Neighborhood Air Toxics Modeling Project
For
Houston and Corpus Christi
Case # 2:11-MC-00044

Phase 1B
Monitoring Network Extension

Quarterly Report for the Period

January 1, 2014 through March 31, 2014

Submitted to

The Honorable Janis Graham Jack
United States District Court for the Southern District of Texas
Corpus Christi, Texas

Ms. Kathleen Aisling
United States Environmental Protection Agency, Region 6
Dallas, Texas

Ms. Susan Clewis
Texas Commission on Environmental Quality, Region 14
Corpus Christi, Texas

Submitted by

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I. Introduction

On February 1, 2008, the United States District Court entered an Order (D.E. 981, Order (pp.1, 7-11)) regarding unclaimed settlement funds in Lease Oil Antitrust Litigation (No.11) Docket No. MDL No.1206. The Court requested a detailed project proposal from Dr. David Allen, the Gertz Regents Professor in Chemical Engineering and the Director of the Center for Energy and Environmental Resources at The University of Texas at Austin (UT Austin), regarding the use of $9,643,134.80 in the Settlement Fund. The proposal was for a project titled "Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi" (hereinafter "Air Toxics Project"). The Air Toxics Project was proposed in two stages. In Stage 1, UT Austin was to develop, apply, demonstrate and make publicly available, neighborhood-scale air quality modeling tools for toxic air pollutants in Corpus Christi, Texas (Phase 1A) and extend the operation of the air quality monitoring network in Corpus Christi, Texas (Phase 1B). The ambient monitoring results were to be used in synergy with the neighborhood-scale models to improve the understanding of emissions and the spatial distribution of air toxics in the region.

On February 21, 2008, the United States District Court for the Southern District of Texas issued an order to the Clerk of the Court to distribute funds in the amount of $4,586,014.92, plus accrued interest, to UT Austin for the purposes of implementing Stage 1 of the Air Toxics Project as described in the detailed proposal submitted to the Court by UT Austin on February 15, 2008 (D.E. 998).

Under the Order to Distribute Funds in MDL No. 1206, on March 3, 2008, at the direction of the Settlement Administrator, $4,602,598.66 was disbursed to UT Austin for Stage 1 of the Project. This amount includes the interest accrued prior to distribution from the MDL No. 1206 Settlement Fund.

In Stage 2, subject to the availability of funds, it was planned that UT Austin would extend the modeling to the Houston, Texas ship channel region, develop a mobile monitoring station that could be deployed in Corpus Christi and in other regions of Texas and/or further extend the operating life of the existing stationary network in the same or a modified spatial configuration. Based on the decision of the U.S. Court of Appeals for the 5th Circuit on June 27, 2011, UT Austin will not be receiving the Stage 2 funding at any point in the future. Further, work on the modeling portion of Stage 1 (Phase 1A) was completed June 30, 2011. Hence, all future progress reports will describe only work on Stage 1 Phase 1B (extending the operation of the air quality monitoring network).

The air quality monitoring network was originally authorized on October 1, 2003, when the United States District Court for the Southern District of Texas issued an order to the Clerk of the Court to distribute funds in the amount of $6,700,000, plus interest accrued, to The University of Texas at Austin (UT Austin) to implement the court ordered condition of probation (COCP) project *Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation* (Project). Those funds have been expended. Funding for the air quality monitoring network originally created for the COCP Project is now provided through Stage 1 Phase 1B of the Air Toxics Project.

This Stage 1 Phase 1B quarterly report has been prepared pursuant to the requirements of the Air Toxics project and is being submitted to the United States District Court, the United States Environmental Protection Agency (EPA), and the Texas Commission on Environmental Quality (TCEQ).

II. Air Toxics Project – Stage 1 - Phase 1B Overview

Phase 1B of the project reserved approximately 65% of the initial Stage 1 project funds, or approximately $3 million, to extend the operation of the Corpus Christi ambient air monitoring network. Under Phase 1B, the project team will use these funds to continue the operation and maintenance of the monitoring network initiated under the Corpus Christi Air Monitoring and Surveillance Camera Project.

III. Air Toxics Project – Stage 1 – Phase 1B Progress Report

The focus of work during the quarter ending March 31, 2014, has been directed to the following activities funded by the Stage 1 Phase 1B extension of the Corpus Christi Air Monitoring network.

A. Operations and Maintenance Phase of the Project

A detailed description of the data analyses for this quarter appears in Appendix A, pages 8 through 33, and a summary of these analyses appears in this section.

The Project currently consists of a network of six (6) air monitoring stations with air monitoring instruments and surveillance camera equipment. A map showing locations of the COCP Project monitoring sites along with TCEQ sites appears in Figure 1, on page 4. Table 1, on pages 4 and 5, identifies the location and instrumentation found at each of the COCP Project sites. TCEQ sites and some of the sites farther from the COCP area than the TCEQ sites, operated by Texas A&M at Kingsville (TAMUK), provide additional data used in these analyses.

Figure 1. Corpus Christi Monitoring Sites, "X" marks site terminated in 2012

Table 1. Schedule of Air Monitoring Sites, Locations and Major Instrumentation

TCEQ CAMS#	Description of Site Location	Monitoring Equipment				
		Auto GC	TNMHC (T) / Canister (C)	H_2S & SO_2	Met Station	Camera
634	Oak Park Recreation Center (**OAK**)	Mar 2005 to date	C: Dec 2004 to Feb 2009 T: Dec 2004 to Apr 2012		Dec 2004 to date	
629	Grain Elevator @ Port of Corpus Christi (**CCG**)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date	
630	J. I. Hailey Site @ Port of Corpus Christi (**JIH**)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date	
635	TCEQ Monitoring Site C199 @ Dona Park (**DPK**)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date	Jan 2005 to date
632	Off Up River Road on Flint Hills Resources Easement (**FHR**)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date	
633	Solar Estates Park at end of Sunshine Road (**SOE**)	Mar 2005 to date	C: Dec 2004 to Feb 2009 T: Dec 2004 to Apr 2012	Dec 2004 to date	Dec 2004 to date	Jan 2005 to date

631	*Port of Corpus Christi on West End of CC Inner Harbor (**WEH**) (terminated)*		T&C: Dec 2004 to May 2012	Dec 2004 to May 2012	Dec 2004 to May 2012	

Table 1 (Continued)
Legend

CAMS	continuous ambient monitoring station
Auto GC	automated gas chromatograph
TNMHC	total non-methane hydrocarbon analyzer (all except CAMS 634 & 633 also have canister hydrocarbon samplers)
H_2S	hydrogen sulfide analyzer
SO_2	sulfur dioxide analyzer
Met Station	meteorology station consisting of measurement instruments for wind speed, wind direction, ambient air temperature and relative humidity
Camera	surveillance camera

A discussion of data findings for the quarter appears in Appendix A, pages 8 through 33. Specifically, the appendix contains the following elements:

- **Auto-GC Data Summary –** In examining the validated fourth quarter of 2013 hourly auto-GC data from Oak Park, Solar Estates, and TCEQ's Palm sites, no individual measurements were found to have exceeded a short-term air monitoring comparison value (AMCV). The validated fourth quarter average concentrations were below each compound's long-term AMCVs. For first quarter 2014 data, the preliminary values were also below respective AMCVs. A summary of data appears in Appendix A, pages 13 through 25. In examining all the data over the course of the project, it does appear that for several hydrocarbon species mean concentrations are higher in 2014 than in recent years.

- **Benzene Summary** – A review of nine years of data is presented, with focus on the first quarter's average concentrations from 2006 (first quarter 2005 had only one month of data) through 2014, appears in Appendix A, pages 26 through 29.

- **Analysis of Sulfur Dioxide at Several Sites** – The JIH CAMS 630 site had measured concentrations high enough and often enough to violate the SO_2 annual National Ambient Air Quality Standards (NAAQS), but concentrations have declined since mid-2012. At the Solar Estates CAMS 633 site, a suspected interferent chemical under southeast winds has resulted in recorded SO_2 measurements above the level of the NAAQS, but the site stopped recording elevated SO_2 from the southeast in late December 2013. Trends from various CAMS sites are examined. These issues are expanded upon in Appendix A, pages 29 through 33.

B. Scheduled Meetings of the Volunteer Advisory Board

The Corpus Christi Project Advisory Board met on April 3, 2014. The meeting notes from that Advisory Board Meeting are found in Appendix B, pages 34 through 36.

C. Project Management and Planning

Project Management and Planning during this period has focused on the following four (4) major activities.

1. **Air Monitoring Operations**
   Operations and maintenance of the six monitoring sites reporting data via the TCEQ LEADS is on-going. The data can be accessed and reviewed at the project website (http://www.utexas.edu/research/ceer/ccaqp/ accessed April 2014).

2. **Communication and Reporting**
   The status of the Project has been communicated through the website, which is operational with portions under continual updating, quarterly and annual reports, and meetings of a Community Advisory Board.

3. **Budget Monitoring**
   Budget monitoring during the period has focused on projects costs for Stage 1 Phase IB – Sites Operation and Maintenance costs. Financial reports for the quarter are included in Appendix C, pages 37 through 39.

4. **Other Contributions**
   There were no other contributions made to the project during this quarter.

III. Financial Report

As required, the following financial summary information is provided. Details supporting this financial summary are included in Appendix C, pages 37 through 39.

A. Total Amount of Air Toxics Project Funds and Other Funds Received Under the Project
   The Air Toxics Project funds received through March 31, 2014 totals $390,968.11. This total includes interest earned through March 31, 2014, in the amount of $3,136,339.79.

B. Detailed List of the Actual Expenditures Paid from Air Toxics Project Funds Stage 1 Phase 1B through March 31, 2014
   Expenditures of Air Toxics Project funds during this quarter totaled $238,081.93. The funds remaining in the Air Toxics account (not spent for Stage 1 Phase 1A) are in a separate account so that separate financial reports can be generated.

C. Total Interest Earned on Air Toxics Project Funds through March 31, 2014
   The interest earned during this quarter totaled $282.45. A report providing detailed calculations of the interest earned on the Air Toxics Project funds is included in Appendix C, pages 37 through 39.

D. Balance as of March 31, 2014, in the Air Toxics Project Account
   The balance in the Air Toxics Project account, including interest earned totals $2,032,449.76.

E. Anticipated Expenditures for the Funds Remaining in the Air Toxics Project Account – Stage 1 Phase 1A

There are no additional expenditures anticipated for Stage 1 Phase 1A.

F. Anticipated Expenditures for the Funds Remaining in the Air Toxics Project Account – Stage 1 Phase 1B

All funds remaining after the close of Stage 1, Phase 1A have been allocated to Stage 1, Phase 1B, and the extension of the operation of the Corpus Christi ambient monitoring network.

The Stage 1 Phase 1A Neighborhood Air Toxics Modeling Project was originally allocated a budget of $2,277,564. As of June 30, 2011, total and final expenditures on Phase 1A totaled $1,863,081.22. The remaining funds totaling $414,482.78, have been transferred, with the Court's permission, to a new account to allow for easier tracking of the expenses as they are utilized for Stage 1 Phase 1B, the extension of the Corpus Christi Air Monitoring Project.

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Members of the Community Advisory Board of the *Corpus Christi Air Monitoring and Surveillance Camera Project*

APPENDIX A

Data Analysis for Corpus Christi Quarterly Report

January 1, 2014 through March 31, 2014

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Data Analysis for Corpus Christi Quarterly Report

This technical report describes results of the monitoring and analysis of data under the Air Toxics Project Stage 1 Phase 1B. The primary focus is on the period January 1 through March 31, 2014. The monitoring network is shown earlier in this report in Figure 1, on page 4, and is described in Table 2, below. This report contains the following elements:

- A summary of Oak Park, Solar Estates, and Palm (TCEQ) auto-GC data for the fourth quarter of 2013 and first quarter of 2014;
- Information on the trends for benzene concentrations at the two project auto-GCs in residential areas, now with nine years of data, and at the TCEQ's Palm auto-GC, with four years of data (since June 2010); and
- A discussion of the sulfur dioxide (SO_2) data from the UT and TCEQ sites.

