Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Quarterly Report for the Period

October 1, 2010 through December 31, 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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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 December 31, 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 22, and a summary of these analyses appears 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 the 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 some of the sites farther from the COCP area than the TCEQ sites operated by Texas A&M at Kingsville (TAMUK) but provide additional data used in these analyses.

Figure 1. Corpus Christi Monitoring Sites

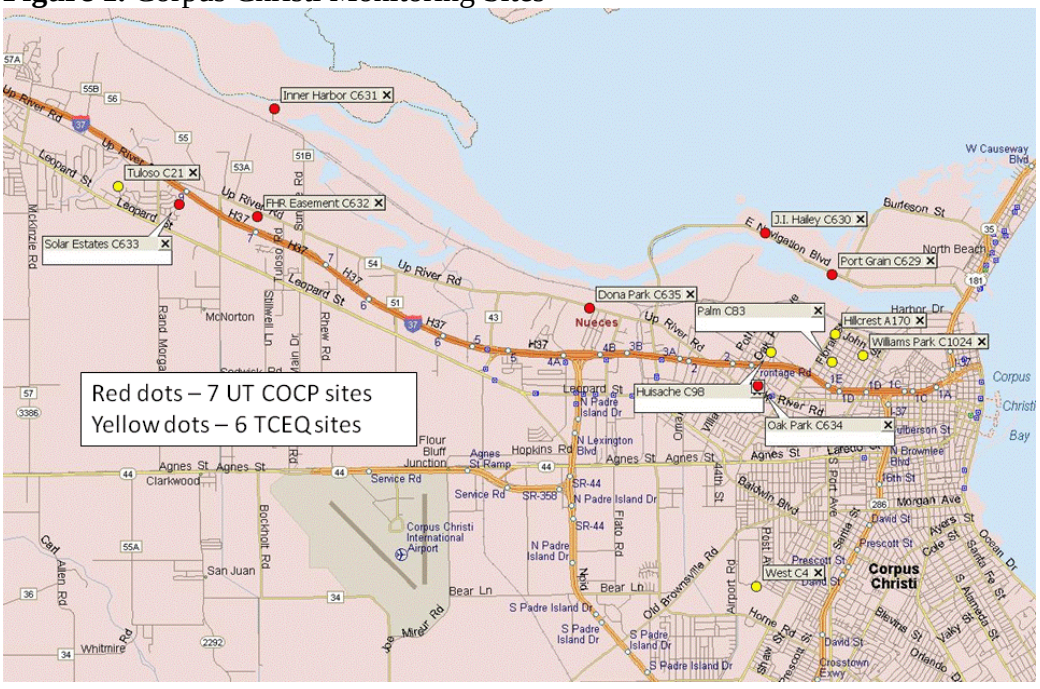

Table 1. Schedule of Air Monitoring Sites, Locations and Major Instrumentation

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 22. Specifically, the appendix contains the following elements:

- **Auto-GC Data Summary –** In examining the fourth 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 11 through 14.

- **SO_2 and H_2S** – No exceedances of the State's standards for sulfur species were measured this quarter. However, exceedances of the National Ambient Air Quality Standards (NAAQS) were measured on four dates.

- **Benzene Summary** – Average benzene concentrations have been relatively constant in recent years. The annual means from 2008, 2009, and 2010 are statistically significantly lower than in the preceding years.

- **Auto-GC Trends at Solar Estates** – Last quarter it was reported that 1,3-butadiene concentrations associated with westerly winds had declined in the past year. This trend continued. There have also been declines in other species.
-

B. Scheduled Meetings of the Volunteer Advisory Board

The Corpus Christi Project Advisory Board met on November 18, 2010. The meeting notes from that Advisory Board Meeting are found in Appendix B, pages 23 through 26.

C. Project Management and Planning

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

1. **Air Monitoring Operations**
   Operations and maintenance of the 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 C, pages 27 and 28.

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

III. Financial Report

As required, the following financial summary information is provided. Details supporting this financial summary are included in Appendix C, pages 27 and 28.

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

The COCP funds received through December 31, 2010 totals $7,548,709.66. This total includes estimated interest earned through December 31, 2010.

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

Expenditures of COCP funds during this quarter totaled $180,358.72. The detailed breakdown of the actual expenditures is included in Appendix C, page 28. 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 interest earned during this quarter totaled $9,252.57. A report providing detailed calculations of the interest earned on the COCP funds during each month of the quarter is included in Appendix C, pages 27 and 28.

D. Balance as of December 31, 2010, in the COCP Account

The balance in the COCP account, including estimated interest earned totals $1,399,595.60.

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

The projected expenditures for the funds remaining totals $1,399,595.60.

Quarterly Report Distribution List:

U.S. District Court
- Mr. Joseph Jasek, Assistant Deputy Chief USPO
- Mr. James Martinez, Supervising USPO

Texas Commission on Environmental Quality
- Ms. Sharon Blue, Litigation Division – Headquarters
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- Ms. Susan Clewis, Director – Region 14
- Mr. David Kennebeck, Field Operations – Region 14

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

Members of the Advisory Board

APPENDIX A

Data Analysis for Corpus Christi Quarterly Report

October 1, 2010 through December 31, 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 October 1 through December 31, 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 4th quarter of 2010;
- 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 concentrations at two auto-GCs in residential areas;
- Information about changes in other species at Solar Estates;

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. A monitor or a region that does not comply with a NAAQS is said to be *noncompliant*. At some point after a monitor or region has been in noncompliance, the U.S. EPA may choose to label the region as *nonattainment*. A nonattainment designation triggers requirements under the Federal Clean Air Act for the development of a plan to bring the region back into compliance.

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

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 99th 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 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. 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 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, 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 operated for seven months, so one can begin to draw conclusions from comparisons to the other two sites' data, and at this point its concentration statistics are similar to those at Oak Park and Solar Estates.

