



EMISSION INVENTORY OF BULK GASOLINE TERMINALS AND BULK GASOLINE PLANTS

Final

Prepared for:

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TABLE OF CONTENTS

Section	Page
ES.0 EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
2.0 CATEGORY DESCRIPTION	3
3.0 FACILITY RESEARCH	6
3.1 TCEQ DATA	6
3.2 DUN & BRADSTREET DATA	8
3.3 U.S. CENSUS DATA	9
4.0 ESTIMATION METHODOLOGIES	12
4.1 LOADING RACKS	12
4.2 STORAGE TANKS	14
4.3 EQUIPMENT LEAKS	15
4.4 FUEL ADDITIVES	17
4.5 OTHER EMISSION SOURCES	17
5.0 SURVEY QUESTIONNAIRE DEVELOPMENT	17
6.0 SURVEY RESULTS	19
6.1 QUALITATIVE DISCUSSION OF BULK FUEL INDUSTRY	21
7.0 EMISSION CALCULATIONS AND INVENTORY RESULTS	22
7.1 2011 COUNTY BUSINESS PATTERNS DATA	23
7.2 LOADING RACK EMISSION PROFILES	24
7.3 STORAGE TANK EMISSION PROFILES	25
7.4 EQUIPMENT LEAK EMISSION PROFILES	27
7.5 2011 BASE YEAR EMISSIONS	28
7.6 OZONE SEASON DAY EMISSIONS	28
7.7 EMISSION PROJECTIONS (FUTURE YEAR 2014)	29
8.0 DATA FORMATTING	29
9.0 RECOMMENDATIONS	29
10.0 REFERENCES	30

Tables	Page
Table ES-1. Overall 2011 Emissions Inventory for Texas	1
Table ES-2. Comparison of Bulk Terminal and Bulk Plant Emissions	2
Table 3-1. Data from the <i>2007 Economic Census</i>	9
Table 3-2. Number of Establishments, By County, By Data Source	9
Table 6-1. Activity Data Collection Survey Disposition	21
Table 7-1. Loading Rack Emissions Profiles	25
Table 7-2. Model Tank Profiles	26

Table 7-3. 2011 State-level Summary of VOC Emissions from Bulk Gasoline Terminals and Plants..... 28

Figures **Page**

Figure 5-1. Online Survey Log-in Screen..... 18

APPENDIX A: BULK TERMINAL AND BULK PLANT SURVEY QUESTIONNAIRE

APPENDIX B: BULK TERMINAL AND BULK PLANT SURVEY POPULATION

APPENDIX C: COUNTY-LEVEL ANNUAL AND OZONE-SEASON DAY VOC EMISSIONS

APPENDIX D: SAMPLE CALCULATIONS FOR HARRIS COUNTY

ACRONYMS

AST	Aboveground storage tank
CBP	County Business Patterns
CFR	Code of Federal Regulations
D&B	Dunn & Bradstreet
DOT	Department of Transportation
EIA	Energy Information Administration
ERG	Eastern Research Group, Inc.
HAPs	Hazardous Air Pollutants
ISD	Independent School District
lbs	Pounds
LP	Liquified petroleum
LPG	Liquified petroleum gas
NAICS	North American Industry Classification System
NESHAP	National Emission Standard for Hazardous Air Pollutants
NO _x	Nitrogen oxides
NSPS	New Source Performance Standard
PST	Petroleum storage tank
QA	Quality assurance
QC	Quality control
RE	Rule effectiveness
RVP	Reid Vapor Pressure
SCC	Standard Classification Codes
TCEQ	Texas Commission on Environmental Quality
TexAER	Texas Air Emissions Repository
TOC	Total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
U.S. EPA	U.S. Environmental Protection Agency
UST	Underground storage tank
VOC	Volatile organic compound

ES.0 EXECUTIVE SUMMARY

Eastern Research Group, Inc. (ERG) has completed a 2011 area source inventory of total volatile organic compound (VOC) emissions for bulk gasoline terminals and bulk gasoline plants in the state of Texas.

In order to collect relevant activity data, a telephone survey, in conjunction with an online survey tool, was conducted. The survey population consisted of 569 potential facilities of interest. A total of 34 facilities responded to the survey (complete and partial responses). Emissions were estimated using U.S. EPA recommended methods for loading racks and equipment leaks. The U.S. EPA TANKS model was used to estimate emissions from gasoline storage tanks at these facilities. Based upon the collected survey data, model facility-specific profiles were developed. These profiles were then used in conjunction with *2011 County Business Patterns* data (U.S. Census Bureau) to estimate county-level emissions from bulk gasoline terminals and plants across the state. The 2011 emissions were carried forward to 2014 “as is”, based on national gasoline consumption data provided by the U.S. Energy Information Administration’s (EIA) short-term energy projections.

A summary of estimated emissions is provided in Table ES-1.

Table ES-1. Overall 2011 Emissions Inventory for Texas

SCC	SCC Description	VOC (tpy)
2501055120	Petrol & Petrol Product Storage /Bulk Plants: All Evaporative Losses /Gasoline	1,768.0
	VOC from Storage Tanks	1,135.1
	VOC from Loading Racks	626.2
	VOC from Equipment Leaks	6.6

For comparison purposes, the 2011 emissions estimated for this project are presented in Table ES-2 along with some estimates developed by TCEQ based upon U.S. EPA’s 2011 National Emissions Inventory (NEI) (Rubick, 2013). The TCEQ estimates were developed by subtracting 2011 point source emissions from the 2011 NEI and then applying a rule effectiveness (RE) factor.

Table ES-2. Comparison of Bulk Terminal and Bulk Plant Emissions

Emission Source	Source	Annual (tpy)	OSD (tpd)
ERG	Bulk Terminals	0.0	0.00
	Bulk Plants	1,768.0	4.73
TCEQ/NEI	Bulk Terminals	7,766.8	21.28
	Bulk Plants	1,861.3	5.10

A comparison of the Table ES-2 emission estimates indicates fairly close agreement between the bulk plant emission estimates. Although the TCEQ bulk terminal emission estimates are quite large, ERG did not estimate bulk terminal emissions based upon the results of the survey. In particular, survey responses (i.e., gasoline throughput and tank size) did not identify facilities sufficiently large enough to be classified as bulk terminals. It is possible that there are bulk terminals in Texas that are not contained in the TCEQ point source inventory, but these were not identified in the survey.

Examination of the methodologies used in the 2011 NEI (i.e., the underlying basis of the TCEQ estimate) indicates that the 2011 NEI estimates were assumed to be identical to those from the 2008 NEI due to resource constraints. In turn, the 2008 estimates were based upon 1998 national estimates developed in support of the Gasoline Distribution MACT standard, which were scaled up by the 2008 to 1998 ratio of national volume of wholesale gasoline supplied (i.e., a factor of 1.089). As a result, assumptions made as part of the 1998 national estimates developed in support of the Gasoline Distribution MACT standard are affecting the 2011 NEI emission estimates. These assumptions are now 15 years old and may not accurately reflect some of the industry trends identified during this project's survey, which are qualitatively discussed in Section 6.1 of this report.

1.0 INTRODUCTION

Eastern Research Group, Inc. (ERG) was contracted by the Texas Commission on Environmental Quality (TCEQ) to develop an annual emissions inventory for bulk gasoline terminals and bulk gasoline plants located in the State of Texas, for base year 2011. The project focused on VOC evaporative and fugitive emissions from motor gasoline loading racks, storage tanks, and equipment leaks at bulk gasoline terminals and bulk gasoline plants. The previous TCEQ emissions inventory for 2011 contained emissions data for a few of these facilities. The activity data required to calculate emissions for this study was collected via phone survey assisted by an online survey tool. The survey results were compiled and then used to estimate

emissions based upon the most appropriate U.S. Environmental Protection Agency (U.S. EPA) emissions guidance. The base year 2011 emissions inventory was also projected to the future year 2014.

This report describes in detail the steps involved during the development of the bulk gasoline terminal and bulk gasoline plant emissions inventory for the State of Texas, and is presented in the following sections:

- Section 2.0 includes a brief category description along with a narrative on potential emission sources;
- Section 3.0 describes the facility research process used to identify potential facility (gasoline bulk terminals and bulk plants) owners and operators;
- Section 4.0 provides a description of the determination of the most appropriate VOC emission estimation methodologies;
- Section 5.0 briefly explains the survey questionnaire development process;
- Section 6.0 summarizes the survey results;
- Section 7.0 describes the emission calculations and inventory results;
- Section 8.0 briefly explains the data formatting associated with the project;
- Section 9.0 provides some recommendations for future development work for this source category;
- Section 10.0 lists all references used in the development of the emissions inventory and associated report;
- Appendix A includes a sample survey questionnaire;
- Appendix B includes a list of survey population facilities;
- Appendix C presents county-level VOC estimates; and
- Appendix D provides sample emission calculations for Harris County.

2.0 CATEGORY DESCRIPTION

Based upon the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities (40 CFR Part 63, subpart BBBBBB), bulk terminals and bulk plants are defined as gasoline storage and distribution facilities that receive gasoline by pipeline, ship or barge, or cargo tank (i.e., delivery tank truck or railcar). Bulk terminals and bulk plants are similar facilities that are differentiated based upon a gasoline throughput threshold of 20,000 gallons per day (75,700 liters per day); bulk terminals have gasoline throughput greater than or equal to this threshold, while bulk plants have gasoline throughput less than this threshold.

Within the overall transportation and marketing infrastructure of gasoline, bulk terminals and bulk plants serve as the midpoint between production at petroleum refineries and the

consumer's motor vehicle gasoline tank delivered at retail gasoline stations. For purposes of this inventory, only those evaporative losses that occur within the bulk terminal or bulk plant fence line were estimated. Therefore, emissions occurring during the transport of gasoline to and from bulk terminals and plants were not included, while the unloading and loading activities at these facilities were included. In addition, emissions were only estimated for gasoline; emissions for crude oil and other fuels (e.g., distillate, kerosene, etc.) were not estimated.

Although there are likely differences in source types located at individual facilities, it was assumed that all bulk gasoline terminals and bulk gasoline plants have the following VOC emission sources: loading racks, storage tanks, and equipment leaks. In addition, some facilities may have a number of less significant VOC emission sources, including: fuel additives and process heaters/boilers. A brief description of each emission source is provided below:

Loading Racks – Loading losses at loading racks are the primary source of evaporative emissions at bulk terminals and bulk plants. Loading losses occur as organic vapors in the vapor space of partially-filled or “empty” cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. In general, any vapor emitted can be assumed to be fully saturated. Liquids with higher vapor pressures or liquids at higher temperatures will yield a greater mass of vapor, for a given volume of space in the vessel. Loading losses can be reduced or eliminated if emissions of saturated vapors are controlled using either a vapor balance service or a combustion device such as a flare or oxidizer.

Storage Tanks – Working, breathing, and standing storage losses from storage tanks are another important emission source at bulk terminals and bulk plants. These losses occur due to the loading of storage tanks and cyclical (diurnal and seasonal) temperature variations. Working losses are the primary means by which vapor emissions occur, and are similar to loading losses at loading racks. They occur when liquids being loaded displace the vapor in the tank. The type of control required for storage tanks depends on the type of facility, their size, and the vapor pressure of the liquid contained.

Equipment Leaks – Equipment leaks from various types of equipment (e.g., valves, pumps, pressure relief devices, etc.) are another source of emissions at bulk terminals and bulk plants. Unlike petroleum refineries, where equipment leaks can be significant due to the large

amount of equipment, equipment leak emissions at bulk terminals and bulk plants tend to be relatively small compared to overall emissions.

Fuel Additives – Based upon geographic and seasonal Reid vapor pressure (RVP) requirements, mixing and blending of fuels and oxygenates may occur at some bulk terminals and bulk plants. This process is typically conducted during the loading of transport vessels or storage tanks, and emissions are controlled in the same way as other vapor emissions during those processes. The only unique emissions associated with fuel additives would be associated with any unmixed additive storage.

Other Emission Sources – Other emission sources that might exist at some bulk terminals and bulk plants are related to fuel combustion and include process heaters and boilers. Emissions from such sources are expected to be very low.

Several federal regulations are applicable to bulk gasoline terminals and bulk gasoline plants. The National Emission Standards for Hazardous Air Pollutants (NESHAP) for Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities (40 CFR Part 63, subpart BBBBBB) establishes emission limits and management practices for gasoline storage tanks, gasoline loading racks, and equipment leaks that are located at area source gasoline distribution bulk terminals, bulk plants, and pipeline facilities (Federal Register, 2008). Area sources are facilities that have the potential-to-emit less than 10 tons per year (tpy) of any single hazardous air pollutant (HAP) and/or 25 tpy of a combination of HAPs. The National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations) (40 CFR Part 63, subpart R) was initially identified as another applicable regulation (Federal Register, 1994); however, it only applies to major source gasoline terminals and pipeline breakout stations (i.e., those that have the potential-to-emit greater than 10 tpy of any single HAP and/or 25 tpy of a combination of HAPs), which have already been inventoried by the TCEQ.

A number of Standards of Performance (NSPS) were also identified that might potentially apply to bulk terminals and bulk stations under this Work Order, including subparts K, Ka, and Kb for storage tanks (Federal Register, 1974; Federal Register, 1980; Federal Register, 1987), and subpart XX for loading racks at bulk terminals (Federal Register, 1983). However, a comparison of subparts K, Ka, Kb, and XX with subpart BBBBBB shows that the requirements of these four NSPS are included in, or superseded by, the requirements in subpart

BBBBBB. Therefore, any area source gasoline bulk terminal or gasoline bulk plant subject to these NSPS would also be subject to subpart BBBBBB.

The effects of all applicable regulations are incorporated into the estimation of emissions from bulk gasoline terminals and bulk gasoline plants.

3.0 FACILITY RESEARCH

Activity data required for emission calculations were primarily collected via a telephone survey and supplemented, on an as needed basis, with appropriate assumptions. The survey questionnaire is included as Appendix A. The development of the survey population is described in this section.

ERG obtained and reviewed data from various sources to develop a list of the potential sources in the state of Texas, including data from the TCEQ, the U.S. Census Bureau, and Dun & Bradstreet. ERG also contacted U.S. EPA, Region 6 regarding the availability of Initial Notification and Notice of Compliance Status reports required by subpart BBBBBB. Region 6 staff indicated that these reports are collected; however, easily accessible summary information regarding these reports does not exist. Since there is no readily available list of gasoline bulk terminals and bulk stations in Texas, ERG had to rely on data from various sources, including the TCEQ, and merge the data in order to form a comprehensive list. The sub-sections below present a summary of the various data sources employed and the steps performed to develop the potential source population.

3.1 TCEQ Data

The TCEQ maintains a database of all petroleum storage tanks (PST) installed in Texas (TCEQ, 2013a; TCEQ, 2013b). This database contains information on the storage tanks, the facilities that contain these tanks, the operators of such facilities, and information on facility owners. The database also contains other information such as storage tank compliance history, operator/owner financial information, and storage tank certification information. In general, it is normal practice to primarily use aboveground storage tanks (ASTs) at bulk gasoline terminals and stations. Therefore, for the purposes of this study it was decided to use only the TCEQ's AST information in conjunction with the facility data, operator and owner information, and exclude information on underground storage tanks (USTs).

ERG primarily utilized information from the “ASTs” dataset and the “Facilities” dataset to develop the survey sample. These datasets contained the following information:

ASTs Dataset – Contains information about AST data, including facility number; tank number; current customer number; year installed; tank status; tank capacity; tank material, containment, substance stored, Stage 1 vapor recovery equipment data; Stage 2 vapor recovery equipment data; and tank regulatory status.

Facilities Dataset – Contains information about each facility owned by the current owners which are present in the owner file. The facility data includes facility ID; facility number; current customer number; facility name; type of facility; facility address; county code; TCEQ region; number of USTs for current owner; number of ASTs for current owner; manager name, title, and phone; owner effective begin date; and disputed owner flag.

The ASTs dataset contained approximately 33,000 records, with each record representing an individual AST. Most facilities have multiple ASTs on-site. Of the available AST data, ERG selected only ASTs that stored gasoline or alcohol blended fuels. Then, ERG only selected ASTs that were flagged as “In Use” or “AST”. ASTs that were flagged as “Out of Use” and/or stored substances other than gasoline or alcohol-blended fuels were excluded from further analysis. The selected AST records represented 4,544 individual ASTs (i.e., 4,544 records).

The Facilities dataset contained information on approximately 75,000 facilities in Texas that have petroleum storage tanks on-site (ASTs and USTs). These data were analyzed and ERG excluded the facilities that do not have any ASTs. Facilities that were reported as “Retail”, “Fleet Refueling”, “Aircraft Refueling”, “Watercraft Refueling”, and “Farm or Residential” were also excluded. At the end of this step, ERG had selected 4,552 facilities (i.e., 4,552 records) for further analysis. Both the “ASTs” and the “Facilities” datasets contained facility numbers (FAC # field). Data from both datasets were matched based on the facility number field. This resulted in 1,319 ASTs that were matched with the facilities data. All the matched facilities were reported as “Wholesale”, “Other”, “None of the above or Unidentified”, or “Indus_Chem_Mfg_Plants”.