Table 2. Schedule of air monitoring sites, locations and major instrumentation

TCEQ CAMS#	Description of Site Location	Monitoring Equipment showing month/year of operations				
		Auto-GC	TNMHC (T) / Canister (C)	H_2S & SO_2	Met Station	Camera
634	Oak Park Recreation Center (**OAK**)	3/05 to date	C: 12/04 to 2/09 T: 12/04 to 4/12		12/04 to date	
629	Grain Elevator @ Port of Corpus Christi (**CCG**)		T&C: 12/04 to date	12/04 to date	12/04 to date	
630	J. I. Hailey Site @ Port of Corpus Christi (**JIH**)		T&C: 12/04 to date	12/04 to date	12/04 to date	
635	TCEQ Monitoring Site C199 @ Dona Park (**DPK**)		T&C: 12/04 to date	12/04 to date	12/04 to date	1/05 to date
632	Off Up River Road on Flint Hills Resources Easement (**FHR**)		T&C: 12/04 to date	12/04 to date	12/04 to date	
633	Solar Estates Park at end of Sunshine Road (**SOE**)	3/05 to date	C: 12/04 to 2/09 T: 12/04 to 4/12	12/04 to date	12/04 to date	1/05 to date
631	*Port of Corpus Christi on West End of CC Inner Harbor (**WEH**) (terminated)*		T&C: 12/04 to 5/12	12/04 to 5/12	12/04 to 5/12	

Legend

CAMS	continuous ambient monitoring station
Auto-GC	automated gas chromatograph
TNMHC	total non-methane hydrocarbon analyzer (all except CAMS 633 & 634 also have canister hydrocarbon samplers)
H_2S	hydrogen sulfide analyzer
SO_2	sulfur dioxide analyzer
Met Station	meteorology station consisting of measurement instruments for wind speed, wind direction, ambient air temperature and relative humidity
Camera	surveillance camera

Glossary of terms

- **Pollutant concentrations** – Concentrations of most gaseous pollutants are expressed in units denoting their "mixing ratio" in air; i.e., the ratio of the number molecules of the pollutant to the total number of molecules per unit volume of air. Because concentrations for all gases other than molecular oxygen, nitrogen, and argon are very low, the mixing ratios are usually scaled to express a concentration in terms of "parts per million" (ppm) or "parts per billion" (ppb). Sometimes the units are explicitly expressed as ppm-volume (ppmV) or ppb-volume (ppbV) where 1 ppmV indicates that one molecule in one million molecules of ambient air is the compound of interest and 1 ppbV indicates that one molecule in one billion molecules of ambient air is the compound of interest. In general, air pollution standards and health effects screening levels are expressed in ppmV or ppbV units. Because hydrocarbon species may have a chemical reactivity related to the number of carbon atoms in the molecule, mixing ratios for these species are often expressed in ppb-carbon (ppbV times the number of carbon atoms in the molecule), to reflect the ratio of carbon atoms in that species to the total number of molecules in the volume. This is relevant to our measurement of auto-GC species and TNMHC, which are reported in ppbC units. For the purpose of relating hydrocarbons to health effects, this report notes hydrocarbon concentrations in converted ppbV units. However, because TNMHC is a composite of all species with different numbers of carbons, it cannot be converted to ppbV. Pollutant concentration measurements are time-stamped based on the start time of the sample, in Central Standard Time (CST), with sample duration noted.

- **Auto-GC** – The automated gas chromatograph collects a sample for 40 minutes, and then automatically analyzes the sample for a target list of 46 hydrocarbon species. These include benzene and 1,3-butadiene, which are air toxics, various species that have relatively low odor thresholds, and a range of gasoline and vehicle exhaust components. Auto-GCs operate at Solar Estates CAMS 633 and Oak Park CAMS 634. In June 2010 TCEQ began operating an auto-GC at Palm CAMS 83 at 1511 Palm Drive in the Hillcrest neighborhood.

- **Total non-methane hydrocarbons (TNMHC)** – TNMHC represent a large fraction of the total volatile organic compounds released into the air by human and natural processes. TNMHC is an unspeciated total of all hydrocarbons, and individual species must be resolved by other means, such as with canisters or auto-GCs. However, the time resolution of the TNMHC instrument is much shorter than the auto-GC, and results are available much faster than with canisters. TNMHC analyzers operate at the sites that do not take continuous hydrocarbon measurements with auto-GCs (CAMS 629, 630, 632, and 635).

- **Canister** – Electro-polished stainless steel canisters are filled with air samples when an independent sensor detects that *elevated* (see below) levels of hydrocarbons (TNMHC) are present. Samples are taken for 20 minutes to try to capture the chemical make-up of the air. In most cases, the first time on any day that the monitored TNMHC concentration exceeds 2000 ppbC at a site for a continuous period of 15 minutes or more, the system will trigger and a sample will be collected. Samples are sent to UT Austin and are

analyzed in a lab to resolve some 60 hydrocarbon and 12 chlorinated species. Canister samplers operate at the four active sites that do not take continuous hydrocarbon measurements with auto-GCs (CAMS 629, 630, 632, and 635).

- **Air Monitoring Comparison Values (AMCV) –** The TCEQ uses AMCVs in assessing ambient data. Two valuable online documents ("Fact Sheet" and "Uses of ESLs and AMCVs Document") that explain AMCVs are at http://www.tceq.texas.gov/toxicology/AirToxics.html (accessed April 2014). The following text is an excerpt from the TCEQ "Fact Sheet" document:

  > Effects Screening Levels are chemical-specific air concentrations set to protect human health and welfare. Short-term ESLs are based on data concerning acute health effects, the potential for odors to be a nuisance, and effects on vegetation, while long-term ESLs are based on data concerning chronic health and vegetation effects. Health-based ESLs are set below levels where health effects would occur whereas welfare-based ESLs (odor and vegetation) are set based on effect threshold concentrations. The ESLs are screening levels, **not ambient air standards.** Originally, the same long- and short-term ESLs were used for both air permitting and air monitoring.
  >
  > There are significant differences between performing health effect reviews of air permits using ESLs, and the various forms of ambient air monitoring data. The Toxicology Division is using the term "air monitoring comparison values" (AMCVs) in evaluations of air monitoring data in order to make more meaningful comparisons. "AMCVs" is a collective term and refers to all odor-, vegetative-, and health-based values used in reviewing air monitoring data. Similar to ESLs, AMCVs are chemical-specific air concentrations set to protect human health and welfare. Different terminology is appropriate because air *permitting* and air *monitoring* programs are different.

- **Rationale for Differences between ESLs and AMCVs** – A very specific difference between the permitting program and monitoring program is that permits are applied to one company or facility at a time, whereas monitors may collect data on emissions from several companies or facilities or other source types (e.g., motor vehicles). Thus, the protective ESL for permitting is set lower than the AMCV in anticipation that more than one permitted emission source may contribute to monitored concentrations.

- **National Ambient Air Quality Standards (NAAQS) –** U.S. Environmental Protection Agency (EPA) has established a set of standards for several air pollutions described in the Federal Clean Air Act. NAAQS are defined in terms of *levels* of concentrations and particular *forms*. For example, the NAAQS for particulate matter with size at or less than 2.5 microns ($PM_{2.5}$) has a *level* of 12 micrograms per cubic meter averaged over 24-hours, and a *form* of the annual average based on four quarterly averages, averaged over three years. Individual concentrations measured above the level of the NAAQS are called *exceedances*. The number calculated from a monitoring site's data to compare to the level of the standard is called the site's *design value*, and the highest design value in the area for a year is the regional design value used to assess overall NAAQS compliance. A monitor or a region that does not comply with a NAAQS is said to be *noncompliant*. At some point after a monitor or region has been in noncompliance, the U.S. EPA may choose to label the region as *nonattainment*. A nonattainment designation triggers

requirements under the Federal Clean Air Act for the development of a plan to bring the region back into compliance.

A more detailed description of NAAQS can be found on the EPA's Website at http://www.epa.gov/air/criteria.html (accessed April 2014).

One species measured by this project and regulated by a NAAQS is sulfur dioxide (SO_2). EPA set the SO_2 NAAQS to include a level of 0.075 ppm, or 75 ppb averaged over one hour, with a form of the three-year average of the annual 99^{th} percentiles of the daily maximum one-hour averages. If measurements are taken for a full year at a monitor, then the 99^{th} percentile would be the fourth highest daily one hour maximum. There is also a secondary SO_2 standard of 0.500 ppm (500 ppb) over three hours, not to be exceeded more than once in any one year.

- **Elevated Concentrations** – In the event that measured pollutant concentrations are above a set threshold they are referred to as "elevated concentrations." The values for these thresholds are summarized by pollutant below. As a precursor to reviewing the data, the reader should understand the term "*statistical significance*." In the event that a concentration is higher than one would typically measure over, say, the course of a week, then one might conclude that a specific transient assignable cause may have been a single upwind pollution source, because experience shows the probability of such a measurement occurring under normal operating conditions is small. Such an event may be labeled "statistically significant" at level 0.01, meaning the observed event is rare enough that it is not expected to happen more often than once in 100 trials. This does not necessarily imply the occurrence of a violation of a health-based standard. A discussion of "elevated concentrations" and "statistical significance" by pollutant type follows:

    - For H_2S, any measured concentration greater than the level of the state residential standards, which is 80 ppb over 30 minutes, is considered "elevated." For SO_2, any measured concentration greater than the level of the NAAQS, which is 75 ppb over one hour, is considered "elevated." Note that the concentrations of SO_2 and H_2S need not persist long enough to constitute an exceedance of the standard to be regarded as elevated. In addition, any closely spaced values that are statistically significantly (at 0.01 level) greater than the long-run average concentration for a period of one hour or more will be considered "elevated" because of their unusual appearance, as opposed to possible health consequence. The rationale for doing so is that unusually high concentrations at a monitor may suggest the existence of unmonitored concentrations closer to the source area that are potentially above the state's standards.
    - For TNMHC, any measured concentration greater than the canister triggering threshold of 2000 ppbC is considered "elevated." Note that the concentrations need not persist long enough to trigger a canister (900 seconds) to be considered elevated.
    - For benzene and other air toxics in canister samples or auto-GC measurements, any concentration above the AMCV is considered "elevated." Note that 20-

minute canister samples and 40-minute auto-GC measurements are both compared with the short-term AMCV.

- Some hydrocarbon species measured in canister samples or by the auto-GC generally appear in the air in very low concentrations close to the method detection level. Similar to the case above with H_2S and SO_2, any values that are statistically significantly (at 0.01 level) greater than the long-run average concentration at a given time or annual quarter will be considered "elevated" because of their unusual appearance, as opposed to possible health consequence. The rationale for doing so is that unusually high concentrations at a monitor may suggest an unusual emission event in the area upwind of the monitoring site.

1. Auto-GC Data Summaries in Residential Areas

In this section the results of semi-continuous sampling for hydrocarbons at the three Corpus Christi auto-GC sites – UT's Solar Estates CAMS 633, UT's Oak Park CAMS 634, and TCEQ's Palm CAMS 83 – are presented. These three sites are located in residential areas. Solar Estates and Oak Park are generally downwind of industrial emissions under northerly winds. Palm, located near the TCEQ's Hillcrest and Williams Park sites in Figure 1, on page 4, is generally downwind of industries under northerly and westerly winds. In examining the aggregated data, one observes similar patterns of hydrocarbons at all three sites.

Table 3, below, lists the data completeness from the project auto-GCs from January 2012 through early 2014 for months for which data validation has been completed. When data are missing the reason is generally owing to quality assurance steps or maintenance procedures. The project regularly exceeds the minimum 75 percent data recovery goal.

Table 3. Percent data recovery by month, 2011-2014, validated data only

Month	Oak Park	Solar Est.	Month	Oak Park	Solar Est.	Month	Oak Park	Solar Est.
Jan-12	94	99	Jan-13	100	100	Jan-14	97	96
Feb-12	90	98	Feb-13	94	99	Feb-14	99	
Mar-12	97	100	Mar-13	97	100			
Apr-12	94	100	Apr-13	100	100			
May-12	77*	96	May-13	99	99			
Jun-12	65	97	Jun-13	75*	91*			
Jul-12	98	93*	Jul-13	98	99			
Aug-12	99	93*	Aug-13	87	98			
Sep-12	99	100	Sep-13	82	99			
Oct-12	98	93	Oct-13	99	99			
Nov-12	99	88	Nov-13	91	100			
Dec-12	97	99	Dec-13	99	99			
Average 2012	**92**	**96**	**Average 2013**	**93**	**99**			

* Months with planned preventive maintenance

Table 4, on page 15, summarizes the validated average data values from the fourth quarter of 2013. Data in this table are available to TCEQ staff at http://rhone3.tceq.texas.gov/cgi-bin/agc_summary.pl (accessed April 2014). Table 5, on page 16, summarizes the as-yet-unvalidated average data values from the first quarter of 2014.

As noted in the preceding paragraph, Tables 4 and 5 show the averages (arithmetic mean of measured values) for 27 hydrocarbon species for the periods of interest, and Table 4 also shows the maximum one-hour values and the maximum 24-hour average concentrations for the fourth quarter's validated data. All concentration values in the tables are in ppbV units. No concentrations or averages of concentrations from the 27 species were greater than TCEQ's air monitoring comparison values (AMCV). The average data columns in Table 4 for the validated fourth quarter 2013 data and Table 5 for the as-yet-unvalidated first quarter 2014 data are shown graphically in Figures 2 and 3, respectively, on page 17. Figures 2 and 3 are plotted on the same y-axis scale, so they can be compared directly. For species measured consistently above their respective method detection limits at the Corpus Christi auto-GCs, mean concentrations are generally similar in the second and third quarters of the year, and similar in the first and fourth quarters of the year. More frequent maritime southerly flow in the spring and summer is a contributor to lower concentrations in the spring-summer second and third quarters, while lower wind speeds and more northerly wind directions contribute to higher concentrations in the fall-winter fourth and first quarters. As can be observed by comparing Figures 2 and 3, average concentrations were similar in the first quarter as in the fourth quarter at all three Corpus Christi sites.

The rows for ***benzene*** are bold-faced in Tables 4 and 5 owing to the concern that the concentrations for this species tend to be closer to the AMCV than are concentrations of other species. The benzene short-term AMCV is 180 ppbV and the benzene long-term AMCV is 1.4 ppbV.

