Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Annual Progress Report for the Period

October 1, 2009 through September 30, 2010

Submitted to

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

Ms. Kathleen Aisling
US 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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ANNUAL PROGRESS REPORT
TO THE U.S. DISTRICT COURT
FOR THE
CORPUS CHRISTI AIR MONITORING AND SURVEILLANCE CAMERA PROJECT

Activity Summary for the period from
October 1, 2009 through September 30, 2010

INTRODUCTION

On October 1, 2003, the US 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 (University) to implement the court ordered condition of probation (COCP) project *Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation* (Project). This annual report has been prepared pursuant to the requirements of the project proposal and is being submitted to the US District Court, the US Environmental Protection Agency (EPA), and the Texas Commission on Environmental Quality (TCEQ).

A. MONITORING SITES AND EQUIPMENT INSTALLED

The COCP consists of a network of seven (7) air monitoring stations as shown in the map below in Figure 1 with air monitoring instruments and surveillance camera equipment as shown in Table 1, page 3.

Figure 1. Map of Project monitoring station locations

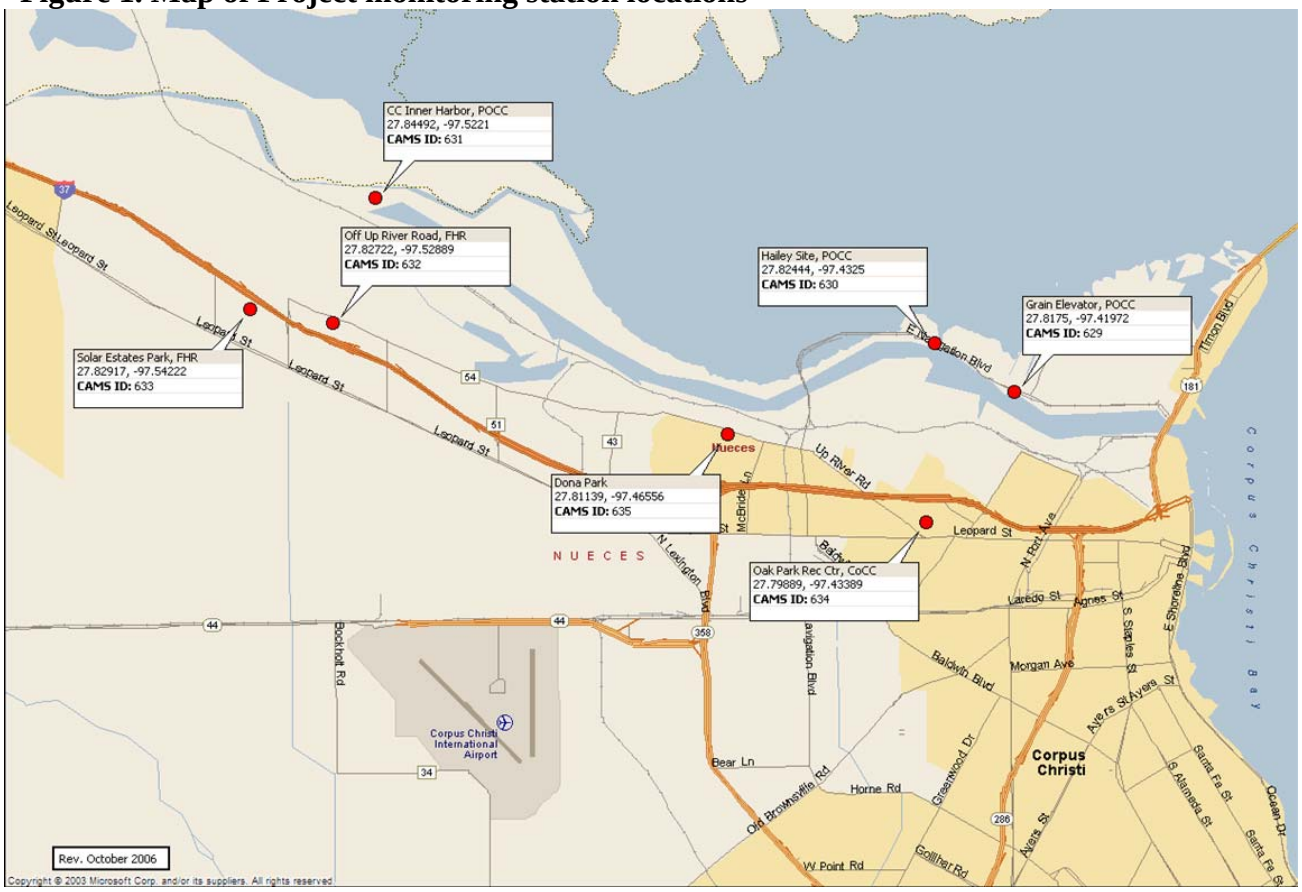

Table 1. Schedule of Air Monitoring Sites, Locations and Major Instrumentation

TCEQ CAMS NOs.	Latitude	Longitude	Description of Site Location	Monitoring Equipment				
				Auto GC	TNMHC	H2S & SO2	Met Station	Camera
634	27.798889 º North	97.433889 º West	Oak Park Recreation Center	Yes	Yes		Yes	
629	27.817500 º North	97.419722 º West	Grain Elevator @ Port of Corpus Christi		Yes	Yes	Yes	
630	27.824444 º North	97.432500 º West	J. I. Hailey Site @ Port of Corpus Christi		Yes	Yes	Yes	
635	27.811389 º North	97.465556 º West	TCEQ Monitoring Site C199 @ Dona Park		Yes	Yes	Yes	Yes
631	27.845278 º North	97.525556 º West	Port of Corpus Christi on West End of CC Inner Harbor		Yes	Yes	Yes	
632	27.827222 º North	97.528889 º West	Off Up River Road on Flint Hills Resources Easement		Yes	Yes	Yes	
633	27.908333 º North	97.542222 º West	Solar Estates Park at end of Sunshine Road	Yes	Yes	Yes	Yes	Yes

Legend

Auto GC	automated gas chromatograph
TNMHC	total non-methane hydrocarbon analyzer
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

B. DATA ANALYSIS

As noted in Table 1, above, the monitoring network provides measurements of a variety of air pollutants, including hydrocarbons, sulfur dioxide and hydrogen sulfide. Provided below are brief findings from the monitoring network during FY2010. More details are available in Appendix A, pages 7 through 36.

Results of Canister Sampling

At five of the seven monitoring sites, an ambient air sample may be collected in a canister in the field for subsequent laboratory analysis if a sustained level of elevated concentrations of total nonmethane hydrocarbons has been measured. During the period from October 1, 2009 through September 30, 2010, a total of 39 usable canister samples were triggered in the Corpus Christi network. (Occasionally a canister will trigger based on malfunction or after a wind shift and thus not show concentrations greater than background levels.) No measured benzene concentrations were higher than the TCEQ's health reference value. However, one canister sample contained a concentration of a hydrocarbon species that exceeded the TCEQ air monitoring comparison value (AMCV) for odors.

Summary of Sulfur Species Monitoring

EPA has established a new federal standard for sulfur dioxide. No exceedances of the State of Texas standards for sulfur dioxide and hydrogen sulfide were measured this fiscal year. However, exceedances of the new federal sulfur dioxide standard were measured.

Summary of Hydrocarbon Species Monitoring

No short-term concentrations or long-run average concentrations were measured that were greater than the State of Texas air monitoring comparison values for benzene, 1,3-butadiene, or any other hydrocarbons this fiscal year. Most species measured have annual averages in FY 2009 and FY 2010, that are significantly lower than in the previous two years. A significant decline in total hydrocarbon concentrations has also been noted at all seven sites since monitoring began.

Trends in Benzene Concentrations in Residential Areas

Because of a high level of concern with benzene, a known carcinogen, this compound is given special attention. An analysis of the benzene data shows concentrations in FY2010 were similar to the two previous years, and significantly lower than in FY2007 and 2006.

Trends in 1,3-Butadiene Concentrations in Residential Areas

The species 1,3-butadiene is a known carcinogen and a highly-reactive ozone precursor. Higher concentrations of this compound at Solar Estates have been measured under westerly winds than under other wind patterns. There is a significant decrease in concentrations associated with westerly wind directions this fiscal year.

C. ADVISORY BOARD

The Advisory Board for the Corpus Christi Air Monitoring and Surveillance Camera Project is a voluntary Board that consists of nine members. The members and their representation on the Board follow:

Ms. Gretchen Arnold	Local Air Quality Issues and Board Spokesperson
Dr. Eugene Billiot	Technical Support to the Board - Instrumentation
Dr. William Burgin	Local Public Health - Local Air Quality Issues
Ms. Joyce Jarmon	Community Representation
Dr. Glen Kost	Community Representation
Ms. Pat Suter	Local Advocacy Group
Ms. Peggy Sumner	Representative Interim Effective February 2009 (City of Corpus Christi)
Mr. Christopher Schulz	Community Representation
Mr. Henry Williams	Community Representation

Two meetings of the Advisory Board were held during the seventh year of the Project. Both meetings were held on the campus of Texas A&M University in Corpus Christi, Texas. Highlights from these meetings follow:

a. October 29, 2009 Meeting

- Six Board members, a guest, Sharon Bailey Lewis of the City of Corpus Christi, and representatives from The University of Texas at Austin and the Texas Commission on Environmental Quality attended the meeting.
- Dr. David Sullivan gave a summary of the early findings resulting from the analysis of data collected at the monitoring stations. Dr. Sullivan reported that during the 3rd quarter of 2009 all values were below TCEQ's Air Monitoring Comparative Values for the Auto

GCs at the Solar Estates and Oak Park sites. The Benzene concentrations continue to be significantly lower at both the Oak Park and Solar Estates sites. Dr. Sullivan also mentioned that the TNMHC concentrations from nearby sources have dropped at the Flint Hills Resources site. Dr. Sullivan reported that at the Solar Estate site, 1,3-Butadiene bears watching. Equistar, which is a rubber manufacturing plant, is approximately 3 miles from the Solar Estate site. On 9/27/09, 1,3-Butadiene was reported at the highest levels monitored but not in excess of any health standards. Mr. David Kennebeck from TCEQ received an alert and called Equistar in response to the alert. Equistar responded that they were monitoring their flares and didn't find anything logged.

- Mr. Torres said he will continue to seek a representative from the Railroad Commission to make a brief presentation at a future meeting.
- The Board was updated on the Enhanced Automated Alert system, the request for installing surveillance cameras at Port of Corpus Christi sites and TCEQ Infrared Camera Equipment. Mr. Torres reported time limitations on use of the funds may constrain our ability to acquire a camera.
- The Board was updated on the Corpus Christi Neighborhood Air Toxics Modeling Project.
- Preparation of an outline detailing the content and presentation of the annual report to the US District Court was discussed.

b. April 29, 2010 Meeting

- Five Board members and guests from the Railroad Commission, Eastern Research Group, and Agency for Toxic Substances and Disease Registry, several community members, and representatives from the US District Court, The University of Texas at Austin, and the Texas Commission on Environmental Quality attended the meeting.
- The Board was updated on the presentation of the Project's Annual Report to the US District Court, which occurred in December 2009.
- Dr. David Sullivan gave a summary of the early findings resulting from the analysis of data collected at the monitoring stations.
- Ms. Danielle Langemann, from the Agency for Toxic Substances and Disease Registry (ATSDR), provided an informational presentation on a public health assessment the ATSDR is performing in Corpus Christi.
- Mr. Arnold Ott, from the Texas Railroad Commission, provided an overview presentation on the Texas Railroad Commission. He explained that the Railroad Commission of Texas (RRC, Commission) is the state agency with primary regulatory jurisdiction over the oil and natural gas industry, pipeline transporters, natural gas and hazardous liquid pipeline industry, natural gas utilities, the LP-gas industry, and coal and uranium surface mining operations.
- The Board was updated on the Corpus Christi Neighborhood Air Toxics Modeling Project.

D. PROJECT MANAGEMENT AND PLANNING

Project Management and Planning during this period has focused on five (5) major activities.

1. Site Operations and Maintenance and Quality Assurance
   Routine operations, maintenance and quality assurance activities have become the norm at each site. These activities help to maintain high data capture and quality of data.

2. Data Analysis
   The Project now has more than five years worth of data. The focus of data analysis has been to examine the frequency, level and direction of sources when measurements exceed trigger or warning levels and to analyze data for trends and other patterns indicated in the data collected.

3. Communication
   Information about the status of the Project has been communicated through:
   a. Advisory Board Meetings,
   b. Project Website (website statistics are included in Appendix B, pages 37 and 38,
   c. Presentations to local community organizations and industry groups,
   d. Quarterly Technical and Financial Reports to the Court and Advisory Board and
   e. Sharing of technical data with the EPA and the Agency for Toxic Substances and Disease Registry.

4. Budget Monitoring
   Budget monitoring during this period has focused on:
   a. Actual project costs for Phase II-Sites Operation and Maintenance,
   b. Administration and oversight costs incurred by the University, and
   c. Budget for future years.
   The Financial Report for the year is included in Appendix C, pages 39 through 43.

5. Other Contributions
   The University of Texas at Austin has been awarded funding for five (5) Supplemental Environmental Projects (SEPs) through the Texas Commission on Environmental Quality since the Project began. These five SEPs total $1,089,379 plus interest earned, which has totaled $40,321.52. A sixth SEP (Equistar Chemicals) was awarded in December 2008 in the amount of $400,000 and was deposited in a holding account pending approval by the TCEQ of a UT Austin SEP Proposal. Subsequent to the March 31, 2009 Quarterly Report to the Court, the TCEQ notified UT Austin that Equistar Chemicals (a subsidiary of LyondellBasell Industries and US affiliate Lyondell Chemical Co.), filed for Chapter 11 bankruptcy on January 6, 2009 and that the $400,000 ordered to be paid by Equistar for this project might be subject to a collection effort in that proceeding on behalf of the creditors. As a consequence, the funding for the Equistar SEP award is now on indefinite hold. UT Austin will advise the court once the final status of the Equistar SEP funds has been determined. All of the SEPs are listed in Appendix D, page 44 and 45.

