UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
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SEP 27 1993

MEMORANDUM

SUBJECT: El Paso Carbon Monoxide (CO) Section 818 Analysis

FROM: Gerald Fontenot, Chief
Air Programs Branch (6T-A)

TO: Joseph Tikvart, Chief
Source Receptor Analysis Branch

Attached is a copy of a draft protocol from the Texas Natural Resource Conservation Commission (TNRCC) outlining its suggested approach for performing a technical analysis for the El Paso CO nonattainment area. The TNRCC is proposing to perform a technical analysis of El Paso CO data in order to demonstrate that El Paso would attain the CO National Ambient Air Quality Standards (NAAQS) by the December 31, 1995, attainment deadline.

The Region has reviewed this protocol and agrees with the TNRCC recommended use of the Gaussian - Plume Multiple Source Air Quality Algorithm (RAM) and a modified approach to accommodate the unique situation that exists in El Paso. I want to share this with you to determine if there are any concerns from a national perspective with the TNRCC approach.

As an introductory background, we would like to point out that El Paso, Texas, is on the international border between the United States and Mexico. It shares its airshed with Ciudad Juarez which is an industrial metropolis with few, if any, air control measures in place. El Paso is nonattainment for three pollutants including CO, ozone, and PM-10.

In recognition of the problems associated with a border area meeting the NAAQS without control over the entire airshed, the authors of the Clean Air Act Amendments (CAAA) of 1990 included a provision for such areas. The provision allows such a nonattainment area, the option to demonstrate to the Administrator's satisfaction that the area would attain "but for the emissions emanating from a foreign country," or Mexico in this situation, and, therefore, avoid "bump up" to the next higher classification. This provision is included in the CAAA Section 818 which amends Section 179B of the Clean Air Act.

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A more detailed discussion is included in the General Preamble for the Implementation of Title 1 of the CAAA. Attached are excerpts from the CAAA and the 40 CFR Part 52 General Preamble for your review.

The Region 6 staff have been working with the TNRCC (formerly the Texas Air Control Board) (TACB) staff for over a year in an attempt to decide upon an approach to performing the technical analysis that will meet the intent of Section 818 of the CAAA and allow El Paso to avoid bump up if it fails to attain by the December 31, 1995, deadline.

We think the TNRCC modeling staff has done a very thorough job of outlining the peculiarities involved with any modeling in the El Paso area and in its support for using the RAM model to perform the analysis. We understand that the Urban Airshed Model (UAM) is the preferred model to use in such a basinwide modeling if data are available for the entire airshed. Unfortunately, there is insufficient data for the Juarez side of the border at the current time to enable TNRCC to perform basinwide modeling.

As you and your staff may be aware, Region 6 has worked with and through the TACB and the Mexican and El Paso local officials for the past several years in an attempt to develop an emissions inventory and collect monitoring data which could be used in basinwide modeling. We, along with TNRCC, have made progress in working with local, State and Federal Mexican officials by providing them technical assistance, and training and by performing special air studies for Juarez.

There is the beginning of an air monitoring network in Juarez at the current time and an emission inventory is being developed. It is our intent, and that of TNRCC officials, that the State will ultimately perform basinwide modeling in the future when data becomes available. Such modeling is required by the 1983 LaPaz Agreement between the United States and Mexico and TNRCC has agreed to perform such modeling in the future when the emission inventory and monitoring data are available.

In summary, there needs to be basinwide modeling for the El Paso CO nonattainment area accomplished using UAM or some comparable model in the future not only to allow local air officials on both sides of the border to develop air control strategies, but to satisfy the LaPaz Agreement. However, at the present time, we believe it would be impractical for TNRCC to use the UAM approach for an area where a good deal of the data are unavailable.

We would like you and your staff to review the proposed protocol which contains a unique approach for a unique situation and let us know if you can support the attached protocol. Look at the recently published El Paso PM-10 SIP which includes a demonstration similar to the one proposed for the CO nonattainment area and which utilizes the RAM model. We can provide you a copy of the PM-10 demonstration if you do not have a copy.

It is our goal to approve the proposed protocol as soon as possible because we are requiring TNRCC to submit the demonstration results as early as possible in 1995 in order for us to review and approve it by the December 1995, deadline.