The matched data were further analyzed and additional records/ASTs were excluded based on the following criteria:

Data that indicated a different type of facility other than gasoline bulk terminal or bulk plant based on the facility name (e.g., convenience marts and food marts; card lock and key lock facilities; refineries; construction facilities; bulk material storage facilities such as grain terminals; car dealerships; gasoline dispensing

facilities; independent school districts (ISDs); Texas DOT facilities; fleet yards for state agencies, counties and other local governments; etc.)

ASTs that were installed/constructed after 2011 (i.e., 2012 and newer)

Facilities that were included in the 2011 Texas Emission Inventory and the 2011 Toxics Release Inventory (TRI). These data were obtained from TCEQ staff. The data contained a list of 60 facilities that reported emissions in the 2011 emission inventory and 259 facilities that reported to 2011 TRI. Based on the data received from the TCEQ, 17 facilities were identified and excluded from the ASTs-Facilities matched list. Most, but not all, of these inventoried sources were major point sources.

After excluding facilities based on the above criteria, the ASTs-Facilities matched list contained data on 851 individual ASTs in 389 facilities.

3.2 Dun & Bradstreet Data

Dun & Bradstreet (D&B) is a public company that maintains a database on businesses and corporations, worldwide. This data is often collected using publicly available records, telephone interviews, newspapers and publications, and trade references, among other sources. ERG maintains an active subscription to D&B data.

ERG queried the D&B database to generate a list of businesses/facilities in the state of Texas that reported their primary North American Industry Classification System (NAICS) code to be 424710 (Petroleum Bulk Stations and Terminals) (D&B, 2013). This list contained information on 256 facilities in Texas. ERG compared the D&B data to the ASTs-Facilities matched list. As a result of this comparison, ERG identified 36 facilities in the D&B list that were already included in the ASTs-Facilities matched list. ERG matched these facilities using facility name and facility location (street address, city, and county). Of the remaining 220 facilities, 40 facilities were dropped from the D&B list based on facility name (e.g., convenience stores, food marts, card lock facilities, car dealerships, etc.) and facility line of business (gasoline dispensing facilities, car wash facilities, construction facilities, bulk material storage facilities, etc.). The final D&B list contained 180 potential additional sources in Texas. These 180 facilities were merged with the 389 facilities identified in the ASTs-Facilities matched dataset. Therefore the final list of potential sources contained a total of 569 facilities.

3.3 U.S. Census Data

ERG obtained data from the *2007 Economic Census* on potential source facilities that were located in Texas (U.S. Census, 2007). The *2007 Economic Census* data contained 8 digit primary NAICS codes for facilities. ERG selected facilities that reported as NAICS 4247101 (petroleum bulk stations & terminals – except LP), 42471011 (petroleum bulk stations – except LP), and 42471012 (petroleum bulk terminals – except LP). Table 3-1 presents a summary of the data obtained from the *2007 Economic Census*. The census data did not contain information on individual facilities, but listed the number of establishments by state and by primary NAICS.

Table 3-1. Data from the 2007 Economic Census

State	2007 NAICS	NAICS Description	Operation	Establishments
Texas	42471011	Petroleum Bulk Stations (except LP)	Wholesale	351
Texas	42471012	Petroleum Bulk Terminals (except LP)	Wholesale	90
Texas	4247101	Petroleum Bulk Stations and Terminals (except LP)	Wholesale	441
Texas	4247102	LP Bulk Stations and Terminals	Wholesale	26
Texas	424710	Petroleum Bulk Stations and Terminals	Wholesale	467

ERG also obtained data from the *2011 County Business Patterns* (CBP) (U.S. Census, 2011). This data contains information on number of facilities by county and NAICS. ERG selected facilities with a primary NAICS of 424710 (Petroleum Bulk Stations and Terminals). The CBP data also contains information on annual sales and employees at the facility-level. The CBP data listed 442 facilities in 148 counties in Texas for the year 2011, whereas the *2007 Economic Census* indicated 467 facilities. Given the difference in data years for the two datasets (i.e., 2007 versus 2011), the number of facilities indicated by these datasets are reasonably close.

In order to check for reasonableness, ERG compared the number of facilities (by county) indicated in the CBP data to the number of facilities (by county) as indicated in the merged TCEQ-D&B data (final list of 569 facilities), as shown in Table 3-2. The final list of 569 facilities, including information on ASTs, and facility contact information is presented in Appendix B.

Table 3-2. Number of Establishments, By County, By Data Source

County	TCEQ-D&B Data	CBP Data	County	TCEQ-D&B Data	CBP Data
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County	TCEQ-D&B Data	CBP Data	County	TCEQ-D&B Data	CBP Data
Anderson	3	2	Kendall	5	2
Andrews	4	2	Kent	1	-
Angelina	4	2	Kerr	3	3
Archer	3	-	Kleberg	1	-
Armstrong	2	-	Lamar	3	2
Atascosa	3	1	Lamb	3	1
Austin	2	1	Lampasas	1	-
Bailey	3	2	La Salle	1	-
Bastrop	1	1	Lavaca	2	-
Baylor	1	1	Lee	2	-
Bell	3	4	Leon	3	2
Bexar	11	11	Liberty	1	2
Bosque	2	-	Limestone	1	1
Bowie	3	5	Lipscomb	2	1
Brazoria	9	9	Live Oak	3	2
Brazos	2	5	Lubbock	8	7
Brewster	1	1	Lynn	1	-
Briscoe	2	1	McMullen	2	1
Brooks	1	-	McLennan	4	9
Brown	1	2	Madison	3	2
Burleson	1	1	McCulloch	1	-
Burnet	5	1	Matagorda	2	1
Caldwell	1	2	Maverick	2	2
Calhoun	5	1	Medina	7	2
Callahan	3	-	Menard	1	-
Cameron	7	6	Midland	8	3
Carson	1	1	Milam	1	2
Cass	3	1	Mills	1	-
Chambers	2	1	Montague	3	2
Cherokee	4	2	Montgomery	8	10
Childress	3	-	Moore	3	-
Cochran	3	-	Morris	3	1
Coke	-	1	Motley	1	-
Coleman	1	1	Nacogdoches	2	1
Collin	5	2	Navarro	1	2
Colorado	10	2	Newton	1	1
Comal	3	2	Nolan	2	-
Comanche	2	3	Nueces	6	6
Concho	2	-	Ochiltree	2	1
Cooke	3	1	Oldham	2	1
Coryell	1	-	Orange	1	1
Cottle	1	-	Palo Pinto	3	2
Crane	1	-	Panola	4	-
Crockett	2	-	Parker	2	2
Culberson	4	-	Parmer	3	3
Dallam	1	1	Pecos	2	1
Dallas	5	16	Polk	2	2

County	TCEQ-D&B Data	CBP Data	County	TCEQ-D&B Data	CBP Data
Deaf Smith	4	-	Potter	2	5
Denton	1	3	Presidio	1	-
De Witt	1	2	Rains	1	1
Dimmit	3	1	Randall	-	1
Duval	3	1	Real	1	-
Eastland	1	2	Red River	2	2
Ector	7	4	Reeves	1	1
Ellis	6	3	Refugio	1	-
El Paso	5	7	Robertson	2	-
Erath	5	2	Rockwall	1	-
Falls	-	2	Runnels	3	1
Fannin	2	1	Rusk	4	1
Fayette	3	1	Sabine	1	-
Fisher	1	-	San Augustine	1	-
Floyd	1	-	San Patricio	2	3
Foard	1	-	Schleicher	1	-
Fort Bend	4	3	Scurry	3	3
Freestone	1	-	Shackelford	1	-
Frio	1	2	Shelby	1	-
Gaines	2	-	Sherman	2	-
Galveston	5	1	Smith	4	6
Gillespie	2	1	Starr	1	-
Gonzales	2	2	Stephens	-	1
Gray	3	1	Sutton	3	1
Grayson	5	2	Swisher	1	-
Gregg	5	7	Tarrant	15	20
Grimes	2	2	Taylor	6	6
Guadalupe	2	1	Terry	1	-
Hale	5	6	Titus	-	2
Hall	1	-	Tom Green	2	1
Hamilton	2	1	Travis	4	10
Hansford	1	-	Trinity	1	1
Hardeman	-	1	Tyler	1	1
Hardin	2	1	Upshur	1	1
Harris	47	56	Upton	2	1
Harrison	5	1	Uvalde	4	2
Hartley	1	-	Val Verde	1	1
Hays	3	1	Van Zandt	1	-
Hemphill	-	2	Victoria	4	3
Henderson	3	-	Walker	1	2
Hidalgo	5	4	Waller	1	1
Hill	3	2	Ward	2	1
Hockley	2	1	Washington	4	2
Hood	2	1	Webb	2	7
Hopkins	2	2	Wharton	4	1
Howard	3	2	Wheeler	2	2
Hudspeth	2	-	Wichita	3	1

County	TCEQ-D&B Data	CBP Data	County	TCEQ-D&B Data	CBP Data
Hunt	2	1	Wilbarger	1	-
Irion	1	-	Willacy	1	-
Jack	1	2	Williamson	2	3
Jackson	1	-	Wilson	4	-
Jasper	3	3	Winkler	2	-
Jefferson	13	15	Wise	6	5
Jim Wells	4	2	Wood	2	2
Johnson	4	2	Young	2	2
Jones	4	1	Zapata	1	-
Karnes	4	1	Unknown	-	1
Kaufman	2	2	TOTAL	596	442

4.0 ESTIMATION METHODOLOGIES

After identifying the potential survey population, the next step performed was the determination of the most appropriate methodologies for estimating evaporative and fugitive VOC emissions from gasoline bulk terminals and bulk plants. This process is outlined below. These methodologies rely upon data collected through the telephone survey conducted by ERG and its subcontractor (see Sections 5.0 and 6.0), and supplemented with appropriate parameter assumptions. In some cases, additional assumptions were required due to insufficient results from the telephone survey.

4.1 Loading Racks

Loading losses are the primary source of emissions that occur at bulk gasoline terminals and bulk gasoline plants. In these operations, the gasoline liquids move from the storage tanks, through the loading racks, and into the delivery vehicles, which may be tank trucks or rail tank cars. Loading losses occur as vapors in the empty cargo tanks are displaced by the liquid being loaded into the tanks. The displaced vapor is either vented to the atmosphere, or captured and controlled with a vapor balance system, flare, or combustor.

Loading losses also occur when gasoline cargos are received by bulk gasoline terminals/bulk gasoline plants and moved to the storage tanks. Liquids may be transported from refineries to the terminals/plants via pipeline, marine barge, tank railcars, or tank trucks. The amount of emissions depends upon the means of the transfer. If gasoline is transported via pipeline, the liquids are pumped directly into the storage tanks, without going through the loading racks. For gasoline transported to terminals and plants via marine barge, tank railcar, or

tank truck, the liquids are unloaded through the loading racks and into the storage tanks. In these cases, loading loss emissions occur due to leaks in the fittings, hoses, and pumps. When a gasoline bulk terminal/plant receives liquids, the majority of emissions are due to vapor in the storage tanks being displaced by the incoming liquids. These types of emissions are more accurately described as storage tank working losses and are calculated in the storage tanks section (see Section 4.2).

The vapors in transport vessels consist of vapors formed in the empty tank by evaporation of residual product from previous loads, vapors transferred to the tank in vapor balance systems as product is being unloaded, and vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is dependent on the following:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

Most bulk gasoline terminals and plants are subject to subpart BBBBBB, which requires the facilities to employ submerged filling (i.e., inlet at the bottom of the fill tank). During submerged filing operations, the liquid turbulence is much lower than splash filing method, resulting in lower evaporative emissions. Loading losses were estimated using the following equation from *AP-42*, Section 5.2 (U.S. EPA, 1995a):

$$L_L = 12.46 \times \frac{SPM}{T} \qquad \text{Equation 1}$$

Where:

- L_L = Loading loss, pounds per 1,000 gallons of liquid loaded (lbs/1,000 gallons);
- S = Saturation Factor (Assume $S = 1.0$ for submerged loading and dedicated vapor balance service);
- P = True vapor pressure of liquid loaded, pounds per square inch absolute (psia);
- M = Molecular weight of vapors, pounds per pound-mole (lbs/lb-mole); and
- T = Temperature of bulk liquid loaded, °R (°F +460).

Since nearly all gasoline bulk terminals and gasoline bulk plants are subject to either NSPS subpart XX, or NESHAP subpart BBBBBB, and these federal regulations require that

cargo tank trucks use submerged loading and vapor balance service, ERG assumed that the saturation factor is equal to 1.0 in all cases. However, the vapor pressure of the gasoline liquids and ambient temperature vary by season, and these values were obtained from earlier ERG studies conducted for TCEQ (ERG, 2006; ERG, 2011).

The evaporative emissions calculated from Equation 1 above represent uncontrolled emissions. Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate by an overall control efficiency term (see Equation 2):

$$CE = L_L \times \left(1 - \frac{eff}{100}\right) \quad \text{Equation 2}$$

Where:

- CE = Controlled emission rate (lbs/1,000 gallons);
- L_L = Loading loss (uncontrolled) (lbs/1,000 gallons); and
- eff = Overall control efficiency.

4.2 Storage Tanks

The recommended methodology for estimating emissions from gasoline storage tanks is taken from AP-42 (U.S. EPA, 1995b). The formulas in AP-42 for working, breathing, and standing loss emissions from storage tanks are incorporated into U.S. EPA's TANKS 4.09D software (TANKS) (U.S. EPA, 2006), which was used to estimate storage tank emissions. The formulas contained within TANKS are numerous, lengthy, and complex, and will not be reproduced here.

Although the TANKS model allows for an infinite variation of inputs, ERG used collected survey data to develop a model tank/facility parameters, and then developed emissions for this model tank (TANKS model output), for the various types of gasoline distributed in Texas, for the temperatures typical of summer and winter seasons of the year. These model tank emissions were then applied to the 2011 CBP data to estimate county-level emissions from gasoline storage tanks. This approach should produce accurate results because the primary drivers of the TANKS equations are liquid throughput, vapor pressure, and temperature. Simplifying assumptions about tank design, color, vent settings, and other model parameters were used in the model TANKS runs.

The control requirements for storage tank emissions are dependent upon the age and storage capacity of the tank. An owner with gasoline storage tanks subject to subpart BBBBBB must control emissions from a storage tank in one of three ways: use a fixed roof with no

controls; collect and control all emissions by 95 percent; or, use a floating roof. The survey attempted to gather information on the type of control used at each tank, and this data was used to develop the model tank/facility for emissions estimation.

The TANKS model could have been used to calculate emissions from each tank at each surveyed gasoline bulk terminal/bulk plant, but this would have required collecting detailed data from survey respondents on tank parameters, throughputs per tank, the vapor pressures of the liquids stored in each tank, and the storage time. Given project resource limitations and screening data availability, this approach was not feasible.

4.3 Equipment Leaks

The recommended methodology for estimation of VOC emissions from equipment leaks was obtained from U.S. EPA's *Protocol for Equipment Leak Emission Estimates* (U.S. EPA, 1995c) (hereafter referred to as the *Protocol*). The *Protocol* is a standard U.S. EPA methodology and ERG has familiarity with the *Protocol* from working on numerous regulatory standards and other projects with U.S. EPA.

The *Protocol* defines four general methods for estimating total organic compound (TOC) emissions from leaking equipment. These four methods, listed in descending order of accuracy, are:

- Unit-specific correlation equation approach;
- U.S. EPA correlation equation approach;
- Screening ranges approach; and
- Average emission factor approach.

While the unit-specific and U.S. EPA correlation equation approaches are the preferred methodologies for estimating emissions from leaking equipment, these approaches also require more data. Unfortunately, screening values are not always available for each component. In such cases, the *Protocol* provides average emission factors that can be applied to specific equipment types (e.g., valves, pumps, etc.). For this project, ERG used the average emission factor approach because subpart BBBB requires facilities to maintain a record of all equipment in gasoline service (63.11094(d) and (e)), so specific equipment type counts should be available.

In general, estimates calculated using average emission factors are not as accurate as those estimated using the correlation equations. In addition, the average emission factors can

significantly overestimate emissions. Average emission factors are available for gas valves, light liquid valves, heavy liquid valves, light liquid pumps, heavy liquid pumps, compressor seals, pressure relief valves, connectors, open-ended lines and sampling connections. ERG used the marketing terminal average emission factors in Table 2-3 of the *Protocol*. These emission factors are in units of kg/hour/source. In order to use the average emission factors, the following data needed to be collected:

- Number of each type of component;
- Service of each component (i.e., gas, light liquid, or heavy liquid);
- TOC concentration of the pipeline material (assumed 100% VOC);
- Percent of components that are leaking (assumed 100% leaking components); and
- Time period each component was used annually (assumed 8,760 hours/year).

To estimate TOC emissions for a specific component type, the following equation was used:

$$E_{TOC} = EF_{comp} \times N \times L \times H \quad \text{Equation 3}$$

Where:

- E_{TOC} = Emissions of TOC from a particular component (lbs/year);
- EF_{comp} = Component-specific emission factor (lbs/hour);
- N = Number of components;
- L = Percent of components leaking; and
- H = Hours of operation per year.

