Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Quarterly Report for the Period

July 1, 2010 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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November 30, 2010

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

II. Project Progress Report

The focus of work during the quarter ending September 30, 2010 has been directed to the following activities.

A. Operations and Maintenance Phase of the Project

A detailed description of the data analyses for this quarter appears in Appendix A, pages 6 through 24, and a summary of these analyses appear in this section.

The Project consists of a network of seven (7) air monitoring stations with air monitoring instruments and surveillance camera equipment. A map showing locations of COCP Project monitoring sites along with TCEQ sites appears in Figure 1, below. Table 1, page 3, identifies the location and instrumentation found at each of the COCP Project sites. TCEQ sites and also some sites farther from the COCP area operated by Texas A&M at Kingsville (TAMUK) provide some additional data used in analyses.

Figure 1. Corpus Christi Monitoring Sites

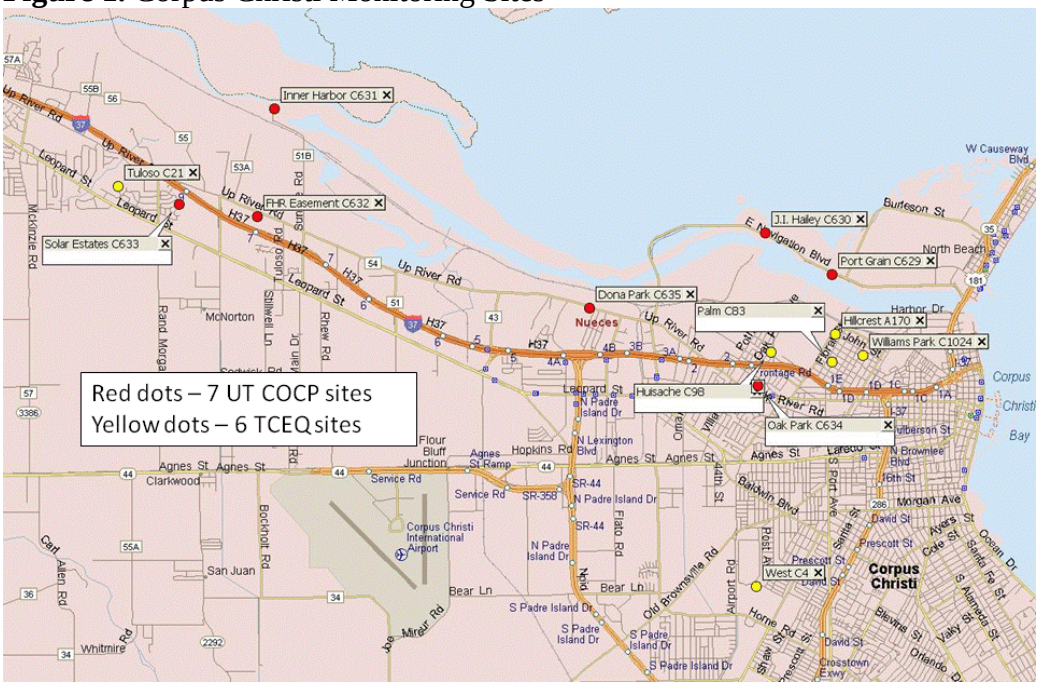

Table 1. Schedule of Air Monitoring Sites, Locations and Major Instrumentation

TCEQ CAMS Nos.	Description of Site Location	Monitoring Equipment				
		Auto GC	TNMHC(T) & Canister(C)	H2S & SO2	Met Station	Camera
634	Oak Park Recreation Center	Yes	T		Yes	
629	Grain Elevator @ Port of Corpus Christi		T&C	Yes	Yes	
630	J. I. Hailey Site @ Port of Corpus Christi		T&C	Yes	Yes	
635	TCEQ Monitoring Site C199 @ Dona Park		T&C	Yes	Yes	Yes
631	Port of Corpus Christi on West End of CC Inner Harbor		T&C	Yes	Yes	
632	Off Up River Road on Flint Hills Resources Easement		T&C	Yes	Yes	
633	Solar Estates Park at end of Sunshine Road	Yes	T	Yes	Yes	Yes

Legend

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 6 though 24. Specifically, the appendix contains the following elements:

- **Auto-GC Data Summary -** In examining the third quarter of 2010 hourly auto-GC data from Oak Park, Solar Estates, and TCEQ's Palm sites no measurements were found to have exceeded a short-term air monitoring comparison value (AMCV). Also, the quarterly averages of all species were below their respective long-term AMCVs. A summary appears in Appendix A, pages 6 through 24.

- **SO_2 and H_2S** – No exceedances of the State's standards for sulfur species were measured this quarter.

- **New National SO_2 Standard** – A recent change to the U.S. Environmental Protection Agency's National Ambient Air Quality Standards (NAAQS) for SO_2 may affect Corpus Christi. One exceedance of the new NAAQS level of 75 ppb (one hour averaged concentration) was recorded at the JIH C630 site this quarter.

- **Benzene Summary** – Although concentrations have declined over the 2005 – 2010 period of monitoring, concentrations greater than 5 standard deviations greater than the mean of benzene are occasionally measured at the Oak Park auto-GC site. These values remain well below the TCEQ's ACMVs. One such value, 10 standard deviations above the mean, was measured on September 19 at 3 p.m. CST.

- **1,3-Butadiene Trend at Solar Estates** – Concentrations of 1,3-butadiene have declined at the Solar Estates auto-GC, and the overall decline is related to a major decline associated with westerly winds.

B. Project Management and Planning

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

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

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

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 B, pages 25 and 26.

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

III. Financial Report

As required, the following financial summary information is provided. Details supporting this financial summary are included in Appendix B, pages 25 and 26.

A. Total Amount of COCP Funds and Other Funds Received Under the Project

The COCP funds received through September 30, 2010 totals $7,539,457.15. This total includes estimated interest earned through September 30, 2010.

B. Detailed List of the Actual Expenditures Paid from COCP Funds

Expenditures of COCP funds during this quarter totaled $231,556.84. The detailed breakdown of the actual expenditures is included in Appendix B, page 26. The activities for which these expenditures were used are detailed in Section II, on page 2 of this report.

C. Total Interest Earned on COCP Funds During the Quarter

The estimated interest earned during this quarter totaled $10,600.37. A report providing detailed calculations of the interest earned on the COCP funds during each month of the quarter is included in Appendix B, pages 25 and 26.

