

APPENDIX S

November 30, 2000 Updates to the ROP and Attainment Demonstration SIP for the HGA Ozone
Nonattainment Area: Point Source Emissions Inventories

Houston/Galveston Attainment Demonstration and
Post-1999 Rate-of-Progress SIP

December 2000

This appendix documents the procedures used for the November 30, 2000 updates to the point source ROP inventories and control strategy reductions for the HGA Ozone Nonattainment Area. Comments on the 1999 HGA SIP submittal included a request by EPA to include milestone analysis for ROP. The attached memorandum describes the methodology used by TNRCC Technical Analysis Division staff to estimate 2002, 2005 and 2007 ROP inventories for point sources.

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

To: Paul Henry

Date: June 3, 2000

From: Kathy Pendleton

Subject: Future Inventory Levels for Houston/Galveston Using Method Outlined in April 19, 2000 State Implementation Plan Revisions, Appendix U.

It was requested that the 2002, 2005, and 2007 future case nitrogen oxide (NO_x) and volatile organic compound (VOC) inventories for the Houston/Galveston area be calculated. Because the latest approved growth method for point sources was that which appeared in the April SIP revisions submitted from TNRCC to the EPA, this method was used. The original proposal for this method was submitted to the EPA and was documented in a interoffice memo from Pendleton, Kathy to Henry, Paul; titled "Estimation of NO_x and VOC Emission Changes In the TCAS, Houston/Galveston, Beaumont/Port Arthur, and Dallas Areas Using Survey Data; dated May 11, 1999. The EPA modified the method outlined in the May 11 memo by incorporating the bankable emissions from shut down units in the calculation. This methodology is outlined in "Revisions to the State Implementation Plan (SIP) For the Control of Ozone Air Pollution", appendix U, dated April 19, 2000. It is attached for reference.

Future case inventories are estimated in two manners. The first methodology is to start from the 1990 base as refined for better emissions calculations. The second method is to cast from the 1999 values reported in the February 5, 1998 revisions to the SIP, Attainment Demonstration for the Houston/Galveston Ozone Nonattainment Area.

Method 1: From the 1990 Base Inventory

The NO_x emissions reported in this memo are extracted either directly or by linear interpolation of the data provided in appendix U. The VOC emissions were calculated using the same method as outlined in appendix U. The calculation for VOC is summarized below. All values are reported Tables 1 and 2:

Table 1. Emissions in tons/year

| Pollutant | 1990 - Adjusted | 2002 | 2005 | 2007 |
|-----------------|-----------------|---------|---------|---------|
| NO _x | 249,832 | 249,626 | 249,806 | 249,925 |
| VOC | 154,513 | 154,856 | 154,942 | 155,000 |

Table 2. Percent Growth Rate

| Pollutant | 1990 - 1999 | 2000 - 2007 |
|-----------------|-------------|-------------|
| NO _x | -0.01301/yr | +0.02389/yr |
| VOC | +0.0185/yr | +0.0185/yr |

NO_x Calculations From 1990 Adjusted Base

The NO_x values for growth rate, 1990 adjusted emissions, and 2007 projected emissions were obtained from the April SIP, appendix U, Table 1 submitted from TNRCC to EPA. A copy of this appendix is attached. The values for the 2002 and 2005 emissions were linearly extrapolated between the 2000 and 2007 NO_x reported in appendix U, Table 1. The growth rate changed at the year 2000 to reflect approval of the attainment demonstration with a 90% NO_x control in the Houston/Galveston eight county area. It was assumed that the level of emission controls for stationary sources will be established and will reduce the baseline from which surplus emission reductions could be calculated. The method for these calculations as reported in the appendix was EPA's modification of a method proposed by TNRCC, documented in the May 11, 1999 memo and reported in appendix A of the SIP.

VOC Calculations From 1990 Adjusted Base

The EPA only calculated NOX emissions and growth rates, so the process was replicated for VOC numbers. Because any VOC control levels and timing were not known by me, the growth rate was estimated solely on the changes in the 90-96 inventory. Modifications can be made after the information becomes available.

Step 1. Adjust the 1990 inventory to reflect more accurate emissions. Changes between 1990 and 1996 due to emission factor changes (3,042 tons) and calculation methodology changes (5,030 tons) total 8,072 tons. Because the base VOC inventory is rule effective (RE) adjusted, these values also need to be RE adjusted.