The percent of components leaking is often not known. For sources subject to certain equipment leak regulations, the regulations specify a maximum percent of leaking components for many component types. This maximum value can be used in the equation above, because these components would be subject to the limit. Although there are no regulatory requirements concerning the maximum percent of leaking components in subpart BBBBBB, ERG could have obtained an actual percent of leaking components for each facility surveyed because subpart BBBBBB requires that each leak detection be recorded in a log book. However, given project resource limitations and expected screening data availability, ERG assumed that all components identified at a bulk gasoline terminal or bulk gasoline plant are leaking. ERG also assumed that TOC is equivalent to VOC, which is a reasonable assumption for evaporative gasoline emissions.

4.4 Fuel Additives

Emissions from fuel additives were calculated in a manner similar to those from storage tanks. Fuel additives represent a small fraction of total gasoline throughput, except in the case where denatured ethanol is mixed with gasoline to meet seasonal oxygenated gasoline formulation requirements. In these instances, ethanol can comprise 5 to 10 percent of the volume of gasoline sold. Fuel additives are stored in dedicated tanks. Additives may be stored in fixed roof tanks, pressure tanks, or floating roof tanks, depending upon the annual throughput volume and vapor pressure. Additives are typically mixed with the gasoline at the loading rack during loading into the cargo tanks. Additive emissions during loading were calculated as part of the loading emissions.

4.5 Other Emission Sources

Other emission sources found at gasoline bulk terminals and bulk plants may include process heaters and process boilers. The survey attempted to estimate the extent to which these emission sources are present and their use. Emissions for these units depend upon the heat input or power rating, and the fuel used. Emission factors and calculation methodology were taken from *AP-42* (U.S. EPA, 1995d; U.S. EPA, 1995e; U.S. EPA, 1995f). It is anticipated that these emission units account for very small amounts of emissions, primarily NO_x.

5.0 SURVEY QUESTIONNAIRE DEVELOPMENT

Following identification of the survey population and the appropriate emissions estimation methodologies, the next step conducted for the project was the development of the survey questionnaire.

The survey questionnaire was developed in consultation with TCEQ staff. A key consideration during the survey questionnaire development process was the balance between obtaining necessary data and minimizing the reporting burden on the survey facility owners/operators. The survey questionnaire is provided in Appendix A. In addition to the telephone survey, ERG also developed an online survey tool that enabled the survey facilitator to record the survey responses in real-time over the internet. The online survey included all necessary script and was designed as a stand-alone tool to assist the survey facilitator and for easy data entry. ERG also anticipated that some survey facility owners/operators would want to complete the survey on their time and at their leisure. To accommodate such requests, ERG

developed an online mirror survey that was identical to the one used by the survey facilitator to record responses.

The online survey consisted of the following sections:

Log-in and facility identity confirmation: Each facility included in the survey population was assigned a unique survey code (i.e., SXXX, where XXX is a sequential number starting with 001). The survey facilitator (ERG's subcontractor) was required to log in to the online survey using the facility's unique survey code and a password. The online survey then required confirmation of the facility name and location. This feature was put in place to avoid transcription errors during log-in (i.e., if the facilitator entered the wrong unique facility ID, then there was an opportunity to confirm the facility identity and correct, if necessary)

Figure 5-1. Online Survey Log-in Screen

TCEQ Bulk Terminal and Bulk Plant Telephone Survey Questionnaire

Survey Authentication

Please enter the facility uniqueID and password below.

UniqueID:

Password:

For questions or concerns regarding this survey, you can contact the Texas Commission on Environmental Quality (TCEQ) at (512)239-5705 (Julie Westphal, TCEQ Air Quality Division) or julie.westphal@tceq.texas.gov. For technical questions regarding this survey or how the survey information will be used, please contact Gopi Manne of Eastern Research Group, Inc. (ERG) at (916)635-6595 or gopi.manne@erg.com.

Basic facility information: This section of the online survey contained basic facility information that was required for the survey. Collected information included: annual amount of gasoline transferred; mode of transport (pipeline, barge, truck, or rail); operational schedule for the facility; whether the facility is TCEQ permitted (air permit); whether the facility handles separate summer and winter gasoline; and any other relevant comments.

Loading racks: This section of the online survey captured information needed for loading rack operations at these facilities. Collected information included: annual quantity of gasoline transferred through the loading racks, number of loading racks, and control device information. The survey respondent had the option to add additional loading racks and enter any comments regarding activities associated with loading racks.

Storage tanks: This section was designed in a similar fashion to the loading racks section, except that the information was for motor gasoline storage tanks.

Collected information included: tank capacity, annual amount of gasoline stored, summer and winter gasoline quantities, controls information, and general comments. As with the loading racks section, this section also allowed the survey respondent to add information on additional/multiple storage tanks.

Equipment leaks: This section captured information required to estimate the fugitive emissions from equipment leaks. Collected information included the type of equipment (e.g., flanges, valves, pressure relief systems, etc.), and the number of each type of equipment.

Fuel blending/mixing: Some facilities conduct fuel mixing/blending on-site. This section gathered the required information from such activities. Collected information included type of additives, additive names, additive storage tank capacity, and controls information.

Other sources: In addition to the sources listed above, bulk gasoline terminals and bulk gasoline tanks may also contain other sources of emissions, such as boilers and heaters. This section required the survey respondents to enter information on the type of heaters, heater capacity, fuel usage information, and any controls present. The respondent could also enter additional comments regarding these types of equipment.

Facility contact information: The last section of the online survey asked the respondent to provide contact information (name, phone, and email) in case follow-up was required at a later stage.

The survey was conducted from June 4 to July 3, 2013. For the survey respondents that requested to complete the survey on their own, responses were requested by July 10, 2013.

6.0 SURVEY RESULTS

The survey disposition results are presented in Table 6-1. During the initial days of the survey, it was evident that some of the contact information (i.e., facility names, contact person name, and contact number) were outdated. The survey subcontractor performed a web search (primarily using Google Search and Google Earth; and online business directories such as Manta, Cortera, and Hoovers) to obtain the correct contact information in instances where the contact information was inaccurate or outdated. The web search was conducted with primary focus on business name and business address. In some cases, Google Earth was also used to visually verify the presence of gasoline storage tanks at the business address.

A trend that was discovered during the initial stages of data collection survey was business consolidation. Some survey respondents indicated that most of the smaller facilities had been bought out by bigger corporations.

Table 6-1. Activity Data Collection Survey Disposition

Survey Call Disposition	# of Facilities	Comments/Notes
Total facilities on survey list	569	
Web search – No information	77	Facilities where original contact information was wrong and subsequent web search did not produce any information
Left Message – No response	86	Facilities with the following situations (multiple attempts made for each facility): 1) Phone rings, but no answer 2) Left voicemail/message, but no response; 3) Set an appointment for telephone survey, but no response when called
Refusal	14	
Location Closed	20	Included facilities where the survey operator was told that the facility was closed by person who answered the phone or where facility closure was indicated during web search
Not a gasoline bulk facility	216	Included convenience stores, residences, office buildings, law firms, bulk material handling (e.g., asphalt, quarry, etc.), gasoline service stations, etc.
Change in ownership – Do not have any information	3	
Duplicates	7	
Completed phone survey	7	
Mirror survey requested	139	Contact requested the survey link to be emailed so they could fill out survey on their own. In some cases, they also asked for no follow-up.
<i>Completed mirror surveys</i>	19	
<i>Partial mirror surveys</i>	9	Surveys that were initiated but not completed. These included surveys in various stages of completion (i.e., some respondents just entered annual gasoline quantity, some entered more information, but none completed)

6.1 Qualitative Discussion of Bulk Fuel Industry

The remainder of this section presents a qualitative discussion on the state of bulk fuel industry, based on anecdotal responses of bulk motor gasoline facility owners/operators to the activity data collection survey.

The bulk fuel industry in Texas began primarily with small family-owned businesses that developed in response to the growth of the fuel industry and the automobile. The current state of the industry evolved from these beginnings – currently there is a mixture of very small businesses with a few employees and one office, petroleum marketers with a few bulk supply plants in a small region that only sell fuel, small companies that own both the fuel supply

company and a retail fueling station (often in the same location), fuel supply companies that own a number of bulk fuel plants and operate regional chains of fueling stations/convenience stores of varying sizes and either lease the stores to management companies or run them themselves, and larger companies that are integrated from the refinery to the refueling retailer. The survey respondents reflect this variety of companies, as well as the industries around them. In particular, many of the companies on the survey list have gone out of business, and many other businesses on the survey list were not eligible for the survey because they are related to petroleum marketing in some way but are not bulk fuel suppliers.

More competitive fuel distribution markets have produced smaller operating margins of late, and the rise in the price of gasoline over the last ten years have crowded out many of the traditional bulk fuel operators in favor of larger companies with more resources that can take advantage of economies of scale and relationships with refineries and retail gasoline stations.

Some survey participants indicated that they seldom kept gasoline on-site at their bulk plants anymore, because of the short-term volatility of the price of gasoline, and because the capital requirements of buying, transporting and storing motor gasoline were now impractical and unprofitable. As a result, almost all of the gasoline is now purchased at the “rack” (i.e., refinery plant gate or very large [point source] terminals) with very little from bulk fuel tanks, because it is more profitable and easier to manage. It was also reported that transportation costs are especially hard on smaller bulk suppliers and are making many of them obsolete.

According to several survey participants, the growth of pipelines, price volatility in both the long- and short-term, and industry consolidation has resulted in fewer smaller bulk plants and the closing of older facilities, especially over the last ten years. As competition has increased, operating margins have decreased and capital requirements have increased, thereby shunting out smaller operators. The future of the industry would seem to indicate a continuation of consolidation with less emphasis on bulk plants for storage and distribution and more focus on logistics and acquiring product directly from large terminals.

7.0 EMISSION CALCULATIONS AND INVENTORY RESULTS

The primary sources of VOC emissions at bulk gasoline terminals and bulk gasoline plants are loading racks and storage tanks. In addition to these sources, emissions were also calculated from equipment leak sources (e.g., valves, flanges, pumps, etc.). Although the

conducted survey included questions regarding fuel mixing/blending operations, heaters, and other fuel-burning equipment, there were no reported instances of these potential emission sources. As a result, emissions were not calculated for these operations/equipment.

The final number of survey responses, including partial responses, was 35. A duplicate entry (as a result of a survey respondent resubmitting the same online survey at a later time) was excluded, so the adjusted number of survey responses was 34. Of the total responses received, 25 were complete (i.e. survey respondent navigated through to the submission page and submitted the survey) and 9 were partial responses (i.e. survey respondent initiated the online survey but did not complete and submit). Wherever possible, all available data were used in the emission calculations regardless of survey completion status.

Based on the limited availability of county-level bulk terminal and bulk plant data to estimate/allocate emissions at the county level, it was decided to use the *2011 County Business Patterns* (CBP) data from the U.S. Census Bureau as the basis for geographic allocation (U.S. Census, 2011). The 2011 CBP data consisted of total number of facilities (NAICS 424710: Petroleum Bulk Stations and Terminals) at the county-level with no distinction between bulk terminals and bulk plants.

7.1 2011 County Business Patterns Data

The 2011 CBP data consisted of 442 facilities for the state of Texas. This data consisted of not only petroleum bulk terminals and bulk plants, but also facilities that handled liquefied petroleum gas (LPG), and related sales and office branches. In order to better understand the source facilities, ERG reviewed data from the *2007 Economic Census* (U.S. Census, 2007). The data presented in the 2007 Census contained the number of facilities in Texas (state-total only) that handled LPG, facilities that were listed as office and sales branches, and petroleum bulk terminals and plants. Using this data, ERG calculated the ratio of petroleum bulk terminals and plants to total facilities listed under NAICS 424710. This ratio was applied to the facilities count in the 2011 CBP data to obtain the county-level number of petroleum bulk terminals and plants.

The next step was to reconcile the facilities contained within TCEQ's 2011 emissions inventory with the 2011 CBP data. After excluding the 63 facilities contained within TCEQ's 2011 emissions inventory, the total number of state-wide facilities in the 2011 CBP data decreased to 326.

Based on the available survey data and 2011 CBP data, it was decided to develop average facility VOC emission profiles and apply these profiles to the 2011 CBP data to estimate emissions at the county-level for Texas. The remainder of this section describes the application of survey data in developing the average facility emission profiles.

7.2 Loading Rack Emission Profiles

Default values from EPA's *AP-42* were used to calculate uncontrolled VOC emission factors for loading losses (VOC lbs/1,000 gallons) (U.S. EPA, 1995a). The saturation factor (S) value was assumed to be 1.0. Different sets of uncontrolled emission factors were calculated for various RVP values (i.e., summer RVP and winter RVP) at the county-level. The summer and winter temperature values used in the calculations were assumed to be 90 °F and 60 °F, respectively, based on the average value of measured pad temperatures during previous fuel sampling efforts undertaken for the TCEQ around the state (ERG, 2006; ERG, 2011). Default gasoline vapor molecular weight and true vapor pressure values were obtained from *AP-42* (U.S. EPA, 1995b). County-level summer and winter RVP values were obtained from previous TCEQ studies (see Table 7.1). Using these parameters, county-level uncontrolled VOC emission factors (lbs/1,000 gallons) were calculated for summer and winter seasons.

A majority of survey respondents who reported data on loading racks (i.e., 23 out of 29 facilities) indicated that they did not have any controls. The remaining six facilities indicated the presence of "closed-loop" control system. *AP-42* indicates a control efficiency range of 90-95 percent for the "closed-loop" system, and the tank truck collection efficiency to be in the range of 70-90 percent (U.S. EPA, 1995a). A conservative approach was followed and the reduction efficiency was calculated to be 63 percent (i.e., 0.9×0.7). Based on the number of facilities that reported zero controls (79 percent), and the number of facilities that reported using a "closed-loop" control system (21 percent), the weighted reduction factor was calculated to be 13.0 percent. This weighted reduction factor was applied to the uncontrolled summer and winter VOC emission factors to develop controlled VOC emission factors at the county-level.

Of the 29 facilities that reported loading rack data, 27 facilities responded to the summer and winter gasoline throughput section of the survey. A total of 15 facilities indicated a summer and winter gasoline split, while 12 facilities did not provide such a split. Based on this data the weighted summer and winter gasoline throughput was calculated to be 53 percent and 47

percent, respectively. The average facility annual gasoline throughput reported by the survey data was 431,230 gallons. Summer and winter seasons were assumed to be six months each.

County-level VOC emissions from loading racks were calculated using the controlled VOC emission factors and average facility summer and winter gasoline throughput in conjunction with the 2011 CBP data. Table 7-1 presents a summary of loading rack emission factors and emissions. A sample calculation for estimation of loading rack emissions in Harris County is presented in Appendix D.

Table 7-1. Loading Rack Emissions Profiles

Season	RVP	Controlled VOC Emission Factor (lbs/1,000 gallons)	Uncontrolled VOC Emission Factor (lbs/1,000 gallons)
Summer	7.0	9.55	8.31
Summer	7.8	10.71	9.32
Summer	8.3	11.43	9.94
Summer	10.0	13.16	11.45
Winter	11.5	9.45	8.22
Winter	13.0	10.25	9.22
Total Annual State-wide Loading Rack VOC Emissions (tons)			626.2

7.3 Storage Tank Emission Profiles

The online survey requested that survey respondents to enter information on their storage tank throughput, tank capacities, tank characteristics (tank type, and tank color) and controls. Approximately 93 percent of the facilities that reported data on storage tanks indicated fixed roof tanks. All of the survey respondents indicated that their tanks are either white or silver colored. None of the survey respondents indicated the presence of controls for their storage tanks. Based on these responses, ERG assumed that all tanks are white, fixed roof tanks with no controls.

Also, the survey responses indicated that no process or line heaters are being used by any of these facilities. Hence, it was assumed that the tanks were not heated. Based on discussion with industry experts and online literature review, it was decided to assume a conical tank roof for the TANKS model runs with an assumed roof slope of 15 degrees. The survey data indicated an average tank capacity of 12,000 gallons and an average of 2 tanks per facility. Typical tank height and tank diameter were selected based on an online literature review of tank manufacturing/dealer websites. The maximum liquid (stored gasoline) height was assumed to be 90 percent of tank height and the average liquid height was assumed to be 47.5 percent of tank

height (average of 90 percent at the high end and 5 percent at that low end of the range). The working volume of the tank was assumed to be 90 percent of total capacity.

Based on the received survey data, ERG developed model tank profiles to be used for running the TANKS software. Since the summer and winter RVP values are different, it was decided to develop summer and winter tank profiles based on these RVP values and to employ the average summer/winter gasoline splits for throughput (53 percent summer and 47 percent winter). For the purposes of this study, summer was defined as May through October and winter was defined as November through April. The output from these model runs was then applied to the CBP data (i.e., number of facilities by county) to estimate county level VOC emissions from gasoline storage tanks at bulk gasoline terminals and bulk gasoline plants in the state of Texas. This approach assumes that all CBP facilities are identical in size and throughput. The annual total VOC emissions from all storage tanks were calculated to be 1,135 tons. Table 7-2 presents the model tank profiles. A sample calculation for estimation of storage tank emissions in Harris County is presented in Appendix D.

