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, 2015 through March 31, 2015

Submitted to

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

Mr. John L. Jones
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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May 29, 2015

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 from Stage 1, Phase 1A 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, 2015, 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

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

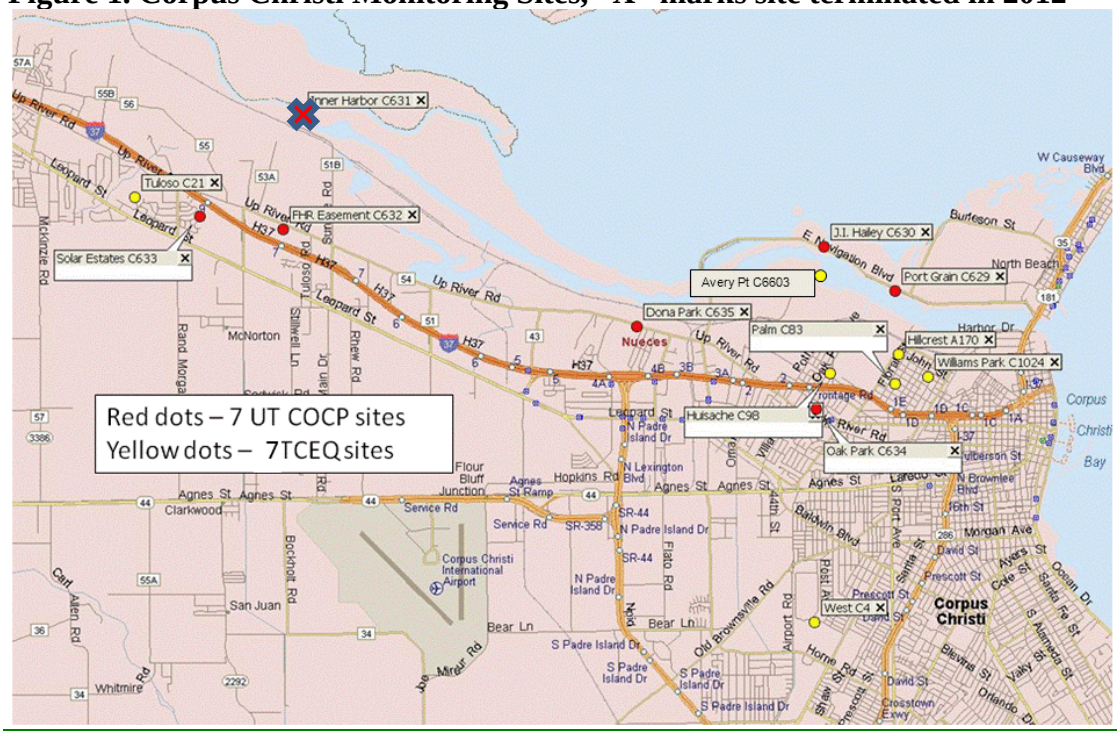

Table 1. Schedule of Air Monitoring Sites, Locations and Major Instrumentation

TCEQ CAMS#	Description of Site Location	Monitoring Equipment 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)

Table 1 (Continued)
Legend

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 detailed description of the data analyses and findings for this quarter appears in Appendix A, pages 8 through 31. Specifically, the appendix contains the following elements:

- **Auto-GC Data Summary –** In examining the validated fourth quarter of 2014 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 and partially validated first quarter average concentrations were below each compound's long-term AMCVs. A summary of data appears on pages 13 through 22. In examining all the data over the course of the project, it does appear that for some hydrocarbon species mean concentrations there is a general increase in recent years.

- **Benzene Summary** – A review of ten years of data is presented, with a focus on overall trends since 2005 and the first quarter average concentrations from 2006 through 2015, which appears on pages 22 through 25.

- **SO_2 and H_2S Summary** – A summary of SO_2 and H_2S data collection in the first quarter is presented on pages 26 through 28, with one case study for the highest measured H_2S value in the quarter.

- **A Case Study on Elevated TNMHC** – A detailed description of the data collected late in the day on March 6 and early in the day on March 7, 2015 that produced several email alerts for elevated TNMHC at JIH CAMS 630 is discussed on pages 28 through 31.

B. 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/).

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.

Dr. Sullivan gave two talks during the week of 1/12-1/15/15. On 1/13/15, Dr. Sullivan spoke before the Corpus Christi Air Quality Group that deals with ozone issues, regarding the October 2014 Ozone Episode and the Corpus Christi Air Monitor Network including the following topics: 2014 Air Monitor Network Data and Air Monitor Network Beyond 2015. On 1/14/15, Dr. Sullivan spoke to the Long Term Health Workgroup regarding the 2014 Air Monitor Network Data.

3. **Budget Monitoring**
   Budget monitoring during the period has focused on projects costs for Stage 1, Phase 1B – Sites Operation and Maintenance costs. Financial reports for the quarter are included in Appendix B, pages 33 through 35.

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 B, pages 33 through 35.

A. Total Amount of Air Toxics Project Funds and Other Funds Received Under the Project
   The Air Toxics Project interest earned received through March 31, 2015 totals $3,137,431.52. This total includes interest earned through March 31, 2015.

B. Detailed List of the Actual Expenditures Paid from Air Toxics Project Funds Stage 1, Phase 1B through March 31, 2015
   Expenditures of Air Toxics Project funds during this quarter totaled $189,710.03. 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, 2015
   The interest earned during this quarter totaled $254.30. The Air Toxics Project total interest earned through March 31, 2015 totals $392,059.84. A report providing detailed calculations of the interest earned on the Air Toxics Project funds is included in Appendix B, pages 33 through 35.

D. Balance as of March 31, 2015, in the Air Toxics Project Account
   The balance in the Air Toxics Project account, including interest earned totals $1,231,611.30.

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, 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.

Quarterly Report Distribution List:

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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, 2015 through March 31, 2015

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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, 2015. 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 2014 and first quarter of 2015;
- Information on the trends for benzene concentrations at the two project auto-GCs in residential areas, now with ten years of first quarter data, and at the TCEQ's Palm auto-GC, with five years of first quarter data (since 2011);
- A summary of sulfur dioxide (SO_2) and hydrogen sulfide (H_2S) monitoring and a case study of March 17 at JIH CAMS 630 regarding the highest one hour H_2S measurement of the first quarter of 2015; and
- A case study on elevated TNMHC and a canister sampled at JIH CAMS 630 on March 6 to March 7, 2015.

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, generally followed by station identification number
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

Table 2 (Continued)
Legend

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 have operated at Solar Estates CAMS 633 and Oak Park CAMS 634 since March 2005. 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 2015). 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 2015).

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 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 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 27 hydrocarbon species 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 hydrocarbon species at all three sites.

Table 3, on page 14, lists the data completeness from the two project auto-GCs from January 2013 through the most recent month of data validation (Feb. 2015). 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, 2013-2015, validated data only

Month	Oak Park	Solar Est.	Month	Oak Park	Solar Est.	Month	Oak Park	Solar Est.
Jan-13	100	100	Jan-14	97	96	Jan-15	93	100
Feb-13	94	99	Feb-14	99	100	Feb-15	96	100
Mar-13	97	100	Mar-14	93	97	Mar-15		
Apr-13	100	100	Apr-14	98	100			
May-13	99	99	May-14	95	98			
Jun-13	75*	91*	Jun-14	100	84*			
Jul-13	98	99	Jul-14	80*	100			
Aug-13	87	98	Aug-14	96	99			
Sep-13	82	99	Sep-14	99	100			
Oct-13	99	99	Oct-14	98	98			
Nov-13	91	100	Nov-14	99	99			
Dec-13	99	99	Dec-14	98	100			
Average 2013	**93**	**99**	**Average 2014**	**96**	**98**	**Average 2015**	**94**	**100**

* Months with planned preventive maintenance

Table 4, on page 16, summarizes the statistics (maximum and average values) on fully validated data from the fourth quarter of 2014. Data in this table are available to TCEQ staff at http://rhone3.tceq.texas.gov/cgi-bin/agc_summary.pl (accessed April 2015). Table 5, on page 17, summarizes the statistics (average values only) on partially validated data from the first quarter of 2015.

As noted in the preceding paragraph, Tables 4 and 5 contain some statistics for 27 hydrocarbon species for the periods of interest. All concentration values in the tables are in ppbV units. No individual 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 and Table 5 are shown graphically in Figures 2 and 3, respectively, on page 18. 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 lower in the second and third quarters of the year, and higher 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 for the most prominent species were higher in the first quarter of 2015 compared with the fourth quarter 2014 at all three Corpus Christi sites. Figure 4, on page 19, shows the average concentrations from the first quarter of 2014, which are lower than in the first quarter of 2015. These differences in quarterly concentration means may be related to meteorology and/or emissions differences.

