIs. This process produced the AOIs the TCEQ has used in developing the list of sources and four-factor analysis used to determine whether additional controls on Texas sources are reasonable to reduce the visibility impact of Texas’ emissions on each area they affect.

The TCEQ used the second order of influence for ten Class I areas within Texas and adjoining states to define the geographic area of concern for significant NO_X and SO_2 emitting sources. The Class I areas considered were Caney Creek, Carlsbad Caverns, Big Bend, Guadalupe Mountains, Salt Creek, Upper Buffalo, Wheeler Peak, White Mountain, and Wichita Mountains. The population of sources determined from the entire state was apportioned to each Class I based on these curves. This list of sources for each Class I area was sent to appropriate state as part of the consultation process. This correspondence and lists of sources are in Appendix 4-3.

Table 6: Proposed SO_2 Controls Based on CENRAP Modeling

Acct No	FIN	Source Type for Control	Control Measure	2018 Base Case SO2 -- Tons	Cntrl -- Tons Reduced	Cntrl -- CE (%)	Controls -- Annualized Cost ($2005)	Controls -- Cost Per Total Ton Reduced	Qbase /5d
BG0057U	BOILER1	Utility Boilers - Coal-Fired	Coal Washing	10,836	3,793	35	$1,824,685	$481	4.93
BG0057U	BOILER1	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	10,836	9724	90	$25,000,104	$2,564	4.93
BG0057U	BOILER2	Utility Boilers - Coal-Fired	Coal Washing	10,658	3,730	35	$1,794,818	$481	4.85
BG0057U	BOILER2	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	10,658	9,593	90	$25,000,104	$2,606	4.85
CG0012C	INCIN	Tail Gas Incinerator	FGD	1,328	1,195	90	$1,703,960	$1,425	2.00
FI0020W	B1	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	23,142	20,828	90	$32,766,310	$1,573	13.77
FI0020W	B2	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	23,641	21,277	90	$32,766,310	$1,540	14.07
GF0002R	B-1	Utility Boilers - Coal-Fired	Coal Washing	16,096	5,634	35	$2,710,461	$481	5.82
GF0002R	B-1	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	16,096	14,486	90	$36,014,449	$2,486	5.82
GH0004O	BLR0009A01	Bituminous/Sub-bituminous Coal (Industrial Boilers)	SDA	1,960	1,764	90	$4,687,674	$2,658	1.76
GH0004O	BLR0010A01	Utility Boilers - Coal-Fired	Coal Washing	1,160	406	35	$195,408	$481	1.04
HG0659W	H600	Cat Cracker Heater	FGD	5,491	4,942	90	$8,474,217	$1,715	2.09

Acct No	FIN	Source Type for Control	Control Measure	2018 Base Case SO2 -- Tons	Cntrl -- Tons Reduced	Cntrl -- CE (%)	Controls -- Annualized Cost ($2005)	Controls -- Cost Per Total Ton Reduced	Qbase /5d
HG0697O	PIR-2	Sulfuric Acid Plants - Contact Absorber (98% Conversion)	Increase % Conversion to Meet NSPS (99.7)	4,101	3,486	85	$670,008	$192	1.55
HG0697O	U-8	Sulfuric Acid Plants - Contact Absorber (98% Conversion)	Increase % Conversion to Meet NSPS (99.7)	7,005	5,954	85	$2,510,927	$422	2.65
HR0018T	H-8*	Sulfur Plant Incinerator	FGD	3,590	3,231	90	$6,865,014	$2,124	3.60
RF0009N	INCIN-COMB	Incinerator	FGD	4,059	3,653	90	$8,153,168	$2,232	5.25
TF0013B	B1	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	19,144	17,230	90	$32,196,462	$1,869	23.06
TF0013B	B2	Utility Boilers - Medium Sulfur Content	FGD Wet Scrubber	19,695	17,725	90	$32,196,462	$1,816	23.73

*Unit Planned Shutdown March 2007

Table 7: Location and Program Status Details For Emission Units With CENRAP Proposed SO_2 Controls

County	Acct No	Company	Plant Name	FIN	BART	CAIR	Industrial Code Description	Nearest Area	Distance (km)
Bexar	BG0057U	CPS	SOMMERS DEELY SPRUCE PWR	BOILER1	No	Yes	Electric Services	Big Bend	440
Bexar	BG0057U	CPS	SOMMERS DEELY SPRUCE PWR	BOILER2	No	Yes	Electric Services	Big Bend	440
Cass	CG0012C	Enbridge	BRYANS MILL PLANT	INCIN	No	No	Nat'l Gas Liq	Caney Creek	133
Freestone	FI0020W	TXU	BIG BROWN	B1	No	Yes	Electric Services	Caney Creek	336
Freestone	FI0020W	TXU	BIG BROWN	B2	No	Yes	Electric Services	Caney Creek	336
Goliad	GF0002R	AEP	COLETO CREEK PLANT	B-1	No	Yes	Electric Services	Big Bend	553
Gray	GH0004O	Celanese	CHEMICAL MANUFACTURING	BLR0009A01	Yes	No	Industrial Organic Chemicals	Wichita Mtns	222
Gray	GH0004O	Celanese	CHEMICAL MANUFACTURING	BLR0010A01	Yes	No	Industrial Organic Chemicals	Wichita Mtns	222
Harris	HG0659W	Shell	DEER PARK PLANT	H600	Yes	No	Petroleum Refining	Caney Creek	526
Harris	HG0697O	Rhodia	HOUSTON PLANT	PIR-2	Yes	No	Industrial Inorganic Chemicals	Caney Creek	529
Harris	HG0697O	Rhodia	HOUSTON PLANT	U-8	Yes	No	Industrial Inorganic Chemicals	Caney Creek	529
Hopkins	HR0018T	Valence	COMO PLT	H-8	No*	No	Nat'l Gas Liq	Caney Creek	199
Reeves	RF0009N	El Paso Natr'l Gas	WAHA PLANT	INCIN-COMB	No	No	Natural Gas Transmission	Carlsbad	155
Titus	TF0013B	TXU	MONTICELLO STM ELE STN	B1	No	Yes	Electric Services	Caney Creek	166
Titus	TF0013B	TXU	MONTICELLO STM ELE STN	B2	No	Yes	Electric Services	Caney Creek	166

* site was exempted for BART

Table 8: Proposed SO_2 Control For Carbon Black Units

County	Acct No.	Company	Site	FIN	BART	Description	2018 Base Case SO2 (tons)	Control Measure	Cntrl CE (%)	Cntrl – Tons Reduced	dist. (km)	Nearest	Qbase/ 5d
Howard	HT0027B	Sid Richard-son	BIG SPRING	PR1002	No	MAIN PROCESS VENT,CO BOILER, and INCINERATION	3,890	FGD	80	3,112	295	Carlsbad	2.6
Howard	HT0027B	Sid Richard-son	BIG SPRING	DRYER22	No	PELLET DRYER	1,454	FGD	80	1,163	295	Carlsbad	1.0
Howard	HT0027B	Sid Richard-son	BIG SPRING	PR1004	No	MAIN PROCESS VENT,CO BOILER, INCINERATION	3,890	FGD	80	3,112	295	Carlsbad	2.6
Howard	HT0027B	Sid Richard-son	BIG SPRING	DRY1006	Yes	PELLET DRYER	1,790	FGD	80	1,432	295	Carlsbad	1.2
Howard	HT0027B	Sid Richard-son	BIG SPRING	DRYER24	No	PELLET DRYER	1,454	FGD	80	1,163	295	Carlsbad	1.0
Howard	HT0027B	Sid Richard-son	BIG SPRING	DRYER23	No	PELLET DRYER	1,454	FGD	80	1,163	295	Carlsbad	1.0
Howard	HT0027B	Sid Richard-son	BIG SPRING	PR1007	Yes	MAIN PROCESS VENT,CO BOILER, and INCINERATION	3,890	FGD	80	3,112	295	Carlsbad	2.6
Hutchin-son	HW0017R	Sid Richard-son	BORGER	B119N	No	INDUSTRIAL NATURAL GAS 10-100MMBTU/HR	4,262	FGD	80	3,410	238	Wichita Mtns	3.6
Orange	OC0020R	Degussa	ECHO	I-1	No	MAIN PROCESS VENT,CO BOILER, and INCINERATION	3,354	FGD	80	2,683	430	Breton Isle	1.6
						Total				20,350			

Table 9: Proposed NO_X Controls Based on CENRAP Modeling

Account	Plant Name	FIN	Source Type for Control	Control Measure	2018 Base Case NOx (Tons)	Control -- Tons Reduced	Controls -- CE (%)	Controls -- Annualized Cost ($2005)	Control -- Cost Per Ton Reduced	Qbase/5d
BG0057U	SOMMERS DEELY SPRUCE PWR	P-5	Utility Boiler - Coal/Tangential	LNC1	2,431	1,052	43.3	$813,312	$773	1.11
BG0057U	SOMMERS DEELY SPRUCE PWR	P-5	Utility Boiler - Coal/Tangential	LNC3	2,431	1,417	58.3	$1,400,066	$988	1.11
CG0010G	TEXARKANA MILL	PB02	ICI Boilers - Wood/Bark/Stoker - Large	SNCR - Urea Based	824	453	55	$907,290	$2,001	1.33
CG0010G	TEXARKANA MILL	RB02	Sulfate Pulping - Recovery Furnaces	OT + WI	822	535	65	$368,011	$689	1.32
C20005I	GUADALUPE COMPRESSOR STATION	C-1	Combustion Turbines - Natural Gas	Dry Low NOx Combustor	850	714	84	$153,587	$215	26.34
C20005I	GUADALUPE COMPRESSOR STATION	C-1	Combustion Turbines - Natural Gas	SCR + LNB	850	799	94	$1,031,230	$1,291	26.34
FC0018G	FAYETTE POWER PROJECT	3-1B	Utility Boiler - Coal/Tangential - POD10	LNC3	2,764	843	58.3	$1,049,562	$1,245	1.00
FI0020W	BIG BROWN	B1	Utility Boiler - Coal/Tangential	LNC3	3,574	593	58.3	$1,518,941	$2,560	2.13
FI0020W	BIG BROWN	B2	Utility Boiler - Coal/Tangential	LNC3	3,725	618	58.3	$1,518,941	$2,456	2.22
GH0003Q	PAMPA PLANT	P-1KATUINC	Indust. Incinerators	SNCR	1,230	553	45	$1,345,248	$2,431	1.11
GH0004O	CHEMICAL MANUFACTUR	BLR0009A01	ICI Boilers - Coal/Wall	SNCR	1,277	511	40	$923,371	$1,807	1.15
GH0004O	CHEMICAL MANUFACTUR	BLR0009A01	ICI Boilers - Coal/Wall	SCR	1,277	1,150	90	$2,646,447	$2,302	1.15

Account	Plant Name	FIN	Source Type for Control	Control Measure	2018 Base Case NOx (Tons)	Control -- Tons Reduced	Controls -- CE (%)	Controls -- Annualized Cost ($2005)	Control -- Cost Per Ton Reduced	Qbase/5d
LB0047N	TOLK STATION	UNIT 1	Utility Boiler - Coal/Tangential	LNC3	2,698	823	58.3	$1,426,484	$1,733	3.03
LB0047N	TOLK STATION	UNIT 2	Utility Boiler - Coal/Tangential - POD10	LNC3	2,510	766	58.3	$1,426,484	$1,863	2.82
LI0027L	RELIANT ENERGY LIMESTONE	1	Utility Boiler - Coal/Tangential - POD10	LNC3	5,703	1,739	58.3	$2,208,408	$1,270	2.97
LI0027L	RELIANT ENERGY LIMESTONE	2	Utility Boiler - Coal/Tangential - POD10	LNC3	5,117	1,561	58.3	$2,023,493	$1,297	2.67
MM0023J	SANDOW STEAM ELECTRIC	S4MB	Utility Boiler - Coal/Tangential - POD10	LNC3	5,509	914	58.3	$1,439,691	$1,574	2.27
NB0014R	GUARDIAN INDUSTRIES	01002	Flat Glass Manufacturing	LNB	2,796	1,118	40	$1,684,527	$1,506	1.67
NB0014R	GUARDIAN INDUSTRIES	01002	Flat Glass Manufacturing	SCR	2,796	2,097	75	$3,203,608	$1,528	1.67
PG0041R	HARRINGTON STATION	UNIT 1	Utility Boiler - Coal/Tangential	LNC3	1,779	543	58.3	$876,960	$1,616	1.28
PG0041R	HARRINGTON STATION	UNIT 2	Utility Boiler - Coal/Tangential	LNC3	1,912	583	58.3	$902,072	$1,547	1.38
PG0041R	HARRINGTON STATION	UNIT 3	Utility Boiler - Coal/Tangential	LNC3	1,845	563	58.3	$902,072	$1,603	1.33
RL0020K	MARTIN LAKE	U1-B1	Utility Boiler - Coal/Tangential	LNC3	8,516	1,414	58.3	$1,981,227	$1,401	7.12
RL0020K	MARTIN LAKE	U2-B2	Utility Boiler - Coal/Tangential	LNC3	5,251	872	58.3	$1,981,227	$2,273	4.39
RL0020K	MARTIN LAKE	U3-B3	Utility Boiler - Coal/Tangential	LNC3	5,105	847	58.3	$1,981,227	$2,338	4.26

Account	Plant Name	FIN	Source Type for Control	Control Measure	2018 Base Case NOx (Tons)	Control -- Tons Reduced	Controls -- CE (%)	Controls -- Annualized Cost ($2005)	Control -- Cost Per Ton Reduced	Qbase/5d
TF0013B	MONTICELLO	B2	Utility Boiler - Coal/Tangential	LNC3	4,553	756	58.3	$1,492,524	$1,975	5.48
WH0040R	WORKS NO 4	STA-22	Flat Glass Manufacturing	LNB	4,733	1,893	40	$2,851,572	$1,506	11.84
WH0040R	WORKS NO 4	STA-22	Flat Glass Manufacturing	SCR	4,733	3,550	75	$5,423,079	$1,528	11.84
WH0040R	WORKS NO 4	STA-23	Flat Glass Manufacturing	LNB	4,192	1,677	40	$2,525,375	$1,506	10.49
WH0040R	WORKS NO 4	STA-23	Flat Glass Manufacturing	SCR	4,192	3,144	75	$4,802,723	$1,528	10.49
				Totals				$ 54,267,839		

