Eastern Research Group, Inc.

STAGE I AND STAGE II GASOLINE DISPENSING EMISSIONS INVENTORY

Final

Prepared for:

Texas Commission on Environmental Quality
Air Quality Division
MC-164, P.O. Box 13087
Austin, TX 78711-3087

August 31, 2008

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ACRONYMS

ERG	Eastern Research Group, Inc.
NIF	National Emission Inventory Format
OBVR	on-board vapor recovery
OSD	ozone season day
PST	petroleum storage tank
RFG	reformulated gasoline
RVP	Reid vapor pressure
SAS	Statistical Analysis Software
SCC	Source Classification Code
TAC	Texas Administrative Code
TCEQ	Texas Commission for Environmental Quality
TxDOT	Texas Department of Transportation
UST	underground storage tank
VMT	vehicle miles traveled
VOC	volatile organic compound

1.0 INTRODUCTION

Gasoline distribution operations (including Stage I and Stage II activities) can be a significant source of volatile organic compound (VOC) emissions within an area source inventory. Accurate gasoline throughput data and other activity information associated with underground gasoline storage tanks are needed for the estimation of VOC emissions from gasoline distribution operations.

In the past, emissions from gasoline distribution operations in Texas were estimated using state-level gasoline sales tax data obtained from the Comptroller's Office, and then allocated to the county-level using vehicle miles traveled (VMT) and/or population data. The allocation of emissions using surrogate activity data was performed because activity data were unavailable at the individual gas station level.

Previously, Eastern Research Group, Inc. (ERG) was contracted by the Texas Commission for Environmental Quality (TCEQ) to conduct a limited field survey of gasoline station throughput data and develop county-level inventories of VOC emissions associated with the fuel dispensing at retail gasoline stations for 2002, 2005, and 2010 (ERG, 2005). The operations inventoried included fuel delivery to underground storage tanks (USTs) (Stage I), vehicle refueling (Stage II), gasoline truck transit, and storage tank breathing. The current study is an effort to revise the activity data and gasoline emissions inventory that were developed in 2005 and develop a gasoline emissions inventory for the year 2007. The most significant improvement over the 2005 study involved conducting a more comprehensive statewide survey of gasoline service stations.

The remainder of the report is presented in the following sections:

- Section 2.0 provides a description of the data collection and survey methodology;
- Section 3.0 describes the development of the database using the collected data;
- Section 4.0 outlines the development of the predictive model;
- Section 5.0 describes the gasoline distribution inventory development;
- Section 6.0 provides results and conclusions related to the project;
- Section 7.0 identifies some recommendations for future work associated with gasoline distribution operations;
- Section 8.0 lists the references used to perform this work;
- Appendix A provides the survey cover letter and survey form;

- Appendix B lists the number of surveys mailed by county;
- Appendix C provides the SAS code that was used for statistical analysis;
- Appendix D presents the crosswalk between county and meteorological stations;
- Appendix E provides the seasonal meteorological data for the Texas meteorological stations; and
- Appendix F includes the MOBILE6 input files that were used to develop the Stage II emission factors.

2.0 DATA COLLECTION

A mail-out survey of gasoline fueling station operators was conducted by ERG during the spring of 2008. The gasoline service stations were asked to provide monthly gasoline sales data for the year 2007. The survey was dated April 1 and was mailed out to 3,000 facilities on April 4. The survey is described in Section 2.1 and the survey sample design methodology is presented in Section 2.2.

2.1 Data Collection Survey

The survey consisted of cover letter on TCEQ letterhead and a one-page survey form. A copy of the survey is included in Appendix A. The survey form requested the following information:

- Facility data (i.e., station/facility name, number of tanks, contact person name, and contact phone number); except for the number of tanks, submittal of the other facility data was optional.
- Tank information (mandatory). This included tank capacity, gasoline grade, presence of Stage I controls, and presence of Stage II controls.
- 2007 annual and monthly throughput information for each tank (mandatory).

A deadline of April 30 was established for the submittal of completed survey forms; however, because of the extended time required for data entry, completed forms were accepted until all received data were entered into the survey database. Data acceptance was closed on June 25.

2.2 Sample Design Methodology

The starting point of the sample design was a database extract (current as of February 14, 2008) provided by TCEQ's Open Records & Reporting Services (Organ, 2008). This extract contained several files that identified permitted UST facilities, facility owners, UST-related information including UST capacity, type of liquid stored in the UST, and other facility-related

information. Several of these files were linked together to form a master sample file containing the following key variables:

- Facility Number (unique identifier);
- Facility Type (used to identify gasoline retail facilities);
- Facility Name;
- Facility Address (including street number, street name, city, state and zip code);
- Facility Manager;
- Facility Phone Number;
- Permittee Name;
- Number of USTs;
- UST capacity in gallons;
- Type of substance stored in the UST; and
- UST status (in use, removed from ground, or permanently filled in place);

After the master file was created, a number of different filters were applied to the file to eliminate extraneous or irrelevant records. The first two filters identified a large number of records to be deleted from the master file. The first filter identified those USTs that were storing non-gasoline substances (i.e., approximately 70,000 records), while the second filter identified those USTs that were removed from the ground, permanently filled in place, or temporarily out of use or empty (i.e., approximately another 70,000 records). Following the application of these two filters, the resultant master file contained about 39,000 records. Three additional screenings (i.e., wholesale facility-related records, records with tank capacities less than 1,000 gallons, and records with invalid addresses) were then applied to the master file. Following these screenings, the master sample file contained 17,024 records, of which approximately 85% of the facilities were retail gasoline service stations. The remaining 15% of the facilities included in the master sample file were fleet refueling stations, as well as agriculture, commercial, industrial, marine, and aviation facilities.

Based upon discussions with TCEQ staff, it was decided that 3,000 facilities would be surveyed for 2007 monthly gasoline throughput data. The survey was significantly different from ERG's 2005 survey effort in three respects:

- The survey was mailed out, while the 2005 survey effort was conducted via in-person site visits.
- The survey covered a significant portion of the overall master file (i.e., 3,000 facilities out of 17,024), while the 2005 survey effort was considerably smaller (i.e., a sample size of 70 facilities).

- The survey covered the entire state of Texas, while 2005 survey effort was geographically limited to a roughly triangular area between the cities of Austin, Dallas/Fort Worth, and Houston.

The sample of 3,000 facilities was stratified based upon the following survey subgroups:

- Subgroup 1 (Statewide geographic distribution - Three [3] surveys per county – 762 facilities);
- Subgroup 2 (Population distribution – 746 facilities surveyed based upon population of the county where they are located [i.e., counties with large populations were allotted more surveys than the counties with lesser population]) (U.S. Census, 2008);
- Subgroup 3 (VMT distribution – 746 facilities surveyed based upon the VMT distribution of the county where they are located [i.e., counties with high VMT were allotted more surveys than counties with low VMT]) (U.S. EPA, 2005); and
- Subgroup 4 (Ozone non-attainment and near non-attainment status – 746 facilities surveyed based upon the population distribution in counties that are non-attainment or near non-attainment for ozone).

The above survey stratification methodology accounts for population and gasoline usage variations. The methodology also addresses the influence of highway proximity and heavy traffic patterns in rural low population areas. Finally, this methodology places additional focus on ozone non-attainment and near non-attainment areas. The numbers listed above for each subgroup indicate the initial assignment of surveys. A listing of county-level surveys disaggregated by survey subgroups is included in Appendix B.

After the stratification methodology was developed, the sample master file containing 17,024 records was input into Statistical Analysis Software (SAS) and a random number was generated and assigned to each facility. Once the random numbers were assigned to each facility, then the data were sorted by county and random number. The first three facilities listed for each county were surveyed under Subgroup 1. After the Subgroup 1 facilities were identified, they were removed from the master dataset and then the remaining facilities to be surveyed under Subgroups 2, 3, and 4 were sequentially assigned the number of surveys indicated in the Appendix B table. If a particular county did not have three facilities to be surveyed under a particular subgroup, then the remainder of the surveys were allotted to the next subgroup. For instance, several counties had fewer than three facilities to be assigned under Subgroup 1; the remaining surveys were then assigned to Subgroup 2. As a result, the final distribution of surveys for Subgroups 1 through 4 was 731, 777, 743, and 749 surveys, respectively.

3.0 DATA AND DATABASE DEVELOPMENT

This section describes the results of the survey responses, as well as the gap filling methodologies that were applied to obtained data.

3.1 Survey Returns

As described above, the survey was mailed out on April 4. Data collection forms were accepted from April 7 through June 25. Survey follow-up was limited to requesting resubmittal of blurry faxes and clarifying missing tank capacities or gasoline grades. A number of phone calls were received by both ERG and TCEQ with most of the inquiries focused on the following issues: explanation of Stage I and Stage II controls, definition of throughput (i.e., fuel deliveries or sales receipts), and guidance for unusual tank configurations, such as compartmentalized (i.e., split) tanks or manifolded tanks (i.e., two tanks connected together and operating as one).

A total of 462 surveys (15.4%) were returned by the post office as undeliverable; this number was later reduced to 437 surveys (14.6%) due to submittal of electronic data from various corporate offices. The undelivered surveys were marked by the post office with various codes. These codes included the following (with the number of undeliverable surveys):

- Not Delivered as Addressed – 183
- No Mail Receptacle – 103
- Attempted – Not Known – 47
- No Such Number – 39
- Vacant – 23
- Insufficient Address – 21
- No Such Street – 6
- Moved – Left No Address – 5
- No Label – 3
- Refused – 2
- Unknown Reason – 2
- Box Closed – 1
- Unclaimed – 1
- Unable to Find –1

A total of 701 surveys (23.4%) from the 3,000 mailed surveys were submitted to ERG. Correcting for the 437 surveys that were undeliverable, the adjusted return rate increased to 27.4%. Of the 701 submitted surveys, 654 (93.3%) provided monthly gasoline throughput. An additional 32 surveys indicated that gasoline was not sold at that location, while another 15

surveys were not used due to illegible survey forms or other unusable data. Of the 701 submitted surveys, 607 of the facilities were identified as retail refueling facilities with another 61 facilities identified as fleet refueling facilities. The remaining facilities were either miscellaneous (e.g., aviation, marine, industrial) or not specifically identified. In addition to the 701 submitted surveys, fuel throughput data were submitted for another 956 facilities that were not included in the 3,000 facility sample. These additional data were typically submitted by corporate offices that received multiple surveys and decided that it was simpler to submit data for all of their facilities rather than extract data only for those facilities that received surveys. These data were electronically submitted which greatly expedited data entry. These additional data potentially introduced some bias relative to the initial stratified survey because it was unlikely that the distribution of these facilities exactly corresponded with the distribution of the survey. However, these additional data did significantly increase the quantity of data available for the statistical analysis. Some additional data from the Texas Department of Transportation (TxDOT) were not entered into the database because they were for aboveground storage tanks. A total of 1,610 facilities (i.e., 654 completed surveys with monthly gasoline throughput plus the 956 additional non-surveyed facilities) were included in the statistical analysis and modeling.

The survey included questions regarding the presence of Stage I and Stage II controls. However, many of the survey responses did not provided information regarding Stage I and Stage II controls. Also, some responses provided inconsistent information (e.g., no controls in a ozone non-attainment county which requires controls). Finally, a large number of the questions fielded by ERG from gasoline stations dealt with what Stage I and Stage II controls actually were. All of these factors pointed to potentially low quality information related to Stage I and Stage II controls. Therefore, it was decided to use existing Texas regulations to assign Stage I and Stage II controls at the county-level.

3.2 Gap Filling

Gap filling was selectively used with the collected data to address missing data fields. Out of the 1,610 collected responses, 1,436 responses were complete and did not require any gap filling. For remaining 174 incomplete responses, it was decided to separate out any tanks with complete data from tanks that required gap filling. Because the statistical analysis and modeling

was conducted at the tank-level, and not the facility-level, complete data from individual tanks were usable even though data for the entire facility were incomplete.

It was also decided that gap filling would only be used if there were 3 months or less of missing throughput data in order to reduce the potential amount of uncertainty introduced into the development of the predictive model. A total of 69 survey responses had 3 months or less of missing monthly throughput data; these were gap filled using linear interpolation and averaging. For instance, if a survey response had missing data for a particular month, then the average of the preceding and subsequent months was used to gap fill the missing data. In cases where data were missing for 2 or 3 consecutive months, then the average monthly throughput for the remaining months (9 or 10) to gap fill the missing monthly throughput data.

4.0 MODEL DEVELOPMENT

In order to develop the Stage I and Stage II gasoline dispensing emissions inventory for the year 2007, it was decided to use survey data to develop a predictive model that would predict tank-specific annual gasoline throughput based on gasoline grade and tank capacity. Since the emissions inventory was to be developed using VOC emission factors based upon gasoline throughput, it was essential to develop the model so that it would predict annual throughput at the service station level. A similar predictive model was developed for the previous study (ERG, 2005). The previous model was based on survey data from randomly selected gasoline service stations in one particular region in the state of Texas; the 2007 inventory survey was conducted statewide.

Regression models are used to predict a dependent variable based upon one or more independent variables. In this analysis, UST capacity is the independent or the predictor variable and gasoline throughput is the dependent or response variable. Regression models are powerful tools, which allow the prediction of future events using information from past or present events. One of the most commonly used regression methods is linear regression. Simple linear regression is a statistical method to predict a dependent (or predictor) variable (Y) using one independent (or response) variable (X). The predicted value of Y is a linear transformation of the X variable (or variables) such that the sum of squared deviations of the observed and predicted Y

is a minimum, known as the least squares method. The model can be stated in the following equation:

$$\mathbf{Y_i = b_0 + b_1 X_i}$$

where: Y_i = Response variable;
X_i = Predictor variable; and
b_0, b_1 = Regression coefficients.

Once the final survey database was gap filled and quality assured, the data was input into Statistical Analysis Software (SAS). The survey database was input into a comma-delimited format (.csv file) and used to input into SAS and saved as a SAS dataset for further analysis and manipulation.

For each storage tank at each facility, the key variables that were used for model building were tank capacity in gallons, gasoline grade (low, high, and mid), monthly throughput in gallons, and month of the throughput value. Throughput values were based on the number of gallons put in the underground storage tanks by the gasoline supplier. The modeling dataset contained 40,092 monthly observations of the individual tanks.

The initial statistical analysis revealed that tank capacity and gasoline grade were the largest influences on monthly throughput. However, the analysis also indicated that, once the effects of tank capacity and gasoline grade were accounted for, the influence of month on monthly throughput was not statistically significant. That is, the sample data did not indicate any consistent seasonal variations in throughput. Therefore, monthly throughputs for each tank were added together to calculate the annual throughput for each tank. All final modeling was then performed on the annual throughput data.

The sample data indicated that annual throughputs for tanks of the same capacity were widely varying. For example, the annual throughputs for low-grade 20,000-gallon tanks had a median throughput of 1,500,000 gallons/year, but the throughputs ranged from 600,000 gallons/year for the 10th percentile to 6,000,000 gallons/year for the 90th percentile. In addition, the sample data indicated that, as expected, the annual throughputs were smaller for smaller capacity tanks. For example, the annual throughputs for low-grade 8,000-gallon tanks had a

median throughput of 230,000 gallons/year, and the throughputs ranged from 64,000 gallons/year for the 10th percentile to 600,000 gallons/year for the 90th percentile.

Using all of the sample data, annual throughput was modeled as a function of tank capacity and gasoline grade. A copy of the SAS code used for the modeling is provided in Appendix C.

The models for the average annual throughput (in gallons) for the three gasoline grades are given by the following equations (where Capacity is the tank capacity in gallons):

- Low-grade: $0.00193 \times (\text{Capacity}^{2.13})$
- Mid-grade: $0.243 \times (\text{Capacity}^{1.40})$
- High-grade: $0.0935 \times (\text{Capacity}^{1.49})$

For example, the average annual throughputs for 10,000-gallon tanks (one of the most common sizes in the survey) would be 639,909 gallons, 98,654 gallons, and 86,967 gallons for low-, mid-, and high-grade gasolines. It should be noted that the coefficients and exponents in the model equations presented above are only shown to three significant digits; the actual models contain more significant digits.

