

CHAPTER 4: DATA ANALYSIS

4.1 INTRODUCTION

Data analysis involves the assessment and characterization of environmental conditions, loadings, and trends. Vast amounts of ozone-related data have been collected in the BPA area. Converting this data into an understanding of ozone formation is the primary function of data analysis. In other words, data analysis turns *data into useful information*.

Ozone data analysis for the BPA area has focused on the underlying components of ozone formation, including the relationships among components. Projects will often divide data into study groups based on ozone exceedance versus nonexceedance days or hours. Components analyzed include:

- Levels and trends in ozone concentrations;
- The effects of wind patterns on ozone levels;
- Background ozone levels, including long range regional transport and local accumulation/carryover from the previous day; and
- Speciated VOC contribution to total reactivity.

Data analysis summaries, results, and conclusions involving these components of ozone formation are discussed in this chapter. More detailed information can be found in the appendices to this SIP. Refer to Appendix A: Conceptual Model of Ozone Formation in the BPA Ozone Non-Attainment Area; Appendix A.1: Conceptual Model Appendix; and Appendix A.2: NO_x and VOC Limitation Analyses.

The results from these projects build upon themselves, thus shaping and directing future work. As the body of knowledge on ozone formation in the BPA area increases, as data analysis is improved through an enhancement of methods and tools, and as strategic planning for future data analysis needs is expanded, more effective ozone control strategies can be developed.

4.2 LEVELS AND TRENDS IN OZONE CONCENTRATIONS

Levels and trends in the design value for ozone have been studied closely over the years in the BPA area. Additional monitors from the South East Texas Regional Planning Commission (SETRPC) monitoring sites have been used to calculate ozone design values since 2001.

Analysis of the 1-hour ozone design values indicates that values generally have improved from the 1980s up until 2003, although there has been much variation in this data. The 1-hour design values, for the most part, have exceeded the 1-hour standard over the 20-year period.

The 8-hour design value trend has remained fairly constant in the BPA area for roughly the last 20 years, although values have exceeded the 8-hour standard most of the time since the late 1980s. From 1998 to 2003, the design value has hovered closely above the standard. Refer to Figure 4.2-1 below for long-term trends in the one and 8-hour ozone design values for the BPA area. With the shift to the 8-hour standards, ozone data analysis projects have also shifted to focus on the underlying components of ozone formation over the longer time period.