Table 10: Location and Program Status Details For Emission Units With Proposed NO_X Controls

County	Account	Company	Plant Name	FIN	BART	CAIR	Industrial Code Description	Nearest Area	Distance (km)
Bexar	BG0057U	CPS	SOMMERS DEELY SPRUCE PWR	P-5	No	Yes	Electric Services	Big Bend	440
Cass	CG0010G	IP	TEXARKANA MILL	PB02	Yes	No	Paper Mills	Caney Creek	124
Cass	CG0010G	IP	TEXARKANA MILL	RB02	Yes	No	Paper Mills	Caney Creek	124
Culberson	C20005I	EL PASO NATRL GAS	GUADALUPE COMPRESSOR STATION	C-1	No	No	Natural Gas Transmission	Guadalupe Mtns	6
Fayette	FC0018G	LCRA - Seymour	FAYETTE POWER PROJECT	3-1B	No	Yes	Electric Services	Caney Creek	554
Freestone	FI0020W	TXU	BIG BROWN	B1	No	Yes	Electric Services	Caney Creek	336
Freestone	FI0020W	TXU	BIG BROWN	B2	No	Yes	Electric Services	Caney Creek	336
Gray	GH0003Q	Cabot	PAMPA PLANT	P-1KATUINC	Yes	No	Carbon Black	Wichita Mtns	221
Gray	GH0004O	CELANESE	CHEMICAL MANUFACTURING	BLR0009A01	No	No	Industrial Organic Chemicals, NEC	Wichita Mtns	222
Lamb	LB0047N	XCEL	TOLK STATION	UNIT 1	No	Yes	Electric Services	Salt Creek	178
Lamb	LB0047N	XCEL	TOLK STATION	UNIT 2	No	Yes	Electric Services	Salt Creek	178
Limestone	LI0027L	Limestone	RELIANT ENERGY LIMESTONE	1	No	Yes	Electric Services	Caney Creek	384
Limestone	LI0027L	Limestone	RELIANT ENERGY LIMESTONE	2	No	Yes	Electric Services	Caney Creek	384

County	Account	Company	Plant Name	FIN	BART	CAIR	Industrial Code Description	Nearest Area	Distance (km)
Milam	MM0023J	TXU	SANDOW STEAM ELECTRIC	S4MB	No	Yes	Electric Services	Wichita Mtns	485
Navarro	NB0014R	GUARDIAN	GUARDIAN INDUSTRIES	01002	No	No	Flat Glass	Caney Creek	334
Potter	PG0041R	XCEL	HARRINGTON STATION	UNIT 1	No	Yes	Electric Services	Wichita Mtns	278
Potter	PG0041R	XCEL	HARRINGTON STATION	UNIT 2	No	Yes	Electric Services	Wichita Mountains	278
Potter	PG0041R	XCEL	HARRINGTON STATION	UNIT 3	No	Yes	Electric Services	Wichita Mountains	277
Rusk	RL0020K	TXU	MARTIN LAKE ELECTRICAL STATION	U1-B1	No	Yes	Electric Services	Caney Creek Wilderness	239
Rusk	RL0020K	TXU	MARTIN LAKE ELECTRICAL STATION	U2-B2	No	Yes	Electric Services	Caney Creek	239
Rusk	RL0020K	TXU	MARTIN LAKE ELECTRICAL STATION	U3-B3	No	Yes	Electric Services	Caney Creek	240
Titus	TF0013B	TXU	MONTICELLO STM ELE STN	B2	No	Yes	Electric Services	Caney Creek	166
Wichita	WH0040R	PPG	WORKS NO 4	STA-22	No	No	Flat Glass	Wichita Mtns	80
Wichita	WH0040R	PPG	WORKS NO 4	STA-23	No	No	Flat Glass	Wichita Mtns	80

Acronyms

FGD – flue gas desulfurization
LNB – low NO_X burner
LNC1 - LNB with close-coupled over-fired air (OFA)
LNC2 – LNB with separated OFA
LNC3 – LNB with both close-coupled and separated OFA.
SDA – spray dryer absorber
SCR – selective catalytic reduction
SNCR – selective non-catalytic reduction
OT + WI – oxygen trim plus water injection

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

In order to determine reasonable progress goals for the state of Texas, the TCEQ needed to quantify the visibility benefit of the potentially reasonable set of point source controls that are described in Appendix 10-1. The TCEQ used CENRAP's modeling of additional point source controls as the basis of this estimate.

The CENRAP developed its set of potentially reasonable point source controls and used CMAQ to estimate the visibility benefit of those controls. The TCEQ and CENRAP used the same AirControlNet to develop their control sets. The CENRAP controls extended across all the CENRAP states, not just Texas. CENRAP also assumed a higher cost per ton as potentially reasonable. Table 1 compares the CENRAP control set to the Texas control set. Table 1 shows the annual cost per ton in constant 2005 dollars which define "potentially reasonable point source controls."
The costs are annualized and standardized on 2005 dollars. (Note that under the Texas control scenario only additional controls in Texas are assumed.)

Table 1: Comparison of CENRAP and Texas Control Sets

	CENRAP	**Texas**
NO_x (tpy) reduction	181,107	27,132
SO_2 (tpy) reduction	725,025	155,873
Total Cost	$2,236,000,000	$324,300,000

Table 2: Projected Visibility Benefit from CENRAP Control Set

Class I Area	**2018 (dv)**	**2018c (dv)**	**Improvement (dv)**
Big Bend	16.63	16.38	0.26
Breton Isle	22.67	17.80	0.46
Caney Creek	22.47	21.46	1.01
Carlsbad Caverns	16.30	16.04	0.26
Guadalupe Mtns	16.30	16.04	0.26
Salt Creek	17.04	16.88	0.15
Upper Buffalo	22.52	21.60	0.91
Wheeler Peak	10.23	10.18	0.05
White Mtn	12.96	12.70	0.26
Wichita Mtns	21.51	20.76	0.75

The projections in Table 2 (and subsequent tables) assume that there will be no change in the coarse mass and soil components of visibility between the base year and 2018.

Table 2 shows visibility impacts under two scenarios. One scenario assumed only "on-the-books" control strategies would be in place by 2018. These results are labeled simply 2018. The other scenario included on-the-books controls plus the CENRAP potentially reasonable control strategy. These results are labeled 2018c.

The Class I areas in Table 2 are of significant interest to Texas. The TCEQ staff used these model results as a framework for estimating the visibility benefits of the potentially reasonable control set developed by the TCEQ.

The CENRAP modeling derived relative response factors (RRF) specific to particular pollutants and Class I areas as per step 3 of section 6.4 of the EPA's "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5 and Regional Haze" (EPA 2007a). These RRF's were multiplied by the measured 2000 through 2004 concentrations at these Class I areas over the 20 percent worst visibility days to estimate concentrations projected for 2018 over said days, as per step 4 of EPA 2007a.

The TCEQ interpolated the RRFs for sulfate and nitrate calculated from the 2018 and 2018c scenarios for each Class I area to generate the expected RRF's that would be obtained if the Texas potentially reasonable control strategy (2018TXc) were selected. Since the emissions differences between the 2018 and 2018c scenarios involve differences over all of CENRAP while the changes in emissions between the 2018 and 2018TXc scenarios involve only changes within Texas, the TCEQ used the results of the PSAT modeling to obtain Class I area specific interpolation coefficients in order to better apportion the expected impacts. An outline of the procedure used is presented in Appendix 10-4, followed by a more general and rigorous mathematical derivation for those interested. A spreadsheet with all the computations is provided as Appendix 10-5. The resulting projected RRFs (shown in Table 3), and corresponding concentrations, of sulfate and nitrate are between those of the 2018 and 2018c scenarios, as would be expected.[1]

Table 3: RRFs Using the Projected 2018 Impacts with the Texas Control Set on Select Class I Areas

Class I Area	Base g RRF for Sulfate	TXc RRF for Sulfate	Base gc RRF for Sulfate	Base g RRF for Nitrate	TXc RRF for Nitrate	Base gc RRF for Nitrate
Big Bend (BIBE)	0.875	0.847	0.832	1.126	1.111	1.088
Guadalupe Mtnts (GUMO)	0.764	0.706	0.699	1.003	0.997	0.987
Wichita Mts (WIMO)	0.709	0.658	0.616	0.814	0.798	0.758
Salt Creek (SACR)	0.800	0.741	0.744	0.917	0.923	0.931
White Mtn (WHIT)	0.809	0.732	0.729	0.987	0.983	0.975

These daily future year species concentrations are then used in steps 5 through 6 of section 6.4 of EPA 2007a to yield the projected visibility metrics, like mean concentrations, extinction, and haze index (in deciviews) for the most impaired days. A comparison of projected mean sulfate and nitrate concentrations over the most impaired days corresponding to the different RRF's at select Class I areas is presented in Table 4, including the projected impacts if the Texas control scenario (2018TXc) had been modeled.

[1] SACR saw a slight increase in modeled nitrate impact with the additional CENRAP potentially reasonable point source controls. This increase is likely due to the decrease of sulfate competing with the nitrate for the available ammonia.

Table 4: Projected Mean Sulfate and Nitrate Concentrations on Select Class I Areas, for Most Impaired Days, Including Projected Concentrations if Texas Controls Had Been Modeled

Class I Area	2018 Sulfate (µg/m^3)	2018TXc Sulfate (µg/m^3)	2018c Sulfate (µg/m^3)	2018 Nitrate (µg/m^3)	2018TXc Nitrate (µg/m^3)	2018c Nitrate (µg/m^3)
Big Bend (BIBE)	4.55	4.40	4.32	0.525	0.518	0.507
Guadalupe Mtnts (GUMO)	2.28	2.11	2.09	0.657	0.653	0.646
Wichita Mts (WIMO)	4.32	4.01	3.75	2.212	2.170	2.060
Salt Creek (SACR)	2.59	2.39	2.40	1.686	1.698	1.713
White Mtn (WHIT)	1.79	1.62	1.62	0.588	0.586	0.581

The daily future year species concentrations are then used in steps 5 through 6 of section 6.4 of EPA 2007a, using the new IMPROVE Equation, to calculate the projected visibility impact. The use of the new IMPROVE Equation is described in Chapter 4 of the Modeling Technical Support Document contained in Appendix 8-1 of this Regional Haze SIP. A spreadsheet is presented in Appendix 10-6 that shows the calculations of the RRF interpolations all the way through application of the RRFs to obtain the visibility metrics (mean concentrations, extinctions, and haze indices over the most impaired days).

Table 5 shows the estimated impact of the Texas control strategy on the Class I areas of significant interest to Texas.

Table 5: Modeled Visibility Benefit from the Texas Control Set

Class I Area	2018 (dv)	2018 TXc (dv)	Improvement (dv)
Big Bend	16.63	16.47	0.16
Breton Isle	22.67	22.62	0.05
Caney Creek	22.47	22.14	0.33
Carlsbad Caverns	16.30	16.08	0.22
Guadalupe Mtns	16.30	16.08	0.22
Salt Creek	17.04	16.86	0.18
Upper Buffalo	22.52	22.35	0.16
Wheeler Peak	10.23	10.18	0.04
White Mtn	12.96	12.72	0.24
Wichita Mtns	21.51	21.15	0.36

Texas 2018 projections assume that there would be no change in the coarse mass and soil components of visibility between the base year and 2018. The TCEQ finds that this is a reasonable assumption for Big Bend and Guadalupe Mountains. The agency has not determined if it is a reasonable assumption for the other Class I areas shown. However, for consistency, TCEQ is presenting the Texas 2018 projections for those areas.

Appendix 10-3: Uniform Rate of Progress Curves Using Default Natural Condition Estimates

Chapter 10 presents the uniform rate of progress (URP) for the best 20 percent and the worst 20 percent days for the two Class I areas in Texas using the best site-specific natural conditions estimates available to the TCEQ. Appendix 10-3 shows the two different URPs for Big Bend National Park and the two for Guadalupe Mountains National Park based on the site-specific estimates and on the default natural conditions estimates the EPA recommends. These are the Natural Conditions II (NCII) estimates.

Table 1: Uniform Rate of Progress for Class I Areas in Texas (Worst 20 Percent Days)

Class I Area	Using Texas Site-specific Natural Condition Estimates			Using EPA-recommended NCII Default Natural Condition Estimates		
	Improvement Needed by 2018 assuming URP (dv)	Progress Annually to 2018 assuming URP (dv)	Improvement Needed by 2064 (dv)	Improvement Needed by 2018 assuming URP (dv)	Progress Annually to 2018 assuming URP (dv)	Improvement Needed by 2064 (dv)
Big Bend	1.7	0.12	7.2	2.3	0.17	10.1
Guadalupe Mountains	1.2	0.08	4.9	2.4	0.17	10.4

Table 2: Reasonable Progress Goals for Class I Areas (Worst 20 Percent Days)

Class I Area	Improvement Projected by 2018 using RPG (dv)	Using Texas Site-specific Natural Condition Estimates			Using EPA-recommended NCII Default Natural Condition Estimates		
		Improvement by 2018 at URP (dv)	Projected Improvement by 2064 at RPG Rate (dv)	Date Natural Visibility Attained at RPG Rate	Improvement by 2018 at URP (dv)	Projected Improvement by 2064 at RPG Rate (dv)	Date Natural Visibility Attained at RPG Rate
Big Bend	0.7	1.7	2.9	2155	2.3	2.9	2215
Guadalupe Mountains	0.9	1.2	3.8	2081	2.4	3.8	2167

These projections of the year in which visibility would improve to natural conditions for the worst 20 percent of days are a requirement of the Regional Haze Rule. The large contribution that international pollution transport makes to Big Bend and to Guadalupe Mountains means that U.S. emission reductions alone could never bring these two Class I areas to natural visibility conditions.