The models above are based upon all available data, but the most frequent data occurred in the following tank capacity ranges:

- Low-grade – 6,000 to 20,000 gallons;
- Mid-grade – 6,000 to 12,000 gallons; and
- High-grade – 4,000 to 12,000 gallons.

Although most of the data occurred within these ranges, sparse data outside of these ranges were also used for model development and spanned the tank capacity range from 1,000 to 40,000 gallons.

The modeling indicated that the actual annual throughput for individual tanks can be several times larger or smaller than the average values calculated by the models. The reason for this is that different facilities experience different sales volume even though they may have the same tank capacity. Nevertheless, the annual total throughput for a large group of tanks (e.g., at the state- or county-level) has an uncertainty of about ±10% (for 95% confidence) because of

averaging. The actual total throughput will be within the uncertainty of the total of the model-predicted throughputs as long as the sample data is representative of the statewide facility usage characteristics.

5.0 EMISSIONS INVENTORY DEVELOPMENT

After the completion of the model development stage, the three model equations described in Section 4.0 were used to predict average annual gasoline throughput for all retail facilities with USTs in the state of Texas. Tank capacities for all the USTs were obtained from the UST database (TCEQ, 2008a). Comparison of the UST database with the available survey data indicated that the UST database probably needs to be updated. Some of the common discrepancies encountered with the UST database included the following:

- Some of the facilities listed in the UST database have been closed;
- Address information for some facilities in the UST database were incorrect (e.g., no facility at the given address, different establishment exists other than the facility indicated in the UST database, etc.);
- Some of the facilities surveyed had a different number of USTs than were indicated in the UST database; and
- Some of the facility tanks contained non-gasoline products, instead of gasoline as indicated in the UST database.

The UST database listed tank capacities for all individual USTs, but did not indicate the specific grade of fuel stored (i.e. low-, mid-, or high-grade gasoline). Since the models were based on specific gasoline grades, it was essential that gasoline grades were assigned to each of the individual USTs listed in the UST database.

In order to obtain meaningful model predictions, it was decided to exclude any facility in the UST database with more than four USTs from the statistical analysis. This decision was based on the returned survey data; none of the returned survey data indicated facilities with more than four gasoline USTs. Facilities in the UST database with more than four USTs were likely large storage facilities (e.g., tank farms, etc.) or fueling facilities with a large number of diesel USTs (e.g., truck stops, etc.). In addition, USTs with very small capacities (i.e., less than 800 gallons) or USTs with zero capacity were also removed. Also, non-gasoline dispensing USTs and non-retail facilities were excluded from the analysis, although surveys were sent to some non-retail facilities. Finally, only those USTs that indicated a tank status of “In Use” or “Temporarily Out of Use” were included. These exclusions reduced the number of retail

gasoline facilities with USTs to approximately 14,700 (i.e., approximately 24% of the total facilities listed in the UST database). In order to assign a specific gasoline grade to each individual UST, the following assumptions were made based upon analysis of the survey data:

- If a facility had only one UST, then that tank was assumed to contain low-grade (i.e., regular) gasoline;
- For facilities with two USTs, the larger capacity tank was assumed to contain low-grade gasoline and the smaller capacity tank was assumed to contain high-grade (i.e., premium) gasoline;
- For facilities with three USTs, the largest capacity tank was assumed to contain low-grade gasoline, the second largest capacity tank was assumed to contain mid-grade (i.e., super) gasoline, and the smallest capacity tank was assumed to contain high-grade gasoline;
- For facilities with four USTs, the two largest capacity tanks were assumed to contain low-grade gasoline, the smallest capacity tank was assumed to contain high-grade gasoline, and the remaining tank was assumed to contain mid-grade gasoline; and
- For facilities with more than four USTs, only the first four USTs were included in the analysis using the assumption listed above.

Using the above assumptions and the model equations for low-, mid-, and high-grade gasoline tanks, average annual throughput was predicted for each individual UST using the appropriate regression equation. The gasoline throughput was then aggregated to the county level based on the location of the UST facilities. It should be noted that eight counties (i.e., Borden, Foard, Hartley, Kenedy, Kent, King, Loving, and Stonewall counties) did not have any retail USTs listed in the UST database, so gasoline throughput and emissions were not estimated.

In order to estimate ozone season day (OSD) emissions, the annual throughput was divided by 365 to calculate average daily throughput and then multiplied by 92 (i.e., 92 days in summer [June, July, and August]) to derive the summer seasonal throughput. The estimated OSD emissions are for a typical or average day; if weekday or weekend day emissions are required, then it is suggested that statewide weekday and weekend VMT be used to derive an appropriate ratio.

Emissions were calculated at the SCC (Source Classification Code) level for all the counties on an annual and ozone season day basis. The emissions inventory included all emissions occurring after the loading of gasoline tank trucks at the bulk terminals. Therefore, the emissions inventory includes Stage I and Stage II emissions, as well as gasoline truck transit

emissions (empty and fully-loaded) and underground tank breathing and emptying emissions due to diurnal barometric pressure changes.

The previous inventory developed by ERG in 2005 also included spillage emissions (SCC 2501060103). However, 2007 Stage II emissions were estimated using the MOBILE6 model. The MOBILE6 model explicitly indicates that the resultant Stage II refueling emission factors include both fuel displacement and spillage (see Section 1.2.4 of the MOBILE6 model documentation) (U.S. EPA, 2003); therefore spillage emissions are not included as a separate emissions category in the 2007 inventory.

The SCCs included in the emissions inventory are the following:

- 2501060050 (Stage I fuel loading – Total);
- 2501060100 (Stage II vehicle refueling – Total);
- 2501060200 (Underground tank breathing and emptying – Total); and
- 2505030120 (Gasoline truck transit).

The development of the emission factors for these four SCCs is described below.

5.1 Stage I Emission Factors

A description of TCEQ's Stage I vapor recovery requirements indicates that Stage I vapor recovery equipment must be installed on gasoline dispensing facilities in the four ozone non-attainment areas: Houston-Galveston (Brazoria, Chambers, Fort Bend, Galveston, Houston, Liberty, Montgomery, and Waller counties), Dallas-Fort Worth (Collin, Dallas, Denton, and Tarrant counties), Beaumont-Port Arthur (Hardin, Jefferson, and Orange counties), and El Paso (El Paso county) (TCEQ, 2008). In addition to the 16 counties in the four ozone non-attainment areas, other counties also have some Stage I vapor recovery requirements. These requirements are as follows:

- Facilities dispensing more than 10,000 gallons of gasoline per month in Ellis, Johnson, Kaufman, Parker, or Rockwall counties (effective June 15, 2007);
- Facilities dispensing more than 25,000 gallons of gasoline per month in either the Austin Early Action Compact Area (Bastrop, Caldwell, Hays, Travis, and Williamson counties) or the San Antonio Early Action Compact Area (Bexar, Comal, Guadalupe, and Wilson counties) (effective December 31, 2005); and
- Facilities dispensing more than 125,000 gallons of gasoline per month in the 90 "covered attainment counties" identified in the Texas Administrative Code (TAC) (TAC, 2006).

Based upon the relatively low throughput thresholds (i.e., 10,000 gallons per month and 25,000 gallons per month), it was assumed that Stage I vapor recovery was also installed at all facilities in the 14 counties located in the Austin Early Action Compact Area, the San Antonio Early Action Compact Area, and the five "Outer Dallas-Fort Worth counties" (i.e., Ellis, Johnson, Kaufman, Parker, and Rockwall counties). The threshold of 125,000 gallons per month for the 90 "covered attainment counties" was much higher and most facilities (i.e., nearly 92 percent statewide) did not meet this threshold; therefore, Stage I vapor recovery was not applied for these counties.

The Stage I vapor recovery emission factor was applied to a total of 30 counties and was assumed to be equal to TCEQ's regulatory requirement (i.e., 0.8 lbs VOC per 1,000 gallons gasoline transferred) (TAC, 1999). The uncontrolled Stage I submerged filling emission factor from AP-42, Table 5.2-7 (i.e., 7.3 lbs VOC per 1,000 gallons) was used for the remaining 224 counties (U.S. EPA, 1995).

5.2 Stage II Emission Factors

Stage II emission factors were estimated using the MOBILE6 emission factor model (U.S. EPA, 2003). Stage II vapor recovery controls were modeled using MOBILE6 for the 16 counties in the Houston-Galveston, Dallas-Fort Worth, Beaumont-Port Arthur, and El Paso ozone non-attainment areas. All other counties were assumed to have no Stage II vapor recovery controls.

Seasonal meteorological data (i.e., average maximum and minimum temperatures for spring, summer, fall, and winter) were obtained from the Texas A&M System Energy Systems Lab's Weather Page (TAMU, 2008) for 17 Texas cities. These cities (and their three letter station codes) were:

- Abilene (ABI)
- Amarillo (AMA)
- Austin (ATT)
- Brownsville (BRO)
- Corpus Christi (CRP)
- El Paso (ELP)
- Fort Worth (DFW)
- Houston (IAH)

- Lubbock (LBB)
- Lufkin (GGG)
- Midland (MAF)
- Port Arthur (BPT)
- San Angelo (SJT)
- San Antonio (SAT)
- Victoria (VCT)
- Waco (ACT)
- Wichita Falls (SPS)

Each Texas county was then assigned to one of these 17 weather stations. The crosswalk for this assignment is presented in Appendix D. The seasonal temperature data are included in Appendix E.

The following fuels were also modeled in the MOBILE6 input files:

- Federal reformulated gasoline (RFG) in the eight Houston-Galveston ozone non-attainment area counties (i.e., summer Reid vapor pressure [RVP] – 6.8; summer oxygenate content – 2.1%; winter RVP – 11.3; and winter oxygenate content – 3.5%);
- Federal RFG in the four Dallas-Fort Worth ozone non-attainment area counties (i.e., summer RVP – 6.8; summer oxygenate content – 2.1%; winter RVP – 11.7; and winter oxygenate content – 3.5%);
- El Paso low-RVP gasoline in the El Paso ozone non-attainment area (i.e., summer RVP – 6.8; winter RVP – 12.3; and winter oxygenate content – 2.7%);
- Regional low-RVP gasoline in the three Beaumont-Port Arthur ozone non-attainment area counties and 95 central and eastern Texas counties (TAC, 2001) (i.e., summer RVP – 7.8; winter RVP – 12.3); and
- Conventional gasoline in the remaining 143 counties (i.e., summer RVP – 8.7; winter RVP – 11.5).

The fuel parameters were obtained from previous analyses conducted by TCEQ and the Texas Transportation Institute (Rubick, 2008; TTI, 2004)

Two separate MOBILE6 input files were prepared. The first file (ii_yes.in) was developed for the 16 counties that have Stage II vapor recovery requirements. The second file (ii_no.in) was developed for the remaining 238 counties that do not have Stage II vapor recovery requirements. Both files are attached in Appendix F. It should be noted that the effects of on-board vapor recovery (OBVR) were automatically addressed by the MOBILE6 model; details can be found in Section 2.8.9.2 of the MOBILE6 User's Guide (U.S. EPA, 2003).

For each valid combination of meteorological station, fuel program, and Stage II vapor recovery, six different scenarios were run:

- Summer fuel with spring temperatures;
- Summer fuel with summer temperatures;
- Summer fuel with fall temperatures;
- Winter fuel with fall temperatures;
- Winter fuel with winter temperatures; and
- Winter fuel with spring temperatures.

Using the MOBILE6 output files from these six different scenarios, six scenario emission factors were obtained. The MOBILE6 emission factors in the output files were initially in units of grams per mile. These emission factors were converted to units of grams per gallon using the fuel efficiency values contained within the MOBILE6 model.

Seasonal emission factors were derived from the six scenario emission factors. The summer emission factors were obtained directly from the summer fuel and summer temperature scenarios. Likewise, the winter emission factors were obtained directly from the winter fuel and winter temperature scenarios. The spring and fall emission factors were more difficult to estimate due to the transition between winter and summer fuels and vice versa. Because all of the fuel programs switch from winter to summer fuel on May 1, the spring emission factor was weighted using a weighting factor of 0.663 (i.e., 61 days during March and April out of 92 spring days) for the winter emission factor and 0.337 (i.e., 31 days during May) for the summer emission factor. For the fall emission factor, the switch from summer to winter occurs on September 15, so the fall emission factor was weighted using a weighting factor of 0.165 (i.e., from September 1 to September 15) for the summer emission factor and 0.835 (i.e., from September 16 until the end of November) for the winter emission factor. One exception to the fall weighting factor was the regional low-RVP gasoline, which switches over on October 1. This changed the weighting factors to 0.330 and 0.770.

5.3 Other Emission Factors

The emission factors for gasoline tank truck transit (empty and fully loaded) were obtained from AP-42, Table 5.2-5 (U.S. EPA, 1995). The fully loaded tank truck transit emissions (i.e., trip from bulk terminal to gasoline station) and empty tank truck transit emissions (i.e., return trip from gasoline station to bulk terminal) were assigned to the gasoline station's

location. In reality, this is not accurate, but this assumption is necessary due to the complexity of gasoline transport and delivery. For typical conditions, the empty emission factors were a range from 0 to 0.11 lbs per 1,000 gallons and the fully loaded emission factors were a range from 0 to 0.01 lbs per 1,000 gallons. The midpoints of these ranges (i.e., 0.055 and 0.005 lbs per 1,000 gallons) were used to estimate emissions, so the composite emission factor was 0.06 lbs per 1,000 gallons. This emission factor was applied to the county-level gasoline throughputs in all 254 Texas counties.

The emission factor for underground tank breathing and emptying was also obtained from AP-42, Table 5.2-7 (U.S. EPA, 1995). The emission factor of 1.0 lbs per 1,000 gallons was applied to the county-level gasoline throughputs in all 254 Texas counties.

5.4 Emissions Inventory

After calculating the annual gasoline throughput for each gasoline station using the predictive model, the VOC emission factors described in Sections 5.1 through 5.3 were used to calculate emissions at the SCC level. The Stage I, tank breathing and emptying, and tank truck evaporative emissions emission factors were based upon gallons of gasoline throughput and so annual gasoline throughput was applied to these factors to calculate emissions from these categories.

However, Stage II emission factors were calculated at the seasonal level. The Stage II emissions estimates were estimated by multiplying seasonal gasoline throughput by the appropriate seasonal emission factor for each county. Seasonal gasoline throughput was estimated by dividing annual throughput by 365 to obtain daily throughput and then multiplying the number of days in each season (i.e., 92 days in spring and summer, 91 days in fall, and 90 days in winter). The seasonal emissions were then aggregated together to obtain annual emissions. Ozone season day Stage II emissions were estimated by simply multiplying daily summer seasonal throughput by the county-level summer emission factors.

The annual emission estimates for the other inventory categories (i.e., Stage I, tank breathing and emptying, and tank truck evaporative emissions) were estimated by multiplying county-level annual throughput by the respective emission factors. Ozone season day emissions were estimated by dividing annual emission by 365 days.

6.0 RESULTS AND CONCLUSIONS

The 2007 annual emission estimates are presented in Table 6-1, while the 2007 ozone season day emission estimates are presented in Table 6.2. Both Table 6-1 and Table 6-2 include category-specific and total emissions, while Table 6-1 also includes county-level gasoline throughput. It should be noted that eight counties (i.e., Borden, Foard, Hartley, Kenedy, Kent, King, Loving, and Stonewall) do not have any gasoline throughput or emissions due to a lack of any retail USTs located within the county. Both annual and OSD emissions were converted into National Emission Inventory Format (NIF), Version 3.0 files; these files are submitted with this report.