Table 7-2. Model Tank Profiles

	Profile Summer 1 (S1)	Profile Summer 2 (S2)	Profile Summer 3 (S3)	Profile Summer 4 (S4)	Profile Winter 1 (W1)	Profile Winter 2 (W2)
Tank Capacity (gallons)	12,000	12,000	12,000	12,000	12,000	12,000
Tank Type	Fixed-Roof	Fixed-Roof	Fixed-Roof	Fixed-Roof	Fixed-Roof	Fixed-Roof
Shell Height (ft)	20.5	20.5	20.5	20.5	20.5	20.5
Shell Diameter (ft)	9.8	9.8	9.8	9.8	9.8	9.8
Maximum Liquid Height (ft)	18.45	18.45	18.45	18.45	18.45	18.45
Average Liquid Height (ft)	9.7375	9.7375	9.7375	9.7375	9.7375	9.7375
Working volume (gallons)	10,800	10,800	10,800	10,800	10,800	10,800
Turnovers per Month	2.23	2.23	2.23	2.23	1.98	1.98
Net Throughput*	144,356.08	144,356.08	144,356.08	144,356.08	128,013.88	128,013.88
Is Tank Heated?	No	No	No	No	No	No
Roof Color	White	White	White	White	White	White
Roof Type	Cone	Cone	Cone	Cone	Cone	Cone

	Profile Summer 1 (S1)	Profile Summer 2 (S2)	Profile Summer 3 (S3)	Profile Summer 4 (S4)	Profile Winter 1 (W1)	Profile Winter 2 (W2)
Roof Slope (degrees)	15	15	15	15	15	15
Roof Height (ft)	1.3	1.3	1.3	1.3	1.3	1.3
Shell Color	White	White	White	White	White	White
Tank Contents (RVP)	7.0	7.8	8.3	10.0	11.5	13.0
Months of operations	6	6	6	6	6	6
Monthly throughput (gallons/month)	24,059.35	24,059.35	24,059.35	24,059.35	21,335.65	21,335.65
VOC Emissions (lbs/6 months)	1,409.71	1,595.32	1,714.87	2,083.82	1,785.53	2,000.74
* This represents summer throughput (6-month period; 53 percent of average annual throughput) for Profiles S1-S4 and winter throughput (6-month period; 47 percent of average annual throughput) for Profiles W1-W2.						

7.4 Equipment Leak Emission Profiles

Of the total 34 survey responses received, 21 facilities reported number of components (i.e., valves, pumps, pressure relief devices, sampling connections, flanges, and open-ended lines). Based on the survey responses, ERG developed an average facility profile that consisted of the number of components of each type. This average facility component profile consists of the following for each facility:

- Valves – 6
- Pumps – 3
- Pressure relief devices – 1
- Sampling connections – 1
- Open-ended lines – 1
- Flanges – 5

The component-based leak emission factors were taken from U.S. EPA's *1995 Protocol for Equipment Leak Emission Estimates* (U.S. EPA, 1995c). These factors represent gasoline marketing terminal average emission factors. These emission factors were applied to the average facility component profile to generate average facility total VOC emissions (0.0203 tons/yr) from equipment leaks. This factor was then applied to the number of facilities, by county, to generate county-level VOC emissions from equipment leaks at bulk gasoline terminals and bulk gasoline plants. The state total VOC emissions from equipment leaks were calculated to be 6.6

tons/year. A sample calculation for estimation of equipment leak emissions in Harris County is presented in Appendix D.

7.5 2011 Base Year Emissions

Table 7-3 presents a state-wide summary of VOC emissions from bulk gasoline terminals and bulk gasoline plants; county-level emissions are presented in Appendix C. Based on the survey responses it was evident that most of the data was from bulk plants (i.e., smaller facilities), so for purposes of this study ERG assigned SCC 2501055120 (Petrol & Petrol Product Storage /Bulk Plants: All Evaporative Losses/Gasoline) to all bulk plant emissions. For completeness, emissions for SCC 2501050120 (Petrol and Petrol Product Storage/Bulk Terminals: All Evaporative Losses/Gasoline) were set to zero for all Texas counties.

Table 7-3. 2011 State-level Summary of VOC Emissions from Bulk Gasoline Terminals and Plants

Emission Source	VOC Emissions (tons/year)
Gasoline Storage Tanks	1,135.1
Gasoline Loading Racks	626.2
Equipment Leaks	6.6
Total (SCC 2501055120)	1,768.0

7.6 Ozone Season Day Emissions

For the purposes of this study, the ozone season (i.e., summer) was assumed to be the time period from May through October (6 month period). As described in the emission calculation section, emissions from loading racks and storage tanks were calculated individually for summer and winter seasons due to different RVP values for summer and winter gasoline. Summer emissions from loading racks and storage tanks were divided by 184 to generate ozone season average day emissions for these source components.

Equipment leak emissions were calculated at the annual level assuming 8,760 hours per year. These annual emissions were divided by 365 to generate ozone season average day emissions.

Finally, the average ozone season day emissions from all source components (i.e., loading racks, storage tanks, and equipment leaks) were aggregated to generate county-level ozone season average day emissions for gasoline bulk facilities.

7.7 Emission Projections (Future Year 2014)

ERG consulted U.S. Energy Information Administration's (EIA) *Short-Term Energy Outlook* data to develop projection factors based on motor gasoline product consumption (EIA, 2013a). The data indicated an insignificant difference in the U.S. national motor gasoline consumption from 2011 (8.75 million bbl/day) to 2014 (8.66 million bbl/day). This represents a reduction in national motor gasoline consumption of approximately 1 percent from 2011 to 2014. In addition, ERG also reviewed data from U.S. EIA's *State Energy Consumption Estimates* (EIA, 2013b). This data contained state-level energy consumption data, by fuel and by sector, from 1960 through 2011. Texas state-level motor gasoline consumption by the transportation sector from 2007 through 2011 indicated slight fluctuations, but no definite trend. As a result, it was decided that 2011 emissions will be carried forward to future year 2014, without any changes.

8.0 DATA FORMATTING

This final project report was developed under Task 5 of the project; the final gasoline bulk terminal and bulk plants emissions inventory (developed under Task 4.2) was formatted (xml format) and uploaded to TexAER, in conjunction with this final project report.

9.0 RECOMMENDATIONS

Through the course of the project, a number of recommendations were identified associated with this source category. These suggestions are included below:

Accurate list of potential sources – NESHAP subpart BBBBBB requires all operators/owners of bulk plants and terminals to submit an Initial Notification or Notification of Compliance Status with their regional EPA air toxics office (Texas will be EPA Region 6). These notifications were not readily accessible for this project.

Mail-out Survey – Conduct mail-out survey with TCEQ cover letter. Adequate time for responses, follow-up, and answering comments or questions from the survey respondents should be provided.

Regional Study – Attempt a region-specific study with a much smaller potential source population and more focused on data collection.

Economics Trends Assessment – Based on anecdotal information (presented in Section 6.1), this source category appears to rapidly diminishing. An economics trends assessment could confirm this.

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APPENDIX A

Bulk Terminal and Bulk Plant Telephone Survey Questionnaire

Survey for Bulk Gasoline Terminals and Bulk Gasoline Plants

GENERAL

1. Hi, my name is _____ from Eastern Research Group. We have been contracted by the Texas Commission on Environmental Quality to gather information on bulk and wholesale distributors of gasoline. May I ask you a couple of questions about your facility?
2. Is your facility a bulk gasoline terminal or a bulk gasoline plant that stores and then distributes gasoline to retail sellers or other end users of gasoline? [If Yes, continue; If No, end]
3. Is your facility subject to the federal NESHAP Subpart BBBBBB? This is the federal rule that regulates emissions from smaller gasoline terminals and gasoline plants. [If Yes, continue; If No, end; If unsure ask to speak with the facilities manager or person responsible for dealing with regulatory officials]
4. How does gasoline arrive at your facility? [pipeline, ship/barge, rail, tank truck]
5. How does gasoline leave from your facility? [pipeline, ship/barge, rail, tank truck]
6. Does your facility handle separate winter and summer gasolines [Yes or No]
7. We wanted to ask you several more questions about your facility, including annual throughput, loading rack stations, tank sizes, and controls. Some of this information is detailed, and might require you to consult your records. Could we send you an email with the survey form for you to fill out later? [ask for email address]

LOADING RACKS

1. What was the annual gasoline throughput of the facility in the year 2011 through the loading racks (total throughput of all racks combined)? [If the facility handles both winter and summer gasoline, provide seasonal totals]
2. How many loading racks does your facility have?
3. For **each** loading rack, does it use a vapor collection and control system? [Yes or No]
4. [If Yes], what type of control device is used (flare or combustor) and what is the approximate control efficiency?
5. If the control device is a combustion device, what is its maximum fuel input (MMBtu/hr)?

STORAGE TANKS

1. Is the throughput of gasoline through the gasoline storage tanks equal to the 2011 throughput of gasoline through the loading racks? [Yes or No]
2. [If No], what is the annual throughput of gasoline through the gasoline storage tanks?
3. How many gasoline storage tanks do you have?

4. For **each** gasoline storage tank, what is the tank type? [underground, aboveground, fixed roof, external floating roof, internal floating roof]
5. For **each** gasoline storage tank, what is the maximum capacity?
6. Do you control VOC emissions from the storage tanks? [Yes or No]
7. [If Yes], what is the control efficiency?
8. Do you have VOC emissions estimates from the gasoline storage tanks located at your facility? [If Yes], would you provide these estimates?

EQUIPMENT LEAKS

1. Can you estimate the quantity of each of the following equipment items that are located at your facility?
 - a. valves
 - b. pumps
 - c. pressure relief devices
 - d. sampling connections
 - e. open-ended valves or lines
 - f. flanges

FUEL BLENDING/MIXING

1. Is fuel blending or mixing conducted at your facility? [Yes or No]
2. [If Yes], what is the type of additive? What is the capacity of the fuel additive storage tank? What is annual throughput of this fuel additive?

OTHER

1. Does your facility operate any process heaters or boilers? [Yes or No]
2. [If Yes], provide heat input capacity (MMBtu/hr) of each; and the type of fuel it burns.

APPENDIX B

Gasoline Bulk Terminal and Bulk Plant Survey Population

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
78939	122154	Ind/Chem/Mfg Plant	WHITE ENERGY-HEREFORD	HEREFORD	Deaf Smith	S001
56867	86765	Wholesale	QUALITY PETROLEUM	KARNACK	Harrison	S002
58834	65375	Wholesale	TROPICANA ENERGY COMPANY INC	AMARILLO	Potter	S003
51662	82508	Wholesale	ALLIED MOTOR OILS	TYLER	Smith	S004
20043	57144	Wholesale	FUEL STORAGE DEPOT 08	SAN ANTONIO	Bexar	S005
53435	66537	Wholesale	SATURDAY SALES	KILLEEN	Bell	S006
50934	59570	Wholesale	PICO BULK PLANT DEL RIO	DEL RIO	Val Verde	S007
16624	55259	Wholesale	H & W PETROLEUM CO	LONGVIEW	Gregg	S008
74955	114591	Wholesale	VELVIN OIL CO	HENDERSON	Rusk	S009
38040	69212	Wholesale	DENNY OIL	NACOGDOCHES	Nacogdoches	S010
37498	68913	Wholesale	WIEMERS OIL	HONDO	Medina	S011
67678	102392	Wholesale	NAVASOTA OIL	NAVASOTA	Grimes	S012
68075	102803	Wholesale	SWEETWATER BULK PLANT	SWEETWATER	Nolan	S013
30392	64864	Wholesale	PETRO PRODUCTS CORP	LEVELLAND	Hockley	S014
50779	53885	Wholesale	DALWORTH OIL	MCKINNEY	Collin	S015
69342	105175	Wholesale	BULK PLANT	PORT LAVACA	Calhoun	S016
50471	62388	Wholesale	PICO BULK PLANT - KENEDY	KENEDY	Karnes	S017
55099	63077	Wholesale	BIG CHIEF DIST	KILLEEN	Bell	S018
53856	65578	Wholesale	MORGAN OIL CO	NACOGDOCHES	Nacogdoches	S019
52311	82687	Wholesale	BERNSHAUSEN OIL	ROSENBERG	Fort Bend	S020
62649	70810	Wholesale	WARDEN OIL CO	BURNET	Burnet	S021
53037	53155	Wholesale	KALLINA OIL CO	GATEWOOD	Colorado	S022
18283	56215	Wholesale	BULK PLANT	CONROE	Montgomery	S023
57963	62733	Wholesale	JP JONES OIL	SEGUIN	Guadalupe	S024
43549	72199	Wholesale	BILL L DOVER	SILSBEE	Hardin	S025
24920	61669	None of the above, or unidentified	BILL JOHNSON OIL CO	CORSICANA	Navarro	S026
52581	66850	Wholesale	STEPHENS FUEL	STEPHENVILLE	Erath	S027
55284	92265	Wholesale	WILLIAMS BROTHERS SUPPLY	WHITE DEER	Carson	S028
51303	69424	Wholesale	CARROLL PETROLEUM CO	RAYMONDVILLE	Willacy	S029
25941	62315	None of the above, or unidentified	JOHN HEBERT DISTRIBUTOR	LIBERTY	Liberty	S030
52341	48779	Wholesale	LAMBERT OIL	CLEBURNE	Johnson	S031
34905	67325	None of the above, or unidentified	JOHN J FIETSAM INC	SCHULENBURG	Fayette	S032
50474	48882	Wholesale	WEHMAN INC BULK PLANT	PLEASANTON	Atascosa	S033
52442	50411	Wholesale	COOPER OIL CO	HAMLIN	Jones	S034

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
53346	51225	Wholesale	GLASS OIL	JACKSONVILLE	Cherokee	S035
51549	46735	Wholesale	L H DANIEL	GREENVILLE	Hunt	S036
41467	45486	Wholesale	DOUGLASS DISTRIBUTING	SHERMAN	Grayson	S037
51378	82369	Wholesale	LAMBERT OIL	WEATHERFORD	Parker	S038
50623	52406	Wholesale	RIP GRIFFIN WHSE BULK PLANT	LUBBOCK	Lubbock	S039
4185	42884	Wholesale	SAN ANTONIO BULK PLANT	SAN ANTONIO	Bexar	S040
51136	70434	Wholesale	JOHN R HARDY	MADISONVILLE	Madison	S041
51047	60270	Wholesale	ROSS PETROLEUM	COMANCHE	Comanche	S042
56802	46820	Wholesale	FGOC BULK PLANT	PLAINVIEW	Hale	S043
50588	57149	Ind/Chem/Mfg Plant	OIL STORAGE 08	SAN ANTONIO	Bexar	S044
48287	69959	None of the above, or unidentified	SUMRALL DIST CO INC	PALESTINE	Anderson	S045
32991	66367	None of the above, or unidentified	REGAL OIL BULK PLANT	SAN ANGELO	Tom Green	S046
56915	43167	Wholesale	DEIBEL OIL	PORT LAVACA	Calhoun	S047
53264	53130	Wholesale	EDWARD J SEIFERT OIL	WEIMAR	Colorado	S048
51987	89498	Wholesale	THOMAS PETROLEUM	HEMPSTEAD	Waller	S049
51213	82288	Wholesale	WEIDENFELLER OIL	FREDERICKSBURG	Kendall	S050
50774	82085	Wholesale	BULK PLANT	TAYLOR	Williamson	S051
71371	108642	Wholesale	WIGGINTON OIL MENARD INC	MENARD		
49277	43618	None of the above, or unidentified	MIKE KROLCZYK	ROSENBERG	Fort Bend	S053
50930	59566	Wholesale	PICO BULK PLANT BOERNE	BOERNE	Kendall	S054
31948	65909	None of the above, or unidentified	BERT SCHRANK	HAMILTON	Hamilton	S055
52257	41517	Wholesale	DOUGLASS OIL	PLAINVIEW	Hale	S056
55578	83445	Wholesale	COLWELL OIL	WAXAHACHIE	Ellis	S057
59986	50011	Wholesale	COLORADO COUNTY OIL	SEALY	Austin	S058
65564	49102	Wholesale	STROEHER & SON BULK PLANT	FREDERICKSBURG	Gillespie	S059
67278	101776	Wholesale	GARRISON OIL CO	SHAMROCK	Wheeler	S060
72802	110843	Wholesale	DYNASTY ENTERPRISES	KENEDY	Karnes	S061
52264	68027	Wholesale	GENE HARRIS PETROLEUM	BURLESON	Johnson	S062

