

## CHAPTER 3: TARGET EMISSION LEVELS AND RFP DEMONSTRATION

### 3.1 INTRODUCTION

This chapter details the process and results to show that the state meets the 15 percent emission reduction requirements for the period between the 2002 base year through the first RFP milestone year 2008.

Compliance with the 2008 milestone emission reduction requirements are demonstrated by using EPA methodologies, first to calculate the elements of the RFP demonstration and then to use these elements in conjunction with EPA RFP methodology to demonstrate compliance with RFP reduction requirements.

The required RFP elements are:

- 2002 base year emissions,
- 2002 to 2008 non-creditable reductions,
- 2008 target levels of emissions,
- 2008 projected emissions with growth,
- 2008 required emission reductions for VOC and NO<sub>x</sub>, and
- control strategy emissions reduction for 2008.

This chapter describes how the elements of the HGB 2008 RFP demonstration are calculated and used to demonstrate compliance with 2008 RFP requirements and provides a summary of the 2008 HGB RFP demonstration. First, the target level of emissions for 2008 is calculated. Second, the 2008 RFP control reductions are subtracted from the 2008 EI that includes growth between 2002 and 2008. When the 2008 projected inventory, minus the RFP controls, is less than the target level of emissions for VOC and/or NO<sub>x</sub>, the RFP requirement has been met.

### 3.2 TARGET LEVEL METHODOLOGY

EPA guidance specifies the method states use to calculate the maximum amount of emissions a nonattainment area can emit for each RFP milestone year. These RFP target levels of emissions are calculated with a six step process.

1. Develop the 2002 base year inventory.
2. Develop the 2002 RFP base year inventory.
3. Develop the adjusted base year inventories for 2002 and 2008.
4. Calculate the non-creditable fleet turnover correction.
5. Calculate the 2008 necessary 15 percent emission reduction.
6. Calculate the 2008 target levels of emissions for VOC and NO<sub>x</sub>.

### 3.3 CALCULATION OF TARGET EMISSION LEVELS

Step one of the RFP target calculation is development of the 2002 base year EI. EPA guidance specifies the method states must use to develop the base year and all other SIP EIs. Details of the development of the 2002 HGB base year inventory are discussed in Chapter Two. Summaries of the 2002 HGB base year NO<sub>x</sub> and VOC emissions inventories are presented in Table 2-13: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions* in Chapter 2. A summary of the target calculations is presented in Tables 3-1: *Summary of Calculation of Target Level for HGB*.

The second step of the RFP target calculation methodology adds or subtracts any emissions from outside the nonattainment area that need to be included with or excluded from the nonattainment

area. The resulting inventory is called the 2002 RFP base year inventory and represents the total anthropogenic emissions for the area. Details of the development of the 2002 HGB RFP base year inventory are discussed in Chapter Two. A summary of the 2002 DFW RFP base year emission inventory is presented in Table 2-13: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions*.

Step three of the target calculation methodology is development of the adjusted base year (ABY) inventories for 2002 and 2008. These inventories are an algebraic representation of the effects of the pre-1990 FCAAA controls projected to the RFP base and milestone years. As such, these inventories can be used to estimate the effects of the pre-1990 FCAAA controls between milestone years. This estimation allows for the calculation of the non-creditable control reduction that is done as step four. The emission rates for an ABY inventory are developed using the latest version of EPA's emission factor model, MOBILE6.2.03. The model input file is set up to turn off all 1990 FCAAA effects, set the model evaluation year to the RFP base or milestone year, and then the model is run to determine emission factors for each base or milestone year with only pre-1990 FCAAA controls. The emission factors for all years are then multiplied by the 2002 base year VMT. Since all the inventories use the base year VMT, these inventories are referred to as RFP ABY inventories. Details of the development of the 2002 and 2008 HGB RFP ABY inventories are documented in Chapter Two.

Step four, calculating the non-creditable fleet turnover correction, is accomplished by subtracting the 2008 ABY inventory from the 2002 adjusted base inventory. Since the ABY inventories estimate the effects of the non-creditable pre-1990 FCAAA controls, the difference between ABY inventories represent an estimate of the non-creditable RFP emission reductions, also referred to as the fleet turnover correction. The equation for calculating the fleet turn over correction for 2008 is:

$$\text{Fleet Turnover Correction for 2008} = [ \text{EF}_{2002\text{ABY}} * \text{VMT}_{2002} ] - [ \text{EF}_{2008\text{ABY}} * \text{VMT}_{2002} ]$$

Where:

- EF<sub>2002ABY</sub> = MOBILE6.2.03 emission rate with pre-1990 CAA controls and 2002 evaluation year
- EF<sub>2008ABY</sub> = MOBILE6.2.03 emission rate with pre-1990 CAA controls and 2008 evaluation year
- VMT<sub>2002</sub> = 2002 vehicle miles traveled