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 2014

Units ppbV	Oak 4Q14			Solar 4Q14			Palm 4Q14		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	225.530	56.290	11.540	240.100	52.130	13.410	301.810	55.330	11.480
Ethylene	35.130	4.613	0.710	8.398	1.642	0.622	30.689	3.465	0.578
Propane	178.270	38.880	7.023	119.920	36.020	7.664	80.844	40.170	7.264
Propylene	4.376	1.210	0.323	9.270	0.931	0.267	5.449	1.008	0.272
Isobutane	81.195	10.080	2.552	45.745	8.277	2.215	46.963	11.330	2.488
n-Butane	158.570	19.690	4.166	43.355	16.360	3.646	73.459	20.860	3.979
t-2-Butene	3.652	0.384	0.091	0.732	0.120	0.047	2.626	0.274	0.058
1-Butene	1.073	0.335	0.065	0.826	0.139	0.028	1.415	0.224	0.075
c-2-Butene	2.474	0.386	0.095	0.734	0.142	0.046	2.315	0.238	0.044
Isopentane	61.776	8.068	2.021	18.634	5.256	1.427	37.963	7.350	1.768
n-Pentane	50.986	6.565	1.384	13.879	4.432	1.013	15.98	5.789	1.172
1,3-Butadiene	4.889	0.272	0.038	0.149	0.025	0.008	0.394	0.082	0.024
t-2-Pentene	1.327	0.295	0.074	0.560	0.059	0.005	3.107	0.265	0.042
1-Pentene	0.798	0.155	0.039	0.357	0.035	0.006	1.980	0.140	0.027
c-2-Pentene	0.630	0.124	0.028	0.282	0.027	0.002	1.689	0.134	0.021
n-Hexane	15.079	2.386	0.579	5.147	1.399	0.452	23.715	2.224	0.520
Benzene	**5.829**	**1.335**	**0.374**	**13.866**	**1.991**	**0.229**	**6.975**	**1.344**	**0.269**
Cyclohexane	8.529	0.923	0.224	2.740	0.499	0.182	19.552	1.531	0.171
Toluene	5.106	1.604	0.454	1.987	0.578	0.241	42.683	6.778	0.394
Ethyl Benzene	0.777	0.145	0.047	0.458	0.077	0.022	2.038	0.362	0.029
m&p -Xylene	4.546	0.461	0.162	8.165	0.958	0.184	6.610	1.246	0.139
o-Xylene	0.776	0.151	0.055	0.585	0.100	0.028	2.234	0.415	0.044
Isopropyl Benzene	2.077	0.328	0.043	1.622	0.143	0.014	0.478	0.113	0.005
1,3,5-Tri-methylbenzene	0.361	0.072	0.019	0.434	0.071	0.011	0.291	0.060	0.016
1,2,4-Tri-methylbenzene	4.119	0.245	0.052	0.449	0.096	0.026	0.731	0.160	0.041
n-Decane	0.614	0.112	0.036	1.144	0.197	0.037	0.403	0.078	0.024
1,2,3-Tri-methylbenzene	0.260	0.062	0.023	0.181	0.031	0.005	0.212	0.046	0.017

Table 5. Partially validated auto-GC mean statistics, 1st quarter 2015

Units ppbV	Oak Park 1Q15	Solar Estates 1Q15	Palm 1Q15
Species	**Mean**	**Mean**	**Mean**
Ethane	17.340	17.250	18.360
Ethylene	1.030	0.759	0.982
Propane	11.190	10.630	11.590
Propylene	0.481	0.282	0.416
Isobutane	3.341	2.650	3.717
n-Butane	5.861	4.844	6.761
t-2-Butene	0.095	0.047	0.124
1-Butene	0.063	0.033	0.114
c-2-Butene	0.060	0.046	0.104
Isopentane	2.549	1.701	2.624
n-Pentane	1.951	1.270	1.723
1,3-Butadiene	0.034	0.009	0.036
t-2-Pentene	0.076	0.007	0.075
1-Pentene	0.038	0.006	0.039
c-2-Pentene	0.028	0.003	0.035
n-Hexane	0.704	0.490	0.630
Benzene	**0.555**	**0.200**	**0.343**
Cyclohexane	0.265	0.175	0.211
Toluene	0.495	0.230	0.341
Ethyl Benzene	0.051	0.020	0.035
m&p -Xylene	0.175	0.187	0.198
o-Xylene	0.060	0.022	0.059
Isopropyl Benzene	0.031	0.011	0.013
1,3,5-Tri-methylbenzene	0.021	0.008	0.019
1,2,4-Tri-methylbenzene	0.052	0.022	0.042
n-Decane	0.040	0.028	0.032
1,2,3-Tri-methylbenzene	0.024	0.002	0.011

Figure 2. Mean ppbV, 27 species at 3 auto-GCs, 4th quarter 2014 (validated data)

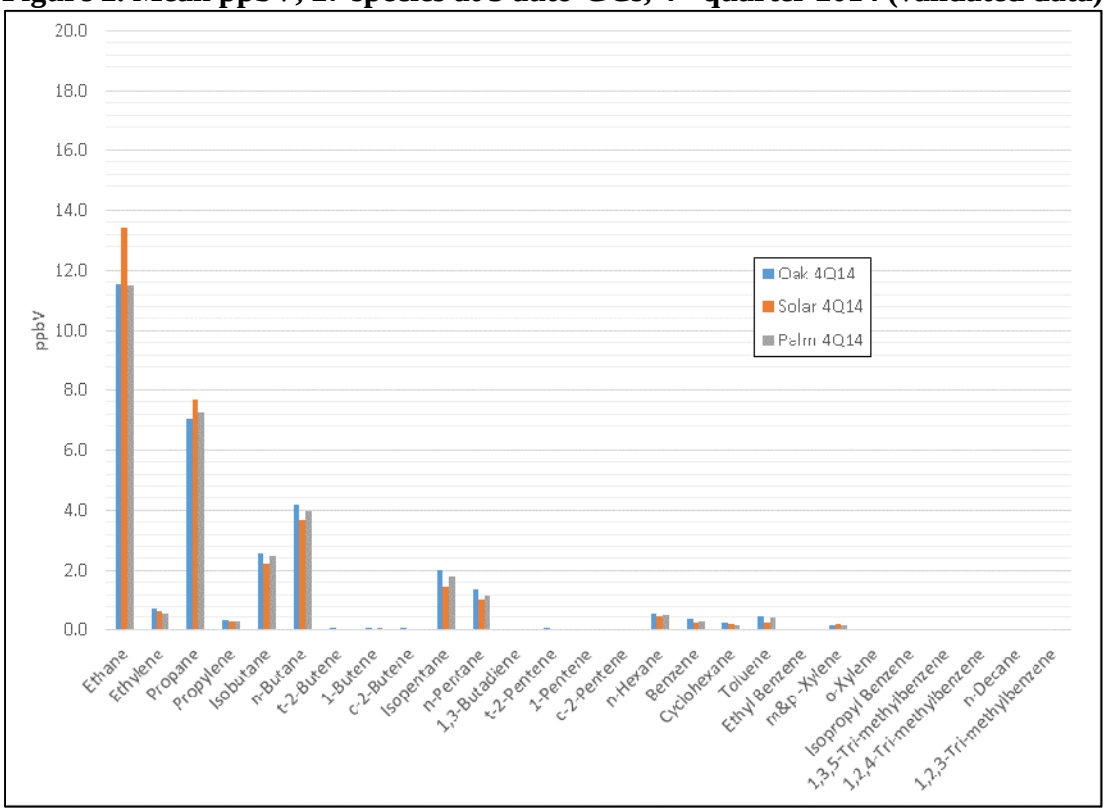


Figure 3. Mean ppbV, 27 species at 3 auto-GCs, 1st quarter 2015 (partially validated data)

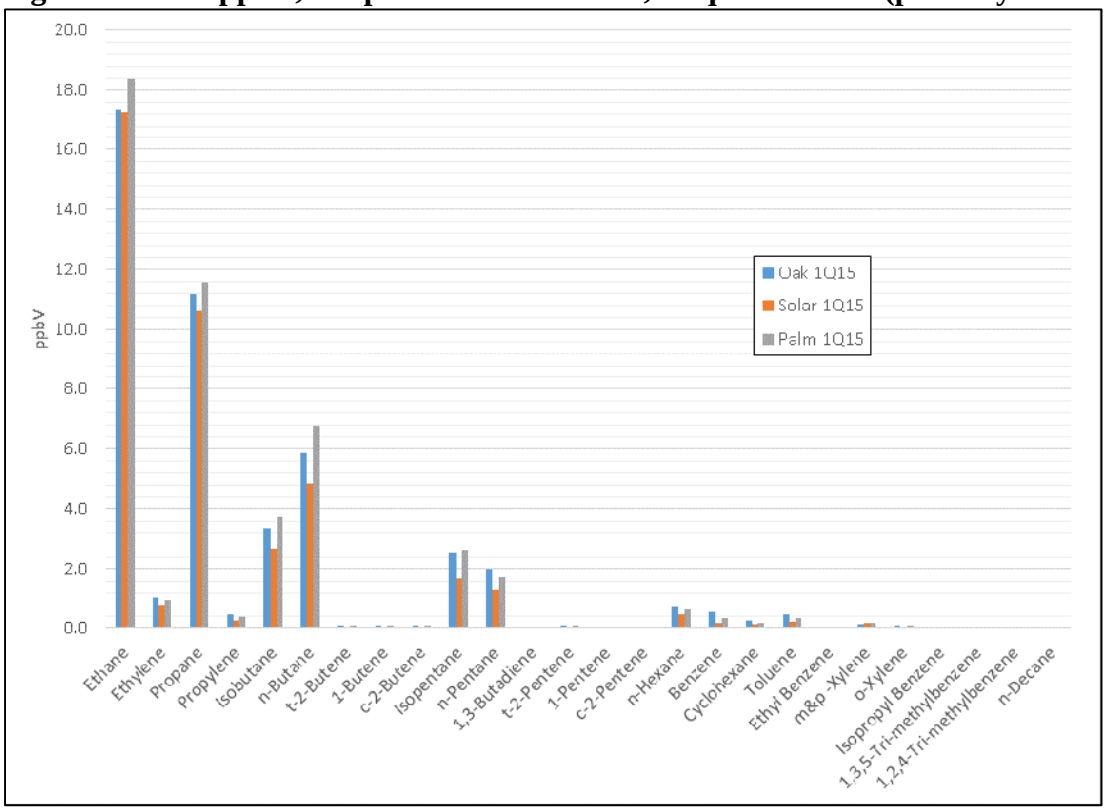
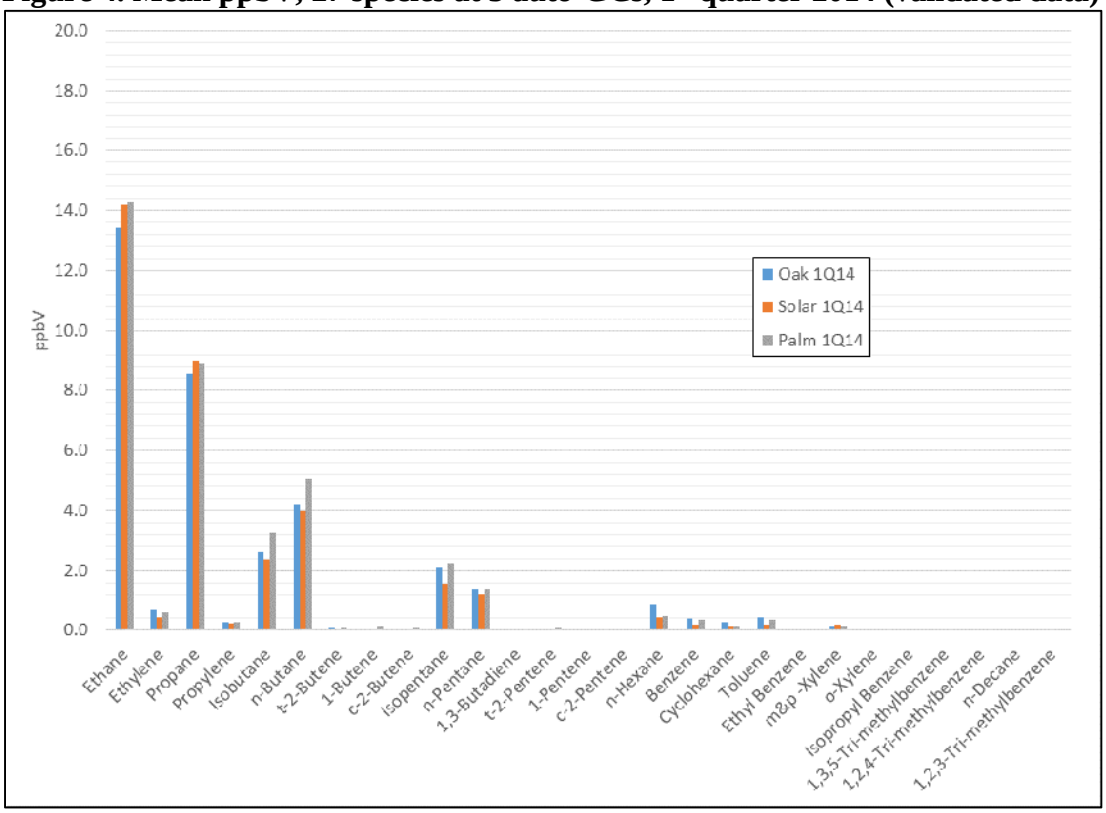