D. Balance as of September 30, 2010, in the COCP Account

The balance in the COCP account, including estimated interest earned totals $1,570,701.81.

E. Expected Expenditures for the Funds Remaining in the COCP Account

The projected expenditures for the funds remaining totals $1,570,701.81.

Quarterly Report Distribution List:

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

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APPENDIX A

Data Analysis for Corpus Christi Quarterly Report

July 1, 2010 through September 30, 2010

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Data Analysis for Corpus Christi Quarterly 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 July 1 through September 30, 2010. The monitoring network is shown in Figure 1, page 2, 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 2nd and 3rd quarters of 2010;
- Information and data analysis related to the new EPA sulfur dioxide (SO_2) standard and how it relates to Corpus Christi;
- Information on the trends for benzene and 1,3-butadiene at two auto-GCs in residential areas.

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**)	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. 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 operate at the five sites that do not take continuous hydrocarbon measurements with auto-GCs (CAMS 629, 630, 631, 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.state.tx.us/implementation/tox/regmemo/AirMain.html#compare
  (accessed October, 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 to the SO_2 NAAQS on this project until now is that the State of Texas's standard of 0.400 ppm or 400 ppb over 30 minutes for SO_2 was much more

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

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 then 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 – Solar Estates C633, Oak Park C634, and TCEQ's new Palm C83 – 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 between the TCEQ's Hillcrest and Williams Park sites in Figure 1, on page 2, is generally downwind under northerly and westerly winds. In examining aggregated data one observes similar patterns of hydrocarbons at all three sites. Palm has only four 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 3, on page 12, summarizes data from the third quarter of 2010 and Table 4, on page 13, summarizes data from the second quarter of 2010. These tables are available to TCEQ staff at http://rhone.tceq.state.tx.us/cgi-bin/agc_summary.pl (accessed October 2010). The data summarized in Table 3 have not completed the standard data validation process, and the data in Table 4 are the most recent quarterly summary of validated data. Generally, very few changes occur during the standard validation process.

Tables 3 and 4 show the average concentrations along with the maximum one-hour and 24-hour average concentrations for 27 hydrocarbon species of interest for the quarter. All concentration values in the tables are in ppbV units. No concentrations or averages of concentrations were greater than TCEQ's air monitoring comparison values (AMCV) during the second or third quarters of 2010. In Tables 3 and 4, the "Num Samples" column includes all ambient samples. The "Mean" is calculated as an average of daily averages and takes into account the number of samples flagged *ambient* for each day. The Mean data columns in Table 3 are shown graphically in Figure 2, on page 14.

The rows for ***benzene*** are bold-faced in Tables 3 and 4 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.

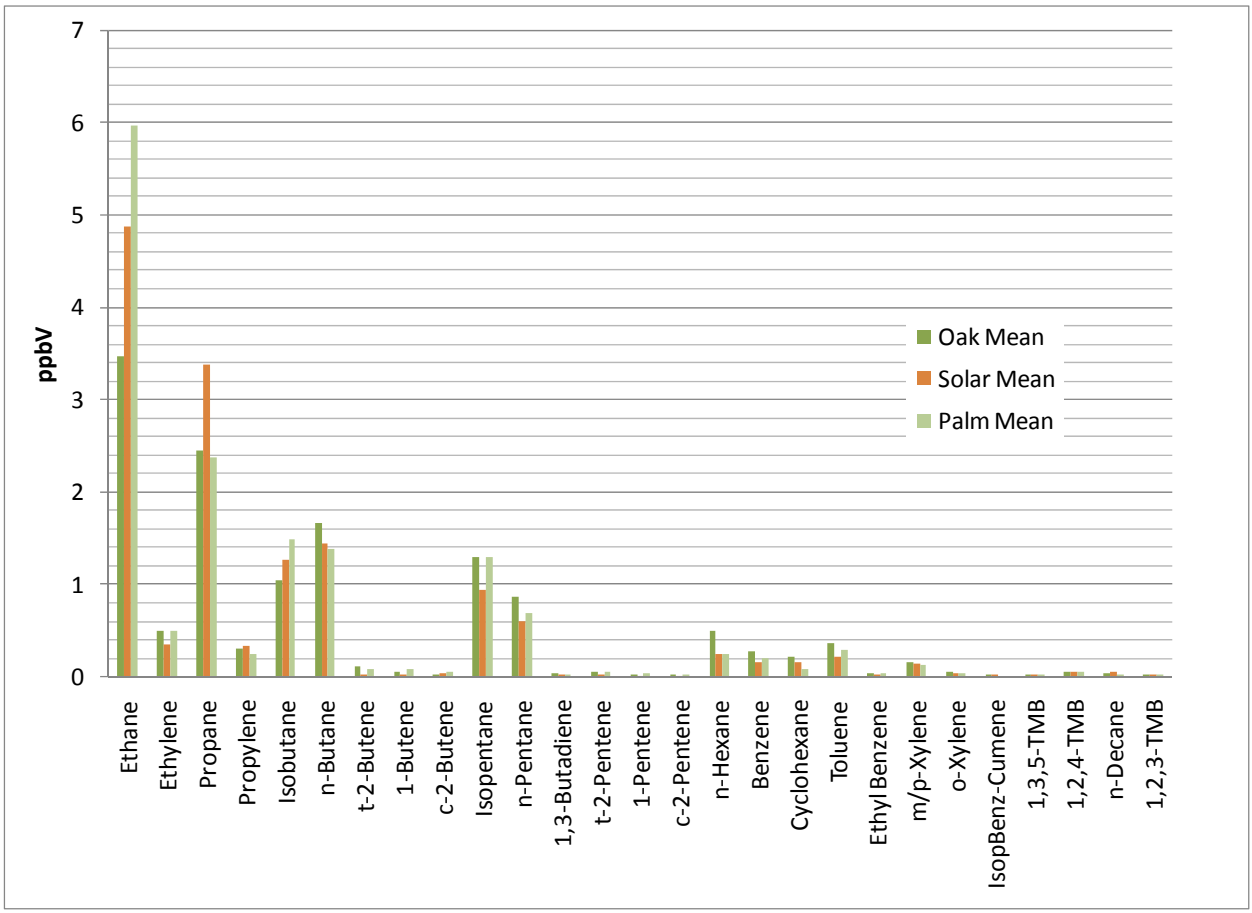
Table 3. Auto-GC statistics 3rd quarter 2010