APPENDIX A

Data Analysis for Corpus Christi Annual Report
October 2009 – September 2010

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Data Analysis for Corpus Christi Annual Report

This technical report describes recent results of monitoring and analysis of data under the Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project for the period October 1, 2009 through September 30, 2010. The monitoring network is shown in Figure 1, page 2, and is described in Table 1, below. This report contains the following elements:

- Results of canister sampling at five sites
- Summary of total nonmethane hydrocarbon monitoring
- Summary of speciated hydrocarbon monitoring in residential areas
    - Trends in benzene concentrations in residential areas
    - Trends in 1,3-butadiene concentrations in residential areas
- Summary of sulfur species monitoring at UT and TCEQ sites

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**)	Yes	T		Yes	
629	Grain Elevator @ Port of Corpus Christi (**CCG**)		T&C	Yes	Yes	
630	J. I. Hailey Site @ Port of Corpus Christi (**JIH**)		T&C	Yes	Yes	
635	TCEQ Monitoring Site C199 @ Dona Park (**DPK**)		T&C	Yes	Yes	Yes
631	Port of Corpus Christi on West End of CC Inner Harbor (**WEH**)		T&C	Yes	Yes	
632	Off Up River Road on Flint Hills Resources Easement (**FHR**)		T&C	Yes	Yes	
633	Solar Estates Park at end of Sunshine Road (**SOE**)	Yes	T	Yes	Yes	Yes

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 it for some 47 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. Project 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 all seven UT/CEER sites.

- **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 and12 chlorinated species. Canister samplers

- **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.state.tx.us/implementation/tox/regmemo/AirMain.html#compare
  (accessed December, 2010). 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.

- **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 *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.
  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. The other two existing NAAQS for SO_2 are 0.03 ppm averaged over one year and 0.14 ppm averaged over 24 hours, not to be exceeded in any one year. There is also a secondary SO_2 standard of 0.500 ppm over three hours, not to be exceeded in any one year. The reason that there has been little attention paid to the SO_2 NAAQS on this project until now is that the State of Texas's standard of

[1] See http://epa.gov/air/criteria.html accessed October 2010

0.400 ppm or 400 ppb over 30 minutes for SO_2 was much more likely to be exceeded than the older NAAQS. With the addition of a new NAAQS for SO_2 in June 2010, however, the situation has changed.

- **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. Results of Canister Sampling

In FY 2010, a total of 39 usable canister samples were taken. A summary of the benzene concentrations appears in Table 2, below. No measured benzene concentration exceeded the TCEQ's AMCV of 180 ppbV.

Table 2. Summary of canister sample counts and benzene concentrations FY 2010

Row Labels	Max of benzene ppbV	Number of cans
CCG CAMS 629	41.7	11
DPK CAMS 635	60.6	11
FHR CAMS 632	1.4	2
JIH CAMS 630	7.8	8
WEH CAMS 631	17.3	7
Grand Total	60.6	39

On one occasion, a canister sample produced a concentration of a specific compound that exceeded odor effects screening levels used by the TCEQ. Details are shown in Table 3, below. The site listed in Table 3 is in a remote industrial area with no nearby residences.

Table 3. One canister sample concentration that exceeded TCEQ AMCV odor effect levels in FY10

Date	Time (start)	Site	Species	ppbV	Odor AMCV
2/16/2010	23:45	CCG C629	2-methylpentane	267.9	83

The total ensemble of canister samples taken over the past five years provides a rich database with which to explore the "factors" that contribute to the measured concentrations. These factors include emission sources such as routine oil refining equipment, incinerator flares, ship loading and unloading, storage tank leaks, spills and industrial upsets, heavy-duty diesel, oil and natural gas extraction, and other sources. The relative mix of chemicals in each sample is related to one or more sources in each case, and statistical methods can be used to partially extract the "signatures" or "fingerprints" of each source factor. Table 4, on page 13, summarizes the factors that have been statistically derived from 198 canister samples from 2006 – 2010 using *principal component analysis*. In the FY2009 Annual Report, using fewer canisters, seven factors were described as contributing to the canister composition. With more canisters, more refined results can be derived. Ten factors are listed in terms of their contribution to resolving the overall variability in concentrations.

- One factor is mainly composed of butenes and pentenes, and labeled "C4-C6 alkenes." These are reactive 4- and 5-carbon compounds produced in refining and used to make other chemical products.
- The second factor includes single branched alkanes and is labeled "methyl-C4-C6."

- The third factor accounts for benzene, ethyl-benzene, toluene, and xylenes, and trimethylbenzenes. These are the "BTEX" compounds produced from refining and used in gasoline formulation.
- The fourth factor accounts for heptane, octane, and nonane, heavier molecular-weight alkane species that may be related to motor fuel, labeled C7-C9 alkanes."
- The fifth factor accounts for ethane, propane, butanes, pentanes, and hexane - the low-molecular-weight alkane species related to natural gas and to gasoline vapor, labeled "Nat'l gas."
- The sixth factor accounts for three "ringed" species, cyclopentane, cyclohexane, and benzene, products of refining, labeled "C5, C6 rings."
- Factor seven accounts for two low molecular-weight species, which may come from refining or vehicle exhaust, labeled "C2-C3 alkenes."
- Three additional factors involve one species or weakly combine two species, and may be outliers.

Table 4. Ten factors derived from 198 canisters 2006-2010.

C4-C6 alkenes	methyl-C4-C6	BTEX	C7-C9 alkanes	Nat'l gas
C5,C6 rings	C2-C3 alkenes	propene, isoprene	Styrene	di-trimethyl-pentanes

The most significant factor triggering canisters appears to be natural gas. The primary component in natural gas is methane. The background concentration for this species in ambient air is around 2,000 ppbC. The coincident TNMHC and methane measured while the canister samples were taken have been examined to look at the relationship between methane and unspeciated TNMHC. Figure 2, on page 14, shows the comparison of methane to TNMHC at the 5-minute period during which each canister began to fill after a valid triggering. The data are color-coded: observations with methane concentration less than 2,500 ppbC in orange and labeled "industry" and higher concentration values in blue and labeled "natural gas." The balance among these samples is 19 from natural gas and 14 from industrial emissions.

Table 5, below, shows the apportioning of the 33 samples shown in Figure 2 into the two categories: natural gas and industry for each site. One sample with TNMHC greater than methane, shown in Figure 2 with the second highest TNMHC (x-axis) value, is classified as "both" as it has elevated methane but excess TNMHC relative to the other samples.

Table 5. Apportioning canister samples by primary emission source type

Site	Industry	Natural gas	Both
Dona Park	2	9	
West End Harbor	6		1
J. I. Hailey	1	3	
CC Grain	5	6	
Total	14	18	1

Figure 3, page 15, shows the surface back-trajectories from the Dona Park site started at the same time as the 11 canister samples taken at that site in FY 10. Seven of the trajectories run out across the Nueces Bay, most likely to natural gas wells at or near the White Point peninsula.

Figure 2. Comparison between methane and TNMHC 5-minute values at the start of a canister sample, 34 samples from four sites in FY10.

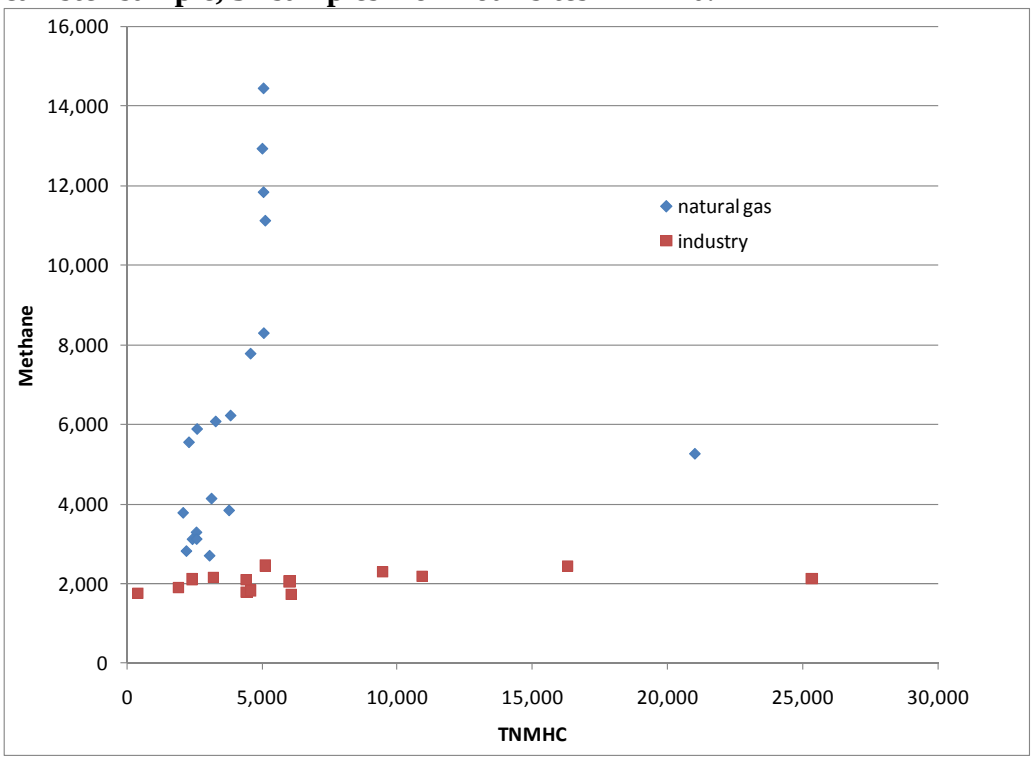
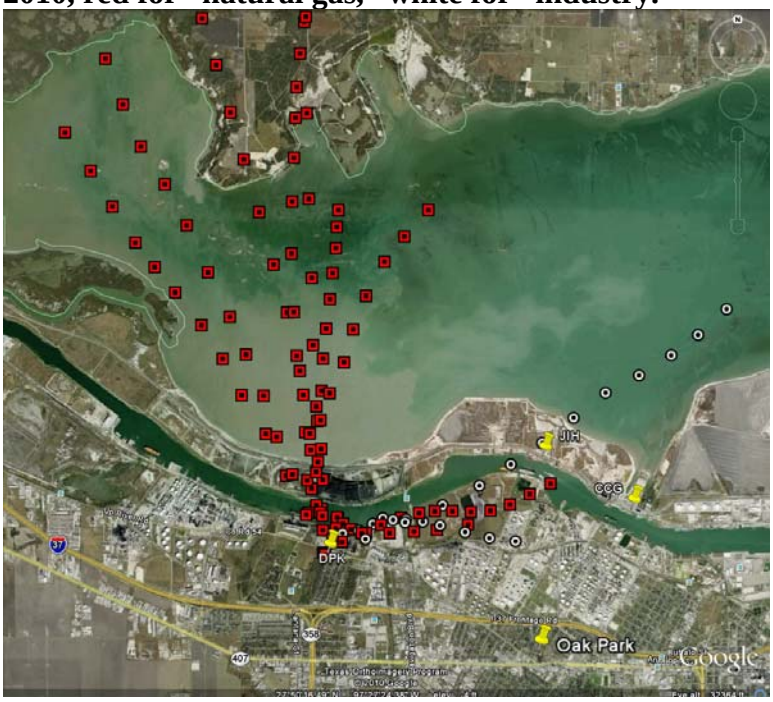


Figure 3. Surface back-trajectories started when canisters were triggered at Dona Park FY 2010, red for "natural gas," white for "industry."



2. Summary of Total Nonmethane Hydrocarbon Monitoring at Seven Sites

In this section, trends in median total nonmethane hydrocarbon (TNMHC) concentrations at the seven UT CAMS sites are discussed. The approach taken is to use the one-hour time resolution data from each site over each calendar quarter October 2005 through September 2010 to assess seasonality and trends. As has been shown in past reports, each site measures its highest concentrations when the wind blows from the industrial source areas, including areas where natural gas extraction is occurring. Thus, Oak Park and Solar Estates have higher concentration measured in the winter than in the summer, because of the increased frequency of northerly winds between October and March. Other sites can see higher concentrations year around, owing to exposure to industrial sources to the south and natural gas extraction to the north.

The graphs of quarterly medians appear in Figures 4 – 10, on pages 16 through 19. Each site's data are graphed on different scales. The FHR site quarter medians are graphed over the widest range, as that site had been affected by a particular source that has ceased operation, thus leading to a rapid decline in concentrations in late 2007. When all other six sites are grouped together, they suggest that concentrations declined from FY2007 to FY2008, and have remained relatively flat for the past three years. This is reflected in Figure 11, on page 19, showing the pooled average of the medians by fiscal year, 2006 – 2010.