Figure 4. Mean ppbV, 27 species at 3 auto-GCs, 1st quarter 2014 (validated data)



As was reported in the recent quarterly reports and in the 2013 and 2014 annual reports, the annual and quarterly means concentrations from Solar Estates and Oak Park are higher over the last four years under northerly winds for ethane and propane and some other *light alkane*[1] species than in the preceding three years. For the first quarter of 2015, the overall trend is for higher concentrations for several alkane species at Oak Park, Solar Estates, and at the TCEQ's Palm site. A preliminary hypothesis is that increased natural gas and oil extraction or processing emissions are possible assignable causes for the higher mean concentrations. Figure 5, on page 20, shows graphical summaries of the mean concentrations for the first quarters of the years 2006 through 2015 for Solar Estates for ethane and propane, two species found in natural gas, and two butane isomers and two pentane isomers, which may be in natural gas and in other fuel products. Figure 6, on page 20, shows only the butane and pentane isomers at Solar Estates to better show the change in these lower-concentration species over time. Figures 7 and 8, on page 21, are similar first quarter graphs for the Oak Park site, and Figures 9 and 10, on page 22, are similar first quarter graphs for the TCEQ Palm site, beginning in 2011.

[1] Alkanes are a class of hydrocarbons that are fully saturated (single carbon-hydrogen and carbon-carbon bonding). The light-weight alkanes discussed here have between two and five carbon atoms.

Figure 5. Mean concentrations of ethane, propane, butane isomers, and pentane isomers during first quarters of each year at Solar Estates

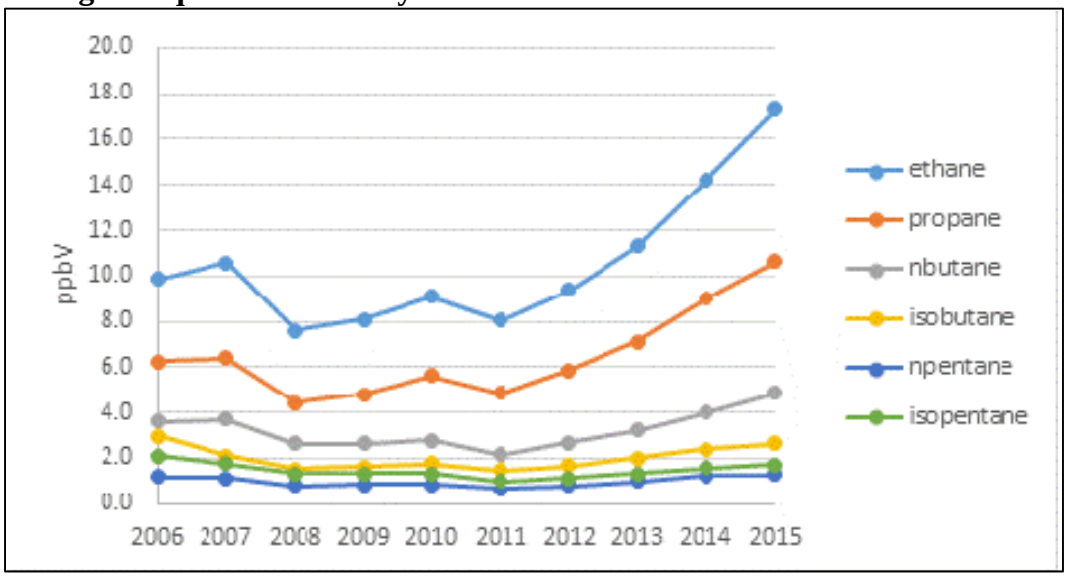


Figure 6. Mean concentrations of butane and pentane isomers during first quarters of each year at Solar Estates

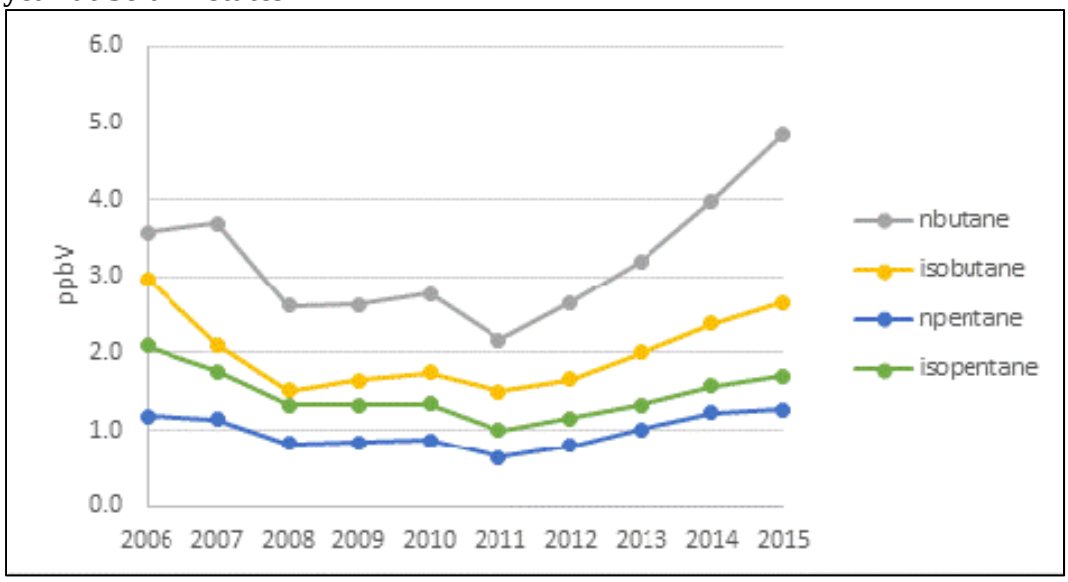


Figure 7. Mean concentrations of ethane, propane, butane isomers, and pentane isomers during first quarters of each year at Oak Park

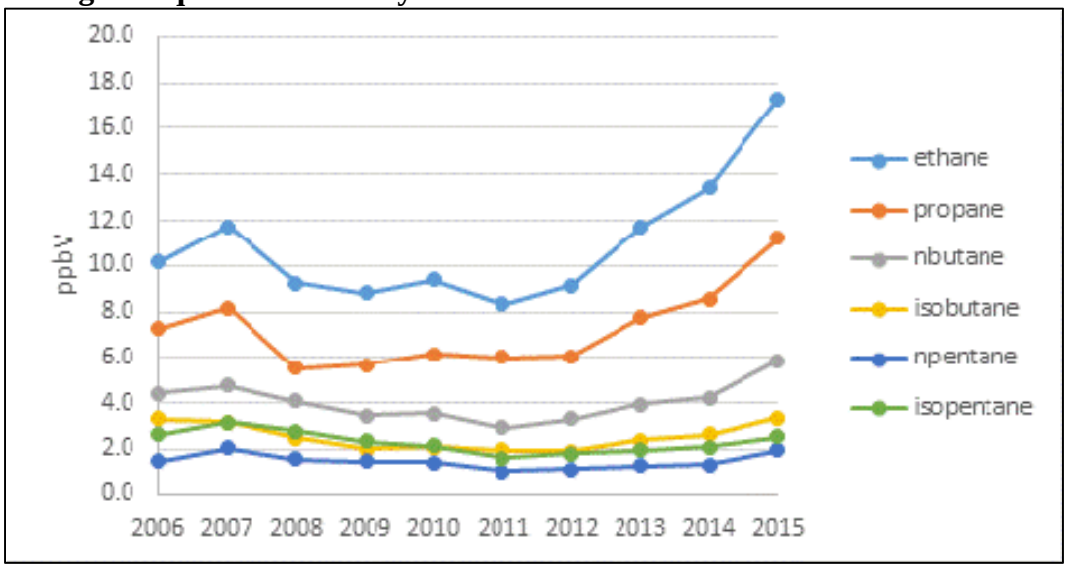


Figure 8. Mean concentrations of butane and pentane isomers during first quarters of each year at Oak Park