Units ppbV	Oak 3Q10			Solar 3Q10			Palm 3Q10		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	71.27	18.84	3.47	50.37	10.49	4.87	96.32	20.32	5.96
Ethylene	43.08	3.86	0.49	27.39	2.11	0.35	47.94	3.93	0.5
Propane	161.42	16.70	2.45	59.96	10.89	3.38	59.83	13.48	2.38
Propylene	11.30	1.74	0.30	8.61	1.21	0.34	14.81	1.52	0.24
Isobutane	104.11	6.85	1.04	25.82	4.52	1.27	70.13	9.82	1.49
n-Butane	410.92	25.77	1.67	26.22	4.57	1.45	60.23	12.17	1.38
t-2-Butene	109.78	5.04	0.12	1.42	0.11	0.03	3.65	0.43	0.09
1-Butene	4.90	0.48	0.05	3.1	0.18	0.03	3.59	0.47	0.08
c-2-Butene	1.00	0.15	0.03	1.94	0.47	0.04	2.79	0.34	0.05
Isopentane	107.31	7.33	1.29	10.57	2.02	0.94	68.07	12.36	1.3
n-Pentane	118.96	7.03	0.86	7.11	1.56	0.6	31.64	6.19	0.69
1,3-Butadiene	6.89	0.78	0.04	5.91	0.29	0.02	5.54	0.28	0.02
t-2-Pentene	2.89	0.17	0.05	4.65	1.17	0.02	2.67	0.22	0.06
1-Pentene	2.23	0.30	0.03	0.85	0.06	0.01	7.09	0.81	0.04
c-2-Pentene	0.56	0.13	0.03	1.13	0.07	0.01	1.38	0.11	0.03
n-Hexane	196.29	13.12	0.49	2.73	0.56	0.24	10.74	1.57	0.25
Benzene	**38.85**	**2.67**	**0.27**	**3.83**	**0.59**	**0.16**	**8.65**	**1.67**	**0.20**
Cyclohexane	87.37	6.11	0.21	19.25	1.01	0.16	2.33	0.59	0.08
Toluene	38.70	3.08	0.36	6.4	0.95	0.22	5.21	1.42	0.29
Ethyl Benzene	2.56	0.22	0.04	0.78	0.11	0.03	3.32	0.3	0.04
m/p-Xylene	13.22	1.10	0.16	3.59	0.52	0.14	12.08	1.06	0.13
o-Xylene	3.14	0.26	0.05	6.59	1.72	0.04	3.39	0.32	0.04
IsopylBenzeneCumene	2.06	0.28	0.02	2.83	0.27	0.02	0.28	0.05	0
1,3,5-TMB	0.98	0.07	0.02	1.58	0.14	0.02	0.62	0.1	0.02
1,2,4-TMB	5.90	0.70	0.06	4.87	1.23	0.05	1.45	0.22	0.06
n-Decane	2.43	0.23	0.04	3.33	0.28	0.05	0.91	0.12	0.03
1,2,3-TMB	0.88	0.06	0.02	0.78	0.08	0.02	0.61	0.1	0.03

Table 4. Validated auto-GC statistics 2nd quarter 2010

Units ppbV	Oak 2Q10			Solar 2Q10			Palm 2Q10 (June only)		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	103.66	13.53	3.15	44.36	25.04	4.37	54.31	11.8	2.99
Ethylene	10.07	1.28	0.29	199.89	11.27	0.38	7.24	0.96	0.29
Propane	436.6	29.49	1.99	40.91	18.13	2.63	117.36	13.83	1.56
Propylene	9.58	1.34	0.16	1.63	0.47	0.11	2.83	0.58	0.16
Isobutane	15.73	3.61	0.62	16.56	7.31	0.96	43.05	5.96	0.76
n-Butane	24.76	4.97	0.89	16.24	8.81	1.18	27.86	5.11	0.75
t-2-Butene	0.48	0.11	0.04	0.99	0.13	0.03	1.88	0.22	0.06
1-Butene	0.43	0.09	0.03	3.79	0.4	0.02	1.98	0.23	0.06
c-2-Butene	0.4	0.09	0.02	0.55	0.08	0.01	1.43	0.16	0.04
Isopentane	14.31	3.19	0.74	9.78	5.87	0.71	12.14	3.21	0.75
n-Pentane	12.47	2.35	0.42	6.16	3.81	0.45	6.61	2.04	0.37
1,3-Butadiene	0.51	0.07	0.02	5.52	0.56	0.02	0.2	0.04	0.02
t-2-Pentene	0.54	0.14	0.03	0.55	0.14	0.01	0.43	0.11	0.05
1-Pentene	0.24	0.07	0.01	0.09	0.05	0.01	0.26	0.06	0.03
c-2-Pentene	0.21	0.05	0.01	0.25	0.07	0	0.24	0.06	0.03
n-Hexane	4.63	0.84	0.14	2.48	1.46	0.16	2.62	0.73	0.15
Benzene	**4.43**	**1.35**	**0.14**	**4.02**	**0.89**	**0.15**	**3.00**	**0.56**	**0.10**
Cyclohexane	2.98	0.74	0.07	1.83	1.09	0.1	1.75	0.28	0.04
Toluene	15.88	2.86	0.27	2.56	1.08	0.16	2.9	0.52	0.21
Ethyl Benzene	0.42	0.05	0.01	0.5	0.17	0.02	0.29	0.07	0.02
m/p-Xylene	1.46	0.22	0.05	4.56	0.77	0.08	0.97	0.22	0.08
o-Xylene	0.47	0.08	0.01	0.55	0.19	0.02	0.33	0.08	0.03
IsopylBenzeneCumene	0.55	0.17	0.01	0.8	0.11	0.01	0.3	0.02	0
1,3,5-TMB	0.34	0.05	0	0.74	0.16	0.01	0.22	0.04	0.02
1,2,4-TMB	0.67	0.11	0.02	0.86	0.21	0.02	0.46	0.1	0.05
n-Decane	0.24	0.05	0.01	2.18	0.4	0.03	0.4	0.07	0.02
1,2,3-TMB	0.26	0.04	0.01	0.52	0.15	0.02	0.27	0.06	0.03

Figure 2. Mean concentrations for 27 hydrocarbon species at three auto-GCs, 3rd quarter 2010



2. 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 4 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 (9/1/10) have been calculated. Not all sites have been assessed for data completeness, except for JIH CAMS 630. 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 5. Values greater than 75 ppb represent noncompliance and are highlighted.