For the best 20 percent of days the requirement is to project the haze index in deciviews for the end of the planning period, which is 2018 for this first Regional Haze SIP submission, and to show that the projection does not show any degradation from the base period average haziness for the best 20 percent days. Table 10-3 in the body of Chapter 10 does show that the modeling using Texas' long-term strategy does provide for 0.2 deciview improvement in haze for the best 20 percent of days at both Big Bend and Guadalupe Mountains. For quick reference a copy of Table 10-3 from the SIP text appears here:

Table 3: Reasonable Progress Goals for Class I Areas (Best 20 Percent Days)

Class I Area	Baseline Visibility (dv)	Projected 2018 Visibility (RPG) (dv)	Improvement by 2018 at RPG (dv)
Big Bend	5.8	5.6	0.2
Guadalupe Mountains	5.9	5.7	0.2

The following two figures show both the site-specific and the EPA default uniform rate of progress lines along with the 2018 projected RPG points for Big Bend and Guadalupe Mountains.

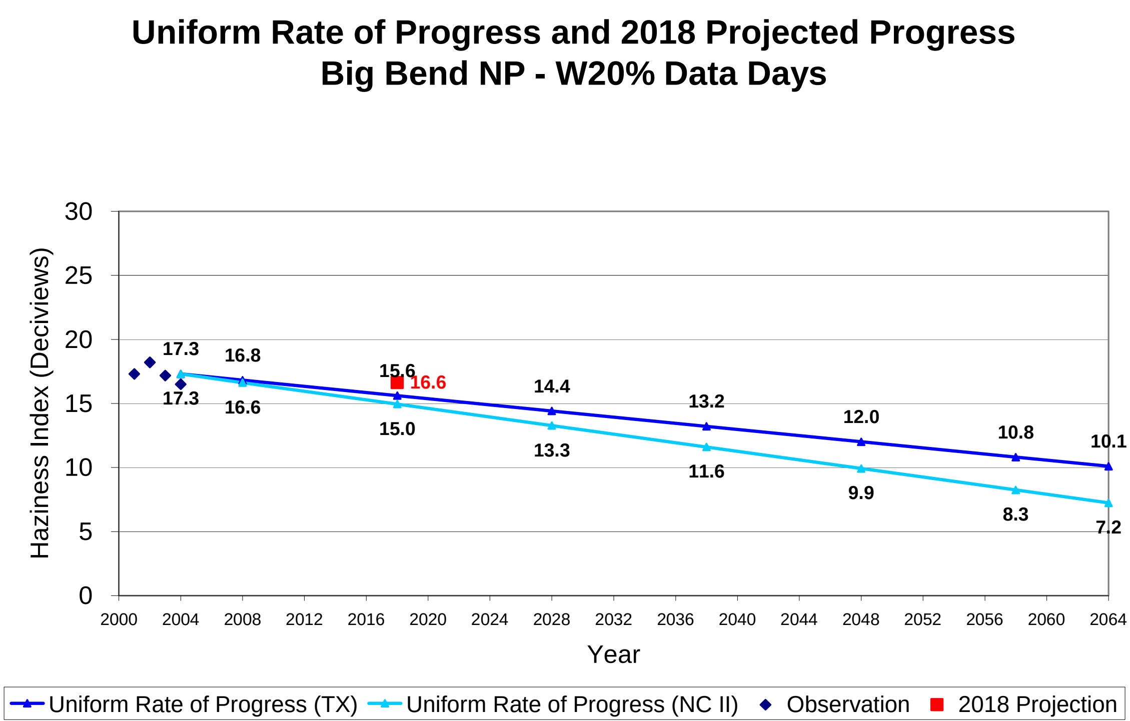

Figure 1: Glide Paths for Big Bend National Park Calculated Using Site-Specific 2064 Natural Conditions Estimates and Natural Conditions II Committee Estimates

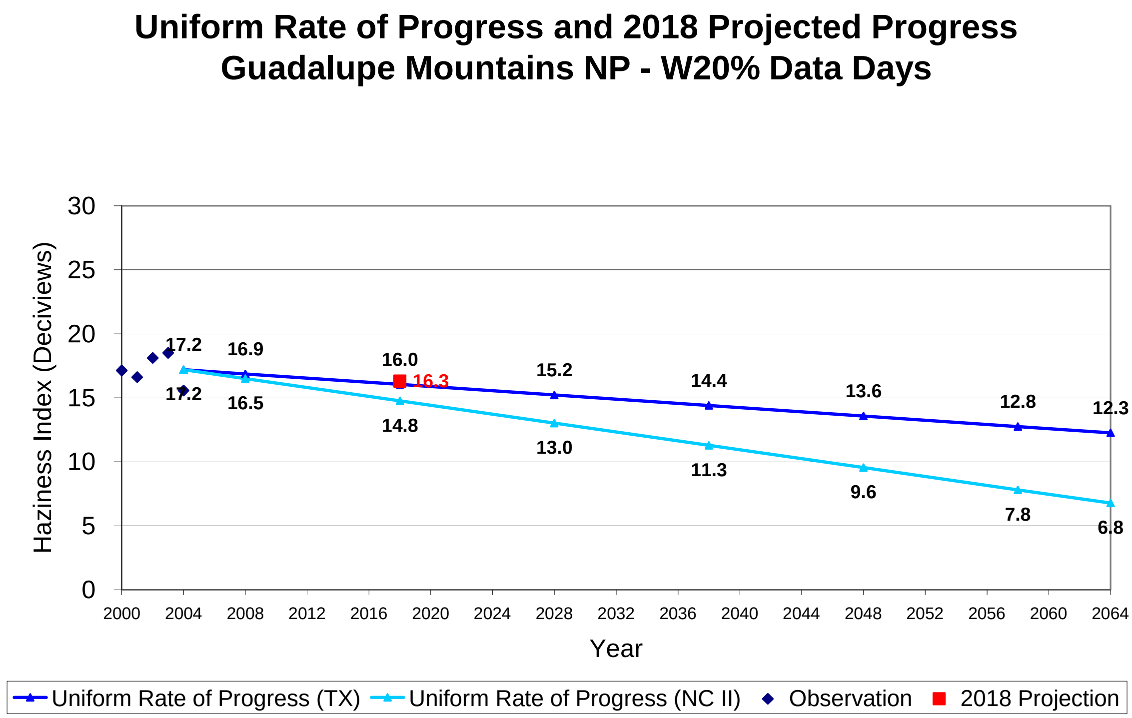

Figure 2: Glide Paths for Guadalupe Mountains National Park Calculated Using Site-Specific 2064 Natural Conditions Estimates and Natural Conditions II Committee Estimates

Appendix 10-4: Detailed Calculations for Estimating Visibility Impacts

DRAFT

Estimating Control Impacts Based on Prior Modeling, Including Particulate Source Apportionment Technology (PSAT) Modeling

By Dr. David Halliday
TCEQ

If results of two or more sets of modeling runs are available, but an estimate of the results of a different set of parameters is needed, such as a different set of controls, and it is not possible to obtain a new set of modeling runs (for instance due to time or budgetary constraints), then some other means of obtaining an estimate of these results is needed. Since Regional Haze modeling (like many other air quality modeling applications) is principally applied via calculation and application of Relative Response Factors (RRFs), it would be natural to interpolate RRFs from prior modeling to estimate RRFs that would be obtained by modeling a given set of controls that are similar to the control sets used in earlier runs.

Within this document we present a reasonable method for estimating impacts of controls that have not actually been modeled, based upon a linear interpolation over RRFs of two available modeling runs. This method is reasonable provided the two interpolated model runs have the same baseline conditions as the unmodeled run, and are sufficiently similar to each other and to the unmodeled run, to justify a linear approximation. The interpolation coefficient used in this method takes advantage of a Source Apportionment Technology (in this case, Particulate Source Apportionment Technology or PSAT) future case run to provide a receptor and/or monitor[1]specific interpolation, provided this run is sufficiently similar to the conditions of the future cases of the prior modeled runs.

Consider one of the two modeled runs to be a "base" control run. The difference in emissions between the "second" control run and this "base" control run are the emission reductions of the "second" control set. Further, the difference in emissions between the unmodeled, or, "target" control run and this "base" control run are the emission reductions of the "target" control set. Since this approach is a linear approximation, emission species such as sulfur dioxide and nitrogen oxides, will be associated with measured species that are most closely related, such as ammonium sulfate and ammonium nitrate, respectively.

The **emissions reduction ratio** associated with a given species will be the ratio of the emission reductions of the "target" control set associated with that species over the emissions reductions of the "second" control set associated with the same species. These ratios are computed on an emission apportionment category basis (such as source region and emitter category) using the same emission apportionment categories in the PSAT future case run. The **apportionment fraction**, for each species and receptor, is the fraction of the average PSAT modeled future case concentration apportioned to a given

[1] Henceforth, the term *receptor* shall be used in place of receptor and/or monitor.

emission apportionment category, for that species and receptor, over all emission apportionment categories that differ between the "base" and "second" control runs. This ensures the sum of the apportionment fractions, over all the emission apportionment categories that differ between the "base" and "second" control runs, will yield one.

The interpolation coefficient, for each species and receptor, equals the sum, over all the emission apportionment categories that differ between the "base" and "second" control runs, of the product of the emissions reduction ratio associated with that species, and the apportionment fraction, for the category, species, and receptor.

This interpolation factor, for each species and receptor, is then multiplied by the difference in the RRFs of the "second" control run and the "base" control run (with the "base" being subtracted from the "second"). This product is added to the RRF of the "base" control run to obtain the estimate of the RRF of the "target" control run, for the given species and receptor.

What follows is a mathematical derivation of this method.

Derivation of the Method

Equation 10-4-1 below shows the method of linear interpolation to a new "target" RRF (RRF_T) from RRFs obtained from "base" (RRF_B) and "second" (RRF_S) modeling runs, as above:

$$\begin{aligned} RRF_{T\,rs} &= \left(1 - f_{T\,rs}\right) RRF_{B\,rs} + f_{T\,rs} RRF_{S\,rs} \\ &= RRF_{B\,rs} + f_{T\,rs}\left(RRF_{S\,rs} - RRF_{B\,rs}\right) \end{aligned} \qquad \text{(eq. 10-4-1)}$$

where $f_{T\,rs}$ is the interpolation coefficient, $RRF_{x\,rs}$ is the RRF for modeling run x, (where $x \in \{B,S,T\}$), with B and S representing the two modeled runs and T representing the interpolated "target" estimate desired, for each receptor (r)and species (s).

If the new control set is simply an interpolated set of emissions between those used in the "base" and "second" modeling, and emissions in these modeling runs are not too different (so a linear approximation is reasonable), then the interpolation coefficient is given by

$$f_{T\,rs} = f_{T\,s} = \frac{E_{T\,r} - E_{B\,s}}{E_{S\,s} - E_{B\,s}} = \frac{\Delta E_{T\,s}}{\Delta E_{S\,s}} \qquad \text{(eq. 10-4-2)}$$

where the $E_{x\,s}$ are the emissions for modeling run x ($x \in \{A,B,I\}$) associated with species s.

If emissions are not simply a scaled interpolation between "base" and "second" model runs, then determination of a proper interpolation coefficient becomes much less straight forward. In this case, the above interpolation is likely to misappropriate the impacts of changes, since it applies the same interpolation for all receptors (r), for a given species (s).

However, if apportioned RRFs from ”base” and ”second” modeling runs were available, then interpolation of apportioned RRFs would be possible and a more representative set of emissions could be obtained. For instance, if the equivalent of RRFs for each run, species, receptor, and apportionment category (such as source region and emitter category, like electric generating units, etc.) were available, it would be possible to obtain RRFs apportioned by such categories.

Given $RRF_{B\,rs} = \sum_t RRF^t_{B\,rs}$ and $RRF_{S\,rs} = \sum_t RRF^t_{S\,rs}$, where the “tag” ($t$) runs over all apportionment categories (such as source region and emitter category) that differ between the runs, an interpolated “target” $RRF_{T\,rs} = \sum_t RRF^t_{T\,rs}$ is obtained:

$$RRF^t_{T\,rs} = RRF^t_{B\,rs} + f^t_{T\,rs}\left(RRF^t_{S\,rs} - RRF^t_{B\,rs}\right) \quad \text{(eq. 10-4-3)}$$

where

$$f^t_{T\,rs} = f^t_{T\,s} = \frac{E^t_{T\,s} - E^t_{B\,s}}{E^t_{S\,s} - E^t_{B\,s}} = \frac{\Delta E^t_{T\,s}}{\Delta E^t_{S\,s}} \quad \text{(eq. 10-4-4)}$$

If the baselines for the two “base” and “second” modeling runs and for the “target” modeling run are identical, then interpolation between RRFs is equivalent to interpolation between averaged modeled concentrations. Thus, if a Source Apportionment Technology (like PSAT) run for the future case is available that involves emissions that are not too different from the future “base”, “second”, and “target” cases, then an apportioned RRFs may be estimated as:

$$RRF^t_{x\,rs} \approx RRF_{x\,rs}\left(\frac{\langle C^t{}_{rs}\rangle}{\sum_t \langle C^t{}_{rs}\rangle}\right) = RRF_{x\,rs}\,\frac{\langle C^t{}_{rs}\rangle}{\langle C_{rs}\rangle} \quad \text{(eq. 10-4-5)}$$

where $\langle C^t{}_{rs}\rangle$ is the averaged modeled future case concentration apportioned to tag (t) for receptor (r), and species (s). $\langle C_{rs}\rangle$ is defined as $\langle C_{rs}\rangle = \sum_t \langle C^t{}_{rs}\rangle$.