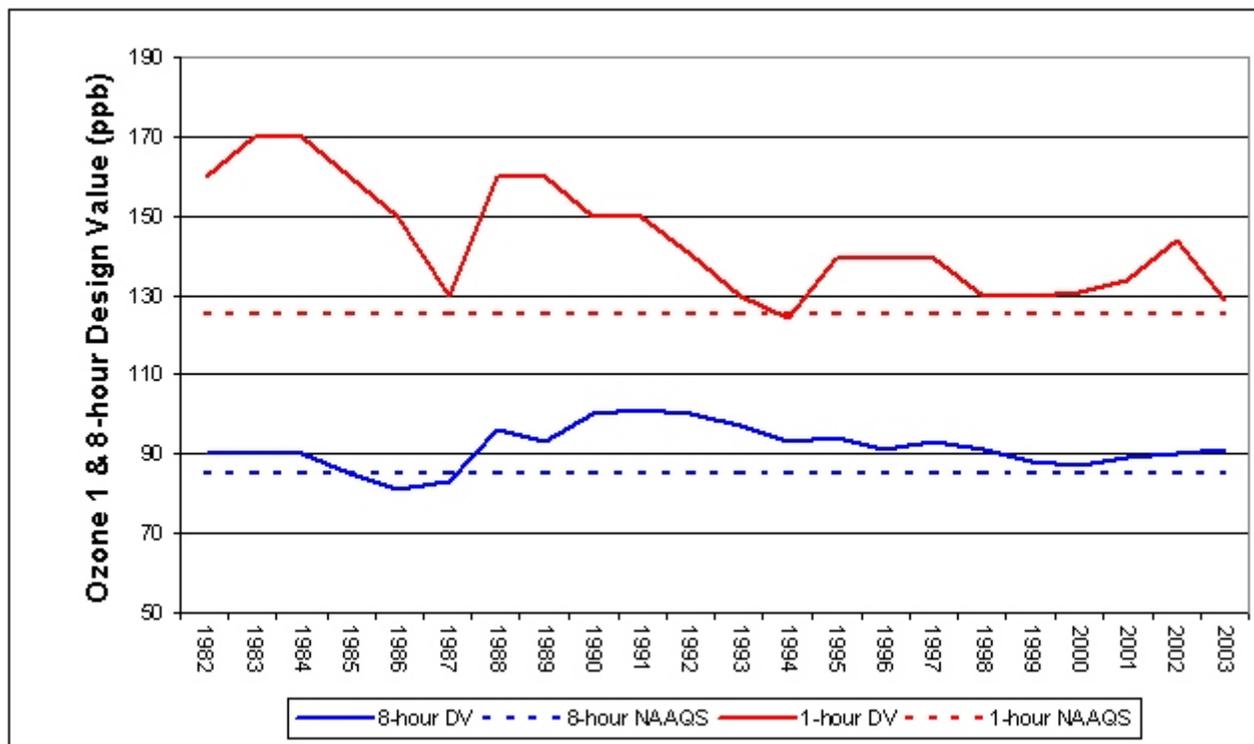


Figure 4.2-1 Ozone 1-Hour and 8-Hour Design Values for BPA (1982-2003)

A data analysis study¹ conducted on the number of exceedance days per year found that there was a general trend of fewer exceedances per decade from the 1970s to the 1990s. From 1972 to 1989, the number of 1-hour exceedance days ranged from zero in 1985 to as high as 49 in 1972. During the 1990s, the number of 1-hour exceedance days ranged from 0 to 17 days per year. The number of 8-hour exceedance days from 1997 to 2002 ranged from 6 to 15 days per year, with no clear trend pattern.

A temporal/spatial data analysis study² was conducted on ozone levels, including the time of the year, the day of the week, and the time of day when ozone levels are high, as well as the movement of high ozone levels through the area.

Results demonstrate that ozone exceedances occur primarily from March through October in the BPA area, and typically peak in late August and early September. An analysis of days of the week characterized by high ozone concentrations shows that there is no clear difference between week days and weekend days. This lack of difference indicates that precursors which do not vary with the day of the week, such as industrial emissions, contribute significantly to high ozone levels. Ozone peaks occur most frequently at 13:00 Local Standard Time (LST), while the most frequent time of ozone exceedances is between 12:00 noon and 15:00 LST.

In addition, the study found that the maximum 1-hour design value is just south of Port Arthur at the Sabine Pass SETRPC C640 monitor. In general, Jefferson County monitors all have experienced

exceedances. This spatial pattern of 1-hour design values may be due to the effects of the land/sea breeze flow reversals in the area. The movement of ozone through the BPA area can be explained further by wind patterns in the area.

4.3 EFFECTS OF WIND PATTERNS ON OZONE LEVELS

Several studies have examined the effects on ozone levels by wind patterns, including wind speed and direction. During the summer, high pressure typically persists over the southern U.S., often leading to stagnant conditions and weak pressure gradients in southeast Texas. In the BPA area, there are persistent sea breezes along the coastline, land-sea breeze flow reversals, and often a daily rotation of the winds. In addition, the influence of subsidence inversions, which reduce vertical mixing in the atmosphere, tend to trap and concentrate pollutants near the surface.

Surface winds provide an indication of the importance of local emission sources on air quality, while upper level, or transport, winds reveal the influence of regional scale emissions on air quality. Wind speeds are usually stronger at higher altitudes, and wind directions may shift with altitude.

High ozone days are generally characterized by morning winds from the northwest and winds from the southwest in the afternoon³. Low ozone days are generally associated with southerly wind flows throughout the day. During the morning on low ozone days, the surface wind speeds tend to be relatively high compared to high ozone days. The frequency of stagnated winds on high ozone days is much greater than on low ozone days.

These wind patterns play a direct role in ozone background levels, including the recirculation of local concentrations that therefore accumulate, as well as through the long-range regional transport of ozone.

4.4 BACKGROUND LEVELS AND TRANSPORT OF OZONE

By far, the most recent data analysis work for the BPA area has focused on background levels and transport of ozone. Perhaps the most difficult part in characterizing background ozone is separating the ozone levels that are transported long distances from those levels that are due to the recirculation, accumulation, or previous-day carryover of locally generated ozone.