Table 3, page 12, summarizes data from the fourth quarter of 2010. Data in this table are available to TCEQ staff at http://rhone.tceq.state.tx.us/cgi-bin/agc_summary.pl (accessed January 2011). The data summarized in Table 3 have not completed the standard data validation process. Generally, very few changes occur during the standard validation process. The complete summary of calendar year 2010 appears in Table 4, page 13.

Tables 3 and 4 show the average (arithmetic mean of measured values), the maximum one-hour value, and the maximum 24-hour average concentrations for 27 hydrocarbon species for the period of interest. All concentration values in the tables are in ppbV units. No concentrations or averages of concentrations from the 27 species were greater than TCEQ's air monitoring comparison values (AMCV) during 2010. Note that values in the 4th quarter are generally higher than in the 2nd or 3rd quarter, which owes in large part to the higher frequency of northerly winds in the winter. The mean data columns in Table 3 for the 4th quarter data are shown graphically in Figure 2, 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.

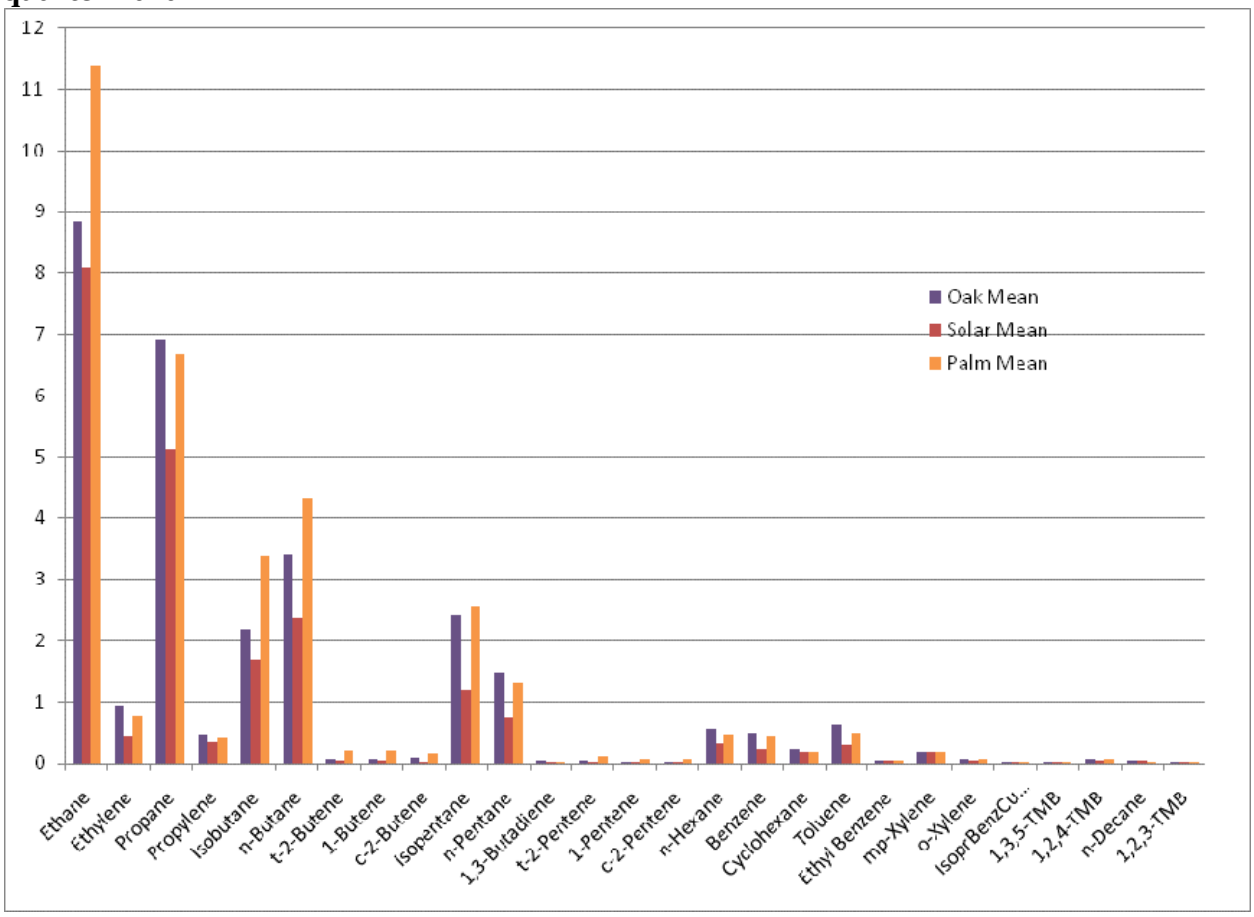
Table 3. Auto-GC statistics 4th quarter 2010