Therefore, a better interpolation is thus obtained as:

$$\begin{aligned} RRF_{T\,rs} &= \sum_t RRF^t_{T\,rs} \\ &= \sum_t RRF^t_{B\,rs} + \sum_t f^t_{T\,s}\left(RRF^t_{S\,rs} - RRF^t_{B\,rs}\right) \\ &\approx RRF_{B\,rs} + \left(RRF_{S\,rs} - RRF_{B\,rs}\right)\sum_t f^t_{T\,s}\frac{\langle C^t{}_{rs}\rangle}{\langle C_{rs}\rangle} \\ &= RRF_{B\,rs} + f_{T\,rs}\left(RRF_{S\,rs} - RRF_{B\,rs}\right) \end{aligned} \qquad \text{(eq. 10-4-6)}$$

The interpolation coefficient, $f_{T\,rs}$, now depends upon the receptor (r), and is given by

$$f_{T\,rs} = \sum_t f^t_{T\,s}\frac{\langle C^t{}_{rs}\rangle}{\langle C_{rs}\rangle} = \sum_t \frac{\Delta E^t_{T\,s}}{\Delta E^t_{S\,s}}\frac{\langle C^t{}_{rs}\rangle}{\langle C_{rs}\rangle} \qquad \text{(eq. 10-4-7)}$$

The foregoing is a reasonable method for estimating impacts of controls that have not actually been modeled, based upon interpolation over two available modeling runs, provided, of course, the two runs over which we are interpolating have identical baseline conditions as would be used for the "target" run to be estimated, and are sufficiently similar to each other and to the "target" run. The interpolation coefficient, thereof, takes advantage of a Source Apportionment Technology (like PSAT) future case run to provide a receptor-specific interpolation, provided this run is sufficiently similar to the conditions of the future cases of the other available runs.

Appendix 10-4 has a large spreadsheet that is not easily printed and is available on line with all the other appendixes. All appendixes are available on the web site <http://www.tceq.state.tx.us/implementation/air/sip/bart/haze_appendices.html>.

If you have problems accessing any files, please contact me below or another SIP coordinator through the receptionist at 512-239-4900:

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Exhibit E

COMMENTS BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY REGARDING THE PROPOSED TEXAS AND OKLAHOMA REGIONAL HAZE FEDERAL IMPLEMENTATION PLAN AND INTERSTATE TRANSPORT STATE IMPLEMENTATION PLAN TO ADDRESS POLLUTION AFFECTING VISIBILITY AND REGIONAL HAZE

DOCKET ID NO. EPA-R06-OAR-2014-0754

Contents

I. Summary

On December 16, 2014, the United States (U.S.) Environmental Protection Agency (EPA) published in the *Federal Register* a notice of proposed rulemaking regarding the Texas and Oklahoma regional haze federal implementation plan (FIP) and interstate transport state implementation plan (SIP) to address pollution affecting visibility and regional haze (79 FR 74818). The Texas Commission on Environmental Quality (TCEQ) provides the following comments on this proposed rule.

For purposes of abbreviation, the Texas 2009 Regional Haze SIP Revision may be shortened to the 2009 RH SIP. Big Bend National Park may also be referred to as Big Bend; Guadalupe Mountains National Park as Guadalupe Mountains; and Wichita Mountains Wilderness as Wichita Mountains.

II. Comments

A. General Comments

A.1. The TCEQ does not support the proposed partial disapproval of Texas' RH SIP or adoption of the proposed FIP. The EPA's proposed partial SIP disapproval and FIP ignores the flexibility the Federal Clean Air Act (FCAA) provides to states in crafting regional haze plans and thus is arbitrary, capricious, and an abuse of discretion. The EPA should withdraw this proposal and propose to approve the TCEQ's 2009 RH SIP as meeting the statutory and regulatory requirements for regional haze.

The TCEQ submitted a RH SIP that meets all requirements of the Federal Clean Air Act (FCAA) and the regional haze rule (RHR). The 2009 RH SIP includes a detailed analysis of each requirement of a regional haze plan, as identified in FCAA, §169A(b)(2) including: a determination of which sources are subject to Best Available Retrofit Technology (BART); reasonable progress goals for the state's Class I areas, based on the four statutory factors; calculations of baseline and natural visibility conditions; consultations with states; and a long-term strategy and a monitoring strategy.

The EPA bears the burden to show Texas' judgment was unreasonable or does not meet the statutory requirements. As the U.S. Supreme Court opined in *Alaska Dept. of Environmental Conservation v. EPA* (540 U.S. 461, 484-89 *(ADEC)*): in reviewing an EPA disapproval of a state's exercise of discretion, courts must defer to state judgments, and the EPA bears the burden of establishing that those judgments were unreasonable. States are due even greater deference under FCAA, §169A (USC 7491) than under the standard articulated under the Supreme Court's decision in *ADEC*.[1] The RHR and EPA guidance suggest that states have a large degree of flexibility in crafting regional haze plans.

The EPA's determination that the TCEQ did not meet all applicable requirements of the FCAA regarding regional haze is flawed. The state plan submitted in 2009 followed all the EPA rules and guidance and contains a thorough analysis and justification for its conclusions for each statutorily required element. The EPA states that the TCEQ did not 'reasonably consider' the four statutory factors in developing the reasonable progress goals (RPG) for its Class I areas, Big Bend and Guadalupe Mountains National Parks. The FCAA requires states to develop RPGs "tak[ing] into consideration" the factors listed in §169A(g)(1). Texas' plan does this. The EPA's complaint is that it would have considered these factors differently than Texas. This is not a valid basis for disapproval of the Texas plan. The EPA proposes to find that it would have developed certain elements of the visibility plan differently, thus holding Texas to a different standard of compliance than what is provided for in statute and rule. This is the very nature of an arbitrary and capricious action. The EPA also proposed that the Texas uniform rate of progress (URP) is faulty because it assumes the TCEQ's natural visibility conditions estimate is incorrect.[2] This is an estimate that was developed by the TCEQ following the EPA's own guidance and rules that provide the states broad flexibility and discretion in their calculation. Again, it appears the EPA prefers a different outcome than that of the Texas plan. The EPA's proposed disapproval of the long-term strategy for Wichita Mountains in Oklahoma is based on new and unfounded interpretations without basis in the FCAA or its rules. First, the EPA claims that the four statutory factors for RPGs apply to the long-term strategy. This is not found in the statute and is not supported by the RHR. The EPA also proposes disapproval of the long-term strategy and state consultations - in which both states agreed with the reductions calculated for sources in Texas that impacted the Wichita Mountains - because Oklahoma's 'progress goal' established for Wichita Mountains must be "approved or approvable" in order for Texas to rely on it in its own plan.

It appears that the EPA has carried out the process of developing its proposed partial SIP disapproval and proposed partial FIP in the following sequence: First, the EPA decided to find a way to impose additional control requirements beyond those in Clean Air Interstate Rule (CAIR) on multiple electric generating units (EGU) in Texas. The EPA then analyzed the Texas 2009 RH SIP using new approval criteria that were not in place in either the RHR or in the EPA's

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[1] See American Corn Growers Assn. v. EPA, 291 F3d., 1 (2002).

[2] "...we propose to find the TCEQ has calculated this rate of progress on the basis of, and compared baseline visibility conditions to, a flawed estimation of natural visibility conditions for the Big Bend and Guadalupe Mountains, as we describe above. Therefore, we propose to disapprove the TCEQ's calculation of the URP needed to attain natural visibility conditions by 2064." 79 FR 74818, 74833

guidance when it was submitted in 2009. Again, the EPA's proposed partial SIP disapproval and FIP is an attempt to force its preferred outcome for specific sources in Texas. This is arbitrary and capricious and does not comport with the FCAA.

A.2. The projected visibility improvement from the proposed FIP requirements are imperceptible at all three Class I areas. The EPA's modeling analysis projects that the combined effect of all the proposed scrubber upgrades (for seven individual units at four sites) will achieve at most only an imperceptible improvement of 0.14 deciviews at Wichita Mountains. Even smaller improvements are projected for Big Bend and Guadalupe Mountains, 0.03 and 0.04 deciviews, respectively. Tables 44 and 45 in the preamble exaggerate the potential benefits of the EPA's proposed FIP and are irrelevant to the approvability of the 2009 RH SIP.

As fully explained in comment J.6., both Table 44: *Calculated RPGs for 20% Worst Days*...and Table 45: *Anticipated Visibility Benefit*... should be removed from the final action because they tabulate calculated benefits that will not occur by 2018, the only year that is appropriate for evaluating the visibility impacts of proposed controls. The 2018 visibility conditions that the 2009 RH SIP will produce are the appropriate starting points for evaluating the effects of the EPA's proposed FIP. Table 45 misleads a reader to believe that the EPA's proposed FIP action would produce a 0.62 deciview improvement in visibility at Wichita Mountains. Instead of calculating a benefit from the air quality that the 2009 RH SIP would produce in 2018, Table 45 misleads the reader by calculating "benefits" from 2011 through 2013 emissions, long before the 2009 RH SIP is fully effective instead of from 2018.

Table 43 in the Preamble presents the calculated benefits in 2018 that could result from the EPA's proposed FIP. However, the potential 0.14 deciview improvement at Wichita Mountains is almost certainly an overstatement of the incremental benefit from the proposed FIP in 2018 because SO_2 emission reductions are occurring due to other requirements, and the actual SO_2 emissions will likely be lower than those in the CENRAP 2018 emissions projections.

Typically, a person can perceive a one (1.0) deciview change in visibility impairment. Visibility differences of 0.14, 0.04, and 0.03 deciview are imperceptible.

Table 1. Visibility Data (in Deciviews)[3]

	Big Bend	Guadalupe Mountains	Wichita Mountains
Baseline Visibility Impairment 2000 – 2004	17.30	17.19	23.81
State-established RPG for 2018	16.60	16.30	21.47
Incremental 2018 Improvement from EPA's Proposed FIP Scrubber Upgrades	0.03	0.04	0.14
EPA-proposed RPGs for 2018	16.57	16.26	21.33
Current Visibility 2009 - 2013	16.30	15.30	21.20

3 From Table 43, (79 FR 84887), and the Western Regional Air Partnership-Technical Support System (WRAP-TSS)

Also, the potential improvement from the proposed FIP is 2% or less of the total impairment projected to exist in 2018 on the most impaired 20% days and even that is likely an overestimate of the FIP's potential benefit because the EPA's analysis does not consider the reductions that will occur from other federal programs, such as the Mercury and Air Toxics Standards (MATS) rule and the implementation of the sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS).

The actual effects of the EPA's proposed FIP are correctly represented in Table 43, which includes the only controls that could be in place by the end of 2018, which is the end of the first regional haze planning period established by the RHR.

With current monitored visibility better than the EPA calculates the proposed FIP would achieve in 2018 and the potential visibility improvements from the proposed FIP are both small and uncertain, the EPA does not have an appropriate basis for adopting the proposed FIP.

A.3. The Texas 2009 RH SIP, as submitted, would ensure more than Texas' proportional contribution to progress toward improved visibility conditions at Wichita Mountains through the first planning period that runs through 2018.

By 2018, Texas' 2009 RH SIP reduces Texas' apportioned contribution to total visibility extinction at Wichita Mountains by more (26.1%) than the reduction from all other states combined (24.5%). Also, Texas' 2009 RH SIP reduces Texas' visibility impairment impact at Wichita Mountains by slightly more than its proportional share of the total baseline visibility impact at Wichita Mountains. Additionally, the Central Regional Air Planning Association (CENRAP) states were in agreement about the amount of progress that was reasonable at Wichita Mountains during the first planning period.

The EPA's proposed partial SIP disapproval and partial FIP undervalue the effectiveness of the long-term strategy embodied in the Texas 2009 RH SIP. Without presenting evidence, the EPA dismisses the progress made as being due to "meteorological conditions, reduction in the impacts from SO_2 emissions, and a reduction in the impacts from coarse materials" (79 FR 74843). The EPA makes the meteorological assertion in spite of the fact that 2011 was one of the hottest and driest years in Texas history and there were unprecedented wildfires that year. The current visibility conditions in Big Bend, Guadalupe Mountains, and Wichita Mountains are already better than the respective state-established and the EPA-proposed RPG for these three Class I areas.

A.4. The requirements in the proposed FIP are untimely for the first regional haze planning period due to the EPA's delay in acting on the 2009 RH SIP submittal.

The EPA is evaluating the approvability of the Texas 2009 RH SIP, which covers the first planning period that runs only through 2018. The EPA has been so untimely in its review of the 2009 RH SIP that only the proposed scrubber upgrades in the proposed FIP could possibly be in place by the end of 2018. The projected benefit of the other proposed FIP controls, the scrubber retrofits, is irrelevant to the approvability of Texas' 2009 RH SIP because they would not be in place during this first planning period.

A.5. Texas disagrees with the EPA's technical approach of evaluating only Texas sources when considering more controls to reduce haze at the Wichita Mountains.

In preparing its proposed actions, the EPA carried out a technical project evaluating the connection between emissions of SO_2 and nitrogen oxides (NO_X) from 38 sources in Texas and visibility impairment at several Federal Class I areas.[4] The EPA's approach to evaluating the

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[4] The 38 Texas sources evaluated are: Big Brown, Big Spring Carbon Black, Borger Carbon Black, Borger Carbon Black Plant, Coleto Creek Plant, Fayette Power Project, Fullerton Gas Plant, Gibbons Creek,

possibility that it might be reasonable to add additional controls to sources of visibility-impairing pollutants is inherently arbitrary and capricious, biased, discriminatory, and unreasonable because, while focusing primarily on the Wichita Mountains in Oklahoma, the approach considered only sources in Texas for possible additional controls. The approach did not consider whether additional controls on sources in Oklahoma, Arkansas, Kansas, or New Mexico may be equally reasonable or more reasonable. The existing EGUs in Texas and the other states surrounding Oklahoma as well as in Oklahoma are in the same category in that they have all been subjected to BART requirements or better-than-BART requirements.

A.6. The EPA's action is based not on current law or guidance but rather the agency's preference of what the law and guidance should be. This is apparent from recent meetings the EPA has conducted with regional planning organizations (RPOs), federal land managers (FLMs), and states on possible changes to the RHR and guidance – changes that in many ways would codify the approach that the EPA has taken in proposing disapproval of the Texas and Oklahoma SIPs.