Background levels of ozone in the BPA area during 8-hour ozone exceedance days typically exceed 40 ppb. In one instance, background levels arriving at the Sabine Pass monitoring station from offshore were greater than 85 ppb, and exceeded 80 ppb for 28 consecutive hours. Understanding the sources of these background levels is critical to the development of any control strategies.

A major data analysis study⁴ was undertaken to determine the effects of background ozone levels on local concentrations. Refer to Appendix A for more detailed information. This study used additional analysis tools to evaluate 1-hour and 8-hour exceedances occurring in BPA from 1998-2002. These additional analysis tools were primarily used to assess air parcel movement. In addition, time series of 5-minute ozone data were reviewed. Each tool uses different inputs and methods, and has different benefits and limitations; therefore, the results presented here are actually a composite of all the results.

4.4.1 Analysis Tools

Two primary tools were used to assess air parcel movement: a forward plume/puff sequence model that uses surface CAMS meteorological data for input, and back trajectories using the NOAA HYbrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model.

The forward plume/puff sequence model was developed by TCEQ and uses surface winds from all the CAMS monitoring stations in the area. The model releases a “puff” each hour from selected sources, and moves it downwind each hour based on that hour's wind speed and direction. The model is typically run on a day by day basis, with particles/puffs being emitted starting at midnight and continuing forward until 10 p.m. or midnight of the following day. The puffs are connected to show the path of the plume over each hour. This approach does not grow or disperse the puffs, nor does it indicate the magnitude of the emissions. Each hour's set of plumes can be animated to show the forward movement of the plumes. The plume/puff sequence model is dependent on surface meteorological stations, and for the areas without local monitors, the model interpolates data from distant sites, resulting in measurement errors that could be as much as ± 10 degrees. However, the animated hourly images generated from model results provide general source regions and transport patterns.

Back trajectories were developed using the HYSPLIT model, which uses Eta Data Assimilation System (EDAS) fields, and are based on 40 km-spaced grid points. Therefore, these HYSPLIT analyses may be a good indicator of large scale (for example, synoptic) flow, but may not be able to capture subtle meso- and micro-scale flows. HYSPLIT can show a general upstream pattern, but may not be the best possible tool for assessing source culpability.

Time series of 5-minute ozone data were also reviewed to help describe day-specific upwind stations, background ozone, plus local and transported contributions of ozone.

4.4.2 Analysis Results

This data analysis study analyzed 23 1-hour exceedance days and 56 8-hour exceedance days in the BPA area from 1998-2002 based on the various meteorological regimes affecting ozone in BPA. These regimes are:

- Local (BPA only)
- Transport from Houston/Galveston
- Local plus Houston/Galveston
- Lake Charles
- Local plus Lake Charles
- Gulf on-shore flow.

Local meteorological conditions are characterized by low or calm wind speeds with less than three knots or nautical miles/hour winds. Since high ozone usually occurs by 16:00 hours, a ten-hour back trajectory from this time that indicates winds do not leave a circle of a 30 nautical mile radius ($3 \text{ knots} * 10 \text{ hours} = 30 \text{ nautical miles}$) from a BPA monitor recording an exceedance is considered to be local conditions.

Conversely, ten-hour back trajectories from 16:00 hours that crossed the 30 mile radius were considered to be transported from an upwind source region. For our analyses, the transport source regions of interest were Houston/Galveston, and to a lesser extent, Lake Charles, Louisiana.

Maritime flow consists of cases where the wind flow comes in from the Gulf of Mexico and over the previous 10+ hours does not seem to lead back to any sources on land. The source may be areas along the Gulf Coast in other states, such as Mississippi, or even further inland.

Combination cases (Local plus Houston/Galveston, Local plus Lake Charles) are much more difficult to identify. That is, one may look at a trajectory, a plume sequence, and an ozone time series and not be able to ascertain whether an exceedance was solely due to local conditions, or local conditions superimposed upon ozone transported in high background.

Results from this study can be found in Tables 4-1 and 4-2 below. Results indicate that the majority of high ozone events in BPA can be attributed to recirculation of local emissions as well as transport of ozone and ozone precursors from the Houston/Galveston/Brazoria (HGB) area. In addition, during high ozone events, background concentrations are generally high and contribute significantly to Beaumont ozone events.