Units ppbV	Oak 4Q10			Solar 4Q10			Palm 4Q10		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	265.73	35.31	8.85	123.01	20.17	8.09	322.65	34.36	11.4
Ethylene	66.8	6.59	0.93	6.59	1.53	0.45	32.35	4.26	0.76
Propane	427.21	37.9	6.92	115.1	13.56	5.11	233.2	27.73	6.67
Propylene	19.84	2.75	0.48	70.31	4.9	0.35	29.71	3.18	0.43
Isobutane	176.28	14.64	2.19	49.41	4.84	1.71	89.82	14.04	3.4
n-Butane	192.54	17.45	3.42	47.88	6.79	2.36	82.28	22.99	4.33
t-2-Butene	1.55	0.21	0.06	1.04	0.12	0.04	6.74	1.34	0.2
1-Butene	11.08	0.61	0.08	0.98	0.13	0.04	6.91	1.29	0.21
c-2-Butene	2.91	0.37	0.09	0.71	0.09	0.02	4.76	1.15	0.15
Isopentane	101.94	11.36	2.41	37.35	4.29	1.21	67.38	15.22	2.57
n-Pentane	75.77	9.12	1.47	26.7	2.77	0.74	24.28	5.09	1.32
1,3-Butadiene	15.61	0.86	0.05	9.18	0.55	0.02	0.91	0.09	0.03
t-2-Pentene	1.59	0.22	0.05	0.38	0.05	0.01	2.85	0.74	0.12
1-Pentene	0.86	0.12	0.03	0.24	0.04	0.01	1.69	0.42	0.07
c-2-Pentene	0.74	0.1	0.03	0.2	0.03	0.01	1.51	0.39	0.06
n-Hexane	22.86	3.82	0.56	10.07	1.01	0.33	9.71	1.72	0.46
Benzene	**34.17**	**3.49**	**0.5**	**9.77**	**0.72**	**0.23**	**15.19**	**1.63**	**0.45**
Cyclohexane	10	1.42	0.23	3.9	0.54	0.19	5.17	0.7	0.18
Toluene	57.15	4.27	0.62	9.31	0.86	0.29	8.56	1.57	0.5
Ethyl Benzene	1.65	0.28	0.05	1.03	0.19	0.04	0.74	0.15	0.05
m/p-Xylene	21.95	1.42	0.19	8.53	1.22	0.18	2.41	0.54	0.18
o-Xylene	1.8	0.29	0.06	1.26	0.22	0.04	0.78	0.19	0.06
IsopylBenzeneCumene	1.78	0.43	0.03	1.16	0.15	0.01	0.75	0.13	0.01
1,3,5-TMB	0.86	0.13	0.02	2.32	0.34	0.02	0.39	0.08	0.03
1,2,4-TMB	1.6	0.31	0.06	6.43	0.44	0.04	1.24	0.23	0.08
n-Decane	1.41	0.27	0.05	4.5	0.69	0.05	0.5	0.08	0.03
1,2,3-TMB	0.53	0.09	0.02	0.75	0.12	0.02	0.38	0.09	0.03

Table 4. Auto-GC statistics 2010

Units ppbV	Oak 2010			Solar 2010			Palm Jun.-Dec. 2010		
Species	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**	**Peak 1hr**	**Peak 24hr**	**Mean**
Ethane	265.73	35.31	6.3	143.36	25.04	6.68	322.65	34.36	7.86
Ethylene	66.8	6.59	0.66	199.89	11.27	0.43	47.94	4.26	0.58
Propane	436.6	37.9	4.45	115.1	18.13	4.23	233.2	27.73	4.1
Propylene	38.44	3.39	0.34	70.31	4.9	0.26	29.71	3.18	0.31
Isobutane	176.28	14.64	1.5	49.41	7.31	1.43	89.82	14.04	2.2
n-Butane	410.92	25.77	2.4	47.88	8.81	1.96	82.28	22.99	2.55
t-2-Butene	109.78	5.04	0.08	2.43	0.29	0.04	6.74	1.34	0.14
1-Butene	11.08	0.61	0.06	3.79	0.4	0.04	6.91	1.29	0.13
c-2-Butene	2.91	0.37	0.05	1.94	0.47	0.03	4.76	1.15	0.09
Isopentane	107.31	11.36	1.66	37.35	5.87	1.05	68.07	15.22	1.77
n-Pentane	118.96	9.12	1.04	26.7	3.81	0.67	31.64	6.19	0.91
1,3-Butadiene	15.61	0.88	0.04	9.18	0.56	0.03	0.91	0.09	0.02
t-2-Pentene	2.89	0.35	0.05	4.65	1.17	0.02	2.85	0.74	0.09
1-Pentene	2.23	0.3	0.03	0.85	0.07	0.01	7.09	0.81	0.05
c-2-Pentene	0.91	0.15	0.02	1.13	0.07	0.01	1.51	0.39	0.05
n-Hexane	196.29	13.12	0.42	10.07	1.46	0.26	10.74	1.72	0.32
Benzene	**38.85**	**3.49**	**0.35**	**9.77**	**0.91**	**0.21**	**15.19**	**1.76**	**0.29**
Cyclohexane	87.37	6.11	0.18	19.25	1.09	0.16	5.17	0.7	0.12
Toluene	62.62	4.27	0.49	9.31	1.08	0.24	8.56	1.57	0.37
Ethyl Benzene	2.56	0.28	0.03	1.44	0.19	0.03	3.32	0.3	0.04
m/p-Xylene	21.95	1.42	0.13	8.53	1.34	0.17	11.95	1.05	0.15
o-Xylene	3.14	0.29	0.04	6.59	1.72	0.04	3.39	0.32	0.05
IsopylBenzeneCumene	2.06	0.43	0.02	2.83	0.27	0.02	0.75	0.13	0.01
1,3,5-TMB	0.98	0.13	0.01	2.32	0.34	0.02	0.62	0.1	0.02
1,2,4-TMB	5.9	0.78	0.04	6.43	1.23	0.04	1.45	0.23	0.06
n-Decane	2.42	0.27	0.03	4.5	0.69	0.04	0.91	0.12	0.03
1,2,3-TMB	0.88	0.09	0.01	0.78	0.15	0.02	0.61	0.1	0.03

Figure 2. Mean concentrations for 27 hydrocarbon species at three auto-GCs, 4th quarter 2010



2. Sulfur Dioxide Concentrations around Corpus Christi

The new EPA standard for SO_2 is based on the three-year rolling average of the 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 have been calculated. As of the end of 2010, the JIH CAMS 630 site was still in noncompliance of the NAAQS (see page 9). A table of the estimated critical statistics – known as "design values" (see page 9) – is below in Table 5. Values greater than 75 ppb represent noncompliance and are highlighted in the table.

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	9.2	17.8	26.4	**102.7**	21.2	12.9	10.6	22.3	33.1

Table 6, below, lists the exceedance hours measured at the JIH C630 site during the fourth quarter on 2010. No other site recorded an exceedance. The coincident H_2S and TNMHC concentrations at that site are also shown along with the wind speed and direction. At the times of the SO_2 exceedances, the H_2S and TNMHC concentrations were close to the typical values measured at this site; this shows that of the measured pollutants, only SO_2 was measured significantly higher than average during these hours. The wind directions during the three episodes are all very close to 170 degrees. Wind speeds are high enough to have transported pollutants in a relatively straight line for the hour of exposure. Another point to observe is the duration of the events. The October 25 exceedance lasted one hour. The November 10 event persisted over two hours, followed by a break as the wind shifted easterly, followed by elevated concentrations over three hours when the winds returned to close to 170 degrees. The December 20 event lasted overnight to December 21 creating two different exceedance days.