The EPA has indicated intentions to revise the RHR and guidance and is in the process of holding meetings with relevant stakeholders such as states, FLMs, and RPOs to receive feedback and input on what these revisions should entail. This is the correct approach for an agency considering making changes to properly promulgated rules. Several stakeholders have already expressed to the EPA that the agency needs to more clearly articulate expectations in the rule or guidance for how to consider the four statutory factors used in setting RPGs. The EPA has posed a series of questions to stakeholders on how to revise the RHR and guidance, including how states should address each RPG factor. For example, the EPA asks if the RPG analysis should include a presumption that certain controls are needed for reasonable progress. This is precisely what the EPA has done in reviewing the Texas 2009 RH SIP and developing the proposed FIP, an action that is without a basis in the current regulations. If the EPA finds that in its review of state RH plans there are flaws in its own rules, the appropriate mechanism for correcting those flaws is not disapproving those plans; it is through prospective, FCAA-compliant rulemaking. The EPA must base its review of the Texas 2009 RH SIP on what the rule and guidance required at the time Texas submitted the plan in 2009. Changes to the law must be properly made through notice and comment rulemaking and not imposed prematurely and without notice to states after plans are submitted. It is arbitrary and capricious, as well as contrary to current case law, to require a state to guess what the EPA may choose to require from a state for an approvable plan. The EPA had appropriate rules and guidance, these were correctly and appropriately followed by the TCEQ in developing the 2009 RH SIP, and the EPA is obligated to follow its own rules and guidance that were in place when the plan was developed as it evaluates the merits of the submission.

B. Visibility Transport

The EPA's interpretation of the RHR is unprecedented, incorrect, and unreasonable. The EPA exceeded its authority in disapproving Texas' long-term strategy.

Goldsmith Gasoline Plant, Great Lakes Carbon LLC, Guadalupe Compressor Station, Harrington Station, Holcim (Texas) LP, HW Pirkey Power Plant, Keystone Compressor Station, Keystone Plant, Lignite-Fired Power Plant, Martin Lake Electrical Station, Midlothian Plant, Monticello Steam Electric Station, Newman Station, North Texas Cement Co., Odessa Cement Plant, Oklaunion Power Station, Pegasus Gas Plant, Reliant Energy Limestone, Sandow Steam Electric, Sherhan Plant, Sommers Deely Spruce Power, Streetman Plant, Texarkana Mill, TNP One Steam Electric Station, Tolk Station, W A Parish Station, Waha Plant, Welsh Power Plant, Works No 4, and Sandow 5 Generating Plant.

The EPA has misinterpreted the requirements in FCAA, §§51.308(d)(1) and (d)(3) and improperly gives meaning to a phrase in order to fill a perceived gap in their own regulations. The RHR requires upwind states to consult with downwind states and develop coordinated strategies to address the upwind state's share of impairment in the downwind state's Class I areas that are impacted. Texas met these long-term strategy requirements. As the EPA admits on 79 FR 74856, in its evaluation of the consultation with Oklahoma, both states agreed with the 2009 Texas plan. Therefore Texas met its obligation under the RHR for the long-term strategy assessment for Class I areas outside the state, specifically Wichita Mountains. The EPA may be correct that its own rules do not address situations where a downwind state's RPG for an area is not properly set, but that does not give the EPA the authority to arbitrarily revise its rules ad hoc, without the proper notice and comment procedures; nor does the flaw in the EPA's rules mean that the Texas plan addressing the long-term strategy is deficient.

The EPA exceeded its authority in disapproving Texas' long-term strategy. First, the EPA bases its proposed disapproval of the RPG and long-term strategy on a new interpretation of FCAA, §51.308(d)(3)(ii) that the 'progress goal' established by a downwind state, i.e. Oklahoma, must be "approved or approvable." This new definition in 2014 of the term progress goal in order to justify the proposed disapproval of the 2009 RH SIP is arbitrary and capricious. The EPA is proposing to disapprove Texas' portion of the RPG calculation for Wichita Mountains, not because of a flaw in Texas' analysis, but because the EPA does not agree with Oklahoma's RPG. The EPA maintains that in this case, it must disapprove both Texas and Oklahoma's plans regarding Wichita Mountains. This interpretation is not found in the rule or statute and is not legally valid for reviewing Texas' long-term strategy or RPG. In fact, the FCAA, §51.308(d)(1) standard for determining the acceptability of the RPG is "it must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least impaired days over the same period." The EPA agrees that both Texas' RPGs for Big Bend and Guadalupe Mountains and Oklahoma's RPG for Wichita Mountains meet this requirement (79 FR 74834).[5]

In developing its long-term strategy for impacts to Wichita Mountains, Texas relied on an agreed upon approach to emission reductions. Oklahoma and Texas both agreed to the Texas SIP long-term strategy during consultation. Texas' long-term strategy was based partly upon meeting the RPG for Wichita Mountains established by Oklahoma. That plan and those consultations are what the EPA must review for compliance with the FCAA. The EPA also relies on an incorrect interpretation of the long-term strategy requirements in (d)(3). Texas is not required to consider the four statutory factors for Class I areas outside the state. These factors are considered in the determination of 'reasonable progress' in FCAA, §169A(g)(1) for Class I areas located in the state. For Class I areas located outside the state, Texas is required to consult with those 'downwind' states in developing coordinated emissions management strategies *as may be necessary* to achieve the RPGs established by the host state.[6] In establishing its long-term strategy, the TCEQ properly relied on its consultation and concurrence with Oklahoma at the time the Texas 2009 RH SIP was developed. That consultation resulted in concurrence that controls - additional to those already required under existing regulations - were not reasonable for Texas sources. The EPA is changing the rules after the fact to give a never before used meaning to 'progress goal' that those goals for Oklahoma must be approved or approvable in order to approve Texas' long-term strategy. The EPA cannot rely on the deference from the

[5] Once again, the EPA engages in creative interpretation of its rules that is not based in the FCAA. The EPA maintains that "ODEQ's RPGs for the Wichita Mountains are consistent with *minimum* requirements of §51.308(d)(1)....." (emphasis added) This section of the rule makes no mention of a minimum level of progress and in fact provides all of the requirements for what the RPG must provide.
[6] For Wichita Mountains, the host state is Oklahoma. See 40 CFR §51.308(d)(3).

courts as this interpretation is inconsistent with the regulation and clearly not found in the RHR.

C. Natural and Baseline Visibility Conditions

C.1. The natural conditions estimates that the EPA proposes are not technically supportable and should be withdrawn. The EPA failed to meaningfully address Texas' justification for its RPG and natural visibility condition analysis. The TCEQ urges the EPA to approve Texas' estimation that 100% of the coarse mass and fine soil observed at Big Bend and Guadalupe Mountains is the best estimation available.

The EPA's proposal to use the Natural Conditions II (NCII) Committee estimations of natural conditions for coarse mass, i.e., dust, and fine soil, ignores the site-specific evidence and analysis presented on page 5-4 of the 2009 RH SIP. Further information and evidence is presented clearly in the appendices and in peer-reviewed scientific publications that are cited.[7]

The technical evidence submitted in the 2009 RH SIP demonstrates that, on the most impaired 20% of days, the suspended soil (coarse mass and fine soil) at Guadalupe Mountains and Big Bend is best estimated by calculating that 100% of the soil is natural. The TCEQ asks the EPA to take note of the following conclusion in Chapter 5, page 5-4, the second paragraph of the 2009 RH SIP:

> The times when human-caused dust is likely to be more important at these sites are on days with less visibility than on the worst dust impaired days, since the most dust impaired days are dominated by dust storms and other blowing dust from the surrounding desert landscapes.

In the proposal, the EPA correctly states:

> We note that with any of the methodologies for calculating natural conditions discussed above, Texas' Class I areas are not projected to meet the URP in 2018 according to the CENRAP modeling and are not projected to meet the goal of natural visibility conditions by 2064 (79 FR 74832).

Importantly however, the EPA failed to note that, since over 50% of the visibility impairment at Big Bend on the most impaired 20% days comes from outside the U.S. and since there is no basis for projecting a reduction in that impact, the goal of reaching natural conditions at Big Bend is unrealistic, as is the implied goal of attaining the URP at any time. A more appropriate goal would be to achieve an appropriate reduction of the visibility impairment caused by anthropogenic emissions in Texas and the rest of the U.S.

The TCEQ correctly calculated natural visibility conditions at Big Bend and Guadalupe Mountains in accordance with FCAA, §51.308(d)(2)(iii) and EPA guidance. The use of a refined estimate is allowed under the rule and guidance. The EPA's determination that this refined approach to estimating natural visibility conditions is "not adequately demonstrated" is improper. Such a basis for review is not found in rule, statute or guidance. The EPA cites "uncertainty" in the TCEQ's assumptions yet the EPA's proposed disapproval and use of the default NCII values is contrary to the evidence presented in the 2009 RH SIP and is unjustified. The EPA admits that dust storms and blown dust from deserts, in a very arid region, are

[7] See Appendix 5-1: Discussion of the Original and Revised Interagency Monitoring of Protected Visual Environments (IMPROVE) Algorithms; Appendix 5-2: Estimate of Natural Visibility Conditions; Appendix 5-2a: Natural Events: Dust Storms in West Texas; Appendix 5-2b: Estimating Natural Conditions Based on Revised IMPROVE Algorithm; Appendix 5-2c: Texas Natural Conditions SAS Program File and Data; see under References - Gill et. al. 2005; Kavouras et. al. 2006, 2007.

significant contributors to impairment in Big Bend and Guadalupe Mountains. The EPA's preference for the default estimates is equally unjustified. It is reasonable to assume coarse mass and dust as 100% naturally sourced for the natural visibility estimate for these areas that are located in a desert environment and close to sources of wind-blown dust. The EPA has not demonstrated that the TCEQ's estimate violates the rule or runs afoul of guidance, or is more uncertain than using the default values. Just because everyone else used the default is not a valid basis for disapproval given that the EPA's rules allow such a refined approach.

C.2. If the EPA does not approve the TCEQ natural conditions estimation that 100% of the soil dust at Big Bend and Guadalupe Mountains on the 20% most impaired days is natural, it should choose an estimate between the 80% natural estimate and 100% approximation.

The FLMs commented that 80% would be more reasonable, but they did not present evidence to support this suggestion. However, the TCEQ considers that 100% is well supported in the 2009 RH SIP.

C.3. Texas agrees with the proposed EPA finding that the TCEQ's estimate of baseline visibility conditions at Big Bend and Guadalupe Mountains have satisfied the requirements of §51.308(d)(2)(i).

D. Natural Visibility Impairment

D.1. In Section V. B. 3 of the preamble, the EPA has mischaracterized the requirement for states to calculate natural visibility impairment beyond natural conditions. Table 3: *Natural Visibility Impairment* on page 74832 of the proposal is an incorrect and misleading characterization of Chapter 5, Table 5-2: *Visibility Metrics for the Class I Areas in Texas*, page 5-4 of the 2009 SIP. The TCEQ disagrees with the EPA's assessment of compliance with this requirement and urges the EPA to approve TCEQ's appropriate and technically defensible estimates of natural conditions, such as those used in the 2009 RH SIP.

Section 51.308(d)(2)(iv)(A) of the RHR says:

> For the first implementation plan addressing the requirements of paragraphs (d) and (e) of this section, the number of deciviews by which <u>baseline conditions exceed natural visibility conditions</u> for the most impaired and least impaired days...[underline added]

Although the EPA appropriately proposes to find that the 2009 RH SIP correctly stated the baseline conditions at Big Bend and Guadalupe Mountains, the subsection just cited requires that the natural visibility conditions for the most and least impaired days at each Class I area be subtracted from the baseline conditions for the most and least impaired days to determine the number of deciviews by which baseline conditions exceed natural conditions on the respective sets of days.

D.2. The TCEQ urges the EPA to accept the use of 100% natural dust as the most reasonable estimate for calculating natural conditions. The EPA's proposal presents no evidence that human activity contributes to the coarse mass or fine soil (dust) at Guadalupe Mountains or Big Bend.

The EPA did not do what the rule requires to calculate natural conditions "by estimating the degree of visibility impairment existing under natural conditions for the most impaired and least impaired days, based on available monitoring information and appropriate data analysis techniques."[8] Since the Texas 2009 RH SIP did present substantial evidence that natural blowing dust is the cause of the coarse mass and fine soil at both parks on the 20% of days with the most visibility impairment, the TCEQ strongly urges the EPA to accept the use of the 100% approximation.

D.3. If the EPA chooses not to accept that estimate or to withdraw its proposed partial SIP disapproval and FIP, the TCEQ urges the EPA to choose an estimate that the dust is between 80% and 100% natural.

The 2009 RH SIP submittal presented strong, peer-reviewed publication evidence that, on the most impaired 20% of days, essentially all the coarse mass and fine soil at Guadalupe Mountains National Park is natural. It also presented evidence assembled by six scientists, including the chairman of the IMPROVE steering committee, that the dust impacts at Big Bend are largely from locally windblown dust. Because of the strong National Park Service restrictions on human activity in Big Bend and the fact that the IMPROVE monitor in Big Bend is surrounded in all directions by 10 or more miles of the park, the conclusion is that naturally eroded soil contributes all or nearly all the coarse mass and fine soil at Big Bend on the 20% of days with the most impaired visibility. The FLMs commented that an approximation of 80% natural would be more reasonable, but they did not present evidence to support this suggestion.

E. Uniform Rate of Progress (URP)

Texas disagrees with the EPA's proposed URP and natural conditions for both the Texas Class I areas. Once a final, technically supportable estimate of natural conditions has been selected, the URP can be calculated by straight-line interpolation from the baseline visibility conditions (2000 – 2004) to the estimated natural conditions in 2064 for each of the Texas Class I areas.

Importantly, the EPA failed to note that, since over 50% of the visibility impairment at Big Bend on the most impaired 20% days comes from outside the U.S. and since there is no basis for projecting a reduction in that impact, the goal of reaching natural conditions at Big Bend is unrealistic, as is the implied goal of attaining the URP at any time.[9] A more appropriate goal would be to achieve an appropriate reduction of the visibility impairment caused by anthropogenic emissions from Texas and the rest of the U.S. Later in the first full paragraph on page 79 FR 74843, the EPA correctly concluded that "it is not reasonable to meet the URP for the Texas Class I areas for this planning period." The EPA also recognized that "emissions and transport from Mexico and other international sources will limit the rate of progress achievable on the 20% worst days..."

