TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

July 18, 2013

<Submitted electronically as requested>

U.S. Environmental Protection Agency
Mr. James Thurman
thurman.james@epa.gov

Re: TCEQ Comments on EPA's Draft "Sulfur Dioxide (SO_2) National Ambient Air Quality Standards Designations Modeling Technical Assistance Document"

Dear Mr. Thurman:

The Texas Commission on Environmental Quality (TCEQ) appreciates the opportunity to comment on the U.S. Environmental Protection Agency's (EPA) draft Sulfur Dioxide (SO_2) National Ambient Air Quality Standards Designations Modeling Technical Assistance Document (TAD). This draft TAD was posted on EPA's website on May 21, 2013.

Enclosed, please find the TCEQ's detailed comments relating to the draft TAD referenced above. If you have any questions concerning the enclosed comments, please contact Mr. Michael Wilson, P.E., Director, Air Permits Division, Office of Air, (512) 239-1922, or at mike.wilson@tceq.texas.gov.

Sincerely,

Zak Covar
Executive Director

Enclosure

Texas Commission on Environmental Quality Comments to the U.S. EPA on the Draft SO_2 NAAQS Designations Modeling Technical Assistance Document

May 21, 2013

Background

On May 21, 2013, the U.S. Environmental Protection Agency (EPA) released a draft Technical Assistance Document (TAD) on the use of modeling to establish attainment designations for the 2010 sulfur dioxide (SO_2) standard. The draft TAD provides EPA's recommendations on how an air agency might appropriately and sufficiently model ambient air in proximity to an SO_2 emission source to establish air quality data for comparison to the 2010 SO_2 national ambient air quality standards (NAAQS) for the purposes of designations. The TAD provides recommendations on several aspects of dispersion modeling in this context, including the use of temporally varying actual emissions, source characterization, meteorological data, model selection, and background concentrations.

The Texas Commission on Environmental Quality (TCEQ) has developed comments on this draft TAD. Any modeling comments provided in this document are not an endorsement of modeling unclassifiable or attainment areas for designation purposes but are intended as input in the event that the EPA chooses to proceed with such a requirement.

General Comments

EPA should reconsider its proposal to use air dispersion modeling results to determine attainment status for designation purposes.

TCEQ commented previously on various issues related to the 1-hour primary SO_2 standard,[1] and continues to disagree with EPA's proposal to use air dispersion modeling to determine existing air quality that demonstrates attainment for designation purposes.[2] EPA should base designations on existing monitoring data and use the "attainment/unclassifiable" designation for areas that cannot be classified on the basis of available information.

TCEQ Modeling TAD Comments

As specified in the preceding comment, TCEQ supports basing designations on existing monitoring data. However, if EPA adopts rules or finalizes an approach that requires modeling be used in the determination of designations for any NAAQS, TCEQ provides the following comments for how the modeling should be conducted.

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[1] TCEQ Petition for Reconsideration of Final Rule: Primary National Ambient Air Quality Standard for Sulfur Dioxide, 75 *FR* 35520, June 22, 2010 ("Final Rule"). EPA Docket Number EPA-HQ-OAR-2007-0352, August 23, 2010.

[2] TCEQ Comments for Guidance for 1-Hour SO2 NAAQS SIP Submissions, 76 *FR* 61098. EPA Docket Number EPA-HQ-OAR-2010-1059, October 3, 2011.

Introduction

1. EPA should reconsider its adherence to modeling approaches that may not be effective for designation purposes.

On page 2 of the TAD, EPA acknowledges there are differences between modeling for attainment designations and compliance with the NAAQS for Prevention of Significant Deterioration (PSD) permitting. TCEQ also notes that there are significant differences between the original SO_2 NAAQS and interim PSD permit modeling procedures for the new 1-hour SO_2 standard. Throughout the TAD, EPA emphasizes the importance of using accurate (hourly emission rates, source characterizations, stack parameters, source locations, building locations) and representative data (temporally varying emissions and emission profiles, meteorological data, monitored background concentrations) when performing any modeling analysis. With the exception of suggesting the use of three years of meteorology, three years of hourly actual emissions (coincident with meteorology), and actual stack height (with actual emissions only), the guidance given or referenced is identical to PSD permit modeling approaches which EPA acknowledges can be conservative. In addition, EPA prescribes which model to use which significantly limits the amount and type of data that can used to characterize current air quality in an area.