Table 6. SO_2 NAAQS exceedances at JIH C630 during the 4th quarter 2010 with coincident C630 H_2S, TNMHC, and local wind direction and speed

Date	Time (CST)	C630 SO_2	C630 H_2S	C630 TNMHC	wind direction	speed mph
10/24/2010	20:00	98.3	0.4	156.2	169.7	9.7
11/10/2010	5:00	77.5	0.8	21.4	174.3	5.3
11/10/2010	6:00	110.9		21.0	169.1	6.0
11/10/2010	9:00	99.8	0.8	20.5	174.1	10.8
11/10/2010	10:00	75.6	0.6	27.8	176.5	10.8
11/10/2010	11:00	92.2	0.6	6.0	166.6	11.2
12/20/2010	21:00	79.6	0.5	80.6	163.1	10.3
12/20/2010	22:00	97.2	0.2	49.9	167.8	10.9
12/20/2010	23:00	106.4	0.2	20.8	171.6	10.8
12/21/2010	0:00	106.5	0.1	5.0	174.7	11.8
12/21/2010	1:00	143.0	0.2	5.0	173.9	12.1
12/21/2010	2:00	104.6	0.5	5.0	172.4	10.2

UT is actively researching the most likely sources of SO_2 affecting the JIH C630 site. The current hypothesis is that ship emission are a primary source, but that industrial sources including flares, a kiln, and several sulfur recovery units may also play roles. The TCEQ has confirmed that a ship was docked across from the JIH site during the prolonged period of elevated SO_2 on December 20 – 21.

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. No values have been measured above an AMCV. A time series with some points annotated by date appears in Figure 3 for Oak Park and Figure 4 for Solar Estates, below. Note the different y-axis scales for the two sites, as Oak Park does tend to see higher concentrations than Solar Estates. The highest values in the fourth quarter for 2010 are noted in Figures 3 and 4.

Figure 3. Oak Park hourly benzene 2005 – 2010, ppbV units, individual elevated values noted, no observations greater than the TCEQ's AMCV

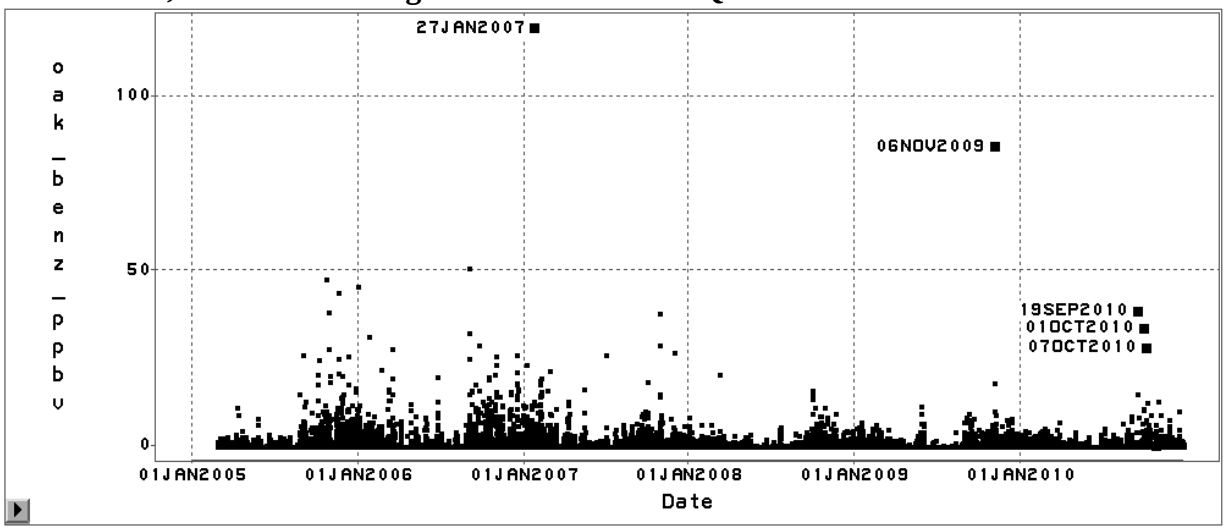
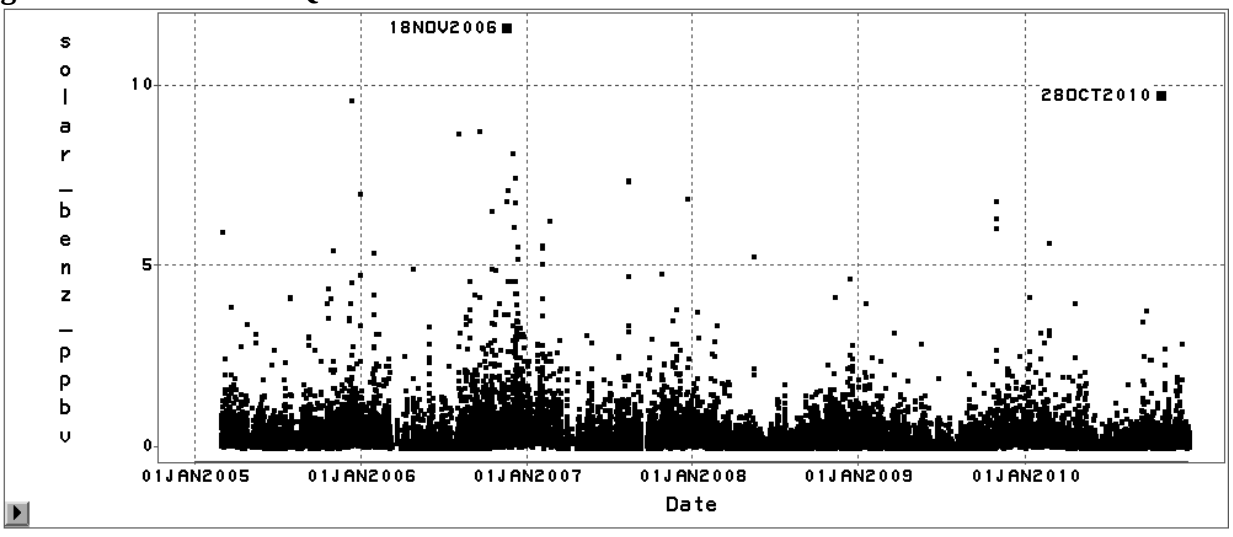