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
50369	62767	Wholesale	BENNY COPE OIL	JOURDANTON	Atascosa	S063
52675	42191	Wholesale	CAM ROCK OIL	CAMERON	Milam	S064
1247	39170	None of the above, or unidentified	GOODING OIL	HONDO	Medina	S065
16124	54809	Wholesale	DALE OIL CO	MULESHOE	Bailey	S066
51658	68123	Wholesale	ROYCE GROFF OIL CO	DEVINE	Medina	S067
53260	86476	Wholesale	WISE CO OIL	DECATUR	Wise	S068
58553	52759	Wholesale	TIDEPORT PETROLEUM	ALICE	Jim Wells	S069
50316	45687	Wholesale	TYLER MARKETING CHEVRON BULK PLANT	ATHEN	Henderson	S070
4970	43496	None of the above, or unidentified	LA FERIA CO-OP	LA FERIA	Cameron	S071
5254	43751	Wholesale	BULK PLANT	VERNON	Wilbarger	S072
50805	64859	Wholesale	F C BOLEN OIL CO INC	MCCAMEY	Upton	S073
51586	44195	Wholesale	WAGCO	SOUR LAKE	Hardin	S074
59736	53417	Wholesale	GRIFFIN OIL	SAN AUGUSTINE	San Augustine	S075
53832	55212	Wholesale	KIRKLAND OIL CO	HENDERSON	Rusk	S076
62888	44324	None of the above, or unidentified	MCCUTCHEON OIL CO	BIG SPRING	Howard	S077
50780	82091	Wholesale	PICO PETROLEUM BARBER FUELS	FLORESVILLE	Wilson	S078
57964	62734	Wholesale	JP JONES OIL	GONZALES	Gonzales	S079
51623	61481	Wholesale	GATESVILLE BULK PLANT	FORT GATES	Coryell	S080
60651	74955	Wholesale	ROBSTOWN BULK PLANT	ROBSTOWN	Nueces	S081
51732	41752	Wholesale	SITTON OIL & MARINE	BEAUMONT	Jefferson	S082
50556	44072	Wholesale	LOMAX OIL COMPANY	VAN HORN	Culberson	S083
61894	92108	Wholesale	BAR F FUELS	EAST BERNARD	Wharton	S084
63436	72327	Wholesale	HALL DISTRIBUTING	PARIS	Lamar	S085
53865	80080	Wholesale	GOODIN FUELS	HEREFORD	Deaf Smith	S086
51740	41738	Wholesale	AWARD COMPANY	MINERAL WELLS	Palo Pinto	S087
76637	117668	Wholesale	GRABLE OIL	JACKSBORO	Jack	S088
51887	65846	Wholesale	RA BAGWELL OIL CO INC	BALLINGER	Runnels	S089
51719	47543	Wholesale	RIO GRANDE DISTRIBUTORS INC	MARFA	Presidio	S090
49808	81539	Wholesale	ADAMS OIL	BECKVILLE	Panola	S091
50461	47863	Wholesale	BORDERS & LONG OIL	KAUFMAN	Kaufman	S092
50472	48880	Wholesale	WEHMAN INC BULK PLANT	KARNES CITY	Karnes	S093
51092	51894	Wholesale	BULK PLANT	JASPER	Jasper	S094
51277	40339	Wholesale	HOPKINS OIL	MART	McLennan	S095

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
56138	61515	Wholesale	FELDERS WHOLESAL INC	BREHAM	Washington	S096
56190	61516	Wholesale	FELDERS WHOLESAL INC	BREHAM	Washington	S097
76248	117009	Wholesale	JOHNSON OIL CO BULK PLANT	ABILENE	Taylor	S098
71274	108524	Wholesale	WIGGINTON OIL CO	BRADY	McCulloch	S099
56317	86122	Wholesale	SOUTHWEST OIL CO OF EAGLE PASS	EAGLE PASS	Maverick	S100
41520	70989	Ind/Chem/Mfg Plant	KOLKHORST PETROLEUM	NAVASOTA	Grimes	S101
36024	67850	None of the above, or unidentified	SOUTHWEST MARKETERS PLANT	MONAHANS	Ward	S102
50289	38206	Wholesale	R E BEDGOOD & SONS	ALICE	Jim Wells	S103
50361	62766	Wholesale	BENNY COPE OIL CO	FLORESVILLE	Wilson	S104
51566	82460	Wholesale	JOHNS OIL COMPANY	FLORESVILLE	Wilson	S105
51620	61478	Wholesale	HAMILTON BULK PLANT	HAMILTON	Hamilton	S106
64322	65179	Wholesale	INDEPENDENT OIL CO - OVERHEAD TANKS	HILLSBORO	Hill	S107
56988	57839	Wholesale	LYLE OIL	FAIRFIELD	Freestone	S108
62915	39683	Wholesale	SCHMIDT & SONS	GONZALES	Gonzales	S109
11452	50571	Wholesale	A&A OIL	COLUMBUS	Colorado	S110
57100	67561	Wholesale	WRINKLE OIL COMPANY	STEPHENVILLE	Erath	S111
52977	43593	Wholesale	PERRYTON EQUITY EXCHANGE	PERRYTON	Ochiltree	S112
57632	52723	Wholesale	MITCHELL OIL CO BULK PLANT	WILLS POINT	Van Zandt	S113
53831	55211	Wholesale	KIRKLAND OIL CO	CARTHAGE	Panola	S114
50295	81902	Wholesale	SCOTT OIL CO	BLUM	Hill	S115
33744	66576	Wholesale	GRIFFIN OIL CO	QUITAQUE	Briscoe	S116
59505	42254	Wholesale	WALKER SIMS OIL CO INC-PLANT	SEMINOLE	Gaines	S117
39883	70021	None of the above, or unidentified	HRNCIR OIL	SCHULENBURG	Fayette	S118
50612	53451	Wholesale	BULK PLANT	EMORY	Rains	S119
52238	68916	Wholesale	WIEMERS OIL	SABINAL	Uvalde	S120
61350	91469	Wholesale	LUCE OIL AND GAS COMPANY	CAMP WOOD	Real	S121
65805	97817	Wholesale	TRI-COUNTY PETROLEUM INC	COLUMBUS	Colorado	S122
79520	123198	Wholesale	GOLDEN WEST OIL	MCALLEN	Hidalgo	S123
83939	128601	Wholesale	HAMPEL OIL DISTRIBUTORS	CRESSON	Hood	S124
51435	71519	Wholesale	HALL OIL	SULPHUR SPRINGS	Hopkins	S125
71194	108428	None of the above, or unidentified	A1 FUEL & SUPPLY	MEMPHIS	Hall	S126

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
63610	94587	None of the above, or unidentified	SUN COAST RESOURCES LUFKIN	LUFKIN	Angelina	S127
59504	42253	Wholesale	BECKER OIL	SLATON	Lubbock	S128
50489	67925	Wholesale	BE TALLEY DISTRIBUTOR	FALFURRIAS	Brooks	S129
52540	77226	Wholesale	REID HARRELL TEXAS OIL	ANSON	Jones	S130
47859	37789	Wholesale	WEST TEXAS GAS	MORTON	Cochran	S131
51888	65847	Wholesale	RA BAGWELL OIL	ROWENA	Runnels	S132
30151	55191	Wholesale	KIRKLAND OIL BULK PLANT	JACKSONVILLE	Cherokee	S133
51937	82578	Wholesale	HUNTER STROMAN OIL	FREER	Duval	S134
20151	57237	Wholesale	PARKS FUELS	BIG SPRING	Howard	S135
36692	45617	Wholesale	GOODEN PETROLEUM	DE LEON	Comanche	S136
51579	71911	Wholesale	MARTINEZ OIL CORPORATION	EAGLE PASS	Maverick	S137
51633	50456	Wholesale	WALTERSCHEID OIL CO	MUENSTER	Cooke	S138
22778	59368	Wholesale	GRAY FUEL & CHEM	ROTAN	Fisher	S139
61210	72391	Wholesale	EKRUT OIL	VALLEY MILLS	Bosque	S140
41229	75531	Wholesale	DONNINA	PEARSALL	Frio	S141
15251	53982	None of the above, or unidentified	HELTON OIL	FARWELL	Parmer	S142
27618	62721	Wholesale	JP JONES OIL	LOCKHART	Caldwell	S143
51545	65942	Wholesale	NEIGHBORS OIL CO	DECATUR	Wise	S144
51958	60437	Wholesale	GARDNER OIL	WOODVILLE	Tyler	S145
55530	69291	Wholesale	AIRINGTON OIL CO	BOWIE	Montague	S146
79062	122406	Wholesale	R B LOVE FUEL COMPANY	STEPHENVILLE	Erath	S147
56955	48883	Wholesale	WEHMAN INC BULK PLANT	POTH	Wilson	S148
50475	55333	Wholesale	DANS PETROLEUM	COTULLA	La Salle	S149
51553	44883	Wholesale	HICKS OIL & BUTANE	HARLINGEN	Cameron	S150
64900	87181	Wholesale	WALLACE OIL CO	MORTON	Cochran	S151
67809	102527	Wholesale	PREWITT PETROLEUM	HUNTSVILLE	Walker	S152
52488	79897	Wholesale	CROSS PLAINS PETROLEUM	CROSS PLAINS	Callahan	S153
51407	61987	Wholesale	FRONK OIL	BOOKER	Lipscomb	S154
51373	51968	Wholesale	KING K COLE	MADISONVILLE	Madison	S155
8496	47438	Wholesale	NATIONAL STATIONS BULK PLANT	PLAINVIEW	Hale	S156
52691	71418	Wholesale	HARDIN OIL	PALESTINE	Anderson	S157
72108	109732	Wholesale	THOMAS PETROLEUM	BEAUMONT	Jefferson	S158
40006	70075	Wholesale	PEARCE PETROLEUM PRODUCTS	MINEOLA	Wood	S159
51289	48731	Wholesale	ALEXANDER OIL CO SEGUIN	SEGUIN	Guadalupe	S160

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
51657	68122	Wholesale	ROYCE GROFF OIL CO	JOURDANTON	Atascosa	S161
37148	40980	None of the above, or unidentified	Q PRODUCTION SERVICES LTD	PALESTINE	Anderson	S162
57310	53647	None of the above, or unidentified	ADAMS RESOURCES & ENERGY	EAGLE LAKE	Colorado	S163
10108	49593	Wholesale	LAMBERT OIL BULK FACILITY	GRANBURY	Hood	S164
51779	56914	Wholesale	INDUSTRIAL OILS 51779	MIDLAND	Midland	S165
51989	49884	Wholesale	MCCORMICK MARKETING INC	SNYDER	Scurry	S166
67246	101723	Wholesale	CONOCO SERVICE CENTER WAREHOUSE	ALBANY	Shackelford	S167
68288	103165	Wholesale	TEXHOMA WHEAT GROWERS FUELS	TEXHOMA	Sherman	S168
84552	129542	Wholesale	HUBERT GLASS OIL	JACKSONVILLE	Cherokee	S169
50578	54981	Wholesale	TANDEM PETROLEUM BULK PLANT	UVALDE	Uvalde	S170
5127	43635	None of the above, or unidentified	CLARKSVILLE OIL & GAS	CLARKSVILLE	Red River	S171
57690	64772	Wholesale	DUNCAN OIL CO	LOMETA	Lampasas	S172
53203	66134	Wholesale	ADKINS OIL CO	CROWELL	Foard	S173
48719	51308	Wholesale	BALCH OIL CO BULKPLANT	SLATON	Lubbock	S174
46773	39705	Wholesale	CAMPBELL OIL	NEWTON	Newton	S175
56991	75108	Wholesale	GOLD STAR PETROLEUM	SAN JUAN	Hidalgo	S176
50999	65216	Wholesale	LINER OIL	ANSON	Jones	S177
57018	42205	Wholesale	THOMAS PETROLEUM	BRIDGEPORT	Wise	S178
51655	63288	Wholesale	TUCKER OIL	SLATON	Lubbock	S179
50631	37792	Wholesale	WTGF ANDREWS 100104	ANDREWS	Andrews	S180
42143	71405	Ind/Chem/Mfg Plant	TEXAS OPERATIONS DIVISION	LONE STAR	Morris	S181
67618	102329	Ind/Chem/Mfg Plant	GRIFFIN FUELS - BULK PLANT	EDEN	Concho	S182
16380	42731	Wholesale	ROYCE GROFF OIL	BOERNE	Kendall	S183
45992	77369	Wholesale	GREER OIL COMPANY	IMPERIAL	Pecos	S184
59820	70164	Wholesale	ASHLEY OIL CO	BOWIE	Montague	S185
64524	70558	Wholesale	ALFORD OIL	CALDWELL	Burleson	S186
51081	50994	Wholesale	LANDERS OIL & PROPANE	HIGGINS	Lipscomb	S187
59996	81336	Wholesale	DAHOPA WHOLESALE FUEL	BURNET	Burnet	S188
23632	59883	None of the above, or unidentified	BUCK PLANT	FABENS	El Paso	S189
53554	83337	Wholesale	DELL VALLEY OIL CO	DELL CITY	Hudspeth	S190
84713	129770	Wholesale	INTEGRA FUEL COMPANY	BAY CITY	Matagorda	S191

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
48664	54058	None of the above, or unidentified	DOBE FUEL	CLAUDE	Armstrong	S192
50659	37819	Wholesale	WTGF OLTON 150101	OLTON	Lamb	S193
52265	68323	Wholesale	MILLEN OIL COMPANY	MCKINNEY	Collin	S194
68264	103107	Wholesale	DUGAS	CHILDRESS	Childress	S195
70075	106449	Wholesale	DAVIDSON OIL	LUBBOCK	Lubbock	S196
71251	108501	Wholesale	ALEXANDER OIL CO YOAKUM BULK PLANT	YOAKUM	Lavaca	S197
71323	108584	Wholesale	OIL PATCH PETROLEUM	CORPUS CHRISTI	Nueces	S198
75771	116178	Wholesale	HENDERSON CO FUEL & OIL	ATHENS	Henderson	S199
66137	99046	Wholesale	LONE STAR SUPER GAS	KILGORE	Gregg	S200
48715	80462	None of the above, or unidentified	VAN HORN EXXON	VAN HORN	Culberson	S201
56826	39580	Wholesale	REEDER OIL CO	DUBLIN	Erath	S202
67306	101819	Wholesale	MYATT FUELS	CLIFTON	Bosque	S203
72292	110027	Wholesale	WOI PETROLEUM INC	DAINGERFIELD	Morris	S204
60267	46720	Wholesale	CONOCO INC	MERTZON	Irion	S205
69013	104556	Wholesale	WTGF MULESHOE 150104	MULESHOE	Bailey	S206
35944	67743	Wholesale	HUGHES PETROLEUM WAREHOUSE	CORRIGAN	Polk	S207
50907	44724	Wholesale	THOMAS PETROLEUM	LA GRANGE	Fayette	S208
61133	76992	Wholesale	S & J OIL COMPANY	GAINESVILLE	Cooke	S209
72412	110208	Wholesale	CENTERGAS FUELS	ABILENE	Callahan	S210
68773	104084	Wholesale	MOBIL BULK PLANT	CLARKSVILLE	Red River	S211
49332	50960	None of the above, or unidentified	LA FERIA YARD	LA FERIA	Cameron	S212
63705	71918	Wholesale	COLLINS OIL	VAN HORN	Culberson	S213
7678	46767	Wholesale	OLTON TEXACO BULK PLANT	OLTON	Lamb	S214
51738	55961	Wholesale	ROEWE EXXON DISTRIBUTOR	WINDTHORST	Archer	S215
76690	117741	Wholesale	BECKAT OIL & FUEL LP	TYLER	Smith	S216
64266	42745	None of the above, or unidentified	ROYCE GROFF OIL CO	LACOSTE	Medina	S217
18985	43365	Wholesale	CHAPMAN	SHERMAN	Grayson	S218
53626	83439	Wholesale	COLWELL OIL	WAXAHACHIE	Ellis	S219
68055	102782	Wholesale	TARPLEY	HONDO	Medina	S220
40882	70571	None of the above, or unidentified	MOFFITT OIL	CYPRESS	Harris	S221
64443	95668	Ind/Chem/Mfg Plant	PLANT 1	WICHITA FALLS	Wichita	S222

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
6417	44746	Wholesale	BULK PLANT	DUBLIN	Erath	S223
33277	88576	Wholesale	OIL PATCH WHARTON	WHARTON	Wharton	S224
51090	60447	Wholesale	CRAFT OIL COMPANY	ORANGE	Orange	S225
56074	57749	Wholesale	CORNELIUS OIL CO	FLOYDADA	Floyd	S226
66295	99399	Wholesale	TERMINAL	LUBBOCK	Lubbock	S227
69659	105726	Ind/Chem/Mfg Plant	KERNS OIL	CARRIZO SPRINGS	Dimmit	S228
32682	86223	None of the above, or unidentified	QUITAQUE PRODUCERS CO-OP 1	QUITAQUE	Briscoe	S229
51367	65617	Wholesale	ZATOPEK OIL	WEST	McLennan	S230
51868	62516	Wholesale	K D TIMMONS	FRANKLIN	Robertson	S231
52976	43592	Wholesale	SUNRAY CO-OP GRUVER BRANCH	GRUVER	Hansford	S232
74464	113622	Wholesale	POSSUM KINGDOM BULK	GRAFORD	Palo Pinto	S233
69114	104756	Wholesale	WTGF SWEETWATER 230105	SWEETWATER	Nolan	S234
58990	89396	Other	PITCOCK	GRAHAM	Young	S235
11978	51076	Wholesale	ROBERTSON FUEL COMPANY	SHAMROCK	Wheeler	S236
54219	50325	Wholesale	ARGUINDEGUI OIL CO-BULK PLANT	LAREDO	Webb	S237
57981	88426	Wholesale	JERRYS WHOLESALE FUELS	LAWN	Taylor	S238
63284	62295	Wholesale	MIDTEX OIL - BULK PLANT	NEW BRAUNFELS	Comal	S239
75133	114945	Wholesale	RYDER OIL	CENTERVILLE	Leon	S240
16061	52756	None of the above, or unidentified	TIDEPORT PETROLEUM	ODEM	San Patricio	S241
20822	57731	None of the above, or unidentified	JUAN CARRASCO MERCANTILE	BALMORHEA	Reeves	S242
23526	59789	None of the above, or unidentified	REXCO	PORT LAVACA	Calhoun	S243
20592	57535	None of the above, or unidentified	SCHLUMBERGER TECHNOLOGY CORPORATION	KINGSVILLE	Kleberg	S244
15962	54633	None of the above, or unidentified	TOM OCONNOR AREA OFFICE	REFUGIO	Refugio	S245
362	38270	Ind/Chem/Mfg Plant	CURTIS WELL SER A DIV OF CURTIS COS LTD	PAMPA	Gray	S246
18327	70822	Ind/Chem/Mfg Plant	INGRAM RAINBOW PLANT	CLEBURNE	Johnson	S247
56706	86558	Ind/Chem/Mfg Plant	SNIDER INDUSTRIES LLP	MARSHALL	Harrison	S248
84720	129781	Ind/Chem/Mfg Plant	INTERNAP	PLANO	Collin	S249
24158	60275	Wholesale	WATSON OIL	WAYSIDE	Armstrong	S250
62914	39682	Wholesale	LAVACA COUNTY OIL & GAS	MOULTON	Lavaca	S251