2. EPA should consider costs related to the information and resources necessary to complete the modeling suggested in the TAD.

Significant resources (human, information, and infrastructure) would be needed, considering the number of potential sources in a state the size of Texas. Assuming emissions thresholds and population limit are used to limit source evaluations, modeling would be performed only for those sources, eliminating the need for statewide modeling.

TCEQ supported a 2,000 ton per year (tpy) or greater emissions threshold, as discussed as an option by the EPA at the stakeholder meetings held May 30 through June 1, 2012. Using this assumption, modeling costs were estimated to be $10,000-$30,000 per site,[3] excluding development of meteorological inputs and project/contract management costs. These costs would significantly increase depending on the complexity of an area, data analyses conducted to determine culpability from multiple sources, and refinement of model inputs required.

3. EPA should develop a more reasonable schedule to address all tasks related to the modeling requirement.

On pages 1-2, EPA refers to the timeline in the February 2013 SO_2 Strategy Paper[4]. TCEQ believes this timeline is not feasible. One of the key modeling-related challenges

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[3] Modeling costs are based on the lower end of the AERMOD cost estimates in the EPA June 23, 2011, MOU among USDA, USDOE, and USEPA *Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the National Environmental Policy Act Process.*

[4] Next Steps for Area Designations and Implementation of the Sulfur Dioxide National Ambient Air Quality Standard, February 6, 2013 (SO_2 Strategy Paper)
http://www.epa.gov/airquality/sulfurdioxide/pdfs/20130207SO2StrategyPaper.pdf

will be the evaluation of numerous sources using approaches typical for permit evaluation and single-source evaluations. The TAD refers to a planned data requirements rulemaking in 2014. The rule would provide criteria for identifying the sources for which air quality should be characterized. It would also provide a schedule defining when states would need to decide whether to conduct modeling (or monitoring) for key sources, and when the resultant findings would need to be submitted to the EPA for use in the subsequent designations process. The TAD also suggests that in this rule, EPA could limit the modeling needed by emissions thresholds and proximity to population. In addition, the rule would give states the flexibility to characterize air quality using modeling of actual emissions or using appropriately sited existing and new monitors. The EPA expects these data would be used for designations in 2017 based on modeling and 2020 based on new monitoring.

To meet the timeline, states would need to conduct preliminary evaluations without knowing the data requirements, such emissions and population thresholds. Per the proposed schedule, both the modeling and monitoring final TADs are issued first (July 2013) and then the data requirements rulemaking proposal follows in late 2013, with the final rules adopted in late 2014. The state then has one year (2015) to determine, in consultation with sources and EPA, the sources and areas that will have new monitors, and other sources that will be subject to modeling. The preliminary monitor plan and modeling protocols are then due in January 2016 with the final monitor plan completed by June 2016. The new monitors must be deployed and modeling completed by January 2017.

This schedule is not practical for several reasons:

- *Insufficient time for informed state planning*. Data requirements are not known. Without clear knowledge of the emissions thresholds and population limits, TCEQ cannot develop meaningful modeling protocols, or gather some of the data, such as downwash structures or emissions for sources that must be included in the modeling demonstration. TCEQ estimates there could be 25-31 modeling protocols required. One year is not enough time for the state to develop a strategy, consult with sources and EPA, develop modeling protocols, get EPA approval, and complete the preliminary monitor deployment plan.
- *Insufficient time to prepare for modeling*. Assuming that emissions thresholds, population limits, and other tools limit the number of sources to be explicitly modeled, the modeling itself (not including emission inventory and meteorological input development; protocol development; preparatory work; post-processing of results; final analysis; and report development) could be completed in approximately one to two years, with a team of six to eight modelers and analysts working full-time. States do not have these resources.
- *Insufficient time to conduct modeling*. One year is not enough time to complete modeling demonstrations. Depending on the scope of the modeling required, it would take two to four years to complete the entire process. The modeling time estimate would increase if refined modeling will be needed to site monitors and whether EPA expects the state to submit modeling protocols and not conduct any refined modeling to support monitor placement decisions until EPA approves the protocols.