The 1-hour and 8-hour exceedance data based on source region vary significantly. For the 1-hour data, the impact from HGB transport plays a greater role than does the 8-hour data. For the 8-hour data, local emissions contribute the majority to exceedances. The fact that HGB transport affects 1-hour exceedances more than it does 8-hour exceedances, and 8-hour exceedances are affected by local emissions, has an impact on control strategies.

**Table 4-1
BPA Area 1-hour ozone exceedances, 1998-2002**

Source Region	# of Cases	Percentage
Local (BPA)	6	28.5%
HGB Transport	5	21.7
Local + HGB	5	21.7
Maritime	2	8.7
Lake Charles	1	4.3
BPA + Other Out-of-State	1	4.3
Other Regional/Out-of-State	3	13.0
Total	23	100%

**Table 4-2
BPA Area 8-hour ozone Exceedances, 1998-2002**

Source Region	# of cases	Percentage
Local (BPA)	31	55%
HGB transport	10	18
Local + HGB	2	4
Maritime	3	5
Lake Charles	5	9
Local + Lake Charles	5	9
Total	56	100%

4.5 CONTRIBUTION OF SPECIATED VOCs

The importance of VOCs to ozone formation has been well established. A data analysis study⁵ was conducted to determine which VOC compounds contribute the most to ozone formation in the BPA area, and to determine trends in these VOCs over the last five years. Refer to Appendix A for more detailed information.

Surface level VOC data in the BPA area is collected at seven TCEQ monitoring stations and six SETRPC (Southeast Texas Regional Planning Commission) stations. This VOC data is collected in canisters in 24-hour composite samples.

VOC reactivity was determined using a metric called the MIR, or maximum incremental reactivity scale. The MIR is a measure of the number of grams of ozone that can be formed from the addition of one gram of the subject VOC, under ideal conditions. In order to determine which VOCs are significant, the concentration of each compound was multiplied by the MIR to convert to a reactivity-weighted concentration, which is called the effective MIR. Effective MIR reactivities take into consideration a compound's capability of forming ozone as well as its measured ambient concentration.

The VOCs that are measured are typically grouped into common categories. The median effective MIR for each group is determined by summing the compounds in the category. Total effective MIR reactivity is calculated by summing the effective MIRs for each group.

For over half of the canister samples in the BPA area, either propylene or ethylene is the top contributor to effective reactivity, and 8 of the 13 monitors contain both propylene and ethylene in the top four compounds. Butadiene was the largest fraction of the effective reactivity at Port Neches for both the TCEQ and the SETRPC sites. The compound group, xylenes, were a large contributor to the total effective reactivity at two monitors. Butanes, butenes, pentanes, and pentenes were also significant contributors to reactivity at several of the sites.

VOC trends were examined using median reactivity changes in each compound group. Overall, a gradual decline in total reactivity can be seen at most of the monitor sites in the BPA area. This decrease in

overall median reactivity indicates a decrease in concentrations of certain compounds from 1997 to 2001. Refer to Appendix A.1 for more detailed information on trends by monitor.

In addition to surface level air quality monitoring, there have been 18 air quality measurement flights in the BPA area⁶ by TCEQ-contracted aircraft since 2001. Currently, data from these flights is in different stages of development and analysis. As for VOCs, there are canister samples from three flights for which a detailed reactivity analysis has been completed. The primary focus of these three flights was to study emissions from industrial point sources. Of the 20 different sampling locations, there were three locations with high effective MIR reactivity. These three high effective reactivity locations were downwind of industrial point sources and were all sampled on February 17, 2003. This day was a nonexceedance day. Ethylene, propylene, and other alkenes represent a large fraction of the reactivity for the high reactivity canisters. Other compounds, such as the alkanes, butanes, and pentanes, also contributed to the effective reactivity. The most reactive canister contained large portions of trimethylbenzenes, aromatics, ethyltoluenes, toluene, and xylene compounds.

The VOC effective reactivity results obtained from the aircraft canister data and the surface level VOC monitoring data are similar and corroborate one another. If the results of different studies using different data sources concur, then greater confidence in the results may exist.