Table 5. SO_2 NAAQS design values for Corpus Christi area sites, ppb units

Year	C21	C4	C629	C630	C631	C632	C633	C635	C98
2007	8.3	23.9	33.6	**118.7**	38.0	20.6	50.5	34.4	36.1
2008	8.3	20.9	30.6	**131.2**	32.8	19.1	31.3	31.0	32.5
2009	8.6	17.6	29.8	**88.9**	32.4	16.6	20.9	22.7	27.7
2010*	9.9	17.2	28.2	**98.5**	20.9	10.8	10.9	22.5	27.3

* 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 3, 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 6, on page 16, 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 3. CAMS 630 SO_2 exceedances by hour of the day, CST, January 1, 2005 – October 20, 2010

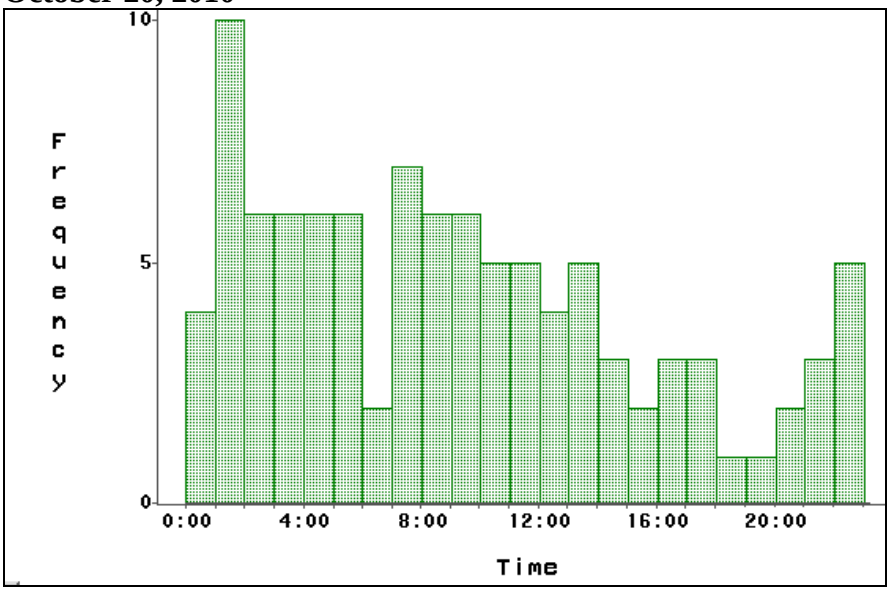


Table 6. List of 31 SO_2 exceedance days at JIH C630, approximate start and end (CST) of period of exceedance, number of exceedance hours, and maximum one-hour value; bold font for overnight episodes affecting two days

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

One exceedance occurred during the third quarter of 2010 on September 7 at JIH C630. 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 4, on page 17, shows a scatter-plot of the one-hour SO_2 exceedances at JIH by one-hour wind direction resultant, and one sees two clusters of directions associated with exceedances: south (centered just less than of 180 or 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 5, on page 18. This same figure shows the mean hydrogen sulfide (H_2S) by wind direction also, as the two species are often related. In comparing Figures 4 and 5, one might note that Figure 5 shows similar mean concentrations near 175 degrees and around 230 degrees, but in Figure 4 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 affect the mean. A histogram of wind directions measured at JIH appears in Figure 6, on page 18. 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 4. CAMS 630 SO_2 exceedances by wind direction of arrival, ppb units

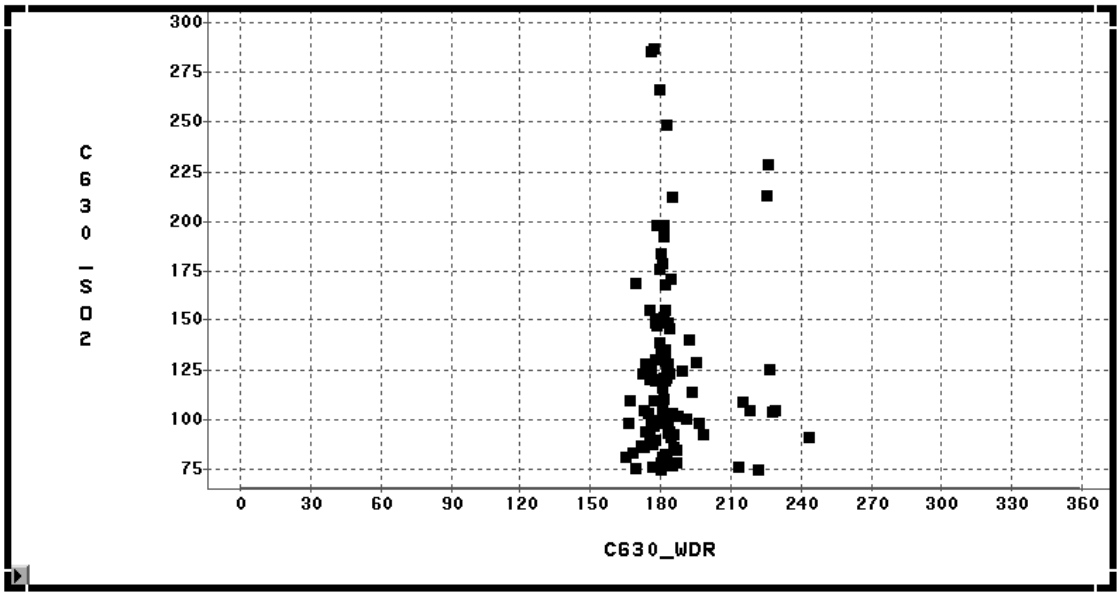


Figure 5. CAMS 630 SO_2 and H_2S mean concentrations by wind direction of arrival, ppb units