We are available for further discussions at your convenience. Please call me at (214) 655-7214 if you would like to discuss the protocol. Technical questions should be addressed to Quang Nguyen at (214) 655-7238.

Attachments

Draft Protocol

Section 818

Modeling Demonstration of Carbon Monoxide

El Paso, Texas

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

12124 PARK 35 CIRCLE

AUSTIN, TEXAS 78753

AUGUST, 1993

I. INTRODUCTION

Section 818 Demonstrations

A small portion of downtown El Paso along the Rio Grande has been designated as a moderate nonattainment area for carbon monoxide. El Paso is unique among nonattainment areas because of the immediate proximity and unquantifiable contribution of Juarez, Mexico.

Federal Clean Air Act Amendments

The Federal Clean Air Act Amendments (FCAA) of 1990 recognize this uniqueness in Section 818. Section 818 appends to Subpart 1 of Part D of Title I of the Clean Air Act a new Section 179B titled 'International Border Areas'. Part (a) of this section states two conditions for implementation and approval of State plans:

"(1) such plan or revision meets all the requirements applicable to it under the Act other than a requirement that such plan or revision demonstrate attainment..."

"(2) the submitting State establishes to the satisfaction of the Administrator that the implementation plan of such State would be adequate to attain and maintain the relevant national ambient air quality standards ... but for emissions emanating from outside of the United States."

General Preamble

The EPA's General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 also distinguishes between the principles of the usual SIP process: quantification, enforceability, replicability, and accountability - and the purpose of a Section 818 demonstration: to avoid the 'bump-up' provision of Section 186(b)(2) if not warranted because of another nation's contributions.

Further, the Preamble also acknowledges that limitations of timely and available data, especially from another country, may have an impact on the selection of modeling techniques, but that the small number of 818 demonstrations preclude the setting of precedent:

"The EPA recognizes that adequate data may not be available in areas outside the United States. Therefore, modeling (consistent with EPA's Guidance on Air Quality Models, Revised) may not be possible in all cases. Because very few areas are likely to be affected by this provision, EPA will determine on a case-by-case

basis whether the State has satisfactorily made the required demonstration. The State is encouraged to consult with the EPA Regional Office in developing any alternate demonstration methods."

Therefore, the Texas Air Control Board, in consultation with EPA Region 6, recognizing the unique nature of an 818 demonstration, proposes a special procedure to implement the El Paso Carbon Monoxide demonstration.

Discussion of Relevant Issues

Wind Speeds

Two general issues pertaining to the 818 demonstration were part of discussions with EPA Region 6. The first issue recognizes the difficulties encountered when modeling with low wind speeds. There are currently no Gaussian or grid models that perform well with wind speeds below 1 meter per second. This limitation is acknowledged with the Appendix A models CAL3QHC and RAM even though their use is encouraged by the GAQM. Low wind speeds are also recognized as a difficult problem for the UAM. The Diagnostic Wind Model exaggerates vertical components of the wind vectors which minimize resulting ground level concentrations in the UAM.

Texas proposes to compensate for this problem by supplementing traditional modeling with meteorological analyses based upon monitored data from a low wind CO episode during December 7-9, 1990. The data obtained during the December 1990 Scoping Study, conducted jointly by the State of Texas, EPA Region 6, the city and county of El Paso, and SEDESOL will be used to supplement the modeled results.

Size of the Nonattainment Area

The enclosed map indicates the boundaries of the nonattainment area and the locations of monitoring stations in both El Paso and Juarez. The nonattainment area is narrow in width but closely follows the Rio Grande River that divides downtown El Paso from Juarez. Significantly, the three monitors outside the nonattainment area (one along the New Mexico Border, another at an elevated position near downtown, and a third in a residential section of El Paso) measured no exceedances during the 1990 episodes.

Similarly, the nonattainment area includes three monitors with measured exceedances, all associated with heavy automobile traffic in the city core and near the border bridges. This is

consistent with the data from the 1990 Base Year Carbon Monoxide Emissions Inventory for El Paso which indicates that 95% of the United States' contributions result from mobile sources.

In contrast, Juarez is generally acknowledged to have more point and area emissions than El Paso. For example, Mexican monitors, particularly 'Techno', have measured exceedances in Mexico. These differences explain the exceedances recorded at Ascarate Park, the fourth U.S. monitor in the nonattainment area, which is not near intersections or any U.S. point and area sources, but is across from Mexican sources.