The 8,072 tons are from the eight county area. To determine an effective RE for this area, the county level RE for each of the eight counties was normalized with the level of emissions.

$$RE_{8 \text{ county}} = \frac{\sum (RE_{\text{county}} * \text{emission}_{\text{county}})}{\sum \text{emission}_{\text{county}}}$$

$$RE_{8 \text{ county}} = 1.29$$

Adjust the 1990 baseline emissions.

$$\begin{aligned} EI_{90 \text{ adjusted}} &= 164,926 - (8,072 * RE_{8 \text{ county}}) \\ EI_{90 \text{ adjusted}} &= 154,513 \text{ tons} \end{aligned}$$

Step 2. Calculate the retired shutdown for Houston/Galveston. The offset ratio (OR) is 1.30/1.0. The shutdown units (SD₉₀₋₉₆) between 1990 and 1996 account for 3,180 tons of emissions

$$\begin{aligned} SD_{\text{adjusted } 90-96} &= SD_{90-96} - (SD_{90-96} / OR) \\ &= 3,180 - (3,180/1.3) \\ &= 733.8 \text{ tons} \end{aligned}$$

Step 3. Determine the annual growth rate (GR_{annual}) based on the start-up and adjusted shutdown emissions in the area. It is a 6 year period so the value is divided by 6 to annualize it.

$$\begin{aligned} GR_{\text{annual}} &= (SU_{90-96} - SD_{\text{adjusted } 90-96}) / 6 \\ &= (905 - 733.8) / 6 \\ &= 28.53 \text{ tons/year} \end{aligned}$$

Where: SU₉₀₋₉₆ is the 905 tons of start up emissions reported in the survey from 1990 to 1996.

Applying this to the base inventory to get growth rate as a percent of the inventory.

$$\begin{aligned} \%GR &= (GR_{\text{annual}} / EI_{90 \text{ adjusted}}) \\ &= (28.53 / 154513) \cdot 100 \\ &= +0.0185\% \end{aligned}$$

Step 4. Apply the growth rate (%GR) to determine the future inventory years using the method outlined in EPA's process in appendix U.

$$\begin{aligned} EI_{\text{future year}} &= EI_{90 \text{ adjusted}} (1 + \%GR/100)^{(\text{future year} - 1990)} \\ EI_{2002} &= 154,513 (1 + 0.0185/100)^{(2002 - 1990)} \\ &= 154,856 \text{ tons} \end{aligned}$$

And similarly,

$$\begin{aligned} EI_{2005} &= 154,942 \text{ tons} \\ EI_{2007} &= 155,000 \text{ tons} \end{aligned}$$

Method 2: Calculations From the 9% ROP SIP

A document titled "Revisions to the State Implementation Plan For the Control of Ozone Air Pollution"; dated February 5, 1998; lists 1999 rate of progress (ROP) target calculations. The 1999 daily inventory listed in this document was used to extrapolated future case NO_x and VOC emission values for 2002, 2005, and 2007. The same growth rate that was developed using the survey data and modified with bankable shutdown emissions was used.

Table 3. NO_x Emissions In Tons Per Day

| | 1999 ROP SIP | 2002 | 2005 | 2007 |
|---|--------------|--------|--------|--------|
| Inventory | 712.27 | 712.78 | 713.12 | 713.46 |
| Inventory - Control Strategy ¹ | 641.04 | 641.50 | 641.81 | 642.12 |

Notes:

- Control Strategy includes:
NO_x RACT

Table 4. VOC Emissions In Tons Per Day

| | 1999 ROP SIP | 2002 | 2005 | 2007 |
|---|--------------|--------|--------|--------|
| Inventory | 518.56 | 518.85 | 519.04 | 519.23 |
| Inventory - Control Strategy ² | 504.04 | 504.32 | 504.51 | 504.69 |
| Inventory - Control Strategy -RE ³ | 477.10 | 477.36 | 477.54 | 477.22 |

Notes:

- Control Strategy includes:
Pulp & Paper MACT
RFG - Tanks
RFG - Loading Racks
- The Rule Effectiveness (RE) credit is for floating roof tanks.

These emissions were estimated using the equation,

$$EI_{\text{future year}} = EI_{99\ 9\% \text{ ROP SIP}} (1 + \%GR/100)^{(\text{future year} - 1999)}$$

where:

$EI_{99\ 9\% \text{ ROP SIP}}$ are the values listed in the 1999 ROP SIP column above,

$\%GR = .02389\%$ for NO_x

$\%GR = .00185\%$ for VOC

cc:

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