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

October 1, 2012 through December 31, 2012

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

David Allen, Ph.D.
Principal Investigator
Center for Energy and Environmental Resources
The University of Texas at Austin
10100 Burnet Road, Bldg 133 (R7100)
Austin, TX 78758
512/475-7842
allen@che.utexas.edu

February 28, 2013

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. Therefore, this and all future reports will focus exclusively on Stage 1 projects. 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 these project activities 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

A. Scope and Objectives

Phase 1B of the project reserves approximately 65% of Stage 1 project funds, or approximately $3 million, to extend the operation of the Corpus Christi ambient monitoring network. The COCP Project funds were fully expended by December 31, 2012 with the exception of the final indirect cost reconciliation of the account, which occurred in early January 2013. No further expenditures will occur on this account.

B. Goals

Under Phase 1B the project team will continue the operation 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 December 31, 2012, 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 9 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 page 4, 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 recently terminated

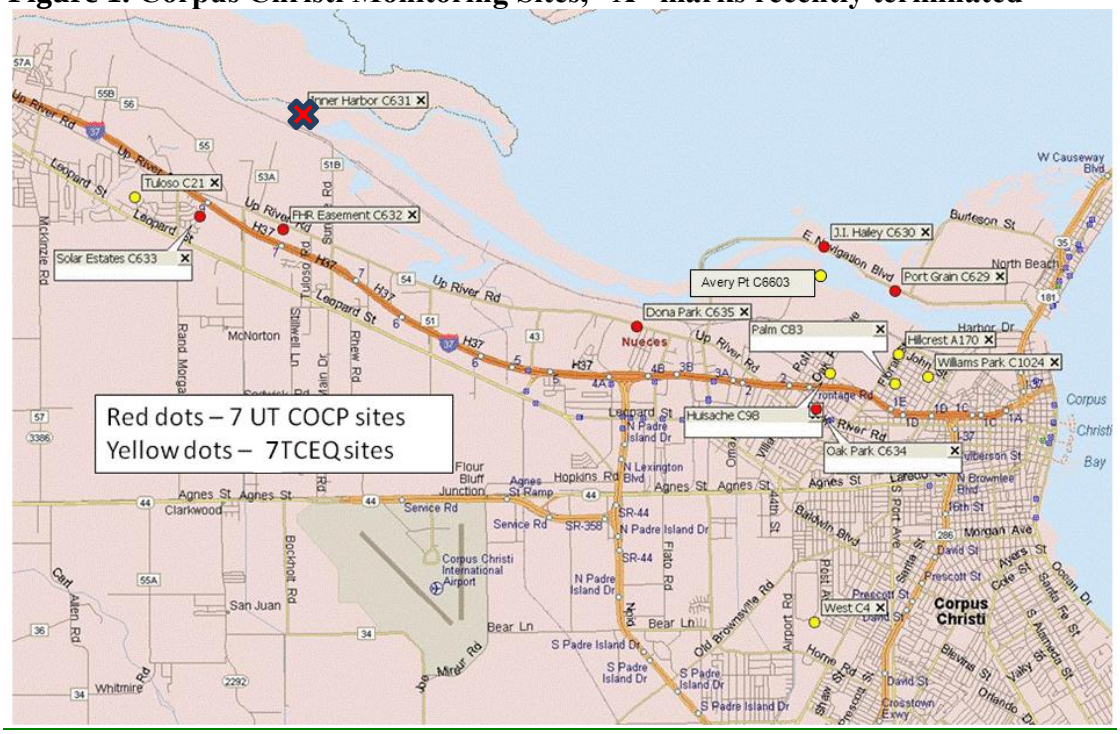


Table 1. Schedule of Air Monitoring Sites, Locations and Major Instrumentation

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**) (to be relocated)*		T&C: Dec 2004 to May 2012	Dec 2004 to May 2012	Dec 2004 to May 2012	

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 9 through 33. Specifically, the appendix contains the following elements:

- **Auto-GC Data Summary –** In examining the validated third quarter of 2012 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 third quarter average concentrations were below each compound's long-term AMCVs. For fourth quarter 2012 data, the preliminary values were also below respective AMCVs. A summary of data appears in Appendix A, pages 14 through 19.

- **Benzene Summary** – A review of the seven years of data is presented, with focus on the quarterly means from 2005 through 2012, appear in Appendix A, pages 19 through 25.

- **TNMHC at Dona Park** – Over the past quarter, the concentrations of TNMHC under northerly winds have been lower than in recent years. This is discussed in more detail in Appendix A, pages 26 and 27.

- **Canister Sampling Results** – On at least two dates in the fourth quarter, TNMHC and methane concentrations rose at a number of monitoring sites as the winds shifted from southerly to northerly during the day's early morning hours. This is discussed in more detail in Appendix A, pages 27 through 30.

- **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 recently declined. Trends from various CAMS site are examined. These issues are expanded upon in Appendix A, pages 30 through 32.

B. Scheduled Meetings of the Volunteer Advisory Board

The Corpus Christi Project Advisory Board met on November 13, 2012. 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/).

   Termination of sampling at the West End of Corpus Christi Inner Harbor Air Monitoring Site Due to Termination of Lease on June 30, 2012
   On March 27, 2012, UT Austin received notice from the Port of Corpus Christi Authority (POCCA) that it was terminating the lease for the use of the land at the project's West End of Corpus Christi Inner Harbor (IH) air monitoring site, CAMS 631. The notice required that all site improvements be removed by June 30, 2012. Site air monitoring operations were terminated on May 15, 2012. All site improvements were removed by June 30, 2012 and acknowledgement that the condition of the vacated site was acceptable to POCCA (per Mr. Dave Michelson, PE, POCCA Chief Engineer) was received July 3, 2012. Equipment from this site is being stored in Corpus Christi at the remaining sites in the network.

   In this quarter, UT Austin continued its efforts to assess options for relocation of this site in the proximity of the Inner Harbor location. The potential sites investigated are owned by the Port of Corpus Christi, M&G Polymers (previously owned by the Driscoll Foundation), Flint Hills Resources, and the City of Corpus Christi. UT Austin also investigated a location leased by the U.S. Department of Agriculture and locations near the Pollywog Pond. Each of the sites investigated has either proven to not be available for our use, were too far from the area of interest or the landowner would not agree to the lease terms proposed by UT Austin (and which were consistent with the requirements of the Court). At this time, we believe that we have exhausted all possible suitable alternative locations.

   UT Austin estimates that the project has sufficient funds to operate the full network (all seven sites) through approximately March 2015. If all remaining funds are used to operate only the currently operating six sites in the network, i.e., do not reestablish the Inner Harbor site, the life of these six sites in the network would be extended about five months. Since at this point identifying a site, negotiating a lease for the site, and reestablishing the Inner Harbor air monitoring station would take eight to nine months minimum, the replacement Inner Harbor site would only be in operation a maximum of twenty-one months before it would need to be decommissioned. In discussing these factors with the Advisory Board at their November 13, 2012 meeting, they agreed that given all of these factors, it would be more cost effective to extend the life of the remaining sites in the network by five months than to expend any more resources on reestablishing the Inner Harbor site.

On December 18, 2012, Dr. Allen submitted a letter to the Honorable Judge Jack requesting approval to not re-establish the Inner Harbor site and use the funds saved to extend the life of the remaining six sites in the network.

On January 11, 2013, UT Austin received a phone call from Ms. Sondra Scotch, Assistant Deputy-In-Charge, District Court Operations for the Honorable Janis Graham Jack, stating that the Honorable Judge Jack approved not re-establishing the Inner Harbor site and using the funds saved to extend the life of the remaining six sites in the network.

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.

3. **Budget Monitoring**
   Budget monitoring during the period has focused on projects costs for Phase II – 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 December 31, 2012 totals $3,133,814.78. This total includes interest earned through December 31, 2012, in the amount of $388,443.10.

B. Detailed List of the Actual Expenditures Paid from Air Toxics Project Funds Phase 1B through December 31, 2012
   Expenditures of Air Toxics Project funds during this quarter totaled $96,793.80. The funds remaining in the Air Toxics account (not spent for 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 December 31, 2012
   The interest earned during this quarter totaled $1,174.55. 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 December 31, 2012, in the Air Toxics Project Account
   The balance in the Air Toxics Project account, including interest earned totals $3,027,540.54.

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

There are no additional expenditures anticipated for Phase 1A.

F. Anticipated Expenditures for the Funds Remaining in the Air Toxics Project Account – 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.

Quarterly Report Distribution List:

U.S. District Court

Ms. Sondra Scotch, Assistant Deputy-In-Charge, District Court Operations
for distribution to the Honorable Janis Graham Jack
Mr. Joseph Jasek, Assistant Deputy Chief USPO
Mr. James Martinez, Supervising USPO

cc:

The University of Texas at Austin

Mr. Lee Smith, Associate Vice President for Legal Affairs
Mr. Vincent M. Torres, Center for Energy and Environmental Resources
Dr. David Sullivan, Center for Energy and Environmental Resources

Texas Commission on Environmental Quality

Ms. Sharon Blue, Litigation Division – Headquarters
Ms. Susan Clewis, Director – Region 14
Mr. Chris Owen, Air Quality Division – Headquarters
Mr. Ken Rozacky, Monitoring Operations Division, Headquarters
Ms. Rosario Torres, Field Operations – Region 14

Environmental Protection Agency

Ms. Kathleen Aisling, Environmental Engineer, Air Enforcement Section, Dallas Regional Office

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

APPENDIX A

Data Analysis for Corpus Christi Quarterly Report

October 1, 2012 through December 31, 2012

The University of Texas at Austin
Center for Energy & Environmental Resources
Contact: Dave Sullivan, Ph.D.
sullivan231@mail.utexas.edu
(512) 471-7805 office
(512) 914-4710 cell

Data Analysis for Corpus Christi Quarterly Report

This technical report describes results of monitoring and analysis of data under the Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project, currently being funded by Air Toxics, Stage 1 Phase 1B. The primary focus is on the period October 1 through December 31, 2012. 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 third and fourth quarters of 2012;
- Information on the trends for benzene concentrations at the two project auto-GCs and the TCEQ's auto-GC in residential areas, now for a full seven years of data, with eight instances of fourth quarters;
- A discussion of trends in TNMHC concentrations under northerly winds at Dona Park;
- A summary of canister sampling this quarter;
- A discussion of the sulfur dioxide (SO_2) data from several sites.

Table 2. 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**) (to be relocated)*		T&C: Dec 2004 to May 2012	Dec 2004 to May 2012	Dec 2004 to May 2012	

Legend

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 "AMCV document") that explain AMCVs are at http://www.tceq.texas.gov/toxicology/AirToxics.html (accessed January 2013). The following text is an excerpt from the TCEQ "fact sheet":

  > 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[1]. 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 15 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

[1] See http://epa.gov/air/criteria.html accessed October 2012

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 TCEQ's Website at http://www.tceq.texas.gov/airquality/monops/naaqs.html (accessed October 2012).