Figure 4. Solar Estates hourly benzene 2005 – 2010, ppbV units, no observations greater than the TCEQ's AMCV



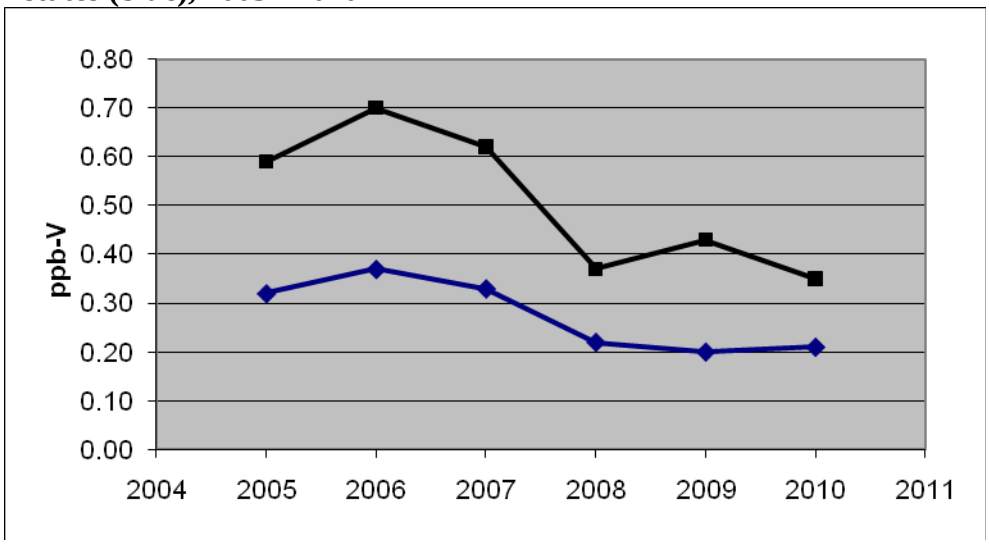
4. Trends in Benzene Concentrations at Two Auto-GCs

Table 7, below, shows the annual summary statistics from the auto-GCs for benzene from 2005 – 2010. The annual means are shown graphically in Figure 5, below. Annual average benzene concentrations have been relatively constant in recent years. The annual means from 2008, 2009, and 2010 are statistically significantly lower than in the preceding years.

Table 7. Summary Statistics for Benzene at Oak Park and Solar Estates, 2005 – 2010, ppbV units

	Year	Num. Obs.	Peak 1-hr	Peak 24-hr	Mean
Oak	2005	6,312	48.17	5.52	0.59
	2006	7,394	51.15	7.78	0.70
	2007	7,628	120.16	8.95	0.62
	2008	7,450	20.93	2.97	0.37
	2009	7,789	86.18	5.96	0.43
	2010	7,518	38.85	3.49	0.35
	Year	Num. Obs.	Peak 1-hr	Peak 24-hr	Mean
Solar	2005	5,299	9.63	1.24	0.32
	2006	6,602	11.66	2.50	0.37
	2007	6,671	7.41	1.80	0.33
	2008	7,589	5.31	1.07	0.22
	2009	7,621	6.84	1.37	0.20
	2010	7,374	9.77	0.91	0.21

Figure 5. Annual mean concentrations of benzene at Oak Park (black) and Solar Estates (blue), 2005 - 2010



5. Changes in Auto-GC Concentrations at Solar Estates by Wind Direction

The last quarterly report discussed the decline in mean concentrations of 1,3-butadiene at Solar Estates. The decline followed some unexpected elevated 1,3-butadiene concentrations on September 26 and 27, 2009, which included the highest values in the monitoring network yet recorded. Figure 6, page 19, shows a series of six individual graphs of mean 1,3-butadiene concentrations as a function of 20-degree wind direction bin by year. The y-axis units are in ppbV. As was noted last quarter in a similar analysis based on fiscal years instead of calendar years, the 2010 disappearance of the peak associated with westerly winds is especially notable. 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. The former Equistar plant is now run by LyondellBasell. The Website for this firm states the following:

> "The Corpus Christi Complex produces ethylene, propylene and fuel products. Our facility produces basic chemical building blocks that our customers convert into consumer products. These include plastics for food packaging and containers, and antifreeze."
> (http://www.lyondellbasell.com/WorldWideLocations/NorthAmerica/USA/Texas/CorpusChristi_EN/AboutUs/ accessed January 2011).

In order to see whether the change in operations affected the behavior of other hydrocarbons measured under westerly winds, a similar directionality analysis has been performed for other auto-GC species and for TNMHC (measured independently with the TNMHC-analyzer). Figure 7, page 20, shows six graphs with annual means by direction for ethylene, and Figure 8, page 21, shows six graphs with annual means by direction for propylene. Both of these sets of graphs show two large contributions from the north-through-east (0 – 120 degrees) and from the west (240-270 degrees). Figure 9, page 22, shows the TNMHC directionality, which also shows the two contributions. The change in concentrations for 1,3-butadiene has been more profound than the changes in the other species and TNMHC.