Other flights that have been conducted in the BPA area were designed to study not only industrial point source emissions, but ozone transport and local ozone production as well. Data from these flights is currently being developed and analyzed. Future sampling missions in the BPA area will examine regional transport of ozone and particulate matter and their precursors, out-of-state transport, and industrial point source emissions.

New data on speciated VOCs is currently being collected at the SETRPC Jefferson County Airport monitoring site. This data is collected hourly through the use of an automated gas chromatograph (auto GC). The VOC auto GC data collected in 2003 and 2004 has not yet been validated, and therefore is not part of this report. Future work will study this data to determine which VOCs contribute the most to reactivity and ozone formation in the BPA area.

Another data analysis study⁷ was conducted on NO_x and VOC limitations in the BPA area. Refer to Appendix N for more detailed information. Understanding where and when ozone formation is limited by VOC or NO_x will help to determine ozone control strategies.

This analysis used the MAPPER (Measurement-based Analysis of Preferences in Planned Emissions Reductions) program for determining NO_x or VOC limitation at six monitors in the BPA area. MAPPER uses the Smog Production (SP) algorithm to approximate where and when peak ozone concentrations are limited by the availability of VOC radicals or nitrogen oxides. Since the SP algorithm uses ambient data, the accuracy of its results depends greatly on the accuracy of the input data. This analysis includes the concentrations of ozone, nitric oxide (NO), and either NO_x (NO₂ + NO) or NO_y (NO₂ + NO + nitrate radicals and other oxidized nitrogen products). The SP algorithm calculates the extent of reaction and determines if an area is NO_x limited, VOC limited, or transitional, meaning that the area could have either limitation. Results of this study indicate that the median extent of reaction for BPA at five of the monitors was transitional for each year from 2000 through 2002. Only one monitor was NO_x limited during this time period. This monitor, Sabine Pass, was NO_x limited in 2000 and 2001, but was calculated to be transitional in 2002.

4.6 FUTURE WORK

The results from these projects build upon themselves, thus shaping and directing future work. Strategic planning for future data analysis studies is continually reevaluated as new information becomes available. Some new information for BPA may be obtained from some of the data analysis projects planned for the Houston area. These Houston projects may simultaneously provide relevant information for BPA due to the ozone/VOC relationship between the two areas, and the fact that some Houston studies may necessarily have a larger geographic scope that encompasses the BPA. Future activities for BPA may include, but are not limited to, the following projects.

4.6.1 Determination of Background Levels and Transport of Ozone

Some of the most complex data analysis projects already completed for the BPA have dealt with characterizing background ozone levels by working to separate those levels that are transported long distances from those levels that are due to the recirculation, accumulation, or previous-day carryover of locally generated ozone. Future work will continue these studies on air parcel movement with a focus on characterizing 8-hour ozone levels.

4.6.2 Determination of Speciated VOCs Contribution to Airmass Reactivity

Different VOCs have been shown to contribute differently to airmass reactivity. A new automated gas chromatograph monitor started collecting VOC data in July, 2003, providing a new data source to determine which VOCs contribute the most to reactivity and ozone formation. Different VOC data sources, such as canister data, automated gas chromatograph data, and aircraft flight data, will continue to be used to provide multiple perspectives for analyses corroboration purposes. The relationship between total airmass reactivity and exceedance versus nonexceedance days are also important topics for further study.

4.6.3 Study of 8-hour Exceedance Days

Recent studies to determine where and when ozone formation is limited by VOC or NO_x will help to evaluate 8-hour ozone exceedances and control strategies. Current studies indicate that the area is transitional between VOC and NO_x limitations. Work to track trends in these limitations will continue as new data is collected. In addition, the variability of VOC emissions, such as from industrial emission events, and the specific mix of VOCs emitted, may also be good predictors of exceedance days.

4.6.4 Other Projects

The TexAQS 2005 study will provide comprehensive data that can be analyzed to verify emissions inventories, investigate episodes and events, determine VOC reactivity, and study pollutant transport, such as the ozone/VOC relationship between the Houston and Beaumont areas. In addition, data analysis projects can be designed and conducted to evaluate SIP control strategies.