F. Reasonable Progress Goals

F.1. The TCEQ agrees with the EPA's proposal to find that Texas' submission meets the requirements of §51.308(d)(1)(iv) regarding reasonable progress goal minimum and state consultations for the two Texas Class I areas.

F.2. The EPA's proposed disapproval of Texas' RPGs and its substitution with new RPGs in the proposed FIP is based on EPA's flawed interpretation of what the FCAA requires for "reasonable progress goals." This action is based on the EPA's conclusion that "reasonable progress" must be determined based on source-specific cost of controls even though such a requirement did not exist in the statute, the RHR, or the guidance available in 2009.

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[8] See 40 CFR §51.308(d)(2)(iii).

[9] See the EPA's approval of Arizona's natural conditions goal of 767 years out for Saguaro East in 79 FR 52469.

The Texas 2009 RH SIP established RPGs for both Big Bend and Guadalupe Mountains that provide for visibility improvement for the most impaired days over the period of the SIP and ensure no degradation in visibility for the least impaired days over the same period. The EPA agrees the SIP meets these requirements. The EPA also agrees that the TCEQ considered the four statutory factors in establishing the RPGs for its Class I areas, in accordance with the RHR. The RHR requires states to establish RPGs that "....must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least impaired days over the same period"(§51.308(d)(1)). The four statutory factors in subparagraph (i) are factors the state must consider in developing the RPGs. These factors in and of themselves do not determine the reasonableness of the goals for the planning period. The RHR, in 40 Code of Federal Regulations (CFR) §51.308((d)(1)(iii), requires the EPA to evaluate whether the state's goal for visibility improvement provides for reasonable progress based on a demonstration of which the four statutory factors are only one element. The EPA's proposed disapproval is a substitution of Texas' statutory responsibility with their own flawed interpretation of what the "reasonable progress goals" must provide and how they are to be determined. This action is based on the EPA's conclusion that 'reasonable progress' must be determined based on source-specific cost of controls even though there is no statutory, regulatory, or precedential basis for this conclusion.

G. Reasonable Progress Four Factor Analysis and Consultation

G.1. The EPA has no basis to disapprove the state's RPGs because the TCEQ did not examine the four statutory factors on a unit-by-unit basis. The TCEQ's analysis of the statutory factors using a source category approach was consistent with the statute, the RHR, and the existing EPA guidance.

Neither FCAA, §169A, the RHR, nor the guidance available in 2009 required a unit-by-unit four factor analysis even where the state's RPGs would improve visibility less than the URP. The statute simply provides that in determining reasonable progress, the four statutory factors shall be taken into consideration (§7491(g)(1)). The statute does not direct how. The RHR provides the same in 40 CFR §51.308(d)(1)(i)(A). In addition, the EPA's RPG guidance does not refer to a unit-by-unit four factor analysis but instead says that states have "flexibility" in how to consider the factors. The EPA has failed to establish that Texas' RPGs do not meet the RHR for improvement in visibility for the most impaired days and no degradation for least impaired days. The EPA also fails to establish that Texas' determination - that additional controls are unnecessary and that they would not provide a discernable visibility improvement for the added cost - is unreasonable based on the text of the FCAA and the EPA regulations.[10] The EPA itself supported the non-source specific four factor analysis approach in reviewing New Mexico's regional haze plan. In a challenge to New Mexico's plan, the EPA "points out that

[10] Dissent in *Oklahoma et al v. EPA* (challenges to the EPA's SIP disapproval and FIP of Oklahoma's RH BART determinations.) 10th circuit July 2013, pages 4-5:

"Finally, it is worth noting that the EPA's regional haze program is distinct in the amount of power given to the states......There are a number of reasons for this approach, not the least of which is that its goals and standards are purely aesthetic rather than directly related to health and safety. The EPA's rule here requires OG&E to make a $1.2 billion investment over the next five years that will, even under EPA's estimate, result in no appreciable change in visibility....
Although the EPA has at least some authority to review BART determinations within a state's SIP, it has no authority to condition approval of a SIP based simply on a preference for a particular control measure. *Texas v. EPA* 690 F3d 670,684 (5th Cir. 2012) see *EME Homer City Generation L.P. v. EPA* 696 F3d 7, 29 (D.C. Cir. 2012) (reviewing a different rule and concluding that the FCAA 'prohibits EPA from using the SIP process to force states to adopt specific control measures'). Oklahoma considered the cost and resulting benefit of such a large investment in scrubbers, and its conclusion was not unreasonable."

[§51.308(d)(1)(i)(A)] does not require a source-specific analysis."[11] The 10th Circuit agreed that "[N]either the Clean Air Act nor the Regional Haze Rule requires source-specific analysis in determination of reasonable progress." (*id*) The EPA has also ignored its own words from the RHR preamble: "....EPA is not specifying in this final rule what specific control measures a State must implement in its initial SIP for regional haze. That determination can only be made by a State once it has conducted the necessary technical analyses of emission, air quality, and the other factors that go into determining reasonable progress" (64 FR 35721).

G.2. The TCEQ disagrees with the EPA's conclusion that $2,700 per ton was too low of a threshold for cost-effective controls.

The EPA stated that CAIR was considered acceptable in lieu of BART but not necessarily designed as a reasonable progress strategy. The TCEQ selected the $2,700 per ton threshold because it was used in the CAIR analyses to control NO_X and SO_2. CAIR was a contemporary program designed for controlling primary and precursor pollutants for health-based ozone and particulate matter NAAQS. The cost rate was not selected because CAIR was considered acceptable for BART, but because it met the high standards for a health-based emissions reduction program. And thus, it was considered more than adequate for the standards of a visibility-based program.

G.3. The TCEQ disagrees with the EPA's assertion that an analysis of controls for a group of sources should not have been performed because this grouped analysis hid potential improvements of smaller-costing controls from individual equipment.

Site specific analyses were not considered necessary because visibility improvements from a group were not perceptible. Thus, a subset of the sources could not result in a better controlled approach or improvement in the visibility predicted by the larger group. The TCEQ performed a grouped source analysis because it was allowed under the EPA's rule and the guidance available at the time the analysis was performed.

G.4. The TCEQ disagrees with the EPA's approach of requiring emissions reductions at certain sites, not necessarily because the reduction had any perceptible improvement in visibility at a Class I area, but because emissions from that source may be significant when compared to other sources.

Reductions to sources that do not have any perceptible impact are not effective regardless of their cost. The regional haze program is designed to improve visibility. The analysis approach completed by the TCEQ was to determine potential, cost-effective controls that would have a perceptible impact on visibility at a Class I area. The program was not designed to make reductions because reductions were possible, nor is that required by either the FCAA or the RHR.

Texas analyzed emissions reductions using four factor analysis, as required by the EPA's RHR (64 FR 35766). Emissions reductions were estimated for sources with the potential suite of controls selected using a $2,700 per ton threshold. A four factor analysis was performed on this group of sources; no perceptible visibility improvement was determined. The goal of the regional haze program is to focus on reasonable progress towards visibility improvement at each Class I area, not to target reductions at specific sources. The EPA appears to have performed its control analysis in the proposed FIP in a reverse-logic form. It targeted reductions at larger-emitting sources, only because they are larger emitting, not through an application of the reasonable progress four factor analysis on potential controls when considering perceptible progress towards achieving natural visibility.

[11] See Wildearth Guardians v. EPA, 770 F3d 919, 944.

G.5. The TCEQ disagrees with the EPA's position that it was unreasonable for Texas not to ask for site-specific data to perform a site-specific analysis because the TCEQ does not have the legal authority to require companies to submit the information necessary to properly evaluate flue gas desulfurization (FGD) scrubber upgrades. It is unreasonable for the EPA to expect the TCEQ to perform an analysis of scrubber upgrades on the specific EGUs when only the EPA has the legal authority to obtain the necessary information to conduct such an analysis.

The EPA stated in its Cost Technical Support Document and in the *Federal Register* notice that the nature of acceptable scrubber upgrades is site-specific and the data were not publicly available. Under FCAA, §114(a), the EPA required companies to submit detailed information regarding the facilities' current scrubber systems and any improvements that have been made since initial installation. The EPA indicated the information was necessary in order to properly evaluate the potential for upgrades to the FGD scrubbers (79 FR 74876).

The TCEQ agrees that such extensive knowledge of the existing scrubber systems is necessary to properly evaluate the viability of upgrading an FGD scrubber. However, the TCEQ does not have any authority equivalent to the EPA's authority under FCAA §114(a) to require submission of cost data or design requirements for a suite of potential scrubber upgrades at individual sites. The TCEQ cannot require the companies to provide the information that the EPA admits is necessary to evaluate FGD scrubber upgrades. There are many possible control strategies TCEQ could of have considered, but it can only evaluate controls for which we have credible and defensible information to support. Additionally, the TCEQ is not aware if this information was even available at the companies in 2008 when this portion of the SIP was developed.

It is unreasonable for the EPA to disapprove a SIP submittal on the basis of the state failing to perform an analysis when only the EPA has the legal authority to require submission of the necessary information for such an analysis. The EPA should not hold the states to a standard for SIP approvability that only the EPA is capable of meeting.

G.6. The EPA's finding that the TCEQ should have considered scrubber upgrades in the 2009 RH SIP is arbitrary and capricious. While the EPA did comment on the TCEQ's proposed 2009 RH SIP, the EPA did not suggest in any way in those comments that the TCEQ should consider scrubber upgrades in the control strategy analysis for reasonable progress goals. The EPA is attempting to hold Texas to a standard created five years after the TCEQ submitted the 2009 RH SIP.

The EPA states in the proposed FIP that it was "unreasonable" for Texas to not perform an analysis of potential scrubber upgrades on coal-fired units in Texas that were already equipped with FGD scrubbers (79 FR 74841). However, in the comments (dated February 15, 2008) that the EPA submitted on the proposed 2009 RH SIP, the EPA did not suggest the TCEQ consider scrubber upgrades as a possible control strategy or indicate in any manner that not considering this potential measure would be grounds for the EPA proposed disapproval of the SIP. Furthermore, in the agency's comments (dated September 30, 2013) on the proposed 2014 Five-Year Texas RH SIP Revision, the EPA again did not mention the subject of FGD scrubber upgrades. The EPA had multiple opportunities to inform the TCEQ that considering FGD scrubber upgrades was as critical as the EPA now claims it to be; however, the EPA did not even mention the subject of scrubber upgrades in any of the formal comments it submitted to the TCEQ during the comment period for the 2009 RH SIP.

The EPA attempts to back-fill its lack of any notice to Texas regarding the consideration of FGD scrubber upgrades by citing statements made by the EPA in the 2005 final BART rulemaking recommending that states consider scrubber upgrades for BART analysis purposes (*Technical Support Document for the Cost of Controls Calculations for the Texas Regional Haze Federal*

Implementation Plan, page 26). However, the EPA's statements in the final BART rulemaking were made solely in the context of BART analysis (70 FR 39171). As Texas was included in the CAIR in 2008 and the EPA determined that CAIR was better than BART, the EPA's comments regarding scrubber upgrades and BART were not relevant to Texas. Furthermore, the EPA did not mention in the 2005 BART rulemaking that states should also consider scrubber upgrades for reasonable progress purposes even if the state's BART-eligible EGUs were subject to CAIR.

The EPA is attempting to hold Texas to a standard of SIP approvability arbitrarily created by the EPA five years after the TCEQ submitted the SIP revision. The EPA is creating impossible standards for SIP approvability by expecting states' SIP revisions to meet requirements created by the EPA after the states are required to submit the SIP revision.

H. BART Determinations

The TCEQ supports the EPA's intention to approve TCEQ's BART determination.

The EPA proposes to approve Texas' determination of which sources in the state are BART-eligible. The EPA also proposes to approve Texas' determination that none of the state's BART-eligible non-EGUs is subject to BART requirements because they are not reasonably anticipated to cause or contribute to visibility impairment in any Class I areas. The EPA proposes to approve the provisions in Texas' BART rules at 30 TAC Subchapter M, with the exception of 30 TAC §116.1510(d), which relies on CAIR.

I. Long-Term Strategy

I.1. The RHR does not require that a downwind state's RPG must be "approved or approvable" in order to determine if the upwind state's long-term strategy meets the statute or the rule. This is a new and illegal change to the RHR without going through notice and comment rulemaking as required by the Administrative Procedures Act and is thus an arbitrary and capricious determination by the EPA.

The EPA's proposed disapproval of the state consultation requirements is based upon Oklahoma's determination, subsequent to submittal of the Texas 2009 RH SIP, that it required further reductions from Texas. The EPA has not justified its determination that Texas failed to meet the requirements of FCAA, §51.308(d)(3)(i) and in fact the record shows that the process as laid out in the SIP and as required by the rule was followed by Texas. The EPA's determination is based on a new definition of progress goal in subsection (d)(3)(ii) and a misstatement of the actual rule itself in subparagraph (i).

Texas met the consultation requirements in §51.308(d)(3)(i). Texas determined where emissions were reasonably anticipated to contribute to visibility impairment in Oklahoma. Texas consulted with Oklahoma. The EPA asserts that the TCEQ should have provided information necessary to identify reasonable reductions, which is not required by the RHR. Oklahoma requested information on controls identified by CENRAP. Oklahoma had information on control upgrades contained in the proposed Texas 2009 RH SIP. Yet, it did not request additional controls on Texas sources or disagree with Texas' determination that additional controls were not warranted during the first planning period. It was only after consultation with Texas that Oklahoma argued that it needed controls that they did not have authority to require from Texas sources. Oklahoma's after-the-fact change in position and the EPA's subsequent proposed disapproval of their RPGs for Wichita Mountains does not provide the legal basis for proposed disapproval of Texas' long-term strategy consultations. The RHR does not require that a downwind state's RPG must be "approved or approvable" in order to determine if the upwind state's long-term strategy meets the statute or the rule. This is a new and illegal change to the RHR and is thus an arbitrary and capricious determination by the EPA.