Figure 6. Average 1,3-butadiene by wind direction 20-degree wind bins at Solar Estates by individual year in ppbV units

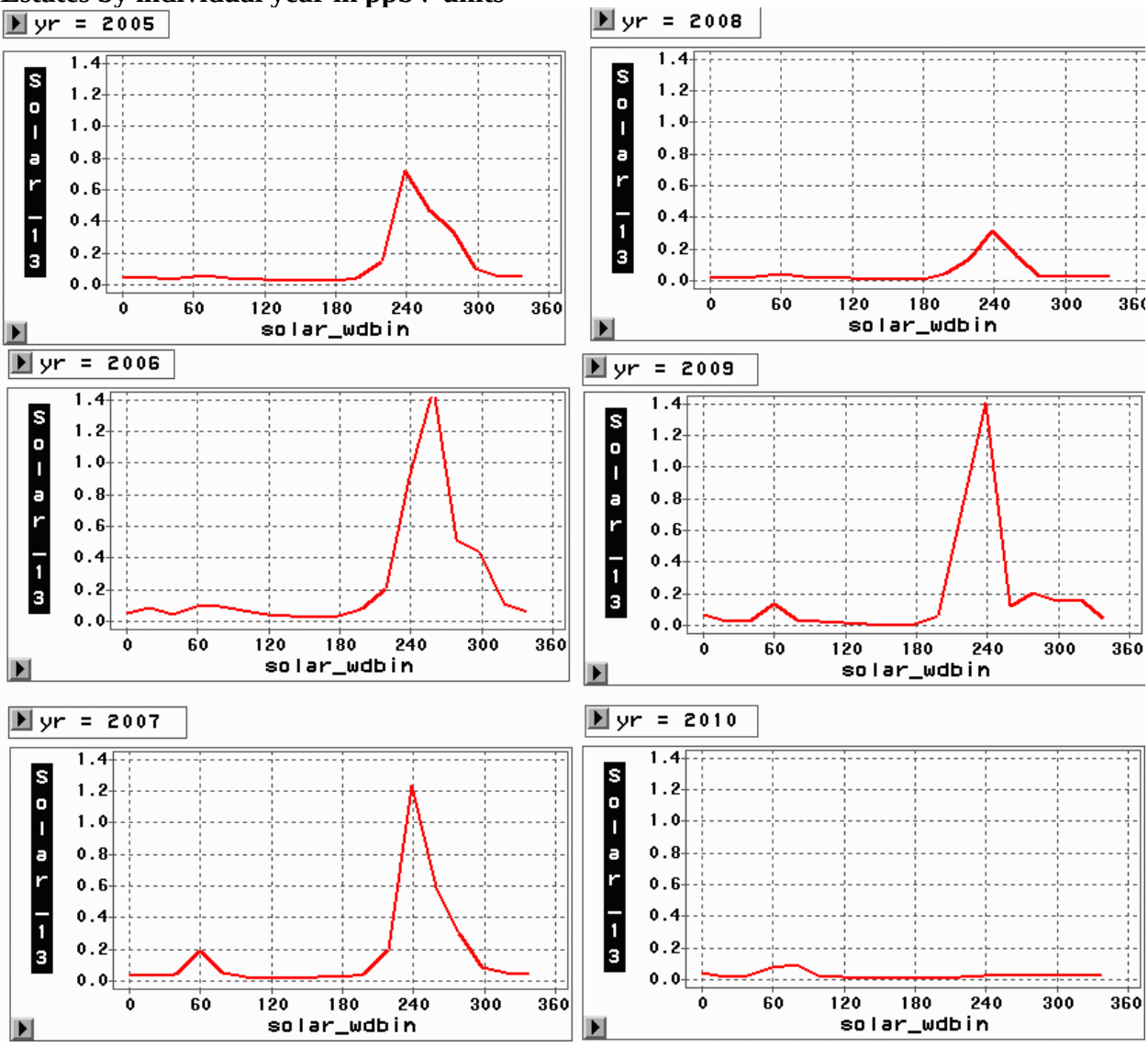


Figure 7. Average ethylene by wind direction 20-degree wind bins at Solar Estates by individual year in ppbV units