One species measured by this project and regulated by a NAAQS is sulfur dioxide (SO_2). Effective June 2, 2010, EPA modified 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. 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 the 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 under northerly and westerly winds. In examining aggregated data one observes similar patterns of hydrocarbons at all three sites.

Table 3, below, lists the data completeness from the project auto-GCs during 2011 and 2012 for which data have been validated.

Table 3. Percent data recovery by month, 2011-2012, validated data only

Date	Oak Park	Solar Estates	Date	Oak Park	Solar Estates
Jan 2011	100	96	Jan 2012	94	99
Feb 2011	84	77	Feb 2012	90	98
Mar 2011	100	95	Mar 2012	97	100
Apr 2011	100	80*	Apr 2012	94	100
May 2011	78	100	May 2012	77*	96
Jun 2011	69*	93	Jun 2012	65	97
Jul 2011	95	96	Jul 2012	98	93*
Aug 2011	56	95	Aug 2012	99	93*
Sep 2011	92	78	Sep 2012	99	100
Oct 2011	99	83			
Nov 2011	97	94	**Average**	**90**	**93**
Dec 2011	100	100			

* Months with planned preventive maintenance

Table 4, on page 16, summarizes the validated average data values from the third quarter of 2012. Data in this table are available to TCEQ staff at http://rhone3.tceq.texas.gov/cgi-bin/agc_summary.pl (accessed January 2013). Table 5, on page 17, summarizes the as-yet-unvalidated average data values from the fourth quarter of 2012.

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 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 third quarter data and Table 5 for the as-yet-unvalidated fourth quarter data are shown graphically in Figures 4 and 5, respectively, on pages 18 and 19. Figures 4 and 5 are plotted on the same y-axis scale, so they can be compared directly. Mean concentrations for all 27 species measured consistently above their respective method detection limits are generally comparable for the fourth and first quarters each year (late autumn, winter, early spring), and are generally higher than the second and third quarters (late spring, summer, early autumn). Increased maritime southerly flow in the spring and summer is a contributor to lower concentrations in the second and third quarters. As can be observed by comparing Figures 4 and 5, average concentrations for all species were higher in the autumn-winter fourth quarter compared to the summer-autumn third quarter.

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 3rd quarter 2012

Units ppbV	Oak 3Q12			Solar 3Q12			Palm 3Q12		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	59.05	18.09	3.94	143.25	16.92	5.28	58.61	17.69	3.80
Ethylene	42.09	3.64	0.40	25.68	2.86	0.28	18.00	1.18	0.28
Propane	339.13	22.75	2.58	100.37	11.49	3.45	206.83	14.22	2.21
Propylene	33.14	1.78	0.18	3.38	0.42	0.10	18.41	0.97	0.14
Isobutane	27.99	4.96	0.89	26.80	3.06	1.18	43.10	6.03	0.87
n-Butane	41.47	6.94	1.24	50.36	4.81	1.40	139.81	14.29	1.38
t-2-Butene	3.65	0.23	0.04	0.47	0.06	0.01	2.67	0.26	0.03
1-Butene	3.46	0.21	0.03	0.51	0.07	0.01	1.27	0.15	0.04
c-2-Butene	2.78	0.17	0.04	0.33	0.04	0.00	2.91	0.27	0.03
Isopentane	43.18	7.61	1.03	16.11	2.28	0.81	81.65	8.45	1.08
n-Pentane	30.59	5.99	0.63	9.83	1.41	0.55	25.54	3.58	0.54
1,3-Butadiene	0.89	0.08	0.04	0.77	0.07	0.01	0.39	0.06	0.02
t-2-Pentene	0.81	0.16	0.04	1.05	0.08	0.01	8.73	0.77	0.07
1-Pentene	0.40	0.09	0.02	0.68	0.05	0.01	4.66	0.41	0.04
c-2-Pentene	0.38	0.08	0.02	0.53	0.04	0.00	4.45	0.39	0.03
n-Hexane	10.90	2.18	0.31	2.82	0.65	0.22	38.06	2.41	0.31
Benzene	**8.42**	**1.67**	**0.28**	**1.91**	**0.39**	**0.10**	**19.80**	**1.71**	**0.15**
Cyclohexane	4.25	0.72	0.09	1.61	0.40	0.12	15.95	1.00	0.09
Toluene	5.09	1.08	0.25	4.41	0.45	0.16	24.62	1.47	0.29
Ethyl Benzene	0.71	0.13	0.03	3.44	0.20	0.02	1.42	0.14	0.03
m&p -Xylene	3.15	0.50	0.11	15.97	0.93	0.09	4.22	0.60	0.12
o-Xylene	0.88	0.15	0.03	5.81	0.32	0.02	1.40	0.17	0.04
Isopropyl Benzene	0.86	0.11	0.01	0.77	0.04	0.00	0.38	0.14	0.00
1,3,5-Trimethylbenzene	0.69	0.06	0.01	0.62	0.08	0.01	0.92	0.10	0.02
1,2,4-Trimethylbenzene	2.09	0.21	0.06	0.63	0.10	0.02	2.26	0.25	0.05
n-Decane	3.75	0.31	0.04	0.56	0.14	0.02	1.42	0.23	0.03
1,2,3-Trimethylbenzene	0.62	0.06	0.01	0.34	0.06	0.01	0.21	0.05	0.03

Table 5. Unvalidated auto-GC mean statistics 4th quarter 2012

Units ppbV	Oak 4Q12	Solar 4Q12	Palm 4Q12
Species	**Mean**	**Mean**	**Mean**
Ethane	10.226	10.411	10.511
Ethylene	0.906	0.503	0.685
Propane	6.825	6.494	6.892
Propylene	0.317	0.195	0.252
Isobutane	2.302	1.957	2.548
n-Butane	3.617	2.856	3.832
t-2-Butene	0.082	0.025	0.056
1-Butene	0.069	0.047	0.067
c-2-Butene	0.066	0.018	0.046
Isopentane	2.337	1.410	1.937
n-Pentane	1.447	1.007	1.162
1,3-Butadiene	0.047	0.015	0.034
t-2-Pentene	0.089	0.015	0.077
1-Pentene	0.049	0.012	0.036
c-2-Pentene	0.043	0.006	0.032
n-Hexane	0.579	0.407	0.521
Benzene	**0.552**	**0.210**	**0.326**
Cyclohexane	0.236	0.277	0.170
Toluene	0.525	0.254	0.419
Ethyl Benzene	0.059	0.030	0.037
m&p -Xylene	0.189	0.209	0.170
o-Xylene	0.060	0.040	0.055
Isopropyl Benzene	0.042	0.012	0.010
1,3,5-Trimethylbenzene	0.017	0.018	0.021
1,2,4-Trimethylbenzene	0.045	0.033	0.051
n-Decane	0.042	0.046	0.038
1,2,3-Trimethylbenzene	0.012	0.008	0.022

Figure 4. Mean ppbV for 27 species at three auto-GCs, 3rd quarter 2012 (validated data)

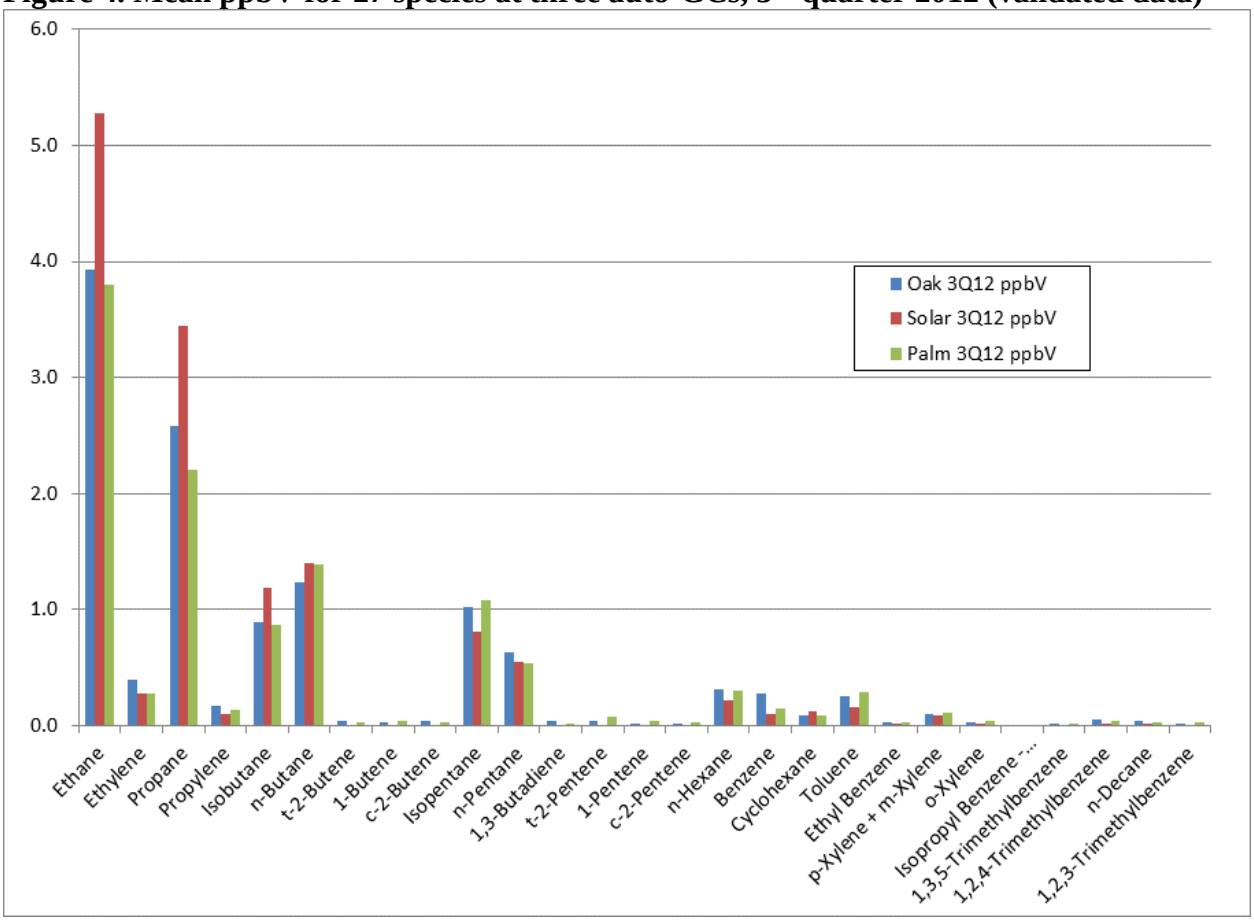
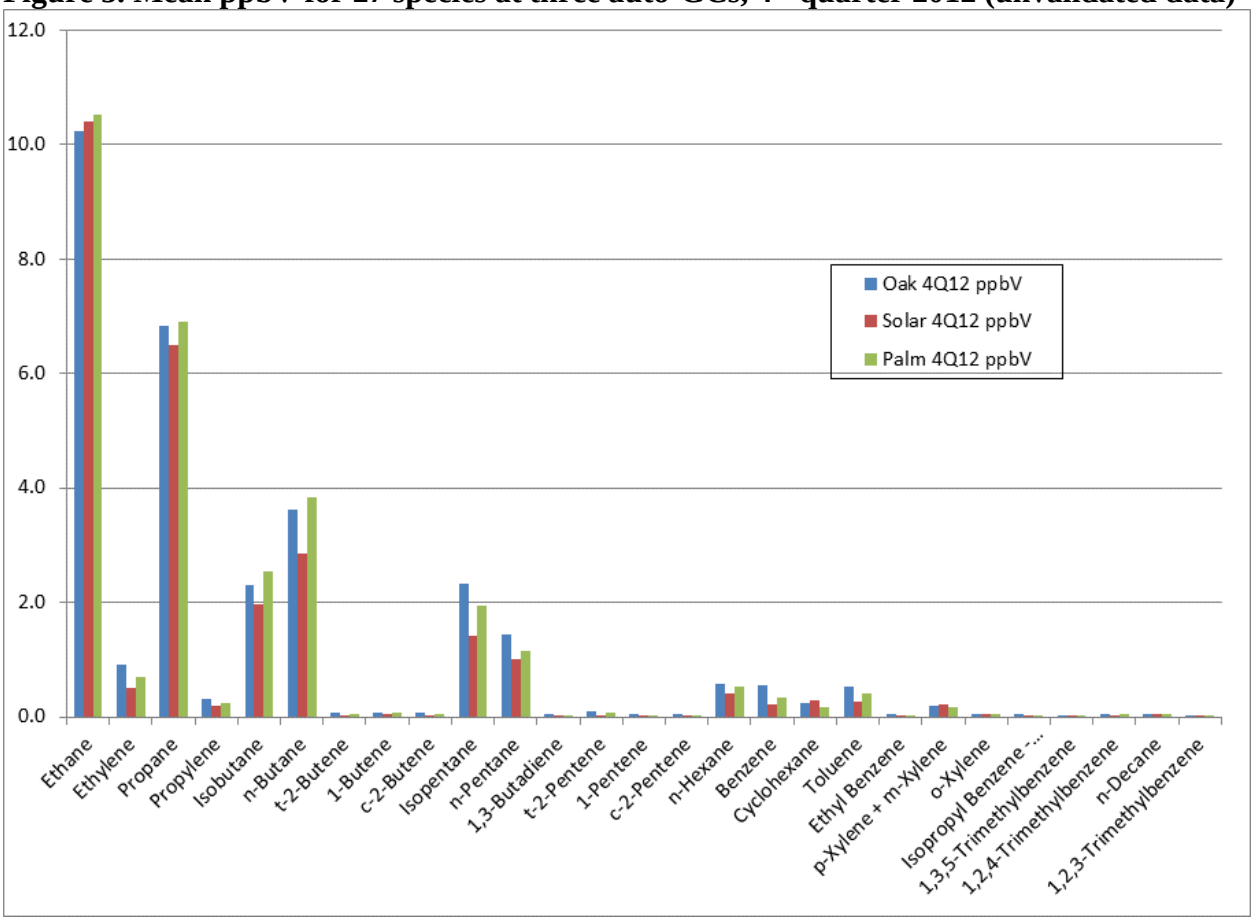