Figure 4. Quarterly median TNMHC ppbC at Port Grain CAMS 629, 4Q CY05 – 3Q CY10

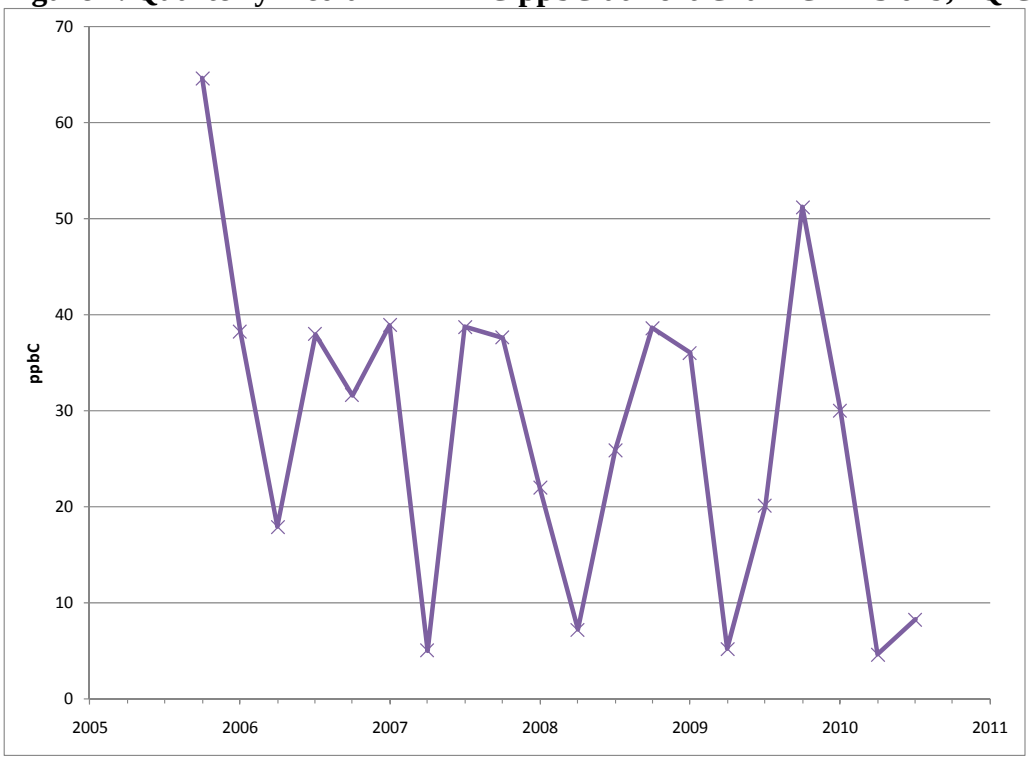


Figure 5. Quarterly median TNMHC ppbC at J.I. Hailey CAMS 630, 4Q CY05 – 3Q CY10

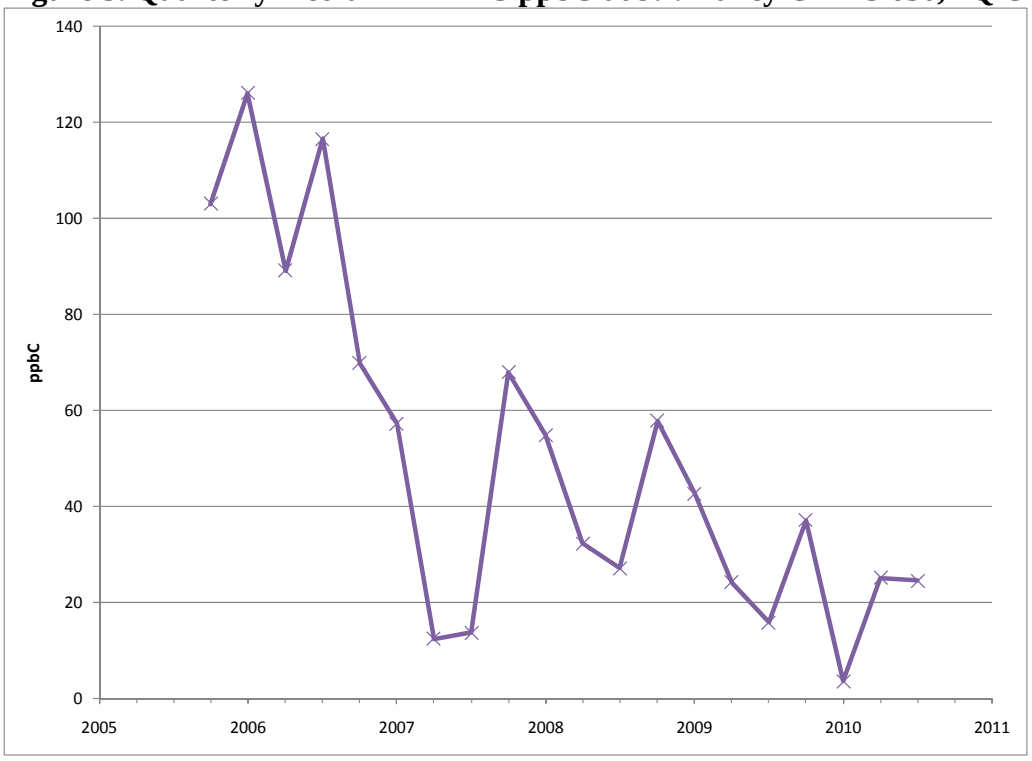


Figure 6. Quarterly median TNMHC ppbC at West End Harbor CAMS 631, 4Q CY05 – 3Q CY10

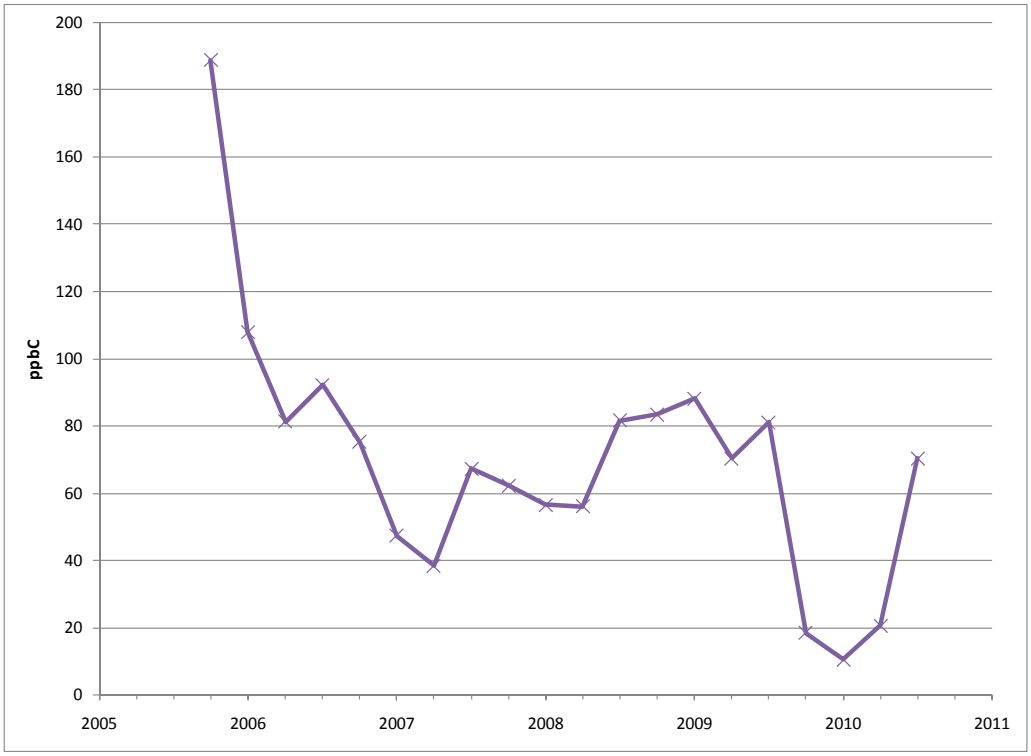


Figure 7. Quarterly median TNMHC ppbC at Flint Hills Resources CAMS 632, 4Q CY05 – 3Q CY10

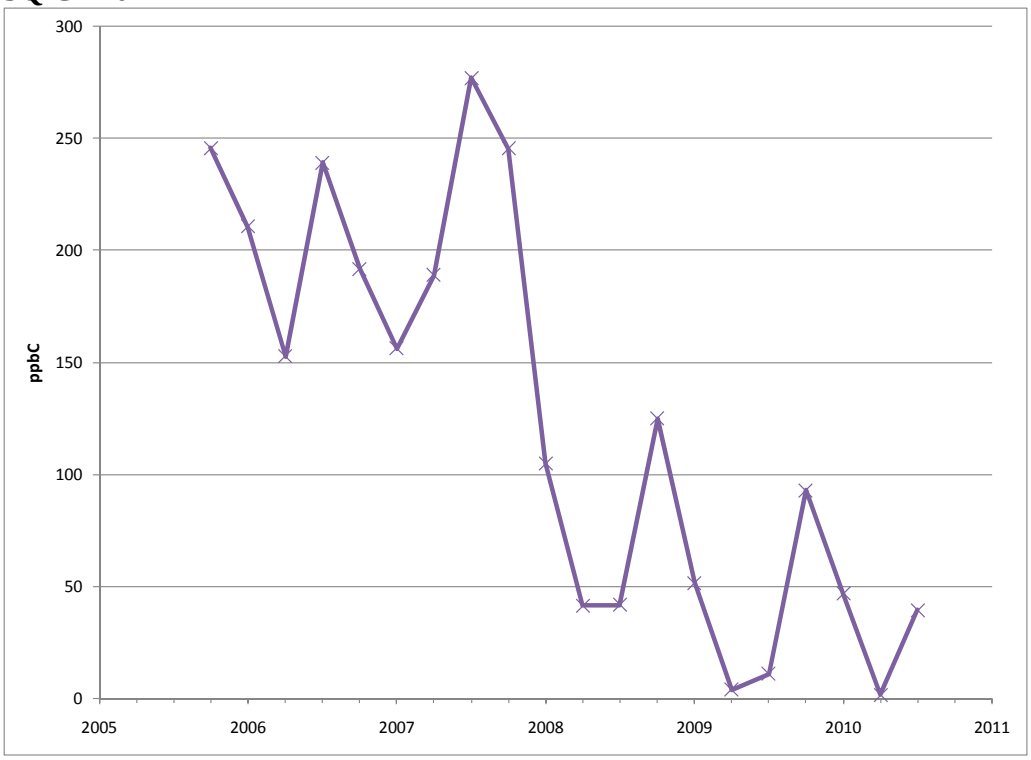


Figure 8. Quarterly median TNMHC ppbC at Solar Estates CAMS 633, 4Q CY05 – 3Q CY10