4. TCEQ disagrees with EPA's approach to allow other party participation in the SIP development process.

On page 3, EPA suggests that other parties may wish to assess SO_2 compliance on a schedule that is quicker than the schedule in the SO_2 Strategy paper or quicker than the EPA may propose in the data requirements rule. In addition, EPA would expect states to evaluate any credible modeling information submitted that indicates potential violations of the NAAQS. TCEQ suggests that accelerating a schedule that is not appropriate or further slowing the SIP development process by diverting resources would not benefit the public. This approach is unnecessary because states give due consideration to comments received once SIPs are proposed to the public.

Guidance on Air Quality Models

1. TCEQ disagrees that modeling should be used to determine designation of attainment or nonattainment.

On page 3, EPA suggests that guidance in the Guideline on Air Quality Models (GAQM),[5] also published as Appendix W of 40 CFR Part 51, would not apply to meet the purpose of the future data requirements rule. EPA states that modeling would be an optional approach to develop information to determine whether an area is violating the SO_2 NAAQS. The planned rule's purpose pertains to designations and the TAD supports analyses of existing air quality rather than analyses of emission limits necessary to provide for attainment after nonattainment designations have been made. TCEQ disagrees with any approach that assumes an area is not meeting air quality standards based on modeling, and reiterates that designations must be made based on ambient air monitoring data.

If modeling is required, cumulative modeling of sources below the planned emissions thresholds and population limits should not be required. There was mention at the States' stakeholder meeting on May 31, 2012, of an approach to limit modeling based on source emissions. Only the source's actual emissions that exceeded an emissions threshold would be modeled. Nearby sources would not be modeled. TCEQ supports this type of approach as it would simplify evaluations.

2. EPA should clarify how states and other parties should interpret "official guidance" in relation to the modeling process described in the TAD.

TCEQ understands that the guidance in the TAD is not binding. However, on page 4, EPA states that clarifications and interpretations of modeling procedures become official EPA guidance through several courses of action. Only one course, publishing through rulemaking, allows for effective, consistent notice and comment.

Given the long time frames necessary to update federal regulations, it is reasonable to have other means, such as policy and guidance memoranda, to address issues that require immediate clarification, however, EPA's guidance and policy memoranda are invariably linked to maximum operating conditions and worst-case assumptions in Appendix W. The policy and guidance memoranda typically do not address model

[5] EPA's Guideline on Air Quality Models (GAQM), also published as Appendix W of 40 CFR Part 51

refinements such as inclusion of chemical transformations and deposition. Without specific guidance on acceptable methods to refine modeling analyses, the development of emission inventories, model input, and refinements becomes time consuming and burdensome as state agencies guess as to what approaches EPA may approve.

EPA should be open to comparable technically-justified approaches. To provide national consistency in application of general guidance, TCEQ requests EPA clarify and provide examples for ambiguous terms used throughout the TAD, such as *clusters, large source, small source, relatively isolated, small to moderate size urban areas, very buoyant sources, short-term, significant concentration gradient, continuous enough, or frequent enough*. TCEQ understands that use of ambiguous terms gives the state flexibility but believes that examples would assist in providing consistency between EPA Regional Modeling Contacts and other states' analyses.

3. Model Selection

EPA and stakeholders have identified significant issues with AERMOD related to permit modeling and EPA's approach to implementing the new SO_2 standard. Existing technical issues discussed during the 10th Modeling Conference, the May 31, 2012 SO_2 stakeholder meeting, and the Regional, State, and Local Modeling Workshops in 2012 and 2013, relate to issues such as the form of the standard, probability of occurrence of emissions from multiple emission points, varying loads and fuels, downwash, wind speed, transport, background, treatment of dispersion in urban environments, decay (oxidation conversion) of SO_2 in various environments, and model performance. These issues should be resolved prior to finalizing the data requirements rule.

Since the purpose of the SO_2 Strategy is to characterize existing air quality, if AERMOD is used to implement some aspect of the standard, the modeling should establish a base case that replicates a historical episode where possible, to prove model performance within statistical standards. The model should be evaluated against known monitoring at a fixed location and time rather than independent of time and location.

4. EPA should explicitly allow the use of photochemical grid models for the SO_2 Strategy evaluations and provide a list of all acceptable models.