Figure 5. Mean ppbV for 27 species at three auto-GCs, 4th quarter 2012 (unvalidated data)



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 – 2012), concentration means have generally been relatively constant. No individual one-hour benzene values have been measured above the AMCV since the beginning of monitoring. A time series for hourly benzene in ppbV units with three points annotated by date appears in Figure 6, on page 20, for Oak Park. The two earlier 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 third point from Sunday November 4, 2012 at 7:00 CST is highlighted as the highest value in 2012 at 36 ppbV. This particular auto-GC measurement was interesting in that most of the hydrocarbon mass (51 percent) in this one hour sample was benzene; however, the November 2012 data have not been validated yet. A back trajectory for this hour is shown in Figure 7, on page 21. No emissions upset reports corresponding to this date were found on the TCEQ's Website, however, the minutes of the December 12, 2012 Long Term Health Work Group show that a Citgo representative stated that there was an overflow at a benzene storage tank on November 4. As Figure 7 shows, the back trajectory from Oak Park passes directly over another monitor – the TCEQ Huisache site. At Huisache, URS, a private environmental services company, measures benzene with a benzene-specific auto-GC. URS measured 264 ppbV for

benzene that same hour of 7:00 CST. This suggests the Oak Park measurement was valid and that a benzene emission release occurred upwind of the Huisache site that morning.

The same graph from Figure 6, below, is reproduced without the two outlier points in Figure 8, on page 22. The time series for Solar Estates appears in Figure 9, on page 22. Note the different y-axis scales for the two sites, as Oak Park does tend to measure higher concentrations than Solar Estates. Figure 10, on page 23, shows the time series for the two-year old TCEQ Palm auto-GC, with two apparent outliers on January 30, 2012 indicated, which were discussed in the report for the first quarter of 2012. Note that for all three sites, the data from the fourth quarter 2012 have not been validated yet.

Figure 6. Oak Park hourly benzene March 2005 – Dec. 31, 2012, ppbV units, individual elevated values noted, no observations greater than the TCEQ's AMCV

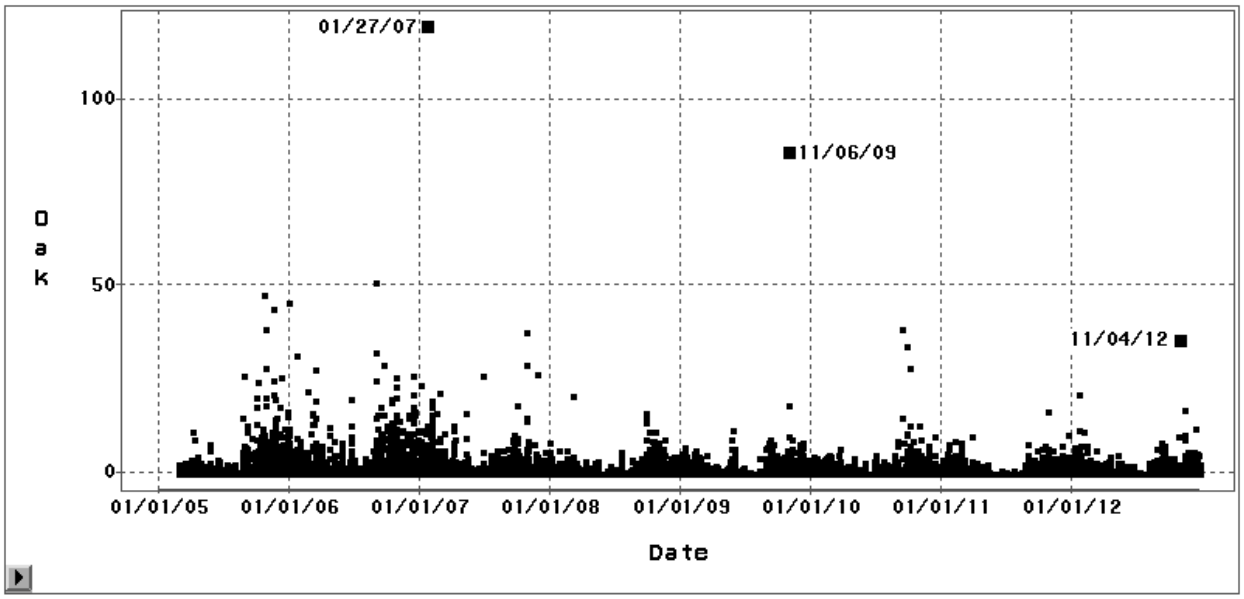


Figure 7. Surface 30-minute back-trajectory started at 7:30 CST on November 4, 2012 from Oak Park at a time corresponding to the highest benzene value recorded in 2012 (data not validated).

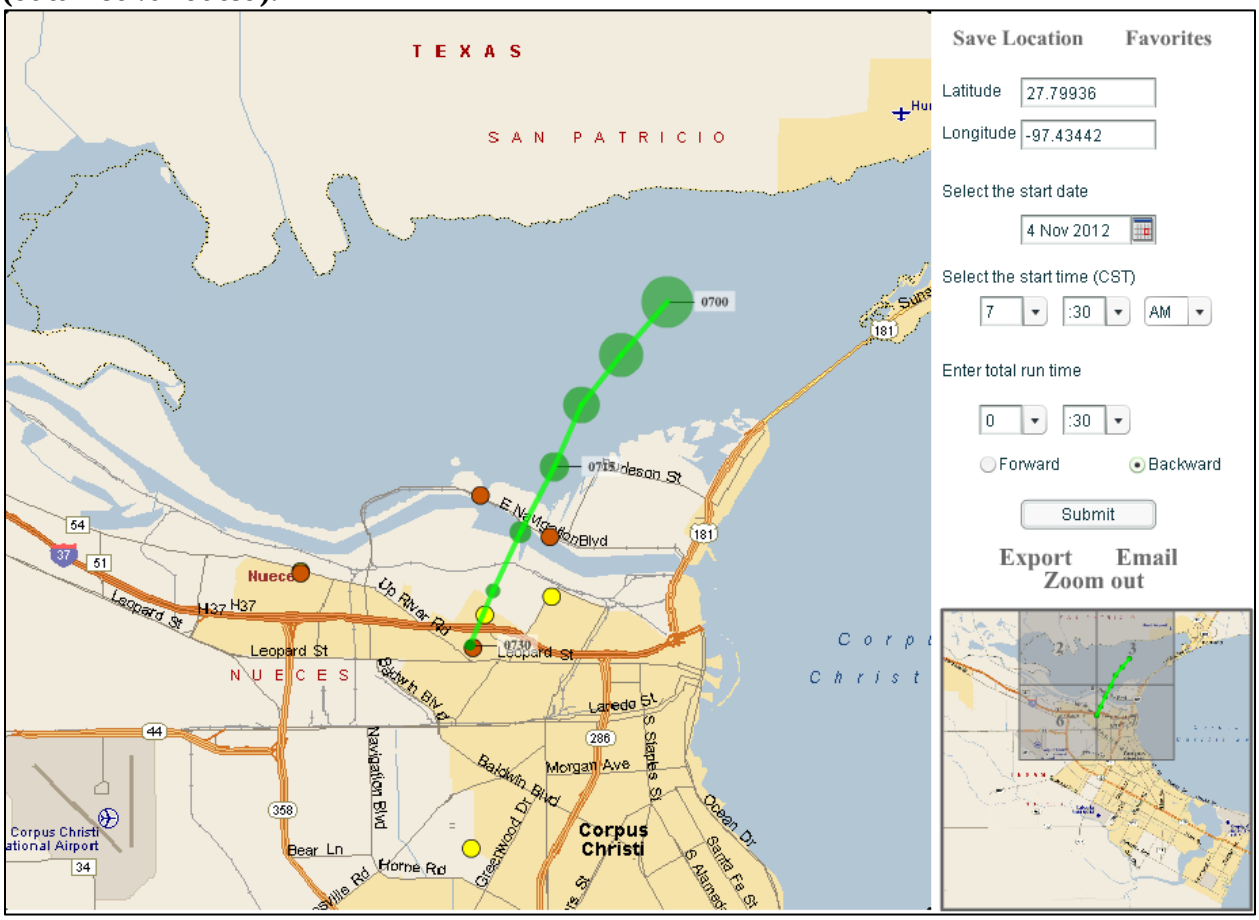


Figure 8. Oak Park hourly benzene Mar. 2005 – Dec. 31, 2012, ppbV units, two outliers from January 27, 2007 and November 6, 2009 removed