4.7 CONCLUSIONS

Data analysis in the Beaumont/Port Arthur area has focused on the underlying factors of ozone formation, including the relationships among these factors. Ambient data has been used to track trends in ozone levels, determine the effects of wind patterns on ozone levels, distinguish between levels of ozone transport and ozone generated locally, identify locally generated ozone that accumulates and recirculates, and evaluate and characterize the contribution of speciated VOCs to total reactivity.

The body of knowledge on ozone formation in BPA continually increases through the collection of additional data and the completion of new data analysis studies. For example, future work will study the

new auto GC data to determine which VOCs contribute the most to reactivity and ozone formation.

The commission continues to develop new data analysis methods and tools to meet these challenges. One new method currently under development is a way to measure ozone trends after filtering out the effects of meteorology. Strategic planning of future data analysis studies is also underway. Data analysis is being streamlined to increase efficiency and more directly focus on needs. These data analysis improvements will help to support the development of better control strategies.

4.8 BIBLIOGRAPHY

1. ENVIRON International Corporation and the University of Texas at Austin Center for Energy and Environmental Resources. *Conceptual Model of Ozone Formation in the Beaumont/Port Arthur Ozone Non-Attainment Area*. November 15, 2002. Appendix A.
2. ENVIRON International Corporation and the University of Texas at Austin Center for Energy and Environmental Resources. *Conceptual Model of Ozone Formation in the Beaumont/Port Arthur Ozone Non-Attainment Area*. November 15, 2002. Appendix A.
3. ENVIRON International Corporation and the University of Texas at Austin Center for Energy and Environmental Resources. *Conceptual Model of Ozone Formation in the Beaumont/Port Arthur Ozone Non-Attainment Area*. November 15, 2002. Appendix A.
4. Red, J., Z. Fang, Breitenbach, P., J. Neece, B. Lambeth. *Beaumont-Port Arthur Conceptual Model*. March, 2004. Appendix A.1.
5. Fang, Z., S. McDowel. *Analysis of Canister Data for the Beaumont-Port Arthur Area*. May 30, 2003. Appendix A.1.
6. Boyer, D. *Beaumont Flight Data and Analysis Summary*. March 5, 2004. Appendix A.1.
7. Fang, Z. *An Analysis of NO_x and VOC Limitations in the Beaumont-Port Arthur Area with MAPPER*. March, 2003. Appendix A.2.

CHAPTER 5: REQUIRED CONTROL STRATEGY ELEMENTS

5.1 POINT SOURCE NO_x CONTROL STRATEGY

The ozone control strategy for the BPA area has focused primarily on NO_x emission reductions from stationary point sources due to the relatively large contributions from this sector of the inventory. Over the last decade, the commission has adopted progressively more stringent regulations in Chapter 117 for the control of NO_x. The following description summarizes the Chapter 117 rulemaking history to date for the BPA area.

In response to requirements of the FCAA, the commission adopted NO_x RACT rules effective June 9, 1993 in Chapter 117, "Control of Air Pollution from Nitrogen Compounds." These requirements applied to electric utility boilers, industrial boilers and process heaters, gas turbines, rich-burn stationary gas-fired internal combustion engines, nitric acid plants, and adipic acid plants in the BPA area., and had a compliance date of November 15, 1999.

On October 27, 1999 the commission adopted "Phase I" of the state's NO_x rulemaking activities for the BPA attainment demonstration. As part of that SIP revision, the commission adopted VOC rules for batch process and industrial wastewater sources and NO_x rules for lean-burn engines. Compliance with the Phase I rules was required by November 15, 2001.

"Phase II" of the state's NO_x rulemaking activities for the BPA attainment demonstration was adopted by the commission on April 19, 2000. These rules required further NO_x reductions from electric utility power boilers (approximately 50% reduction) and from industrial boilers and process heaters (approximately 20% reduction). The schedule set forth in the rules for the Phase II reductions requires two-thirds of the reductions to be achieved by May 1, 2003, and the remaining one-third to be achieved by May 1, 2005.

5.2 OTHER ELEMENTS OF THE CONTROL STRATEGY

In addition to reductions from point sources, the ozone control strategy for BPA includes reductions realized from various Federal standards for onroad and nonroad sources. The onroad mobile source control strategies consist of FMVCP, Tier I, NLEV, and onroad HDD, and the nonroad strategies consist of locomotives, nonroad HDD, small engines, and recreational marine engines.