Table 4. Validated auto-GC statistics, 4th quarter 2013

Units ppbV	Oak 4Q13			Solar 4Q13			Palm 4Q13		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	311.034	62.421	13.639	105.511	46.669	12.152	487.225	88.063	17.089
Ethylene	107.235	11.307	0.880	31.402	1.95	0.477	65.740	6.774	0.746
Propane	149.783	40.977	9.227	219.672	34.448	7.976	240.659	37.495	9.847
Propylene	35.659	3.926	0.347	39.008	2.242	0.255	26.905	2.930	0.340
Isobutane	79.593	15.862	3.229	24.343	7.44	2.241	210.874	23.607	4.241
n-Butane	78.247	19.46	5.106	48.74	15.196	3.762	223.068	25.931	6.839
t-2-Butene	1.412	0.252	0.073	1.050	0.116	0.029	4.801	0.489	0.094
1-Butene	0.964	0.165	0.058	2.492	0.182	0.031	10.836	0.834	0.128
c-2-Butene	1.710	0.227	0.058	0.977	0.102	0.017	3.290	0.365	0.080
Isopentane	51.701	7.931	2.663	17.137	4.784	1.581	83.948	11.019	3.185
n-Pentane	33.346	6.527	1.674	10.888	4.414	1.198	46.220	6.783	1.829
1,3-Butadiene	0.430	0.093	0.043	0.264	0.052	0.023	0.604	0.091	0.031
t-2-Pentene	4.013	0.338	0.077	1.072	0.101	0.017	6.790	0.856	0.133
1-Pentene	2.610	0.184	0.043	0.593	0.059	0.012	3.350	0.43	0.078
c-2-Pentene	2.144	0.170	0.039	0.551	0.05	0.007	3.544	0.433	0.069
n-Hexane	12.995	2.461	0.575	4.456	1.296	0.442	16.021	2.46	0.632
Benzene	**9.203**	**2.055**	**0.455**	**4.093**	**0.466**	**0.185**	**14.304**	**2.533**	**0.433**
Cyclohexane	8.062	2.253	0.372	2.29	0.475	0.198	7.272	1.19	0.251
Toluene	16.354	2.598	0.550	2.231	0.526	0.221	6.386	1.532	0.435
Ethyl Benzene	1.563	0.130	0.046	0.548	0.061	0.024	0.812	0.172	0.042
m&p -Xylene	6.318	0.481	0.161	10.896	1.515	0.209	2.841	0.919	0.182
o-Xylene	1.265	0.143	0.051	0.743	0.104	0.031	0.750	0.213	0.055
Isopropyl Benzene	1.395	0.187	0.030	1.394	0.118	0.01	0.597	0.204	0.011
1,3,5-Tri-methylbenzene	0.303	0.063	0.018	0.357	0.059	0.014	0.679	0.077	0.017
1,2,4-Tri-methylbenzene	0.528	0.138	0.053	0.371	0.079	0.026	0.952	0.118	0.044
n-Decane	0.532	0.117	0.034	0.910	0.144	0.043	1.770	0.139	0.026
1,2,3-Tri-methylbenzene	0.389	0.096	0.022	0.193	0.037	0.007	0.369	0.055	0.016

Table 5. Unvalidated auto-GC mean statistics, 1st quarter 2014

Units ppbV	Oak 1Q14	Solar 1Q14	Palm 1Q14
Species	**Mean**	**Mean**	**Mean**
Ethane	13.415	14.228	14.194
Ethylene	0.692	0.462	0.595
Propane	8.537	8.995	8.817
Propylene	0.274	0.247	0.271
Isobutane	2.604	2.385	3.235
n-Butane	4.206	3.982	5.036
t-2-Butene	0.071	0.034	0.096
1-Butene	0.048	0.037	0.138
c-2-Butene	0.048	0.02	0.064
Isopentane	2.074	1.573	2.215
n-Pentane	1.352	1.223	1.36
1,3-Butadiene	0.034	0.029	0.04
t-2-Pentene	0.048	0.014	0.081
1-Pentene	0.026	0.01	0.049
c-2-Pentene	0.024	0.006	0.04
n-Hexane	0.87	0.442	0.471
Benzene	**0.403**	**0.201**	**0.352**
Cyclohexane	0.281	0.171	0.165
Toluene	0.431	0.209	0.344
Ethyl Benzene	0.034	0.024	0.03
m&p -Xylene	0.119	0.204	0.138
o-Xylene	0.038	0.031	0.042
Isopropyl Benzene	0.024	0.009	0.007
1,3,5-Trimethylbenzene	0.014	0.016	0.016
1,2,4-Trimethylbenzene	0.047	0.028	0.042
n-Decane	0.027	0.042	0.024
1,2,3-Trimethylbenzene	0.016	0.004	0.016

Figure 2. Mean ppbV for 27 species at three auto-GCs, 4th quarter 2013 (validated data)

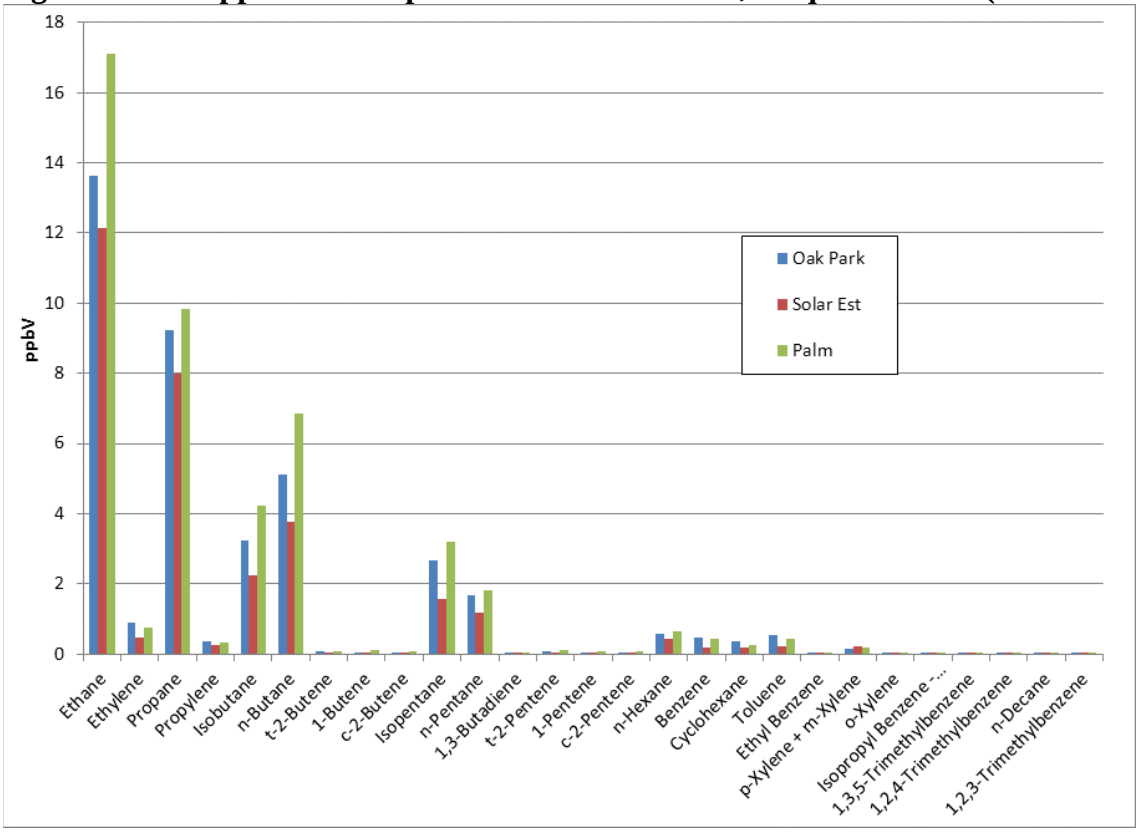
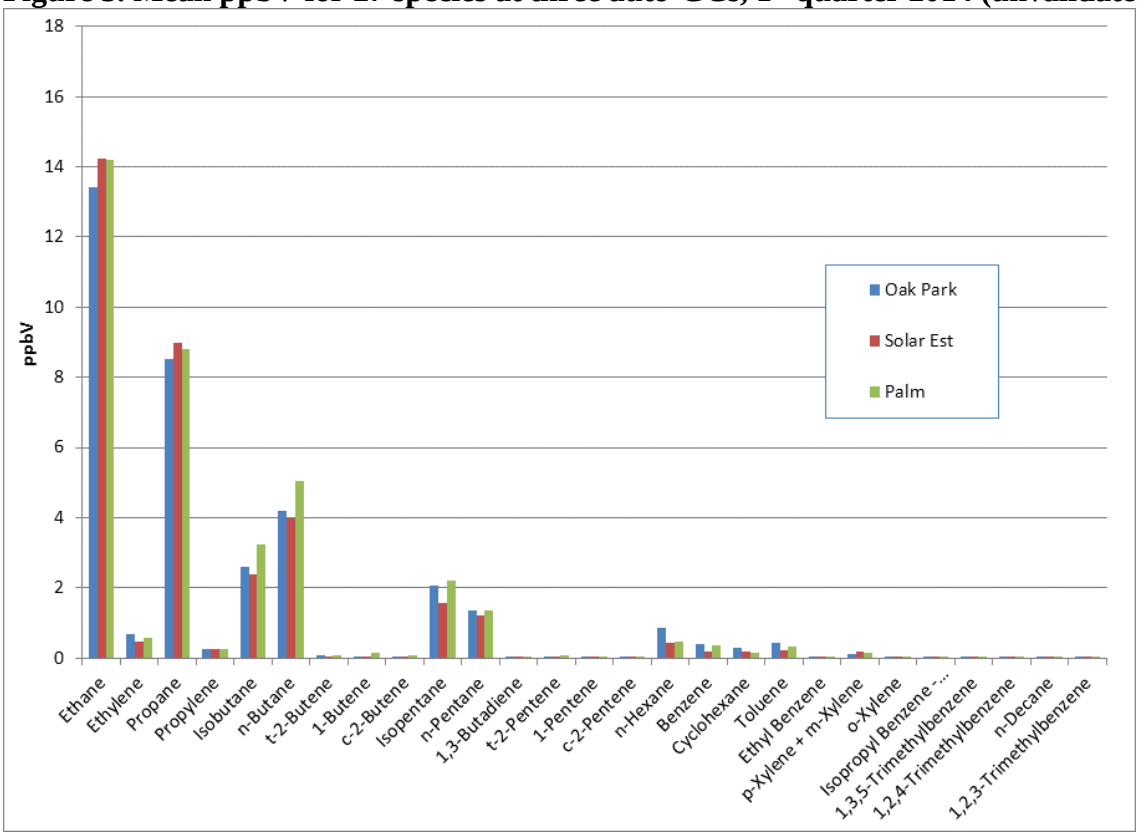


Figure 3. Mean ppbV for 27 species at three auto-GCs, 1st quarter 2014 (unvalidated data)



In examining the annual means from Solar Estates and Oak Park since the beginning of the project in 2005, one finds that concentrations are higher over the last three years for ethane and propane and some other alkane species than in the preceding three years. A preliminary hypothesis is that increased natural gas emissions or more favorable meteorological conditions (e.g., wind direction) are possible assignable causes for the higher mean concentrations. Figure 4, below, and Figure 5, on page 19, show graphical summaries of the mean concentrations of propane, a species found in natural gas, at the three auto-GCs for the fourth quarter and the first quarter of each year, respectively. Figure 6, on page 20, and Figure 7, on page 21, shows the average concentrations of 27 hydrocarbon species for each year in the project from Calendar Year 2006 – 2013 at Oak Park and Solar Estates, respectively. Note that 2005 is not included in the Figures 6 and 7 graphs because it was an "incomplete" year.

Figure 4. Mean concentrations of propane during fourth quarters of each year at Oak Park (blue) and Solar Estates (red), and Palm (green) 2010 – 2013

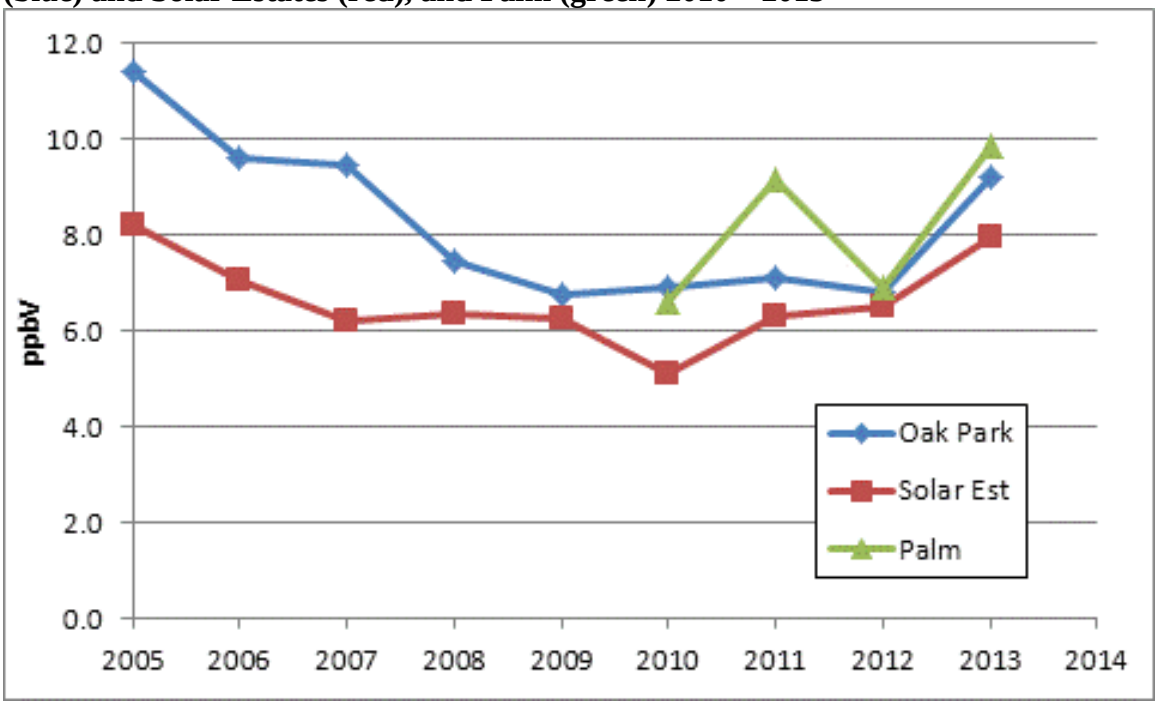


Figure 5. Mean concentrations of propane during first quarters of each year at Oak Park (blue) and Solar Estates (red), and Palm (green) 2011 – 2014