Step five, calculating required 2008 reductions, is accomplished by multiplying the 2002 ABY inventory values by the percent reduction needed to meet RFP requirements. EPA's Phase II Eight-Hour Ozone Implementation Rule requires all ozone nonattainment areas classified as moderate and above to reduce NO<sub>x</sub> and/or VOC emissions by 15 percent for the period 2002 through 2008, but use of NO<sub>x</sub> emissions reductions must meet the criteria in Section 182(c)(2)(C) in the FCAAA. For the eight HGB counties, an equivalent percentage of NO<sub>x</sub> reduction may be substituted for VOC reduction requirements. The total percent NO<sub>x</sub> and VOC reductions must equal the 15 percent. Accordingly, the RFP reduction requirement for this SIP is satisfied with 15 percent reduction in NO<sub>x</sub> emissions. The following equation generally describes the method to calculate the percentage of NO<sub>x</sub> emissions substituted for VOC emissions:

$$N_{2008} = 15 - V_{2008}$$

where:

$V_{2008}$  = percentage VOC reductions for 2008  
 $N_{2008}$  = percentage NO<sub>x</sub> reductions for 2008

The VOC and NO<sub>x</sub> percentages are multiplied by the 2002 ABY inventories for VOC and NO<sub>x</sub> respectively to calculate the required VOC and NO<sub>x</sub> emission reductions for 2002. The adjustment to 2008 is calculated by subtracting the non-creditable reductions between 2002 and 2008 from the 2002 base year inventory. The equations for calculating the required percent reductions for VOC and NO<sub>x</sub> are described below. Details of the emission reductions used to satisfy the RFP requirements are documented in Chapter 4 and summarized in Table 4-1: *Summary of HGB RFP Emission Reductions for 2008.*

$$RQ_{VOC} = [ BY_{2002VOC} - ( ABY_{2002VOC} - ABY_{2008VOC} ) ] * PV_{2008}$$

and

$$RQ_{NOx} = [ BY_{2002NOx} - ( ABY_{2002NOx} - ABY_{2008NOx} ) ] * PN_{2008}$$

where:

$RQ_{VOC}$	= required percent VOC emission reductions by 2008
$RQ_{NOx}$	= required percent NO <sub>x</sub> emission reductions by 2008
$BY_{2002VOC}$	= 2002 base year inventory for VOC
$BY_{2002NOx}$	= 2002 base year inventory for NO <sub>x</sub>
$ABY_{2002VOC}$	= 2002 adjusted base year inventory for VOC
$ABY_{2002NOx}$	= 2002 adjusted base year inventory for NO <sub>x</sub>
$ABY_{2008VOC}$	= 2008 adjusted base year inventory for VOC
$ABY_{2008NOx}$	= 2008 adjusted base year inventory for NO <sub>x</sub>
$PV_{2008}$	= percentage VOC reductions by 2008
$PN_{2008}$	= percentage NO <sub>x</sub> reductions by 2008

Step six, calculating 2008 target levels of emissions, is accomplished by subtracting the required emission reductions calculated in step five and the fleet turnover correction factor calculated in step four from the 2002 base year inventory. This target level represents the level of emissions in 2008 in order for the HGB area to meet its eight-hour ozone RFP requirements for the 2008 RFP milestone year. Because the fleet turnover correction affects both NO<sub>x</sub> and VOC, target levels will be calculated for both pollutants even when the entire reduction requirement is taken from one pollutant or the other. The calculation of the target levels of emissions for the milestone year can be generalized into the following equation:

$$TL_{2008X} = RFPBY_{2002X} - RQ_X - FTC_{2008X}$$

where:

$TL_{2008X}$	= Target level of emissions for 2008 milestone
$RFPBY_{2002X}$	= 2002 RFP base year emissions
$RQ_X$	= Emission reduction requirement for 2008 for pollutant X
$FTC_{2008X}$	= Fleet turnover correction term for 2008 for pollutant X
X	= Either VOC or NO <sub>x</sub>

The RFP plan must demonstrate that the projected emissions for 2008, reflecting the RFP control strategy, will be less than or equal to the calculated target values. Appendix 1, Sheet 14 documents the calculation of the 2008 target values. Table 3-1: *Summary of Calculation of Target Level for HGB* summarizes calculation of the target levels for 2008 for the HGB area. The following sections describe how the target levels are integrated into the RFP demonstration.

**Table 3-1: Summary of Calculation of Target Level for HGB**

Description	NO <sub>x</sub> tpd	VOC tpd
① Step 1: 2002 Base Year Inventory (Tables 2-13 and 2-14)	830.57	743.30
② Step 2: Add or subtract emissions that are to be added from outside the NA	0.00	0.00
③ 2002 RFP Base Year Inventory (Tables 2-14 and 2-15)	830.57	743.30
④ Step 3: 2002 Adjusted Base Year Inventory (Appendix 1, Sheet 9, ABY Calcs)	882.57	791.20
⑤ 2008 Adjusted Base Year Inventory (Appendix 1, Sheet 9, ABY Calcs)	840.37	781.20
⑥ Step 4: Calculate Non-creditable reductions (④ minus ⑤ )	42.20	10.00
⑦ Step 5 :Adjust 2002 Base Year Inventory for Non-creditable Reductions (③ minus ⑥)	788.37	733.30
⑧ Percent of NO <sub>x</sub> (PN) and VOC (PV) to meet 15% Reduction Requirement PN + PV = 15	15	0
⑨ Calculate the 2002 to 2008 15% Reduction Requirement (⑦ x ⑧ )	118.26	0.00
⑩ Step 6 Calculate the Target Level of Emissions (③ minus ⑥ minus ⑨ )	670.11	733.30