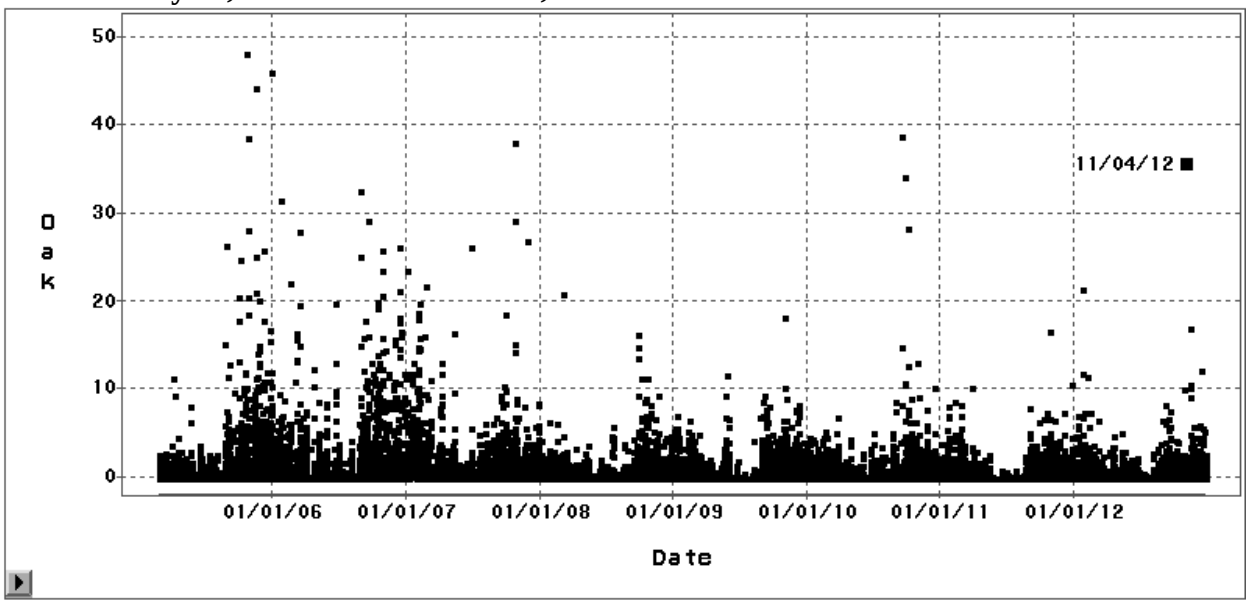


Figure 9. Solar Estates hourly benzene Mar. 2005 – Sept. 30, 2012, ppbV units, no observations greater than the TCEQ's AMCV

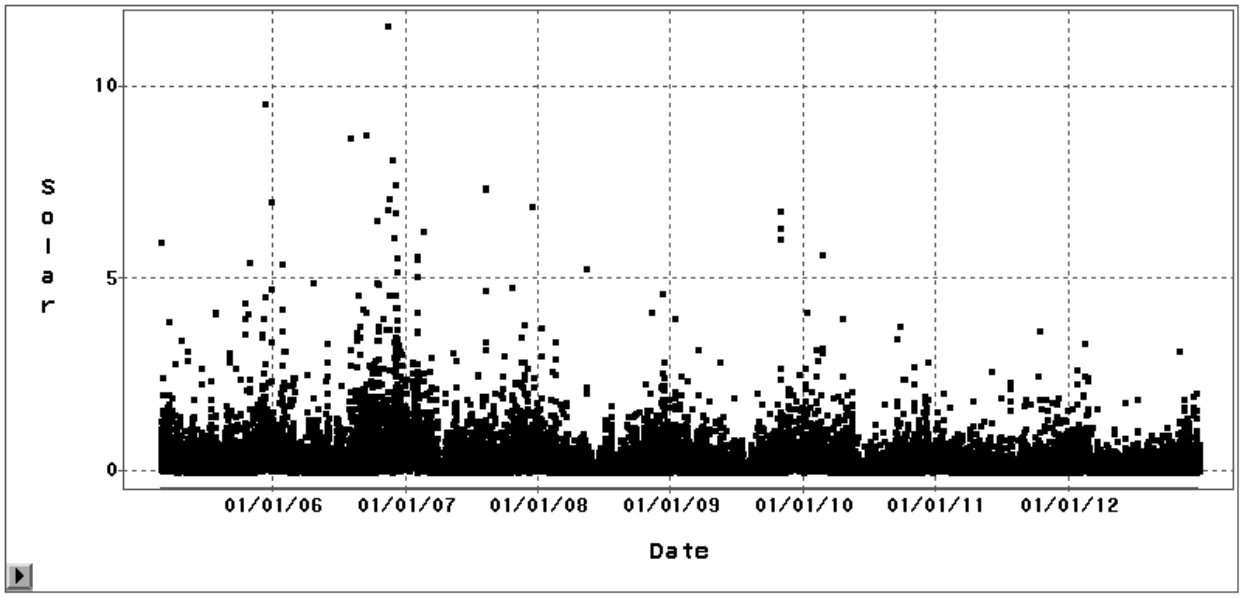


Figure 10. TCEQ Palm hourly benzene June 1, 2010 – Sept. 30, 2012, ppbV units, individual elevated value noted, no observations greater than the TCEQ's AMCV

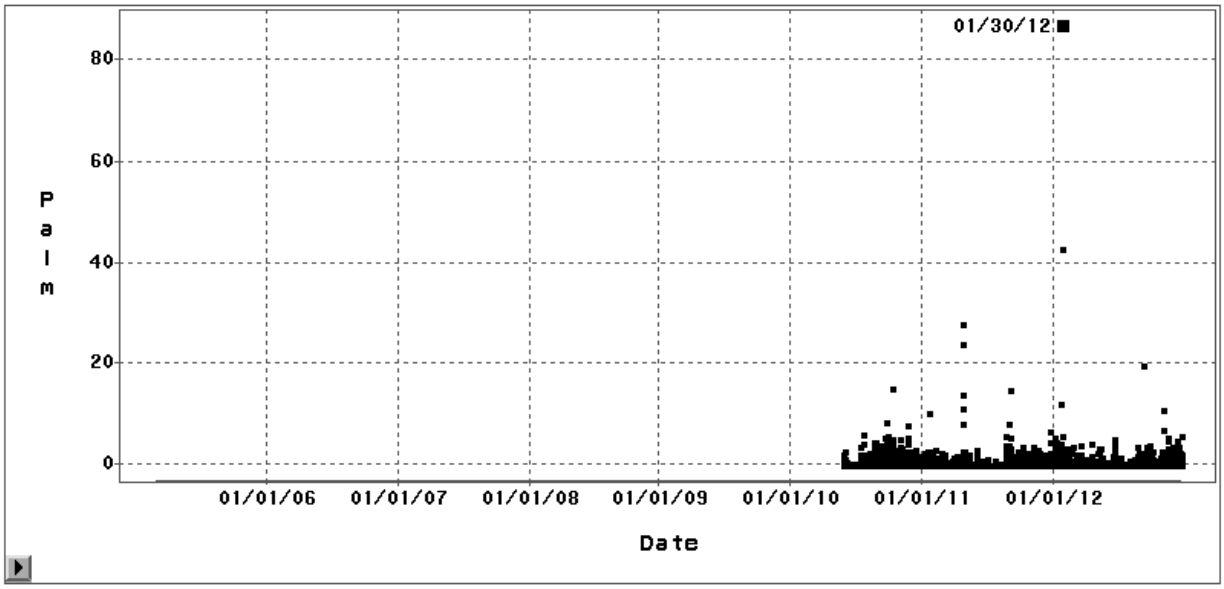
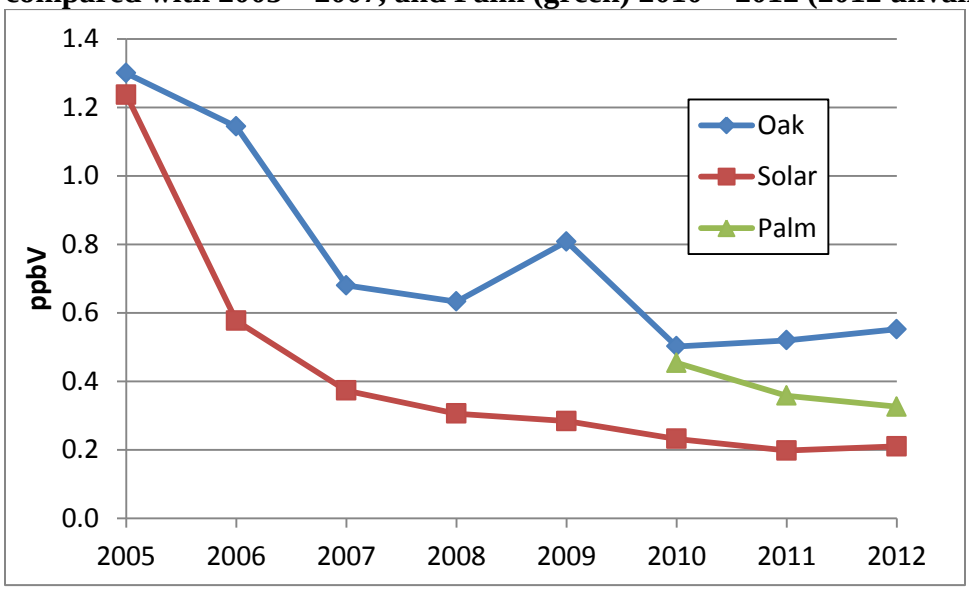


Table 6, on page 24, shows the fourth quarter average concentrations from the auto-GCs for benzene from 2005 – 2012 (2012 unvalidated). The fourth quarter means are graphed in Figure 11, on page 24. The means for TCEQ's Palm site are shown for 2010 through 2012 only. The fourth quarter means at UT sites from 2008 through 2012 are statistically significantly lower than in the fourth 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. Mean statistics for Benzene at Oak Park and Solar Estates, 4th quarter 2005 – 2012 Palm 2010 – 2012, ppbV units (2012 unvalidated)

4th qtr/year	Oak	Solar	Palm
2005	1.300	1.237	
2006	1.144	0.577	
2007	0.680	0.373	
2008	0.633	0.306	
2009	0.808	0.284	
2010	0.502	0.232	0.454
2011	0.520	0.198	0.358
2012	0.552	0.210	0.326

Figure 11. Mean concentrations of benzene during fourth quarters of each year at Oak Park (blue) and Solar Estates (red), 2005 – 2012, with lower values in 2008 – 2012 compared with 2005 – 2007, and Palm (green) 2010 – 2012 (2012 unvalidated)



An explanation for the change in concentrations over time at the Oak Park and Solar Estates sites may lie in emission reductions from industrial sources north of the sites. Figures 12 and 13, on page 25, show line graphs for the mean concentrations of benzene by 20-degree wind bins (ignoring winds less than 2 miles per hour) at Oak Park comparing 2006 (the first full year of data) to 2012 (the most recent year, fourth quarter unvalidated). Figures 14 and 15, on page 25, show an identical comparison for Solar Estates. At Oak Park there has been a large reduction (75 percent) in concentrations associated with the north-northeast, and at Solar Estates a reduction in concentrations associated with the northeast. For both sites, refineries and other industrial facilities lie in these upwind directions.