The total annual emissions are also graphically represented in Figure 6-1. County-level total emissions are disaggregated into four classifications: red, orange, yellow, and green (in descending order). The eight counties without any retail USTs are shown in gray. The boundaries of the 16 ozone non-attainment counties are shown with thick black lines. The ten counties with the highest total emissions are (in descending order): Harris, Hidalgo, Bexar, Dallas, Cameron, Tarrant, Travis, Nueces, Webb, and McLennan.

Overall, the results shown in Figure 6-1 appear reasonable. The highest emissions occurred in Harris County with two significant bands of high emitting counties along I-35 from Laredo to Dallas-Fort Worth and along I-20 from Dallas-Fort Worth towards Shreveport, Louisiana. High emissions can also be seen in Lubbock County (Lubbock), Nueces County (Corpus Christi), and Cameron and Hidalgo counties (Brownsville/McAllen); it should be noted that these areas do not have Stage I and/or Stage II vapor requirements, unlike some of the non-attainment and near non-attainment areas, and so the emissions appear relatively more prominent. Most counties in West Texas and the Panhandle have low emissions (i.e., less than

Table 6-1. 2007 Annual County-Level Emissions

County Name	FIPS Code	Annual Throughput (gallons)	Stage I (tons/yr)	Stage II (tons/yr)	Breathing/ Emptying (tons/yr)	Tank Truck Transport (tons/yr)	Total (tons/yr)
Anderson	001	30,397,218	110.9	73.1	15.2	0.9	200.1
Andrews	003	9,242,784	33.7	21.2	4.6	0.3	59.8
Angelina	005	71,770,705	262.0	172.5	35.9	2.2	472.5
Aransas	007	31,723,963	115.8	81.0	15.9	1.0	213.6
Archer	009	5,905,436	21.6	13.3	3.0	0.2	38.0
Armstrong	011	4,739	0.0	0.0	0.0	0.0	0.0
Atascosa	013	28,229,511	103.0	69.1	14.1	0.8	187.1
Austin	015	30,667,434	111.9	75.4	15.3	0.9	203.6
Bailey	017	9,064,877	33.1	18.9	4.5	0.3	56.8
Bandera	019	11,396,821	41.6	27.6	5.7	0.3	75.2
Bastrop	021	95,359,291	38.1	233.5	47.7	2.9	322.2
Baylor	023	3,508,717	12.8	7.9	1.8	0.1	22.6
Bee	025	22,465,368	82.0	56.7	11.2	0.7	150.6
Bell	027	196,624,642	717.7	471.1	98.3	5.9	1,293.0
Bexar	029	1,041,844,767	416.7	2,550.0	520.9	31.3	3,518.9
Blanco	031	20,277,172	74.0	49.1	10.1	0.6	133.8
Borden	033	NE	NE	NE	NE	NE	NE
Bosque	035	21,071,427	76.9	50.5	10.5	0.6	138.6
Bowie	037	69,633,946	254.2	165.2	34.8	2.1	456.2
Brazoria	039	261,098,115	104.4	192.7	130.5	7.8	435.5
Brazos	041	126,568,685	462.0	311.2	63.3	3.8	840.3
Brewster	043	9,324,890	34.0	21.1	4.7	0.3	60.1
Briscoe	045	1,081,634	3.9	2.3	0.5	0.0	6.8
Brooks	047	11,799,457	43.1	30.2	5.9	0.4	79.5
Brown	049	38,442,806	140.3	90.8	19.2	1.2	251.5
Burleson	051	15,317,989	55.9	37.7	7.7	0.5	101.7
Burnet	053	36,636,035	133.7	88.6	18.3	1.1	241.8
Caldwell	055	37,812,994	15.1	92.6	18.9	1.1	127.8
Calhoun	057	34,749,905	126.8	87.7	17.4	1.0	232.9
Callahan	059	7,988,465	29.2	18.3	4.0	0.2	51.7
Cameron	061	292,207,293	1,066.6	747.7	146.1	8.8	1,969.2
Camp	063	12,001,278	43.8	28.5	6.0	0.4	78.6
Carson	065	5,278,159	19.3	11.0	2.6	0.2	33.1
Cass	067	14,389,364	52.5	34.1	7.2	0.4	94.3
Castro	069	7,350,469	26.8	15.4	3.7	0.2	46.1
Chambers	071	26,725,224	10.7	19.7	13.4	0.8	44.5
Cherokee	073	38,248,082	139.6	91.9	19.1	1.1	251.8
Childress	075	16,315,461	59.6	36.9	8.2	0.5	105.1
Clay	077	10,010,364	36.5	22.6	5.0	0.3	64.5
Cochran	079	3,451,743	12.6	7.5	1.7	0.1	22.0
Coke	081	2,825,977	10.3	6.4	1.4	0.1	18.2
Coleman	083	4,075,073	14.9	9.3	2.0	0.1	26.4
Collin	085	419,999,415	168.0	307.2	210.0	12.6	697.8
Collingsworth	087	4,384,592	16.0	9.9	2.2	0.1	28.2
Colorado	089	29,893,696	109.1	73.5	14.9	0.9	198.5
Comal	091	92,367,490	36.9	226.1	46.2	2.8	312.0
Comanche	093	21,170,578	77.3	50.0	10.6	0.6	138.5
Concho	095	10,266,453	37.5	23.3	5.1	0.3	66.2
Cooke	097	39,440,779	144.0	90.7	19.7	1.2	255.6

Table 6-1. Continued

County Name	FIPS Code	Annual Throughput (gallons)	Stage I (tons/yr)	Stage II (tons/yr)	Breathing/ Emptying (tons/yr)	Tank Truck Transport (tons/yr)	Total (tons/yr)
Coryell	099	30,358,690	110.8	72.7	15.2	0.9	199.6
Cottle	101	1,035,504	3.8	2.3	0.5	0.0	6.7
Crane	103	3,371,319	12.3	7.7	1.7	0.1	21.8
Crockett	105	6,271,802	22.9	14.2	3.1	0.2	40.4
Crosby	107	8,341,943	30.4	18.2	4.2	0.3	53.1
Culberson	109	7,594,200	27.7	17.8	3.8	0.2	49.5
Dallam	111	7,280,056	26.6	15.2	3.6	0.2	45.6
Dallas	113	1,309,083,864	523.6	957.4	654.5	39.3	2,174.8
Dawson	115	10,870,708	39.7	23.8	5.4	0.3	69.2
Deaf Smith	117	19,699,040	71.9	41.1	9.8	0.6	123.5
Delta	119	6,332,424	23.1	15.0	3.2	0.2	41.5
Denton	121	370,260,310	148.1	270.8	185.1	11.1	615.1
Dewitt	123	10,323,783	37.7	26.1	5.2	0.3	69.2
Dickens	125	2,539,499	9.3	5.6	1.3	0.1	16.2
Dimmit	127	8,643,612	31.5	21.9	4.3	0.3	58.0
Donley	129	10,089,786	36.8	21.1	5.0	0.3	63.2
Duval	131	7,527,552	27.5	19.0	3.8	0.2	50.5
Eastland	133	30,385,281	110.9	69.5	15.2	0.9	196.5
Ector	135	98,674,286	360.2	226.3	49.3	3.0	638.7
Edwards	137	1,539,323	5.6	3.5	0.8	0.0	9.9
Ellis	139	111,737,655	44.7	265.0	55.9	3.4	369.0
El Paso	141	378,161,293	151.3	286.4	189.1	11.3	638.1
Erath	143	35,421,485	129.3	81.0	17.7	1.1	229.1
Falls	145	10,997,897	40.1	26.3	5.5	0.3	72.3
Fannin	147	28,219,402	103.0	64.9	14.1	0.8	182.8
Fayette	149	29,823,286	108.9	73.3	14.9	0.9	198.0
Fisher	151	1,173,338	4.3	2.7	0.6	0.0	7.6
Floyd	153	5,333,420	19.5	11.7	2.7	0.2	34.0
Foard	155	NE	NE	NE	NE	NE	NE
Fort Bend	157	293,420,981	117.4	216.6	146.7	8.8	489.4
Franklin	159	12,012,141	43.8	28.5	6.0	0.4	78.7
Freestone	161	27,366,657	99.9	65.6	13.7	0.8	180.0
Frio	163	11,101,572	40.5	26.9	5.6	0.3	73.3
Gaines	165	6,049,852	22.1	13.2	3.0	0.2	38.5
Galveston	167	252,334,437	100.9	186.2	126.2	7.6	420.9
Garza	169	6,811,577	24.9	14.9	3.4	0.2	43.4
Gillespie	171	26,836,076	98.0	64.9	13.4	0.8	177.1
Glasscock	173	726,876	2.7	1.7	0.4	0.0	4.7
Goliad	175	3,543,037	12.9	8.9	1.8	0.1	23.8
Gonzales	177	32,960,828	120.3	80.7	16.5	1.0	218.4
Gray	179	20,133,048	73.5	42.1	10.1	0.6	126.2
Grayson	181	92,255,512	336.7	212.1	46.1	2.8	597.8
Gregg	183	191,811,846	700.1	455.0	95.9	5.8	1,256.7
Grimes	185	22,174,179	80.9	54.5	11.1	0.7	147.2
Guadalupe	187	100,195,966	40.1	245.2	50.1	3.0	338.4
Hale	189	34,006,066	124.1	74.3	17.0	1.0	216.5
Hall	191	5,357,340	19.6	11.2	2.7	0.2	33.6
Hamilton	193	11,399,449	41.6	26.9	5.7	0.3	74.6
Hansford	195	4,636,957	16.9	9.7	2.3	0.1	29.1
Hardeman	197	6,694,274	24.4	15.1	3.3	0.2	43.1

Table 6-1. Continued

County Name	FIPS Code	Annual Throughput (gallons)	Stage I (tons/yr)	Stage II (tons/yr)	Breathing/ Emptying (tons/yr)	Tank Truck Transport (tons/yr)	Total (tons/yr)
Hardin	199	39,120,535	15.6	31.1	19.6	1.2	67.5
Harris	201	2,891,616,171	1,156.6	2,134.1	1,445.8	86.7	4,823.3
Harrison	203	72,250,606	263.7	171.4	36.1	2.2	473.4
Hartley	205	NE	NE	NE	NE	NE	NE
Haskell	207	8,439,205	30.8	19.3	4.2	0.3	54.6
Hays	209	107,166,607	42.9	262.4	53.6	3.2	362.1
Hemphill	211	5,000,372	18.3	10.4	2.5	0.2	31.3
Henderson	213	88,232,871	322.0	209.3	44.1	2.6	578.1
Hidalgo	215	569,959,031	2,080.4	1,458.5	285.0	17.1	3,840.9
Hill	217	43,458,925	158.6	104.1	21.7	1.3	285.8
Hockley	219	23,345,089	85.2	51.0	11.7	0.7	148.6
Hood	221	53,202,461	194.2	126.2	26.6	1.6	348.6
Hopkins	223	37,835,449	138.1	89.7	18.9	1.1	247.9
Houston	225	35,353,892	129.0	85.0	17.7	1.1	232.7
Howard	227	25,626,346	93.5	58.8	12.8	0.8	165.9
Hudspeth	229	3,352,214	12.2	7.9	1.7	0.1	21.9
Hunt	231	106,986,137	390.5	246.0	53.5	3.2	693.2
Hutchinson	233	14,776,699	53.9	30.9	7.4	0.4	92.6
Irion	235	2,393,497	8.7	5.4	1.2	0.1	15.4
Jack	237	8,301,683	30.3	19.0	4.2	0.2	53.7
Jackson	239	24,072,453	87.9	60.7	12.0	0.7	161.4
Jasper	241	22,919,225	83.7	55.1	11.5	0.7	150.9
Jeff Davis	243	982,980	3.6	2.3	0.5	0.0	6.4
Jefferson	245	174,708,481	69.9	139.0	87.4	5.2	301.5
Jim Hogg	247	6,419,806	23.4	16.4	3.2	0.2	43.3
Jim Wells	249	37,627,698	137.3	95.2	18.8	1.1	252.5
Johnson	251	111,175,115	44.5	263.7	55.6	3.3	367.1
Jones	253	14,428,586	52.7	33.0	7.2	0.4	93.3
Karnes	255	7,179,194	26.2	18.1	3.6	0.2	48.1
Kaufman	257	104,944,943	42.0	248.9	52.5	3.1	346.5
Kendall	259	27,332,863	99.8	66.1	13.7	0.8	180.4
Kenedy	261	NE	NE	NE	NE	NE	NE
Kent	263	NE	NE	NE	NE	NE	NE
Kerr	265	33,137,362	121.0	80.2	16.6	1.0	218.7
Kimble	267	19,890,439	72.6	45.1	9.9	0.6	128.2
King	269	NE	NE	NE	NE	NE	NE
Kinney	271	1,146,834	4.2	2.8	0.6	0.0	7.6
Kleberg	273	40,839,583	149.1	103.3	20.4	1.2	274.0
Knox	275	1,110,018	4.1	2.5	0.6	0.0	7.1
Lamar	277	32,349,162	118.1	76.7	16.2	1.0	211.9
Lamb	279	9,844,461	35.9	21.5	4.9	0.3	62.7
Lampasas	281	21,926,713	80.0	51.8	11.0	0.7	143.5
La Salle	283	7,970,558	29.1	20.2	4.0	0.2	53.5
Lavaca	285	17,517,244	63.9	44.2	8.8	0.5	117.4
Lee	287	20,789,103	75.9	50.9	10.4	0.6	137.8
Leon	289	19,975,697	72.9	47.9	10.0	0.6	131.4
Liberty	291	66,131,108	26.5	48.8	33.1	2.0	110.3
Limestone	293	38,027,478	138.8	91.1	19.0	1.1	250.1
Lipscomb	295	1,911,971	7.0	4.0	1.0	0.1	12.0
Live Oak	297	14,847,828	54.2	37.9	7.4	0.4	100.0