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
148	68064	Wholesale	H H FARM	ABERNATHY	Hale	S252
5861	44234	Wholesale	CENTERGAS FUELS	PAMPA	Gray	S253
68708	103979	Wholesale	THOMAS PETROLEUM	LAREDO	Webb	S254
69465	105414	Wholesale	SUNRAY CO-OP CONLEN BRANCH	DALHART	Dallam	S255
74653	114001	Wholesale	VEGA BULK PLANT	VEGA	Oldham	S256
79165	122576	Wholesale	JT HORN OIL CO INC - EASTLAND	EASTLAND	Eastland	S257
74005	112834	Wholesale	THOMAS PETROLEUM	ODESSA	Ector	S258
78888	122062	Wholesale	SEMINOLE WAREHOUSE 100100	SEMINOLE	Gaines	S259
22399	58990	Wholesale	J & J OIL COMPANY	HAPPY	Swisher	S260
83755	128200	Wholesale	SUNDANCE FUELS	SPRING	Harris	S261
50707	54535	Wholesale	ZBRANEK BROTHERS	NADA	Colorado	S262
61638	58826	Wholesale	KEY OIL CO	HOUSTON	Harris	S263
78233	120597	Wholesale	CANYON STATE OIL	EL PASO	El Paso	S264
84237	129086	Wholesale	SUN COAST RESOURCES	BEAUMONT	Jefferson	S265
21554	58274	Other	LEVELLAND COMPRESS CO	LEVELLAND	Hockley	S266
51294	88210	Ind/Chem/Mfg Plant	GIFFORD-HILL & COMPANY INC 72	GARDEN RIDGE	Comal	S267
51961	69455	Ind/Chem/Mfg Plant	HUNTER PIT	HUNTER	Comal	S268
79574	123279	None of the above, or unidentified	FREESTONE PRODUCTION OFFICE	BUFFALO	Leon	S269
47481	78715	None of the above, or unidentified	WALTER LASLEY & SONS INC	STRATFORD	Sherman	S270
260	38184	None of the above, or unidentified	BARBEE-NEUHAUS IMPLEMENT	WESLACO	Hidalgo	S271
28041	63004	Wholesale	CANTRELL OIL & GAS	MCLEAN	Gray	S272
36651	93876	Wholesale	MARLOW OIL	TERRELL	Kaufman	S273
48270	93338	Ind/Chem/Mfg Plant	R & C GENERAL	LONE OAK	Hunt	S274
41490	88177	Ind/Chem/Mfg Plant	CORNERSTONE C & M INC	CHICO	Wise	S275
79388	122967	Wholesale	WTGF BIG SPRING 230106	BIG SPRING	Howard	S276
41050	70672	Wholesale	GRIFFIN FUELS BULK PLANT	ELDORADO	Schleicher	S277
61359	71591	Wholesale	YARD - PORTABLE TANKS	WINTERS	Runnels	S278
69152	104815	Wholesale	GPM	FRANKEL CITY	Andrews	S279
71482	108771	Wholesale	DBA SULLIVAN WHOLESALE DISTRIBUTORS	MEXIA	Limestone	S280
76636	117667	Wholesale	EAGLE PROPANE AND FUELS	ODESSA	Ector	S281
54756	82057	None of the above, or unidentified	PROTHEAM SERVICES GROUP	PASADENA	Harris	S282

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
51114	70433	None of the above, or unidentified	JOHN R HARDY	MADISONVILLE	Madison	S283
46883	78591	None of the above, or unidentified	R BURRELL DAY	SAN ANTONIO	Bexar	S284
47367	78650	None of the above, or unidentified	JACKIES STATION & GRO	LEGGETT	Polk	S285
24175	60286	Ind/Chem/Mfg Plant	SUNOCO LA PORTE PLANT	LA PORTE	Harris	S286
57482	87703	Ind/Chem/Mfg Plant	INEOS USA	DEER PARK	Harris	S287
64515	55597	Ind/Chem/Mfg Plant	SNEED BOOSTER	STINNETT	Moore	S288
73930	112720	Ind/Chem/Mfg Plant	BLAGRAVE & DUFFEY INC	HOUSTON	Harris	S289
9552	49137	None of the above, or unidentified	MOORE BROTHERS SHOP	LUFKIN	Angelina	S290
19394	76506	None of the above, or unidentified	MUTUAL TOLL CONDO	MIDLAND	Midland	S291
52092	71921	Wholesale	CONNEL OIL BULK PLANT	VAN HORN	Culberson	S292
74672	114033	None of the above, or unidentified	Q V SERVICES OF TEXAS INC	ALVIN	Brazoria	S293
37413	86619	None of the above, or unidentified	KENNETH R STEWART	BUFFALO GAP	Taylor	S294
30016	72228	Wholesale	DALE OIL	MULESHOE	Bailey	S295
53204	81451	Wholesale	SOUTHWEST ENERGY DISTRIBUTORS	ODESSA	Ector	S296
75468	115613	Wholesale	FLOMOT KEYSTOP	FLOMOT	Motley	S297
84235	129083	Wholesale	RMCF YARD	CYPRESS	Harris	S298
44429	72664	None of the above, or unidentified	PFEIFFER & SON	LA PORTE	Harris	S299
65325	69270	None of the above, or unidentified	FRIONA INDUSTRIES LITTLEFIELD	LITTLEFIELD	Lamb	S300
24821	79751	Ind/Chem/Mfg Plant	DIBOLL COMPLES	DIBOLL	Angelina	S301
24829	97101	Ind/Chem/Mfg Plant	WESTVACO TEXAS EVADALE MILL	EVADALE	Jasper	S302
53495	83299	Ind/Chem/Mfg Plant	SALT CREEK FIELD UNIT YARD	JAYTON	Kent	S303
51069	82201	Wholesale	DIXIE OIL COMPANY	SAN ANTONIO	Bexar	S304
65113	40784	Wholesale	DRAW KEY PUMPS	TAHOKA	Lynn	S305
11627	91975	Ind/Chem/Mfg Plant	MIDLOTHIAN PLANT	MIDLOTHIAN	Ellis	S306
396	38323	None of the above, or unidentified	COLEMAN DISTRIBUTING	BROWNWOOD	Brown	S307
85270	130459	None of the above, or unidentified	CHEVRON DOLLAR HIDE PLANT	ANDREWS	Andrews	S308

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
51808	82539	Other	DOCS REVERSE UNITS	MONAHANS	Ward	S309
2057	40403	Wholesale	B & D OIL CO	KERMIT	Winkler	S310
17191	37984	Wholesale	LSI ABILENE	ABILENE	Taylor	S311
27190	90124	Wholesale	CENTERGAS FUELS	AMARILLO	Potter	S312
33384	66458	Wholesale	WAREHOUSE	PARIS	Lamar	S313
50932	59568	Wholesale	CARRIZO SPRINGS BULK PLANT	CARRIZO SPRINGS	Dimmit	S314
52932	43591	Wholesale	PERRYTON EQUITY EXCHANGE	FARNSWORTH	Ochiltree	S315
53449	67862	Wholesale	WELL TECH	SNYDER	Scurry	S316
64513	70674	Wholesale	GRIFFIN FUELS	EDEN	Concho	S317
69647	105710	Wholesale	TELL GIN	TELL	Childress	S318
71491	108783	Wholesale	SUNRAY CO-OP ETTER BRANCH	ETTER	Moore	S319
74461	113617	Wholesale	CEE VEE KEYSTOP	CEE VEE	Cottle	S320
84238	129087	Wholesale	SUN COAST RESOURCES	CORPUS CHRISTI	Nueces	S321
52473	92630	Ind/Chem/Mfg Plant	SMITH & COMPANY	CONROE	Montgomery	S322
56073	59171	Ind/Chem/Mfg Plant	LUBRIZOL	DEER PARK	Harris	S323
68489	103604	Ind/Chem/Mfg Plant	OXY MIDLAND FARMS	ANDREWS	Andrews	S324
532	38380	None of the above, or unidentified	CANTEX	MINERAL WELLS	Palo Pinto	S325
12124	51197	None of the above, or unidentified	OXY VINYLs LA PORTE PLANT	LA PORTE	Harris	S326
77992	120186	None of the above, or unidentified	JOHNSON RESOURCES	CORPUS CHRISTI	Nueces	S327
78857	122005	None of the above, or unidentified	T A W	GODLEY	Johnson	S328
75593	115825	None of the above, or unidentified	LAUDERDALES	FORT WORTH	Tarrant	S329
74869	114398	None of the above, or unidentified	LONE STAR PARK AT GRAND PRAIRIE	GRAND PRAIRIE	Dallas	S330
19758	56841	None of the above, or unidentified	BREDERO PRICE COMPANY	PEARLAND	Brazoria	S331
18756	56588	None of the above, or unidentified	CARL J CAHILL	SONORA	Sutton	S332
65327	69272	Ind/Chem/Mfg Plant	HEREFORD BI PRODUCTS	HEREFORD	Deaf Smith	S333
68707	103978	Ind/Chem/Mfg Plant	THE FORDYCE CO	MISSION	Hidalgo	S334
78634	121455	Ind/Chem/Mfg Plant	FTSI SERVICES BRYAN	BRYAN	Brazos	S335
79747	123672	Ind/Chem/Mfg Plant	FTSI SERVICES VOCA	VOCA	McCulloch	S336
84257	129119	Ind/Chem/Mfg Plant	TEJAS INDUSTRIES-EAST PLANT	HEREFORD	Deaf Smith	S337

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
61730	91198	None of the above, or unidentified	ALAGADON FARMS INC./EVANS STEVEN REX	MIDLAND	Midland	S338
83838	128363	None of the above, or unidentified	CYRUS ONE	HOUSTON	Harris	S339
70144	106566	Wholesale	FT HANCOCK ENERGY CO	FORT HANCOCK	Hudspeth	S340
52373	46717	Ind/Chem/Mfg Plant	AMAX OIL CO	OZONA	Crockett	S341
54272	83997	Ind/Chem/Mfg Plant	BELL PROCESSING	WICHITA FALLS	Wichita	S342
72940	111074	Ind/Chem/Mfg Plant	CARTHAGE YARD	DE BERRY	Panola	S343
20972	85244	None of the above, or unidentified	P & O PORTS TEXAS	LA PORTE	Galveston	S344
65847	98302	None of the above, or unidentified	DEVEREUX	VICTORIA	Victoria	S345
77037	118256	None of the above, or unidentified	BALFOUR BEATTY FIELD OFFICE	FRISCO	Collin	S346
85343	130548	None of the above, or unidentified	IOC COMPANY SITE 1	EDINBURG	Hidalgo	S347
74667	114025	Wholesale	RICKS EXPLORATION	OZONA	Crockett	S348
11828	50966	None of the above, or unidentified	BOYD INDUSTRIES INC	BOYD	Wise	S349
20577	57525	None of the above, or unidentified	AKIN WAREHOUSE	WICHITA FALLS	Archer	S350
21993	58668	None of the above, or unidentified	ASARCO EL PASO	EL PASO	El Paso	S351
51379	52408	Wholesale	GRIFFIN OIL CO	BROWNFIELD	Terry	S352
52722	82606	Wholesale	BROWNSVILLE LOCATION	BROWNSVILLE	Cameron	S353
53464	79813	Wholesale	SUNLAND DISTRIBUTORS	ALPINE	Brewster	S354
53472	67873	Wholesale	SOUTHWEST MARKETERS	FORT STOCKTON	Pecos	S355
58051	69838	Wholesale	MIDTEX OIL BEAUMONT WAREHOUSE 94	BEAUMONT	Jefferson	S356
61216	81757	Wholesale	HAIGOOD & CAMPBELL	ARCHER CITY	Archer	S357
63051	93832	Wholesale	MILLS COMPANY DIST CO	GOLDTHWAITE	Mills	S358
25986	77423	Ind/Chem/Mfg Plant	OLD OCEAN PLANT	SWEENY	Brazoria	S359
53201	57809	Ind/Chem/Mfg Plant	J M HUBER CORPORATION	MARBLE FALLS	Burnet	S360
80070	124273	Ind/Chem/Mfg Plant	RHODIA HOUSTON PLANT	HOUSTON	Harris	S361
19698	56747	None of the above, or unidentified	CHARPIOT & DUNN	BELLVILLE	Austin	S362

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27119	62540	None of the above, or unidentified	MOBIL CHEMICAL	BEAUMONT	Jefferson	S363
50628	82056	None of the above, or unidentified	PROTHERM SERVICES GROUP LLC	FREEPORT	Brazoria	S364
71552	108878	None of the above, or unidentified	CRIST FUEL	WILDORADO	Oldham	S365
53645	69448	Ind/Chem/Mfg Plant	TEXAS INDUSTRIES	AUSTIN	Travis	S366
77157	118472	Ind/Chem/Mfg Plant	VARCO INTERNATIONAL	LONE STAR	Morris	S367
33800	66625	None of the above, or unidentified	PONDEROSA	REALITOS	Duval	S368
36756	68258	None of the above, or unidentified	PETRO HUNT LLC	COMO	Wood	S369
39000	69920	None of the above, or unidentified	CAPROCK IND INC IV	DALHART	Hartley	S370
47405	78677	None of the above, or unidentified	COMBS ENTERPRISES	HENDERSON	Rusk	S371
48405	55371	None of the above, or unidentified	YORK INTERNATIONAL	SAN ANTONIO	Bexar	S372
64241	71213	None of the above, or unidentified	TDCJ TORRES UNIT	HONDO	Mason	S373
65326	69271	None of the above, or unidentified	CATTLETOWN INC	FRIONA	Parmer	S374
65329	69274	None of the above, or unidentified	KAR LTD	FRIONA	Parmer	S375
70136	106543	None of the above, or unidentified	J CARROLL WEAVER	SINTON	San Patricio	S376
50545	59269	Wholesale	TOWNSEND-STRONG	LUBBOCK	Lubbock	S377
53470	67871	Wholesale	WARREN PETROLEUM CO	CRANE	Crane	S378
52225	82647	Other	CONEX	BEAUMONT	Jefferson	S379
72903	111003	Ind/Chem/Mfg Plant	SWEET 16	BENAVIDES	Duval	S380
578	39344	Wholesale	COLORADO COUNTY OIL	COLUMBUS	Colorado	S381
51336	62844	Wholesale	HOELSCHER OIL COMPANY	COLUMBUS	Colorado	S382
73473	111984	Wholesale	LSI SONORA	SONORA	Sutton	S383
75904	116415	Wholesale	CHILDRESS KEYSTOP	CHILDRESS	Childress	S384
84075	128813	Wholesale	BRIDGEPORT WAREHOUSE	BRIDGEPORT	Wise	S385
41092	70716	Ind/Chem/Mfg Plant	GREENS PORT TERMINAL	HOUSTON	Harris	S386