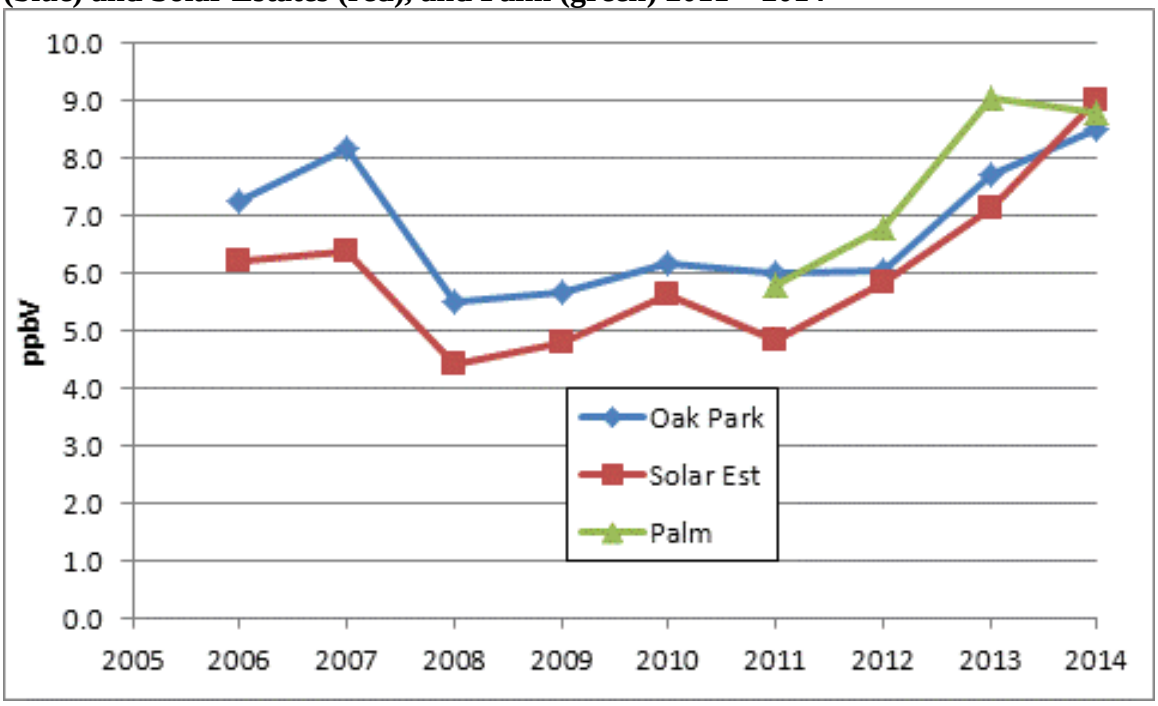


Figure 6. Mean concentrations of 27 hydrocarbon species by year at Oak Park 2006-2013

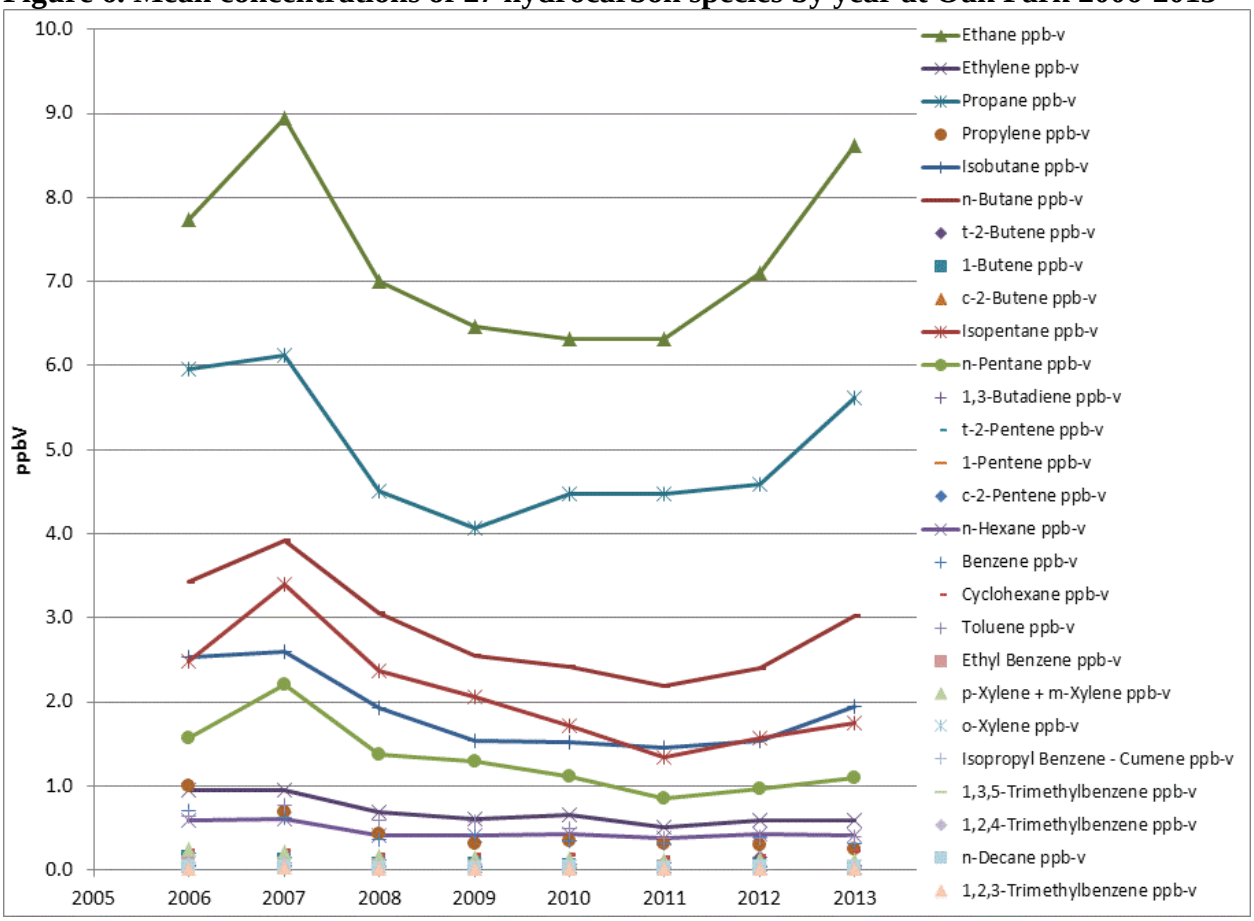
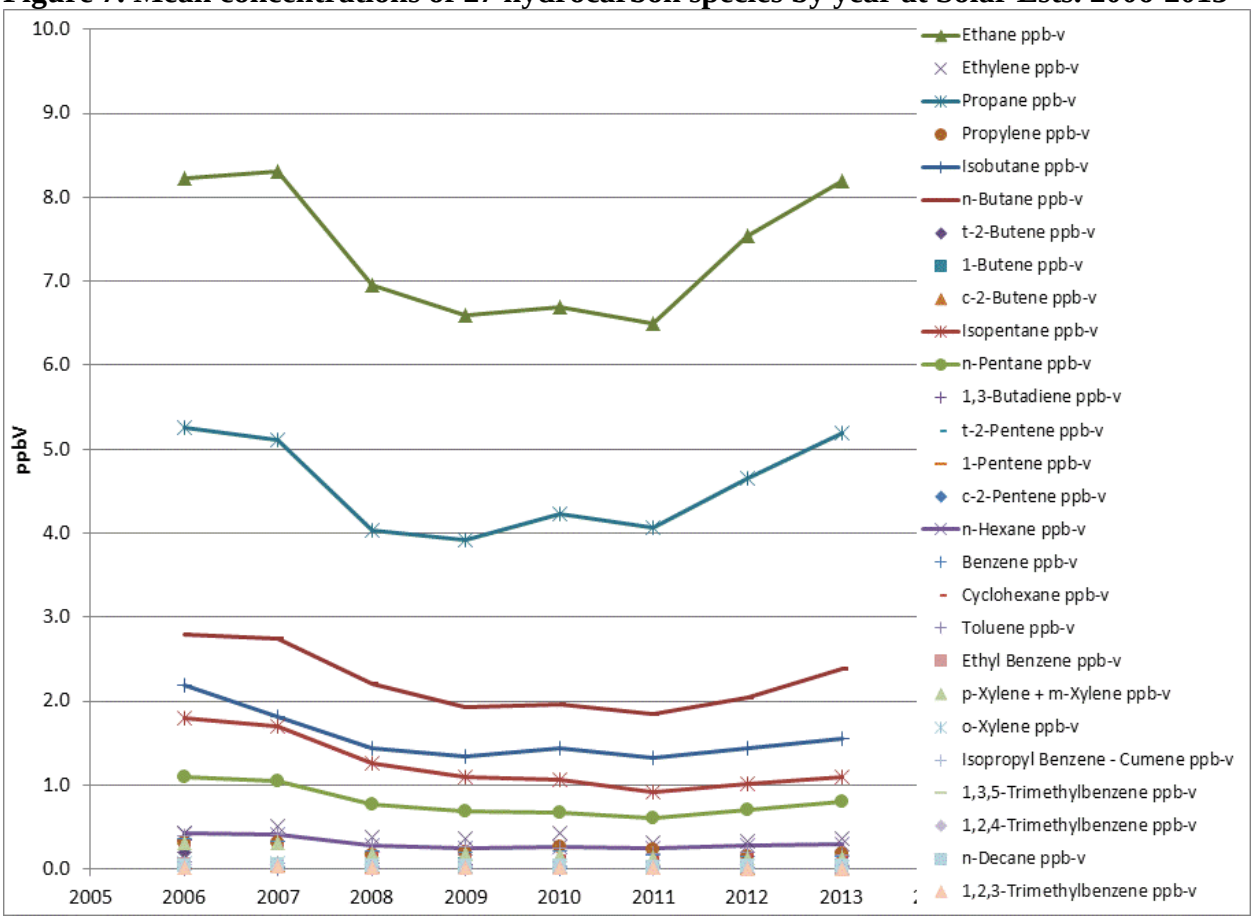


Figure 7. Mean concentrations of 27 hydrocarbon species by year at Solar Ests. 2006-2013



By looking at the mean concentrations by wind direction, it may be possible to learn more about these observed trends. Figure 8, on page 22, shows the results of calculating the mean concentration at Oak Park by 15-degree bins by calendar year for the years 2008 – 2013 for seven alkane species. Figure 9, on page 23, shows similar analyses for Solar Estates. Concentrations in Figures 8 and 9 are in ppbV.