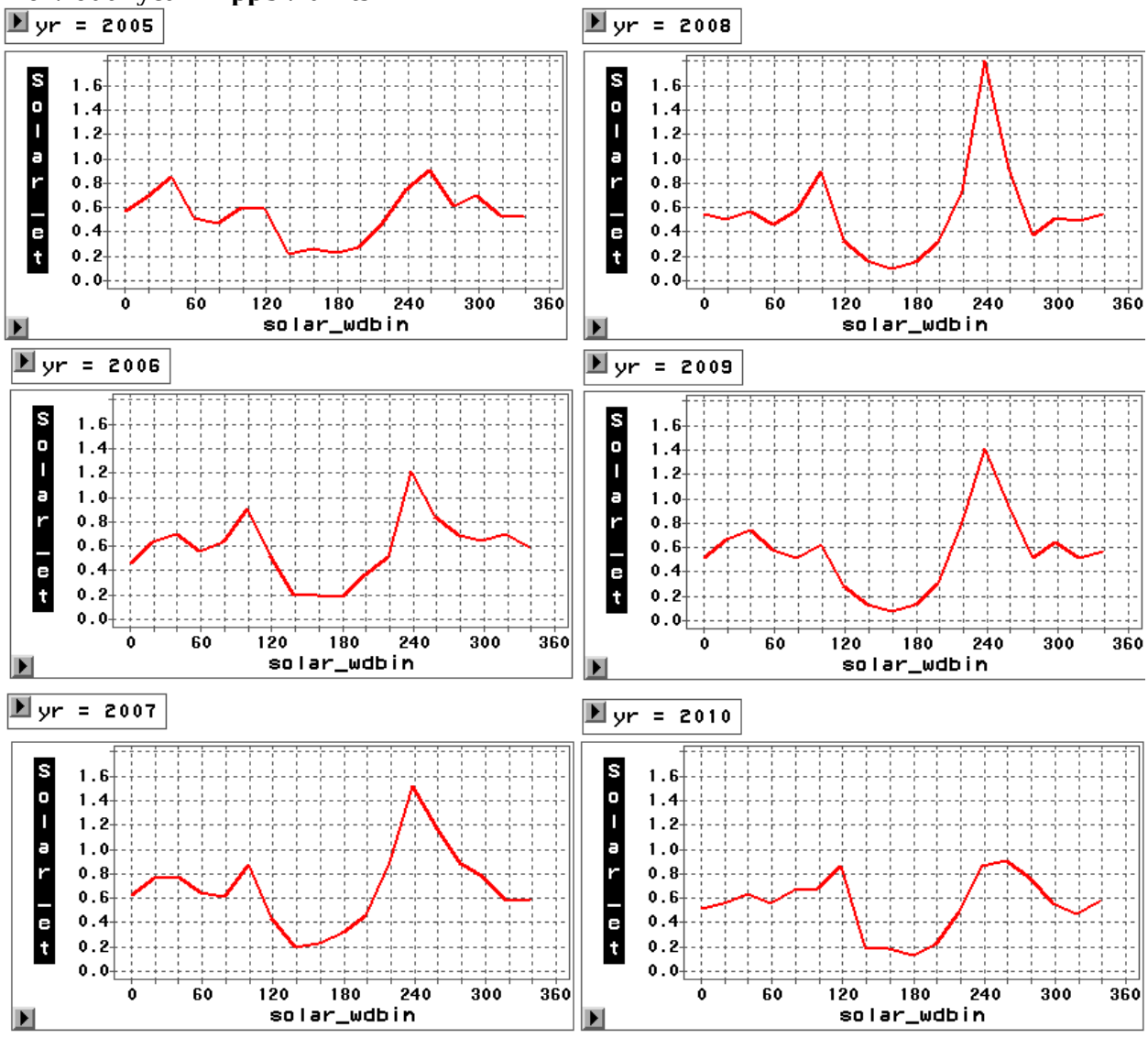


Figure 8. Average propylene by wind direction 20-degree wind bins at Solar Estates by individual year in ppbV units

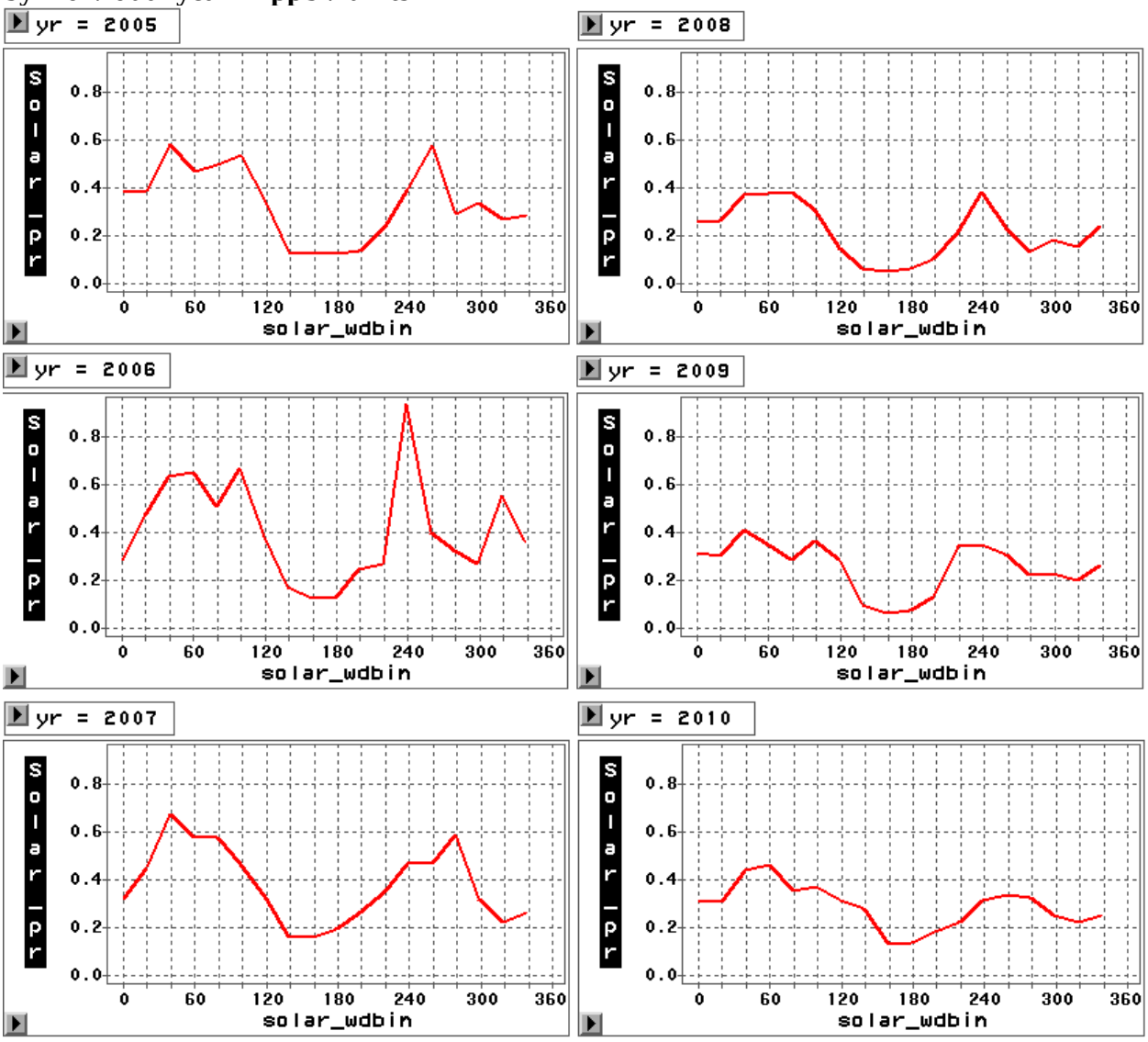
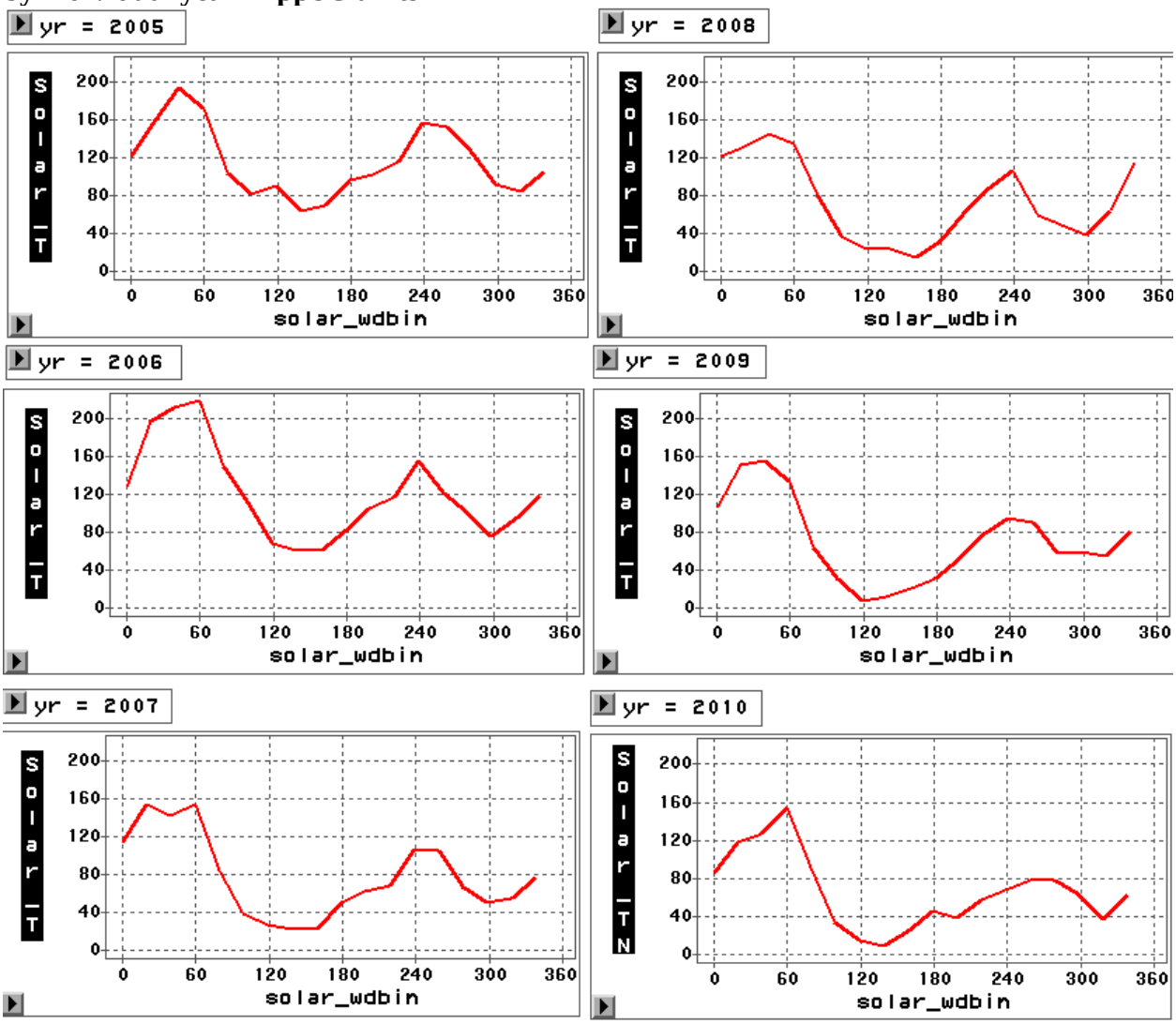