5.2.1 Portable Fuel Container Rule

A statewide portable fuel container rule is being adopted concurrently with this SIP revision. The new rule establishes new requirements relating to the design criteria for portable fuel containers and portable fuel container spouts. The new rules establish design criteria for "no-spill" portable gas cans based in large part on the CARB standards. Effective December 31, 2005, these new rules will limit the type of portable fuel containers and portable fuel container spouts sold, offered for sale, manufactured, and/or distributed in the State of Texas. Fuel released into the environment can lead to the contamination of both the state's air and water. These rules will ensure that portable fuel containers manufactured under these standards will release fewer amounts of fuel as the result of spillage and evaporation.

5.2.2 Voluntary Incentive Program-TERP

In 2002 the 77th Texas Legislature passed Senate Bill 5 which established the Texas Emission Reduction Plan (TERP). The bill provided funding mechanisms for the program and the state anticipated that about

\$133 million in new fees would be collected to fund the emission reductions contemplated. The major funding source, a tax on out-of-state vehicle registrations, was found to be in violation of the commerce clause of the Fourteenth Amendment of United States Constitution and Article I. Section 3 of the Texas Constitution. See H.M. Dodd Motor Co. Inc. and Autoplex Automotive, LP. v. Texas Department of Public Safety, et al., Cause No GNID2585(200th Judicial District Court, Travis County, February 21, 2002). The 78th Texas Legislature passed House Bill 1365, which restored funding the TERP program through an alternative funding mechanism.

House Bill 1365 imposes a fee on the delivery of undyed diesel fuel in order to adequately fund the TERP program. Funding is expected to total approximately \$150,000,000 per year statewide. The legislature also allocated funds to this program for other affected areas of the state, including the three counties comprising the BPA ozone nonattainment area.

The first emissions reduction incentive grant projects funded under the TERP were for fiscal years 2002 - 2003 (September 1, 2001 through August 31, 2003). The funds available for award under the grants program were substantially less than the \$130 million originally expected due to the loss of funding from the primary funding mechanism. Revenue generated for the TERP program was only \$20.5 million per fiscal year, with approximately \$14 million per fiscal year available for emission reduction incentive grants. As a result, applications were only accepted for projects in the HGB and DFW nonattainment areas.

The TERP was enhanced in 2003 through the enactment of House Bill 1365 by authorizing funding for projects that include stationary engines and equipment that use fuels other than diesel and restoring adequate funding to the program. Projected revenue for the TERP is expected to average about \$140 million per fiscal year through FY 2008. The Emissions Reduction Incentive Grants Program is allocated 87.5% of that total, or about \$120.5 million per fiscal year.

To date, the program has awarded over \$44.2 million to 120 grant projects, which are projected to result in NO_x reductions of over 7,535 tons, at an average cost per ton of NO_x reduced of \$5,800. In the BPA area, the projects funded to date are projected to result in NO_x reductions of over .0991 tpd in 2007.

For information on recent TERP activities, please visit the following web site:
<http://www.tnrcc.state.tx.us/oprd/sips/terp.html>

The NO_x reductions achieved for the BPA attainment demonstration are summarized in Table 5-1 below.

**Table 5-1
NO_x Reduction Estimates**

EPA-ISSUED RULES		2007 Projected tpod	Reduction, tpod
FMVCP, Tier I, NLEV, on-road HDD		35.61	6.4
Locomotive engines		5.24	1.89
Non-road HDD		28.42	7.73
Small engines		0.49	-0.48
Recreational marine engines		0.13	-0.1
Subtotal		68.69	15.44
 STATE-ISSUED RULES			
	<u>Compliance date</u>		
<u>NO_x RACT rules:</u>	11/15/99 (except lean-burn engines)		6.10
Electric utility boilers			
Industrial boilers			
Industrial process heaters			
Gas turbines			
Rich-burn engines			
Lean-burn engines	11/15/01		6.80
<u>Attainment demonstration</u>			
<u>NO_x rules:</u>			
Electric utility boilers	2/3 reductions by 5/1/03		62.19
Industrial boilers	Remaining 1/3 reduction by		
Industrial process heaters	5/1/05		
Gas turbines			
Subtotal		170.51	75.09
TOTAL		239.20	90.53