Performance Evaluation

The Guideline for Modeling Carbon Monoxide from Roadway Intersections recommends both the UAM and RAM for modeling of background (urban mesoscale) carbon monoxide concentrations. The UAM model requires a performance evaluation to ensure correct results. Section 818 demonstrations require excluding the foreign emissions component. However, a performance evaluation cannot be performed without including the significant Juarez contributions, which undermines the validity and usefulness of UAM model output.

In contrast, RAM is a regulatory model which has been approved and validated and, therefore, can be modeled with only U.S. emissions and does not require a performance evaluation.

The Guideline points out there is a trade-off between the advantages of tracking rapidly changing meteorological conditions with the UAM and the associated cost of both data input and time to evaluate and run the model. Sensitivity to meteorological conditions is expected to be pronounced for chemically reactive species tracked in ozone modeling. However, modeling a non-reactive species in a localized area adjoining the international border does not justify the costs of UAM modeling given the weaknesses in performance evaluation.

Modeling Overview

Texas proposes to follow EPA carbon monoxide modeling guidance using RAM to determine urban mesoscale (background) concentrations for nonstagnant conditions. We will use CAL3QHC for hotspot analysis of designated intersections. Supplementary analysis of Mexican contributions using monitored data for low wind speed situations will be discussed in Section III. Therefore, the model selection is based upon four criteria:

- The EPA timetable for completion of the 818 demonstration is approximately fourteen months, which does not allow enough time for a UAM effort,

- CO modeling in El Paso must be accomplished with an incomplete set of emissions data concentrating on the U.S. Border area, prohibiting an adequate performance evaluation to validate a UAM study,

- 818 demonstrations are unique with respect to other CO nonattainment areas, and determination of modeling procedures on a case-by-case basis in consultation with EPA Region 6 will not impact nation-wide precedents, and

- RAM modeling for the urban background will be consistent with the previously established and accepted protocol for RAM modeling of PM_{10} in El Paso.

In the future, with continued improvement of meteorological and emissions databases (especially data from Juarez), UAM may become the preferred choice for regional modeling, but with regard to the points above, UAM cannot be recommended at this time. The anticipated studies associated with Annex V of the 1983 United States-Mexico Environmental Agreement should make regional modeling more reliable and lead to a traditional SIP in which detailed regional control strategies are possible.

II. DRAFT MODELING PROTOCOL

Executive Summary

We propose the following outline of our modeling procedure. We will use EPA Guidelines and El Paso Department of Traffic and Transportation data to identify three intersections with high volume and three with high level-of-service. We will use RAM to identify the worst case meteorological scenario producing the largest background concentrations during five winter seasons (October through March) at each selected location. We will use CAL3QHC with the episode specific data from RAM to model the mobile components at the selected intersections. Finally, the sum of the RAM and CAL3QHC output at the intersections will be compared to the NAAQS.

Seasonal Selection

December and January have the highest frequency of exceedances for carbon monoxide. We will model carbon monoxide for the five most recent winter seasons between 1988 and 1992. Concurrent monitored values were well instrumented during the jointly

conducted December 1990 Scoping Study which documented some of the highest recorded values of CO.

Meteorological Data

Five years of meteorological data from the National Weather Service Station at the El Paso International Airport will be used for RAM model runs. RAMMET will generate the meteorological file.

Intersection Ranking and Selection

El Paso Department of Traffic and Transportation will provide traffic data on the busiest intersections.

Following the EPA Guideline for Modeling Carbon Monoxide From Roadway Intersections, we will screen and sort the top twenty El Paso intersections by traffic volume, selecting the top three. The same list of twenty intersections will then be sorted by Level-of-Service (LOS) and the top three from both lists will be modeled by CAL3QHC. We propose to add Ascarate Park and the two border bridges if not identified by the above procedure.

Emissions Data

RAM modeling will use a complete winter inventory of U.S. point and area sources. Data for U.S. sources will come from the 1990 Base Year Carbon Monoxide Emissions Inventory for El Paso. Seasonal adjustments will be made where appropriate. No stationary Mexican sources will be included in the inventory.