Table 6-1. Continued

County Name	FIPS Code	Annual Throughput (gallons)	Stage I (tons/yr)	Stage II (tons/yr)	Breathing/ Emptying (tons/yr)	Tank Truck Transport (tons/yr)	Total (tons/yr)
Llano	299	21,260,495	77.6	51.4	10.6	0.6	140.3
Loving	301	NE	NE	NE	NE	NE	NE
Lubbock	303	166,876,847	609.1	364.8	83.4	5.0	1,062.4
Lynn	305	2,087,024	7.6	4.6	1.0	0.1	13.3
McCulloch	307	10,660,075	38.9	24.2	5.3	0.3	68.7
McLennan	309	203,136,346	741.4	486.7	101.6	6.1	1,335.8
McMullen	311	5,922,301	21.6	15.0	3.0	0.2	39.7
Madison	313	10,827,252	39.5	26.6	5.4	0.3	71.9
Marion	315	5,025,022	18.3	11.9	2.5	0.2	32.9
Martin	317	2,582,501	9.4	5.9	1.3	0.1	16.7
Mason	319	5,714,106	20.9	13.8	2.9	0.2	37.7
Matagorda	321	30,547,570	111.5	77.1	15.3	0.9	204.8
Maverick	323	32,394,089	118.2	81.9	16.2	1.0	217.4
Medina	325	33,777,081	123.3	81.7	16.9	1.0	222.9
Menard	327	1,294,664	4.7	2.9	0.6	0.0	8.3
Midland	329	79,724,352	291.0	182.8	39.9	2.4	516.1
Milam	331	27,606,414	100.8	67.9	13.8	0.8	183.3
Mills	333	1,852,155	6.8	4.4	0.9	0.1	12.1
Mitchell	335	5,490,163	20.0	12.6	2.7	0.2	35.5
Montague	337	16,087,616	58.7	36.3	8.0	0.5	103.6
Montgomery	339	333,760,964	133.5	246.3	166.9	10.0	556.7
Moore	341	20,858,570	76.1	43.6	10.4	0.6	130.8
Morris	343	10,810,000	39.5	25.6	5.4	0.3	70.8
Motley	345	92,106	0.3	0.2	0.0	0.0	0.6
Nacogdoches	347	70,038,378	255.6	168.3	35.0	2.1	461.1
Navarro	349	61,910,901	226.0	148.3	31.0	1.9	407.1
Newton	351	254,208	0.9	0.6	0.1	0.0	1.7
Nolan	353	16,928,558	61.8	38.7	8.5	0.5	109.5
Nueces	355	245,750,557	897.0	627.2	122.9	7.4	1,654.4
Ochiltree	357	8,195,070	29.9	17.1	4.1	0.2	51.4
Oldham	359	5,501,868	20.1	11.5	2.8	0.2	34.5
Orange	361	66,996,681	26.8	53.3	33.5	2.0	115.6
Palo Pinto	363	29,072,512	106.1	66.5	14.5	0.9	188.0
Panola	365	19,468,506	71.1	46.8	9.7	0.6	128.2
Parker	367	78,078,494	31.2	185.2	39.0	2.3	257.8
Parmer	369	11,353,343	41.4	23.7	5.7	0.3	71.2
Pecos	371	25,936,185	94.7	58.8	13.0	0.8	167.2
Polk	373	41,642,610	152.0	100.1	20.8	1.2	274.1
Potter	375	112,369,408	410.1	234.7	56.2	3.4	704.4
Presidio	377	5,997,474	21.9	13.6	3.0	0.2	38.7
Rains	379	12,714,095	46.4	30.2	6.4	0.4	83.3
Randall	381	78,074,169	285.0	163.1	39.0	2.3	489.4
Reagan	383	2,382,801	8.7	5.5	1.2	0.1	15.4
Real	385	460,135	1.7	1.1	0.2	0.0	3.0
Red River	387	7,858,527	28.7	18.6	3.9	0.2	51.5
Reeves	389	7,090,556	25.9	16.3	3.5	0.2	45.9
Refugio	391	12,901,362	47.1	32.6	6.5	0.4	86.5
Roberts	393	1,192,672	4.4	2.5	0.6	0.0	7.5
Robertson	395	21,197,914	77.4	52.1	10.6	0.6	140.7
Rockwall	397	49,841,174	19.9	118.2	24.9	1.5	164.6

Table 6-1. Continued

County Name	FIPS Code	Annual Throughput (gallons)	Stage I (tons/yr)	Stage II (tons/yr)	Breathing/ Emptying (tons/yr)	Tank Truck Transport (tons/yr)	Total (tons/yr)
Runnels	399	8,572,164	31.3	19.4	4.3	0.3	55.3
Rusk	401	23,193,878	84.7	55.7	11.6	0.7	152.7
Sabine	403	3,488,151	12.7	8.4	1.7	0.1	23.0
San Augustine	405	7,147,218	26.1	17.2	3.6	0.2	47.1
San Jacinto	407	19,819,605	72.3	48.7	9.9	0.6	131.6
San Patricio	409	78,782,573	287.6	201.1	39.4	2.4	530.4
San Saba	411	11,442,163	41.8	27.7	5.7	0.3	75.5
Schleicher	413	2,072,221	7.6	4.7	1.0	0.1	13.4
Scurry	415	13,904,813	50.8	30.4	7.0	0.4	88.5
Shackelford	417	5,634,855	20.6	12.9	2.8	0.2	36.4
Shelby	419	24,334,602	88.8	58.5	12.2	0.7	160.2
Sherman	421	2,208,620	8.1	4.6	1.1	0.1	13.8
Smith	423	185,907,581	678.6	441.0	93.0	5.6	1,218.1
Somervell	425	8,269,166	30.2	19.6	4.1	0.2	54.2
Starr	427	70,698,348	258.0	180.9	35.3	2.1	476.4
Stephens	429	10,156,572	37.1	23.2	5.1	0.3	65.7
Sterling	431	1,848,466	6.7	4.2	0.9	0.1	11.9
Stonewall	433	NE	NE	NE	NE	NE	NE
Sutton	435	6,427,417	23.5	14.6	3.2	0.2	41.4
Swisher	437	3,188,440	11.6	6.7	1.6	0.1	20.0
Tarrant	439	1,176,451,569	470.6	860.4	588.2	35.3	1,954.5
Taylor	441	110,500,621	403.3	252.8	55.3	3.3	714.7
Terrell	443	1,407,204	5.1	3.2	0.7	0.0	9.1
Terry	445	6,696,474	24.4	14.6	3.3	0.2	42.6
Throckmorton	447	422,793	1.5	1.0	0.2	0.0	2.7
Titus	449	35,894,768	131.0	85.1	17.9	1.1	235.2
Tom Green	451	81,461,163	297.3	184.6	40.7	2.4	525.1
Travis	453	536,439,616	214.6	1,313.6	268.2	16.1	1,812.4
Trinity	455	14,702,780	53.7	35.3	7.4	0.4	96.8
Tyler	457	12,398,375	45.3	29.8	6.2	0.4	81.6
Upshur	459	44,132,435	161.1	104.7	22.1	1.3	289.2
Upton	461	2,558,984	9.3	5.9	1.3	0.1	16.6
Uvalde	463	20,135,362	73.5	48.7	10.1	0.6	132.9
Val Verde	465	34,662,370	126.5	83.8	17.3	1.0	228.7
Van Zandt	467	44,400,092	162.1	105.3	22.2	1.3	290.9
Victoria	469	86,820,016	316.9	219.1	43.4	2.6	582.0
Walker	471	64,287,764	234.7	158.1	32.1	1.9	426.8
Waller	473	39,319,705	15.7	29.0	19.7	1.2	65.6
Ward	475	10,421,762	38.0	23.9	5.2	0.3	67.5
Washington	477	33,920,287	123.8	83.4	17.0	1.0	225.2
Webb	479	217,803,701	795.0	551.0	108.9	6.5	1,461.4
Wharton	481	66,186,738	241.6	167.0	33.1	2.0	443.7
Wheeler	483	11,702,553	42.7	24.4	5.9	0.4	73.4
Wichita	485	115,014,875	419.8	259.8	57.5	3.5	740.6
Wilbarger	487	12,426,441	45.4	28.1	6.2	0.4	80.0
Willacy	489	17,414,064	63.6	44.6	8.7	0.5	117.4
Williamson	491	234,328,879	93.7	573.8	117.2	7.0	791.7
Wilson	493	34,588,244	13.8	84.7	17.3	1.0	116.8
Winkler	495	5,466,291	20.0	12.5	2.7	0.2	35.4
Wise	497	60,113,260	219.4	142.6	30.1	1.8	393.9

Table 6-1. Continued

County Name	FIPS Code	Annual Throughput (gallons)	Stage I (tons/yr)	Stage II (tons/yr)	Breathing/ Emptying (tons/yr)	Tank Truck Transport (tons/yr)	Total (tons/yr)
Wood	499	46,581,346	170.0	110.5	23.3	1.4	305.2
Yoakum	501	6,762,342	24.7	14.8	3.4	0.2	43.1
Young	503	18,279,495	66.7	41.8	9.1	0.5	118.2
Zapata	505	14,244,903	52.0	36.5	7.1	0.4	96.0
Zavala	507	7,693,737	28.1	19.5	3.8	0.2	51.6

NE = Not estimated

Table 6-2. 2007 Ozone Season Day County-Level Emissions

County Name	FIPS Code	Stage I (lbs/day)	Stage II (lbs/day)	Breathing/ Emptying (lbs/day)	Tank Truck Transport (lbs/day)	Total (lbs/day)
Anderson	001	607.9	359.1	83.3	5.0	1,055.3
Andrews	003	184.9	119.9	25.3	1.5	331.6
Angelina	005	1,435.4	847.8	196.6	11.8	2,491.6
Aransas	007	634.5	382.5	86.9	5.2	1,109.1
Archer	009	118.1	78.8	16.2	1.0	214.1
Armstrong	011	0.1	0.1	0.0	0.0	0.2
Atascosa	013	564.6	337.1	77.3	4.6	983.6
Austin	015	613.3	362.0	84.0	5.0	1,064.4
Bailey	017	181.3	112.0	24.8	1.5	319.6
Bandera	019	227.9	150.5	31.2	1.9	411.5
Bastrop	021	209.0	1,144.1	261.3	15.7	1,630.0
Baylor	023	70.2	46.8	9.6	0.6	127.2
Bee	025	449.3	270.9	61.5	3.7	785.4
Bell	027	3,932.5	2,360.9	538.7	32.3	6,864.4
Bexar	029	2,283.5	12,440.0	2,854.4	171.3	17,749.1
Blanco	031	405.5	269.0	55.6	3.3	733.5
Borden	033	NE	NE	NE	NE	NE
Bosque	035	421.4	253.0	57.7	3.5	735.6
Bowie	037	1,392.7	840.2	190.8	11.4	2,435.1
Brazoria	039	572.3	944.8	715.3	42.9	2,275.3
Brazos	041	2,531.4	1,493.9	346.8	20.8	4,392.8
Brewster	043	186.5	120.9	25.5	1.5	334.4
Briscoe	045	21.6	13.4	3.0	0.2	38.1
Brooks	047	236.0	154.2	32.3	1.9	424.4
Brown	049	768.9	510.4	105.3	6.3	1,390.9
Burleson	051	306.4	180.8	42.0	2.5	531.6
Burnet	053	732.7	486.1	100.4	6.0	1,325.2
Caldwell	055	82.9	453.7	103.6	6.2	646.4
Calhoun	057	695.0	419.0	95.2	5.7	1,214.9
Callahan	059	159.8	104.5	21.9	1.3	287.5
Cameron	061	5,844.1	3,817.7	800.6	48.0	10,510.4
Camp	063	240.0	144.8	32.9	2.0	419.7
Carson	065	105.6	65.2	14.5	0.9	186.1
Cass	067	287.8	173.6	39.4	2.4	503.2
Castro	069	147.0	90.8	20.1	1.2	259.2
Chambers	071	58.6	95.5	73.2	4.4	231.7
Cherokee	073	765.0	451.8	104.8	6.3	1,327.9
Childress	075	326.3	217.8	44.7	2.7	591.5
Clay	077	200.2	133.6	27.4	1.6	362.9
Cochran	079	69.0	42.7	9.5	0.6	121.7
Coke	081	56.5	36.6	7.7	0.5	101.4
Coleman	083	81.5	53.3	11.2	0.7	146.7
Collin	085	920.5	1,546.3	1,150.7	69.0	3,686.6
Collingsworth	087	87.7	58.5	12.0	0.7	159.0
Colorado	089	597.9	352.8	81.9	4.9	1,037.5
Comal	091	202.4	1,102.9	253.1	15.2	1,573.6
Comanche	093	423.4	281.1	58.0	3.5	766.0
Concho	095	205.3	133.1	28.1	1.7	368.2
Cooke	097	788.8	476.4	108.1	6.5	1,379.8

Table 6-2. Continued

County Name	FIPS Code	Stage I (lbs/day)	Stage II (lbs/day)	Breathing/ Emptying (lbs/day)	Tank Truck Transport (lbs/day)	Total (lbs/day)
Coryell	099	607.2	364.5	83.2	5.0	1,059.9
Cottle	101	20.7	13.8	2.8	0.2	37.5
Crane	103	67.4	43.7	9.2	0.6	121.0
Crockett	105	125.4	81.3	17.2	1.0	224.9
Crosby	107	166.8	103.1	22.9	1.4	294.1
Culberson	109	151.9	99.5	20.8	1.2	273.4
Dallam	111	145.6	89.9	19.9	1.2	256.7
Dallas	113	2,869.2	4,819.6	3,586.5	215.2	11,490.5
Dawson	115	217.4	134.3	29.8	1.8	383.3
Deaf Smith	117	394.0	243.4	54.0	3.2	694.6
Delta	119	126.6	76.4	17.3	1.0	221.4
Denton	121	811.5	1,363.2	1,014.4	60.9	3,250.0
Dewitt	123	206.5	124.5	28.3	1.7	360.9
Dickens	125	50.8	31.4	7.0	0.4	89.5
Dimmit	127	172.9	115.2	23.7	1.4	313.2
Donley	129	201.8	124.7	27.6	1.7	355.8
Duval	131	150.6	100.3	20.6	1.2	272.7
Eastland	133	607.7	397.6	83.2	5.0	1,093.6
Ector	135	1,973.5	1,280.2	270.3	16.2	3,540.2
Edwards	137	30.8	20.0	4.2	0.3	55.2
Ellis	139	244.9	1,348.2	306.1	18.4	1,917.6
El Paso	141	828.8	1,371.2	1,036.1	62.2	3,298.3
Erath	143	708.4	463.6	97.0	5.8	1,274.9
Falls	145	220.0	132.1	30.1	1.8	384.0
Fannin	147	564.4	340.9	77.3	4.6	987.2
Fayette	149	596.5	352.0	81.7	4.9	1,035.1
Fisher	151	23.5	15.4	3.2	0.2	42.2
Floyd	153	106.7	65.9	14.6	0.9	188.1
Foard	155	NE	NE	NE	NE	NE
Fort Bend	157	643.1	1,061.7	803.9	48.2	2,557.0
Franklin	159	240.2	144.9	32.9	2.0	420.1
Freestone	161	547.3	328.6	75.0	4.5	955.4
Frio	163	222.0	146.6	30.4	1.8	400.8
Gaines	165	121.0	74.8	16.6	1.0	213.3
Galveston	167	553.1	913.1	691.3	41.5	2,198.9
Garza	169	136.2	84.2	18.7	1.1	240.2
Gillespie	171	536.7	356.0	73.5	4.4	970.7
Glasscock	173	14.5	9.4	2.0	0.1	26.1
Goliad	175	70.9	42.7	9.7	0.6	123.9
Gonzales	177	659.2	393.6	90.3	5.4	1,148.5
Gray	179	402.7	248.7	55.2	3.3	709.9
Grayson	181	1,845.1	1,114.4	252.8	15.2	3,227.4
Gregg	183	3,836.2	2,314.4	525.5	31.5	6,707.7
Grimes	185	443.5	261.7	60.8	3.6	769.6
Guadalupe	187	219.6	1,196.4	274.5	16.5	1,707.0
Hale	189	680.1	420.2	93.2	5.6	1,199.1
Hall	191	107.1	66.2	14.7	0.9	188.9
Hamilton	193	228.0	151.3	31.2	1.9	412.4
Hansford	195	92.7	57.3	12.7	0.8	163.5
Hardeman	197	133.9	89.4	18.3	1.1	242.7