I.2. The EPA's finding that the TCEQ did not meet the long-term strategy consultation requirements of 40 CFR §51.308(d)(3)(i) and (ii) ignores the voluminous and detailed consultation record contained in the Texas 2009 RH SIP. The EPA holds Texas to a different standard of review than it has with other similar regional haze SIPs.

Section 51.308(d)(3) requires, (i) that Texas consult with other states if its emissions are reasonably anticipated to contribute to visibility impairment at that state's Class I areas(s), and (ii) if so, it must demonstrate that it has included in its SIP all measures necessary to obtain its share of emission reductions needed to meet the RPG for that Class I area.

As the EPA acknowledges, the TCEQ relied on CENRAP source apportionment modeling and its own supplemental analysis, available to all affected states, FLMs, and tribes, to evaluate and identify reasonable controls. The TCEQ did include additional controls or measures in its SIP, beyond those required to meet other programs, and every state in the consultation, including Oklahoma, concurred. For Wichita Mountains, additional controls were not deemed reasonable given that the CENRAP modeling – agreed to by all the states – showed that the visibility impairment contributions from Texas go down during the planning period (2002 – 2018). The EPA's preamble, and Table 26 acknowledge this.[12] Most importantly, Oklahoma did not request additional controls from Texas during consultation. The EPA ignores the record and proposes to hold the Texas plan to a standard that is not found in the RHR. The EPA merely disagrees with the TCEQ's conclusions and attempts to apply a 'reasonableness" standard to §51.308(d)(3)(ii) where none exists. That section only requires that the TCEQ demonstrate that all controls necessary to meet the progress goal, for Wichita Mountains, are included. Oklahoma agreed that no additional controls were needed at the time, and the evidence that the contribution to visibility improvement from emission reductions at Texas sources during the planning period is a sufficient basis for these conclusions.

The EPA has viewed similar consultations in other state SIPs, using the same CENRAP information, as meeting the RHR requirements for long-term strategy consultations. A case in point is Arkansas's regional haze plan. The CENRAP modeling that the EPA now finds lacking for Texas and Oklahoma's consultation was perfectly fine for Arkansas. It demonstrated that visibility impairment from Arkansas sources at Hercules Glades in Missouri was projected to increase during 2002-2018. In consultations with Missouri, Arkansas made no commitment for additional controls beyond those already factored into CENRAP's modeling for 2018. All states agreed with this determination, including Missouri. Yet, with no further explanation, the EPA approved Arkansas' consultation and its determination that no additional controls were necessary, as consistent with the RHR, even though the data that was clearly available to everyone showed impairment at Hercules Glades due to Arkansas' sources would increase (76 FR 64186, 64216).

I.3. The TCEQ disagrees with the EPA's positon that Texas did not adequately address the documentation requirements in 40 CFR §51.308(d)(3)(iii) regarding the technical basis for Texas' long-term strategy.

The proposal quotes the RHR:

> The State must document the technical basis, including modeling, monitoring and emissions information, on which the State is relying to determine its apportionment of emission reduction obligations necessary for achieving reasonable progress in each mandatory Class I Federal area it affects. The State

[12] "The contributions from Texas sources on total visibility impairment decreases from 2002 to 2018 at all impacted Class I areas shown in the tables below." 79 FR page 74860.

> may meet this requirement by relying on technical analyses developed by the regional planning organization and approved by all State participants (79 FR 74861).

Texas documented the modeling, the monitoring, and emissions information data used for the 2009 RH SIP. The modeling was completed by CENRAP and available for all states. The monitoring data were available from the IMPROVE monitors and the emissions data had been previously approved by the EPA. The preamble contains a lengthy discussion – over eight *Federal Register* pages, plus the Technical Support Document - of Texas' consultation with Oklahoma, Colorado, Arkansas, and New Mexico, the CENRAP process and modeling and the TCEQ's supplemental analysis of CENRAP's technical analysis. This discussion belies the EPA's claim that the TCEQ did not adequately meet the requirements in 40 CFR §51.308(d)(3)(iii) to document the technical basis for the TCEQ's apportionment determination. The EPA and Oklahoma cannot fairly argue that not all relevant data was available to inform them of Texas source's visibility impact on neighboring Class I areas and the reasoned analysis that additional controls would not be necessary to reduce visibility impairment outside Texas.

I.4. The TCEQ's analysis of potential additional controls is adequate and approvable. The EPA's proposed finding that a specific type of unit-by-unit cost and effectiveness analysis was necessary to have an approvable long-term strategy and an approvable consultation with Oklahoma contradicts the EPA's own June 1, 2007 *Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program*. The EPA's methodology of evaluating possible additional controls on existing EGUs is not required by the RHR or by the guidance in place at the time Texas prepared its 2009 RH SIP.

The EPA's own guidance, Chapter 4: Identify Control Measures for Contributing Source Categories for the First Planning Period, page 4-2, states:

> The Regional Haze Rule gives States wide latitude to determine additional control requirements, and there are many ways to approach identifying additional control measures; however, you must at a minimum, consider the four statutory factors.

The TCEQ prepared its analysis of the cost and effectiveness of additional controls by selecting sources and controls that met a $2,700 per ton threshold. This threshold amount was used in CAIR, as well as used by the EPA in preparing its BART rules and guidance.

The control package Texas considered included SO_2 controls at 24 facilities from 15 sites. The NO_X controls included 24 facilities at 15 sites. The calculated haze index improvements at affected Class I areas from the additional controls ranged from a low of 0.04 deciview at Wheeler Peak in New Mexico to 0.36 deciview at Wichita Mountains in Oklahoma. The estimated annualized cost for the controls necessary to achieve these calculated benefits was $324 million. Texas determined that this cost is unreasonable for a visibility improvement that is below the threshold of perception and below the 0.5 deciview criteria the EPA used for "contribute to."

Also on page 4-2, the guidance refers to the EPA's AirControlNET database as a source of $324 million a year. In its analysis, Texas relied on the cost and effectiveness information supplied by AirControlNET regarding control techniques for specific source categories. In preparing the 2009 RH SIP, Texas did use appropriate areas of influence; it did consider controls from the EPA's AirControlNET database; and it did consider the four statutory factors in considering whether additional controls were reasonable to implement.

The EPA's preference for a different analysis procedure that reaches a similar conclusion about cost and effectiveness is not a justifiable basis for the EPA to disapprove Texas' process in developing its 2009 RH SIP submittal nor is it a justifiable basis for the EPA to disapprove the Texas-Oklahoma consultation about Texas' impact on visibility impairment at Wichita Mountains.

J. Response to Proposed FIP Requirements

J.1. The EPA's proposed FIP is contrary to authority provided in the FCAA. The statute provides the EPA with authority to address state plans that it believes are substantially inadequate to comply with the Act's requirements. The EPA RHR identifies periodic reviews and plan updates as the remedy for addressing RH SIPs that are inadequate.

In order to promulgate a FIP, the FCAA requires that the EPA disapprove a state plan in whole or in part for not meeting the applicable requirements of §110(k). Texas' plan was complete by operation of law and met all requirements. The EPA has no authority to impose a FIP that merely replaces the EPA's judgment for Texas' but does not correct an error or is not based on a failure of Texas' plan to meet the requirements of the RHR or FCAA.[13]

The EPA's RHR established the remedy for a substantially inadequate plan as periodic updates, not a federal plan.[14] The nature of regional haze and the statutory requirement for reasonable progress and *long-term* solutions to visibility impairment require regular updates and reviews of state plans by the states themselves. Thus, the very nature of regional haze planning recognizes that the solution to plans that don't make adequate progress towards the natural visibility condition goal is an update of the plan, not a FIP.

J.2. The FCAA gives states authority to develop regional haze plans that reflect state needs. The EPA should not get deference for its own choices in its FIP over those of Texas.

The EPA's interpretation of its authority to review regional haze submissions under FCAA, §169A is flawed. While the EPA review and state revision of regional haze SIPs is a component of §110, the FCAA also provides an independent grant of authority to states, and specific language identifying the EPA authority to establish goals and guidance for regional haze. The use of the word "guideline" in the in §169A evidences a clear congressional intent that states be granted wide latitude in decision-making here. FCAA, §169A inherently limits the EPA's SIP approval and review authority in §110.

The EPA's only complaint regarding the 2009 Texas SIP is that it would have taken a different approach to meet the statutory and regulatory requirements. The EPA's suggested reliance on the NCII default values in estimating natural visibility conditions at Big Bend and Guadalupe Mountains rather than the FLM's 80% approach was not adequately justified and therefore is unreasonable.

The statute requires that in developing the RPG, the regulating entity must consider "the energy and non-air quality environmental impacts of compliance." Nowhere in the EPA's proposal is this factor further defined. The EPA provides guidance to states on how to consider this factor,

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[13] See Train, 421 U.S. 60, 79 "The CAA gives the [EPA] no authority to question the wisdom of a State's choice of emission limitations if such choices are part of a plan which satisfies the standards of 110(a)(2)."
[14] See 64 FR 35745: "...section 110(a)(2)(F) of the CAA provides that SIPs are to require 'periodic reports on the nature and amounts of emissions and emissions-related data' and 'correlation of such reports....with any emission limitations or standards establish pursuant to this chapter.' Moreover, section 110(a)(2)(H) requires SIPs to provide for revision when found to be substantially inadequate to 'comply with any additional requirements established under...[the CAA].'"

but ignores a crucial part of the term. The EPA cites only one element of its BART guidance as the basis of its analysis of this factor, but ignores another more important element: the impact to energy reliability and costs due to compliance with the RPG controls in the proposed FIP that are developed for a large segment of the electric energy production in Texas.

J.3. The EPA's cost analysis for the proposed FIP is not adequate, in particular regarding the FGD scrubber upgrades. The EPA cannot use the claim of confidential business information to circumvent its obligation to provide the public with adequate information regarding the economic analysis of its regulatory actions or to defend its decision to disapprove the Texas 2009 RH SIP.

The EPA cites the companies' claims of confidential business information to defend its complete lack of any cost information regarding upgrades to scrubbers and merely claims that all the scrubber upgrades were less than $600 per ton (79 FR 74877). Confidential business information is not a justification for failing to provide proper cost impact information of a proposed rule. The EPA could have provided example cost information for each type of scrubber upgrade considered without disclosing any specific information claimed confidential by the companies. The EPA has not even provided a total cost for all the scrubber upgrades. Additionally, while the proposal preamble and *Technical Support Document for the Cost of Controls Calculations for the Texas Regional Haze Federal Implementation Plan* include detailed information on the costs of the scrubber retrofits, the EPA also did not provide a total cost estimate of the seven EGUs that EPA has proposed standards that would require installation of new FGD scrubbers. The only total cost estimate provided by the EPA for the proposed FIP is the approximate $2 billion provided by EPA staff in informal discussions with the TCEQ.

The EPA claims the TCEQ should have considered scrubber upgrades as a cost-effective control measure in the Texas 2009 RH SIP revision. Yet, even with the proposed FIP, the EPA has not provided the TCEQ or the public with any information to evaluate the cost-effectiveness of scrubber upgrades. Neither the TCEQ nor the public is required to accept the EPA's unsubstantiated claim that the cost-effectiveness of the scrubber upgrades is less than $600 per ton. The EPA is using the cost-effectiveness of scrubber upgrades as a basis for disapproving the Texas 2009 RH SIP and must provide adequate information for evaluating the basis of the EPA's decision. The EPA should provide cost information for all scrubber upgrade methodologies considered by the agency.

J.4. The TCEQ disagrees with the EPA proposal to calculate visibility impairment, (i.e., baseline visibility conditions minus natural visibility conditions) using the EPA's proposed substitute natural visibility conditions for Big Bend and Guadalupe Mountains instead of the natural visibility conditions calculated by Texas for its two Class I areas.

The EPA should accept Texas' calculation of natural visibility conditions at Big Bend and Guadalupe Mountains. These calculations followed the requirements of 40 CFR §51.308(d)(2)(iii) using data and analyses specific to each of the Class I areas. The EPA's proposed substitute estimates of natural conditions were developed by a committee working on national estimates rather than using site specific scientific studies. The EPA did use the correct Baseline Visibility Conditions, 2000-2004, in Table 40.

J.5. The TCEQ supports the EPA's proposal to find that it is not reasonable to provide for rates of progress at Wichita Mountains, Big Bend, or Guadalupe Mountains that would attain natural visibility conditions by 2064 and to use the baseline conditions calculated by Texas in establishing the URP at Big Bend and Guadalupe Mountains.

Once technically supportable natural conditions estimates are selected for these two Class I areas, the URP can be established for them. However, as discussed in comment C.1., the TCEQ disagrees with the EPA's proposal regarding the natural conditions estimates.

J.6. The TCEQ urges the EPA to remove all text about benefits of emission reductions from "actual emission levels" from its final action and technical support documents. These discussions exaggerate the potential benefits of the EPA's proposed FIP and are irrelevant to the approvability of the 2009 RH SIP.

Both Table 44: *Calculated RPGs for 20% Worst Days*...and Table 45: *Anticipated Visibility Benefit*... should be removed from the final action because they tabulate calculated benefits that will not occur by 2018, the only year that is appropriate for evaluating the visibility impacts of proposed controls. The 2018 visibility conditions that the 2009 RH SIP will produce are the appropriate starting points for evaluating the effects of the EPA's proposed FIP.

The EPA inappropriately suggests in its proposal and technical support documents that emission rates in 2011, 2012, or 2013 are relevant to what the Texas 2009 RH SIP will achieve by 2018. The RHR sets 2018, the last year in the first planning period, as the time by which a state's SIP must provide for reaching the state's RPG. The RHR does not imply the need for particular emission levels during any intermediate year between the baseline period and 2018.

There is no technical basis for the EPA's selection of actual emissions from 2009 through 2013 as the base from which to calculate the benefit of applying the FIP controls. During the 2009 through 2013 period, the emissions were not affected by the full range of additional emission reduction requirements contained in the 2009 RH SIP.