TCEQ questions whether AERMOD is the only suitable model to meet the purpose of EPA's SO_2 Strategy. TCEQ notes that EPA does not identify a preferred model for SO_2 in Appendix W. However, on page 5 of the TAD, EPA effectively eliminates the ability of the state to use photochemical grid models, such as CAMx. EPA states that AERMOD should be used for SO_2 SIP evaluations unless use of an alternative model can be justified, such as the Buoyant Line and Point Source Dispersion Model (BLP). Since BLP was designed to handle unique modeling problems associated with aluminum reduction plants, there does not appear to be any flexibility for an alternative to AERMOD. All recommendations made in Appendix W went through the rulemaking process. EPA's preference to use AERMOD for analysis of SO_2 has not gone through the rulemaking process.

TCEQ notes that guidance for attainment demonstrations, EPA -454/B-07-002, allows states to determine which model is appropriate with input from EPA. However, if TCEQ wanted to use CAMx as well as AERMOD to implement the SO_2 Strategy, EPA requires a

justification[6] that includes information well-known to EPA. The procedure to justify alternative models in Section 3.2 of Appendix W amounts to unnecessary work because states must justify why AERMOD is not appropriate *and* why the alternative model is superior to AERMOD.

Providing this justification would unnecessarily tie up resources. Strictly adhering to the requirements in Appendix W Section 3.2.2 would not give TCEQ sufficient time to propose an alternative model to AERMOD. If EPA were to reject demonstration approaches using CAMx, it is probable that TCEQ could not meet EPA's planned implementation timeline.

As stated previously, without the data requirements rule in place, TCEQ is unsure what its demonstration strategy will be. Using a grid model that improved meteorological fields and provided additional photochemical (and other) atmospheric reactions, could offer a better simulation of existing air quality than AERMOD with AERMET. In addition, EPA should evaluate AERMOD to determine if technical updates could be made to assess existing air quality for concentrated urban or industrial areas. For these complex situations, options should allow for use of regional scale models. The models could incorporate higher resolution tools such as Plume-in-Grid sampling grids, if needed.

TCEQ requests that EPA provide a list of other models, such as CAMx, that have been used extensively in regulatory assessment, that states can use without being required to submit lengthy justification and model performance studies. Since models like CAMx have been used by many state agencies and EPA to provide air quality assessments, it would be unnecessary for states to go through the rigor specified in Appendix W Section 3.2.2 (e).

Grid models can better represent variability in surface characteristics which impact the meteorology, variability in meteorological parameters both horizontally and vertically, and spatial and temporal variability of SO_2 concentrations from nearby and distance sources. For example, CAMx could be used with adequate land cover characteristics for the meteorological fields to provide a better representation of existing air quality. In addition CAMx can also consider both wet deposition and aqueous chemistry. This capability is important in Texas, and many other states, as SO_2 may react more quickly with moisture (humidity) on cloudy days to form H_2SO_4 (two hours or less), than EPA's default AERMOD half-life of 4 hours in urban areas.

In addition to the flexibility to use photochemical models, EPA should also allow for alternate approaches to identify the sources that should be modeled using refined dispersion modeling. Application of a regional grid model such as CAMx at relatively-high resolution (1 - 4 kilometers), combined with conservative assumptions about emissions and a threshold concentration inversely proportional to the grid cell area should suffice to identify possible areas of concern. Advantages of this approach include the ability to include additional SO_2 sources; use of weather research and forecasting (WRF) wind fields rather than "straight-line" winds from discrete National Weather Service (NWS) locations; and account for impacts over larger domains than AERMOD can handle. Additionally, using a grid model could provide estimates of background

[6] 40 CFR 51, Appendix W, Section 3.2 Use of Alternative Models.

values that should be more representative than those derived from other techniques.

5. EPA should provide information, including potential corrections, regarding all technical issues that have been identified with the AERMOD Modeling System.

On page 5, EPA lists the components of the AERMOD Modeling System. The AERMOD modeling system was promulgated in 2005,[7] however the regulatory system of model and preprocessor computer programs included in Appendix W is AERMOD, AERMAP, and AERMET. The BPIPPRIME program is not in Appendix W so it should be considered non-regulatory as are AERSURFACE and AERSCREEN.