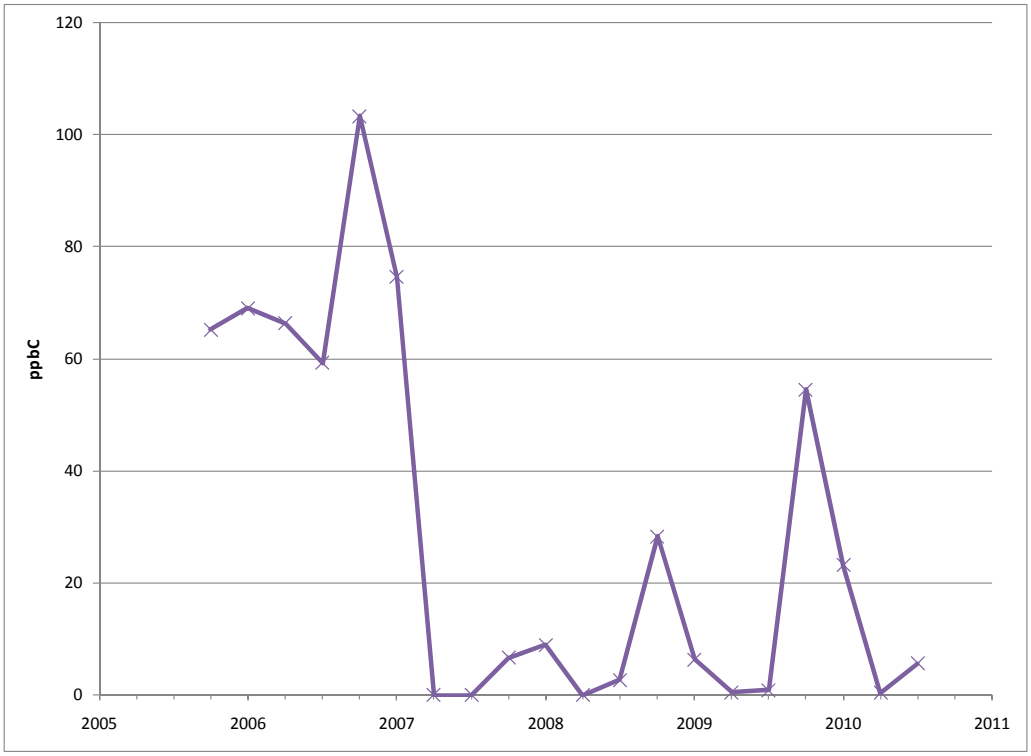


Figure 9. Quarterly median TNMHC ppbC at Oak Park CAMS 634, 4Q CY05 – 3Q CY10

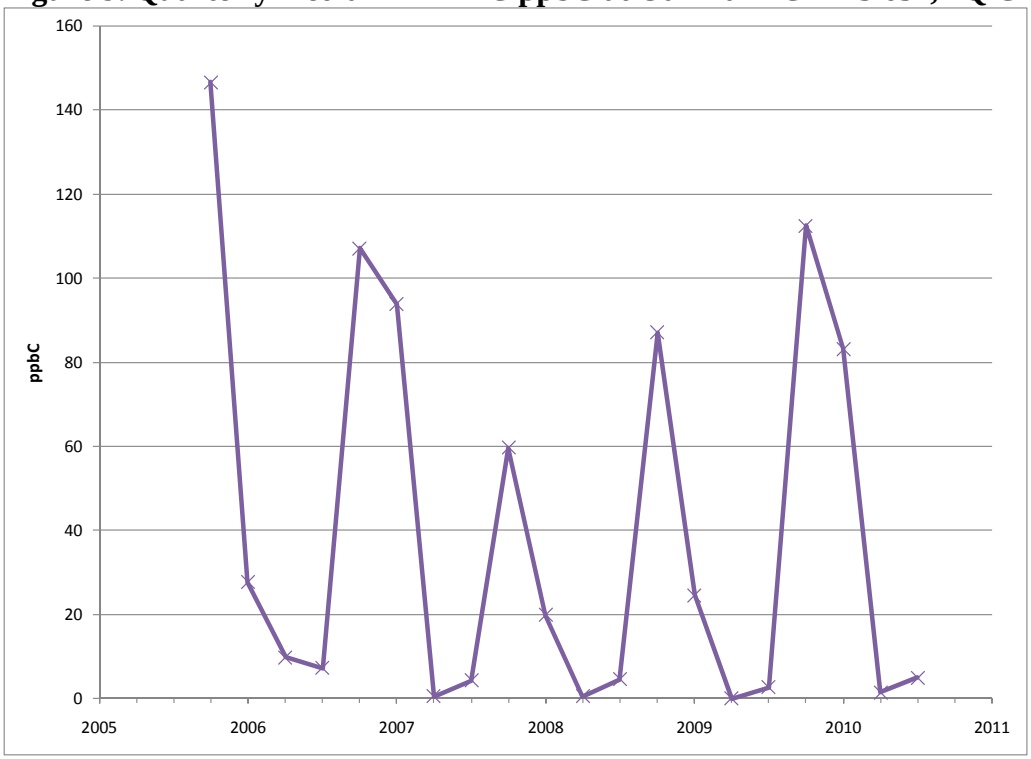


Figure 10. Quarterly median TNMHC ppbC at Dona Park CAMS 635, 4Q CY05 – 3Q CY10

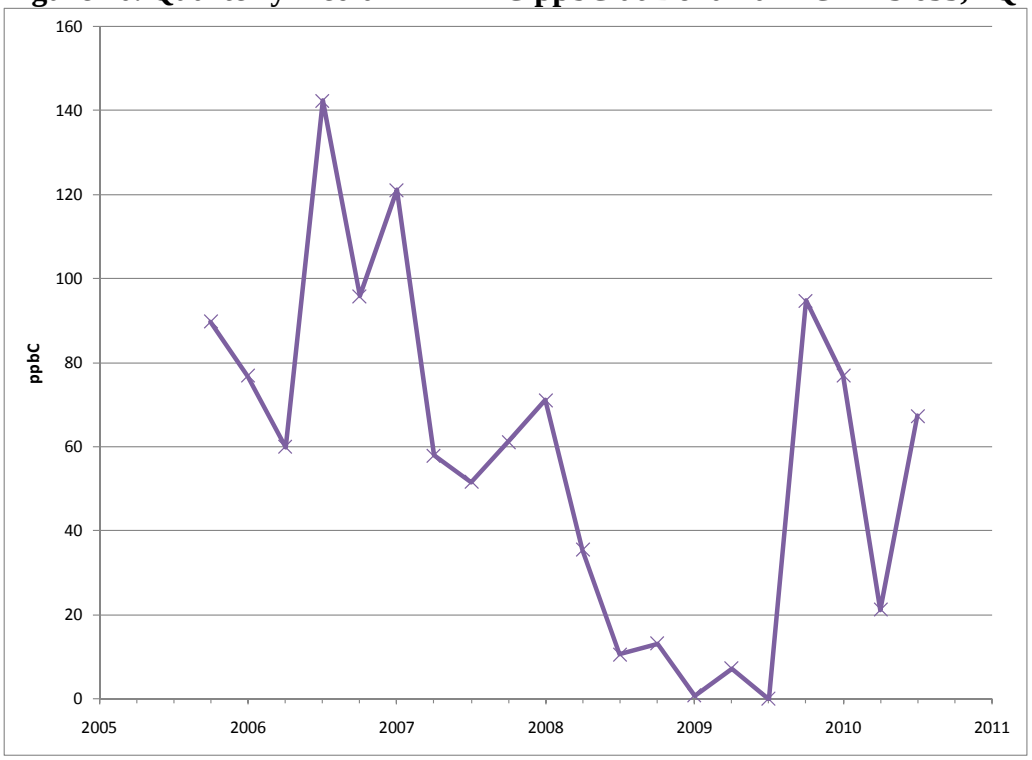
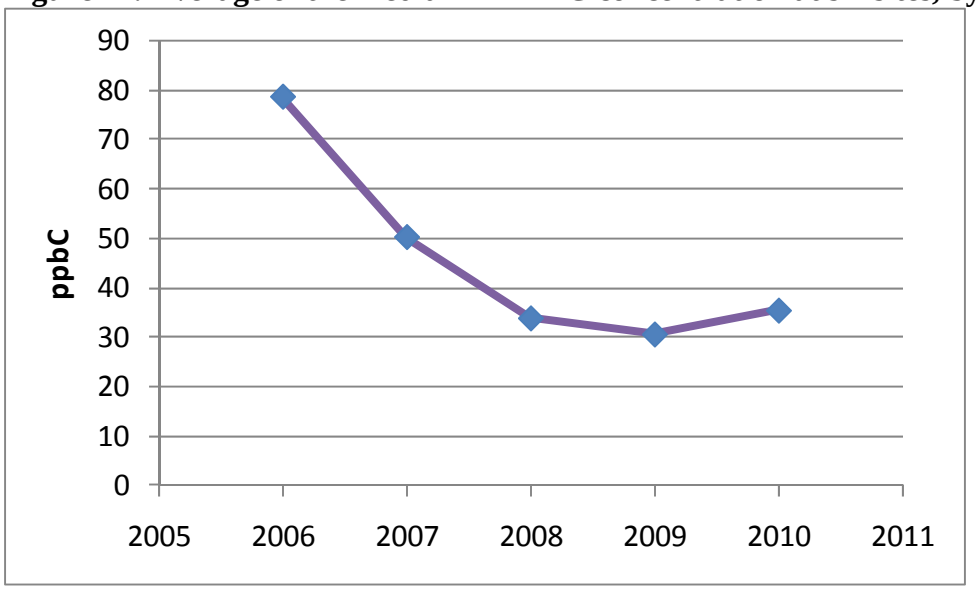


Figure 11. Average of the median TNMHC concentration at six sites, by FY 2006 – FY 2010



3. Auto-GC Data Summaries in Residential Areas

In this section the results of semi-continuous sampling for hydrocarbons at the project auto-GC sites – Solar Estates C633, Oak Park C634 – are presented. These sites are located in residential areas. Solar Estates and Oak Park are generally downwind of industrial emissions under northerly winds. TCEQ began operating a new auto-GC at their Palm site located between the TCEQ's Hillcrest and Williams Park sites in the Hillcrest neighborhood. In examining aggregated data one observes similar patterns of hydrocarbons at all three sites. Palm has only six months of data, so it is hard to draw conclusions from comparisons to the other two sites' data, but at this point its concentration statistics are similar to those at Oak Park and Solar Estates.

Table 6, on page 21, summarizes data for Solar Estates and Oak Park from FY 2010. The data summarized in Table 6 have not completed the standard data validation process; however, generally very few changes occur during the standard validation process.

Table 6 shows the average concentrations along with the maximum one-hour and 24-hour average concentrations for 27 hydrocarbon species of interest. All concentration values in the table are in ppbV units. No concentrations or averages of concentrations were greater than TCEQ's air monitoring comparison values (AMCV) during FY 2010.

The rows for ***benzene*** are bold-faced in Table 6 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. On November 6, 2009 a one-hour benzene value of 86 ppb was measured at 4 a.m. CST at the Oak Park site. Winds were from the north, and the concentrations remained statistically significantly greater than the site's mean concentration that morning until the wind shifted. No assignable cause for the elevated concentrations has been determined.

Figure 12, on page 22, shows the mean concentration for the 27 species of interest by fiscal year at Oak Park, and Figure 13, on the following page, shows the same graphical synopsis for Solar Estates. As is clear in these two graphs, species mean concentrations more or less fall into three categories. The lower molecular-weight and less chemically-reactive alkane species (ethane, propane, butane, iso-butane, pentane, and iso-pentane) have mean concentrations greater than 1.0 ppbV. The second category would be the lower molecular-weight and more reactive alkenes (ethylene and propylene) and some six and seven carbon species (hexane, benzene, cyclohexane, and xylene-isomers), which have mean concentrations between 0.4 and 1.0 ppbV. The third category based on mean concentration is all the other species averaging less than 0.2 ppbV. In order to better show the trends in these data, a second pair of graphs are shown in Figures 14 and 15, on pages 24 and 25, respectively, for the concentration means of the lower concentration species. Note that the scales for the two auto-GCs are the same between Figures 12 and 13 and between Figures 14 and 15. In comparing these four graphs we can make the following conclusions:

1. Ethane means are about the same at both sites. For other alkane species, concentrations at Oak Park are generally higher.
2. Trends indicate that the mean concentrations have declined overall since FY2006.
3. However, mean concentrations are relatively flat over the past two or three years.

Table 6. Auto-GC statistics for FY 2010

	Oak Park FY10			Solar Estates FY10		
Species	**Peak 1-Hour**	**Peak 24-Hour**	**Mean**	**Peak 1-Hour**	**Peak 24-Hour**	**Mean**
Ethane	170.91	39.6	6.60	143.36	27.66	7.05
Ethylene	52.72	4.93	0.67	199.89	11.27	0.47
Propane	436.6	29.49	4.40	89.10	18.13	4.51
Propylene	38.44	3.39	0.33	8.61	1.21	0.24
Isobutane	104.11	7.19	1.57	25.82	7.31	1.53
n-Butane	410.92	25.77	2.51	32.50	8.81	2.14
t-2-Butene	109.78	5.04	0.10	2.43	0.32	0.06
1-Butene	4.90	0.77	0.07	8.22	0.58	0.05
c-2-Butene	2.74	0.51	0.06	1.94	0.47	0.04
Isopentane	116.17	9.39	1.83	22.25	5.87	1.17
n-Pentane	118.96	7.04	1.16	14.54	3.81	0.75
1,3-Butadiene	7.78	0.88	0.04	5.91	0.56	0.03
t-2-Pentene	2.89	0.45	0.06	4.65	1.17	0.03
1-Pentene	2.23	0.30	0.03	0.85	0.12	0.02
c-2-Pentene	0.91	0.21	0.03	1.13	0.09	0.01
n-Hexane	196.29	13.12	0.44	5.11	1.46	0.27
Benzene	**86.18**	**5.96**	**0.43**	**6.84**	**1.37**	**0.22**
Cyclohexane	87.37	6.11	0.21	19.25	1.09	0.17
Toluene	62.62	3.91	0.56	6.40	1.20	0.26
Ethyl Benzene	2.56	0.22	0.04	1.44	0.21	0.03
p-Xylene + m-Xylene	13.22	1.10	0.14	13.47	1.91	0.20
o-Xylene	3.14	0.26	0.04	6.59	1.72	0.04
Isopropyl Benzene &Cumene	2.06	0.29	0.02	2.83	0.27	0.02
1,3,5-TMB*	0.98	0.10	0.02	1.63	0.20	0.02
1,2,4-TMB*	5.90	0.78	0.04	4.87	1.23	0.04
n-Decane	2.42	0.23	0.02	3.69	0.41	0.05
1,2,3-TMB*	0.88	0.07	0.01	0.78	0.15	0.02

* TMB= trimethylbenzene

Although the Long Term Health Work Group only asks for reports on the 27 species in Table 6, the auto-GC measure 46 species. One 1-hour value above the odor effects AMCV was measured at Oak Park for the species n-propylbenzene, which is one of the other 19 auto-GC species. This species has the lowest odor threshold among the auto-GC species (3.8 ppbV).

Figure 12. Mean concentrations for 27 hydrocarbon species at Oak Park auto-GCs, by FY 2006 - 2010

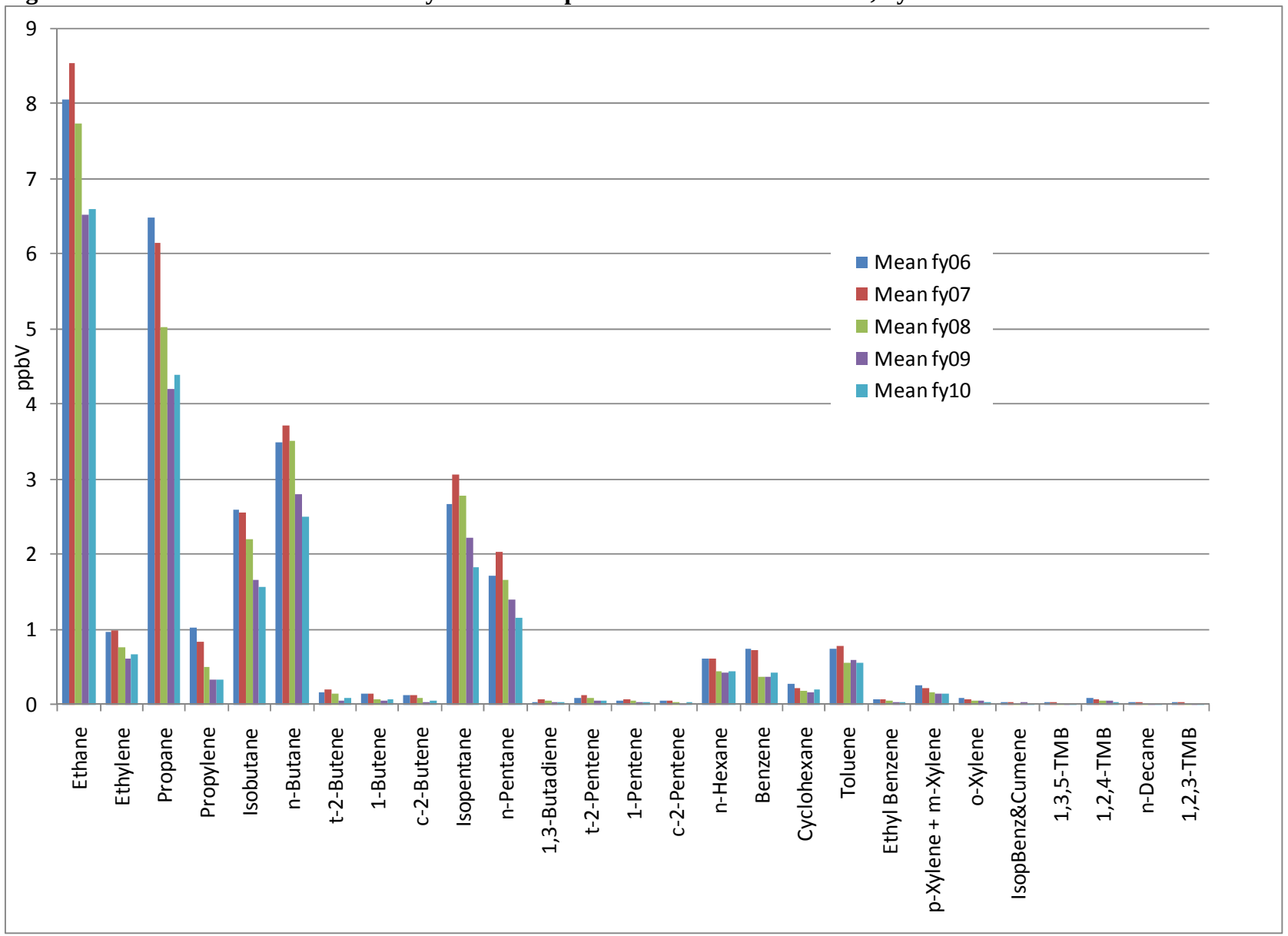


Figure 13. Mean concentrations for 27 hydrocarbon species at Solar Estates auto-GCs, by FY 2006 - 2010