Table 6-2. Continued

County Name	FIPS Code	Stage I (lbs/day)	Stage II (lbs/day)	Breathing/ Emptying (lbs/day)	Tank Truck Transport (lbs/day)	Total (lbs/day)
Hardin	199	85.7	153.3	107.2	6.4	352.6
Harris	201	6,337.8	10,463.2	7,922.2	475.3	25,198.5
Harrison	203	1,445.0	871.8	197.9	11.9	2,526.6
Hartley	205	NE	NE	NE	NE	NE
Haskell	207	168.8	110.4	23.1	1.4	303.7
Hays	209	234.9	1,285.7	293.6	17.6	1,831.9
Hemphill	211	100.0	61.8	13.7	0.8	176.3
Henderson	213	1,764.7	1,064.6	241.7	14.5	3,085.5
Hidalgo	215	11,399.2	7,446.4	1,561.5	93.7	20,500.8
Hill	217	869.2	521.8	119.1	7.1	1,517.2
Hockley	219	466.9	288.5	64.0	3.8	823.2
Hood	221	1,064.0	641.9	145.8	8.7	1,860.5
Hopkins	223	756.7	456.5	103.7	6.2	1,323.1
Houston	225	707.1	417.6	96.9	5.8	1,227.4
Howard	227	512.5	332.5	70.2	4.2	919.4
Hudspeth	229	67.0	43.9	9.2	0.6	120.7
Hunt	231	2,139.7	1,292.3	293.1	17.6	3,742.7
Hutchinson	233	295.5	182.6	40.5	2.4	521.0
Irion	235	47.9	31.0	6.6	0.4	85.8
Jack	237	166.0	108.6	22.7	1.4	298.8
Jackson	239	481.4	290.2	66.0	4.0	841.6
Jasper	241	458.4	270.7	62.8	3.8	795.7
Jeff Davis	243	19.7	12.8	2.7	0.2	35.3
Jefferson	245	382.9	684.5	478.7	28.7	1,574.8
Jim Hogg	247	128.4	83.9	17.6	1.1	230.9
Jim Wells	249	752.6	501.4	103.1	6.2	1,363.2
Johnson	251	243.7	1,341.4	304.6	18.3	1,908.0
Jones	253	288.6	188.8	39.5	2.4	519.3
Karnes	255	143.6	86.6	19.7	1.2	251.0
Kaufman	257	230.0	1,266.3	287.5	17.3	1,801.1
Kendall	259	546.7	360.9	74.9	4.5	986.9
Kenedy	261	NE	NE	NE	NE	NE
Kent	263	NE	NE	NE	NE	NE
Kerr	265	662.7	439.6	90.8	5.4	1,198.6
Kimble	267	397.8	257.8	54.5	3.3	713.4
King	269	NE	NE	NE	NE	NE
Kinney	271	22.9	15.1	3.1	0.2	41.4
Kleberg	273	816.8	544.2	111.9	6.7	1,479.6
Knox	275	22.2	14.8	3.0	0.2	40.2
Lamar	277	647.0	390.3	88.6	5.3	1,131.3
Lamb	279	196.9	121.7	27.0	1.6	347.1
Lampasas	281	438.5	291.1	60.1	3.6	793.3
La Salle	283	159.4	106.2	21.8	1.3	288.8
Lavaca	285	350.3	211.2	48.0	2.9	612.4
Lee	287	415.8	249.4	57.0	3.4	725.6
Leon	289	399.5	239.9	54.7	3.3	697.4
Liberty	291	144.9	239.3	181.2	10.9	576.3
Limestone	293	760.5	456.6	104.2	6.3	1,327.6
Lipscomb	295	38.2	23.6	5.2	0.3	67.4
Live Oak	297	297.0	179.0	40.7	2.4	519.1

Table 6-2. Continued

County Name	FIPS Code	Stage I (lbs/day)	Stage II (lbs/day)	Breathing/ Emptying (lbs/day)	Tank Truck Transport (lbs/day)	Total (lbs/day)
Llano	299	425.2	282.1	58.2	3.5	769.0
Loving	301	NE	NE	NE	NE	NE
Lubbock	303	3,337.5	2,062.2	457.2	27.4	5,884.3
Lynn	305	41.7	25.8	5.7	0.3	73.6
McCulloch	307	213.2	138.2	29.2	1.8	382.3
McLennan	309	4,062.7	2,439.1	556.5	33.4	7,091.8
McMullen	311	118.4	78.9	16.2	1.0	214.6
Madison	313	216.5	127.8	29.7	1.8	375.8
Marion	315	100.5	60.6	13.8	0.8	175.7
Martin	317	51.7	33.5	7.1	0.4	92.7
Mason	319	114.3	75.8	15.7	0.9	206.7
Matagorda	321	611.0	368.3	83.7	5.0	1,068.0
Maverick	323	647.9	431.7	88.8	5.3	1,173.6
Medina	325	675.5	446.0	92.5	5.6	1,219.6
Menard	327	25.9	16.8	3.5	0.2	46.4
Midland	329	1,594.5	1,034.3	218.4	13.1	2,860.3
Milam	331	552.1	325.8	75.6	4.5	958.1
Mills	333	37.0	24.6	5.1	0.3	67.0
Mitchell	335	109.8	71.8	15.0	0.9	197.6
Montague	337	321.8	214.7	44.1	2.6	583.2
Montgomery	339	731.5	1,207.7	914.4	54.9	2,908.5
Moore	341	417.2	257.7	57.1	3.4	735.5
Morris	343	216.2	130.4	29.6	1.8	378.0
Motley	345	1.8	1.1	0.3	0.0	3.2
Nacogdoches	347	1,400.8	827.3	191.9	11.5	2,431.5
Navarro	349	1,238.2	743.4	169.6	10.2	2,161.4
Newton	351	5.1	3.0	0.7	0.0	8.8
Nolan	353	338.6	221.5	46.4	2.8	609.3
Nueces	355	4,915.0	2,963.0	673.3	40.4	8,591.7
Ochiltree	357	163.9	101.3	22.5	1.3	289.0
Oldham	359	110.0	68.0	15.1	0.9	194.0
Orange	361	146.8	262.5	183.6	11.0	603.9
Palo Pinto	363	581.5	380.5	79.7	4.8	1,046.3
Panola	365	389.4	230.0	53.3	3.2	675.9
Parker	367	171.1	942.1	213.9	12.8	1,340.0
Parmer	369	227.1	140.3	31.1	1.9	400.3
Pecos	371	518.7	336.2	71.1	4.3	930.2
Polk	373	832.9	491.9	114.1	6.8	1,445.7
Potter	375	2,247.4	1,388.3	307.9	18.5	3,962.1
Presidio	377	119.9	77.7	16.4	1.0	215.1
Rains	379	254.3	153.4	34.8	2.1	444.6
Randall	381	1,561.5	964.6	213.9	12.8	2,752.8
Reagan	383	47.7	30.9	6.5	0.4	85.5
Real	385	9.2	6.1	1.3	0.1	16.6
Red River	387	157.2	94.8	21.5	1.3	274.8
Reeves	389	141.8	92.0	19.4	1.2	254.4
Refugio	391	258.0	155.5	35.3	2.1	451.0
Roberts	393	23.9	14.7	3.3	0.2	42.1
Robertson	395	424.0	250.2	58.1	3.5	735.7
Rockwall	397	109.2	601.4	136.6	8.2	855.4

Table 6-2. Continued

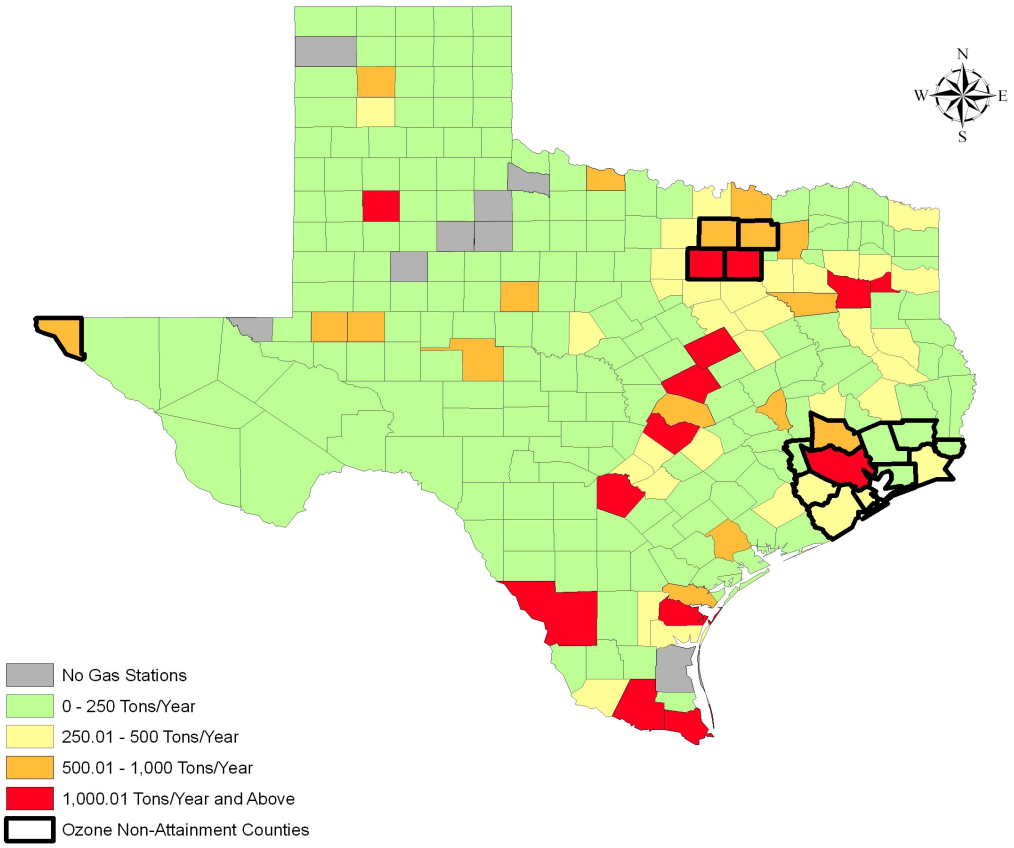
County Name	FIPS Code	Stage I (lbs/day)	Stage II (lbs/day)	Breathing/ Emptying (lbs/day)	Tank Truck Transport (lbs/day)	Total (lbs/day)
Runnels	399	171.4	111.1	23.5	1.4	307.4
Rusk	401	463.9	274.0	63.5	3.8	805.2
Sabine	403	69.8	41.2	9.6	0.6	121.1
San Augustine	405	142.9	84.4	19.6	1.2	248.1
San Jacinto	407	396.4	233.9	54.3	3.3	687.9
San Patricio	409	1,575.7	949.9	215.8	13.0	2,754.3
San Saba	411	228.8	151.8	31.3	1.9	413.9
Schleicher	413	41.4	26.9	5.7	0.3	74.3
Scurry	415	278.1	171.8	38.1	2.3	490.3
Shackelford	417	112.7	73.7	15.4	0.9	202.8
Shelby	419	486.7	287.5	66.7	4.0	844.8
Sherman	421	44.2	27.3	6.1	0.4	77.9
Smith	423	3,718.2	2,243.2	509.3	30.6	6,501.2
Somervell	425	165.4	99.8	22.7	1.4	289.2
Starr	427	1,414.0	923.7	193.7	11.6	2,542.9
Stephens	429	203.1	132.9	27.8	1.7	365.5
Sterling	431	37.0	24.0	5.1	0.3	66.3
Stonewall	433	NE	NE	NE	NE	NE
Sutton	435	128.5	83.3	17.6	1.1	230.5
Swisher	437	63.8	39.4	8.7	0.5	112.4
Tarrant	439	2,578.5	4,331.3	3,223.2	193.4	10,326.3
Taylor	441	2,210.0	1,446.1	302.7	18.2	3,977.0
Terrell	443	28.1	18.2	3.9	0.2	50.5
Terry	445	133.9	82.8	18.3	1.1	236.1
Throckmorton	447	8.5	5.5	1.2	0.1	15.2
Titus	449	717.9	433.1	98.3	5.9	1,255.2
Tom Green	451	1,629.2	1,055.8	223.2	13.4	2,921.6
Travis	453	1,175.8	6,436.0	1,469.7	88.2	9,169.6
Trinity	455	294.1	173.7	40.3	2.4	510.4
Tyler	457	248.0	146.5	34.0	2.0	430.4
Upshur	459	882.6	532.5	120.9	7.3	1,543.3
Upton	461	51.2	33.2	7.0	0.4	91.8
Uvalde	463	402.7	265.9	55.2	3.3	727.0
Val Verde	465	693.2	457.7	95.0	5.7	1,251.6
Van Zandt	467	888.0	535.7	121.6	7.3	1,552.7
Victoria	469	1,736.4	1,046.8	237.9	14.3	3,035.3
Walker	471	1,285.8	758.8	176.1	10.6	2,231.2
Waller	473	86.2	142.3	107.7	6.5	342.6
Ward	475	208.4	135.2	28.6	1.7	373.9
Washington	477	678.4	400.4	92.9	5.6	1,177.3
Webb	479	4,356.1	2,902.4	596.7	35.8	7,891.0
Wharton	481	1,323.7	798.0	181.3	10.9	2,314.0
Wheeler	483	234.1	144.6	32.1	1.9	412.6
Wichita	485	2,300.3	1,535.2	315.1	18.9	4,169.6
Wilbarger	487	248.5	165.9	34.0	2.0	450.5
Willacy	489	348.3	227.5	47.7	2.9	626.4
Williamson	491	513.6	2,811.4	642.0	38.5	4,005.5
Wilson	493	75.8	413.0	94.8	5.7	589.3
Winkler	495	109.3	70.9	15.0	0.9	196.1
Wise	497	1,202.3	725.3	164.7	9.9	2,102.2

Table 6-2. Continued

County Name	FIPS Code	Stage I (lbs/day)	Stage II (lbs/day)	Breathing/ Emptying (lbs/day)	Tank Truck Transport (lbs/day)	Total (lbs/day)
Wood	499	931.6	562.1	127.6	7.7	1,629.0
Yoakum	501	135.2	83.6	18.5	1.1	238.5
Young	503	365.6	239.2	50.1	3.0	657.9
Zapata	505	284.9	186.1	39.0	2.3	512.4
Zavala	507	153.9	102.5	21.1	1.3	278.7

NE = Not estimated

Figure 6-1. Total County Level Emissions (tons/year)



250 tons per year) with the exception of several urban areas: Lubbock County (Lubbock), El Paso County (El Paso), Potter County (Amarillo), Midland County (Midland), Ector County (Odessa), Tom Green County (San Angelo), and Taylor County (Abilene). Finally, of the eight counties without any retail gasoline stations, five counties (Borden, Kenedy, Kent, King, and Loving) have less than 1,000 population, two counties have between 1,000 and 5,000 population (Foard and Stonewall), and only Hartley County has greater than 5,000 population.

7.0 RECOMMENDATIONS FOR FUTURE WORK

The most significant issue experienced during the survey and inventory development effort was discrepancies existing in the UST database. The relatively large number of surveys that were returned undeliverable highlights these discrepancies. In many cases, the mailing addresses were incorrect or outdated. Also, in some instances, a non-retail facility was incorrectly identified as a retail gasoline station. Finally, the UST operating status in some instances was not current (i.e., some USTs had been closed or removed for 10 years or more).

The TCEQ UST database was designed for historical registration purposes, rather than for emissions inventory development. As such, some discrepancies between the UST entries in the database and USTs "out in the field" should be expected. If a similar effort is conducted in the future, some consideration should be given to obtaining a current list of retail gasoline facilities from a government agency or industry association, rather than a historical registration list of USTs.

The 2007 inventory developed under this project was based upon a random survey. However, it may be desirable to examine a more representative subset of the USTs in future studies. For instance, the UST database includes some large tanks (i.e., greater than 30,000 gallons) and some small tanks (i.e., less than 1,000 gallons). However, most of the tanks have a capacity between 8,000 and 20,000 gallons. The inclusion of the large and small tanks potentially skews the model. A focused survey on the tanks between 8,000 and 20,000 gallons would likely improve the model performance.

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APPENDIX A:

SURVEY COVER LETTER AND FORM

Buddy Garcia, *Chairman*
Larry R. Soward, *Commissioner*
Bryan W. Shaw, Ph.D., *Commissioner*
Glenn Shankle, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 1, 2008

Re: Request for Calendar Year 2007 Gasoline Monthly Throughput for Gasoline Retail Service Stations

Dear Owner/Operator:

The Texas Commission on Environmental Quality (TCEQ) is developing an area source emissions inventory for gasoline retail service stations operating in the State of Texas. An area source is a group of similar entities that, taken collectively, produce a significant amount of air pollution. Per Texas Health & Safety Code §382.014 and 30 Texas Administrative Code (TAC) §101.10, the TCEQ has the authority to request a regulated entity to submit operational data to develop an air emissions inventory for the State of Texas. Please find the enclosed TCEQ Gasoline Survey requesting the owners and/or operators of gasoline retail service stations to provide their monthly throughput data for calendar year 2007. The monthly inventory control records for retail gasoline service stations are already required to be maintained and kept in accordance with 30 TAC §334.48(c). The enclosed TCEQ Gasoline Survey is requested to be completed and submitted by April 30, 2008.