Figure 8. Oak Park average ppbV concentrations for seven auto-GC alkane species by 15-degree wind direction bin, by calendar year 2008 - 2013

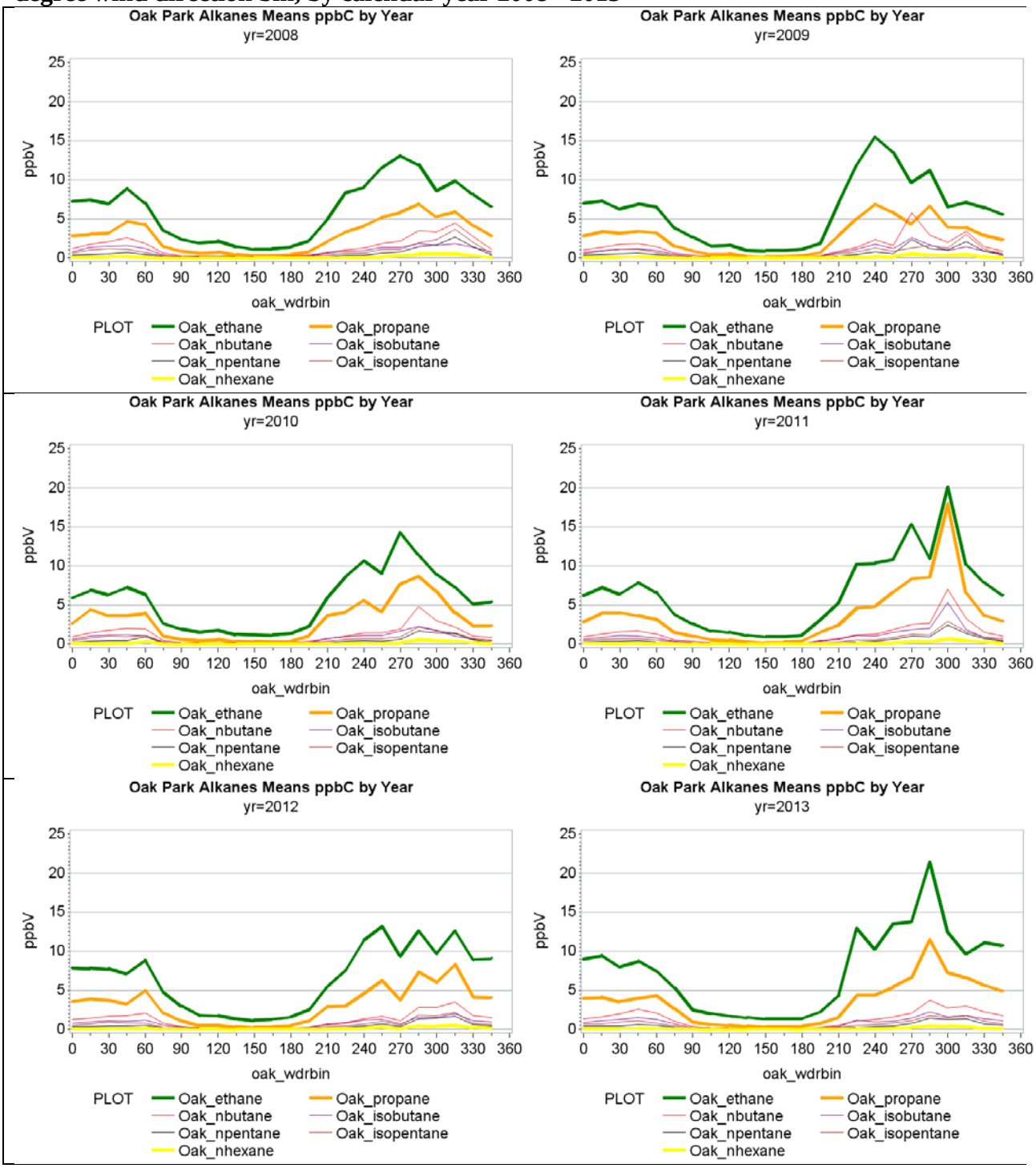
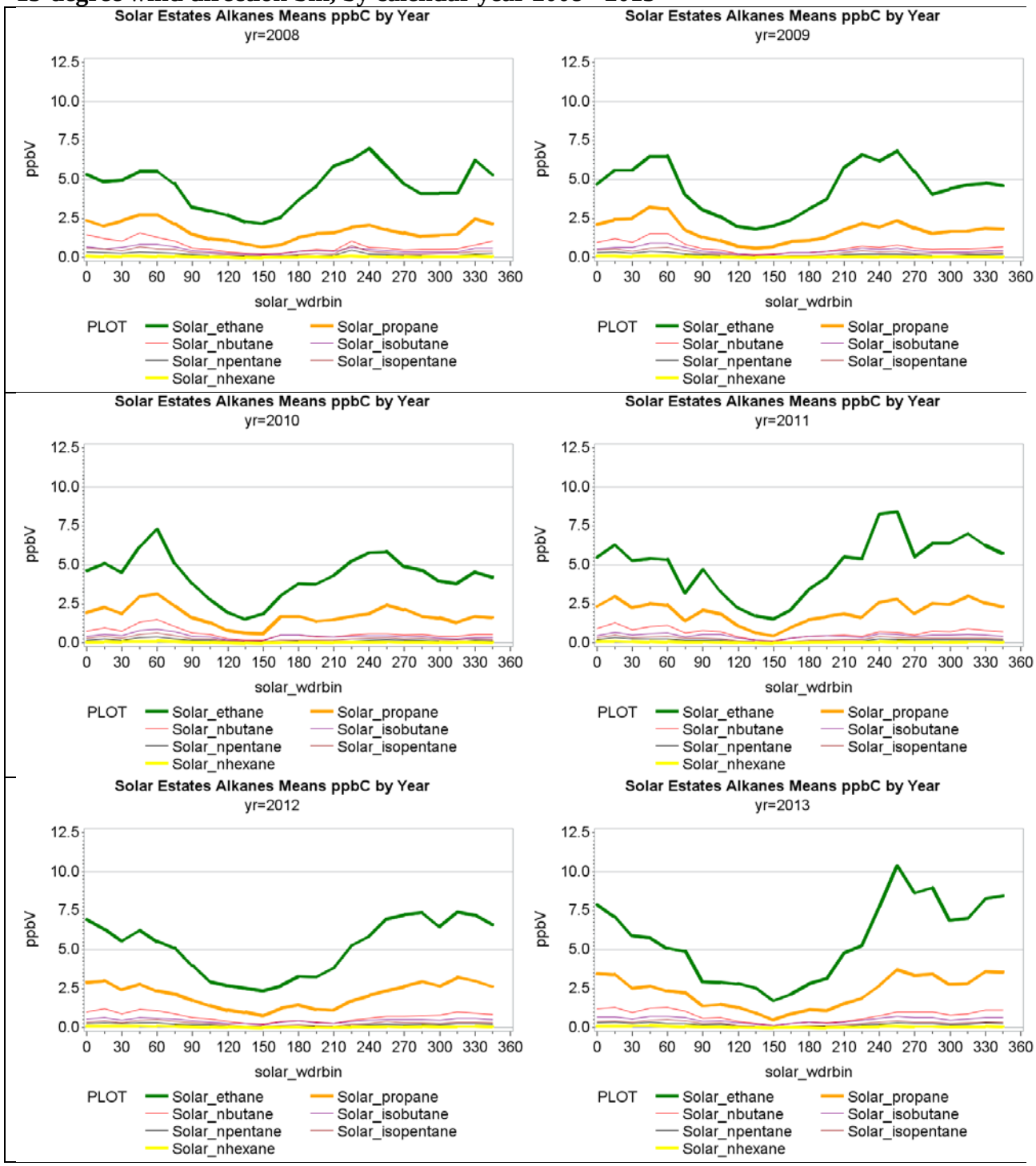


Figure 9. Solar Estates average ppbV concentrations for seven auto-GC alkane species by 15-degree wind direction bin, by calendar year 2008 - 2013



For Oak Park, there are statistically significant increases from 2010 to 2013 (four years) in propane, as an example, for the wind direction bins in Table 6, below. Note that in this application, p-values less than or equal to 0.05 are considered statistically significant. There are a few additional directions for which there were three years in a row of increases, but which had higher p-values[1]. Such an increase may be considered important and will be looked at in coming months along with those directions listed in the table. The increases are associated with northerly winds.

Table 6. Wind direction bins at Oak Park associated with statistically significant increases from 2010 to 2013 (four years) in propane

Range	Center (point plotted in Figure 9)	Slope	p-value
352.5 – 7.5 degrees	0	0.478 ppbv/yr	0.0166
67.5 – 82.5 degrees	75	0.551 ppbv/yr	0.0010
322.5 – 337.5 degrees	330	1.040 ppbv/yr	0.0172
337.5 – 352.5 degrees	345	0.887 ppbv/yr	0.0055

For Solar Estates, there are statistically significant increases from 2010 to 2013 in propane for wind direction bins in Table 7, below. As was mentioned above, p-values less than or equal to 0.05 are considered statistically significant, so the changes at the 15 and 30 degrees center points are just outside this characterization. The increases in Table 7 are associated with westerly through northerly winds.

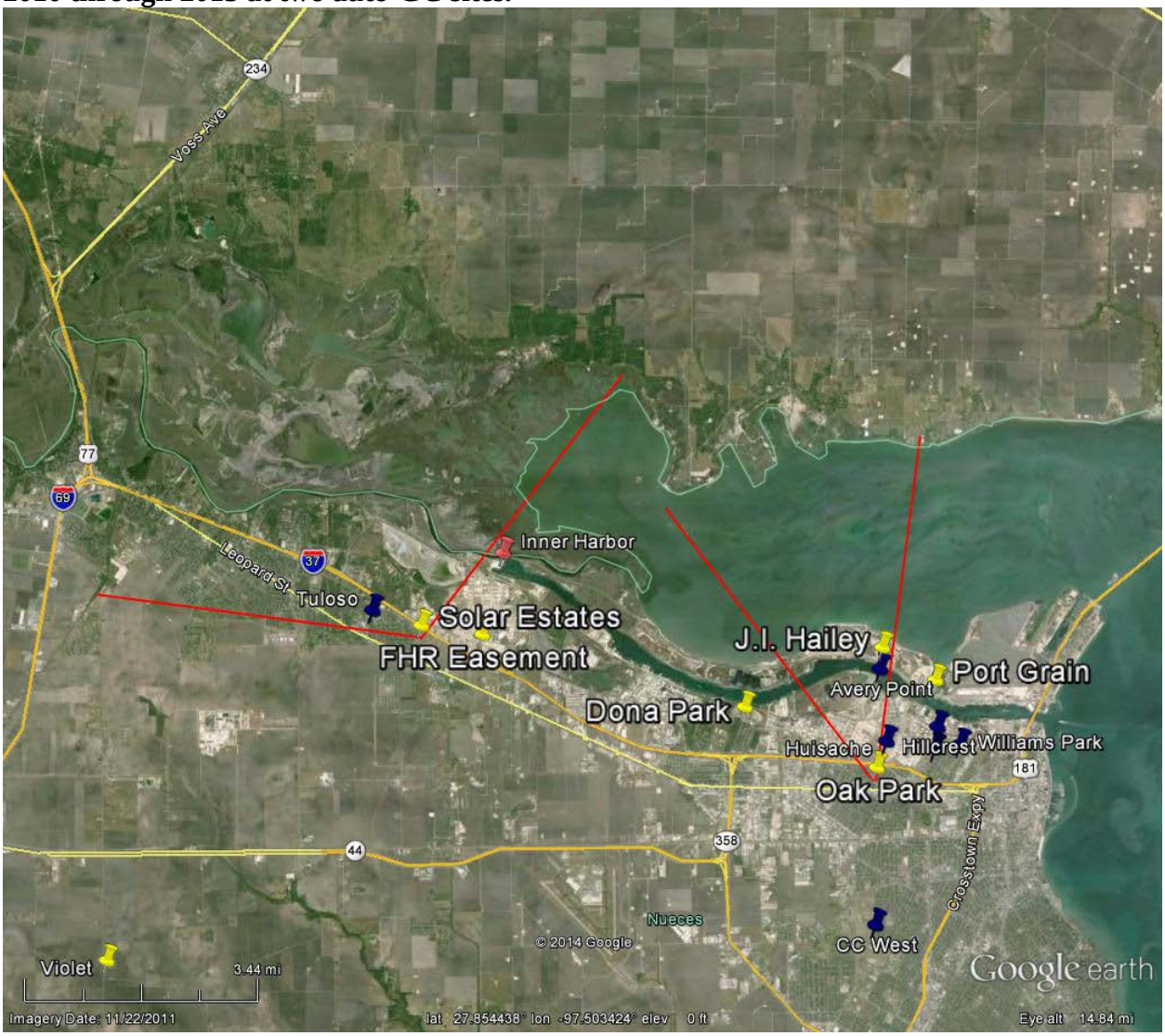
Table 7. Wind direction bins at Solar Estates associated with statistically significant increases from 2010 to 2013 (four years) in propane

Range	Center (point plotted in Figure 9)	Slope	p-value
352.5 – 7.5 degrees	0	0.512 ppbv/yr	0.0027
7.5 – 22.5 degrees	15	0.341 ppbv/yr	*0.0599*
22.5 – 37.5 degrees	30	0.207 ppbv/yr	*0.0574*
277.5 – 292.5 degrees	285	0.559 ppbv/yr	0.0129
322.5 – 337.5 degrees	330	0.610 ppbv/yr	0.0088
337.5 – 352.5 degrees	345	0.445 ppbv/yr	0.0226

The map in Figure 10, on page 25, is a Google Earth Pro map showing peak directions for increases in propane from 2010 through 2013 at two auto-GC sites. Not included is the 75 degree direction at Oak Park. Although the 300 degree direction did not have a statistically significant change, it did have a possibly important three year in a row increase and so is included in the range of directions shown for Solar Estates in Figure 10.

[1] A "p-value" communicates the probability that an observed effect (such as a positive trend) would occur by random chance alone. Thus, a p-value = 0.05 says that the chance of observing a trend of the computed magnitude would be 1 in 20 if the underlying data were random with no real trend present. Since the chance of calculating a trend if one is not present is so low, one assumes instead that the data are not random and that a real effect is present.

Figure 10. Google Earth Pro map showing peak directions for increases in propane from 2010 through 2013 at two auto-GC sites.



2. Benzene Concentrations in Residential Areas

As has been discussed in past reports, benzene concentrations in the recent years are lower than in the first three years of operation at the two auto-GCs operated at Oak Park CAMS 634 and Solar Estates CAMS 633. Also, in recent years (2008 – 2014), concentration averages have generally shown little variation. No individual one-hour benzene values have been measured above the AMCV since the beginning of monitoring. A time series for Oak Park hourly benzene in ppbV units with two points annotated by date appears in Figure 11, below. The two points from 6:00 CST Saturday, January 27, 2007, and 4:00 CST Friday, November 6, 2009, are identified as statistical outliers in that they are unusually high given the balance of the data. The same graph is reproduced without the two outlier points in Figure 12, on page 27. The time series for Solar Estates appears in Figure 13, on page 27. Note the different y-axis scales for the two sites, as Oak Park does tend to measure higher concentrations than Solar Estates. Figure 14, on page 28, shows the time series for the TCEQ Palm auto-GC, with an apparent outlier on January 30, 2012 indicated. Note that for all three sites, the data from the first quarter 2014 have not all been validated yet.