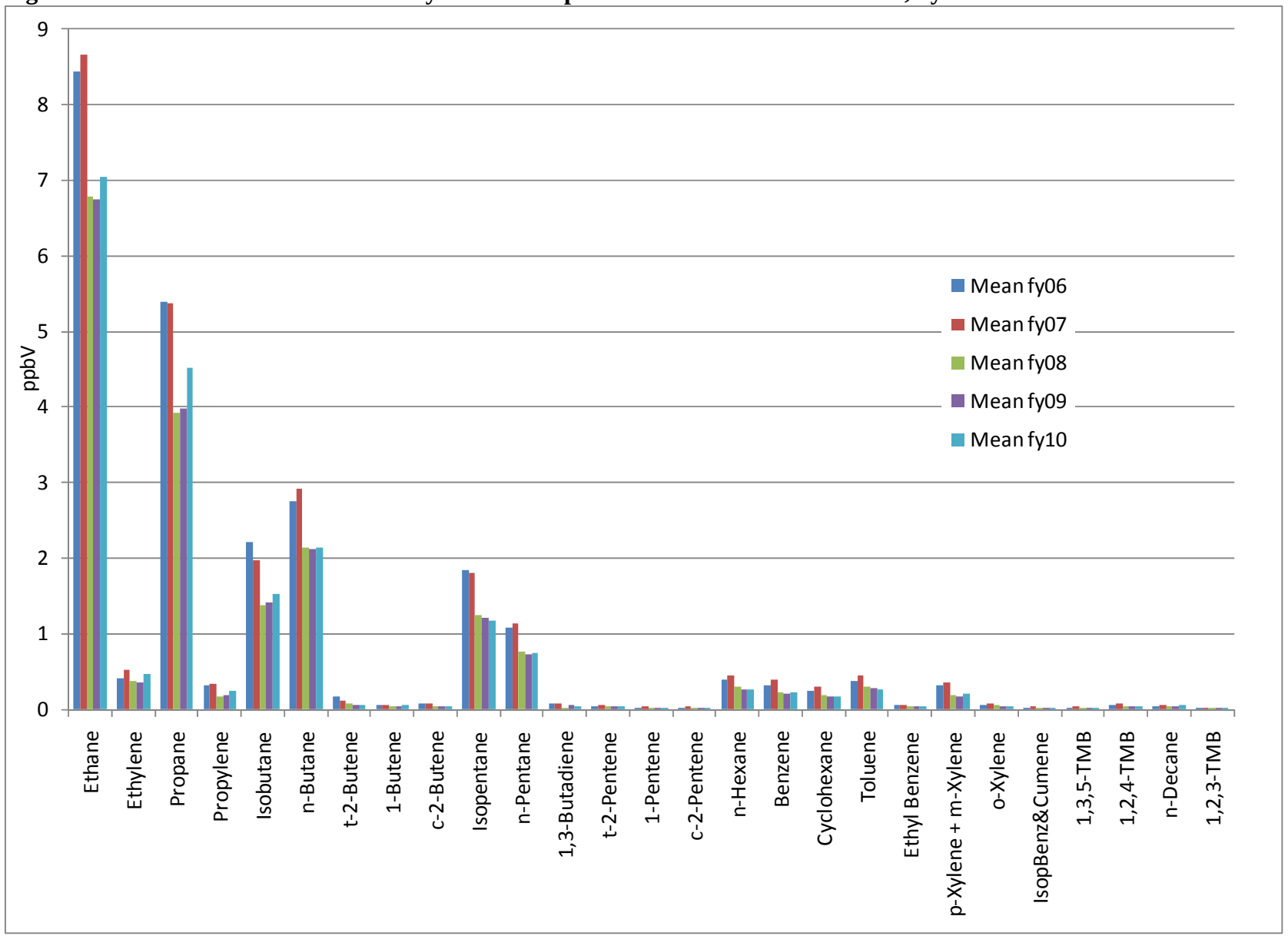


Figure 14. Mean concentrations for 21 reactive hydrocarbon species at Oak Park auto-GCs, by FY 2006 - 2010

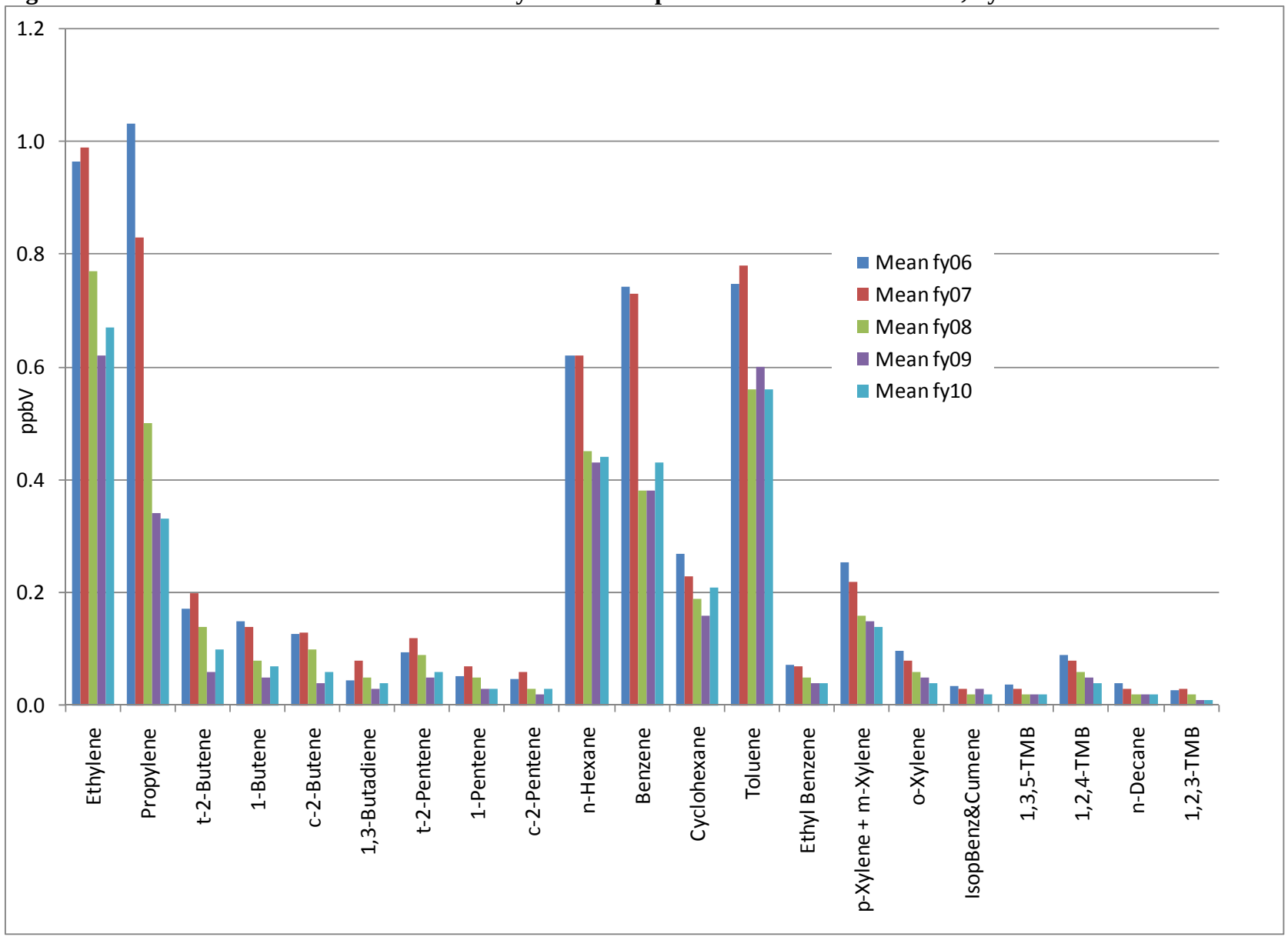
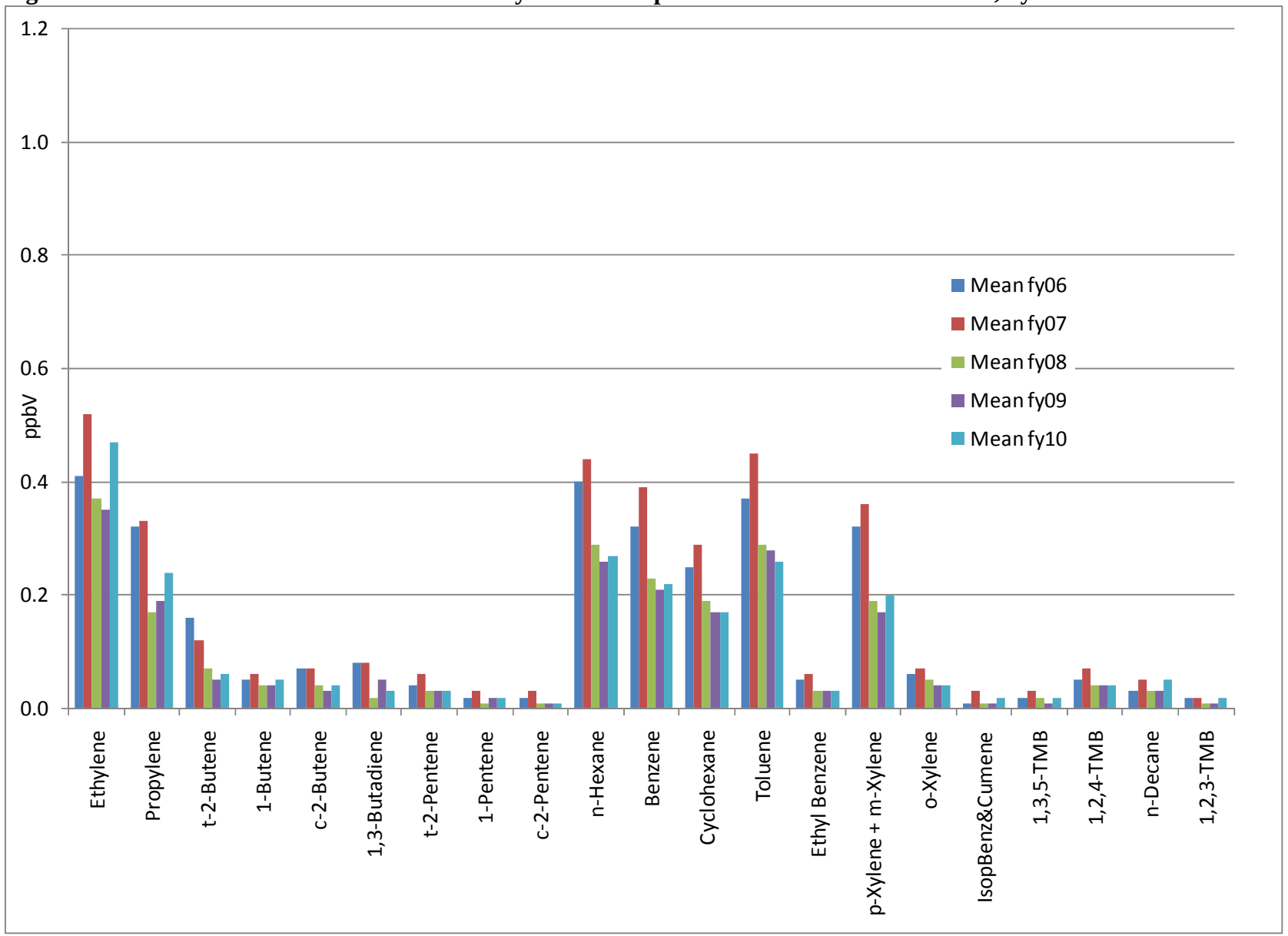


Figure 15. Mean concentrations for 21 reactive hydrocarbon species at Solar Estates auto-GCs, by FY 2006 - 2010



As was noted previously, benzene tends to be a species of concern because measurements and averages sometimes approach the AMCV. In recent years, benzene concentrations have declined in Corpus Christi at both UT and at TCEQ canister sampling sites. In January 2010, the TCEQ removed Nueces County from its Air Pollution Watch List for benzene based on the improvements in air quality.