Figure 12. Mean benzene ppbV CY 2006 at Oak Park by 20-degree wind bin, speed >= 2 mph

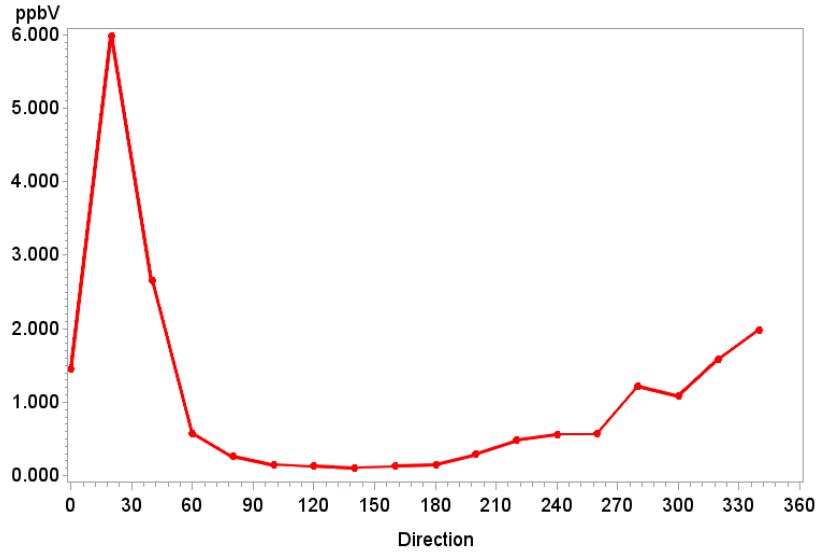


Figure 13. Mean benzene ppbV CY 2012 at Oak Park by 20-degree wind bin, speed >= 2 mph

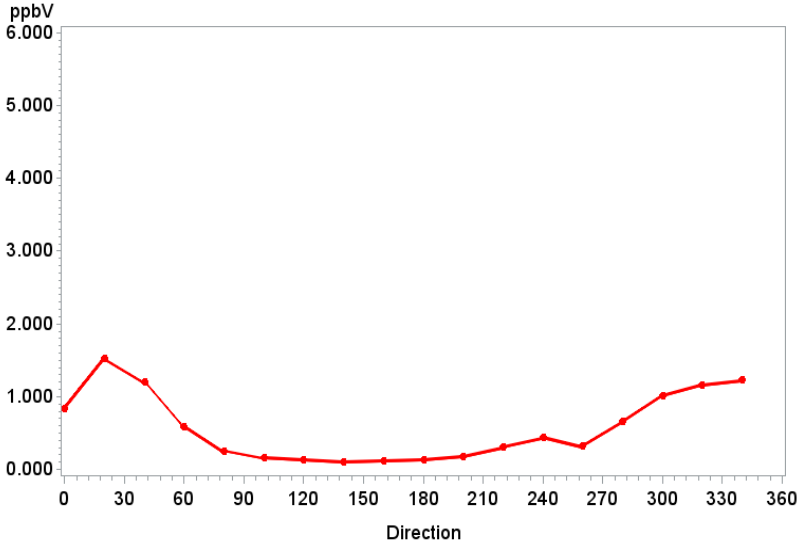


Figure 14. Mean benzene ppbV CY 2006 at Solar Estates by 20-degree wind bin, speed >= 2 mph

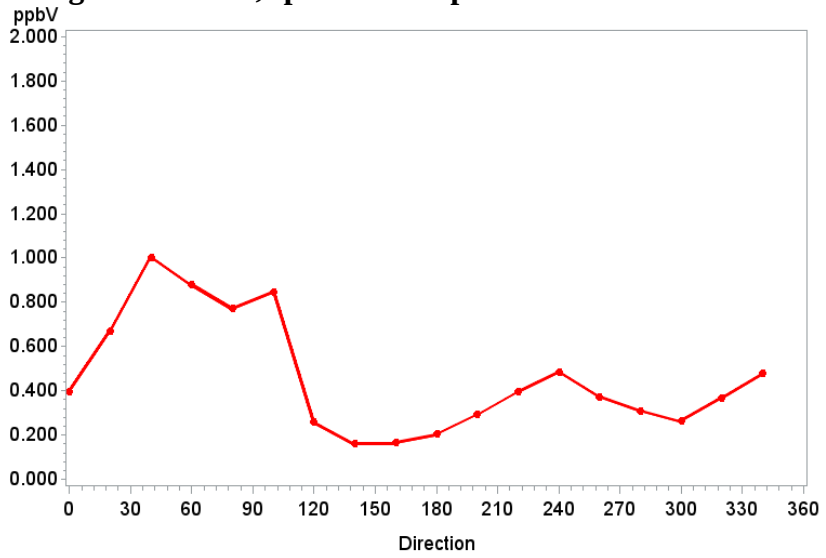
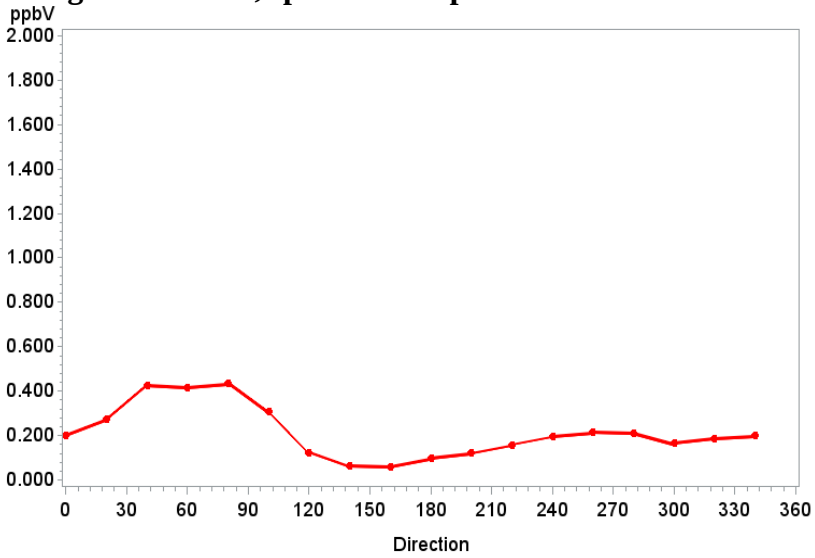


Figure 15. Mean benzene ppbV CY 2012 at Solar Estates by 20-degree wind bin, speed >= 2 mph



3. TNMHC at Dona Park

Over the past quarter, the concentrations of TNMHC under northerly winds have been lower than in recent years. As has been reported since the 4th quarter 2008 report in early 2009, elevated TNMHC and methane concentrations at Dona Park CAMS 635 have been measured in recent winters. TCEQ Regional staff members at the time attributed this to natural gas extraction activities on the White Point peninsula and other locations nearby, and data from the Texas Railroad Commission confirms the presence of many wells in that area. In 2012, however, a smaller number of elevated TNMHC measurements have been recorded under northerly winds at Dona Park. Figures 16 through 21, on page 27, show a series of graphs with the annual average of TNMHC when measured under specific wind directions, shown with identical y- and x-axis scales for TNMHC ppbC and calendar year, respectively. The direction associated with the highest average concentration, peaking in 2011, was the north-northwesterly direction between 345 and 355 degrees, centered at 350 degrees, and shown in Figure 16. Figure 17 shows the mean concentration under winds between 355 and 5, centered on due north, and having a lower peak mean than in Figure 16 but that also peaked in 2011 and is lower in 2012. Figure 18 shows the mean concentration under winds between 335 and 345, centered on 340 degrees, and having a lower peak mean than in Figure 16 but that also peaked in 2011 and is lower in 2012. The graphs in Figures 19, 20, and 21 are similarly constructed with wind directions moving away from the peak direction range in Figure 16, showing the lessening effect of whatever source or sources affect Dona Park under north-northwest winds.

In addition to the White Point peninsula and other locations on the north shore and within Nueces Bay where natural gas extraction is occurring, there is also an industrial facility located on the Joe Fulton Trade Corridor that appears to have been built between March 2006 and March 2008, based on an examination of historical aerial images available with Google Earth Pro. This facility lies in the upwind direction associated with Figure 16 and the highest TNMHC mean concentrations. Figure 16 suggests a rise in concentrations in 2007, within the period that this facility appeared in aerial images. The TCEQ staff has been provided with this information.

Figure 16. Mean TNMHC concentration ppbC units, by year, with wind direction greater than 345 and less than 355 degrees (north-nw).

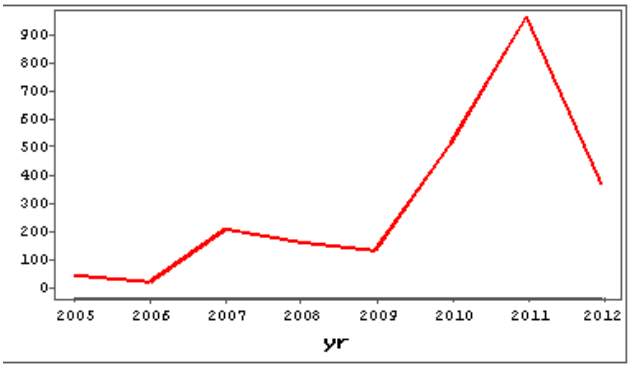


Figure 17. Mean TNMHC concentration ppbC units, by year, with wind direction greater than 355 and less than 5 degrees (due north).