TCEQ is aware of some technical issues raised by stakeholders related to permit modeling but is not always aware of EPA discussions of issues and potential fixes with selected stakeholders or in some venues. Therefore, TCEQ requests that EPA provide all technical issues that have been identified by EPA or any state or local entity to EPA, associated with each regulatory and non-regulatory portion of the modeling system and how to adjust the modeling process or predicted concentrations due to such issues.

6. Modeling Domain

On page 6, EPA suggests that the number and locations of potential modeling domains will depend on the requirements in the future data requirements rule. TCEQ repeats the previously stated concern that without clear knowledge of the emissions thresholds and population limits TCEQ cannot develop meaningful modeling protocols or gather data for sources that must be included in the modeling demonstration. As previously stated, using a grid model could provide estimates of background values that should be more representative than those derived from distant monitors or other techniques.

Determining Sources to Model

1. EPA should not require modeling of sources less than the emissions thresholds adopted by rule.

On pages 6-7, EPA describes a complicated, resource-intensive, multi-step process to model sources below the emissions thresholds that could cause or contribute to a NAAQS violation. TCEQ does not agree with this approach. Contributions from non-modeled sources can be included in the background concentrations and not explicitly modeled using AERMOD. Again, a grid model could be used to estimate background concentrations and certain concentration gradients.

2. EPA should clearly state criteria that can be used to refine transport times of emissions within the modeling domain.

Gaussian models, such as AERMOD, assume constant emissions to allow for steady state analysis, negligible dispersion downwind, non-reactive pollutants, homogenous meteorological condition over the modeled domain, and wind speed that is constant in time and in elevation. Transport time is of particular interest. Transport time from a source to a receptor could be greater than one hour at distances less than 50 kilometers (km) or ~31 miles given a wind speed less than ~31 miles per hour (mph) for a specific

[7] 70 *FR* 68218.

hour. A typical maximum wind speed would be about 15 mph (25 km per hour). It would be more appropriate to limit the modeling domain to a 20-30 km radius for a small number of sources that exceed the emissions thresholds. In addition, EPA should clearly state in the guidance that it is appropriate to refine model results using technical judgment if the modeled results would not represent actual conditions.

Receptor Grid

1. EPA should define and provide examples for ambiguous terms related to receptor placement.

On page 8, EPA states that receptor placement should be of sufficient density to provide resolution needed to detect significant gradients in the concentrations, with receptors placed closer together near the source to detect local gradients and placed farther apart away from the source. TCEQ suggests that EPA define and provide examples for ambiguous terms such as significant concentration gradient, local concentration gradient, closer together, farther apart and ambient boundary to ensure all EPA Regional Modeling contacts provide consistent guidance.

2. TCEQ disagrees with EPA's fence-line approach.

On page 8, EPA suggests that the user place receptors at key locations, such as around facility fence lines, which EPA suggests define the ambient air boundary for a particular source or monitor location for comparison to monitored concentrations for model evaluation purposes. Ambient air is defined by rule and is used in PSD modeling demonstrations and ambient air monitoring.[8] The guidance in the modeling TAD is for a SIP demonstration, not for a PSD permit application or the location of a regulatory monitor. For example, it is not realistic to place receptors over bodies of water, over unfenced plant property, on buildings, or over roadways when you could not place a monitor at the same locations to determine concentrations to compare to the NAAQS. TCEQ notes that the guidance in the SO_2 Monitoring TAD suggests that modeling used to site monitors should not place receptors at locations that are not feasible as ambient monitoring locations (i.e., water bodies, military reservation, etc.)

3. EPA should clearly indicate that the state should determine the adequacy of receptor placement.

On page 3, EPA expects the data requirement rule would allow for modeling as an optional approach to estimate existing air quality -- the other approach would be regulatory ambient air monitoring. Yet EPA's receptor placement approach seems to replicate PSD permitting requirements. Though the permitting program and SIP development process both require demonstrations regarding attainment status, the scope, purpose, and process for each differ. Regarding scope, the permitting program is applied on a project (source) basis and utilizes a background concentration to account for other sources in an area. A SIP considers all sources and location of ambient air monitors in an area. In both instances, the appropriate location of receptors would be case-specific.