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
28457	44886	None of the above, or unidentified	SCHNEIDER DIST	SAN ANGELO	Tom Green	S387
31917	65889	None of the above, or unidentified	BRASHER BROS	SEYMOUR	Baylor	S388
41491	88178	None of the above, or unidentified	GIFFORD HILL & COMPANY	FERRIS	Ellis	S389
01-827-5088			ADAMS OIL ENTERPRISES	TRINITY	TRINITY	S390
01-875-8634			ADAMS OIL GAS	ODESSA	ECTOR	S391
12-914-9147			ADINO ENERGY CORPORATION	HOUSTON	HARRIS	S392
04-286-2864			ADINO EXPLORATION- LLC	COLEMAN	COLEMAN	S393
10-182-1549			ALAMO PETROLEUM EXCHANGE	GIDDINGS	LEE	S394
82-682-4463			ALANI SONS INC	IRVING	DALLAS	S395
61-715-1279			AMERICAN AIRLINES FUEL CORPORATION	FORT WORTH	TARRANT	S396
03-982-4898			ANGIE MARKETER USA- LLC	HOUSTON	HARRIS	S397
01-507-7633			ANTERRA PETROLEUM- LLC	AUSTIN	TRAVIS	S398
79-422-4829			ANTOINE CITGO MINI MART	HOUSTON	HARRIS	S399
06-701-9877			ATCO DISTRIBUTING COMPANY	TEXARKANA	BOWIE	S400
02-639-3702			AVENUE FUEL DISTRIBUTORS INC	ENNIS	ELLIS	S401
02-700-8887			AVERY & COMPANY	SAN ANTONIO	BEXAR	S402
10-301-7674			BAKER PETROLITE CORPORATION	POINT COMFORT	CALHOUN	S403
61-917-5359			BELL HYDROGAS- INC.	BOERNE	KENDALL	S404
02-691-9522			BENTON RAINEY INC	PARIS	LAMAR	S405
02-680-7818			BILL C SMITH INC	MARBLE FALLS	BURNET	S406
78-331-6560			BLACKHAWK SHELL	HOUSTON	HARRIS	S407
11-083-0684			BLUEBONNET OIL & GAS	THREE RIVERS	LIVE OAK	S408
03-817-5212			BLUEBONNET PETROLEUM- INC.	BRENHAM	WASHINGTON	S409
02-021-3190			BRANNON DISTRIBUTING COMPANY INC	CONROE	MONTGOMERY	S410
02-615-4658			BRANNON DISTRIBUTING COMPANY INC	CONROE	MONTGOMERY	S411
04-164-1041			BRIGHT & COMPANY	GRAND PRAIRIE	DALLAS	S412
05-716-8452			BRISCOE OIL INC	ROCKWALL	ROCKWALL	S413
80-659-8806			BUCCANEER PIPELINE COMPANY	FREEMPORT	BRAZORIA	S414
61-692-4721			CEDAR MARINE TERMINALS- LP	BAYTOWN	CHAMBERS	S415
78-765-8525			CLARKSVILLE OIL & GAS CO LTD	TYLER	SMITH	S416

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
05-407-4257			CLEMENTS OIL CORPORATION	ATLANTA	CASS	S417
03-914-5391			COLONIAL OIL INDUSTRIES- INC.	HOUSTON	HARRIS	S418
07-853-6505			CONOCOPHILLIPS COMPANY	ARLINGTON	TARRANT	S419
14-119-5482			COWHOUSE PARTNERS LLC	DUMAS	MOORE	S420
01-269-2252			CP INTERNATIONAL- INC.	HOUSTON	HARRIS	S421
02-654-3702			D C DISTRIBUTORS INC	HENDERSON	RUSK	S422
01-921-8679			DAVID GEE OIL CO	NOCONA	MONTAGUE	S423
08-267-9317			DERRICK OIL & SUPPLY- INC. OF PORT ARTHUR- TEXAS	PORT ARTHUR	JEFFERSON	S424
00-679-2995			DIAMOND NOORAANS	HOUSTON	HARRIS	S425
79-185-2254			DIAMOND SHAMROCK REFINING AND MARKETING COMPANY	ABERNATHY	HALE	S426
80-833-2972			DRF INDUSTRIES LLC	HOUSTON	HARRIS	S427
02-600-7898			DUNCAN THOMAS PETROLEUM INC	ATLANTA	CASS	S428
87-982-4993			EGS HYROCARBONS CORP	HOUSTON	HARRIS	S429
62-520-9622			ENRON PIPELINE HOLDING COMPANY	HOUSTON	HARRIS	S430
04-956-3984			ENTERPRISE COMPANIES- INCORPORATED	HOUSTON	HARRIS	S431
83-050-8607			EXCALIBUR PROCESSING- LLC	HOUSTON	HARRIS	S432
13-448-3643			EXXON MOBIL CORPORATION	WASKOM	HARRISON	S433
78-823-4628			EXXON MOBIL CORPORATION	ROSENBERG	FORT BEND	S434
14-710-5886			FASHING PLANT	KENEDY	KARNES	S435
05-130-4432			FLINT HILLS RESOURCES CORPUS CHRISTI- LLC	BUDA	HAYS	S436
96-272-3719			FLINT HILLS RESOURCES CORPUS CHRISTI- LLC	CEDAR CREEK	BASTROP	S437
04-627-1789			FLOYD LACKEY & SONS INC	SAN MARCOS	HAYS	S438
15-351-3296			FOUR STATES PETROLEUM SALE INC	BECKVILLE	PANOLA	S439
07-835-2188			FREEPORT LNG EXPANSION- L.P.	HOUSTON	HARRIS	S440
00-528-1097			GENESIS CRUDE OIL	TEXAS CITY	GALVESTON	S441
19-006-4993			GOLDSTON OIL CORP	GLADEWATER	GREGG	S442
01-578-0661			GOLDSTREAM- INC.	KERMIT	WINKLER	S443
02-696-9790			GOLDSTREAM- INC.	RANKIN	UPTON	S444
62-317-8857			GREENS SHELL	HOUSTON	HARRIS	S445
07-460-2236			GUTIERREZ OIL COMPANY	RIO GRANDE CITY	STARR	S446
02-610-9413			H&M WHOLESALE- INC.	COLLEGE STATION	BRAZOS	S447

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
12-318-8356			HOLLY ENERGY PARTNERS- L.P.	ABILENE	TAYLOR	S448
07-836-0231			HOPKINS OIL COMPANY INC	CRAWFORD	MCLENNAN	S449
05-445-2776			HOUSTON - PASADENA APACHE OIL COMPANY- LP	PASADENA	HARRIS	S450
09-248-7172			HOUSTON LBC L P	SEABROOK	HARRIS	S451
18-066-9210			HUNTER SALES INC	ALICE	JIM WELLS	S452
01-269-6084			HUNTER-ASH OIL CO INC	ALICE	JIM WELLS	S453
15-618-8088			HYPERION ENERGY LP	BRENHAM	WASHINGTON	S454
01-523-2360			INDEPENDENT MARKETER	FORT WORTH	TARRANT	S455
82-745-3189			INSIGHT EQUITY ACQUISITION PARTNERS- LP	EULESS	TARRANT	S456
06-769-3244			IPR	HOUSTON	HARRIS	S457
11-334-3953			J A M DISTRIBUTING CO	BEAUMONT	JEFFERSON	S458
06-639-0951			J AND L HOLDING COMPANY- INC.	HOUSTON	HARRIS	S459
04-956-8400			J CINCO INC	PFLUGERVILLE	TRAVIS	S460
15-119-3059			J CINCO INC	TEMPLE	BELL	S461
79-008-8343			JAD OIL CO	VICTORIA	VICTORIA	S462
96-798-7178			JAGEE GP- LLC	FORT WORTH	TARRANT	S463
03-081-4179			JAMES A NELSON OIL GAS	MIDLAND	MIDLAND	S464
03-882-5849			JENEX PETROLEUM CORPORATION	THE WOODLANDS	MONTGOMERY	S465
05-822-3848			JENEX PETROLEUM CORPORATION	ODESSA	ECTOR	S466
15-634-7510			J-O'B OPERATING COMPANY	TYLER	SMITH	S467
08-835-6316			KINDER MORGAN BULK TERMINALS- INC.	PORT ARTHUR	JEFFERSON	S468
03-482-4279			KINO OIL OF TEXAS- L.L.C.	FREDERICKSBURG	GILLESPIE	S469
05-513-6873			K-P OIL CO	CONROE	MONTGOMERY	S470
06-725-8525			L THREE INC	HOUSTON	HARRIS	S471
95-778-1669			LAGNIAPPE MANUFACTURING INC	ARLINGTON	TARRANT	S472
11-436-1132			LAKE OIL COMPANY	EAGLE LAKE	COLORADO	S473
86-095-1375			LATCH OIL- INC.	JASPER	JASPER	S474
02-595-9396			LEE OIL CO.- INC.	ALVIN	BRAZORIA	S475
02-713-0517			LINDELL INC	TAYLOR	WILLIAMSON	S476
02-595-9826			LLOYD Q SEABOLT CO INC	ALVIN	BRAZORIA	S477
79-101-2672			LONGBRANCH ENERGY	CENTER	SHELBY	S478

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
04-495-1963			MAGELLAN MIDSTREAM PARTNERS LP	MIDLAND	MIDLAND	S479
04-145-4273			MANGUM OIL AND GAS COMPANY	KILGORE	GREGG	S480
14-161-1249			MARTIN ENERGY SERVICES LLC	HOUSTON	HARRIS	S481
04-775-1995			MAX VAUGHAN DISTRIBUTING COMPANY	TEXARKANA	BOWIE	S482
01-766-9995			MAXEY ENERGY COMPANY	UVALDE	UVALDE	S483
15-629-4696			MAXEY ENERGY COMPANY	KERRVILLE	KERR	S484
02-670-5483			MCBRYDE OIL COMPANY LLC	KERRVILLE	KERR	S485
06-637-4299			MCCRAW OIL COMPANY- INC.	BONHAM	FANNIN	S486
11-985-0886			MCNALLEN OIL CO INC	FORT WORTH	TARRANT	S487
62-127-2553			MEADOWBROOK FUEL CENTER	FORT WORTH	TARRANT	S488
02-684-4233			MIDLAND 66 OIL COMPANY INC	MIDLAND	MIDLAND	S489
00-273-6431			MIDSTREAM MAGELLAN PARTNERS L P	ODESSA	ECTOR	S490
00-436-4432			MIDSTREAM MAGELLAN PARTNERS L P	GRAPEVINE	TARRANT	S491
96-343-4449			MIDTEX OIL- L.P.	CONROE	MONTGOMERY	S492
17-779-2447			MIDWEST MARKETING- INC.	ABILENE	TAYLOR	S493
12-081-4574			MIECO TERMINAL AND MARKETING- INC	HOUSTON	HARRIS	S494
10-384-6366			MORGAN OIL CO INC	LUFKIN	ANGELINA	S495
10-267-0999			MOTIVA ENTERPRISES LLC	PASADENA	HARRIS	S496
11-597-9452			MOTIVA ENTERPRISES LLC	SAN ANTONIO	BEXAR	S497
15-608-4626			MOTIVA ENTERPRISES LLC	HEARNE	ROBERTSON	S498
80-821-2237			NATIONAL FUELS & LUBRICANTS- INC	SNYDER	SCURRY	S499
05-424-8422			NAVAJO REFINING COMPANY. LLC	EL PASO	EL PASO	S500
03-092-8543			NEW DISTRIBUTING CO.- INC.	VICTORIA	VICTORIA	S501
79-040-1074			NIC HOLDING CORP.	HOUSTON	HARRIS	S502
80-988-5846			NIC HOLDING CORP.	THE WOODLANDS	MONTGOMERY	S503
17-665-6817			NICHOLS BROTHERS	ANSON	JONES	S504
60-188-2533			OIL PATCH FUEL & SUPPLY- INC.	COMBES	CAMERON	S505
05-351-8455			OPEN SOURCE MARKETER	SULPHUR SPRINGS	HOPKINS	S506
00-539-3595			PANTHER ENERGY SERVICES- INC.	HOUSTON	HARRIS	S507

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
11-035-7667			PATHFINDER PETROLEUM PRODUCTS- INC	HOUSTON	HARRIS	S508
05-866-6587			PEARMAN OIL AND LP GAS- INC.	WAXAHACHIE	ELLIS	S509
00-925-3019			PETRO BEE-JAY INC	WHITEFACE	COCHRAN	S510
05-402-0990			PETRO PAK INC	PORT ARTHUR	JEFFERSON	S511
07-306-8017			PETROLEUM FUELS COMPANY INC	LEAGUE CITY	GALVESTON	S512
94-784-3645			PETROLEUM SERVICE CORP	PORT ARTHUR	JEFFERSON	S513
96-245-9538			PETROMAX- LLC	BAY CITY	MATAGORDA	S514
86-705-8349			PIPELINE TERMINAL MANAGEMENT	HOUSTON	HARRIS	S515
88-345-2088			POWER UP DISTRIBUTOR PERFORMANCE LUBRICANTS	VICTORIA	VICTORIA	S516
15-405-7678			PREMIER BROKERAGE- INC.	DALLAS	COLLIN	S517
86-080-6020			PRESIDIO SWD INC	CARRIZO SPRINGS	DIMMIT	S518
78-890-7017			PRIDE REFINING ALEDO TERMINAL	ALEDO	PARKER	S519
02-681-3568			RALPH WATSON OIL COMPANY INC	MARSHALL	HARRISON	S520
84-921-3173			RANHAT CORPORATION	HOUSTON	HARRIS	S521
02-676-2716			REEVES OIL CO.- INC.	LONGVIEW	GREGG	S522
10-274-9579			RICON PRODUCTS INC	AUSTIN	TRAVIS	S523
08-395-3109			ROYCE GROFF OIL COMPANY	CASTROVILLE	MEDINA	S524
02-336-3789			RUTHERFORD OIL CORP.	GEORGE WEST	LIVE OAK	S525
09-102-0045			RUTHERFORD OIL CORPORATION	WINNIE	CHAMBERS	S526
12-058-4040			RUTHERFORD OIL CORPORATION	BRAZORIA	BRAZORIA	S527
05-312-5852			RYDER OIL CO L L C	BUFFALO	LEON	S528
09-323-5666			SAAB PETROLEUM CORPORATION	SUGAR LAND	FORT BEND	S529
12-720-4043			SANTROL PRODUCTS	MIDLAND	MIDLAND	S530
01-030-0442			SHELL DOWNTOWN	HOUSTON	HARRIS	S531
60-695-8762			SIMONS PETROLEUM- INC.	CYPRESS	HARRIS	S532
78-532-9215			SIMONS PETROLEUM- INC. (BAM)	ODESSA	ECTOR	S533
04-594-2794			SMITH WHOLESALERS INC	ATLANTA	CASS	S534
96-775-2671			ST LINDEN TERMINAL- LLC	SAN ANTONIO	BEXAR	S535
85-919-0097			STATION POINT SHELL	ARLINGTON	TARRANT	S536
17-363-0844			STEAGALL OIL COMPANY- INC.	FORT WORTH	TARRANT	S537
84-863-0760			SWATI ENTERPRISES- INC.	PORT ARTHUR	JEFFERSON	S538
13-720-7622			TAYLOR-SMART LLC	BONHAM	FANNIN	S539
78-583-3042			TEPPCO CRUDE OIL CO	GRAHAM	YOUNG	S540
03-933-4110			TEPPCO CRUDE PIPELINE LP	BAYTOWN	HARRIS	S541
17-759-1807			TERRILL PETROLEUM COMPANY INC	HEMPHILL	SABINE	S542

TCEQ FACILITY NUMBER	TCEQ FACILITY ID	FACILITY TYPE	FACILITY NAME	CITY	COUNTY	ERG SURVEY ID
02-707-8146			TEXCO	SAN MARCOS	HAYS	S543
01-505-5136			THE THRIFTY MARKETER	FORT WORTH	TARRANT	S544
78-408-1317			THOMAS PETROLEUM- LLC	ROBSTOWN	NUECES	S545
80-119-5496			THOMAS PETROLEUM- LLC	SAN BENITO	CAMERON	S546
04-296-7435			THOMPSON OIL CO INC	NEW SUMMERFIELD	CHEROKEE	S547
83-012-4462			TIGUA ENTERPRISES- INC.	EL PASO	EL PASO	S548
94-617-5627			TRANSCANADA PIPELINE USA LTD.	HOUSTON	HARRIS	S549
13-395-1884			TRIFINERY PETROLEUM SERVICE	CORPUS CHRISTI	NUECES	S550
00-216-5987			TRIPLE A OIL COMPANY	MANSFIELD	TARRANT	S551
11-025-0649			TRU-CHEM LLC	HOUSTON	HARRIS	S552
08-731-1452			TTEX INC	YORKTOWN	DEWITT	S553
03-082-2207			UNION OIL CO OF CALIFORN	MIDLAND	MIDLAND	S554
02-629-6680			VALERO	SAN ANTONIO	BEXAR	S555
04-504-5092			VALERO	HOUSTON	HARRIS	S556
04-555-5416			VALERO	ZAPATA	ZAPATA	S557
96-355-5222			VALERO MARKETING AND SUPPLY COMPANY	SAN ANTONIO	BEXAR	S558
86-720-0487			VF RUSSIA INC	DALLAS	DALLAS	S559
01-055-0051			W B BROWN OIL CO INC	KERRVILLE	KERR	S560
02-361-8127			W. DOUGLASS DISTRIBUTING- LTD.	SHERMAN	GRAYSON	S561
94-549-2700			W. DOUGLASS DISTRIBUTING- LTD.	SHERMAN	GRAYSON	S562
17-106-1807			WALSH AND WATTS- INC.	WICHITA FALLS	WICHITA	S563
13-761-4079			WANJURA OIL CO	WEIMAR	COLORADO	S564
02-721-4527			WEST GAS SERVICE INC	WEST	MCLENNAN	S565
84-139-4344			WESTEX CAPITAL- LTD.	LA COSTE	MEDINA	S566
08-685-8404			WILLIAM C WALTERSCHEID	MUENSTER	COOKE	S567
08-073-6457			WISE- COLLINS OIL CO LLC	HILLSBORO	HILL	S568
02-650-2146			YOUNG OIL CO	GILMER	UPSHUR	S569

Note: Facilities with ERG Survey ID's from S390 to S569 are from the Dun & Bradstreet database. These data do not have the following fields: TCEQ FACILITY NUMBER, TCEQ FACILITY ID, and FACILITY TYPE. For the D&B facilities, DUNS Numbers are listed under the "TCEQ FACILITY NUMBER" field.