Figure 11. Oak Park hourly benzene March 2005 – March 31, 2014, ppbV units, individual elevated values noted, no observations greater than the TCEQ's AMCV

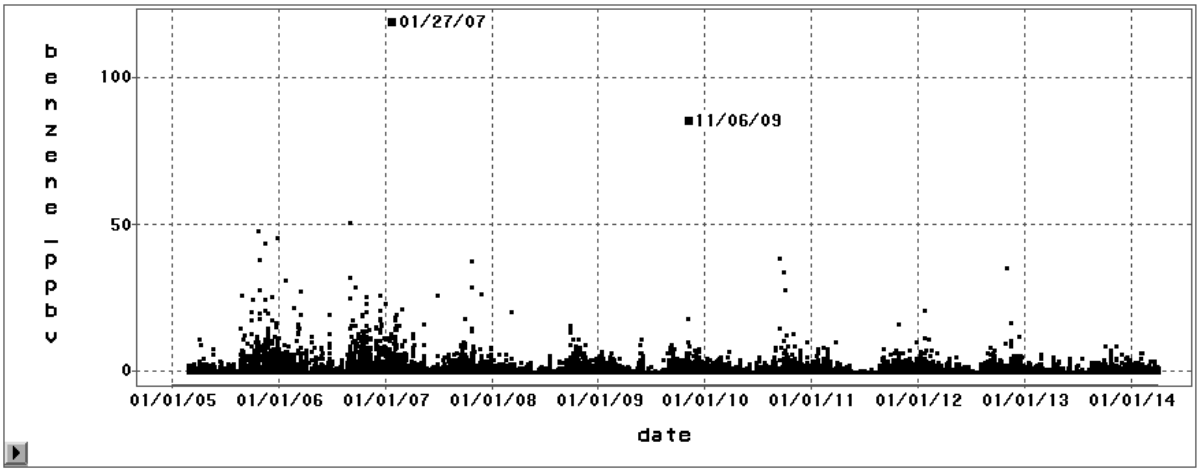


Figure 12. Oak Park hourly benzene Mar. 2005 – March 31, 2014, ppbV units, two outliers from January 27, 2007 and November 6, 2009 removed

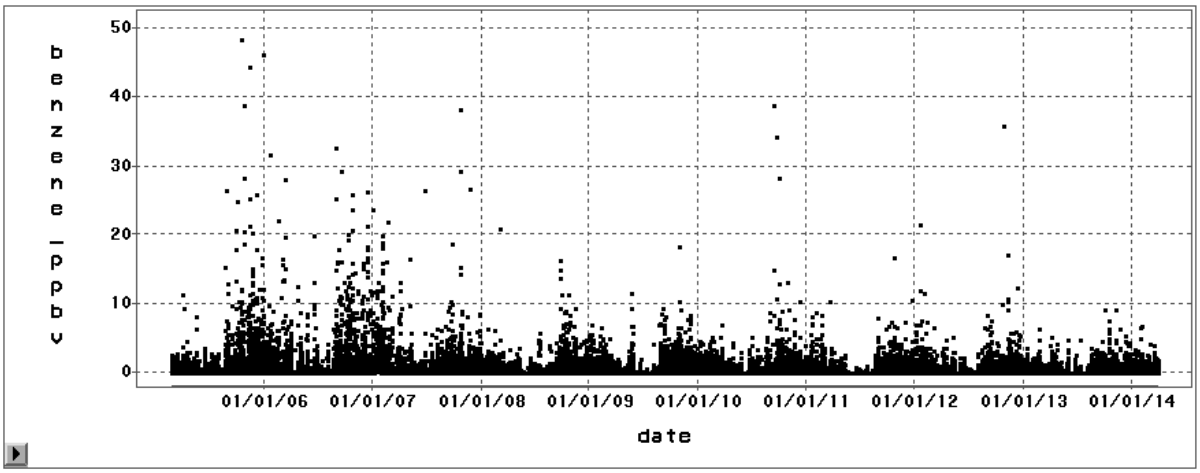


Figure 13. Solar Estates hourly benzene Mar. 2005 – March 31, 2014, ppbV units, no observations greater than the TCEQ's AMCV

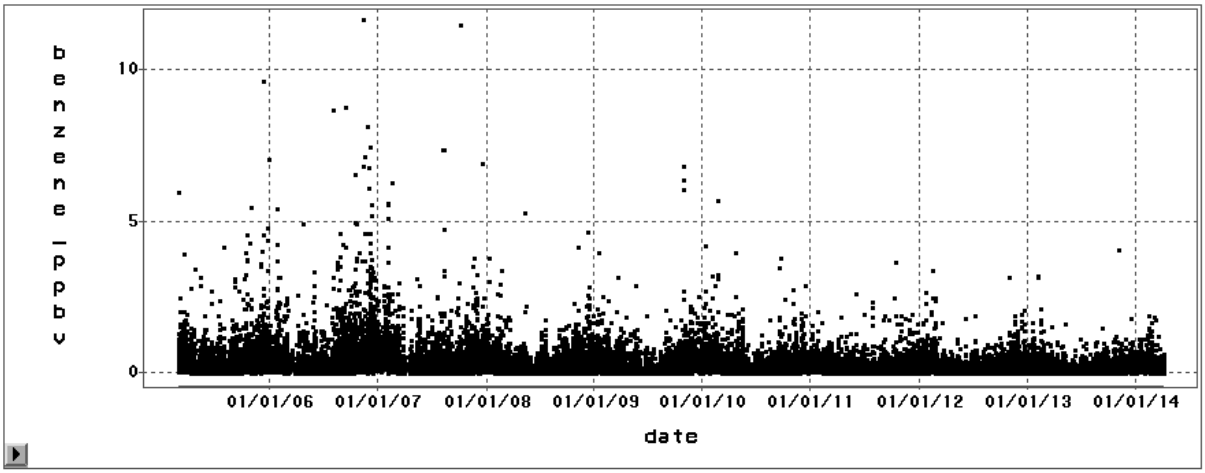


Figure 14. TCEQ Palm hourly benzene June 1, 2010 – March 31, 2014, ppbV units, individual elevated value noted, no observations greater than the TCEQ's AMCV

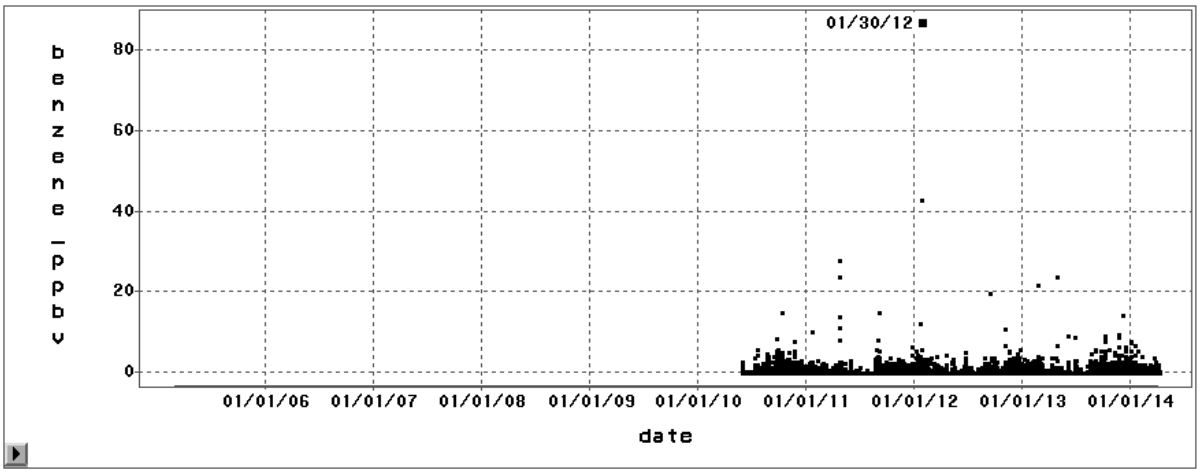
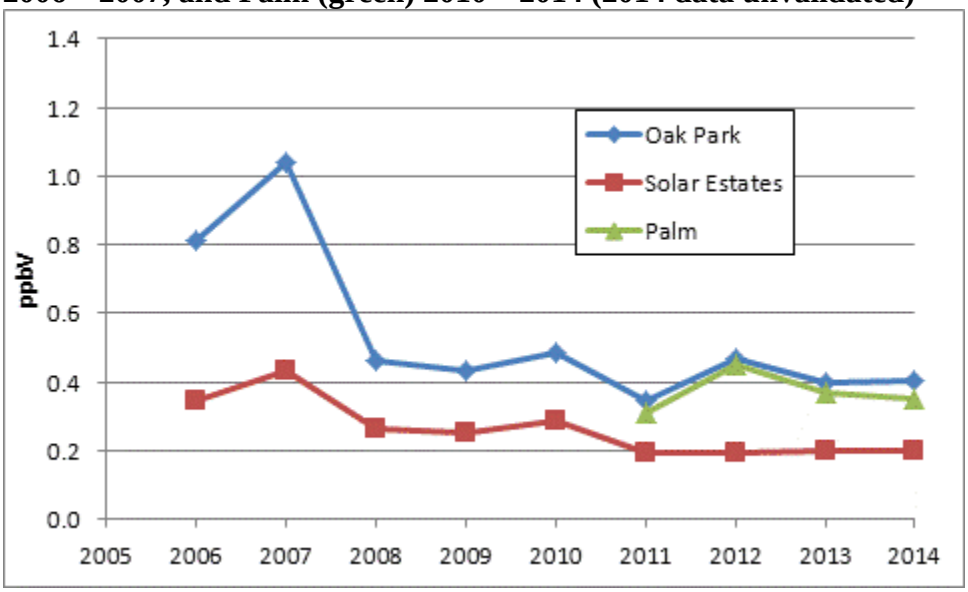


Table 8, on page 29, shows the first quarter average concentrations from the auto-GCs for benzene from 2006 – 2014 (2014 data unvalidated). Because monitoring began in March 2005, the first quarter of 2005 is not appropriate to include in this analysis. The project now has nine years of complete first quarter data. The first quarter means are graphed in Figure 11, on page 29. The means for TCEQ's Palm site are shown for 2010 through 2014 only. The first quarter averages at UT sites from 2008 through 2014 are statistically significantly lower than in the first quarters of the project's first two years, and this finding is similar to findings for other quarters in recent reports on this project.

Table 8. Mean statistics for Benzene at Oak Park and Solar Estates, 1st quarter 2006 – 2014, Palm 2011 – 2014, ppbV units (2005 – insufficient data; 2014 - data unvalidated)

4th qtr/year	Oak	Solar	Palm
2005			
2006	0.813	0.342	
2007	1.040	0.432	
2008	0.464	0.264	
2009	0.433	0.253	
2010	0.485	0.287	
2011	0.344	0.195	0.308
2012	0.468	0.193	0.450
2013	0.398	0.201	0.369
2014	0.403	0.201	0.352

Figure 11. Mean concentrations of benzene during first quarters of each year at Oak Park (blue) and Solar Estates (red), 2006 – 2014 with lower values in 2008 – 2014 compared with 2006 – 2007, and Palm (green) 2010 – 2014 (2014 data unvalidated)



3. Sulfur Dioxide Measurements at Corpus Christi Monitors

Since monitoring of SO_2 began, concentrations had been high enough frequently enough that the JIH CAMS 630 site did not comply with the EPA's current SO_2 NAAQS (described earlier on pages 11and 12) through 2012. However, concentrations appear to have declined over the course of 2012 to 2014 at JIH CAMS 630 and the site now appears to comply with the NAAQS. Table 9, on page 30, shows the design values (defined earlier on pages 11 and 12) for SO_2 monitors in Nueces County. The bolded numbers in the column for JIH CAMS 630 represent the values above 75 ppb and thus noncompliant. The most recent 2011 – 2013 design value at CAMS 630 is 47 ppb. In addition to the decline at CAMS 630, all sites except Solar Estates CAMS 633 have their lowest design value over the study period in the most recent three year period.

Table 9. SO_2 design values for Nueces County monitors

Years (CY)	Tuloso C21	West C4	Port Grain C629	JIH C630	Inner Harbor C631	FHR C632	Solar Estates C633	Dona Park C635	Huisache C98
2005-2007	8	24	34	**119**	38	21	51	34	36
2006-2008	8	21	31	**131**	33	19	31	31	32
2007-2009	9	18	30	**89**	32	17	21	23	28
2008-2010	9	17	26	**103**	21	13	11	22	33
2009-2011	9	12	19	**80**	15	13	30	20	27
2010-2012	8	10	15	**76**		12	40	12	23
2011-2013	6	7	11	47		12	51	8	10

Research to date has concluded that emissions from ships operating in the Corpus Christi ship channel and docked along the shores had been major contributors to elevated SO_2 concentrations at JIH and to some extent at other sites. The main source of SO_2 is believed to be the result of emissions from diesel engines used in dockside ships' auxiliary engines running on high-sulfur diesel fuel. However, over the course of the last half of 2012 and throughout 2013 into 2014, SO_2 concentrations at JIH have been lower than early 2012 and earlier years. On June 1, 2012 new regulations for sulfur content in diesel fuel for marine vessels went into effect. Thus, both small ships motoring in the ship channel and large ships docked in the ship channel are likely now producing lower emissions of SO_2. It is very likely that this has led directly to the lower design value at JIH CAMS 630, and perhaps may have contributed to declines at other sites in the area.

