APPENDIX U

POINT SOURCE GROWTH RATES FOR HGA, BPA, AND DFW SIP MODELING, 3/22/00, RICHARD KARP

DALLAS/FORT WORTH ATTAINMENT DEMONSTRATION

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GROWTH ESTIMATES

To estimate growth for stationary point sources, TNRCC has proposed using survey data of point source startups and shutdowns that occurred over the period from 1990 to1996. The survey questionnaire was included with the 1996 annual emissions inventory that was sent to sources in ozone nonattainment areas. TNRCC compiled the survey data into categories reflecting the various reasons for changes in emissions between 1990 and 1996 for the HG, BPA, DFW and TCAS regions (see appendix A). Not all of the point source facilities responded to the survey. The TNRCC emission inventory regulation at 30 TAC 101.10(b)(2)(A) states that accounts that have operational changes which result in less than a 5% or 5 tpy change in emissions are not required to submit an annual emissions inventory update. So the emission changes reflected in the survey may not be proportional to changes in the entire emissions inventory.

The following emission change categories were enumerated for the four regions:

1. Emission Factor Changes,
2. Calculation Methodology Changes,
3. Changes Due to Added Control Devices,
4. Process Changes,
5. Operating Rate Changes,
6. Equipment Start-up,
7. Equipment Shutdown, and
8. Other.

EPA/6 proposes the following procedure to be used in developing growth rates from the survey data for the four regions.

1. Assume that the emission change categories, 1 and 2 above reflect refinements to the 1990 Emission Inventory (EI). For example, categories 1 & 2, presumably represent more accurate emissions. Therefore, the 1990 EI needs to be adjusted downward to reflect the more refined emission estimates. For example, the survey indicates that for the HG region:

   a. the Emission Factor Changes (category 1 above) amount to 9696tpy, and
   b. the Calculation Methodology Changes (category 2 above) amount to 12,813tpy,

   So the adjusted 1990 EI for the HG region is: 272,341 - 22,509 = 249,832tpy.

2. The shutdown emissions have the potential to be certified as surplus (i.e., bankable) and placed into the TNRCC bank. Upon use as offsets for nonattainment New Source Review (NSR) purposes, a source is required to obtain emission offsets in a ratio greater than 1:1 . Thus, based upon an area's offset ratio, a portion of the shutdown emissions will be permanently retired. The offset ratios for the nonattainment areas are:

Offset Ratio (OR)	Nonattainment area
1.30:1	HGA
1.20:1	DFW
1.15:1	BPA

Thus the retired shutdown emissions are calculated for each nonattainment area by:

$$SDa_{90\text{-}96} = SD_{90\text{-}96} - (SD_{90\text{-}96} / OR_{NA})$$

Where: $SD_{90\text{-}96}$ = emission shutdowns between 1990 and 1996,
OR_{NA} = offset ratio for specified nonattainment area, and
SDa = retired shutdown emissions.

3. The annual emission Growth Rate (GR) for the period 1990-1996 can then be calculated as the difference between the survey startups ($SU_{90\text{-}96}$) minus the portion of the shutdowns permanently retired ($SDa_{90\text{-}96}$) divided by six (6) years. Thus the annual growth rates for the nonattainment areas are:

$$GR = [(SU_{90\text{-}96}) - (SDa_{90\text{-}96})] / (6 \text{ Years})$$

The annual percent emission Growth Rate ($\%GR_{90\text{-}96}$) for the period 1990-1996 can then be determined by:

$$\%GR_{90\text{-}96} = (GR / EI_{90}[ADJ]) * 100 \quad \text{in units of} \quad \% \quad \text{per year}$$

where: EI_{90}[ADJ] is the adjusted 1990 EI from step one above.

4. The growth of emissions from 1990 to 2000 when the attainment demonstration will be approved can be determined from

$$EI_{2000} = EI_{90}(ADJ) * (1+\%GR_{90\text{-}96})^{10}$$

5. When the attainment demonstration is approved, the level of emission controls for all stationary sources within the nonattainment area will be established. For purposes of discussion, assume that HGA will require 90% NOx control, DFW 88%, BPA 40% and that the TCAS region is an overall 5% control. These control requirements will reduce the baseline from which surplus emission reductions could be calculated. When these controls are mandated, the portion of the shutdown emissions after controls (SD_{AC}) that will be retired can be determined as:

$$SD_{AC} = SDa_{90\text{-}96} * (1 - \text{Control \%})$$

6. Assuming that the startup rate remains constant and using the shutdown emissions

adjusted for the lower baseline resulting from the control strategies assumed in the attainment demonstration, the emission growth rate from 2000 to 2007 (GR) can be calculated as:

$$GR = [(SU_{90\text{-}96}) - (SDa_{AC})] / (6 \text{ Years})$$

The annual percent emission Growth Rate ($\%GR_{00\text{-}07}$) for the period 2000-2007 can then be determined by:

$$\%GR_{00\text{-}07} = (GR / EM_{2000}) * 100 \quad \text{in units of} \quad \% \quad \text{per year}$$

7. The growth of emissions from 2000 to the 2007 attainment date can be determined from:

$$EI_{2007} = EI_{2000} * (1+ \%GR_{00\text{-}07})^7$$

8. The growth of emissions from 1990 to the 2007 attainment date can be determined from:

$$GR = (EI_{2007} - EI_{90}[ADJ])$$

The annual percent emission Growth Rate ($\%GR_{90\text{-}07}$) for the period 1990-2007 can then be determined by:

$$\%GR_{90\text{-}07} = (GR / EI_{90}[ADJ]) * 100 \quad \text{in units of} \quad \% \quad \text{per year}$$

$\%GR_{90\text{-}07}$ is the growth rate to use with the base case point source modeling inventory to estimate the 2007 future year modeling inventory.

Table 1 contains the results for NOx emission growth from stationary sources from 1990 to 2007.

Table 1

1990 - 2007 NOx Growth Rate due to Startups and Shutdowns Only

REGION	HGA	BPA	DFW	TCAS
1990 NOx Emissions, tons	272,341	77,335	38,101	385,741
ADJ.1990 NOx Emissions, tons	249,832	71,150	28,017	347,724
% Growth per Year 1990-1996	-0.01301	-0.1246	+0.01527	+0.01807
2000 NOx Est. Emissions, tons	249,507	70,269	28,060	348353
% Growth per Year 2000-2007	+0.02389	-0.07554	+0.01594	+0.01804
2007 NOx Est. Emissions, tons	249,925	69,898	28,091	348,793
Total NOx Growth, 1990-2007 in tons	+93	-1,252	+74	+1,069
% Growth per Year 1990-2007	+0.002179	-0.1035	+0.01557	+0.01808

Note: 1.This table is based upon the survey data in appendix A.
2. An Annual Emission estimate for DFW was determined as 350*(Daily Ozone Season Emission).