CHAPTER 6: FUTURE ATTAINMENT PLANS

The commission plans to address the remaining elements of the 1-hour and 8-hour ozone attainment demonstrations not included in the current adoption as follows:

1-Hour Attainment Demonstration

The commission will consider a subsequent SIP revision to address RACT for major sources in the BPA area. The rule for batch processing (Chapter 115, Subchapter B, Division 6: Batch Processes, Subpart 115.167, relating to Exemptions) sets an exemption level of 100 tons per year VOC, based on all stationary sources included in an account. The commission will consider an amendment to the rule to lower the exemption level to 50 tons per year to meet federal requirements for RACT. The FCAA states that RACT should be implemented as expeditiously as practicable.

The commission will consider a RACM analysis of available NO_x and VOC control measures that can be adopted and implemented in time to advance the attainment date from 2007 to an earlier date. Given that it generally takes 18 months to 2 years lead time prior to an effective date for a rule and nine months or longer for the rule process, it is unlikely that any additional measures will meet this test. Analysis conducted to date have not yielded any candidate control measures.

8-Hour Attainment Demonstration

This 8-hour attainment demonstration SIP makes use of the options provided to states in EPA's 8-hour ozone implementation rule. Phase 1 of the EPA rule, which was published in the April 30, 2004 *Federal Register*, provides flexibility to states in transitioning from the 1-hour to the 8-hour standard. EPA plans to issue Phase 2 rules concerning RFP, requirements for modeling and attainment demonstrations, RACM and RACT. Since the BPA area is a marginal area for 8-hour ozone, many of the activities previously discussed should address many of the issues contained in Phase II of the rule. TCEQ will work expeditiously to obtain approval of the SIP.

6.1 FUTURE INITIATIVES

The TCEQ continues to move forward with technology research and development and building the science for ozone modeling and analysis. These initiatives will be beneficial to improving air quality in Texas.

New Technology Research and Development (NTRD) Program

The TCEQ's NTRD Program provides incentives to encourage and support research, development and commercialization of technologies that reduce pollution in Texas. The program was formed as the result of legislative requirements for the TCEQ to take over the functions of the Texas Council on Environmental Technology (TCET). The primary objective of the NTRD Program is to promote commercialization technologies that will support projects that are eligible for funding under the TERP Emissions Reduction Incentive Grants Program. The NTRD Program will also work to streamline and expedite the process through which the TCEQ and the EPA provide recognition and SIP credit for new, innovative and creative technological advancement. This program will help spur the entrepreneurial and inventive spirit of Texans to help develop new technologies to assist in solving Texas' air quality problems.

TexAQS 2000 II

The Texas 2000 Air Quality Study, the most comprehensive and successful air quality study conducted to date in the U.S., with over 40 research organizations and over 250 scientists, has provided and will continue to provide a large part of the scientific basis for reassessing the ozone problem in the HGB and BPA ozone nonattainment areas. The second phase of this study, TexAQS II, is scheduled for 2005 and 2006 and will include the eastern half of Texas. The pre-study work has already begun and will continue through 2004. The meteorological, pollutant concentration, and transport data will be collected from May 2005 through October 2006 with the intensive field study period lasting from August to September 2006. The TCEQ will be heavily involved in this research in order to improve regulatory analysis and prediction tools used for developing ozone SIPs. The study will assess formation and accumulation of ozone, year-round air pollution meteorology, and inventories of ozone. Research will also be conducted on ozone transport into, within, and out of Texas. For more information on the TexAQS 2000, please see the following web site:

<http://www.utexas.edu/research/ceer/texaqs/>

The commission has a long history of supporting enhancements to air quality models and associated applications and input data. These endeavors are critical to supporting SIP development for Texas areas and will continue to be a top priority. The commission is committed to working in cooperation with the regulated community, academia, research consortiums, and others to ensure that the modeling used to develop effective control strategies will use the most current scientific methodologies and information to replicate high ozone episodes in a given area.

Because the level of scientific knowledge is constantly evolving, a comprehensive description of ongoing or planned research projects is not provided at this time. However, the TCEQ does maintain a catalog of projects relevant to Texas, which is available at the following web site:

http://www.tceq.state.tx.us/air/aqp/airquality_science.html