The TCEQ had been operating a special purpose SO_2 site at Avery Point CAMS 6603 shown back on page 4, in Figure 1, located south of the JIH CAMS 630 site. Data collected at the Avery Point site over two years was of great use in assigning the cause of elevated SO_2 at JIH to ships at the nearby docks. TCEQ decommissioned the Avery Point site on December 31, 2013.

The one site for which the design value was not lower in 2013 was the Solar Estates CAMS 633 site. Evidence has been compiled to suggest that some chemical other than SO_2, interfering with the SO_2 measurement has caused elevated SO_2 concentrations at Solar Estates and also to a lesser extent at FHR.

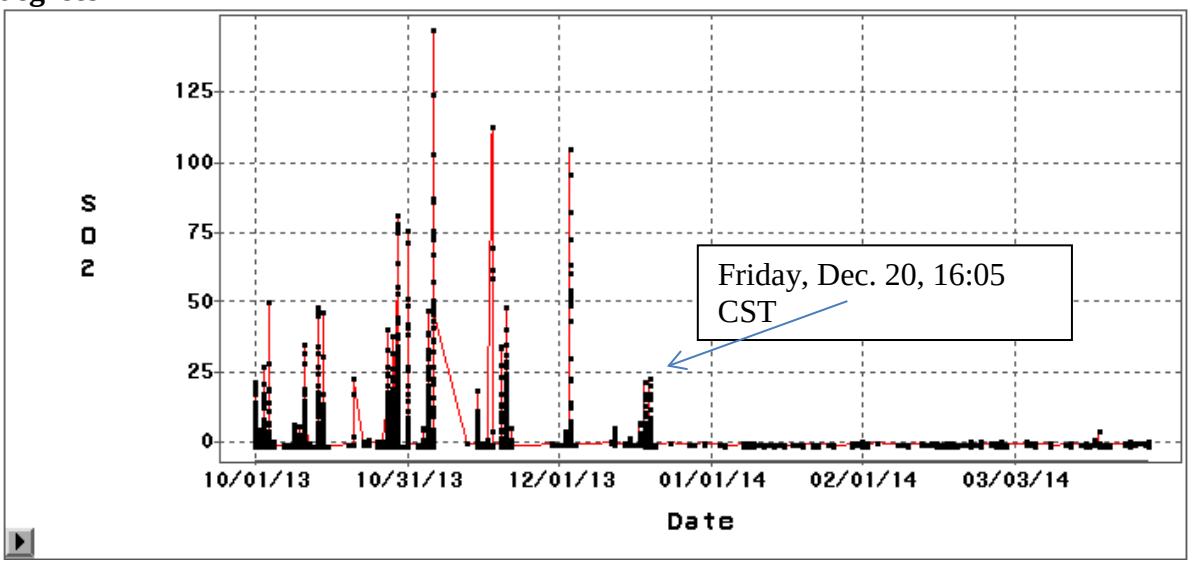
Changes in SO_2 Concentrations at Solar Estates

Figure 12, on page 31, shows the recent 5-minute SO_2 concentrations at Solar Estates measured with coincident wind speed greater than or equal to 5 mph and wind direction between 135 and 170 degrees. This is the range of directions within which elevated SO_2 concentrations have been measured since May 2011. As is clear from the graph in Figure 12, no elevated concentrations were measured after Friday, December 20, 2013 through March 31, 2014. After December 20, 16:05 CST, the winds remained steady between 150 and 165 degrees until at least 19:00[2]. The

[2] The latest time at which elevated SO_2 had been measured under southeast winds since Oct. 1, 2013 was 18:40 CST.

next time at which conditions were consistent with elevated SO_2 measurements (southeast winds, day time, non-holiday weekday) did not occur again until January 8, 2014 at 4:00 CST. Therefore, it is hard to know whether emissions ceased on Friday December 20 owing, say, to early afternoon pre-holiday shutdown or whether a process change occurred at that time, or whether a process change occurred sometime between then and January 8, 2014. However, in some 1,639 observations under conditions previously consistent with elevated SO_2 measurements made from January 8 – March 31, 2014, only one concentration greater than 1.6 ppb has been measured, that being an isolated 5.0 ppb measurement on Friday March 21 at 15:55 CST. In 2,365 observations made under conditions consistent with elevated SO_2 measurements from October 1 to December 20, 2013, 25 percent of measurements were 6.5 ppb or higher and 10 percent were 18 ppb or higher.

Figure 12. Recent 5-minute SO_2 concentrations at Solar Estates measured with coincident wind speed greater than or equal to 5 mph and wind direction between 135 and 170 degrees



One concern might be that there was a change in the operation of the SO_2 instrument at Solar Estates. An examination of the quality assurance tests routinely run on all of UT's monitoring instruments shows that the SO_2 instrument at Solar Estates passed all daily, weekly, and monthly quality tests in December 2013 and January 2014. A review of the operator logs for those two months shows that the contractor consistently reported that all equipment at the site was working as expected. Figure 13, on page 32, shows the recent 5-minute SO_2 concentrations at Solar Estates measured with coincident wind speed greater than or equal to 5 mph and wind direction less than 135 or greater than 170 degrees, which is a wide range of directions that do not point near the suspected source of emissions affecting the SO_2 monitor. Figure 13 is on the same y-axis scale as Figure 12 for comparison purposes. Figure 14, on page 32, is a close-up of Figure 13 on a shorter y-axis scale, showing that the highest concentrations coincident with wind speeds above 5 mph from less than 135 or greater than 170 degrees have been lower since mid-December. However, in Figure 14 the measured concentrations on four specific dates were above 5 ppb, and on two of these – October 15 and October 29 – the wind directions were 133 and 132, respectively, for the maximum values associated with those dates, and for the other two –

November 12 and December 11 – winds were from known SO_2 source areas to the north. Figure 15, on page 33, shows the Figure 14 graph without the southeast wind data on October 15 and 29 and without the data from November 12 and December 11. Figure 15 helps to confirm that the operation of the SO_2 instrument was unchanged before and after the December 20 to January 8 period, often measuring over 2 ppb SO_2 under northerly winds, whereas no measurement in excess of 1 ppb has been made since January 8 under southeast winds.

Figure 13. Recent 5-minute SO_2 concentrations at Solar Estates measured with coincident wind speed greater than or equal to 5 mph and wind direction less than 135 or greater than 170 degrees (not from direction to suspected interferent source)

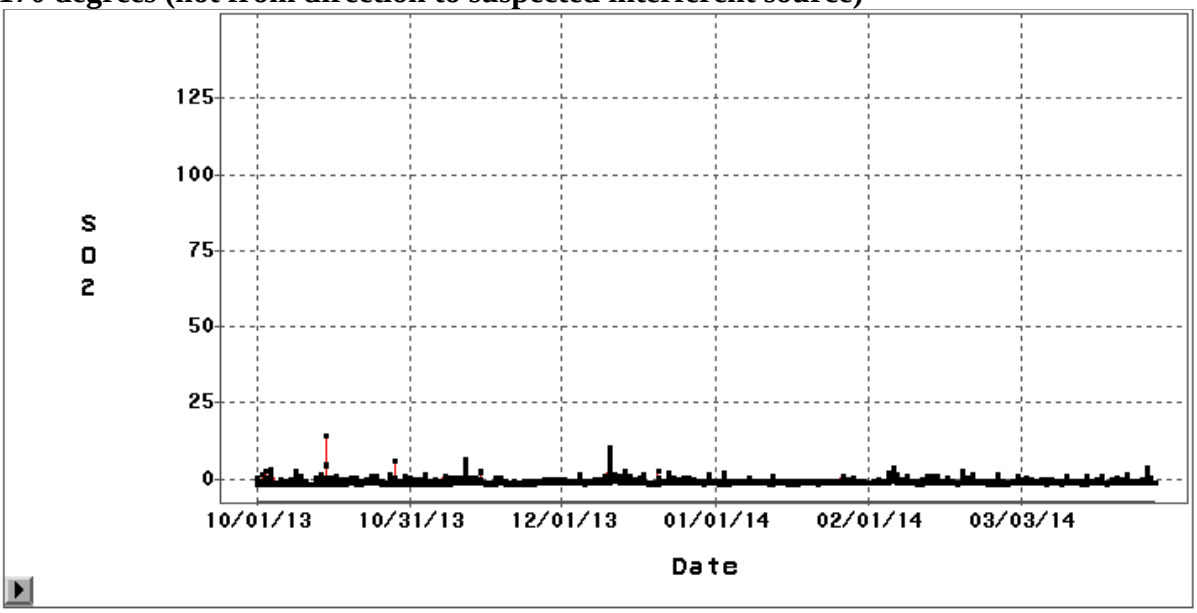


Figure 14. Recent 5-minute SO_2 concentrations at Solar Estates measured with coincident wind speed greater than or equal to 5 mph and wind direction less than 135 or greater than 170 degrees (same as Figure 13 with different y-axis scale)

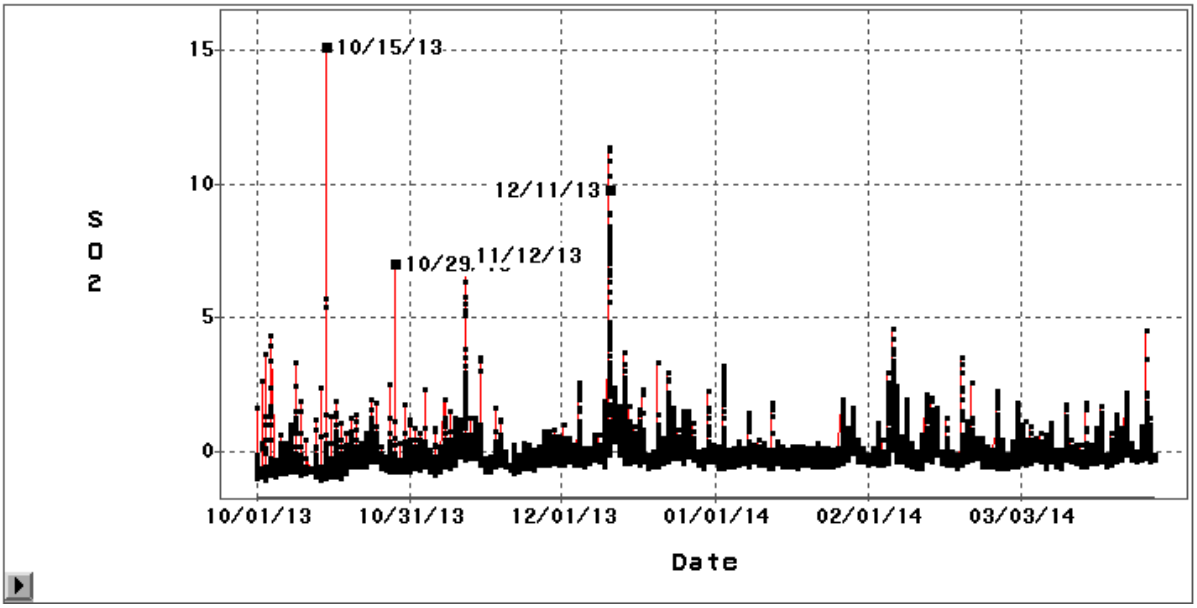
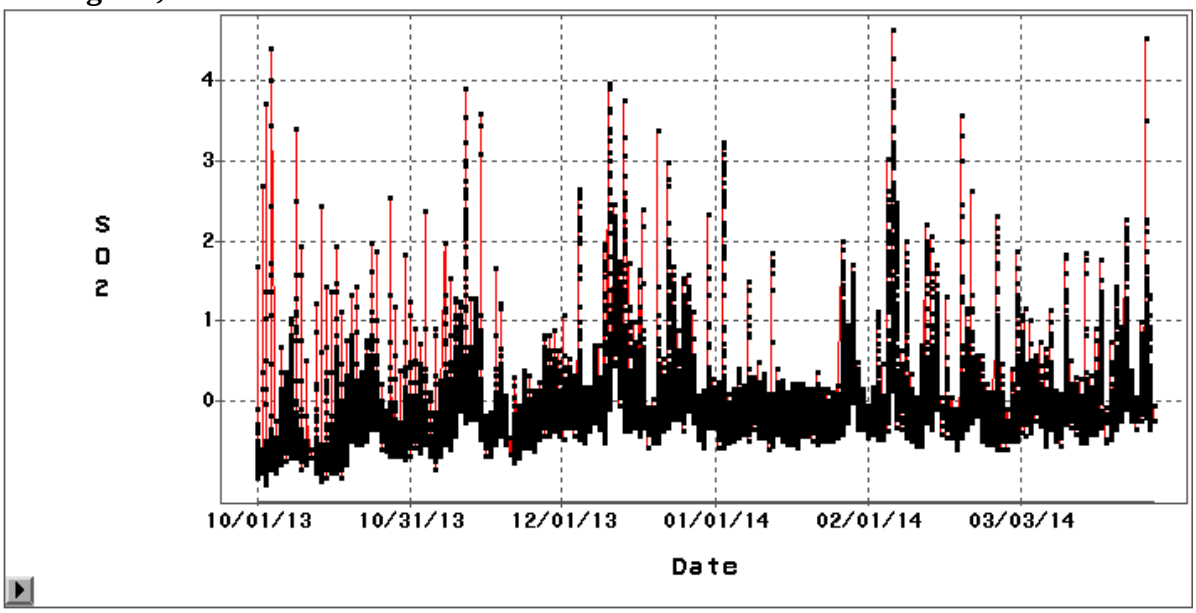


Figure 15. Recent 5-minute SO_2 concentrations at Solar Estates measured with coincident wind speed greater than or equal to 5 mph and wind direction less than 135 or greater than 170 degrees, observations from four dates removed



Conclusions from the First Quarter 2014 Data

In this quarter's report, several findings have been made:

- No exceedances of the EPA SO_2 NAAQS level were measured this quarter at UT sites or at TCEQ sites. TCEQ's Avery Point site was shut down Dec. 31, 2013. Dockside ship emissions that had affected the UT JIH CAMS 630 site and the Avery Point appear to have diminished since June 2012, which is likely relatable to new federal rules on marine fuel. The JIH site now appears to have come into compliance with the SO_2 NAAQS.
- SO_2 measurements at Solar Estates on daytime weekdays under southeast winds had often been high enough to record exceedances of the NAAQS. However, sometime between December 20, 2013 and January 8, 2014, a change in ambient air occurred so that no elevated concentrations have been measured under southeast winds in 2014 at Solar Estates. Evidence accumulated over the course of this project suggests some unknown chemical other than SO_2 had been causing elevated SO_2 measurements at Solar Estates.
- Fourth quarter 2013 and first quarter 2014 concentrations at the auto-GCs remain well below the TCEQ's AMCVs for all species tracked for this project. Trends in quarterly average benzene concentrations remain relatively flat. Mean concentrations for several hydrocarbon species possibly associated with natural gas have increased in the past three years.
- Periodic air pollution events continue to be measured on a routine basis.