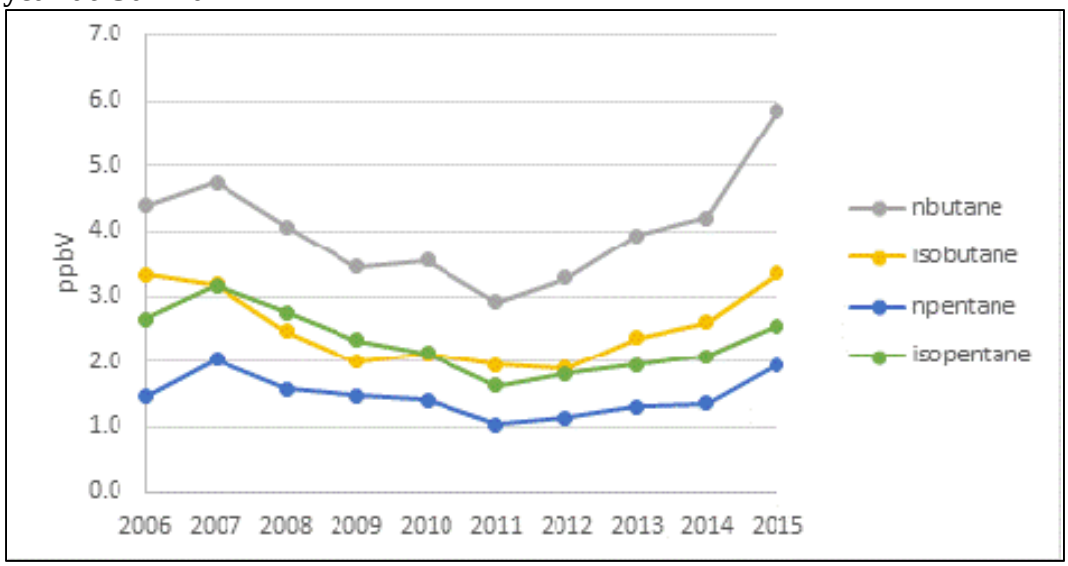


Figure 9. Mean concentrations of ethane, propane, butane isomers, and pentane isomers during first quarters of each year at TCEQ's Palm site

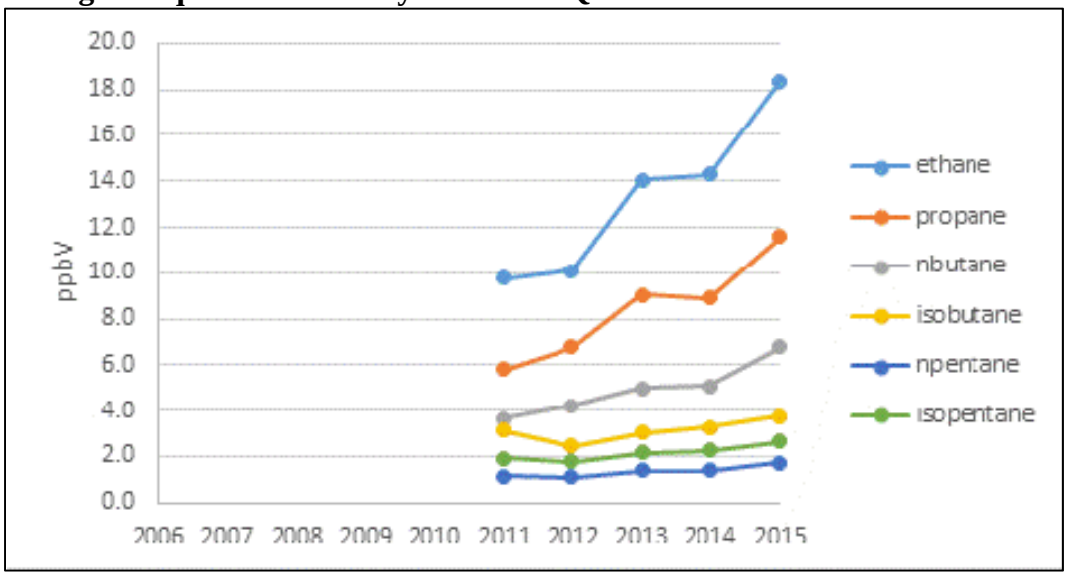
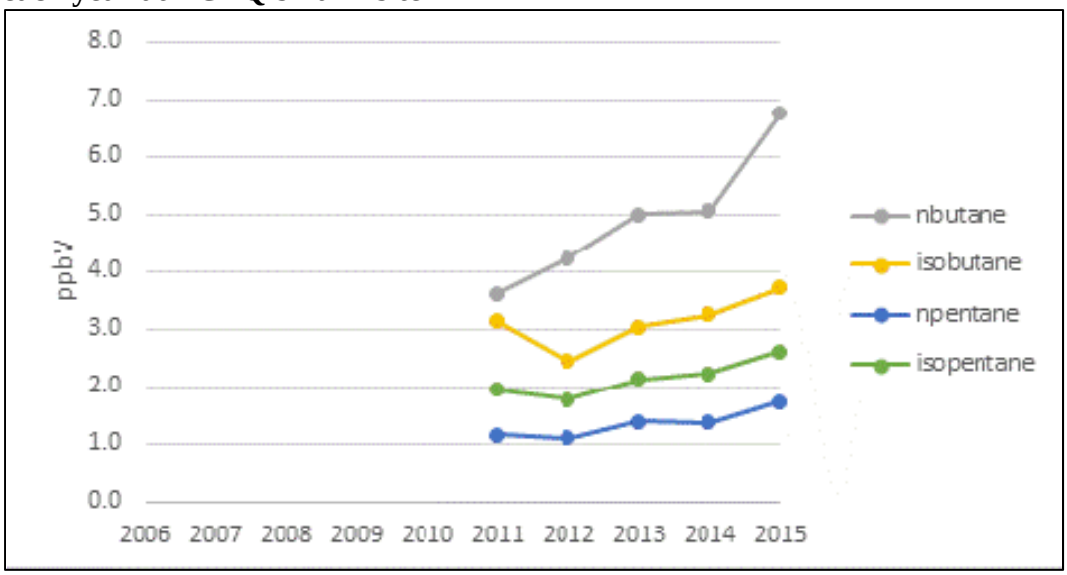


Figure 10. Mean concentrations of butane and pentane isomers during first quarters of each year at TCEQ's Palm site



2. Benzene Concentrations in Residential Areas

As has been discussed in past reports, benzene concentrations in 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 through 2015), concentration averages have generally shown relatively little variation compared to earlier years, unlike the behavior of the light alkane species described earlier in this report. 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 from March 1, 2005 through March 31, 2015 with two points

annotated by date appears in Figure 11, below. The two points from 6:00 a.m. CST Saturday, January 27, 2007, and 4:00 a.m. CST Friday, November 6, 2009, measured under northerly winds, 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, below. The time series for Solar Estates appears in Figure 13, below, with the highest value to date from October 3, 2014 labeled, having been measured under northeasterly winds. Note the different y-axis scales for the two sites, as Oak Park does tend to measure higher benzene concentrations than Solar Estates. Figure 14, on page 24, shows the time series for the TCEQ Palm auto-GC, operating since 2010, with apparent outliers on January 30, 2012 and May 13, 2014 indicated, both measured under northerly winds.

Figure 11. Oak Park hourly benzene March 1, 2005 – March 31, 2015, ppbV units, individual elevated values noted, no observations greater than the TCEQ's AMCV

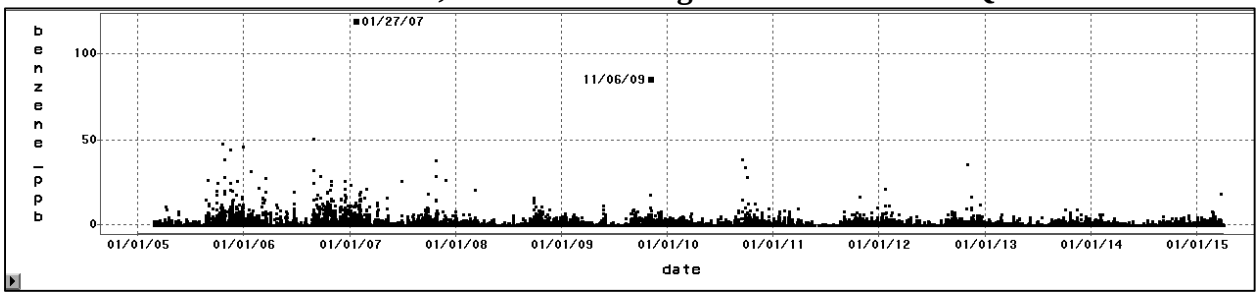


Figure 12. Oak Park hourly benzene March 1, 2005 – March 31, 2015, ppbV units, two outliers from January 27, 2007 and November 6, 2009 removed

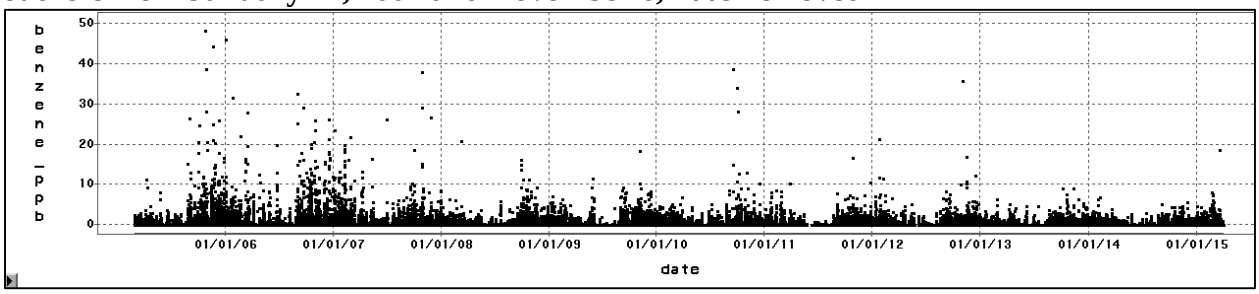


Figure 13. Solar Estates hourly benzene Mar. 2005 – March 31, 2015, ppbV units, maximum concentration noted, no observations greater than the TCEQ's AMCV