The purpose of the permitting program is to demonstrate compliance based on a

[8] 40 CFR 50.1 (e).

reasonable worst-case set of conditions. A SIP analysis must replicate the nonattainment problem. For SIPs, the process is to analyze the situation based on actual emissions and monitored concentrations, identify culpable sources, develop a control strategy to reduce emissions, and then demonstrate attainment through modeling. The focus of modeling results is at monitor locations.

Therefore, EPA should clearly indicate that the state should determine the adequacy of receptor placement.

Emissions Inputs

1. TCEQ agrees with the approach to use actual emissions to determine existing air quality.

On page 5, EPA states that the planned data requirements rule would allow states to use models to determine estimates of existing air quality. TCEQ agrees with the approach to use actual emissions, stack dispersion parameters, and representative meteorological data to estimate 1-hour SO_2 design values.

2. TCEQ does not agree with periodic review of attainment demonstrations contemplated by EPA.

On page 9, EPA states it anticipates developing guidance -- and not rule -- for periodic review to judge whether emissions have increased to levels that might be causing NAAQS violations. TCEQ does not agree with this concept, and urges EPA to avoid onerous periodic review requirements. The Federal Clean Air Act already provides for the NSR permitting program that would suffice for this review.

3. EPA must balance the need for representative actual emissions with the time and resources needed to develop an emissions inventory.

On pages 9-19, EPA provides approaches to provide accurate temporal representations of actual emissions. However, the provision of so many ways to provide actual emissions data will prohibit national consistency of state's emissions inventories and modeling approaches.

TCEQ anticipates that the collection of detailed daily and hourly operational data from individual sources would be extremely burdensome, and would adversely affect the SO_2 Strategy timeline. Therefore, EPA should consider the difficulty states will have and include a balanced approach to emissions inventory development in the data requirements rule.

4. EPA should provide examples of emission scenarios for intermittent sources.

On page 20, EPA suggests that states should only include emissions scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of maximum daily 1-hour concentrations. TCEQ requests that EPA provide examples of emission scenarios that could meet this expectation.

Source Characterization

1. EPA should reconsider the version of AERMOD for use with its stack height proposal.

On page 21, EPA discusses good engineering practice (GEP) stack height rule limits, the BPIPPRIME program, and downwash. However, stakeholders have raised significant concerns related to EPA's modification of AERMOD related to permit modeling that changed how the model calculates downwash effects. EPA should remove the change from the regulatory version of AERMOD until independent peer review, consequence analyses, and evaluations are conducted for stacks above rule height limits. In addition, these evaluations should be conducted concurrently with an independent review and evaluation of the effective length parameter in the BPIPPRIME program that is used to develop the downwash input for AERMOD.

2. EPA should not preclude the use of grid models because they do not consider downwash.

As previously stated, TCEQ suggests that it is inappropriate to consider downwash without first evaluating a model's performance, particularly if the model is used to simulate concentrations at an ambient air monitor. Once acceptable model performance is established, downwash effects can be appropriately considered for modeling based on actual or allowable emissions. This evaluation would apply to both dispersion and grid models.

EPA should not preclude the use of grid models because they do not directly consider downwash. TCEQ notes that neither GEP stack height rules nor downwash of major stationary source apply to photochemical grid models when evaluating ozone, in either performance evaluations or control strategy development. Until EPA conducts independent peer review, consequence analyses, and evaluations that demonstrate a model's capability to accurately represent downwash effects, EPA should allow the use of grid models as the states deem appropriate. In addition, EPA should provide Regional Modeling Contacts with reasonable guidelines related to the inclusion of downwash in AERMOD for any sources in the modeling domain.

3. TCEQ agrees that actual stack heights should be used to estimate ambient air quality.

On page 21, EPA recommends the use of actual stack heights, instead of GEP, when modeling to estimate ambient air quality. TCEQ agrees with this approach.

Urban/Rural Determination

1. EPA should allow the use of other models to determine boundary layer characteristics and the method to address chemical transformation and deposition.

TCEQ would like the flexibility to propose grid models, such as CAM_X, that can better represent spatial variability of urbanization and handle the complex chemical transformations that could occur in urban and rural areas.