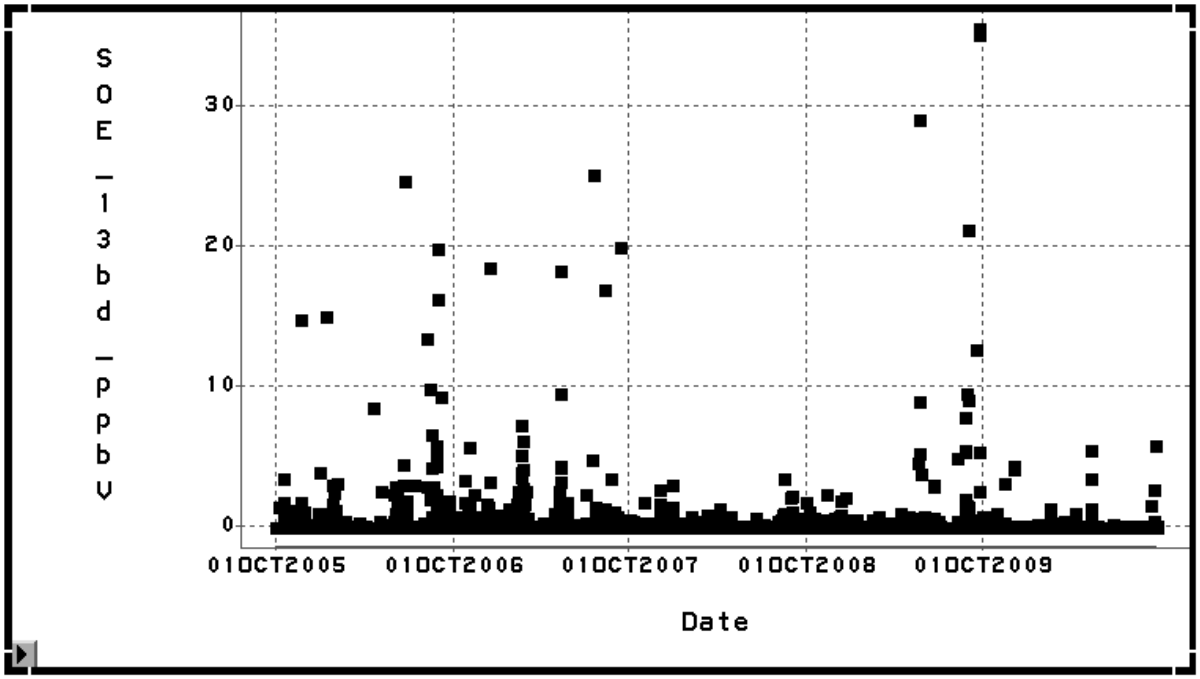
Table 7, below, shows the concentrations at all the auto-GCs operating in Texas in FY2010 in rank order for mean concentration. The mean concentration at Oak Park is third highest among 22 sites. Solar Estates appears to rank in the lower half. Note that three sites in the table have incomplete data (less than 75 percent data return, so there is higher uncertainty in the true one-year mean at these sites (Mustang Bayou, Dish Airfield, Eagle Mountain Lake). The AMCV for benzene for long-term (e.g., annual) data comparisons is 1.4 ppbV.

Table 7. Statistics on benzene ppbV at 22 auto-GCs operating in Texas in FY 2010

Site	Num Samples	Peak 1-Hr ppbV	Peak 24-hr ppbV	Mean
Lynchburg Ferry	7,221	246.49	20.21	0.85
Channelview	6,620	24.14	2.36	0.48
Oak Park	7,518	86.18	5.96	0.43
Chamizal	6,820	13.15	2.84	0.41
Clinton	6,493	14.11	1.91	0.37
Beaumont-Downtown	7,481	14.35	1.86	0.35
Mustang Bayou	*4,458*	28.45	2.42	0.34
Nederland High School	7,328	14.2	4.71	0.33
HRM-3 Haden Road	7,303	17.62	3.31	0.32
Cesar Chavez	7,567	7.86	1.4	0.31
Hou.DeerPrk2	7,255	13.56	1.83	0.31
Houston Milby Park	7,212	12.46	1.59	0.29
Odessa Hays	7,462	13.76	1.38	0.28
Solar Estates	7,328	6.84	1.37	0.22
Wallisville Road	7,635	21.76	2.27	0.21
Dallas Hinton St.	6,969	2.83	0.79	0.19
Texas City 34th St.	7,521	6.51	0.81	0.18
Ft. Worth Northwest	7,490	3.61	0.55	0.16
Lake Jackson	7,161	1.77	0.41	0.12
Dish Airfield	*3,371*	1.49	0.33	0.11
Danciger	7,161	1.87	0.41	0.1
Eagle Mountain Lake	*3,481*	0.36	0.15	0.05

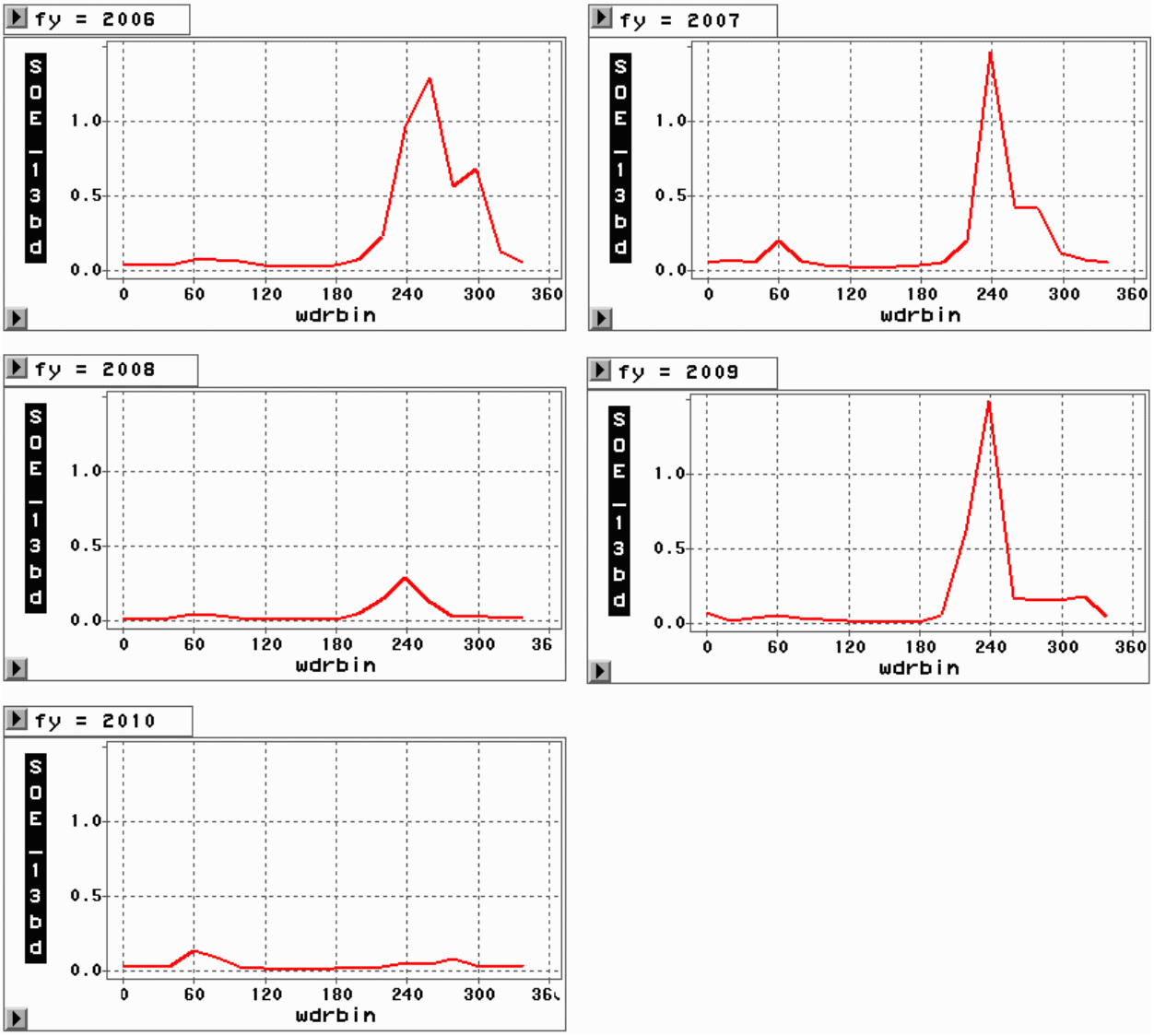
Past reports have discussed some unexpected elevated 1,3-butadiene concentrations at the Solar Estates auto-GC. As recently as September 26 and 27, 2009, the highest values in the monitoring network were recorded. However, since then, 1,3-butadiene concentrations have declined at the Solar Estates auto-GC. Figure 16, below, shows a time series graph of concentrations in ppbV units at Solar Estates from October 1, 2005 to the current fiscal year end on Sep. 30, 2010. Figure 17, on page 28, shows the mean concentrations of 1,3-butadiene by 20 degree wind direction bins. Especially notable is the disappearance of the peak associated with westerly winds. The last time a measurement was made that was more than 2 standard deviations greater than the mean value for winds between 180 and 300 degrees that was possibly attributable to industry activity west of Solar Estates was on November 16, 2009. The change in concentration is hypothesized to be due to changes in operations at a chemical plant three miles west of the Solar Estates site. According to a press release from Lyondell Basell, "Corpus Christi, TX, olefins plant will transition to a feedstock slate of nearly all natural gas liquids (NGL) in 2010. Equistar will idle the site's butadiene extraction and hydrodealkylation units as part of this transition."[2]

Figure 16. Time series for 1,3-butadiene at Solar Estates in ppbV units



[2] Equistar to Add Feedstock Flexibility at Corpus Christi August 21, 2009
http://lyondellbasell.mediaroom.com/index.php?s=43&item=762 accessed December 2010

Figure 17. Average 1,3-butadiene by wind direction 20-degree wind bins at Solar Estates by individual fiscal year (Oct-Sept) in ppbV units



4. Sulfur Dioxide Concentrations around Corpus Christi

Up until 2010, Corpus Christi complied with all of the EPA's National Ambient Air Quality Standards (NAAQS). However, as was described on page 10 of this report, EPA has revised the SO_2 NAAQS. The new standard is based on the three-year rolling mean 99th percentile of annual daily one-hour SO_2 maxima. The 99th percentile would be the fourth highest daily maximum in a complete 365 day year. Daily one-hour maxima and the annual 99th percentiles for each Corpus Christ site, 2005 – 2010 (10/15/10) have been calculated. The JIH CAMS 630 site appears to be in noncompliance of the new NAAQS. A table of the estimated critical statistics – known as "design values" – is below in Table 8. Values greater than 75 ppb represent noncompliance and are highlighted.

Table 8. SO_2 NAAQS design values for Corpus Christi area sites, ppb units

Year	C21	C4	C629	C630	C631	C632	C633	C635	C98
2007	8	24	34	**119**	38	21	50	34	36
2008	8	21	31	**131**	33	19	31	31	32
2009	9	18	30	**89**	32	17	21	22	28
2010*	10	17	28	**98**	21	12	11	22	27

* Incomplete three year period

At the JIH CAMS 630 site, some 106 hourly values on 31 days have been measured above the level of the 75 ppb one-hour NAAQS since January 1, 2005. Figure 18, below, shows a histogram for the hour of the day during which exceedances have been measured during the monitoring program. They are distributed throughout the day with a higher rate of occurrence during the first half of the day. Table 9, on page 30, lists the exceedance days with descriptions of the hour of the first exceedance, and last, which is labeled with ":59" in the minutes place to reflect that it is the end of the hour of the measurement. Note that some episodes overlap to the following day, which is indicated by bold font records.

Figure 18. CAMS 630 SO_2 exceedances by hour of the day, CST, January 1, 2005 – October 20, 2010

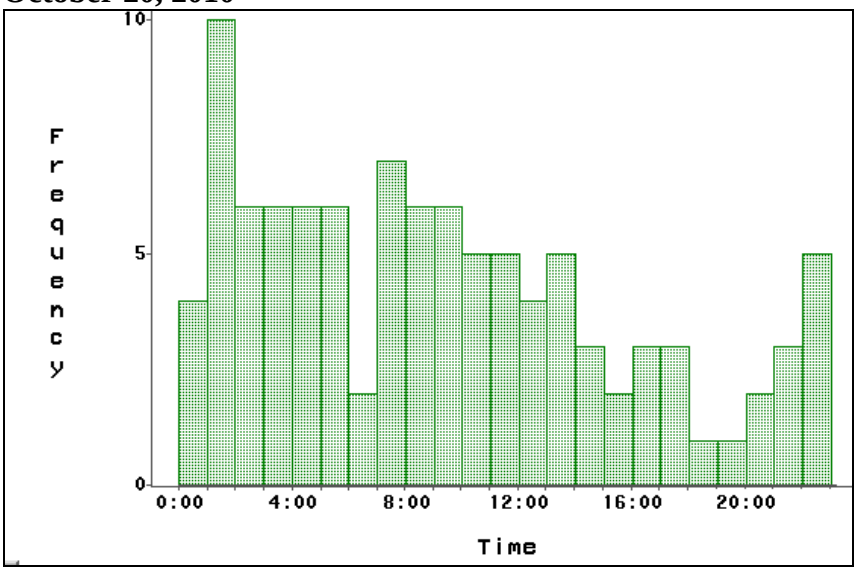


Table 9. List of 31 SO_2 exceedance days at JIH C630, approximate start and end (CST) of period of exceedance, number of exceedance hours, and maximum one-hour value; bold font for overnight episodes affecting two days