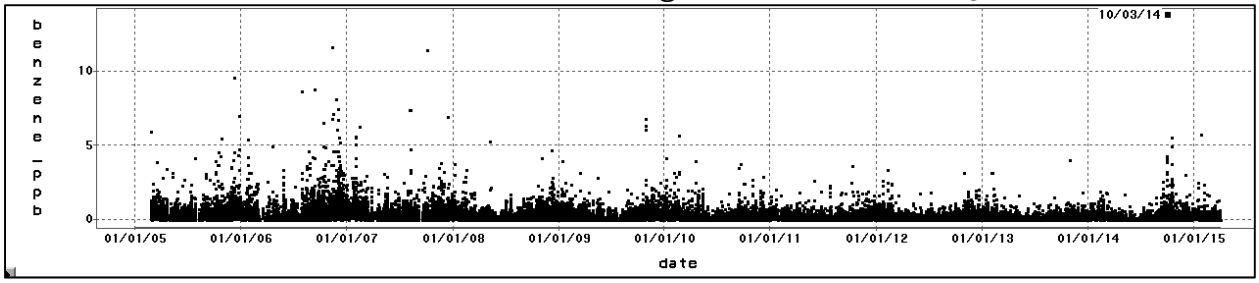


Figure 14. TCEQ Palm hourly benzene June 1, 2010 – March 31, 2015, ppbV units, individual highest concentrations noted, no observations greater than the TCEQ's AMCV

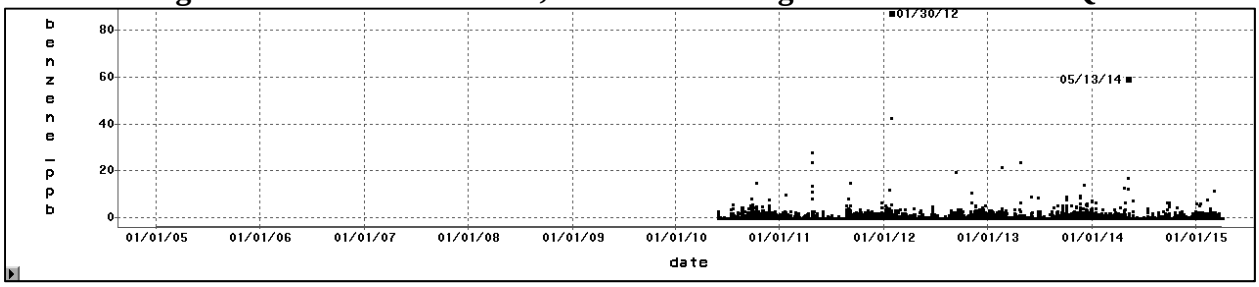


Table 6, below, shows the first quarter average concentrations from the two project auto-GCs for benzene from 2006 through 2015, and for the TCEQ Palm site since 2011. The first quarter of 2005 had only data for March for the two project auto-GCs and so was not judged to be representative. The project now has ten years of complete first quarter data. The first quarter means are graphed in Figure 15, on page 25. The means for TCEQ's Palm site are shown for 2011 through 2015 only. The first quarter averages at UT sites from 2008 through 2015 are statistically significantly lower than in the first quarters of the project's first three years, and this finding is similar to findings for other quarters in recent reports on this project. Table 6 and Figure 15 shows relatively little variation in the quarterly means for Solar Estates from 2011 through 2015, with values ranging from 0.195 to 0.201 ppbV.

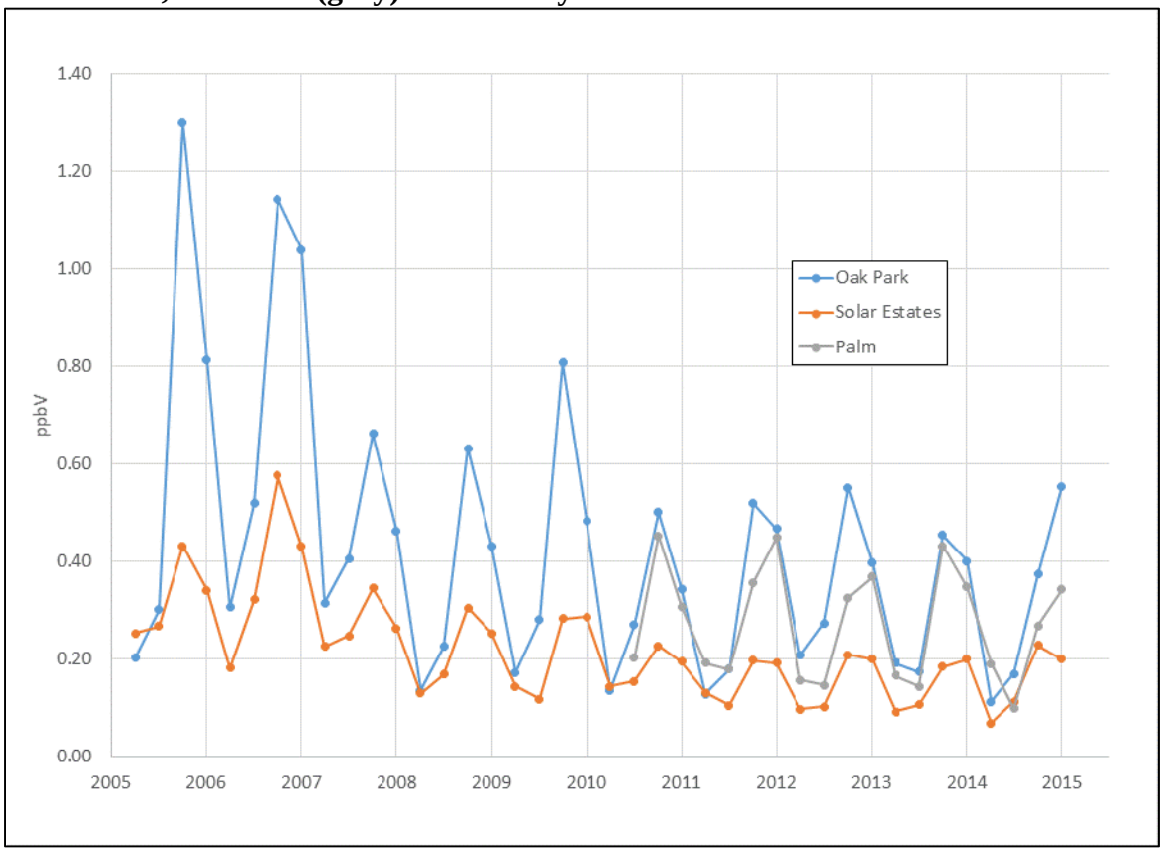
Figure 16, on page 25, shows the quarterly means for the three sites since each started operation. This figure shows the strong seasonal effects, the early downward trend and subsequent flattening out in the trends at Oak Park and Solar Estates, and similarity between the Oak Park and TCEQ Palm benzene concentration means until late 2014. The Oak Park value in the first quarter of 2015 was 38 percent higher than the first quarter of 2014, and the highest first quarter average since 2007. This may have been caused by meteorology or emissions or a combination. This trend will be watched closely.

Table 6. Mean statistics for Benzene at Oak Park and Solar Estates, 1st quarter 2006 – 2015, Palm 2011 – 2015, ppbV units

year	Oak Park	Solar Estates	Palm
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	0.402	0.200	0.349
2015	0.555	0.200	0.343

Figure 15. Mean concentrations of benzene, ppbV units, during fourth quarters of each year at Oak Park (blue) and Solar Estates (orange), 2005 – 2014 and Palm (gray) 2010 – 2014

Figure 16. Mean concentrations of benzene by quarter of each year at Oak Park (blue) and Solar Estates (orange), 2005 – early 2015 with lower values in 2008 – 2015 compared with 2005 – 2007, and Palm (gray) 2010 – early 2015



3. Sulfur Dioxide and Hydrogen Sulfide Measurements at Corpus Christi Monitors

As was mentioned earlier in this report, SO_2 ambient concentrations are regulated by the National Ambient Air Quality Standards (NAAQS) established in 2010. EPA set the SO_2 NAAQS to include a level of 75 ppb averaged over one hour, with a form of the three-year average of the annual 99th percentiles of the daily maximum one-hour averages. If measurements are taken for a full year at a monitor, then the 99th percentile would be the fourth highest daily one hour maximum. Individual hourly concentrations measured above the SO_2 75 ppb level of the NAAQS are called *exceedances*. The average of the three years 99th percentile daily maxima at a monitoring site is that site's *design value*. There is also a secondary SO_2 standard of 500 ppb over three hours, not to be exceeded more than once in any one year; however, concentrations this high have not been measured by TCEQ or UT monitors. The TCEQ also has a shorter 30-minute rolling average net ground level standard of 400 ppb that may not be added by an individual emission source on top of a background concentration. Concentrations this high have not been measured by TCEQ or UT monitors in Corpus Christi.

Over time, regulatory efforts have reduced the amount of sulfur in fuels, leading to reduced SO_2 in ambient air. Recent reports on this project have shown that the reductions in sulfur content in fuel used in ships in the Corpus Christi ship channel have led to reduced concentrations measured at specific monitors. Sulfur reductions have also been made in diesel fuel used by some motor vehicles and in the coal used in some power plants. Currently all Nueces County SO_2 monitors are in compliance with the NAAQS.

Hydrogen sulfide (H_2S) is not a NAAQS-regulated pollutant, but can be odorous and toxic. It is regulated by the TCEQ 30-minute rolling average net ground level standard of 80 ppb that may not be added by an individual emission source on top of a background concentration. Elevated measured concentrations in the proximity of 80 ppb in Texas are very rare, with the exception being one monitoring site in El Paso. There have been no 80 ppb 30-minute exceedances in Corpus Christi since April 2012.