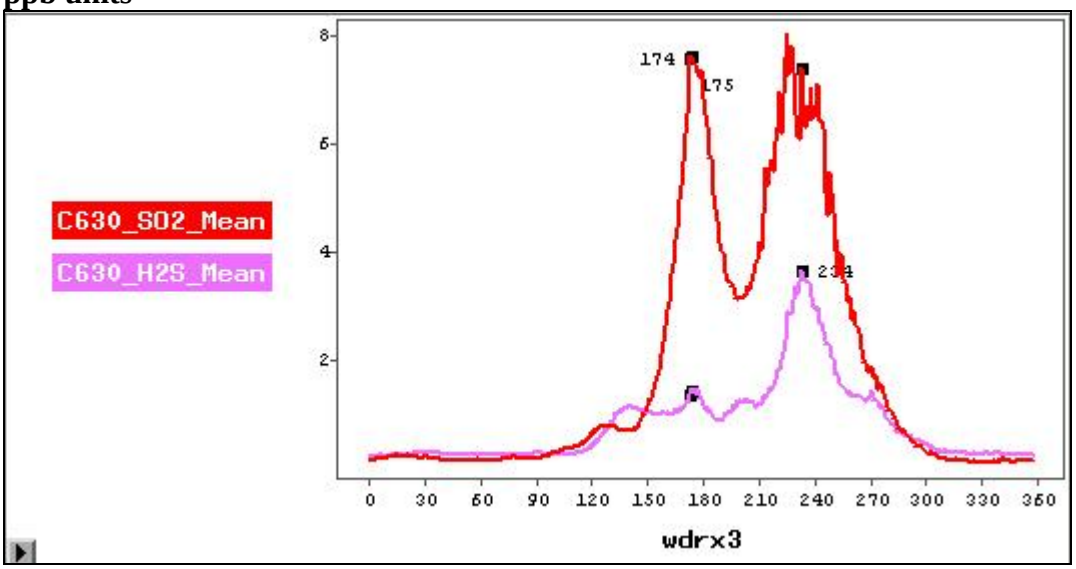
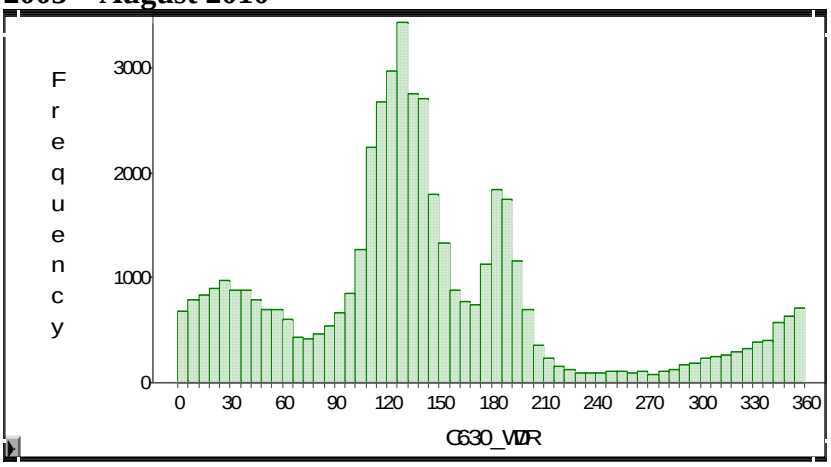


Figure 6. Histogram of hourly wind direction resultant at JIH CAMS 630, January 2005 – August 2010



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 7, on page 19, 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 6. 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 8, on page 19. 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 8 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 8 map may be located along this "axis."

Figure 7. JIH CAMS 630 and CCG CAMS 629 SO_2 mean concentrations by wind direction of arrival, ppb units