Mobile emissions will be calculated using MOBILE 5A for both El Paso and Mexican vehicles traveling in El Paso using average December and January temperatures as seasonal input. Emissions will be gridded by the Texas Department of Transportation. These mobile sources will be translated into RAM area sources.

Mobile Mexican sources in El Paso will be included at particular intersections and bridges. The percentage of Mexican vehicles will be determined by the Municipal Planning Office of El Paso and the U.S. Department of Customs. Mexican CO emissions will be weighted by a factor of 1.25 with respect to U.S. vehicles. This factor was determined from a study by Remote Sensing Technologies conducted in March 1993 of all bridge traffic entering the United States.

RAM Background Modeling Procedure

Using the meteorological and emissions data described above, RAM will be run with the regulatory option using a one kilometer receptor grid focused over the center of El Paso. In the vicinity of each identified intersection, the two bridges, and Ascarate Park source groups will also be gridded into one kilometer cells.

Double Counting

To avoid double counting of mobile source emissions, we will use the values of CO concentration calculated by RAM at the nearest receptor upwind from the intersection or bridge modeled. This effectively defines the urban mesoscale component of carbon monoxide concentrations at the intersection without double counting the intersection contribution.

CAL3QHC Modeling Procedure

CAL3QHC will be run with standard receptor locations according to the latest CAL3QHC modeling procedure in the Guideline for Modeling CO from Roadway Intersections. Wind direction used as input to CAL3QHC will match hourly values used by RAM. We will default to wind speeds of one meter per second, and since we are modeling an urban area, we will use the default stability class "D" as recommended.

Post-Processing

The total CO concentration will be determined by adding the highest hourly concentrations calculated from CAL3QHC to the hourly urban mesoscale concentration calculated by RAM for the same time and location (using values from the nearest upwind receptor) and then computing the eight-hour average.

III. SUPPLEMENTARY ANALYSIS OF MEXICAN CONTRIBUTIONS

There is extensive meteorological data available from two significant joint studies conducted with EPA Region 6, the 1990 Scoping Study, as well as the 1989 Saturation Study. These will be used to supplement the traditional modeling approach. The very close proximity of the nonattainment area to the Mexican Border makes possible additional analysis of contributions from Juarez.

Meteorological Analysis

We will review the CO highest episodes during the last five years to determine what meteorological factors are associated with high CO events. We will determine whether there are several distinct regimes causing CO events or if all events occur under the same synoptic situation. We will also determine if all events are characterized by winds from the same source region.

Transport of Pollutants

We will evaluate hourly wind flow and velocities during the December 1990 episode to determine if circulation patterns contribute to pooling and mixing of CO from both sides of the border. We will also analyze trajectory data for the December 1990 episode to demonstrate the probability of significant transport from Mexico during CO episodes.