The maximum one-hour values measured at each project site for SO_2 and H_2S in the first quarter of 2015 are shown in Table 7, on page 27. The 20.4 ppb H_2S one-hour value at JIH CAMS 630 was measured on March 17 at 2 a.m., CST, with winds from the south. The peak 5-minute H_2S value that morning was 41.6 ppb at 2:30 a.m., and the maximum 30-minute average was 22.8 ppb. A short time later H_2S rose above background levels at the Grain CAMS 629 site, peaking at 15.2 ppb for a 5-minute value at 4:20 a.m. Five-minute time series graphs for H_2S at JIH CAMS 630 and Grain CAMS 629, March 16 evening to March 17, 2015 morning, with JIH wind direction are shown in Figure 17, on page 27. Figure 18, on page 27, shows side-by-side surface back-trajectories generated by the UT Corpus Christi Trajectory Tool from 2:30 a.m. CST JIH CAMS 630 and from 4:20 a.m. CST Grain CAMS 629 on March 17, 2015. No emissions upsets were reported in the TCEQ's online database for Nueces County on March 16 or 17. The trajectory points from Figure 18 were exported to separate files and then input into UT's Google Earth Pro geographic information system program that also maps emission sources. Figure 19, on page 28, shows an aerial view of the monitoring sites, reported sulfur compound emission source locations (many of which emit H_2S), and a circle showing several sources within 400

meters of the intersection of the two trajectory centerlines. This analysis is not intended to identify a specific emission source, but rather to validate the measurements from the monitors.

Table 7. Maximum one-hour SO_2 and H_2S, ppb units, at project sites, first quarter 2015

Site	SO_2	H_2S
Grain CAMS 629	9.3	7.45
JIH CAMS 630	10.0	20.40
FHR CAMS 632	3.2	2.04
Solar Estates CAMS 633	3.3	1.85
Dona Park CAMS 635	2.3	2.73

Figure 17. Time series 5-minute data for H_2S at JIH CAMS 630 and Grain CAMS 629, March 16 evening to March 17, 2015 morning, with JIH wind direction

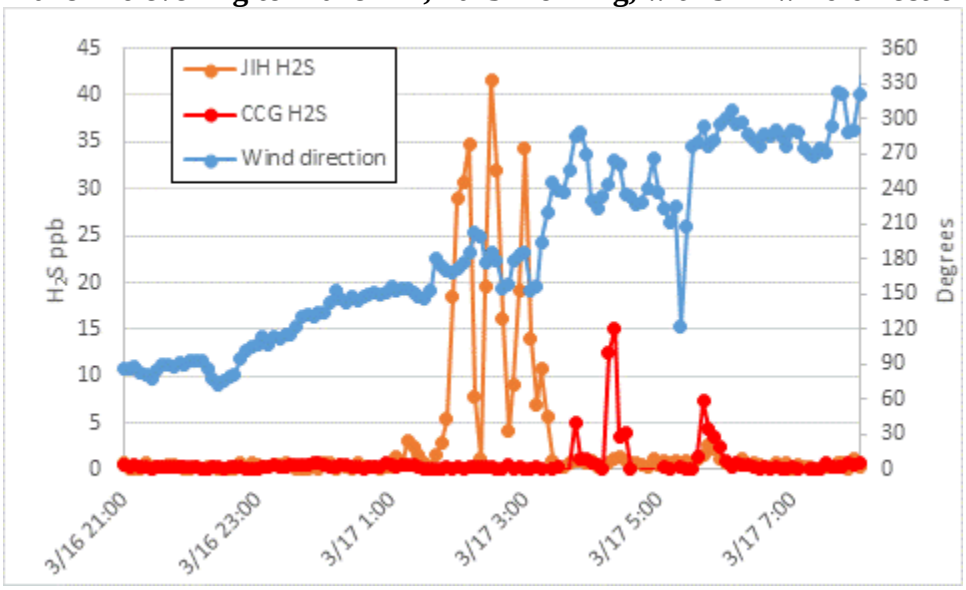


Figure 18. Surface back-trajectories from 2:30 a.m. CST JIH CAMS 630 and from 4:20 a.m. CST Grain CAMS 629 on March 17, 2015

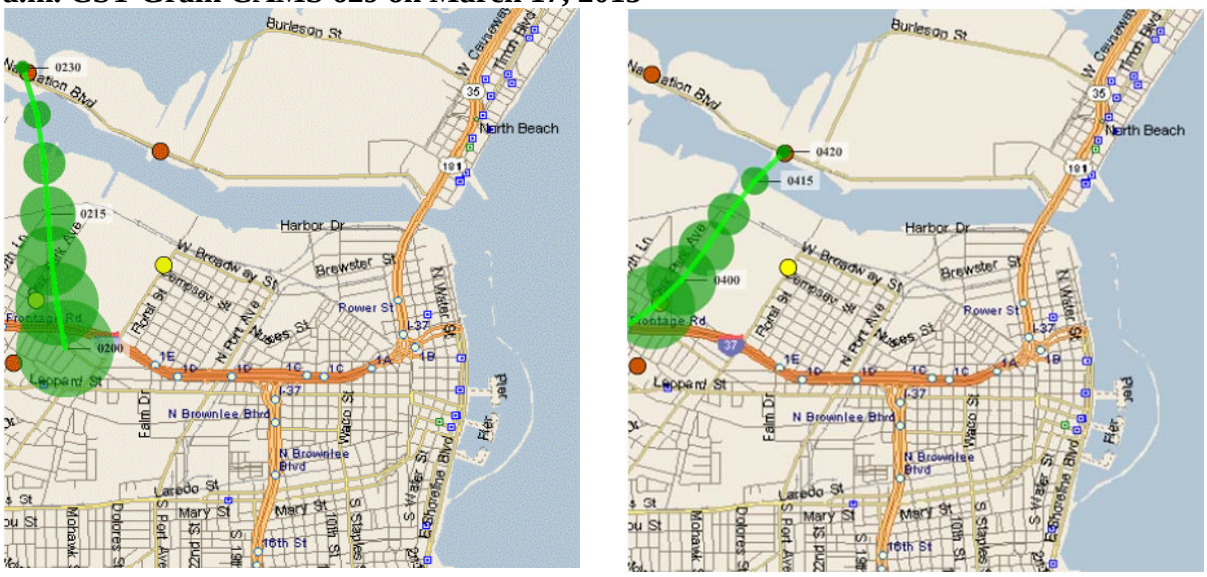
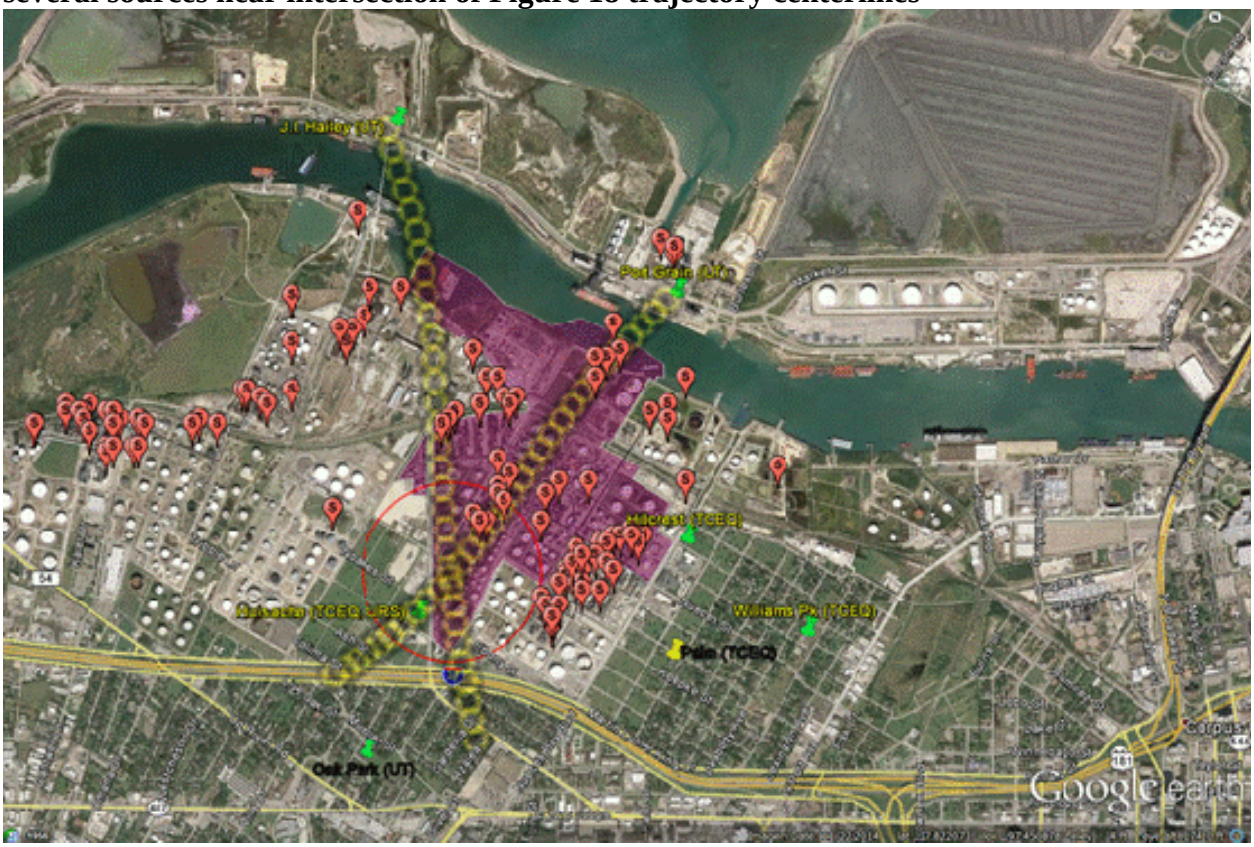


Figure 19. Aerial view of monitoring sites, sulfur sources, and a 400 meter circle showing several sources near intersection of Figure 18 trajectory centerlines



4. TNMHC Event Case Study

As is noted in each quarterly report, there are several occurrences of elevated concentrations for TNMHC each quarter. The highest TNMHC five-minute concentration in the first quarter of 2015 was measured at JIH CAMS 630 on March 6 at 11 p.m. CST. As shown in the time series graph in Figure 20, page 29, TNMHC exceeded 35,000 ppbC for one sample, and concentrations rose and fell three times between 10:30 p.m. CST and midnight. During this period, methane concentrations were relatively unchanged, suggesting natural gas was not present. Later, between 1:00 and 4:00 a.m. CST March 7, TNMHC again rose above 5,000 ppbC, but methane also rose above its approximately 2,000 ppbC background concentration. A canister sample was triggered at 11:09 p.m. CST March 6 and sampled for the time period shown in Figure 20 as *Ch 2 MFC* (channel 2 mass flow controller). The resulting canister concentrations in ppbC units are shown in Figure 21, on page 30. This sample has more n-butane than is normally observed in sampling. The surface back-trajectory from the JIH CAMS 630 site for March 6 at 11 p.m. CST appears in Figure 22, on page 30. No emissions upsets were reported in the TCEQ's online database for Nueces County on March 6 or 7.