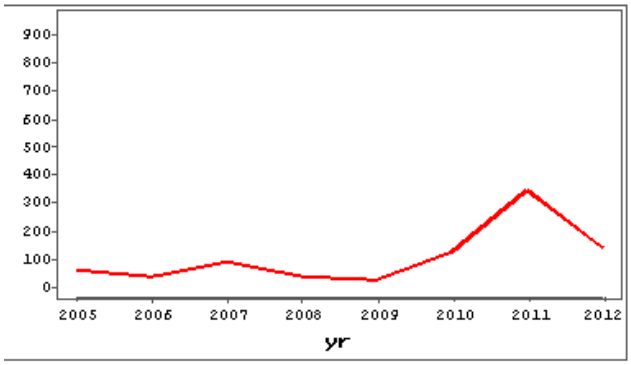


Figure 18. Mean TNMHC concentration ppbC units, by year, with wind direction greater than 335 and less than 345 degrees.

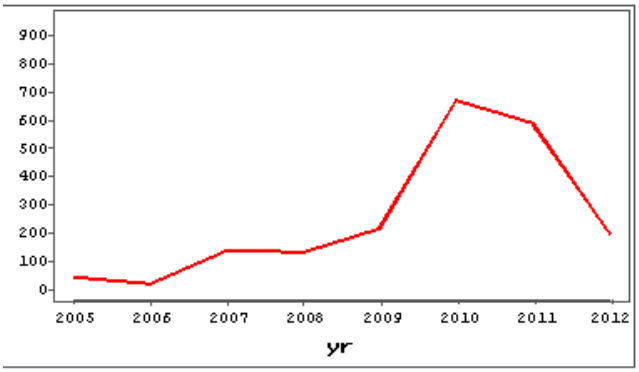


Figure 19. Mean TNMHC concentration ppbC units, by year, with wind direction greater than 5 and less than 15 degrees.

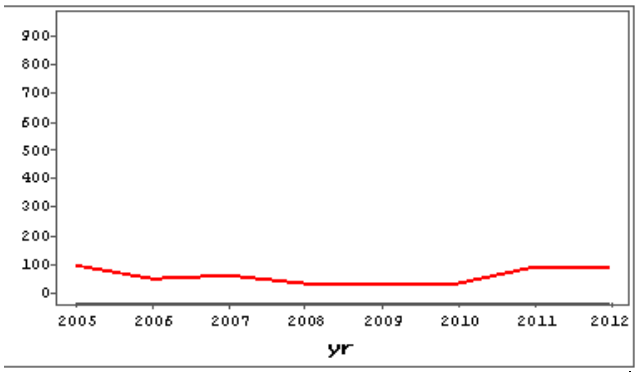


Figure 20. Mean TNMHC concentration ppbC units, by year, with wind direction greater than 325 and less than 335 degrees.

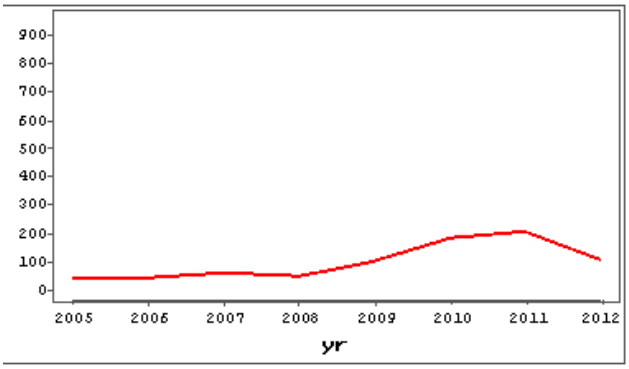
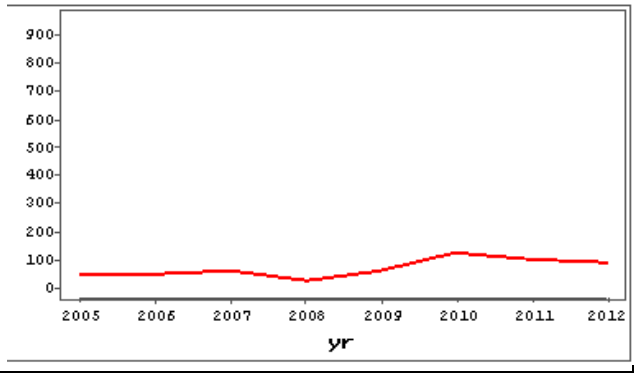


Figure 21. Mean TNMHC concentration ppbC units, by year, with wind direction greater than 315 and less than 325 degrees.



4. Canister Sampling Results

Six canister samples were taken in the fourth quarter. An individual can triggered at Port Grain CAMS 629 on Oct. 23 under southeast winds carrying only hydrocarbons (no elevated methane or sulfur species), with benzene at 118 ppbv (compare to the AMCV=180 ppbV) and a total sum of ppbC of only 2,950 ppbC in the sum of hydrocarbons in the canister compared to approximately 6,000 ppbC in TNMHC by the continuous instrument. A back trajectory

associated with this event appears in Figure 22, below. No emissions upset reports corresponding to this event were found on the TCEQ's Website.

Figure 22. Surface 30-minute back-trajectory started at 7:35 CST on October 23, 2012 from Port Grain at a time corresponding to the highest TNMHC value moments before a canister was triggered.

On October 10 at 6:58 CST, a can triggered at JIH under light northerly winds. The changes in TNMHC concentration were correlated with changes in methane concentrations that morning.

On Oct. 30 and again on Nov. 20, multiple monitors measured TNMHC and methane levels that rose across a broad area of the ship channel in the morning as winds shifted from southerly to northerly. On Oct. 30 this led to triggering at Dona Park and at JIH. On Nov. 20 cans were triggered at Port Grain and JIH.

An examination of the canister compositions shows very similar make-up among the samples on October 10, October 23, and November 20. These are shown in one graph in Figure 23, on page 29. In Figure 23, the concentrations for four canisters are measured on the left hand y-axis, and the higher concentrations for the JIH 11/20 sample are measured on the other axis. Figure 24, on page 30, shows the very different composition for the 10/23 Port Grain canister sample.

Figure 23. Concentrations of hydrocarbons in five canister samples (note four on one axis, JIH 11/20 on other axis)

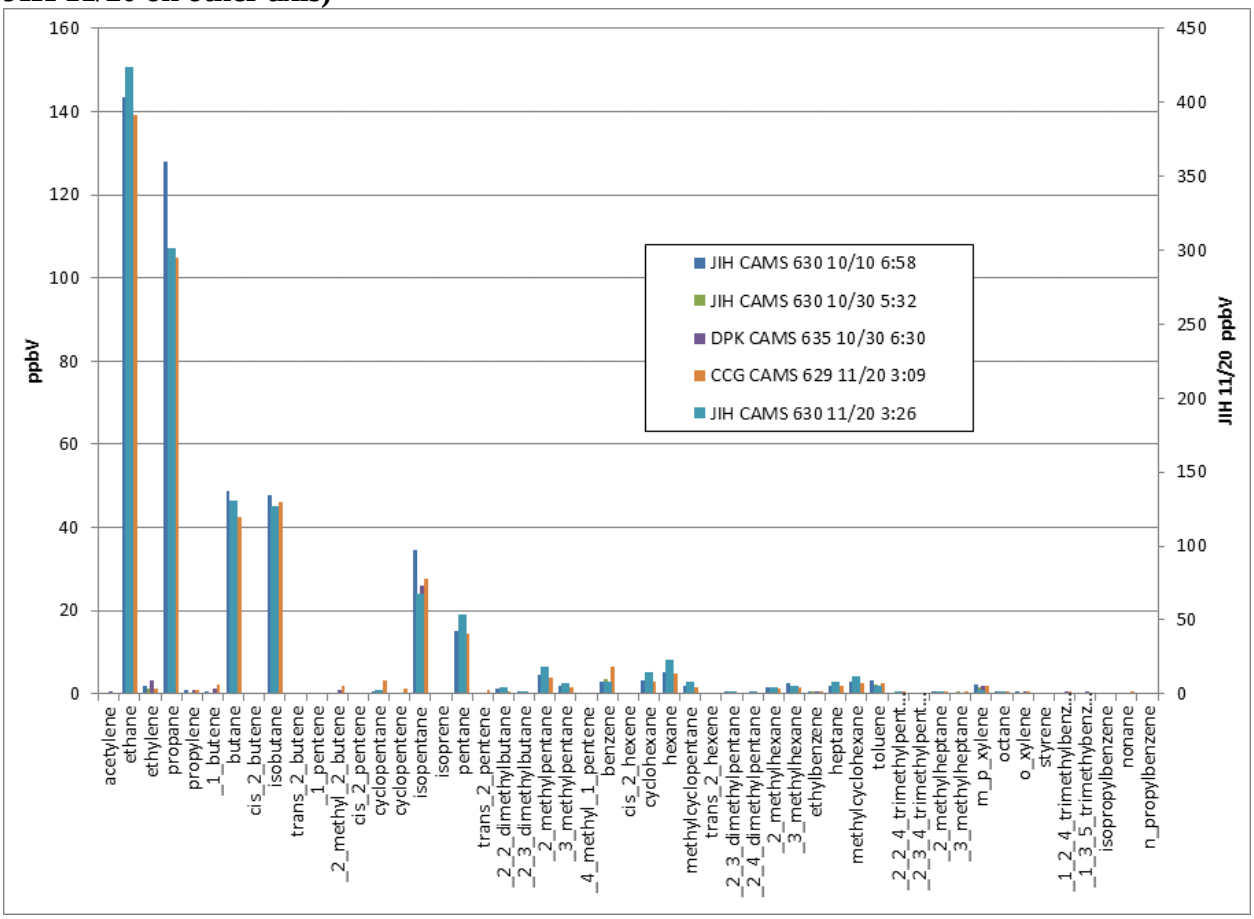
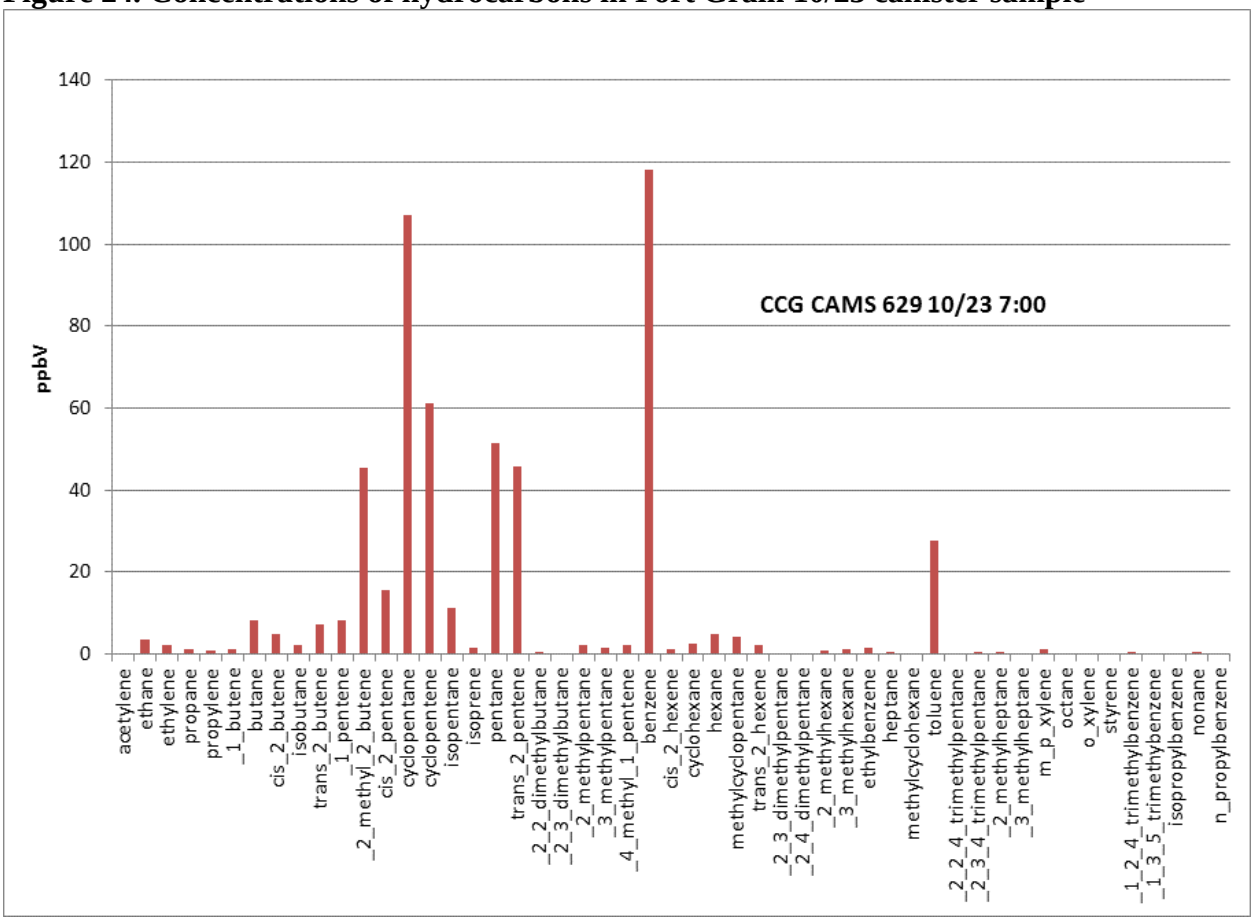