APPENDIX C

County-Level Annual and Ozone Season Day (OSD) VOC Emissions

FIPS	COUNTY	ANNUAL VOC (TPY)	OSD VOC (TPD)
48001	Anderson	10.57	0.026
48003	Andrews	12.06	0.037
48005	Angelina	10.57	0.026
48007	Aransas	-	-
48009	Archer	-	-
48011	Armstrong	-	-
48013	Atascosa	5.59	0.015
48015	Austin	5.28	0.013
48017	Bailey	12.06	0.037
48019	Bandera	-	-
48021	Bastrop	5.59	0.015
48023	Baylor	5.49	0.016
48025	Bee	-	-
48027	Bell	16.76	0.044
48029	Bexar	16.76	0.044
48031	Blanco	-	-
48033	Borden	-	-
48035	Bosque	-	-
48037	Bowie	21.14	0.052
48039	Brazoria	5.00	0.013
48041	Brazos	21.14	0.052
48043	Brewster	5.00	0.013
48045	Briscoe	6.03	0.018
48047	Brooks	-	-
48049	Brown	10.98	0.031
48051	Burleson	5.28	0.013
48053	Burnet	5.30	0.015
48055	Caldwell	5.59	0.015
48057	Calhoun	5.28	0.013
48059	Callahan	-	-
48061	Cameron	30.16	0.092
48063	Camp	-	-
48065	Carson	6.03	0.018
48067	Cass	5.28	0.013
48069	Castro	-	-
48071	Chambers	-	-
48073	Cherokee	10.57	0.026
48075	Childress	-	-
48077	Clay	-	-
48079	Cochran	-	-
48081	Coke	6.03	0.018
48083	Coleman	5.49	0.016
48085	Collin	10.00	0.026
48087	Collingsworth	-	-
48089	Colorado	10.57	0.026
48091	Comal	11.17	0.029
48093	Comanche	10.98	0.031

FIPS	COUNTY	ANNUAL VOC (TPY)	OSD VOC (TPD)
48095	Concho	-	-
48097	Cooke	5.78	0.016
48099	Coryell	-	-
48101	Cottle	-	-
48103	Crane	-	-
48105	Crockett	-	-
48107	Crosby	-	-
48109	Culberson	-	-
48111	Dallam	6.03	0.018
48113	Dallas	54.98	0.142
48115	Dawson	-	-
48117	DeafSmith	-	-
48119	Delta	-	-
48121	Denton	10.00	0.026
48123	DeWitt	10.57	0.026
48125	Dickens	-	-
48127	Dimmit	5.49	0.016
48129	Donley	-	-
48131	Duval	5.49	0.016
48133	Eastland	10.98	0.031
48135	Ector	18.09	0.055
48137	Edwards	-	-
48139	Ellis	10.57	0.026
48141	ElPaso	21.14	0.052
48143	Erath	10.00	0.026
48145	Falls	11.17	0.029
48147	Fannin	5.28	0.013
48149	Fayette	5.28	0.013
48151	Fisher	-	-
48153	Floyd	-	-
48155	Foard	-	-
48157	FortBend	10.00	0.026
48159	Franklin	-	-
48161	Freestone	-	-
48163	Frio	10.60	0.029
48165	Gaines	-	-
48167	Galveston	-	-
48169	Garza	-	-
48171	Gillespie	5.30	0.015
48173	Glasscock	-	-
48175	Goliad	-	-
48177	Gonzales	10.57	0.026
48179	Gray	6.03	0.018
48181	Grayson	10.57	0.026
48183	Gregg	26.42	0.064
48185	Grimes	10.57	0.026
48187	Guadalupe	5.59	0.015

FIPS	COUNTY	ANNUAL VOC (TPY)	OSD VOC (TPD)
48189	Hale	30.16	0.092
48191	Hall	-	-
48193	Hamilton	5.30	0.015
48195	Hansford	-	-
48197	Hardeman	6.03	0.018
48199	Hardin	5.28	0.013
48201	Harris	164.95	0.425
48203	Harrison	-	-
48205	Hartley	-	-
48207	Haskell	-	-
48209	Hays	5.59	0.015
48211	Hemphill	12.06	0.037
48213	Henderson	-	-
48215	Hidalgo	18.09	0.055
48217	Hill	11.17	0.029
48219	Hockley	6.03	0.018
48221	Hood	5.28	0.013
48223	Hopkins	10.57	0.026
48225	Houston	-	-
48227	Howard	12.06	0.037
48229	Hudspeth	-	-
48231	Hunt	5.28	0.013
48233	Hutchinson	-	-
48235	Irion	-	-
48237	Jack	10.00	0.026
48239	Jackson	-	-
48241	Jasper	10.57	0.026
48243	JeffDavis	-	-
48245	Jefferson	36.99	0.090
48247	JimHogg	-	-
48249	JimWells	10.60	0.029
48251	Johnson	10.57	0.026
48253	Jones	6.03	0.018
48255	Karnes	5.59	0.015
48257	Kaufman	10.57	0.026
48259	Kendall	10.60	0.029
48261	Kenedy	-	-
48263	Kent	-	-
48265	Kerr	10.60	0.029
48267	Kimble	-	-
48269	King	-	-
48271	Kinney	-	-
48273	Kleberg	-	-
48275	Knox	-	-
48277	Lamar	10.57	0.026
48279	Lamb	6.03	0.018
48281	Lampasas	-	-

FIPS	COUNTY	ANNUAL VOC (TPY)	OSD VOC (TPD)
48283	LaSalle	-	-
48285	Lavaca	-	-
48287	Lee	-	-
48289	Leon	10.57	0.026
48291	Liberty	5.00	0.013
48293	Limestone	5.59	0.015
48295	Lipscomb	6.03	0.018
48297	LiveOak	11.17	0.029
48299	Llano	-	-
48301	Loving	-	-
48303	Lubbock	36.19	0.111
48305	Lynn	-	-
48307	McCulloch	5.49	0.016
48309	McLennan	27.93	0.073
48311	McMullen	-	-
48313	Madison	10.57	0.026
48315	Marion	-	-
48317	Martin	-	-
48319	Mason	-	-
48321	Matagorda	5.28	0.013
48323	Maverick	10.98	0.031
48325	Medina	10.60	0.029
48327	Menard	-	-
48329	Midland	12.06	0.037
48331	Milam	10.57	0.026
48333	Mills	-	-
48335	Mitchell	-	-
48337	Montague	10.98	0.031
48339	Montgomery	39.99	0.103
48341	Moore	-	-
48343	Morris	5.28	0.013
48345	Motley	-	-
48347	Nacogdoches	5.28	0.013
48349	Navarro	10.57	0.026
48351	Newton	5.28	0.013
48353	Nolan	-	-
48355	Nueces	5.59	0.015
48357	Ochiltree	6.03	0.018
48359	Oldham	6.03	0.018
48361	Orange	5.28	0.013
48363	PaloPinto	10.00	0.026
48365	Panola	-	-
48367	Parker	5.28	0.013
48369	Parmer	12.06	0.037
48371	Pecos	6.03	0.018
48373	Polk	10.57	0.026
48375	Potter	24.12	0.074

FIPS	COUNTY	ANNUAL VOC (TPY)	OSD VOC (TPD)
48377	Presidio	-	-
48379	Rains	5.28	0.013
48381	Randall	6.03	0.018
48383	Reagan	-	-
48385	Real	-	-
48387	RedRiver	10.57	0.026
48389	Reeves	6.03	0.018
48391	Refugio	-	-
48393	Roberts	-	-
48395	Robertson	-	-
48397	Rockwall	-	-
48399	Runnels	6.03	0.018
48401	Rusk	5.28	0.013
48403	Sabine	-	-
48405	SanAugustine	-	-
48407	SanJacinto	-	-
48409	SanPatricio	11.17	0.029
48411	SanSaba	-	-
48413	Schleicher	-	-
48415	Scurry	12.06	0.037
48417	Shackelford	-	-
48419	Shelby	-	-
48421	Sherman	-	-
48423	Smith	26.42	0.064
48425	Somervell	-	-
48427	Starr	-	-
48429	Stephens	5.49	0.016
48431	Sterling	-	-
48433	Stonewall	-	-
48435	Sutton	6.03	0.018
48437	Swisher	-	-
48439	Tarrant	44.99	0.116
48441	Taylor	30.16	0.092
48443	Terrell	-	-
48445	Terry	-	-
48447	Throckmorton	-	-
48449	Titus	10.57	0.026
48451	TomGreen	6.03	0.018
48453	Travis	39.10	0.102
48455	Trinity	5.28	0.013
48457	Tyler	5.28	0.013
48459	Upshur	-	-
48461	Upton	6.03	0.018
48463	Uvalde	10.60	0.029
48465	ValVerde	5.49	0.016
48467	VanZandt	-	-
48469	Victoria	10.57	0.026

FIPS	COUNTY	ANNUAL VOC (TPY)	OSD VOC (TPD)
48471	Walker	10.57	0.026
48473	Waller	5.00	0.013
48475	Ward	6.03	0.018
48477	Washington	10.57	0.026
48479	Webb	32.94	0.093
48481	Wharton	5.28	0.013
48483	Wheeler	12.06	0.037
48485	Wichita	-	-
48487	Wilbarger	-	-
48489	Willacy	-	-
48491	Williamson	11.17	0.029
48493	Wilson	-	-
48495	Winkler	-	-
48497	Wise	21.14	0.052
48499	Wood	10.57	0.026
48501	Yoakum	-	-
48503	Young	10.98	0.031
48505	Zapata	-	-
48507	Zavala	-	-
Total		1,768.00	4.73

APPENDIXD

SampleCalculations–HarrisCounty

Sample Calculations for Harris County

1) VOC from Loading Racks

$$VOC_{LR} = VOC_{LR-Sum} + VOC_{LR-Win}$$

Where:

VOC_{LR}	= Annual VOC loading rack emissions (tons)
VOC_{LR-Sum}	= Summer VOC loading rack emissions (tons)
VOC_{LR-Win}	= Winter VOC loading rack emissions (tons)

$$VOC_{LR-Sum} = EF_{Cont-Sum} \times Q_{LR-Sum}$$

Where:

VOC_{LR-Sum}	= Summer VOC loading rack emissions (tons)
$EF_{Cont-Sum}$	= Summer VOC controlled loading rack emission factor (lbs/1000 gallons)
Q_{LR-Sum}	= Summer loading rack throughput (gallons)

$$EF_{Unc-Sum} = 12.46 \times \left(\frac{SPM}{T} \right)$$

Where:

$EF_{Unc-Sum}$	= Uncontrolled summer VOC loading rack emission factor (lbs/1000 gallons)
S	= Saturation factor (1.0)
P	= True vapor pressure (6.2 psia)
M	= Molecular weight of vapor (68 lb/lb-mole)
T	= 90°F (550°R)

$$EF_{Unc-Sum} = 12.46 \times \left(\frac{1.0 \times 6.2 \times 68}{550} \right) = \frac{9.55 \text{ lbs}}{1000 \text{ gal}}$$

$$EF_{Cont-Sum} = EF_{Unc-Sum} \times (1 - CF)$$

Where:

$EF_{Cont-Sum}$	= Controlled summer VOC loading rack emission factor (lbs/1000 gallons)
$EF_{Unc-Sum}$	= Uncontrolled summer VOC loading rack emission factor (lbs/1000 gallons)
CF	= Control factor from survey (0.13)

$$EF_{Cont-Sum} = \frac{9.55 \text{ lbs}}{1000 \text{ gal}} \times (1 - 0.13) = \frac{8.31 \text{ lbs}}{1000 \text{ gal}}$$

$$Q_{LR-Sum} = N_x \times Q_{LR-Tot} \times F_{Sum}$$

Where:

Q_{LR-Sum}	=Summerloadingrackthroughput(gallons)
N_x	=Numberoffacilitiesincounty x (HarrisCounty–33[adjusted CBPfacilitycount])
Q_{LR-Tot}	=Totalannualloadingrackthroughput(gallons)(431,230gallons fromsurveydata)
F_{Sum}	=Averagesummerthroughputfraction(53percent)

$$Q_{LR-Sum} = 33 \times 431,230 \text{ gal} \times 0.53 = 7,542,213 \text{ gal}$$

$$VOC_{LR-Sum} = \frac{8.31 \text{ lbs}}{1000 \text{ gal}} \times 7,542,213 \text{ gal} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = 31.34 \text{ tons VOC}$$

Similarly, $VOC_{LR-Win} = 27.50 \text{ tons VOC}$

$$VOC_{LR} = 31.34 \text{ tons VOC} + 27.50 \text{ tons VOC} = 58.84 \text{ tons VOC}$$

2) VOC from Storage Tanks

$$VOC_{ST} = VOC_{ST-Sum} + VOC_{ST-Win}$$

Where:

VOC_{ST}	=AnnualVOCstoragetankemissions(tons)
VOC_{ST-Sum}	=SummerVOCstoragetankemissions(tons)
VOC_{ST-Win}	=WinterVOCstoragetankemissions(tons)

$$VOC_{ST-Sum} = N_x \times T_N \times ER_{x-Sum}$$

Where:

VOC_{ST-Sum}	=SummerVOCstoragetankrackemissions(tons)
N_x	=Numberoffacilitiesincounty x (HarrisCounty–33[adjusted CBPfacilitycount])
T_N	=Numberoftankspersfacility(2fromsurveydata)
ER_{x-Sum}	=SummerpertankemissionsforHarriscountyusingS1TANKS modelprofile(1,409.71lbs)

$$VOC_{ST-Sum} = 33 \times 2 \times 1,409.71 \text{ lbs} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = 46.52 \text{ tons VOC}$$

$$VOC_{ST-Win} = N_x \times T_N \times ER_{x-Win}$$

Where:

VOC_{ST-Win} = Winter VOC storage tank crack emissions (tons)
 N_x = Number of facilities in county x (Harris County – 33 [adjusted CBP facility count])
 T_N = Number of tanks per facility (2 from survey data)
 ER_{x-Win} = Winter per tank emissions for Harris County using W1TANKS model profile (1,785.53 lbs)

$$VOC_{ST-Sum} = 33 \times 2 \times 1,785.53 \text{ lbs} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = 58.92 \text{ tons VOC}$$

$$VOC_{ST} = 46.52 \text{ tons VOC} + 58.92 \text{ tons VOC} = 105.44 \text{ tons VOC}$$

3) VOC from Equipment Leaks

$$VOC_{EL} = N_x \times \sum_c (n_c \times EF_c \times t_c)$$

Where:

VOC_{EL} = Annual VOC equipment leak emissions (tons)
 c = Equipment type c
 N_x = Number of facilities in county x (Harris County – 33 [adjusted CBP facility count])
 n_c = Number of equipment type c at each facility (from survey data; see table below)
 EF_c = Emission factor for equipment type c (see table below)
 t_c = Leaking time for equipment type c (assumed 8,760 hours/year)

Equipment Type	Number per Facility	TOC Emission Factor (kg/hour/component)
Valves	6	0.000043
Pumps	3	0.00054
Pressure Relief Devices	1	0.000043
Sampling Connections	1	0.000008
Open-Ended Lines	1	0.00013
Flanges	5	0.000008

It was assumed that all (100 percent) components leak and that TOC is equivalent to VOC.

$$\begin{aligned}
 VOC_{EL} &= 33 \\
 &\times \left\{ \left(6 \times \frac{0.000043 \text{ kg}}{\text{hr}} \right) + \left(3 \times \frac{0.00054 \text{ kg}}{\text{hr}} \right) + \left(1 \times \frac{0.000043 \text{ kg}}{\text{hr}} \right) \right. \\
 &+ \left. \left(1 \times \frac{0.000008 \text{ kg}}{\text{hr}} \right) + \left(1 \times \frac{0.00013 \text{ kg}}{\text{hr}} \right) + \left(5 \times \frac{0.000008 \text{ kg}}{\text{hr}} \right) \right\} \\
 &\times \left(\frac{8760 \text{ hrs}}{\text{yr}} \right) = 606.78 \text{ kg VOC} = 0.67 \text{ tons VOC}
 \end{aligned}$$

4) TotalVOC

$$VOC_{Total} = VOC_{LR} + VOC_{ST} + VOC_{EL}$$

Where:

VOC_{Total} = TotalVOCemissions(tons)

VOC_{LR} = LoadingrackVOCemissions(tons)

VOC_{ST} = StoragetankVOCemissions(tons)

VOC_{EL} = EquipmentleakVOCemissions(tons)

$$VOC_{Total} = 58.84\text{tonsVOC} + 105.44\text{tonsVOC} + 0.67\text{tonsVOC} = 164.95\text{tonsVOC}$$