Choosing 2011 ignores seven more years of emissions reductions required under Texas' long-term strategy. As Texas' 2014 Five-Year RH SIP submittal shows in Figure 4-1: *Texas Modeled Emissions Inventory Summary for 2002* and Figure 4-2: *Updated Texas Emissions Inventory Summary for 2005*, the SO_2 and NO_X emissions in Texas are already lower than the straight line between the 2000 through 2004 baseline condition period and the 2018 SO_2 and NO_X emissions estimates used to develop the 2009 RH SIP.[15]

Table 45 misleads a reader to believe that the EPA's proposed FIP action would produce a 0.62 deciview improvement in visibility at Wichita Mountains. However, as discussed in comment A.2., the potential 0.14 deciview improvement at Wichita Mountains is almost certainly an overstatement of the incremental benefit from the proposed FIP in 2018 because SO_2 emission reductions are occurring due to other requirements and the actual SO_2 emissions will likely be lower than those in the CENRAP 2018 emissions projections.

K. Proposed Disapproval of the Infrastructure SIPs

The TCEQ disagrees with the EPA's proposed disapproval of §110(a)(2)(D)(i) requirement for visibility protection for the Texas infrastructure SIP submittals for ozone, particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), and SO_2 NAAQS. The EPA fails to go into any detail on the reasons for disapproving these multiple, separate SIPs.

For the 1997 eight-hour ozone standard, the EPA only states that Texas originally failed to make a timely submission, and notes that CAIR was then promulgated and implemented by the EPA. Texas was not in CAIR for ozone, and subsequently submitted a separate transport SIP for the 1997 eight-hour ozone NAAQS. The EPA neglects to offer any reason or explanation for why this submission was inadequate or deserving of disapproval, other than the promulgation and implementation of the CSAPR. Although Texas was included in CSAPR for the 1997 eight-hour

[15] See https://www.tceq.texas.gov/assets/public/implementation/air/sip/haze/13012SIP_ado.pdf.

ozone standard, Texas has from the beginning challenged that inclusion, and litigation over the matter is on-going. Additionally, the EPA failed to act on, or even mention the Texas ozone transport SIP submission before including Texas in CSAPR for the 1997 ozone standard.

For the 1997 $PM_{2.5}$ NAAQS, Texas was included in CAIR, and subsequently complied with CAIR requirements. The EPA included Texas in CSAPR for the 1997 $PM_{2.5}$ NAAQS at final promulgation of the rule, without having given Texas proper notice of this inclusion by including Texas in the proposed rule. Texas has challenged its inclusion in CSAPR for the 1997 $PM_{2.5}$ NAAQS, and litigation over this matter is also on-going. The linkage of Texas to a single monitor in an area already attaining the relevant NAAQS is a clear case of over-control, something explicitly prohibited by the FCAA, as acknowledged by the Supreme Court.[16] Texas also submitted a transport SIP for the 2006 $PM_{2.5}$ NAAQS. Although this SIP did rely on CAIR, the EPA has failed to offer any substantive reason why this is inappropriate, given that CSAPR replaced CAIR, and the sole Texas linkage in the final CSAPR for 2006 $PM_{2.5}$ are to the same inappropriate monitor in an area already attaining the NAAQS.

As for the 2008 ozone, 2010 SO_2, and 2010 NO_2 standards, Texas has submitted transport SIPs for each of these standards demonstrating that Texas does not have transported emissions out of state that interfere with attainment or maintenance in any downwind state.

The EPA fails to offer any rational or reasoned explanation for why these SIP submissions are inadequate. In fact, the EPA fails to offer any analysis of these SIP submissions at all; therefore, this proposed disapproval is arbitrary, capricious, and not supportable. Finally, the EPA states that because it is proposing the need for additional SO_2 controls on Texas sources to prevent interference with measures required to be included in the Oklahoma Regional Haze SIP to protect visibility, the EPA must therefore disapprove the §110(a)(2)(D)(i) submittals for 1997 $PM_{2.5}$, 2006 $PM_{2.5}$, and 2010 SO_2 NAAQS. The EPA fails to offer any support for this contention, or the inclusion of the $PM_{2.5}$ standards in this list. The EPA has repeatedly stated that infrastructure requirements, including transport requirements, are pollutant specific. Therefore, a requirement to increase SO_2 controls does not, without further explanation, necessarily include the requirements for $PM_{2.5}$. Although the EPA has taken other actions in conflict with its guidance on this issue, there is no rational reason to continue to perpetuate this error.

L. Nationwide Scope and Effect

The TCEQ disagrees with the EPA's assertion that this action is a rulemaking of nationwide scope and effect. Any appeal of the EPA's final action on Texas' regional haze plan and FIP should be filed the 5th Circuit Court of Appeals.

The EPA argues that the proposed FIP and SIP disapproval actions for Texas and Oklahoma have nationwide scope and effect and therefore, under FCAA, §307(b)(1), appeal must be to the D.C. Circuit. First, the TCEQ notes that the EPA has in fact taken the opposite position in several final actions on regional haze plans in Oklahoma, New Mexico and Arizona.[17]

These EPA actions do not have nationwide scope and effect; they are not nationally applicable, but apply only to two states. The EPA has provided no legal basis - beyond a one sentence assertion - to support that its actions interpreting the RHR as they apply to Texas and Oklahoma are of "nationwide scope and effect." This interpretation of the RHR as it applies to Texas and Oklahoma Regional Haze SIPs is unsupported by the EPA's proposed action. The action here specifically deals with plans adopted by Texas and Oklahoma to meet the FCAA and regional haze regulations as they apply in their respective jurisdictions. Each regional haze plan

16 See E.P.A. v. EME Homer City Generation, L.P., 134 S.Ct. 1584, at 1608 (April 29, 2014).
17 See for example: 79 FR 12944, 12954 March 7, 2014; 77 FR 70693, 70705, Nov. 27, 2012; 78 FR 46142, 46174 July 13, 2013; 79 FR 52420, 52479, Sept. 3, 2014.

submitted by the various states is unique, addressing visibility impairment at Class I areas in those states and in surrounding states. The EPA's proposed partial disapproval of Texas' plan and proposed imposition of a FIP does not rely solely on an interpretation of their rules but rather on a review of the Texas plan's comportment with those rules. The EPA has proposed determinations that Texas did not develop its natural visibility conditions and RPG correctly. The EPA then goes on to draft RPG controls for 15 Texas units and redo the natural visibility estimates. This proposal is *Texas-centric*; it is not nationally applied.

The EPA then attempts to plug the obvious hole in its position by pointing to congressional report language that allows the Administrator to determine its action has nationwide scope and effect if the rulemaking extends to two judicial districts. This is not found in the FCAA. In fact, §307(b)(1) specifically states that "any implementation plan" or "any other final action of the Administrator under this chapter....which is locally or regionally applicable may be filed only in the United States Court of Appeals for the appropriate circuit." The fact that Oklahoma is in the Tenth Circuit and Texas is in the Fifth Circuit is immaterial to potential petitions for review. The TCEQ's comments and any future actions it may or may not take in court will be based on the EPA's action on Texas' SIP and any FIP the EPA has imposed on Texas, not Oklahoma. As stated previously, venue for regional haze plans in several neighboring states, including Oklahoma, is already established in their respective circuits.

M. Electric Reliability

M.1. The EPA should consider the findings of the Electric Reliability Council of Texas (ERCOT) report *Impacts of Environmental Regulations in the ERCOT Region.*

The EPA has not evaluated any potential impacts of the proposed FIP to reliability and prices of electricity in Texas, as further discussed below. In 2014, ERCOT conducted a study of the impacts that environmental regulations have in the ERCOT Region. The report, entitled *Impacts of Environmental Regulations in the ERCOT Region*, was finalized on December 16, 2014, and is included as Appendix 1 to the TCEQ's comments. While the report included a number of environmental regulations, such as the MATS rule, Clean Power Plan, and CSAPR, ERCOT also included the EPA's proposed Regional Haze FIP for Texas in its analysis. The TCEQ incorporates the ERCOT report into the agency's comments and encourages the EPA to consider the findings of the ERCOT report.

M.2. The EPA is using a loophole in Executive Order 12866 to avoid evaluating the potential energy impacts of the proposed action as required by Executive Order 13211. The proposed FIP affects a significant portion of Texas' base load power generation fleet and the EPA should evaluate and consider the impacts of the proposed FIP on the reliability and price of electricity in Texas.

The EPA claims that the proposed FIP is not subject to Executive Order 12866, regarding Regulatory Planning and Review, because the proposed rule is not a rule of general applicability and therefore, is not a significant regulatory action (79 FR 74889). If the proposed FIP is not a significant regulatory action under Executive Order 12866, then the EPA indicates the rule is not subject Executive Order 13211, regarding actions that significantly affect energy supply, distribution, or use (79 FR 74890). However, while the EPA claims that the rule is not of general applicability to avoid trigging the requirements of Executive Orders 12866 and 13211, the EPA also claims that the rule is of nationwide scope and effect in an effort to have any petitions for review be filed in the United States Court of Appeals for the District of Columbia (79 FR 74888). The EPA claims the rule is of national scope for purposes of legal challenges, but then claims the rule is of limited scope for the purposes of avoiding Executive Orders 12866 and 13211 without any explanation of how this action can have two contradictory scopes. The scope of the regulatory action proposed by the EPA is either nationwide or limited to Texas; it cannot be both.

As discussed in TCEQ comment II. L, the TCEQ disagrees with the EPA's position that the proposed action is of nationwide scope (79 FR 74888). However, the TCEQ also disagrees with the EPA position that the potential impact to the supply, distribution, and use of energy does not need to be considered in this proposed action. While the EPA has not provided a complete economic impact analysis for the proposed FIP, the annualized cost for the scrubber retrofits portion of the proposal is estimated to be approximately $238 million per year, greatly exceeding the $100 million per year threshold established under Executive Order 12866. Furthermore, the EPA's proposed FIP would meet Executive Order 13211 criteria for being "likely to have a significant adverse effect on the supply, distribution, or use of energy" based on the guidance provided in Office of Management and Budget (OMB) Memoranda 01-27, July 13, 2001 Guidance for Implementing Executive Order 13211. Section 4 of the OMB Memoranda 01-27 provides a number of examples of adverse effects for the purpose of Executive Order 13211. One of the listed examples is a reduction in electricity production in excess of 1 billion kilowatt-hours or in excess of 500 megawatts (MW) of installed capacity. According to a recent ERCOT report included in Appendix 1 to the TCEQ's comments, ERCOT's modeling indicates that approximately 1,800 MW of capacity from the affected coal-fired EGUs are expected to retire due to the EPA's proposed Regional Haze FIP requirements, exceeding the threshold in the OMB guidance for an adverse effect.[18] Also, with the exception of the San Miguel facility, each of the units subject to the EPA's proposed FIP is greater than 500 MW. If just one of these units is no longer economically viable as a result of the EPA's FIP, it would result in the reduction of more than 500 MW of installed capacity.

According to OMB Memoranda 01-27, the basic purpose of Executive Order 13211 is to ensure that agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy." The EPA's interpretation of Executive Orders 12866 and 13211 would mean that a national rule applying to all coal-fired EGUs in the country with an annualized cost of $100 million per year that might result in the loss of only 500 MW of a capacity would require an energy impact analysis because it may have a significant adverse effect on the supply, distribution, or use of energy. However, according to the EPA's interpretation, a rule costing more than twice that cost threshold and potentially resulting in the loss of more the three times the capacity but focused within a discrete electric reliability region in a single state that has limited connections to the rest of the United States' grid does not require any analysis or consideration of the possible adverse impacts on energy. In other words, the EPA's position is that the Federal Government does not need to concern itself with a potentially severe impact of this proposed rule on the supply, distribution, or use of energy within ERCOT because the impact is limited to a single state. Such an interpretation and outcome is illogical and clearly contrary to the stated intent of Executive Order 13211. The potentially for adverse effects from the EPA's proposed rule is actually increased, not lessened, because the costs and impacts of the rule are focused within a smaller region.

Additionally, FCAA, §169A(g) requires that the State and the Administrator consider the energy and non-air quality environmental impacts of compliance when determining the best available retrofit technology. While the EPA's guidance on evaluating energy impacts for BART analyses does not specifically address considering electrical grid reliability and electricity prices, the guidance does make allowance for considering indirect energy impacts as well as potential impacts such as locally scarce fuels and significant economic disruption or unemployment (70 FR 39169). Furthermore, the EPA recommends that states consider the BART guidelines when

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[18] See ERCOT Report Impacts of Environmental Regulations in the ERCOT Region, December 16, 2014, page 27.

evaluating the energy and non-air environmental impacts for reasonable progress goal purposes.[19]

The proposed action affects almost 10,000 MW of generation capacity in Texas and almost 8,800 MW of that capacity is within the ERCOT region. The affected units in ERCOT represent approximately 11% of region's 2015 total capacity based on ERCOT's *Report on Capacity, Demand, and Reserves for the ERCOT Region, 2015 – 2024*.[20] Based on the significant portion of the Texas electrical grid affected by the EPA proposal and the projected retirements estimated by ERCOT to result from this action, the EPA should analyze and consider the possible impacts of the proposed rule on the reliability and prices of electricity in Texas, regardless of the applicability of Executive Orders 12866 and 13211.

M.3. The TCEQ recommends that the EPA withdraw the proposed FIP; however, if the EPA does finalize the FIP, the EPA should include an electric reliability safety valve provision in the final rule.

As discussed in comments sections A, J, and K, the TCEQ maintains that its 2009 RH SIP is approvable as submitted and the EPA should withdraw the proposed FIP. However, if the EPA does finalize the FIP then the final rule should include a reliability safety valve provision. The EPA has not considered the potential electric reliability implications of the proposed rule. A reliability safety valve provision in the rule could be a provision that allows the EPA to grant an extension to the compliance dates in situations where electric reliability is at risk, after consultation with the appropriate Independent System Operator/Regional Transmission Organization.

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19 See Guidance for Setting Reasonable Progress Goals under the Regional Haze Program, June 1, 2007, page 5-3; 79 FR 74874.
20 See http://www.ercot.com/gridinfo/resource; December 1, 2014.

Appendix 1: Impacts of Environmental Regulations in the ERCOT Region