Ascarate Park Analysis

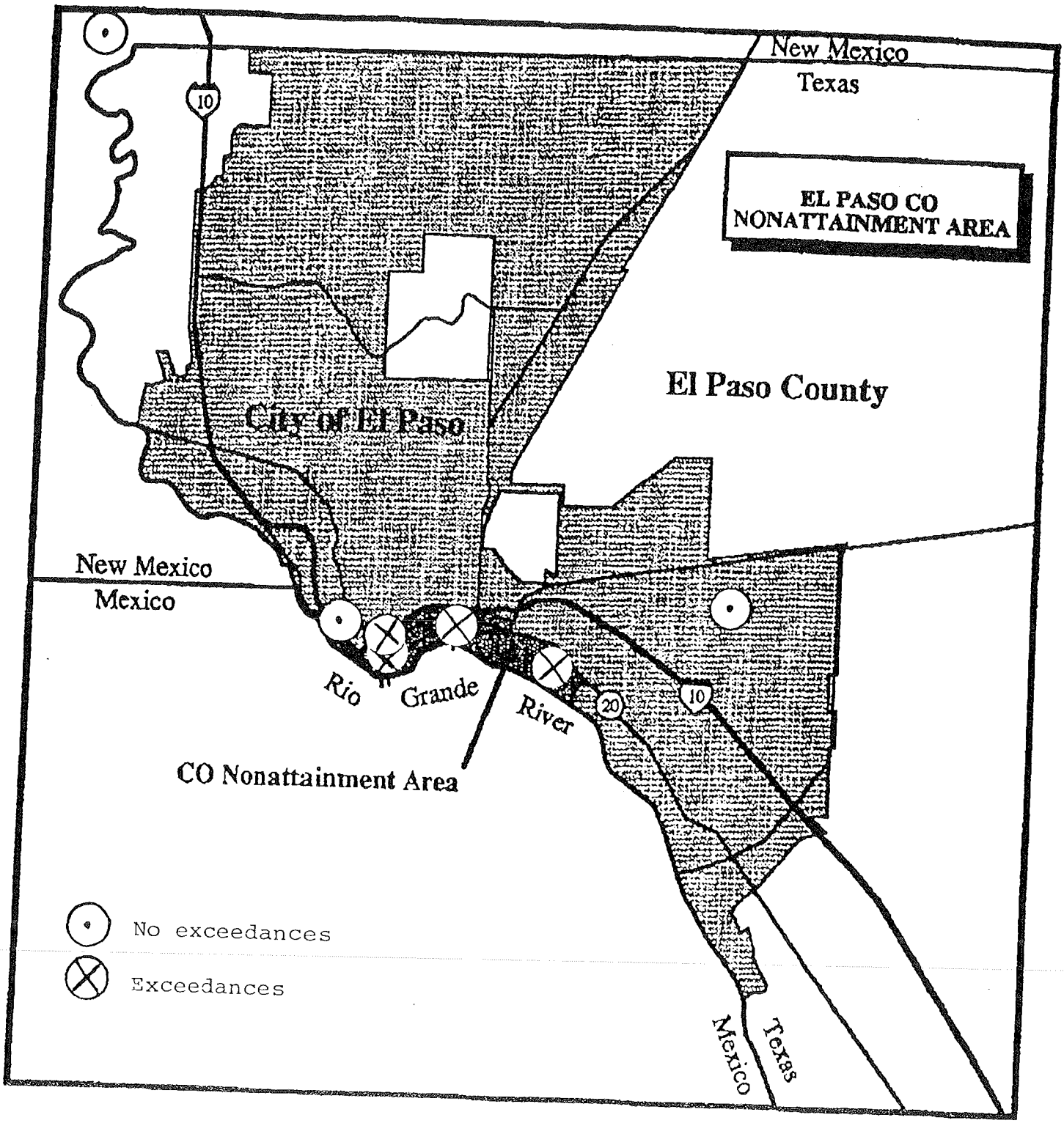
We will model Ascarate Park to demonstrate that U.S. sources alone cannot account for the high monitored values, and therefore Mexican sources are a significant contributor to the total CO loading. We expect that it will not be identified by either the traffic volume or level of service screening technique. Ascarate Park in the U.S. has experienced monitored exceedances and yet has no nearby intersections and no large emissions sources nearby in the United States. However, Ascarate Park is within 1000 meters of the Mexican Border and experiences southerly winds during CO episodes.

IV. PROPOSED MODELING TIMELINE

CAL3QHC and RAM Modeling for El Paso

The following modeling schedule was developed to meet the deadlines agreed upon with EPA Region 6 for the Section 818 Demonstration for Carbon Monoxide for El Paso. The schedule is based upon the assumption that EPA will be able to review the enclosed modeling protocol and approve it within 60 days of submission.

Tasks	Projected Completion
MODELING	
Submit Modeling Protocol	08/31/93
Receive EPA Approval for RAM	10/31/93
Meteorological Analysis	12/31/93
CAL3QHC Intersection Modeling	12/31/93
RAM Emissions Inventory	01/31/94
RAM Modeling (Background)	04/30/94
Model Control Strategies	06/30/94
Complete Draft Technical Report	08/30/94
Receive EPA Comments on Draft	09/30/94
Send Final Technical Report to EPA	11/15/94
ADMINISTRATION	
Draft Rules	12/31/94
Commission Reviews Draft Rules and Technical Report	01/25/95
Publish Notice of Hearing	02/10/95
Public Hearing	03/10/95
Analysis of Testimony	04/30/95
Agenda Mailout	05/17/95
TNRCC Adoption	06/07/95
Publish in Texas Register	06/30/95
Transmittal to EPA	07/31/95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