### 3.4 GROWTH

This 2008 RFP SIP demonstration must also describe how any growth in emissions between 2002 and 2008 will be offset. If the target levels are subtracted from projected inventories that include growth and exclude all controls between 2002 and 2008, the result will be the required RFP control reductions that account for noncreditable reductions, the percent reduction requirement and emissions growth. The following two equations represent the general calculation methodology for determining the total amount of control reduction for VOC and NO<sub>x</sub> that is required for the 2008 HGB milestone year. Table 3-2: *Summary of Required Reductions that Include Growth for HGB* summarizes the calculation of the required reductions for the HGB area.

$$ER_{NO_x2008} = UPE_{2008NO_x} - TL_{2008NO_x}$$

$$ER_{VOC2008} = UPE_{2008VOC} - TL_{2008VOC}$$

Where:

$$ER_{NO_x2008} = \text{RFP NO}_x \text{ emission reductions for 2008}$$

$$UPE_{2008NO_x} = \text{uncontrolled projected NO}_x \text{ emissions for 2008}$$

$$TL_{2008NO_x} = \text{Target level of NO}_x \text{ emissions for 2008 milestone}$$

$$ER_{VOC2008} = \text{RFP VOC emission reductions for 2008}$$

$$UPE_{2008VOC} = \text{uncontrolled projected VOC emissions for 2008}$$

$$TL_{2008VOC} = \text{Target level of VOC emissions for 2008 milestone}$$

**Table 3-2: Summary of Required Reductions that Include Growth for HGB**

Description	NO <sub>x</sub> tpd	VOC tpd
① Uncontrolled Projected 2008 Inventory (Chapter 2, Tables 2-15 and 2-16)	1026.63	948.03
② Target Level of Emissions for 2008 (from Table 3-1)	670.11	733.30
③ Required Reductions for 2008 (① minus ② )	356.52	214.73
④ Noncreditable Reductions (from Table 3-1)	42.20	10.00
⑤ 2002 to 2008 15% Reduction Requirement (from Table 3-1)	118.26	0.00
⑥ Amount of Reduction to Account for Growth (③ minus ④ minus ⑤ )	196.06	204.73

The projection or forecast year EIs is the state's estimation of the level of VOC and NO<sub>x</sub> emissions if no further action is taken to control VOC or NO<sub>x</sub> emissions. The VOC and NO<sub>x</sub> projected year EIs are derived by applying the appropriate projection methodologies to the 2002 base year EIs, to emission factor development, and/or to activity level estimates. The resulting inventories include any growth that occurs between 2002 and 2008. The projection methodology for the uncontrolled 2008 RFP EIs excludes changes in the emission factors due to control strategies so that the projections represent the total growth in emissions. The development of the uncontrolled projected EIs is documented in Chapter Two.

### 3.5 RFP DEMONSTRATION

The EPA's Phase II Eight-Hour Ozone Implementation Rule requires all ozone nonattainment areas classified as moderate and above to reduce NO<sub>x</sub> and/or VOC emissions by 15 percent for the period 2002 through 2008. The target levels are subtracted from the emissions forecast to calculate the required emission reductions necessary for the 2008 milestone year. The actual reductions achieved are then subtracted from the required reductions. The control strategy plan must show emission reductions that will reduce the future EIs to a value less than the emissions target value. For the eight HGB counties, this requirement is met by reductions of 15 percent NO<sub>x</sub> for RFP and three percent NO<sub>x</sub> for contingency purposes. Since all reductions in the HGB counties are accomplished with NO<sub>x</sub> reductions, there are no VOC reduction requirements for these counties. Table 3-3: *Summary of RFP Demonstration for Eight HGB Counties* summarizes the demonstration of the RFP plan for HGB for the 2008 milestone year. All RFP calculations, including the required 2008 reductions, the fleet turnover correction factor, and the 2008 target emission levels are calculated and shown in Appendix 1.

**Table 3-3: Summary of RFP Demonstration for Eight HGB Counties for 2008**

<b>Description</b>	<b>NO<sub>x</sub> tpd</b>	<b>VOC* tpd</b>
2008 Uncontrolled Emissions Forecast (Chapter 2, Tables 2-15 and 2-16)	1026.63	948.03
Target Level of 2008 Emissions (Table 3-1)	670.11	733.30
Required Reductions from 2008 Uncontrolled Emissions Forecast (Table 3-2)	356.52	214.73
Sum of 2008 RFP Control Reductions (from Chapter 4, Table 4-1)	472.67	341.40
Are Control Reductions Greater Than Required Reductions?	Yes	Yes

\* VOC reductions were not used for RFP demonstration purposes, but are needed to establish the MVEB as detailed in Chapter Five.