Date	Start	End	Num Hours	Max ppb
1/5/2005	7:00	14:59	8	117
1/25/2005	19:00	20:59	2	106
1/27/2005	14:00	17:59	4	250
11/23/2005	9:00	9:59	1	92
1/7/2006	1:00	7:59	6	230
1/13/2006	1:00	1:59	1	105
1/15/2006	1:00	1:59	1	101
2/1/2006	22:00	22:59	1	126
2/27/2006	**22:00**	**23:59**	2	126
2/28/2006	**0:00**	**11:59**	12	199
3/7/2006	0:00	4:59	5	120
3/9/2006	23:00	23:59	1	90
3/29/2006	5:00	5:59	1	95
10/12/2006	1:00	1:59	1	82
10/25/2006	**16:00**	**23:59**	5	289
10/26/2006	**0:00**	**13:59**	5	268
11/15/2006	1:00	1:59	1	77
7/15/2007	4:00	5:59	2	86
2/3/2008	**2:00**	**23:59**	8	199
2/4/2008	**0:00**	**1:59**	2	131
3/3/2008	4:00	8:59	5	129
5/21/2008	7:00	7:59	1	84
8/10/2008	7:00	11:59	5	129
12/27/2008	11:00	14:59	4	149
1/21/2009	18:00	22:59	3	172
3/4/2009	3:00	5:59	3	136
8/1/2009	8:00	10:59	3	121
1/25/2010	23:00	23:59	1	94
1/26/2010	1:00	2:59	2	101
3/14/2010	7:00	12:59	9	142
9/7/2010	13:00	13:59	1	78

There have been four exceedance days in FY 2010 at JIH C630. The most recent occurred on September 7, 2010. The CITGO Corpus Christi Refinery East Plant reported an upset with flare emissions, including SO_2, over the September 5 – 8 period. The surface back-trajectory goes south southeast and passes over this facility. Figure 19, on page 31, shows a scatter-plot of the

one-hour SO_2 exceedances at JIH by one-hour wind direction measurements, and one sees two clusters of directions associated with exceedances: south (centered just less of 180 and just east of south) and southwest (between 210 and 240). Using data filtered to remove very light winds (< 2.5 miles per hour), the mean concentration as a function of wind direction for SO_2 at JIH is shown in Figure 20, on page 32. This same figure shows the mean hydrogen sulfide (H_2S) by wind direction also, as the two species are often related. In comparing Figures 19 and 20, one might note that Figure 20 shows similar mean concentrations near 175 degrees and around 230 degrees, but in Figure 19 there are many more exceedances near 175 than near 230 degrees. The explanation is that there are relatively few winds associated with southwesterly flow in the area, so a small number of large values affects the mean. A histogram of wind directions measured at JIH appears in Figure 21, on page 32. This is a well-exposed site for wind direction measurement, and the most frequent winds are from southeast, and least frequent are from the west. This suggests that all else held equal, a monitor placed the same distance from the SO_2 source area at some point west of JIH would be directly downwind of the source area more often.

Figure 19. CAMS 630 SO_2 exceedances by wind direction of arrival, ppb units

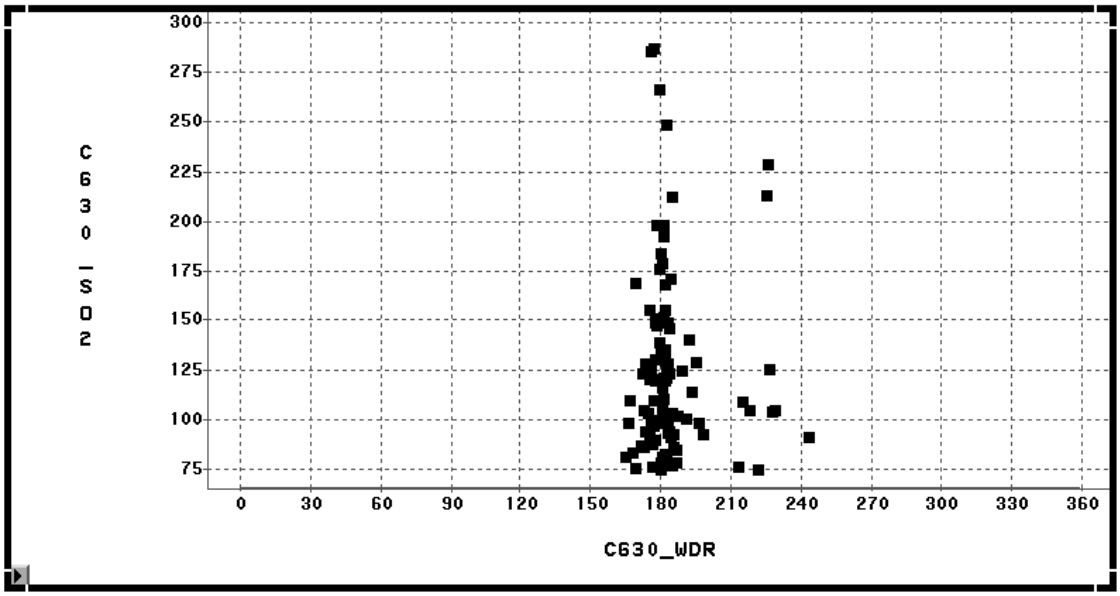


Figure 20. CAMS 630 SO_2 and H_2S mean concentrations by wind direction of arrival, ppb units

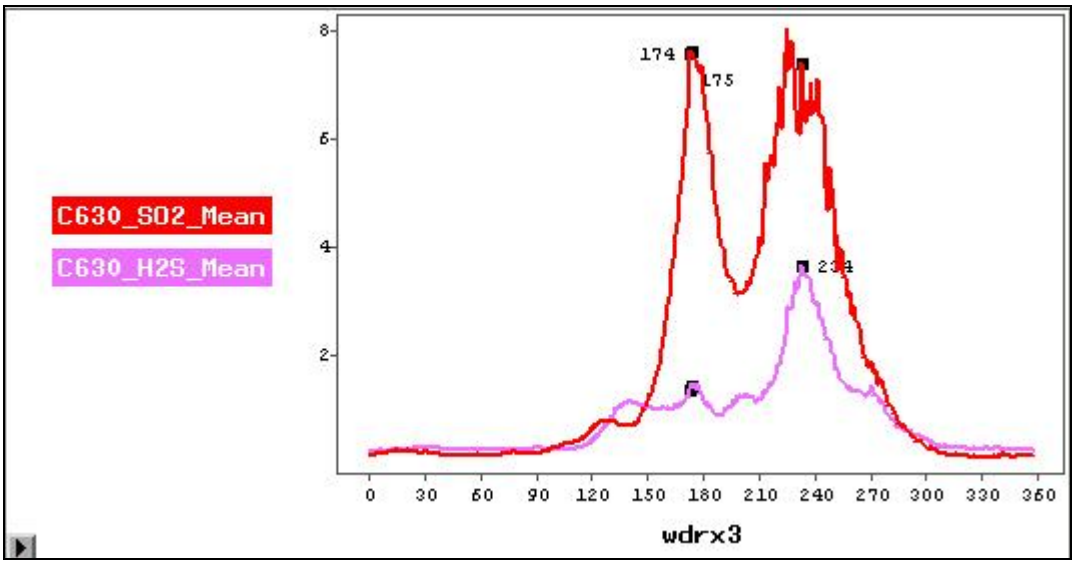
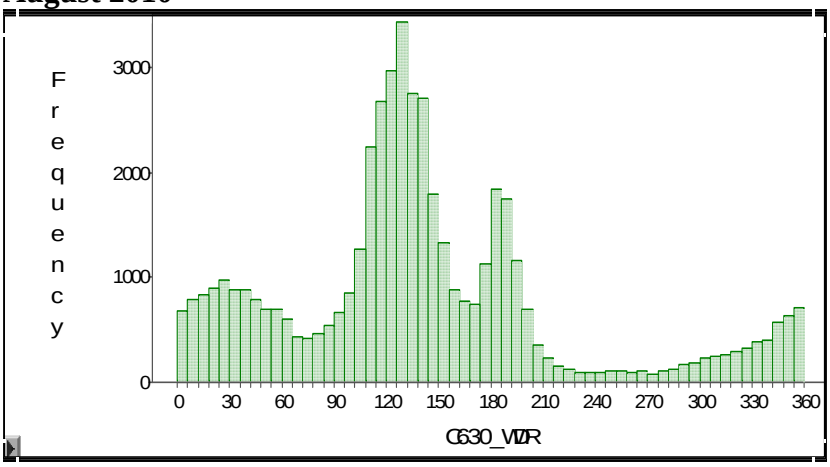


Figure 21. Histogram of hourly wind direction resultant at JIH CAMS 630, January 2005 – August 2010



The monitor closest to JIH is the CCG C629 site located 1,400 meters (0.9 miles) away at a southeast bearing (120 degrees) to JIH. Figure 22, on page 33, compares the mean concentration of SO_2 at JIH to the mean at CCG as a function of wind direction. The peak direction at CCG is 280 degrees, which is a relatively infrequent wind direction according to Figure 21. A similar directionality analysis for SO_2 has been conducted using data from Dona Park C635 and TCEQ's Huisache C98 sites. A composite aerial map showing the four monitoring sites, the key directions for SO_2 mean concentration, and the locations of SO_2 industrial point sources from the TCEQ's 2005 modeling emissions inventory is shown in Figure 23, on page 34. Aside from the many industrial sources, research shows that ships are also a source of SO_2 emissions, and the ray from CCG and one ray from JIH both pass by docks. It is interesting to note in Figure 23 that the stronger southerly ray from JIH and the northwesterly ray from Huisache point toward

each other. UT will check with TCEQ as to whether an industrial source not now shown on the Figure 23 map may be located along this "axis."

Figure 22. JIH CAMS 630 and CCG CAMS 629 SO_2 mean concentrations by wind direction of arrival, ppb units

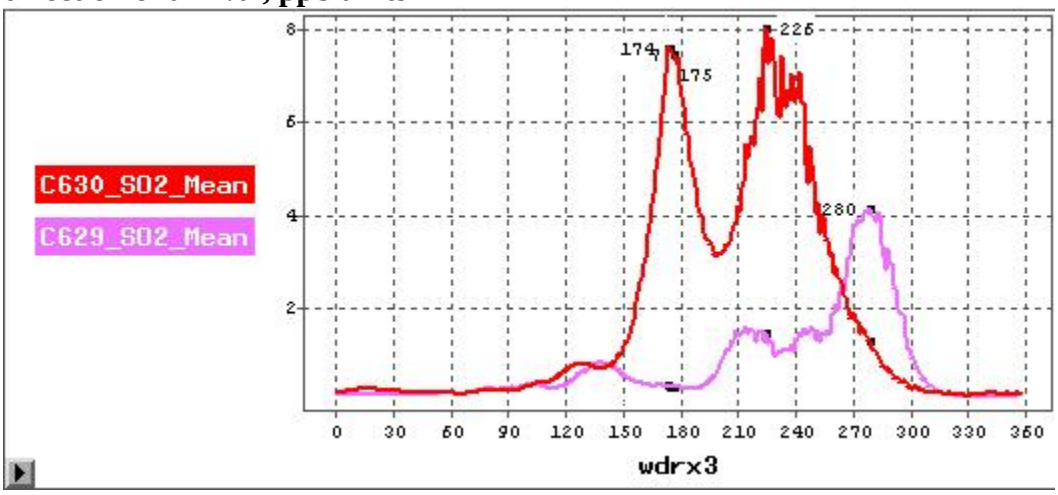


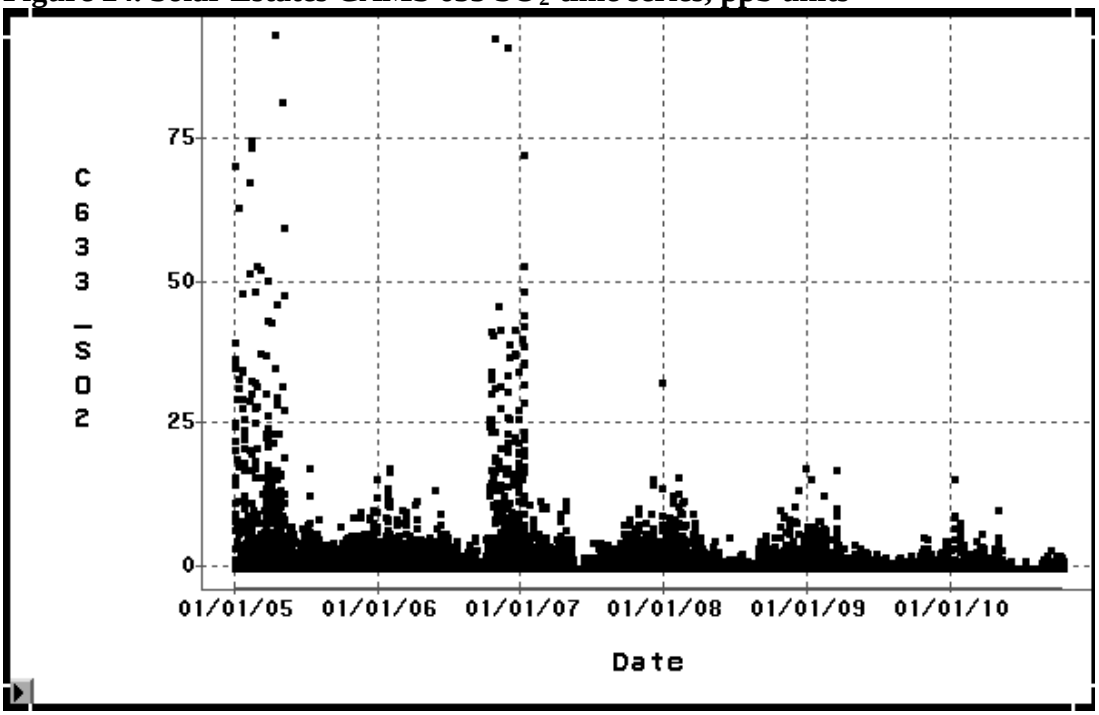
Table 10, on page 35, contains a list of the other historical SO_2 75 ppb one hour exceedances at Corpus Christi area sites. Exceedances have been recorded on 18 hours on 12 days at four sites. The exceedances at Solar Estates C633, a residential area site, occurred under southerly winds and very likely owing to emissions from industrial sources on Leopard St. SO_2 concentrations at Solar Estates C633 frequently had been elevated in two periods in 2005 and 2006, and declined suddenly in early 2007. The time series of SO_2 data for C633 is shown graphically in Figure 24, on page 35. Some exceedances were measured at C633 in the past and at other sites more recently; however, as has been stated, only one site – JIH C630 – has measured enough exceedances recently to potentially violate the new SO_2 NAAQS.