Figure 24. Concentrations of hydrocarbons in Port Grain 10/23 canister sample



5. Sulfur Dioxide Measurements at Corpus Christi Monitors

One hour SO_2 concentrations above 75 ppb are considered to be individual exceedances of the level of the NAAQS. The maximum one hour value for each day at a site is logged, and at the end of the year the 99th percentile daily maximum is selected. This value is averaged with the same statistic from the previous two years, and the resulting three-year average is compared with 75 ppb to determine compliance. If a site collects a full year of data, then the 99th percentile value would be the 4th highest daily maximum for the year. The resulting statistic is called the *design value* for a monitoring site. Table 7, on page 31, contains the design values for Corpus Christi monitors (TCEQ and UT) for recent three-year periods. The JIH CAMS 630 site shows noncompliance in each three-year period to date. A row has been entered in Table 7 for the incomplete 2010 – 2012 period, because the fourth highest daily maximum at JIH for 2012 through three validated quarters (61.4 ppb on January 6), which would be the 99th percentile value in a full year, was already high enough to create a rolling three year average over 75 ppb. The balance of this table will be filled in next quarter after full data validation for 2012.

Concentrations appear to have declined over the course of 2012 at JIH CAMS 630. If the lower concentrations continue through 2013, then the JIH site would come into compliance with the current SO_2 NAAQS.

Table 7. SO_2 NAAQS design values for Corpus Christi area sites, ppb units, values greater than 75 ppb represent noncompliance

Years	C21	C4	C629	C630	C631	C632	C633	C635	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*				**76**					

* 2012 not all validated

Research to date has concluded that emissions from ships operating in the Corpus Christi ship channel and docked along the shores are 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 2012, SO_2 concentrations at JIH have been steadily declining. This is reflected in Figures 25, 26, and 27, on page 32. A likely explanation appears in this paragraph. Figure 25 shows the time series of 5-minute SO_2 measurements at JIH over the period from June 1, 2011 to January 23, 2012. Episodes of elevated SO_2 were frequent over this period. Figure 26 shows the time series of 5-minute SO_2 measurements at JIH over the period a year later, from June 1, 2012 to January 23, 2013. The y-axis is the same in both figures, but the range of SO_2 concentrations is much smaller over the more recent period. The two periods plus the intervening period are shown in Figure 26, using only measurements with coincident wind direction from the southerly directions associated with the highest 1% of concentrations. In Figure 26 there is a note to indicate the date June 1, 2012. The significance of this date comes from Title 40 of the Code of Federal Regulations (40CFR). This is the codification of federal law related to protection of the natural environment, and Part 80 of 40CFR deals with the regulation of fuels and fuel additives. Part 80, Subpart I is titled Motor Vehicle Diesel Fuel; Nonroad, Locomotive, and Marine Diesel Fuel; and ECA Marine Fuel, and specifies a schedule for reducing sulfur content in diesel fuel used by smaller boats and ships and for reducing sulfur content in fuel used by larger "Emission Control Area" ships, those large vessels operating within 200 nautical miles (230 miles) of the coast. The requirements in 40CFR Part 80.510 specify that by June 1, 2012, sulfur content in marine diesel fuel must drop from the 500 ppm limit set in 2007 to a new 15 ppm limit. A provision in an international treaty to which the U.S. is party will require additional reduction in sulfur content in the larger ocean going vessel (OGV) fuel in 2015. However, the OGVs generally operate smaller diesel motors while at dock, and it is very likely that the fuel employed for these smaller motors now has lower sulfur content. Thus, both small ships motoring in the ship channel and large ships docked in the ship channel may now be producing lower emissions of SO_2.

Figure 25. Five-minute SO_2 at JIH, June 1, 2011 – January 23, 2012

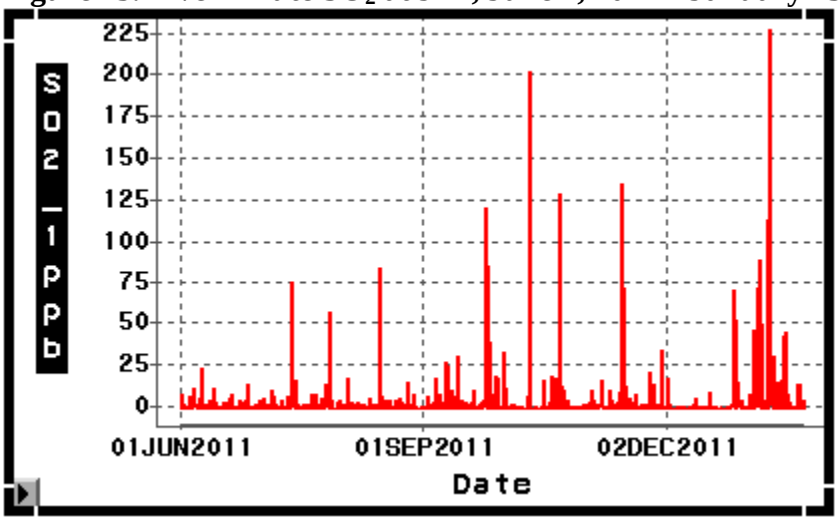


Figure 26. Five-minute SO_2 at JIH, June 1, 2012 – January 23, 2013

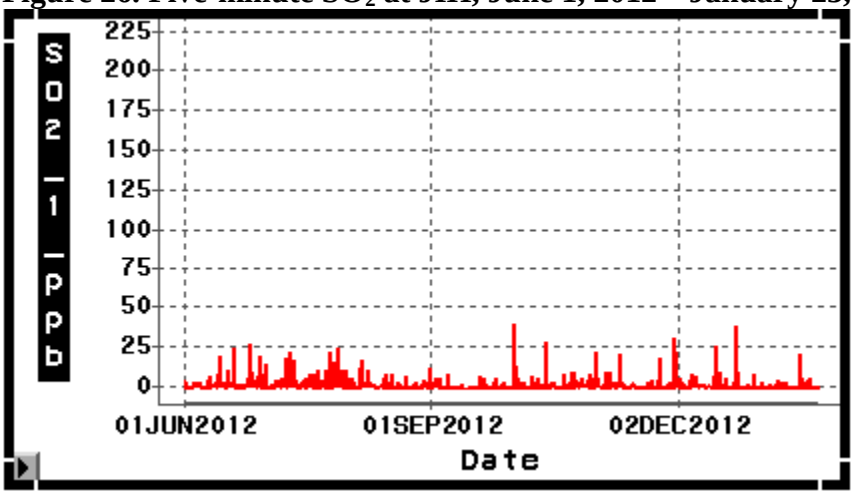
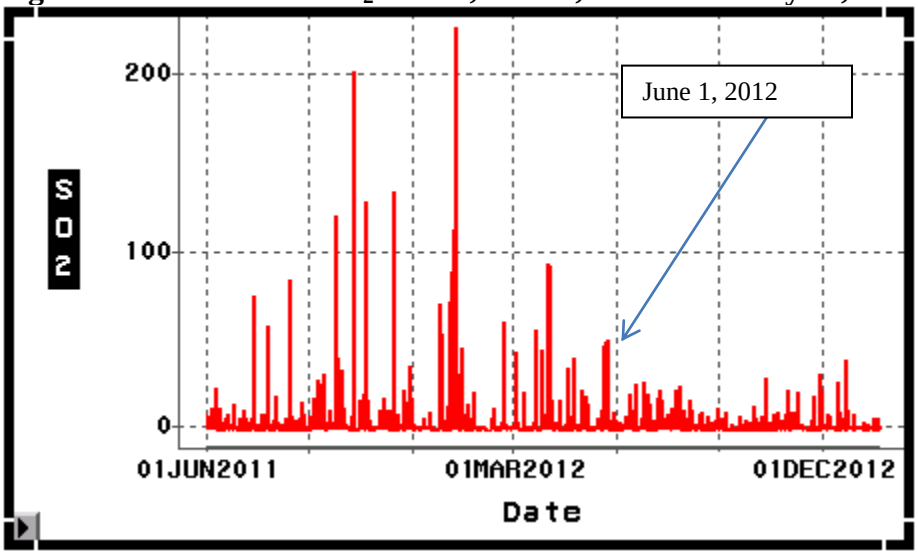


Figure 27. Five-minute SO_2 at JIH, June 1, 2011 – January 23, 2013, 120 < WDR < 270 deg.