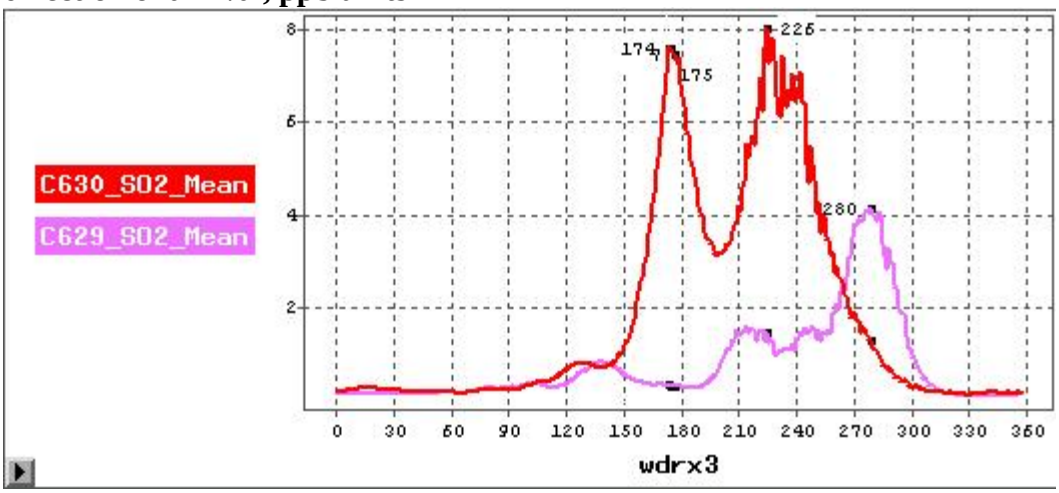


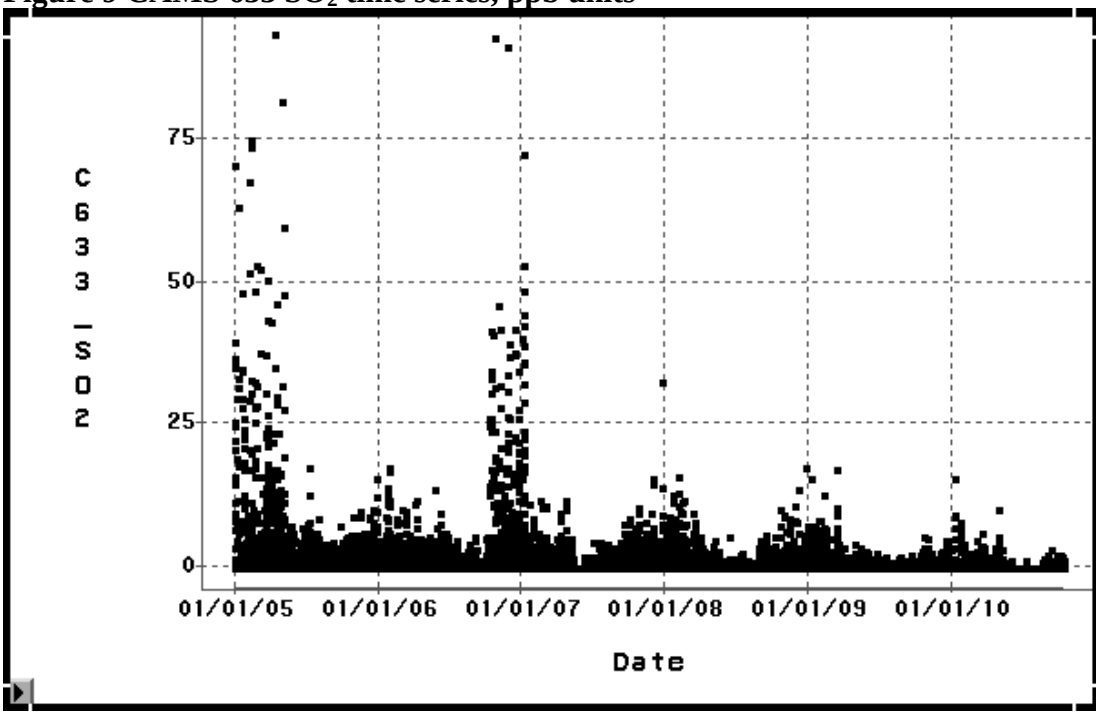
Figure 8. Key directions associated with peak SO_2 overlaid on an aerial of the area with SO_2 industrial sources from the TCEQ 2005 emissions inventory

Table 7, on page 21, 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 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 9, on page 21. However, as has been stated, only one site – JIH C630 – has measured enough exceedances to potentially violate the new SO_2 NAAQS.

Table 7. 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 9 CAMS 633 SO_2 time series, ppb units



3. Benzene Concentrations in Residential Areas

As has been discussed in past reports, benzene concentrations have been declining at the two auto-GCs operated at Oak Park CAMS 634 and Solar Estates CAMS 633. However, one benzene value measured at Oak Park at 38 ppbV on September 19, 3:00 p.m. CST was the highest single mid-day (10 a.m. – 6 p.m. CST) benzene concentration measured to date. No values were measured above an AMCV. A time series with some points annotated by date appears in Figure 10, below. A similar graph with a different y-axis scale for Solar Estates appears in Figure 11, below.

Figure 10. Oak Park hourly benzene 2005 – 2010, individual outlier values noted, no observations greater than the TCEQ's AMCV

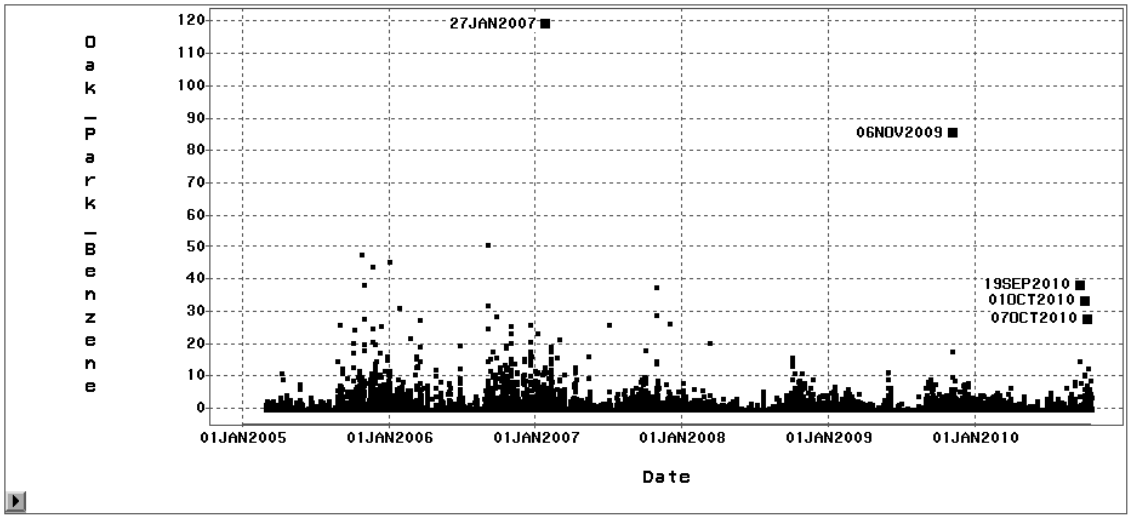
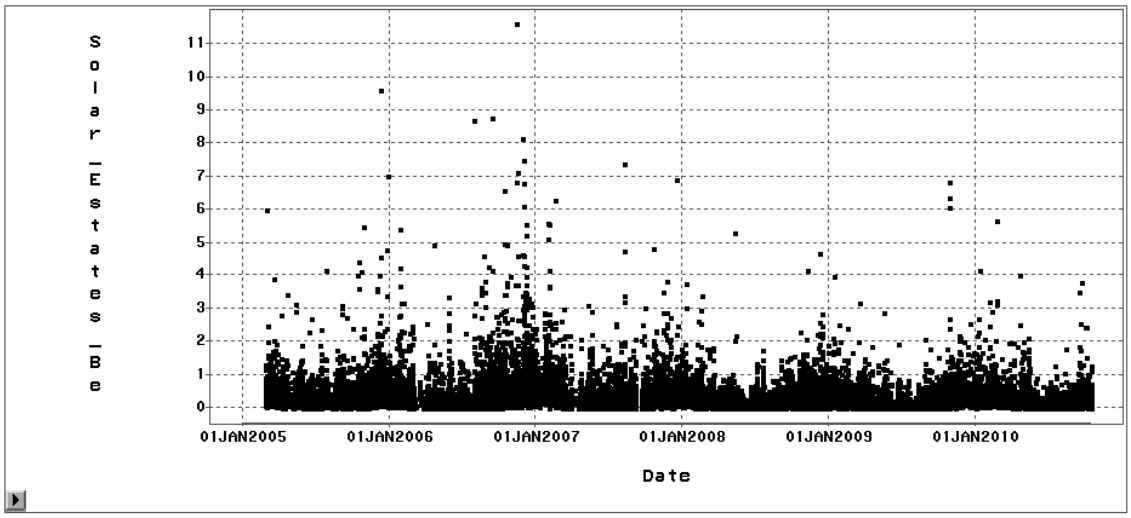


Figure 11. Solar Estates hourly benzene 2005 – 2010, no observations greater than the TCEQ's AMCV



The value noted on September 19, 2010 at 3 p.m. CST was measured under northeasterly winds, and the air passed over the Flint Hills Resources East Refinery, which did report an upset on September 20, but not on September 19.