Just to contrast the types of emission sources the JIH CAMS 630 site measures, Figure 23, on page 31, shows the surface back trajectory for 2:00 a.m. CST on March 7, corresponding to the

later period of elevated TNMHC in Figure 20. Figure 24, on page 31, shows the strong linear relationship of methane with TNMHC that suggests the source was natural gas.

Figure 20. TNMHC and methane 5-minute ppbC time series at JIH CAMS 630 late March 6 to early March 7, 2015, with canister sampling period as red dashed line

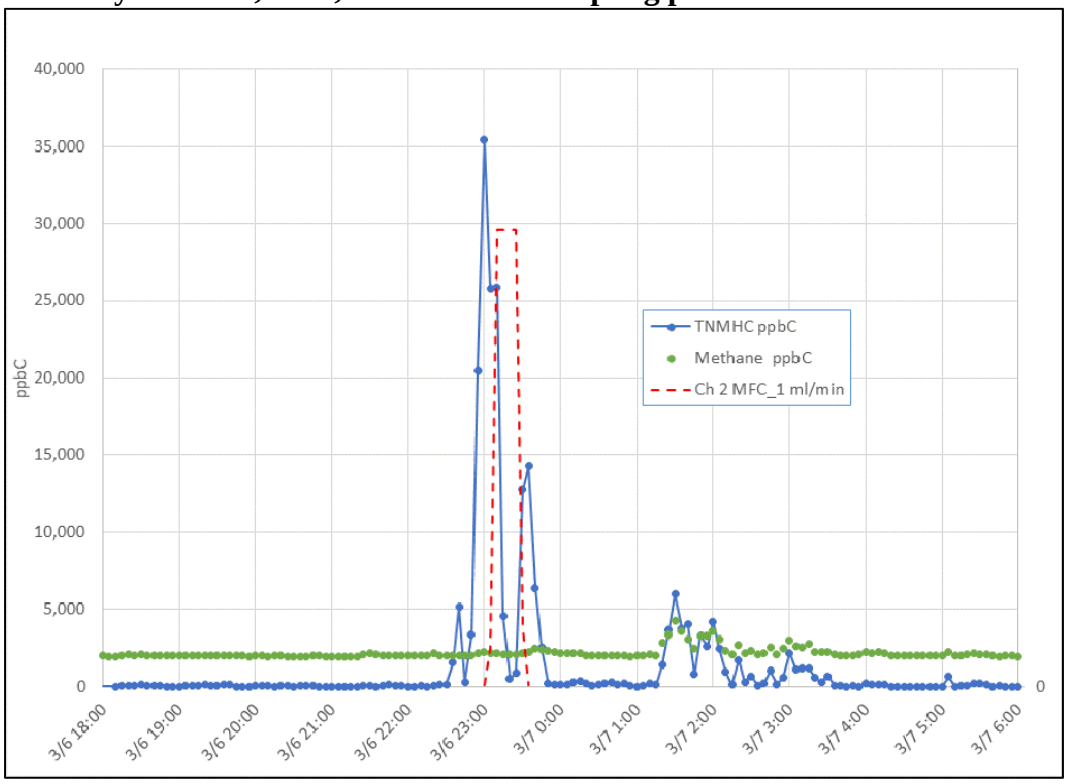


Figure 21. Canister ppbC composition triggered 3/6/15 at 11:09 p.m. CST, JIH CAMS 630

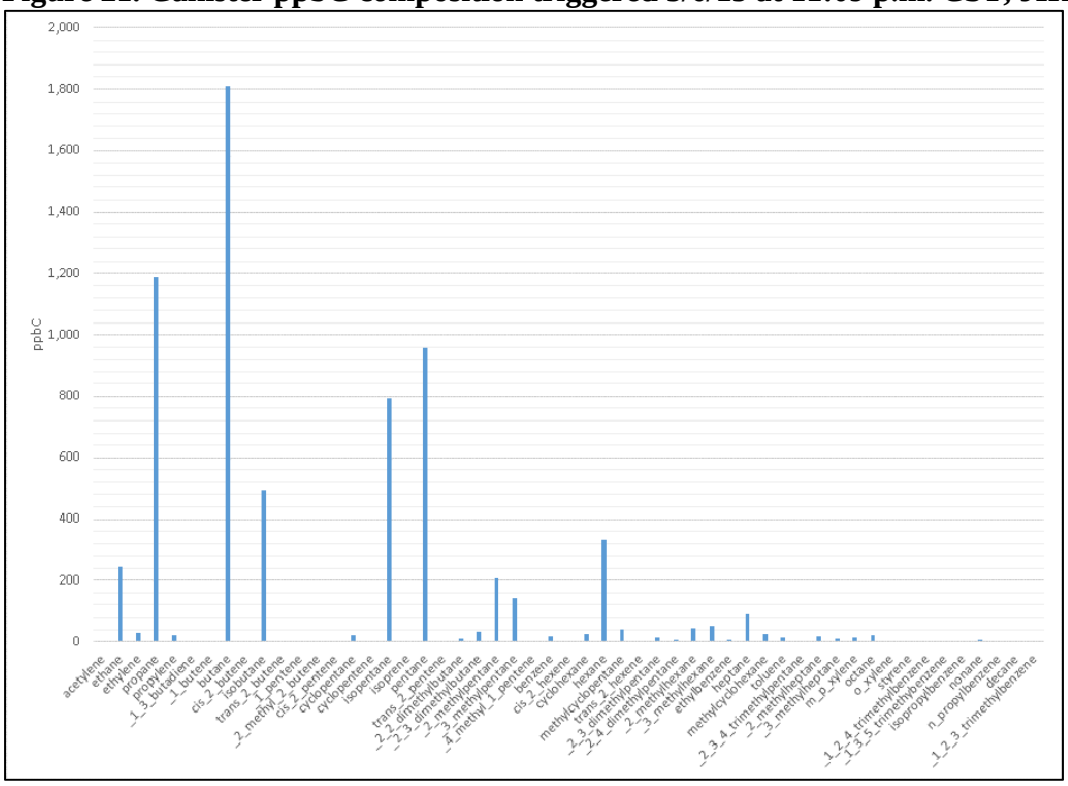


Figure 22. Surface back-trajectory from JIH CAMS 630 at 11 p.m. CST 3/6/15 associated with maximum TNMHC concentration from Figure 19

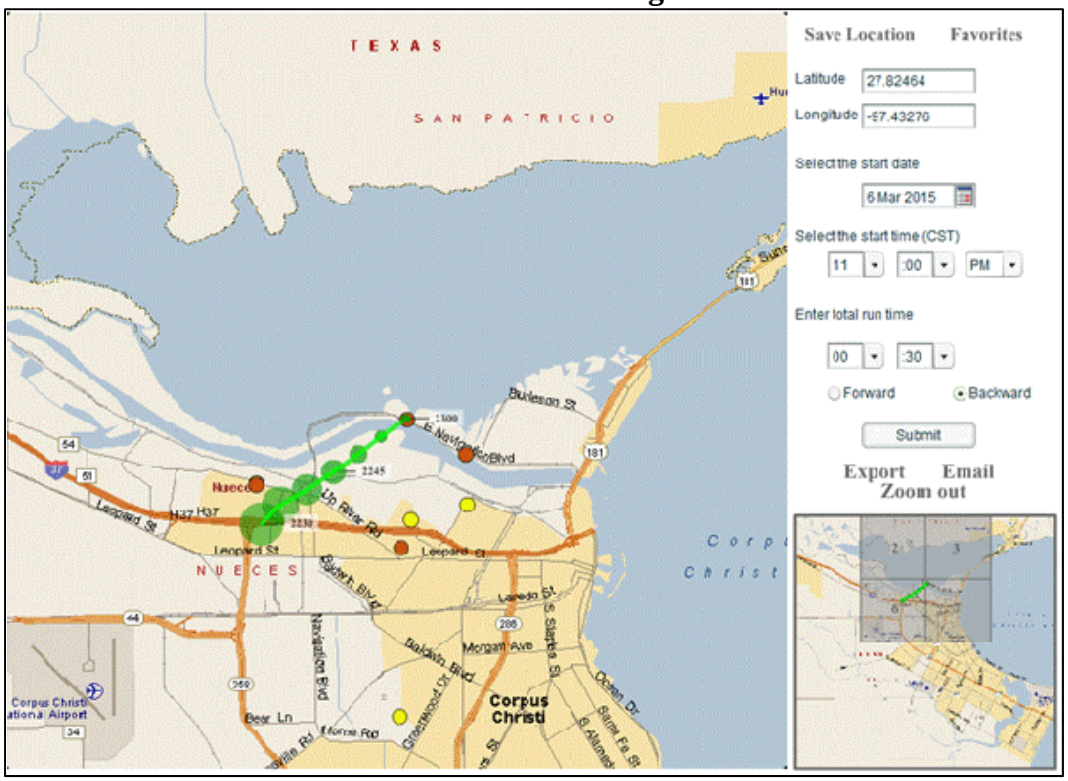


Figure 23. Surface back-trajectory from JIH CAMS 630 at 2:00 a.m. CST 3/7/15 associated with coincident elevated TNMHC and methane in Figure 19 (on page 28)