On pages 22 and 24, EPA discusses the need to characterize the area around a source as urban or rural to determine the applicable boundary layer characteristics that affect the model's prediction of downwind concentrations. EPA discusses various methods to

determine boundary layer characteristics for use with AERMOD related to permit modeling. The referenced methods (Auer Land Use, Population Density, and AERSURFACE) will not yield exactly the same results. For the purpose of modeling for designations, EPA should discuss how the results from any of these methods can provide reasonably representative boundary layer characteristics as each method relies on different information, such as United States Geological Survey quad (Auer Land Use) or 1992 National Land Cover Database (NLCD) (AERSURFACE), and population data.

2. EPA should update the guidance on use of the half-life default and wet and dry deposition in AERMOD. EPA should also allow the use of other models to address chemical transformation and deposition.

On pages 22-24, EPA discusses the need to characterize the area around a source as urban or rural to determine the effect of chemical transformations on the model's prediction of downwind concentrations. EPA states that this characterization is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources and assumes that chemical transformation is unimportant in rural area over short time periods.[9]

The regulatory option to use a single half-life value in AERMOD and only in urban areas is based on a paper published in 1964.[10] The assumptions that 1) transformation in rural areas over a few hours is unimportant and 2) urban area transformations can be based on a single exponential decay factor and account for the effects of temperature, light intensity, humidity, interaction with other pollutants, wet and dry deposition maybe be appropriate for permit modeling but may be overly conservative for the purpose of characterizing existing air quality -- specifically in light of the level of the 1-hour standard.

For example, while EPA considers SO_2 transformation in rural areas unimportant, TCEQ notes there are substantial nitrogen oxide (NO_x) sources, such as power plants, located in rural areas and that SO_2 reacts readily with NO_x. More recent papers make the argument that SO_2 reacts more quickly with moisture (humidity) on cloudy days to form H_2SO_4 (two hours or less), than EPA's default AERMOD half-life. Both wet deposition and aqueous chemistry are available in photochemical grid models, such as CAMx, but not in AERMOD.

In addition, this guidance does not address removal of SO_2 by deposition. Though AERMOD can account for wet and dry deposition, there is no specific guidance on how this capability can be implemented for removal of SO_2. Not accounting for any removal of SO_2 during transport could provide unrealistically high predicted concentrations of existing air quality. Therefore, TCEQ requests that EPA provide guidance on how to implement wet and dry deposition algorithms in regards to SO_2 removal.

Meteorology

1. EPA should provide examples of representativeness.

On pages 24-25, EPA discusses surface characteristics and representativeness. EPA emphasizes the importance of using representative data when conducting dispersion

[9] 40 CFR 51 (Appendix W), 2005, Section 7.2.6 Chemical Transformation.
[10] Turner, D.B., 1964, *A Diffusion Model for an Urban Area*, Journal of Applied Meteorology, 3(1): 83–91.

modeling. It would be helpful if EPA would define criteria as to what determines representativeness when determining existing air quality. TCEQ requests that EPA clarify its expectation of what is representative or appropriate to accomplish the purpose of the SO2 Strategy. Without a clear understanding of the meaning of representative, there does not appear to be much difference between using a screening technique or refined model since there could be a high degree of uncertainty in the model input data. Though modeling can produce results over a large domain, this does not address the validity of the predicted concentrations within the domain.

2. Background Concentrations

On pages 26-27, EPA discusses the use of monitored concentrations to estimate impacts from background sources. TCEQ suggests that EPA specifically allow modeled background concentration using a regional scale model such as CAMx to estimate hourly background concentrations when determining existing air quality.

Documentation

EPA must commit to review and comment on modeling and analysis protocols in a timely manner.

On page 31, EPA states that the data requirements rule would require the state to submit a modeling and analysis protocol that details the methodology and model inputs before conducting any modeling. As previously stated, without clear knowledge of the emissions thresholds and population limits, TCEQ cannot develop meaningful modeling protocols.

In addition, EPA should clearly state in the Monitoring TAD whether modeling and analysis protocols will be required. Since EPA recommends a meeting with the EPA Regional Modeling Contact and other technical and planning staff to discuss the modeling and analysis protocols before the state starts any refined modeling, the data requirements rule must include a commitment to review and comment on modeling and analysis protocols in a timely manner.