4. Decline in 1,3-Butadiene Concentrations at Solar Estates

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 12, below, shows a series of six individual time series graphs of concentrations in ppbC units at Solar Estates by year (Oct. 1 – Sep. 30) from 2005 (partial year Mar. 1 – Sep. 30 2005) to the current year (Oct. 1, 2009 – Sep. 30, 2010). Figure 13, on page 24, 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 more than 2 standard deviations greater than the mean value for winds between 180 and 300 degrees that was possibly attributable to industry west of Solar Estates was recorded 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.

Figure 12. Time series for 1,3-butadiene at Solar Estates by individual year (Oct-Sept) in ppbC units

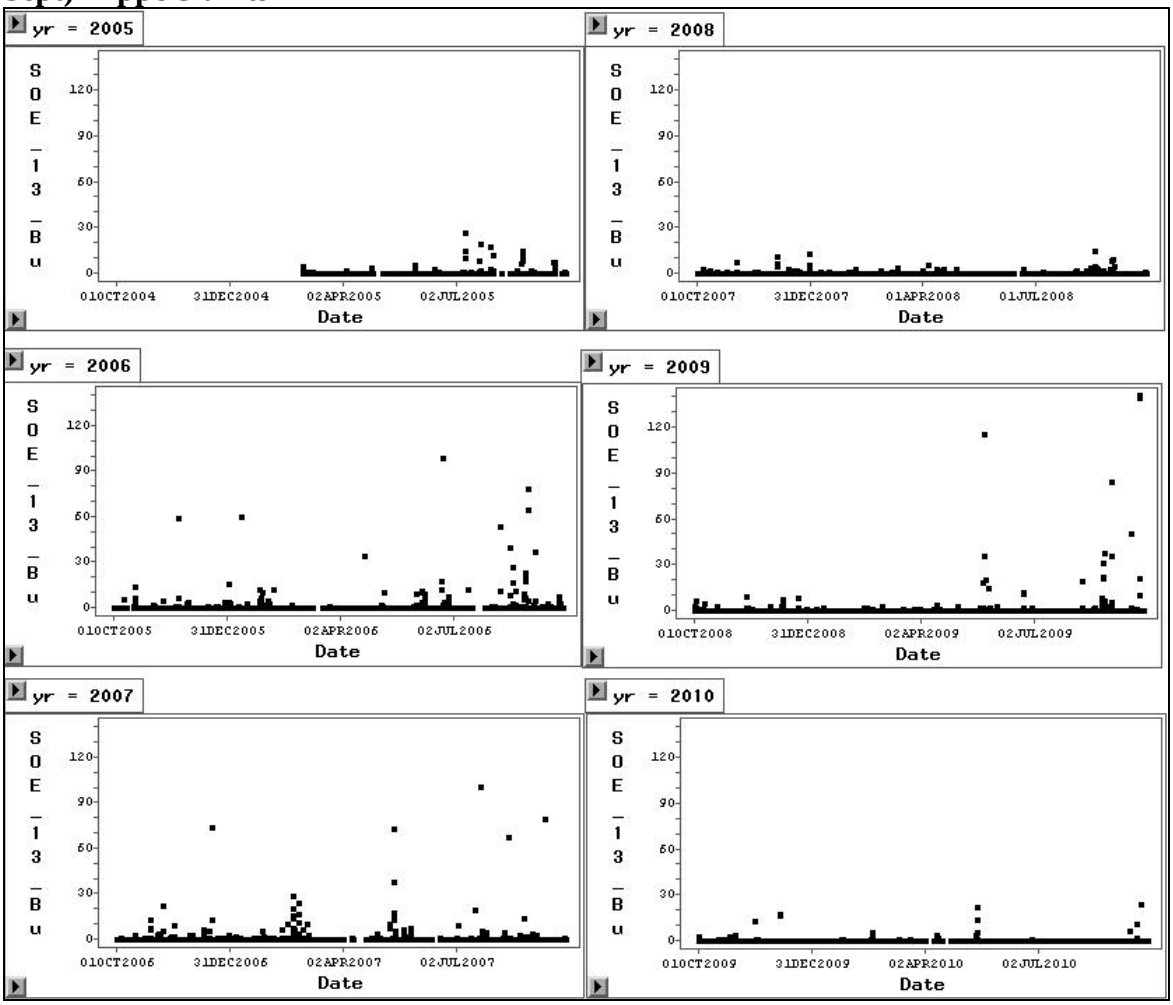
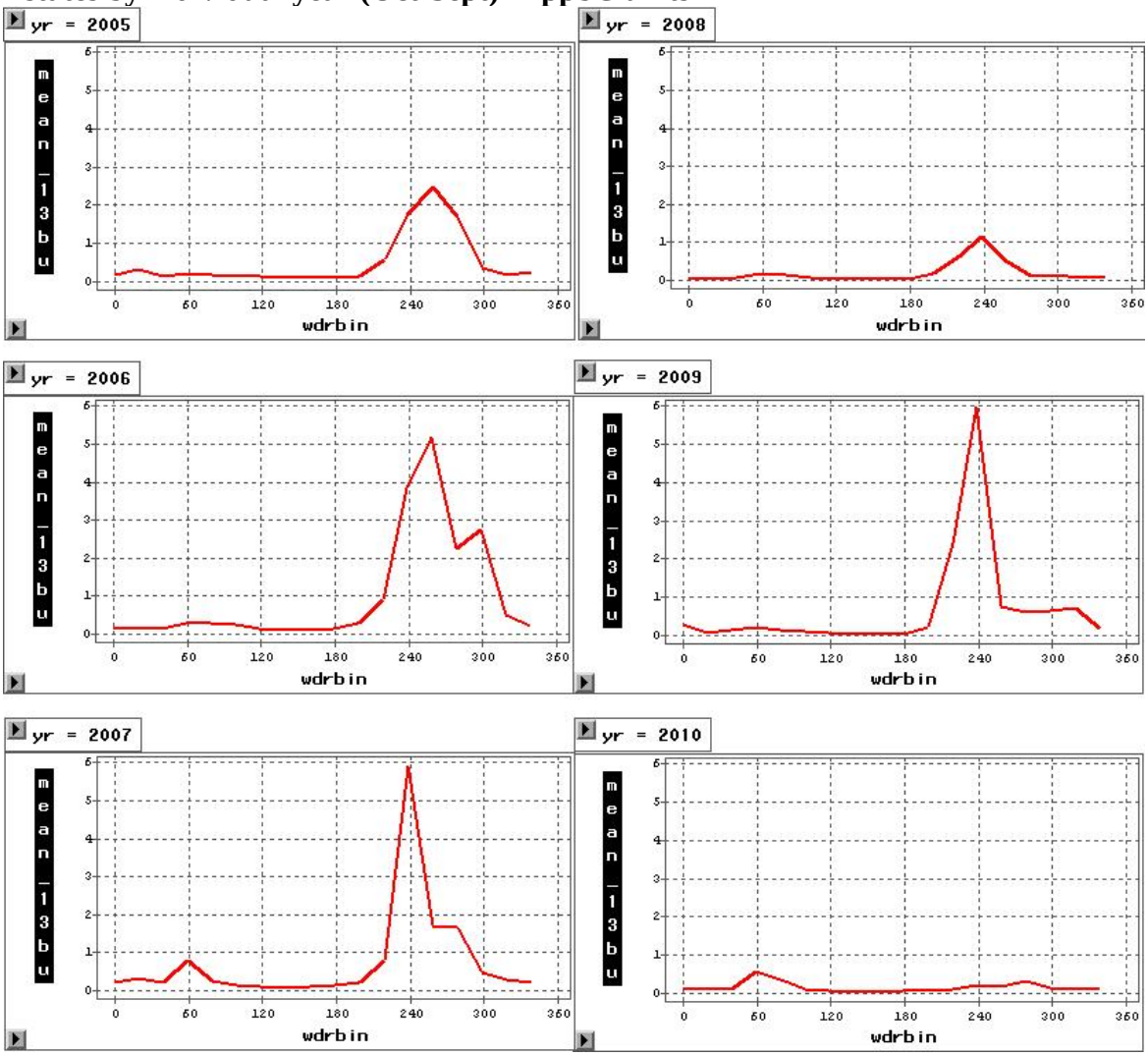