Conclusions from the Fourth Quarter 2012 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, including the TCEQ's Avery Point. Dockside ship emissions that had affected the UT JIH CAMS 630 site and the Avery Point appear to have diminished for the second quarter in a row, which may be related to new federal rules on marine fuel. If trends continue, the JIH site would come into compliance with the SO_2 NAAQS after 2013.
- Third and fourth quarter 2012 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.
- Periodic air pollution events continue to be measured on a routine basis.

Further analyses will be provided upon request.

APPENDIX B

November 13, 2012
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 1003, NRC Building

12:00 pm – 2:00 pm

November 13, 2012

Advisory Board Members Present:

Ms. Gretchen Arnold	Corpus Christi Pollution Prevention Partnership TAMUCC
Ms. Joyce Jarmon	Corpus Christi Community Council
Dr. Glen Kost	Public Health Awareness
Dr. Eugene Billiot	TAMUCC
Ms. Sharon Lewis	Interim City of Corpus Christi

Ex-Officio Members of the Board Present:

Ms. Rosario Torres	TCEQ – Region 14
Ms. Micole Gonzalez –St John	TCEQ – Region 14
Mr. Chris Owen	TCEQ – Region 14

Guests Present:

Mr. Frank McDaniel	TCEQ
Mr. Brian Miculka	TCEQ
Ms. Susan Hoelscher	TCEQ

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 12:00 pm.

II. Project Overview and Status

Dr. Dave Sullivan gave an update on and analysis of monitoring data collected by the Project for the past 7 years. The Project has now collected 7.5 to 8 years of monitoring data.

III. Follow up to Old Business/Action Items

In response to a request from the Advisory Board at the last meeting, Mr. Torres gave an update on the relocation of the Inner Harbor Monitoring site. Mr. Torres presented the findings from the eight site options and their availability as follows:

Site	Owner	Status	Comments
A(1)	Port of Corpus Christi	Eliminated	Not available
A(2)	Port of Corpus Christi	Not recommended at this time	Lease Terms & Conditions not acceptable to Court
B	Port of Corpus Christi	Eliminated	Not available
C(1)	Driscoll Foundation	Eliminated	New owners, not available
C(2)	Port of Corpus Christi	Eliminated	Not available
FHR Pad Site	Flint Hills Resources		Lease Terms & Conditions not acceptable to Court

Site	Owner	Status	Comments - continued
Closed Landfill East Area	City of Corpus Christi	Under consideration	Engineering challenges with with landfill site preparations
Old Gun Range Area	City of Corpus Christi	Under consideration	Farther away than preferred

Discussions followed with the Advisory Board on the pros and cons with the various sites including 2 additional sites proposed by Ms. Joyce Jarmon and Ms. Gretchen Arnold. Ms. Jarmon also recommended considering the possibility of the Pollywog Pond site. She thought there was plenty of land there that was not being used and might make a suitable site. Ms. Arnold recommended the USDA site that was shown on the PowerPoint presentation slide by Dr. Sullivan.

During the discussion of the City of Corpus Christi had 2 sites under consideration the Advisory Board asked Ms. Sharon Lewis of her opinion of the availability and likelihood of using either site. Ms. Lewis mentioned the City of Corpus Christi was concerned with liability issues surrounding both of the sites. Ms. Lewis will go back to the City of Corpus Christi to further discuss and get a decision on these sites. Mr. Torres will contact Ms. Lewis to follow up with any additional information she may need. **ACTION ITEM**

Ms. Arnold agreed with the recommendation to pursue the USDA property and moved that this property be considered. Dr. Kost second the motion. In response, Mr. Torres said the UT Team will investigate the property that is owned by the USDA. **ACTION ITEM** If after UT investigates all of the remaining options and the two added today all options fail to provide a suitable site, it was recommended by Ms. Arnold to discontinue the search and use the funds to further extend the project life with only the remaining six sites in the network. The goal of the Advisory Board should be to have a decision either on, a suitable replacement site or extension of the project and not replace the Inner Harbor monitoring site by the time UT sends out the Annual Report to the Court. The Advisory Board agreed that this should be the goal.

Also in response to a previous request of the Advisory Board, Mr. Torres contacted Mr. Omar Valdez to arrange for a presentation at the Advisory Board meeting on 11/13/12 in regards to the testing of the emissions from the demolitions at Dona Park as reported during the last Advisory Board meeting. Unfortunately Mr. Valdez declined the invitation as he was not able to obtain approval from his management to travel to Corpus Christi to make a presentation at the Advisory Board meeting. UT Staff will try and obtain the data and work on a presentation of the data at a future meeting. **ACTION ITEM**

V. Adjourn

The meeting adjourned at 2:00pm.

APPENDIX C

Financial Report of Expenditures
Financial Report of Interest Earned

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

Accounting Report for the Quarter
10/01/2012 - 12/31/2012

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 this Quarter	Adjusted Budget	Prior Activity	Current Activity 10/01/12 - 12/31/12	Encumbrances	Remaining Balance 12/31/2012
Salaries-Prof	**12**	$616,882.00	$228,508.00	($95,903.26)	$749,486.74	($749,486.74)	$0.00	$0.00	$0.00
Salaries-CEER	**15**	$66,780.00	$24,045.00	($11,435.81)	$79,389.19	($79,389.19)	$0.00	$0.00	$0.00
Fringe	**14**	$149,185.00	$55,852.00	($22,669.10)	$182,367.90	($182,367.90)	$0.00	$0.00	$0.00
Supplies	**50**	$61,991.00	-$5,831.00	($21,633.36)	$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
Consultants	**60**	$22,500.00	$2,500.00	($25,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00
Subcontracts	**61-63**	$600,000.00	$0.00	($54,943.78)	$545,056.22	($545,056.22)	$0.00	$0.00	$0.00
Modeling/Computer Sv	**67**	$46,500.00	$12,500.00	($59,000.00)	$0.00	$0.00	$0.00	$0.00	$0.00
Computation Center	**68**	$0.00	$1,800.00	$0.00	$1,800.00	($1,800.00)	$0.00	$0.00	$0.00
Tuition	**71**	$17,727.00	$0.00	($125.00)	$17,602.00	($17,602.00)	$0.00	$0.00	$0.00
Travel	**75**	$15,000.00	$5,000.00	($17,403.03)	$2,596.97	($2,596.97)	$0.00	$0.00	$0.00
Equipment	**80**	$17,500.00	$7,500.00	($17,755.00)	$7,245.00	($7,245.00)	$0.00	$0.00	$0.00
Indirect Costs	**90**	$243,122.00	$53,952.00	($54,063.44)	$243,010.56	($243,010.56)	$0.00	$0.00	$0.00
TOTALS		**$1,863,933.00**	**$413,631.00**	**($414,482.78)**	**$1,863,081.22**	**($1,863,081.22)**	**$0.00**	**$0.00**	**$0.00**

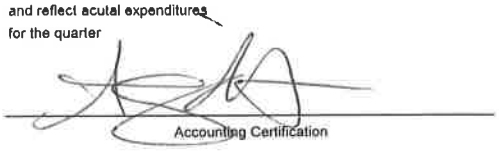
C. Interest Earned by COCP Funds as of 12/31/2012

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 12/31/2012

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

2/7/2013

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

Accounting Report for the Quarter
10/01/2012 - 12/31/2012

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

Total Grant Amount:	$2,745,371.68
Total Interest Earned:	$388,443.10
Total Funds Received:	**$3,133,814.78**

B. Summary of Expenditures Paid by Air Toxics Funds

		Yr 1 Budget	Year 2 Budget	Adjustments Prior Quarter	Adjustments This Quarter	Adjusted Budget	Prior Activity	Current Activity 10/01/12 - 12/31/12	Encumbrances	Remaining Balance 12/31/2012
Salaries-Prof	**12**	$111,654.00	$183,063.49	($2,210.00)	($27,285.84)	$265,221.65	($6,408.25)	($18,880.53)	$0.00	$239,932.87
Fringe	**14**	$24,563.88	$40,273.97	$0.00	$0.00	$64,837.85	($1,243.22)	($4,385.13)	$0.00	$59,209.50
Salaries-CEER	**15**	$0.00	$0.00	$2,210.00	$27,285.84	$29,495.84	$0.00	($1,493.85)	$0.00	$28,001.99
Salary Holding	**16**	$133,401.93	$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
Cell Phone Allowance	**42**	$0.00	$300.00	$60.00	$0.00	$360.00	$0.00	($90.00)	$0.00	$270.00
SEP Reserve	**43**	$10,800.00	$0.00	$0.00	$0.00	$10,800.00	$0.00	$0.00	$0.00	$10,800.00
Contingency	**47**	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Monthly M&O	**50**	$0.00	$0.00	$42,117.93	($12,460.61)	$29,657.32	($169.50)	($2,422.45)	($5,737.80)	$21,327.57
Equipment & Spare Parts	**51**	$0.00	$32,584.00	$0.00	$0.00	$32,584.00	$0.00	($5,250.23)	($800.00)	$26,533.77
Telephone SWB-DSL/RR	**52**	$0.00	$8,454.00	$1,946.00	$0.00	$10,400.00	($359.87)	($2,176.72)	$0.00	$7,863.41
Electric	**53**	$0.00	$22,438.00	$4,062.00	$0.00	$26,500.00	$0.00	($6,318.79)	$0.00	$20,181.21
Gases	**54**	$0.00	$10,811.00	$1,439.00	$0.00	$12,250.00	($63.02)	($1,712.39)	($132.77)	$10,341.82
Consultant Services - Holding	**60**	$80,000.00	$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	$163,777.00	$0.00	$358,527.38	$0.00	($36,053.48)	$0.00	$322,473.90
Analytical	**68**	$0.00	$27,839.39	$0.00	$12,160.61	$40,000.00	$0.00	($5,206.00)	$0.00	$34,794.00
Travel	**75**	$0.00	$3,000.00	$0.00	$300.00	$3,300.00	$0.00	($178.95)	($0.03)	$3,121.02
Equipment	**80**	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Indirect Costs	**90**	$54,062.97	$78,527.13	$0.00	$0.00	$132,590.10	($1,236.58)	($12,625.28)	$0.00	$118,728.24
TOTALS		**$414,482.78**	**$602,041.36**	**$0.00**	**$0.00**	**$1,016,524.14**	**($9,480.44)**	**($96,793.80)**	**($6,670.60)**	**$903,579.30**

C. Interest Earned by COCP Funds as of 12/31/2012

Prior Interest Earned:	$387,268.55
Interest Earned This Quarter:	$1,174.55
Total Interest Earned to Date:	**$388,443.10**

D. Balance of COCP Funds as of 12/31/2012

Total Grant Amount:	$2,745,371.68
Total Interest Earned:	$388,443.10
Total Expenditures:	($106,274.24)
Remaining Balance:	**$3,027,540.54**

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

Accounting Certification

2/7/2013