The TCEQ will use the submitted data to accomplish air quality planning objectives and to meet federal emissions reporting requirements. The data from your facility will be used for statistical analysis only and will not be republished or disseminated for other purposes. The estimated emissions from all gasoline stations in Texas will be developed at the county-level and reported in the U.S. Environmental Protection Agency's National Emission Inventory.

The data requested is required to be made accessible for reference, inspection, and copying by agency personnel or appointees of the agency. This letter does not create any additional recordkeeping or filing requirements beyond what is already required in the rules.

The TCEQ appreciates your assistance in this effort. If you have any questions, please feel free to contact Mr. Charlie Rubick, TCEQ Project Representative, at (512) 239-1478.

Sincerely,

Kevin C. Cauble, Manager
Emissions Assessment Section
Air Quality Division

KCC/CR/rs

Enclosure

TCEQ Gasoline Survey

Station Name: _____ ERG Code: _____

Number of Underground Gasoline Tanks: _____

Contact Name: _____

Contact Phone Number: _____

Please enter Tank Capacity and Monthly Gasoline Throughput by tank in gallons. **DO NOT** fill out the survey for diesel or other fuels.

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
Capacity (gallons)					
Gasoline Grade					
Stage I Controls? *(Y or N)*					
Stage II Control? *(Y or N)*					
Throughput (gallons)					
January 2007					
February 2007					
March 2007					
April 2007					
May 2007					
June 2007					
July 2007					
August 2007					
September 2007					
October 2007					
November 2007					
December 2007					
Total 2007					

For questions or concerns regarding this survey, contact Charlie Rubick (TCEQ) at 512-239-1478 or crubick@tceq.state.tx.us. For technical questions regarding the survey, contact Marty Wolf (ERG) at 916-361-6752 or marty.wolf@erg.com.

Please fax the completed survey forms to 916-361-6759 or e-mail to marty.wolf@erg.com. Please return the completed survey no later than March xx, 2008.

APPENDIX B:

COUNTY-LEVEL SURVEY COUNTS

County-Level Survey Counts

County Name	FIPS Code	Subgroup 1 Surveys	Subgroup 2 Surveys	Subgroup 3 Surveys	Subgroup 4 Surveys	Total Surveys
Anderson	001	3	2	2	0	7
Andrews	003	3	0	1	0	4
Angelina	005	3	3	3	0	9
Aransas	007	3	1	1	0	5
Archer	009	3	0	0	0	3
Armstrong	011	2	0	0	0	2
Atascosa	013	3	1	2	0	6
Austin	015	3	1	2	0	6
Bailey	017	3	0	0	0	3
Bandera	019	3	1	1	0	5
Bastrop	021	3	2	3	3	11
Baylor	023	3	0	0	0	3
Bee	025	3	1	1	0	5
Bell	027	3	9	9	0	21
Bexar	029	3	52	43	68	166
Blanco	031	3	0	1	0	4
Borden	033	1	0	0	0	1
Bosque	035	3	1	1	0	5
Bowie	037	3	3	4	0	10
Brazoria	039	3	10	7	13	33
Brazos	041	3	5	5	0	13
Brewster	043	3	0	0	0	3
Briscoe	045	2	0	0	0	2
Brooks	047	3	0	1	0	4
Brown	049	3	1	1	0	5
Burleson	051	3	1	1	0	5
Burnet	053	3	1	2	0	6
Caldwell	055	3	1	1	2	7
Calhoun	057	3	1	1	0	5
Callahan	059	3	0	1	0	4
Cameron	061	3	13	8	0	24
Camp	063	3	0	0	0	3
Carson	065	3	0	1	0	4
Cass	067	3	1	1	0	5
Castro	069	3	0	0	0	3
Chambers	071	3	1	3	1	8
Cherokee	073	3	2	2	0	7
Childress	075	3	0	0	0	3
Clay	077	3	0	1	0	4
Cochran	079	3	0	0	0	3
Coke	081	3	0	0	0	3
Coleman	083	3	0	0	0	3
Collin	085	3	23	17	31	74
Collingsworth	087	3	0	0	0	3
Colorado	089	3	1	2	0	6
Comal	091	3	3	4	4	14
Comanche	093	3	0	1	0	4
Concho	095	3	0	0	0	3
Cooke	097	3	1	2	0	6
Coryell	099	3	2	1	0	6

County Name	FIPS Code	Subgroup 1 Surveys	Subgroup 2 Surveys	Subgroup 3 Surveys	Subgroup 4 Surveys	Total Surveys
Cottle	101	3	0	0	0	3
Crane	103	3	0	0	0	3
Crockett	105	3	0	1	0	4
Crosby	107	3	0	0	0	3
Culberson	109	3	0	1	0	4
Dallam	111	3	0	0	0	3
Dallas	113	3	79	84	103	269
Dawson	115	3	0	1	0	4
Deaf Smith	117	3	1	1	0	5
Delta	119	3	0	0	0	3
Denton	121	3	20	16	26	65
Dewitt	123	3	1	1	0	5
Dickens	125	3	0	0	0	3
Dimmit	127	3	0	0	0	3
Donley	129	3	0	1	0	4
Duval	131	3	0	1	0	4
Eastland	133	3	1	1	0	5
Ector	135	3	4	3	0	10
Edwards	137	3	0	0	0	3
Ellis	139	3	5	5	6	19
El Paso	141	3	25	17	32	77
Erath	143	3	1	1	0	5
Falls	145	3	1	1	0	5
Fannin	147	3	1	1	0	5
Fayette	149	3	1	2	0	6
Fisher	151	3	0	0	0	3
Floyd	153	3	0	0	0	3
Foard	155	0	0	0	0	0
Fort Bend	157	3	17	9	22	51
Franklin	159	3	0	1	0	4
Freestone	161	3	1	2	0	6
Frio	163	3	1	1	0	5
Gaines	165	3	1	1	0	5
Galveston	167	3	10	7	12	32
Garza	169	3	0	1	0	4
Gillespie	171	3	1	1	0	5
Glasscock	173	1	0	0	0	1
Goliad	175	3	0	0	0	3
Gonzales	177	3	1	1	0	5
Gray	179	3	1	1	0	5
Grayson	181	3	4	4	0	11
Gregg	183	3	4	4	5	16
Grimes	185	3	1	1	0	5
Guadalupe	187	3	4	4	5	16
Hale	189	3	1	1	0	5
Hall	191	3	0	0	0	3
Hamilton	193	3	0	0	0	3
Hansford	195	3	0	0	0	3
Hardeman	197	3	0	0	0	3
Hardin	199	3	2	2	2	9
Harris	201	3	130	107	171	411
Harrison	203	3	2	3	3	11

County Name	FIPS Code	Subgroup 1 Surveys	Subgroup 2 Surveys	Subgroup 3 Surveys	Subgroup 4 Surveys	Total Surveys
Hartley	205	0	0	0	0	0
Haskell	207	3	0	0	0	3
Hays	209	3	4	5	6	18
Hemphill	211	3	0	0	0	3
Henderson	213	3	3	2	4	12
Hidalgo	215	3	24	15	0	42
Hill	217	3	1	3	0	7
Hockley	219	3	1	1	0	5
Hood	221	3	2	1	2	8
Hopkins	223	3	1	2	0	6
Houston	225	3	1	1	0	5
Howard	227	3	1	1	0	5
Hudspeth	229	3	0	0	0	3
Hunt	231	3	3	3	4	13
Hutchinson	233	3	1	1	0	5
Irion	235	3	0	0	0	3
Jack	237	3	0	0	0	3
Jackson	239	3	0	1	0	4
Jasper	241	3	1	2	0	6
Jeff Davis	243	2	0	0	0	2
Jefferson	245	3	8	8	11	30
Jim Hogg	247	3	0	0	0	3
Jim Wells	249	3	1	2	0	6
Johnson	251	3	5	3	7	18
Jones	253	3	1	1	0	5
Karnes	255	3	1	1	0	5
Kaufman	257	3	3	4	4	14
Kendall	259	3	1	1	0	5
Kenedy	261	1	0	0	0	1
Kent	263	1	0	0	0	1
Kerr	265	3	2	1	0	6
Kimble	267	3	0	1	0	4
King	269	0	0	0	0	0
Kinney	271	3	0	0	0	3
Kleberg	273	3	1	1	0	5
Knox	275	3	0	0	0	3
Lamar	277	3	2	2	0	7
Lamb	279	3	0	1	0	4
Lampasas	281	3	1	1	0	5
La Salle	283	3	0	1	0	4
Lavaca	285	3	1	1	0	5
Lee	287	3	1	1	0	5
Leon	289	3	1	2	0	6
Liberty	291	3	3	3	3	12
Limestone	293	3	1	1	0	5
Lipscomb	295	3	0	0	0	3
Live Oak	297	3	0	1	0	4
Llano	299	3	1	1	0	5
Loving	301	0	0	0	0	0
Lubbock	303	3	9	7	0	19
Lynn	305	3	0	0	0	3
McCulloch	307	3	0	0	0	3

County Name	FIPS Code	Subgroup 1 Surveys	Subgroup 2 Surveys	Subgroup 3 Surveys	Subgroup 4 Surveys	Total Surveys
McLennan	309	3	8	9	0	20
McMullen	311	3	0	0	0	3
Madison	313	3	0	1	0	4
Marion	315	3	0	0	0	3
Martin	317	3	0	0	0	3
Mason	319	3	0	0	0	3
Matagorda	321	3	1	1	0	5
Maverick	323	3	2	1	0	6
Medina	325	3	1	2	0	6
Menard	327	3	0	0	0	3
Midland	329	3	4	4	0	11
Milam	331	3	1	1	0	5
Mills	333	3	0	0	0	3
Mitchell	335	3	0	1	0	4
Montague	337	3	1	1	0	5
Montgomery	339	3	13	12	18	46
Moore	341	3	1	1	0	5
Morris	343	3	0	1	0	4
Motley	345	3	0	0	0	3
Nacogdoches	347	3	2	2	0	7
Navarro	349	3	2	4	0	9
Newton	351	2	0	0	0	2
Nolan	353	3	0	1	0	4
Nueces	355	3	11	11	14	39
Ochiltree	357	3	0	0	0	3
Oldham	359	3	0	1	0	4
Orange	361	3	3	4	4	14
Palo Pinto	363	3	1	1	0	5
Panola	365	3	1	1	0	5
Parker	367	3	4	3	5	15
Parmer	369	3	0	1	0	4
Pecos	371	3	1	1	0	5
Polk	373	3	2	2	0	7
Potter	375	3	4	4	0	11
Presidio	377	3	0	0	0	3
Rains	379	3	0	0	0	3
Randall	381	3	4	3	0	10
Reagan	383	3	0	0	0	3
Real	385	1	0	0	0	1
Red River	387	3	0	1	0	4
Reeves	389	3	0	1	0	4
Refugio	391	3	0	1	0	4
Roberts	393	3	0	0	0	3
Robertson	395	3	1	1	0	5
Rockwall	397	3	2	2	3	10
Runnels	399	3	0	0	0	3
Rusk	401	3	2	2	2	9
Sabine	403	3	0	0	0	3
San Augustine	405	3	0	0	0	3
San Jacinto	407	3	1	1	0	5
San Patricio	409	3	2	3	3	11
San Saba	411	3	0	0	0	3

County Name	FIPS Code	Subgroup 1 Surveys	Subgroup 2 Surveys	Subgroup 3 Surveys	Subgroup 4 Surveys	Total Surveys
Schleicher	413	3	0	0	0	3
Scurry	415	3	1	1	0	5
Shackelford	417	3	0	0	0	3
Shelby	419	3	1	1	0	5
Sherman	421	3	0	0	0	3
Smith	423	3	7	8	9	27
Somervell	425	3	0	0	0	3
Starr	427	3	2	1	0	6
Stephens	429	3	0	0	0	3
Sterling	431	2	0	0	0	2
Stonewall	433	0	0	0	0	0
Sutton	435	3	0	1	0	4
Swisher	437	3	0	1	0	4
Tarrant	439	3	56	52	74	185
Taylor	441	3	4	4	0	11
Terrell	443	2	0	0	0	2
Terry	445	3	0	1	0	4
Throckmorton	447	3	0	0	0	3
Titus	449	3	1	2	0	6
Tom Green	451	3	3	3	0	9
Travis	453	3	31	27	41	102
Trinity	455	3	0	0	0	3
Tyler	457	3	1	1	0	5
Upshur	459	3	1	1	2	7
Upton	461	3	0	0	0	3
Uvalde	463	3	1	1	0	5
Val Verde	465	3	2	1	0	6
Van Zandt	467	3	2	3	0	8
Victoria	469	3	3	3	4	13
Walker	471	3	2	3	0	8
Waller	473	3	1	2	2	8
Ward	475	3	0	1	0	4
Washington	477	3	1	2	0	6
Webb	479	3	8	4	0	15
Wharton	481	3	1	2	0	6
Wheeler	483	3	0	1	0	4
Wichita	485	3	4	4	0	11
Wilbarger	487	3	0	1	0	4
Willacy	489	3	1	1	0	5
Williamson	491	3	12	9	16	40
Wilson	493	3	1	1	2	7
Winkler	495	3	0	0	0	3
Wise	497	3	2	3	0	8
Wood	499	3	1	1	0	5
Yoakum	501	3	0	0	0	3
Young	503	3	1	1	0	5
Zapata	505	3	0	0	0	3
Zavala	507	3	0	0	0	3
Total		**731**	**777**	**743**	**749**	**3000**

APPENDIX C:

SAS CODE USED FOR STATISTICAL ANALYSIS

```
/************************

Program:   ust_aug08.sas - made by modifying ust2.sas

Created:   13AUG2008

Author:    THDeFries,MFWeatherby

Purpose:   Models annual gasoline flow through a gasoline storage tank based on tank capacity and gasoline grade.
           Applies models to Texas storage tanks.
           Updated with sample data from 2008.

************************/



*options ps=27 ls=108  obs=30000; * For viewing on screen;
options ps=48 ls=122; *obs=100000 ; * For printing with prl;

libname here '/proj1/TCEQ_GasolineAnalysis';

X 'rm -f ust_aug08.ps';
filename plotout 'ust_aug08.ps';
goptions
  device=pscolor
  colors=(black blue green red)
  gsfname=plotout
  gsfmode=append
  ftext=simplex
  htext=0.8
  hby  =1.4
  rotate=landscape;

footnote "/proj1/TCEQ_GasolineAnalysis/ust_aug08.sas &sysdate &systime";



*Bring in Texas tank population data;
*NOTE: THIS NEEDS TO BE UPDATED FOR THE AUG 2008 SURVEY;

data popdata;
  length DataSource $ 10 FacName $ 50 GasGrade $ 4;
  infile "/proj1/TCEQ_GasolineAnalysis/2008Pop.csv" dlm=',' dsd missover firstobs=2 ;
  input FacID FacNum CustNum FacName $ TCEQRegion CountyCode_TCEQ O3NA $ capacity FacType $
TankID $ GasGrade $ ;

  DataSource="Population";
  AnnT=.;
  capacityunit="Gallons";
  if GasGrade = "high" then GasGrade = "High";
  if GasGrade = "mid" then GasGrade = "Mid";
  if GasGrade = "low" then GasGrade = "Xlow";


data sampledata;
```

```
  length ERGcode $ 10 TankID $ 10 GasGrade $ 5 ;
  infile "/proj1/TCEQ_GasolineAnalysis/USTData_ToTim.csv" dlm=',' dsd missover pad firstobs=2;
  input ERGcode $ FacType $ TankID $ capacity GasGrade $ tank_stage1 $ tank_stage2 $ JanT FebT MarT AprT
MayT JunT JulT AugT SepT OctT NovT DecT ;

/*

ERG_Code,FacType,Tank_Number,Tank_Capacity_Gallons,Tank_FuelGrade,Tank_StageI,Tank_StageII,TThruJan
,TThruFeb,TThruMar,TThruApr,TThruMay,TThruJun,TThruJul,TThruAug,TThruSep,TThruOct,TThruNov,TThru
Dec
S0006,R,1,4000,High,Y,,95,9,53,45,30,9,21.5,34,3,28,67,17
S0006,R,2,11500,Low,Y,,954,953,946,1199,1353,1208,1200,1176,845,940,868,965
S0011,R,1,12000,Low,,Y,48634,48302,61257,56940,56694,49751,55102,54380,54597,56167,47188,48746
S0011,R,2,8000,High,,Y,3171,3081,3984,3187,3062,2636,2783,2797,2715,3046,2554,2644
S0017,R,1,12000,Low,,,15880,14260,14934,18400,17102,17782,19098,17127,15201,19179,16368,15802
S0027,R,1,6000,Low,,,4987,4055,6085,5127,8547,5803,4878,6378,5470,5635,5456,4457

*/




data sampledata;
  set sampledata;

  keep ERGcode TankID capacity GasGrade JanT FebT MarT AprT MayT JunT JulT AugT SepT OctT NovT DecT
;
run;


data sampledata;
  set sampledata;

  length DataSource $ 10;
  DataSource = "Sample";
  AnnT= JanT+FebT+MarT+AprT+MayT+JunT+JulT+AugT+SepT+OctT+NovT+DecT ;
  drop JanT FebT MarT AprT MayT JunT JulT AugT SepT OctT NovT DecT;
run;


data missing;
  length DataSource $ 10;
  input DataSource $ GasGrade $ capacity AnnT;
  cards;
Missing Low 2000  .
Missing Low 3000  .
Missing Low 4000  .
Missing Low 5000  .
Missing Low 6000  .
Missing Low 8000  .
Missing Low 10000  .
Missing Low 12000  .
Missing Low 15000  .
Missing Low 20000  .
Missing Low 30000  .
Missing Low 40000  .
```

```
Missing Mid 2000  .
Missing Mid 3000  .
Missing Mid 4000  .
Missing Mid 5000  .
Missing Mid 6000  .
Missing Mid 8000  .
Missing Mid 10000  .
Missing Mid 12000  .
Missing Mid 15000  .
Missing Mid 20000  .
Missing High 2000  .
Missing High 3000  .
Missing High 4000  .
Missing High 5000  .
Missing High 6000  .
Missing High 8000  .
Missing High 10000  .
Missing High 12000  .
Missing High 15000  .
Missing High 20000  .
Missing High 30000  .
   ;



data sampledata;
   set sampledata missing;

data all;
   set sampledata popdata;

   log_flow= log(AnnT);
   if capacity=0 then capacity=0.1;
   log_capacity=log(capacity);
   if GasGrade="Low" then GasGrade="Xlow";

proc sort;
   by GasGrade;

*proc gplot uniform;
*   plot AnnT * capacity;
*   by GasGrade;
*
*proc gplot uniform;
*   plot log_flow * log_capacity;
*   by GasGrade;


proc glm ;
   by GasGrade;
   model log_flow = log_capacity / ss1 ss2 solution CLPARM ;
   output out=prediction predicted=predlnflow L95M=L95M U95M=U95M;

proc gplot data=prediction;
   by GasGrade;
   where GasGrade ne "";
```

```
  plot log_flow * log_capacity=1  predlnflow * log_capacity=2 /overlay;
  symbol1 v=plus i=none c=black;
  symbol2 v=none i=join c=black l=1;


data prediction;
  set prediction;
  by GasGrade;

  exppredlnflow=exp(predlnflow);
  if GasGrade="High" then do;
    pred_meanflow= (82922.77 / 55851.38)*exp(predlnflow);
    pred_u95mflow= (82922.77 / 55851.38)*exp(u95m);
    pred_l95mflow= (82922.77 / 55851.38)*exp(l95m);
    end;
  if GasGrade="Mid" then do;
    pred_meanflow= (97341.06 / 67572.99)*exp(predlnflow);
    pred_u95mflow= (97341.06 / 67572.99)*exp(u95m);
    pred_l95mflow= (97341.06 / 67572.99)*exp(l95m);
    end;
  if GasGrade="Xlow" then do;
    pred_meanflow= (906355.03 / 678931.42)*exp(predlnflow);
    pred_u95mflow= (906355.03 / 678931.42)*exp(u95m);
    pred_l95mflow= (906355.03 / 678931.42)*exp(l95m);
    end;

*The BCFs are the mean of AnnT divided by the mean of the exponential of the predicted lnx flows;
proc means n mean;
  by GasGrade;
  where AnnT ne . and GasGrade ne "" and DataSource="Sample";
  var AnnT exppredlnflow pred_meanflow;


proc gplot;
  by GasGrade;
  plot pred_meanflow * capacity=1 pred_u95mflow * capacity=2 pred_l95mflow * capacity=3 / overlay;
  symbol1 v=dot i=none l=1 c=black;
  symbol2 v=plus i=none c=black;
  symbol3 v=plus i=none c=black;


data error;
  set prediction;
  if DataSource="Missing";
  up_pct= 100* ((pred_u95mflow / pred_meanflow)-1);
  lo_pct= 100* ((pred_l95mflow / pred_meanflow)-1);

proc print;
  var GasGrade capacity pred_meanflow pred_u95mflow pred_l95mflow up_pct lo_pct;



/*
The estimated annual throughput (in gallons) for a tank with volume Capacity (in gallons) at each GasGrade is
therefore:
```

GasGrade	Annual Throughput
Low	(906355.03 / 678931.42) * exp(-6.541499403) * (Capacity ** 2.130395725)
Mid	(97341.06 / 67572.99) * exp(-1.779607527) * (Capacity ** 1.402116304)
High	(82922.77 / 55851.38) * exp(-2.765015869) * (Capacity ** 1.492136938)

For example, a 10,000 gallon tank would have an estimated annual throughput of 639,909 gallons of Low GasGrade fuel.

The uncertainty in the mean predicted value for each GasGrade and tank Capacity is a function of GasGrade and Capacity.
The uncertainties range from about +-5% to +-20% for Low GasGrade, from about +-9% to +-25% for Mid GasGrade, and from +-5% to +-20% for High GasGrade - depending on tank Capacity. (See ust_aug08.lst)
We can easily calculate the uncertainties for all tanks in the state by inputting the 22,000 tank dataset to this SAS program. From this we can easily get the totals and their uncertainties for the state and by county. This is simple - don't do it any other way.;

```
*/



data pop_pred;
  set prediction;
  if DataSource="Population";

  if GasGrade="Xlow" then GasGrade="Low";

  pred_annualflow = pred_meanflow;
  U95_annualflow  = pred_u95mflow;
  L95_annualflow  = pred_l95mflow;

  if capacity=0.1 then do;
    capacity       =0;
    pred_annualflow =0;
    U95_annualflow  =0;
    L95_annualflow  =0;
  end;

  drop L95M U95M predlnflow DataSource      AnnT log_flow log_capacity exppredlnflow
      pred_meanflow pred_u95mflow pred_l95mflow;


data pop_pred;
  set pop_pred;
  up_pct=100*((U95_annualflow/pred_annualflow)-1);
  lo_pct=100*((L95_annualflow/pred_annualflow)-1);
  file "/proj1/TCEQ_GasolineAnalysis/TCEQGasFlow_2008.csv" dlm=',' dsd;
  put FacNum FacName CountyCode_TCEQ TankID capacity capacityunit GasGrade pred_annualflow
U95_annualflow L95_annualflow up_pct lo_pct;
  run;
```

```
/*proc print;
   var FacNum FacName StNum StName StType City State Zip CountyCode_TCEQ TankStatus TankID
       capacity capacityunit GasGrade NumTanks CntyFIPS pred_annualflow U95_annualflow L95_annualflow;
*/
proc means sum;
   var pred_annualflow U95_annualflow  L95_annualflow  ;

proc sort;
   by CountyCode_TCEQ;
proc means sum noprint;
   by CountyCode_TCEQ;
   var pred_annualflow U95_annualflow  L95_annualflow  ;
   output out=county_avg sum=sum_pred_flow sum_U95_flow sum_L95_flow;

data county_avg;
   set county_avg;
   up_pct= 100* ((sum_u95_flow / sum_pred_flow)-1);
   lo_pct= 100* ((sum_l95_flow / sum_pred_flow)-1);

proc print;
   var CountyCode_TCEQ sum_pred_flow up_pct lo_pct sum_U95_flow sum_L95_flow;

end;
```

APPENDIX D:

COUNTY-METEOROLOGICAL STATION CROSSWALK

County Name	FIPS Code	Weather Station Code
Anderson	001	GGG
Andrews	003	MAF
Angelina	005	GGG
Aransas	007	CRP
Archer	009	SPS
Armstrong	011	AMA
Atascosa	013	SAT
Austin	015	IAH
Bailey	017	AMA
Bandera	019	SAT
Bastrop	021	ATT
Baylor	023	SPS
Bee	025	VCT
Bell	027	ACT
Bexar	029	SAT
Blanco	031	ATT
Borden	033	LBB
Bosque	035	ACT
Bowie	037	DFW
Brazoria	039	IAH
Brazos	041	IAH
Brewster	043	SJT
Briscoe	045	AMA
Brooks	047	BRO
Brown	049	ACT
Burleson	051	IAH
Burnet	053	ATT
Caldwell	055	ATT
Calhoun	057	VCT
Callahan	059	ABI
Cameron	061	BRO
Camp	063	DFW
Carson	065	AMA
Cass	067	DFW
Castro	069	AMA
Chambers	071	BPT
Cherokee	073	GGG
Childress	075	SPS
Clay	077	SPS
Cochran	079	LBB
Coke	081	SJT
Coleman	083	ABI
Collin	085	DFW
Collingsworth	087	SPS

County Name	FIPS Code	Weather Station Code
Colorado	089	IAH
Comal	091	SAT
Comanche	093	ACT
Concho	095	SJT
Cooke	097	SPS
Coryell	099	ACT
Cottle	101	SPS
Crane	103	MAF
Crockett	105	SJT
Crosby	107	LBB
Culberson	109	ELP
Dallam	111	AMA
Dallas	113	DFW
Dawson	115	LBB
Deaf Smith	117	AMA
Delta	119	DFW
Denton	121	DFW
Dewitt	123	VCT
Dickens	125	LBB
Dimmit	127	CRP
Donley	129	AMA
Duval	131	CRP
Eastland	133	ABI
Ector	135	MAF
Edwards	137	SJT
Ellis	139	DFW
El Paso	141	ELP
Erath	143	ABI
Falls	145	ACT
Fannin	147	SPS
Fayette	149	IAH
Fisher	151	ABI
Floyd	153	LBB
Foard	155	SPS
Fort Bend	157	IAH
Franklin	159	DFW
Freestone	161	ACT
Frio	163	SAT
Gaines	165	LBB
Galveston	167	IAH
Garza	169	LBB
Gillespie	171	ATT
Glasscock	173	MAF
Goliad	175	VCT

County Name	FIPS Code	Weather Station Code
Gonzales	177	SAT
Gray	179	AMA
Grayson	181	SPS
Gregg	183	DFW
Grimes	185	IAH
Guadalupe	187	SAT
Hale	189	LBB
Hall	191	AMA
Hamilton	193	ACT
Hansford	195	AMA
Hardeman	197	SPS
Hardin	199	BPT
Harris	201	IAH
Harrison	203	DFW
Hartley	205	AMA
Haskell	207	ABI
Hays	209	ATT
Hemphill	211	AMA
Henderson	213	DFW
Hidalgo	215	BRO
Hill	217	ACT
Hockley	219	LBB
Hood	221	DFW
Hopkins	223	DFW
Houston	225	GGG
Howard	227	MAF
Hudspeth	229	ELP
Hunt	231	SPS
Hutchinson	233	AMA
Irion	235	SJT
Jack	237	ABI
Jackson	239	VCT
Jasper	241	GGG
Jeff Davis	243	MAF
Jefferson	245	BPT
Jim Hogg	247	BRO
Jim Wells	249	CRP
Johnson	251	DFW
Jones	253	ABI
Karnes	255	VCT
Kaufman	257	DFW
Kendall	259	SAT
Kenedy	261	BRO
Kent	263	LBB

County Name	FIPS Code	Weather Station Code
Kerr	265	ATT
Kimble	267	SJT
King	269	LBB
Kinney	271	SAT
Kleberg	273	CRP
Knox	275	SPS
Lamar	277	DFW
Lamb	279	LBB
Lampasas	281	ACT
La Salle	283	CRP
Lavaca	285	VCT
Lee	287	ATT
Leon	289	ACT
Liberty	291	IAH
Limestone	293	ACT
Lipscomb	295	AMA
Live Oak	297	CRP
Llano	299	ATT
Loving	301	MAF
Lubbock	303	LBB
Lynn	305	LBB
McCulloch	307	SJT
McLennan	309	ACT
McMullen	311	CRP
Madison	313	IAH
Marion	315	DFW
Martin	317	MAF
Mason	319	ATT
Matagorda	321	VCT
Maverick	323	CRP
Medina	325	SAT
Menard	327	SJT
Midland	329	MAF
Milam	331	IAH
Mills	333	ACT
Mitchell	335	ABI
Montague	337	SPS
Montgomery	339	IAH
Moore	341	AMA
Morris	343	DFW
Motley	345	LBB
Nacogdoches	347	GGG
Navarro	349	ACT
Newton	351	GGG

County Name	FIPS Code	Weather Station Code
Nolan	353	ABI
Nueces	355	CRP
Ochiltree	357	AMA
Oldham	359	AMA
Orange	361	BPT
Palo Pinto	363	ABI
Panola	365	GGG
Parker	367	DFW
Parmer	369	AMA
Pecos	371	SJT
Polk	373	GGG
Potter	375	AMA
Presidio	377	SJT
Rains	379	DFW
Randall	381	AMA
Reagan	383	MAF
Real	385	ATT
Red River	387	DFW
Reeves	389	MAF
Refugio	391	VCT
Roberts	393	AMA
Robertson	395	IAH
Rockwall	397	DFW
Runnels	399	SJT
Rusk	401	GGG
Sabine	403	GGG
San Augustine	405	GGG
San Jacinto	407	IAH
San Patricio	409	CRP
San Saba	411	ATT
Schleicher	413	SJT
Scurry	415	LBB
Shackelford	417	ABI
Shelby	419	GGG
Sherman	421	AMA
Smith	423	DFW
Somervell	425	DFW
Starr	427	BRO
Stephens	429	ABI
Sterling	431	SJT
Stonewall	433	LBB
Sutton	435	SJT
Swisher	437	AMA
Tarrant	439	DFW

County Name	FIPS Code	Weather Station Code
Taylor	441	ABI
Terrell	443	SJT
Terry	445	LBB
Throckmorton	447	ABI
Titus	449	DFW
Tom Green	451	SJT
Travis	453	ATT
Trinity	455	GGG
Tyler	457	GGG
Upshur	459	DFW
Upton	461	MAF
Uvalde	463	SAT
Val Verde	465	SAT
Van Zandt	467	DFW
Victoria	469	VCT
Walker	471	IAH
Waller	473	IAH
Ward	475	MAF
Washington	477	IAH
Webb	479	CRP
Wharton	481	VCT
Wheeler	483	AMA
Wichita	485	SPS
Wilbarger	487	SPS
Willacy	489	BRO
Williamson	491	ATT
Wilson	493	SAT
Winkler	495	MAF
Wise	497	DFW
Wood	499	DFW
Yoakum	501	LBB
Young	503	ABI
Zapata	505	BRO
Zavala	507	CRP

APPENDIX E:

SEASONAL METEOROLOGICAL DATA

Weather Station	Winter Min (°F)	Winter Max (°F)	Spring Min (°F)	Spring Max (°F)	Summer Min (°F)	Summer Max (°F)	Fall Min (°F)	Fall Max (°F)
ABI	34	55	54	76	71	92	54	75
ACT	37	59	55	77	72	93	58	78
AMA	24	47	41	67	65	89	45	69
ATT	41	62	59	78	74	92	61	80
BPT	44	63	59	77	74	89	60	79
BRO	53	69	65	81	75	90	66	83
CRP	49	67	62	79	75	92	65	83
DFW	37	56	55	75	73	93	57	76
ELP	33	61	47	77	69	93	49	77
GGG	39	60	56	77	71	92	56	80
IAH	42	64	59	78	73	91	61	81
LBB	28	54	47	74	67	88	49	72
MAF	30	59	49	78	67	93	52	74
SAT	40	63	58	78	73	92	60	81
SJT	32	55	54	77	69	92	54	76
SPS	30	53	51	76	71	94	53	75
VCT	46	66	61	78	75	92	62	81

APPENDIX F:

MOBILE6 INPUT FILES

ii_yes.in – For counties with Stage II vapor recovery requirements

```
MOBILE6 INPUT FILE :
*updated 12/5/00, mkb
> This text will be written to the monitor screen.
* This text is for annotating this file and is otherwise ignored.
POLLUTANTS        : HC
DATABASE OUTPUT    :
WITH FIELDNAMES    :
DATABASE EMISSIONS : 1111 1112 11
AGGREGATED OUTPUT  :
EMISSIONS TABLE    : ii_yes.tb1
SPREADSHEET        :

RUN DATA
> This text will be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
EXPRESS HC AS VOC  :

STAGE II REFUELING :
05 1 80 60

SCENARIO RECORD    : BPT-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 60. 79.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : BPT-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 44. 63.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : BPT-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 59. 77.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : BPT-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 59. 77.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : BPT-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 74. 89.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : BPT-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
```

```
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 60. 79.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : BPT-Winter Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 60. 79.
FUEL RVP           : 11.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : BPT-Winter Fuel Winter Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 44. 63.
FUEL RVP           : 11.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : BPT-Winter Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 59. 77.
FUEL RVP           : 11.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : BPT-Summer Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 59. 77.
FUEL RVP           : 6.8
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : BPT-Summer Fuel Summer Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 74. 89.
FUEL RVP           : 6.8
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : BPT-Summer Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 60. 79.
FUEL RVP           : 6.8
ALTITUDE           : 1
```

OXYGENATED FUELS : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : DFW-Winter Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 57. 76.
FUEL RVP : 11.7
ALTITUDE : 1
OXYGENATED FUELS : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : DFW-Winter Fuel Winter Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 37. 56.
FUEL RVP : 11.7
ALTITUDE : 1
OXYGENATED FUELS : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : DFW-Winter Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 55. 75.
FUEL RVP : 11.7
ALTITUDE : 1
OXYGENATED FUELS : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : DFW-Summer Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 55. 75.
FUEL RVP : 6.8
ALTITUDE : 1
OXYGENATED FUELS : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : DFW-Summer Fuel Summer Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 73. 93.
FUEL RVP : 6.8
ALTITUDE : 1
OXYGENATED FUELS : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : DFW-Summer Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 57. 76.
FUEL RVP : 6.8
ALTITUDE : 1
OXYGENATED FUELS : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM : 2 S

SCENARIO RECORD : ELP-Winter Fuel Fall Temp Nonattainment

```
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 49. 77.
FUEL RVP           : 12.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.027 1

SCENARIO RECORD    : ELP-Winter Fuel Winter Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 33. 61.
FUEL RVP           : 12.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.027 1

SCENARIO RECORD    : ELP-Winter Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 47. 77.
FUEL RVP           : 12.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.027 1

SCENARIO RECORD    : ELP-Summer Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 47. 77.
FUEL RVP           : 6.8
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Summer Fuel Summer Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 69. 93.
FUEL RVP           : 6.8
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Summer Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 49. 77.
FUEL RVP           : 6.8
ALTITUDE           : 1

SCENARIO RECORD    : IAH-Winter Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 61. 81.
FUEL RVP           : 11.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : IAH-Winter Fuel Winter Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
```

```
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 42. 64.
FUEL RVP           : 11.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : IAH-Winter Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 59. 78.
FUEL RVP           : 11.3
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.035 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : IAH-Summer Fuel Spring Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 59. 78.
FUEL RVP           : 6.8
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : IAH-Summer Fuel Summer Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 73. 91.
FUEL RVP           : 6.8
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM       : 2 S

SCENARIO RECORD    : IAH-Summer Fuel Fall Temp Nonattainment
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 61. 81.
FUEL RVP           : 6.8
ALTITUDE           : 1
OXYGENATED FUELS   : 0.000 1.000 0.000 0.021 1
FUEL PROGRAM       : 2 S

END OF RUN
```

ii_no.in – For counties without Stage II vapor recovery requirements

```
MOBILE6 INPUT FILE :
*updated 12/5/00, mkb
> This text will be written to the monitor screen.
* This text is for annotating this file and is otherwise ignored.
POLLUTANTS        : HC
DATABASE OUTPUT    :
WITH FIELDNAMES    :
DATABASE EMISSIONS : 1111 1112 11
AGGREGATED OUTPUT  :
EMISSIONS TABLE    : ii_no.tb1
SPREADSHEET        :

RUN DATA
> This text will be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
EXPRESS HC AS VOC  :
EXPAND EVAPORATIVE :

SCENARIO RECORD    : ABI-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 54. 75.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ABI-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 34. 55.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ABI-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 54. 76.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ABI-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 54. 76.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ABI-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 71. 92.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ABI-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
```

```
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 54. 75.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 37. 59.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 55. 77.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 55. 77.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 72. 93.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
```

```
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 37. 59.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 55. 77.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 55. 77.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 72. 93.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : ACT-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : AMA-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 45. 69.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : AMA-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 24. 47.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : AMA-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 41. 67.
FUEL RVP           : 11.5
ALTITUDE           : 1
```

```
SCENARIO RECORD    : AMA-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 41. 67.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : AMA-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 65. 89.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : AMA-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 45. 69.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 61. 80.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 41. 62.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 59. 78.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 59. 78.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 74. 92.
FUEL RVP           : 8.7
```

```
ALTITUDE          : 1

SCENARIO RECORD    : ATT-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 61. 80.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 61. 80.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 41. 62.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 59. 78.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 59. 78.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 74. 92.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : ATT-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 61. 80.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : BRO-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
```

```
MIN/MAX TEMP       : 66. 83.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : BRO-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 53. 69.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : BRO-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 65. 81.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : BRO-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 65. 81.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : BRO-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 75. 90.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : BRO-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 66. 83.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : CRP-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 65. 83.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : CRP-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 49. 67.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : CRP-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
```

CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 62. 79.
FUEL RVP : 11.5
ALTITUDE : 1

SCENARIO RECORD : CRP-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 62. 79.
FUEL RVP : 8.7
ALTITUDE : 1

SCENARIO RECORD : CRP-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 75. 92.
FUEL RVP : 8.7
ALTITUDE : 1

SCENARIO RECORD : CRP-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 65. 83.
FUEL RVP : 8.7
ALTITUDE : 1

SCENARIO RECORD : CRP-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 65. 83.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : CRP-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 49. 67.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : CRP-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 62. 79.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : CRP-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 62. 79.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : CRP-Summer Fuel Summer Temp 95 LOW

```
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 75. 92.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : CRP-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 65. 83.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : DFW-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 57. 76.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : DFW-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 37. 56.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : DFW-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 55. 75.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : DFW-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 55. 75.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : DFW-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 73. 93.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : DFW-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 57. 76.
FUEL RVP           : 7.8
ALTITUDE           : 1
```

```
SCENARIO RECORD    : ELP-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 49. 77.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 33. 61.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 47. 77.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 47. 77.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 69. 93.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : ELP-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 49. 77.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : GGG-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 56. 80.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : GGG-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 39. 60.
```

```
FUEL RVP          : 12.3
ALTITUDE          : 1

SCENARIO RECORD    : GGG-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 56. 77.
FUEL RVP          : 12.3
ALTITUDE          : 1

SCENARIO RECORD    : GGG-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 56. 77.
FUEL RVP          : 7.8
ALTITUDE          : 1

SCENARIO RECORD    : GGG-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 71. 92.
FUEL RVP          : 7.8
ALTITUDE          : 1

SCENARIO RECORD    : GGG-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 56. 80.
FUEL RVP          : 7.8
ALTITUDE          : 1

SCENARIO RECORD    : IAH-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 61. 81.
FUEL RVP          : 12.3
ALTITUDE          : 1

SCENARIO RECORD    : IAH-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 42. 64.
FUEL RVP          : 12.3
ALTITUDE          : 1

SCENARIO RECORD    : IAH-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 59. 78.
FUEL RVP          : 12.3
ALTITUDE          : 1

SCENARIO RECORD    : IAH-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
```

EVALUATION MONTH : 7
MIN/MAX TEMP : 59. 78.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : IAH-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 73. 91.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : IAH-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 61. 81.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : LBB-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 49. 72.
FUEL RVP : 11.5
ALTITUDE : 1

SCENARIO RECORD : LBB-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 28. 54.
FUEL RVP : 11.5
ALTITUDE : 1

SCENARIO RECORD : LBB-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 47. 74.
FUEL RVP : 11.5
ALTITUDE : 1

SCENARIO RECORD : LBB-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 47. 74.
FUEL RVP : 8.7
ALTITUDE : 1

SCENARIO RECORD : LBB-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 67. 88.
FUEL RVP : 8.7
ALTITUDE : 1

SCENARIO RECORD : LBB-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.

```
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 49. 72.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : MAF-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 52. 74.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : MAF-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 30. 59.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : MAF-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 49. 78.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : MAF-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 49. 78.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : MAF-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 67. 93.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : MAF-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 52. 74.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 60. 81.
FUEL RVP           : 11.5
ALTITUDE           : 1
```

```
SCENARIO RECORD    : SAT-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 40. 63.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 73. 92.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 60. 81.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 60. 81.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 40. 63.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 12.3
```

```
ALTITUDE          : 1

SCENARIO RECORD    : SAT-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 58. 78.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 73. 92.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : SAT-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 60. 81.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : SJT-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 54. 76.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SJT-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 32. 55.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SJT-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 54. 77.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SJT-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 54. 77.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SJT-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
```

```
MIN/MAX TEMP       : 69. 92.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SJT-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 54. 76.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Winter Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 53. 75.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Winter Fuel Winter Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 30. 53.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Winter Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 51. 76.
FUEL RVP           : 11.5
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Summer Fuel Spring Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 51. 76.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Summer Fuel Summer Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 71. 94.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Summer Fuel Fall Temp
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 53. 75.
FUEL RVP           : 8.7
ALTITUDE           : 1

SCENARIO RECORD    : SPS-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
```

CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 53. 75.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : SPS-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 30. 53.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : SPS-Winter Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 51. 76.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : SPS-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 51. 76.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : SPS-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 71. 94.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : SPS-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 7
MIN/MAX TEMP : 53. 75.
FUEL RVP : 7.8
ALTITUDE : 1

SCENARIO RECORD : VCT-Winter Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 62. 81.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : VCT-Winter Fuel Winter Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR : 2007
EVALUATION MONTH : 1
MIN/MAX TEMP : 46. 66.
FUEL RVP : 12.3
ALTITUDE : 1

SCENARIO RECORD : VCT-Winter Fuel Spring Temp 95 LOW

```
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 1
MIN/MAX TEMP       : 61. 78.
FUEL RVP           : 12.3
ALTITUDE           : 1

SCENARIO RECORD    : VCT-Summer Fuel Spring Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 61. 78.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : VCT-Summer Fuel Summer Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 75. 92.
FUEL RVP           : 7.8
ALTITUDE           : 1

SCENARIO RECORD    : VCT-Summer Fuel Fall Temp 95 LOW
> This text will also be written to the descriptive output file.
* This text is for annotating this file and is otherwise ignored.
CALENDAR YEAR      : 2007
EVALUATION MONTH   : 7
MIN/MAX TEMP       : 62. 81.
FUEL RVP           : 7.8
ALTITUDE           : 1

END OF RUN
```

APPENDIX G:

SAMPLE CALCULATIONS

Example calculations for annual emissions in Anderson County (FIPS 001)

Annual gasoline throughput for County FIPS 001 = 30,397,218 gallons

SCC	SCC Description	Emission Factor	Units
2501060050	Stage I – Total	7.3	lbs/1000 gallons
2501060100	Stage II – Total	2.212 (spring)	grams/gallon
		1.956 (summer)	grams/gallon
		2.215 (fall)	grams/gallon
		2.342 (winter)	grams/gallon
25010601200	UST Losses	1	lbs/1000 gallons
2505030120	Transit Losses	0.06	lbs/1000 gallons

Emissions from Stage I:

VOC emissions = emission factor (by county) × annual throughput

Stage I emission factor for County FIPS 001 = 7.3 lbs/1000 gallons

VOC emissions = 7.3 lbs/1000 gallons × 30,397,218 gallons = 221,899.7 lbs
= 110.9 tons

Emissions from Stage II:

VOC emissions = Σ(emission factor (by county, by season) × seasonal throughput)

Stage II emission factor for County FIPS 001 in spring = 2.212 g/gallon
Stage II emission factor for County FIPS 001 in summer = 1.956 g/gallon
Stage II emission factor for County FIPS 001 in fall = 2.215 g/gallon
Stage II emission factor for County FIPS 001 in winter = 2.342 g/gallon

Number of days in spring = 92
Number of days in summer = 92
Number of days in fall = 91
Number of days in winter = 90

Average daily throughput in County FIPS 001 = 30,397,218 ÷ 365 days
= 83,280.05 gallons/day

Average spring seasonal throughput = 83,280.05 gallons/day × 92 days
= 7,661,764.5 gallons
Average summer seasonal throughput = 83,280.05 gallons/day × 92 days
= 7,661,764.5 gallons

Average fall seasonal throughput = 83,280.05 gallons/day × 91 days
= 7,578,484.5 gallons

Average winter seasonal throughput = 83,280.05 gallons/day × 90 days
= 7,495,204.4 gallons

Stage II emissions in spring = 2.212 g/gallon × 7,661,764.5 gallons
= 16,947,823.1 grams
= 16,947,823.1 grams × (453.6 g/1 lb) × (2000 lbs/1 ton)
= 18.7 tons

Stage II emissions in summer = 1.956 g/gallon × 7,661,764.5 gallons
= 14,986,411.4 grams
= 14,986,411.4 grams × (453.6 g/1 lb) × (2000 lbs/1 ton)
= 16.5 tons

Stage II emissions in fall = 2.215 g/gallon × 7,578,484.5 gallons
= 16,786,343.2 grams
= 16,786,343.2 grams × (453.6 g/1 lb) × (2000 lbs/1 ton)
= 18.5 tons

Stage II emissions in winter = 2.342 g/gallon × 7,495,204.4 gallons
= 17,553,768.7 grams
= 17,553,768.7 grams × (453.6 g/1 lb) × (2000 lbs/1 ton)
= 19.3 tons

Total Stage II emissions for County FIPS 001 = 18.7 + 16.5 + 18.5 + 19.3 = 73.1 tons

***Emissions from UST**:*

VOC emissions = emission factor × annual throughput

VOC emissions = [1 lbs/1000 gallons × 30,397,218 gallons]
= 30,397.2 lbs
= 15.2 tons

***Emissions from Transit Losses**:*

VOC emissions = emission factor x annual throughput

VOC emissions = [(0.06 lbs/1000 gallons) × 30,397,218 gallons]
= 1,823.8 lbs
= 0.9 tons

Total VOC emissions for County FIPS 001 = 110.9 + 73.1 + 15.2 + 0.9 = 200.1 tpy