Figure 13. Average 1,3-butadiene by wind direction 20-degree wind bins at Solar Estates by individual year (Oct-Sept) in ppbC units



Conclusions from the Third Quarter 2010 Data

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

- Third quarter benzene concentrations at the auto-GCs show all auto-GC species of interest remain well below the TCEQ's AMCVs.
- 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.
- Periodic air pollution events continue to be measured on a routine basis, but values of species above the AMCV levels were not observed this quarter.

Further analyses will be provided upon request.

APPENDIX C

Financial Report of Expenditures
Financial Report of Interest Earned

Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Accounting Report for the Quarter
07/01/10 - 09/30/10

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

Total Grant Amount:	$6,761,718.02
Total Interest Earned:	$777,739.13
Total Funds Received:	$7,539,457.15

B. Summary of Expenditures Paid by COCP Funds

		Year 3 Budget	Year 4 Budget	Year 5 Budget	Year 6 Budget	Year 7 Budget	Yrs 1-7 Adjusted Budget	Prior Activity	Current Activity 07/01/10 - 09/30/10	Encumbrances	Remaining Balance 9/30/2010
Salaries-Prof	12	$216,128.63	$160,652.00	286,279.40	299,633.00	318,499.00	$1,281,192.03	($1,091,384.29)	($38,415.89)	($33,302.35)	$118,089.50
Salaries-CEER	15	$19,606.37	$15,636.00	33,123.00	30,948.00	29,880.00	$129,193.37	($122,431.49)	($6,760.75)	$0.00	$1.13
Fringe	14	$47,984.00	$38,783.00	58,333.00	72,726.00	76,643.00	$305,100.00	($244,416.33)	($9,567.11)	($6,961.65)	$44,154.91
Communication	42					900.00	$900.00	($630.00)	($225.00)	$0.00	$45.00
Other/C-Analysis	47/68	$60,474.00	$73,500.00	(8,656.40)	73,500.00	4,219.00	$122,949.60	($73,943.00)	($12,321.00)	$0.00	$36,685.60
Supplies	50	$86,844.00	$33,500.00	68,676.00	122,682.00	65,386.00	$447,763.73	($381,192.32)	($38,265.63)	($11,834.31)	$16,471.47
	51		$20,300.00	8,000.00		6,170.00	$30,792.27	($17,014.04)	($38.50)	($174.26)	$13,565.47
Subcontract	62-65	$1,965,693.00	$314,022.00	296,734.00	346,289.00	591,523.00	$3,514,261.00	($3,062,851.08)	($95,487.90)	$0.00	$355,922.02
Travel	75	$2,300.00	$2,000.00	7,719.00	9,000.00	6,712.00	$30,191.00	($26,312.43)	($272.00)	$0.00	$3,606.57
Equipment	80	$0.00	$0.00	0.00			$0.00	$0.00	$0.00	$0.00	$0.00
Indirect Costs	90	$359,855.00	$98,759.00	112,531.00	143,217.00	164,990.00	$879,352.00	($717,023.52)	($30,203.06)	$0.00	$132,125.42
TOTALS		$2,758,885.00	757,152.00	862,739.00	1,097,997.00	1,264,922.00	$6,741,695.00	($5,737,198.50)	($231,556.84)	($52,272.57)	$720,667.09

C. Interest Earned by COCP Funds as of 09/30/10

Prior Interest Earned:	$767,138.76	
Interest Earned This Quarter:	$10,600.37	Includes September Estimate
Total Interest Earned to Date:	$777,739.13	

D. Balance of COCP Funds as of 09/30/10

Total Grant Amount:	$6,761,718.02	
Total Interest Earned:	$777,739.13	
Current Q. Expenses	($231,556.84)	
Total Expenditures:	($5,737,198.50)	
Remaining Balance:	$1,570,701.81	Includes Interest for Sept '10

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

Accounting Certification