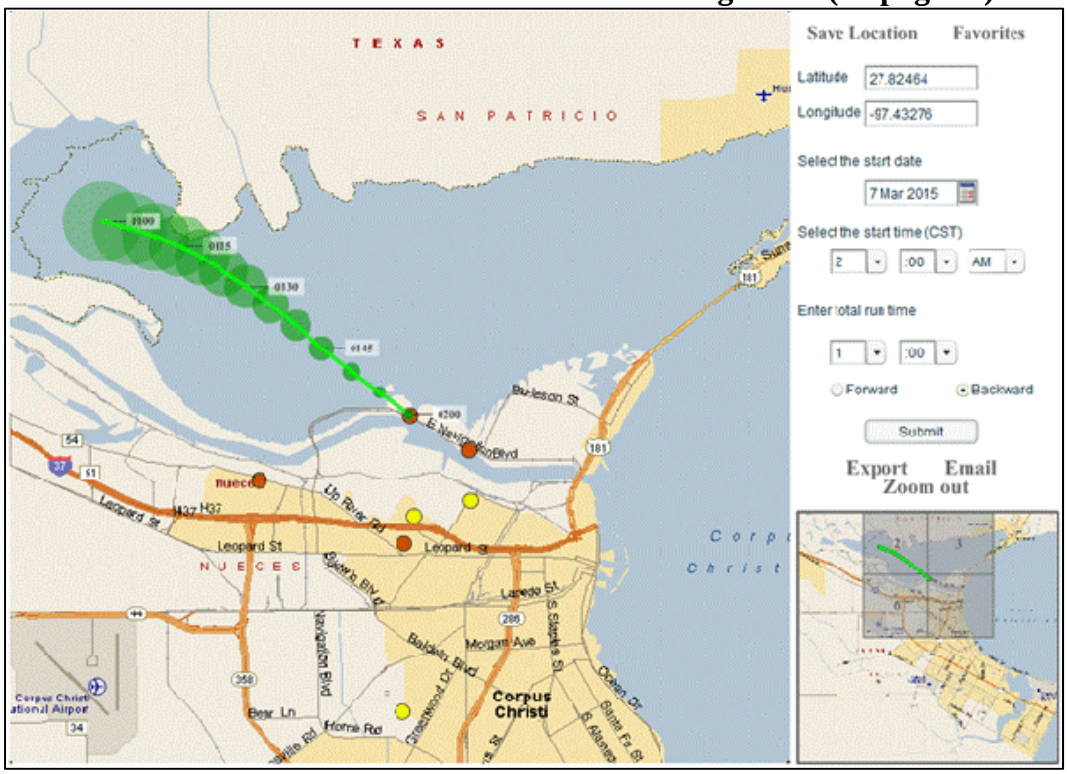
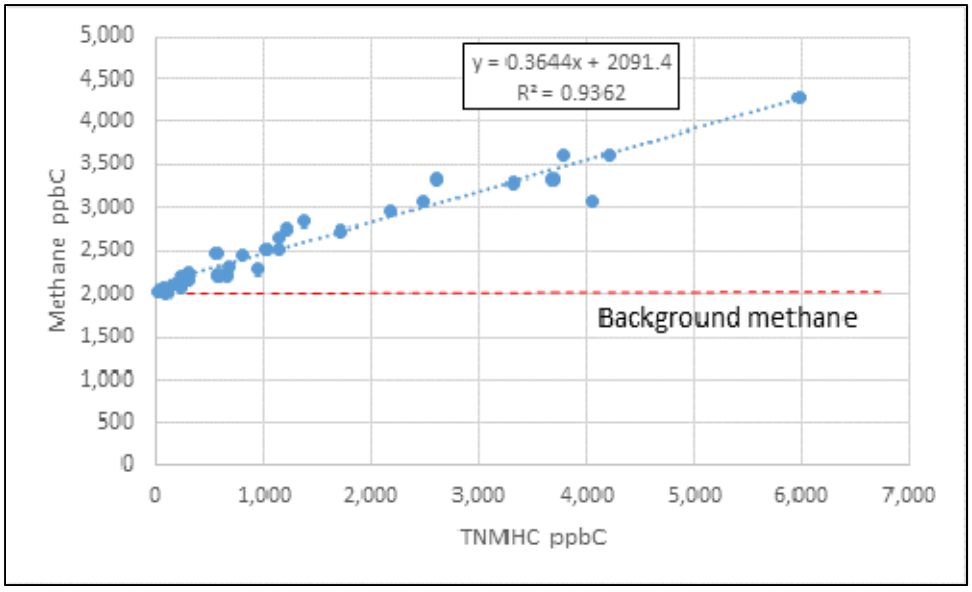


Figure 24. Methane vs TNMHC concentrations from 1:05 to 3:35 a.m. CST on 3/7/15 at JIH CAMS 630



Conclusions from the First Quarter 2015 Data

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

- Fourth quarter 2014 and first quarter 2015 concentrations at the auto-GCs remained well below the TCEQ's AMCVs for all species tracked for this project. Trends in quarterly average benzene concentrations remain relatively flat, although a small increase in benzene at Oak Park means measurements will be more closely examined in coming quarters.
- Mean concentrations for several light alkane hydrocarbon species, possibly associated with natural gas, have increased in the past four years under northerly winds, and this is especially pronounced in the first quarter averages.
- No exceedances of the EPA SO_2 NAAQS level were measured this quarter at UT sites or at TCEQ sites. All sites are maintaining NAAQS compliance. One case study was shown for elevated H_2S that remained below the state standard.
- Periodic air pollution events continue to be measured on a routine basis.

Further analyses will be provided upon request.

APPENDIX B

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
1/1/15 - 3/31/15

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

Total Grant Amount:	$2,745,371.68
Total Interest Earned:	$392,059.84
Total Funds Received:	**$3,137,431.52**

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 1/1/15 - 3/31/15	Encumbrances	Remaining Balance 1/1/15 - 3/31/15
Salaries-Prof	12	$111,654.00	$183,063.49	$31,566.18	$31,566.18	$98,233.06	$0.00	$424,516.73	($198,561.45)	($29,411.73)	($614.70)	$195,928.85
Fringe	14	$24,563.88	$40,273.97	$11,051.05	$11,051.05	$34,155.63	$0.00	$110,044.53	($56,258.22)	($9,992.31)	($6,622.42)	$37,171.58
Salaries-CEER	15	$0.00	$0.00	$16,538.09	$0.00	$55,713.31	$0.00	$66,251.40	($44,377.42)	($9,289.12)	$0.00	$12,584.86
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	$495.00	$0.00	$1,155.00	($810.00)	($90.00)	$0.00	$255.00
SEP Reserve	43	$10,000.00	$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	($5,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Monthly M&O	50	$0.00	$0.00	$20,908.45	$20,908.45	$42,472.49	$0.00	$83,380.94	($64,088.17)	($1,526.17)	($2,018.80)	$5,747.80
Equipment & Spare Parts	51	$0.00	$32,584.00	$17,539.29	$17,539.29	($3,858.00)	$0.00	$46,265.29	($32,380.98)	($5,878.25)	($8,415.00)	-$408.94
Telephone SWB OSL/RR	52	$0.00	$8,454.00	$8,707.47	$8,707.47	$10,391.56	$0.00	$27,553.83	($19,455.00)	($2,379.73)	$0.00	$5,718.30
Electric	53	$0.00	$22,438.00	$23,086.69	$23,086.69	$20,257.77	$0.00	$65,782.45	($49,759.41)	($4,633.69)	$0.00	$11,389.35
Gases	54	$0.00	$10,811.00	$10,676.72	$10,676.72	$13,457.71	$0.00	$34,946.43	($24,911.03)	($1,644.76)	($1,604.96)	$5,784.68
Other Costs	55	$0.00	$0.00	$260,000.00	$260,000.00	($260,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
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	$728,836.82	$0.00	$1,389,670.92	($898,670.13)	($88,609.07)	$0.00	$402,391.72
Analytical	66	$0.00	$27,839.39	$6,458.00	$6,458.00	$72,883.61	$0.00	$107,181.00	($86,181.00)	($10,798.00)	$0.00	$30,202.00
Travel	75	$0.00	$3,000.00	$1,000.62	$1,000.62	$2,832.38	$0.00	$6,833.00	($3,116.90)	($712.42)	$0.00	$3,003.68
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	$94,555.71	$0.00	$358,091.95	($223,840.48)	($24,744.78)	$0.00	$109,506.69
TOTALS		**$414,482.78**	**$602,041.36**	**$1,003,920.42**	**$993,382.33**	**$724,927.12**	**$0.00**	**$2,745,371.68**	**($1,716,110.19)**	**($189,710.03)**	**($19,275.88)**	**$820,275.58**

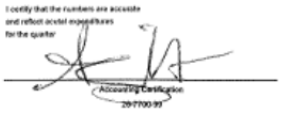
C. Interest Earned by Air Toxics Funds as of 1/1/15 - 3/31/15

Prior Interest Earned:	$391,805.54
Interest Earned This Quarter:	$254.30
Total Interest Earned to Date:	$392,059.84

D. Balance of Air Toxics Funds as of 1/1/15 - 3/31/15

Total Grant Amount:	$2,745,371.68
Total Interest Earned:	$392,059.84
Total Expenditures:	($1,905,820.22)
Remaining Balance:	**$1,231,611.30**

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



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

Accounting Report for the Quarter
1/1/15 - 3/31/15

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 1/1/15 - 3/31/15	Encumbrances	Remaining Balance 1/1/15 - 3/31/15
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 3/31/15

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 12/31/14

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