Further analyses will be provided upon request

APPENDIX B

April 3, 2014
Advisory Board Meeting Notes

ADVISORY BOARD MEETING

Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Texas A&M University - Corpus Christi

Room 2010, NRC Building

12:00 pm – 2:00 pm

April 3, 2014

Advisory Board Members Present:

Ms. Gretchen Arnold	Corpus Christi Advocate
Dr. Glen Kost	Public Health Awareness
Ms. Joyce Jarmon	Corpus Christi Community Council

Ex-Officio Members of the Board Present:

Ms. Rosario Torres	TCEQ – Region 14
Mr. Chris Owen	TCEQ – Region 14 via teleconference call
Ms. Neera Erraguntla	TCEQ – Region 14 via teleconference call

Project Personnel Present:

Mr. Vincent Torres	The University of Texas at Austin
Dr. Dave Sullivan	The University of Texas at Austin
Ms. Terri Mulvey	The University of Texas at Austin

I. Call to Order and Welcome

Mr. Vincent Torres called the meeting to order at 12:10 pm.

II. Project Overview and Status

A. Phase II – Site Operation and Maintenance

Dr. Dave Sullivan gave an update on and analysis of monitoring data collected by the Project for the past 9 years. The Project has now collected 9 years of monitoring data.

Dr. Kost asked if there was only one report of elevated benzene in FY 2013. Dr. Sullivan reported that yes, the Port Grain site had triggered a canister sample of elevated benzene on Oct 23, 2012. Dr. Kost inquired if the canister was triggered due to emissions from the ships. Dr. Sullivan reported that not due to ships but quite possibly a release from an above ground storage tank in the area. However, he was not sure what chemical was released. Mr. Chris Owens asked how long sampling duration was. Dr. Sullivan responded that the duration of the sampling was 20 minutes.

Dr. Sullivan noted there was an uptick in propane and ethane in FY 2013, with higher concentrations associated with westerly and northerly winds. Dr. Kost inquired if it was

possibly due to either new pipelines or new storage tanks in the area. Ms. Gretchen Arnold mentioned that there were four workers that were hurt in a flash fire at an Enterprise Products natural gas processing plant. Dr. Kost mentioned that residents of Dona Park were concerned with this incident. Dr. Sullivan will request information from the Railroad Commission. Ms. Rosario Torres also mentioned that she will follow up with the Railroad Commission. Dr. Sullivan asked the Advisory Board members to send any specific questions to him and he will try to find answers. Dr. Sullivan will get back to the Advisory Board with more information after further study. **ACTION ITEM**

Dr. Sullivan mentioned that there were several upticks in SO_2 between 10/01/13 and 12/20/13 at the Solar Estates monitoring site but which leveled off at zero through 3/04/14. Mr. Owens mentioned that a bleaching agent was a possible source that was used in the stacks at the refinery to control odors. The hours of the elevated SO_2 were noted during the work day during either early morning or late afternoon. The TCEQ had contacted the company and was told that the company had not changed any of the cleaning chemicals, nor were any scrubber solutions changed. Neither the TCEQ nor the company has any idea what changed to cause the uptick in SO_2. Dr. Sullivan will continue to look into this.

III. Follow up to Old Business/Action Items

IV. Advisory Board

Mr. Torres suggested the weeks of November 10, December 8, or December 15, 2014 as possible meeting dates for the next Advisory Board meeting.

V. Adjourn

The meeting adjourned at 1:45pm.

APPENDIX C

Financial Report of Expenditures
Financial Report of Interest Earned

Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi - Phase 1B

Accounting Report for the Quarter
01/01/14 - 03/31/14

A. Total Amount of Air Toxics Funds and Other Funds Received Under This Proposal

Total Grant Amount:	$2,745,371.68
Total Interest Earned:	$390,968.11
Total Funds Received:	**$3,136,339.79**

B. Summary of Expenditures Paid by Air Toxics Funds

		Yr 1 Budget	Year 2 Budget	Year 3 Budget	Year 4 Budget	Adjustments Prior Quarter	Adjustments This Quarter	Adjusted Budget	Prior Activity	Current Activity 01/01/14 - 03/31/14	Encumbrances	Remaining Balance 01/01/14 - 03/31/14
Salaries-Prof	12	$111,654.00	$183,063.49	$31,566.18	$31,566.18	($29,495.84)	$0.00	$296,787.83	($62,224.95)	($40,831.81)	($66.95)	$193,664.12
Fringe	14	$24,563.88	$40,273.97	$11,051.05	$11,051.05	$0.00	$0.00	$75,888.90	($19,088.40)	($13,066.08)	($592.61)	$43,141.81
Salaries-CEER	15	$0.00	$0.00	$10,538.09	$0.00	$29,495.84	$0.00	$40,033.93	($18,136.36)	($12,061.47)	$0.00	$9,836.10
Salary Holding	16	$133,401.93	$0.00	$0.00	$0.00	($133,401.93)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Quality Assurance	41	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Cell Phone Allowance	42	$0.00	$300.00	$360.00	$360.00	$60.00	$0.00	$720.00	($450.00)	($90.00)	$0.00	$180.00
SEP Reserve	43	$10,800.00	$0.00	$0.00	$0.00	($10,800.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Contingency	47	$0.00	$0.00	$5,000.00	$5,000.00	$0.00	$0.00	$5,000.00	$0.00	$0.00	$0.00	$5,000.00
Monthly M&O	50	$0.00	$0.00	$20,908.45	$20,908.45	$30,957.32	$0.00	$51,865.77	($25,706.98)	($10,398.81)	($5,066.00)	$10,693.98
Equipment & Spare Parts	51	$0.00	$32,584.00	$17,539.29	$17,539.29	$0.00	$0.00	$50,123.29	($24,506.47)	($3,009.78)	$0.00	$22,607.04
Telephone SWB-DSL/RR	52	$0.00	$8,454.00	$8,707.47	$8,707.47	$1,946.00	$0.00	$19,107.47	($10,536.19)	($2,574.31)	$0.00	$5,996.97
Electric	53	$0.00	$22,438.00	$23,086.69	$23,086.69	$4,062.00	$0.00	$49,586.69	($27,758.03)	($6,516.70)	$0.00	$15,311.96
Gases	54	$0.00	$10,811.00	$10,676.72	$10,676.72	$1,439.00	$0.00	$22,926.72	($12,373.97)	($6,288.55)	($4,118.83)	$145.37
Other Costs	55	$0.00	$0.00	$260,000.00	$260,000.00	$0.00	$0.00	$260,000.00	$0.00	$0.00	$0.00	$260,000.00
Consultant Services - Holding	60	$80,000.00	$0.00	$0.00	$0.00	($80,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Consultant Services - ORSAT/TMSI	61-62	$0.00	$194,750.38	$466,081.72	$466,081.72	$218,430.02	$0.00	$879,262.12	($469,979.94)	($90,881.55)	$0.00	$318,400.63
Analytical	68	$0.00	$27,839.39	$6,458.00	$6,458.00	$22,960.61	$0.00	$57,258.00	($36,762.00)	($20,350.00)	$0.00	$146.00
Travel	75	$0.00	$3,000.00	$1,000.62	$1,000.62	$300.00	$0.00	$4,300.62	($1,653.30)	($958.70)	($0.03)	$1,688.59
Equipment	80	$0.00	$0.00	$0.00	$0.00	$43,700.00	$0.00	$43,700.00	($43,700.00)	$0.00	$0.00	$0.00
Indirect Costs	90	$54,062.97	$78,527.13	$130,946.14	$130,946.14	$14,947.95	$0.00	$278,484.19	($112,931.51)	($31,054.17)	$0.00	$134,498.51
TOTALS		**$414,482.78**	**$602,041.36**	**$1,003,920.42**	**$993,382.33**	**$114,600.97**	**$0.00**	**$2,135,045.53**	**($865,808.10)**	**($238,081.93)**	**($9,844.42)**	**$1,021,311.08**

C. Interest Earned by Air Toxics Funds as of 01/01/14 - 03/31/14

Prior Interest Earned:	$390,685.66
Interest Earned This Quarter:	$282.45 *Need to wait for interest doc to be final approved next week 5/2/14
Total Interest Earned to Date:	**$390,968.11**

D. Balance of Air Toxics Funds as of 01/01/14 - 03/31/14

Total Grant Amount:	$2,745,371.68
Total Interest Earned:	$390,968.11
Total Expenditures:	($1,103,890.03)
Remaining Balance:	**$2,032,449.76**

I certify that the numbers are accurate and reflect acutal expenditures for the quarter

Accounting Certification
26-7700-99

Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi - Stage 1 Phase 1A

Accounting Report for the Quarter
01/01/14 - 03/31/14

A. Total Amount of Air Toxics Funds and Other Funds Received Under This Proposal

Total Grant Amount:	$1,863,081.22
Total Interest Earned:	$344,222.10
Interest Transferred to Phase 1B	($344,222.10)
Total Funds Received:	**$1,863,081.22**

B. Summary of Expenditures Paid by Air Toxics Funds

		Yr 1 and Yr2 Budget	Year 3 Budget	Adjustments Prior Quarter	Adjustments This Quarter	Adjusted Budget	Prior Activity	Current Activity 07/01/13 - 09/30/13	Encumbrances	Remaining Balance 07/01/13 - 09/30/13
Salaries-Prof	**12**	$616,882.00	$228,508.00	($95,903.26)	$0.00	$749,486.74	($749,486.74)	$0.00	$0.00	$0.00
Salaries-CEER	**15**	$66,780.00	$24,045.00	($11,435.81)	$0.00	$79,389.19	($79,389.19)	$0.00	$0.00	$0.00
Fringe	**14**	$149,185.00	$55,852.00	($22,669.10)	$0.00	$182,367.90	($182,367.90)	$0.00	$0.00	$0.00
Supplies	**50**	$61,991.00	-$5,831.00	($21,633.36)	$0.00	$34,526.64	($34,526.64)	$0.00	$0.00	$0.00
Contingency	**51**	$6,746.00	$27,805.00	($34,551.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Consultants	**60**	$22,500.00	$2,500.00	($25,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Subcontracts	**61-63**	$600,000.00	$0.00	($54,943.78)	$0.00	$545,056.22	($545,056.22)	$0.00	$0.00	$0.00
Modeling/Computer Svs	**67**	$46,500.00	$12,500.00	($59,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Computation Center	**68**	$0.00	$1,800.00	$0.00	$0.00	$1,800.00	($1,800.00)	$0.00	$0.00	$0.00
Tuition	**71**	$17,727.00	$0.00	($125.00)	$0.00	$17,602.00	($17,602.00)	$0.00	$0.00	$0.00
Travel	**75**	$15,000.00	$5,000.00	($17,403.03)	$0.00	$2,596.97	($2,596.97)	$0.00	$0.00	$0.00
Equipment	**80**	$17,500.00	$7,500.00	($17,755.00)	$0.00	$7,245.00	($7,245.00)	$0.00	$0.00	$0.00
Indirect Costs	**90**	$243,122.00	$53,952.00	($54,063.44)	$0.00	$243,010.56	($243,010.56)	$0.00	$0.00	$0.00
TOTALS		$1,863,933.00	$413,631.00	($414,482.78)	$0.00	$1,863,081.22	($1,863,081.22)	$0.00	$0.00	$0.00

C. Interest Earned by COCP Funds as of 09/30/13

Prior Interest Earned:	$344,222.10
Interest Earned This Quarter:	$0.00
Interest Transferred to Phase 1B	-$344,222.10
Total Interest Earned to Date:	**$0.00**

D. Balance of COCP Funds as of 09/30/13

Total Grant Amount:	$1,863,081.22
Total Interest Earned:	$0.00
Total Expenditures:	($1,863,081.22)
Remaining Balance:	**$0.00**

I certify that the numbers are accurate
and reflect acutal expenditures
for the quarter

Accounting Certification
26-7696-41