Figure 23. Key directions associated with peak SO_2 overlaid on an aerial of the area with SO_2 industrial sources from the TCEQ 2005 emissions inventory

Table 10. Other CC sites with SO_2 NAAQS exceedances

Site	Date	Time	SO2 ppb
C629	10/29/2006	8:00	77.7
	1/24/2010	20:00	145.3
	1/24/2010	21:00	98.9
C631	4/14/2005	17:00	85.9
	4/14/2005	18:00	80.4
	4/14/2005	23:00	106.2
	10/1/2006	16:00	85.6
	5/21/2007	2:00	92.4
	2/21/2009	7:00	80.2
C633	4/15/2005	6:00	93.7
	5/5/2005	6:00	81.7
	10/30/2006	18:00	92.9
	11/28/2006	7:00	91.2
C98	1/1/2008	12:00	283.0
	1/1/2008	13:00	257.3
	1/1/2008	14:00	260.0
	1/1/2008	15:00	178.4
	3/20/2008	13:00	275.8

Figure 24. Solar Estates CAMS 633 SO_2 time series, ppb units



Conclusions from the FY 2010 Data

In this year's report, several findings have been presented:

- Periodic air pollution events continue to be measured on a routine basis, but values of hydrocarbons above the TCEQ's air monitoring comparison values (AMCVs) are rarely observed. One measurement exceeded an odor AMCV this year in the auto-GC data, and one canister sample also had an odor AMCV exceedance.
- Oil & gas extraction in the area produces concentrations measurable by the monitoring network.
- Under the new NAAQS for SO_2, the JIH C630 site appears to be noncompliant. The State of Texas and EPA would have to consider several issues before actually designating the area nonattainment. Otherwise, there were no SO_2 or H_2S exceedances of other standards.
- Concentrations of 1,3-butadiene have dropped at the Solar Estates site. This is very likely due to changes in operations at a chemical plant three miles west of the site.

Further analyses will be provided upon request.

APPENDIX B

Web Site Statistics

Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project
Web Site Statistics

	Calendar Year 2005			Calendar Year 2006			Calendar Year 2007			Calendar Year 2008			Calendar Year 2009			1-01-10 thru 12-06-10		
	Hits	Views	Visits	Hits	Views	Visits	Hits	Views	Visits	Hits	Views	Visits	Hits	Views	Visits	Hits	Views	Visits
The University of Texas at Austin Corpus Christi Web Sites:																		
Main Web Site (All Pages)	44,572	16,122		50,623	25,903		45,492	25,223		61,930	37,496		64,482	31,729		42,403	***	
Trajectory Tool Web Site ("ceer_trajectory" directory)	288		21	367		230	39,425		4,385	56,513		9,495	44,202		9,028	37,989		9,401
SubTotal - UT Web Sites	**44,860**	**16,122**	**21**	**50,990**	**25,903**	**230**	**84,917**	**25,223**	**4,385**	**118,443**	**37,496**	**9,495**	**108,684**	**31,729**	**9,028**	**80,392**	**0**	**9,401**
TCEQ Web Sites:																		
Monitoring Operations Corpus Christi AutoGC Page								342			1,176			1,336			1,102	
SubTotal - TCEQ Web Sites	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**342**	**0**	**0**	**1,176**	**0**	**0**	**1,336**	**0**	**0**	**1,102**	**0**
Total - Both Institutions	**44,860**	**16,122**	**21**	**50,990**	**25,903**	**230**	**84,917**	**25,565**	**4,385**	**118,443**	**38,672**	**9,495**	**108,684**	**33,065**	**9,028**	**80,392**	**1,102**	**9,401**

	Denotes this count not collected
***	Views are no longer available on UT's Urchin Weblog system
	TCEQ opened all 21 AGC site's to the public on 1-1-10, since there are 2 Corpus Christi AGC sites, we use this formula ((Total Views / 21) * 2) to estimate the Views for this report

Definition of Terms:

Hit - A request for a file from the web server. Available only in log analysis. The number of hits received by a website is frequently cited to assert its popularity, but this number is extremely misleading and dramatically over-estimates popularity. A single web-page typically consists of multiple (often dozens) of discrete files, each of which is counted as a hit as the page is downloaded, so the number of hits is really an arbitrary number more reflective of the complexity of individual pages on the website than the website's actual popularity. The total number of visitors or page views provides a more realistic and accurate assessment of popularity.

Page View - A request for a file whose type is defined as a page in log analysis. An occurrence of the script being run in page tagging. In log analysis, a single page view may generate multiple hits as all the resources required to view the page (images, .js and .css files) are also requested from the web server.

Visit / Session - A series of requests from the same uniquely identified client with a set timeout. A visit is expected to contain multiple hits (in log analysis) and page views.

Prepared by Denzil Smith 1/19/2011

APPENDIX C

Financial Reports

ANNUAL PROGRESS REPORT
TO THE U.S. DISTRICT COURT
FOR THE
CORPUS CHRISTI AIR MONITORING AND SURVEILLANCE CAMERA PROJECT

Financial Summary

A. PROJECT EXPENDITURES

First Year Paid Expenditures	(10/2/03 - 9/30/04)	$ 663,448.81
Second Year Paid Expenditures	(10/1/04 - 9/30/05)	$1,291,272.21
Third Year Paid Expenditures	(10/1/05 - 9/30/06)	$ 461,868.36
Fourth Year Paid Expenditures	(10/1/06 – 9/30/07)	$ 688,645.02
Fifth Year Paid Expenditures	(10/1/07 – 9/30/08)	$ 997,731.32
Sixth Year Paid Expenditures	(10/1/08 - 9/30/09)	$ 896,094.86
Current Year Expenditures	(10/1/09 - 9/30/10)	$ 969,694.76
Current Year Encumbrances*	(10/1/09 - 9/30/10)	$ 48,647.88
Total Project Expenditures (including Current Year Encumbrances)	(10/2/03 - 9/30/10)	$6,017,403.22

Note: Summary of Expenditures found in *Exhibit A*, page 41.

B COCP FUNDS REMAINING

Initial deposit on 10/2/03	$6,761,718.02
Less expenditures through 9/30/10	($5,968,755.34)
Less encumbrances through 9/30/10*	($ 48,647.88)
Plus interest earned as of 9/30/10	$ 770,941.23
Total	$1,515,256.03
COCP FUNDS REMAINING AS OF 9/30/10	**$1,515,256.03**

* Some expenses incurred during Year 7 of the Project have not been billed by University vendors or subcontractors and/or approved for payment so those charges were not posted to the general ledger as of 9/30/10. Those encumbered charges are estimated to be $48,647.88.

EXHIBIT A

Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

***Expenditure Summary* for the Project Period 10/2/03 through 9/30/10**

DESCRIPTION	**Budget Allocation through Year 6**	**Prior Year paid Expenditures**	**Current Year paid Expenditures**	***TOTAL EXPENDITURES**	***BALANCE AVAILABLE**
SALARIES & WAGES	1,281,192.03	(914,472.89)	(215,327.29)	(1,129,800.18)	*151,391.85*
CEER ADMIN SALARIES	129,193.37	(91,119.57)	(38,072.67)	(129,192.24)	*1.13*
FRINGE BENEFITS	305,100.00	(201,536.30)	(52,447.14)	(253,983.44)	*51,116.56*
Canister Anal. and Other	122,949.60	(54,766.00)	(31,498.00)	(86,264.00)	*36,685.60*
Supplies and Utilities	479,456.00	(307,512.21)	(129,853.28)	(437,365.49)	*42,090.51*
SUBCONTRACT	3,514,261.00	(2,788,244.10)	(370,094.88)	(3,158,338.98)	*355,922.02*
TRAVEL	30,191.00	(20,664.85)	(5,919.58)	(26,584.43)	*3,606.57*
EQUIPMENT	0.00	0.00	0.00	0.00	*0.00*
TOTAL DIRECT COSTS	5,862,343.00	(4,378,315.92)	(843,212.84)	(5,221,528.76)	*640,814.24*
INDIRECT COSTS **/15% TDC**	879,352.00	(620,744.66)	(126,481.92)	(747,226.58)	*132,125.42*
TOTAL EXPENDITURES	$6,741,695.00	($4,999,060.58)	($969,694.76)	($5,968,755.34)	$772,939.66

* Some expenses incurred during Year 7 of the Project have not been billed by University vendors or subcontractors and/or approved for payment so those charges were not posted to the general ledger as of 9/30/10. Those encumbered charges are estimated to be $48,647.88. When received and approved, those charges will be paid from the available balance.

CORPUS CHRISTI AIR MONITORING AND SURVEILLANCE CAMERA PROJECT

University of Texas at Austin
Annual Audit Report Results

The University's Annual Reports and Audit Statements are made available for public review at the following website:

http://www.sao.state.tx.us/reports/main/10-330.pdf

Attached is a copy of The University of Texas at Austin's Certification Statement for the Office of Management and Budget (OMB) Circular A-133 Audit conducted during the 2008/2009 fiscal year. The OMB Circular A-133 Audit for the 2009/2010 fiscal year is currently being conducted. The results of the 2008/2009 Audit will be made available at the above website. It is anticipated the audit results will be posted in late Spring 2011.

SUBRECIPIENT AUDIT FORM

(including financial reports and internal controls)

FOR FISCAL YEAR ENDING AUGUST 31, 2009

SUBRECIPIENT'S LEGAL ENTITY NAME AND ADDRESS

The University of Texas at Austin
Office of Sponsor Projects
The University of Texas at Austin
P.O. Box 7159
Austin, TX 78713-7159

☒ Our audit report for the subject fiscal year has been completed. Findings at The University of Texas at Austin were noted; however, there were no questioned costs.

The A-133 Audit for The University of Texas at Austin is issued as part of the statewide audit conducted by the State Auditor's Office. A complete copy of the audit report is available at:

http://www.sao.state.tx.us/reports/main/10-339.pdf Federal Portion

Or at http://www.sao.state.tx.us/reports/; select the Statewide Reports link.

Items related to the Research and Development cluster for The University of Texas at Austin are outlined on page numbers 407-414. The report contains the finding, corrective action plan and anticipated implementation dates.

Authorizing Signature: _____ **Date:** 3/23/10

Jason Richter
Associate Director, Office of Sponsored Projects

APPENDIX D

Supplemental Environmental Projects

SEP Project List

APPENDIX D

Supplemental Environmental Projects (SEP) awarded to The University of Texas at Austin

No.	SEP (Name)	Docket No.	Period of Performance	Award Amount	Interest Earned as of 9/30/10	UT Account Number	Project Description - Notes
1	CITGO Regfining and Chemicals Company, L.P.	2001-1469-AIR-E	7/2004-7/2006	$680,000.00	$19,978.03	26-7690-94	Task 1 - Extend the operation of the air monitoring network in Corpus Christi for an additional year.
				$190,000.00	$7,956.39	26-7690-95	Task 2 - Development of the Trajectory Tool
2	Duke Energy Field Services	2003-1122-AIR-E	2/2005-8/2005	$5,187.00	$100.15	26-4254-75	Purchase additional canisters for the Corpus Christi monitoring sites.
3	El Paso Merchant Energy Petroleum Company	2001-1023-AIR-E	2/2006-6/2008	$46,004.00	$1,264.83	26-7693-36	Task 1 - Enchancement to the Automated Trajectory Tool.
				$90,044.00	$5,810.15	26-7692-88	Task 2 - Additional Canister Analysis, Power Loss Hardware and Software and Wind Direction Filter.
4	Sherwin Aluminia	2004-1982-IR-E	10/2007-12/2009	$10,244.00	$557.00	26-7695-56	Used for canister analyses.
5	Texas Molecular Corpus Christi Services, Limited	D1-GV-07-001054	2/2009-9/2011	$67,900.00	$4,654.97	26-7697-82	Purchase a FLIR ThermaCAM GasFindIR-HS (IR camera) and accessories, train subcontractor personnel in use of camera, conduct video taping recording in the Corpus Christi refinery row area.
6	Equistar Chemicals, LP	D1-GV-06-002509	*See note below	$400,000.00	$0.00	To be assigned	Purchase a FLIR ThermaCAM GasFindIR-HS (IR camera) and accessories, train personnel in use of camera, conduct video taping in recording in the Corpus Christi refinery row area. * See note below
	TOTAL			**$1,489,379.00**	**$40,321.52**		

* A check in the amount of $400,000 was received by UT Austin 12/08/08 and was deposited in a holding account pending approval by the TCEQ of a UT Austin SEP Proposal. Subsequent to the March 31, 2009 Quarterly Report to the Court, the TCEQ notified UT Austin that Equistar Chemicals (a subsidiary of LyondellBasell Industries and US affiliate Loyondell Chemical Co.), filed for Chapter 11 bankruptcy on January 6, 2009 and that the $400,000 ordered to be paid by Equistar for this project might be subject to a collection effort in that proceeding on behalf of the creditors. As a consequence, the funding for the Equistar SEP award is now on indefinite hold. UT Austin will advise the court once the final status of the Equistar SEP funds has been determined.