Figure 9. Average TNMHC by wind direction 20-degree wind bins at Solar Estates by individual year in ppbC units



Conclusions from the Fourth Quarter 2010 Data

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

- Fourth 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 (see page 9). The State of Texas and EPA would have to consider several issues before actually designating the area nonattainment. The current hypothesis is that ship emissions play a significant role in elevated SO_2 concentrations at this site.
- Concentrations of 1,3-butadiene under westerly winds have dropped significantly at the Solar Estates site. This is very likely due to changes in operations at a chemical plant three miles west of the site. Changes in other species and TNMHC are less profound.
- 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 B

April 29, 2010
Advisory Board Meeting Notes

ADVISORY BOARD MEETING

Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Texas A&M University - Corpus Christi

Room 2010, NRC Building

1:30 pm – 3:30 pm

November 18, 2010

Advisory Board Members Present:

Ms. Gretchen Arnold	Corpus Christi Pollution Prevention Partnership TAMUCC
Ms. Joyce Jarmon	Corpus Christi Community Council
Dr. Glen Kost	Public Health Awareness
Ms. Pat Suter	Coastal Bend Sierra Club
Dr. Eugene Billiot	TAMUCC
Rev. Henry Williams	Hillcrest Community

Guest Present:

Ms. Jaclyn Uresti	Chief of Staff for State Representative Abel Herrero

Ex-Officio Members of the Board

Mr. James Martinez	Probation Office - US District Court
Ms. Rosario Torres	TCEQ – Region 14
Ms. Susan Clewis	TCEQ – Region 14
Mr. Ken Rozacky	TCEQ
Mr. Chris Owen	TCEQ

Project Personnel Present:

Dr. David Allen	The University of Texas at Austin
Mr. Vince Torres	The University of Texas at Austin
Dr. Dave Sullivan	The University of Texas at Austin
Dr. Elena McDonald-Buller	The University of Texas at Austin
Mr. Gary McGaughey	The University of Texas at Austin
Ms. Terri Mulvey	The University of Texas at Austin

I. Call to Order and Welcome

A. Mr. Vince Torres called the meeting to order at 1:35 pm.

II. Project Overview and Status

A. Data Collection and Analyses

Dr. Dave Sullivan gave his presentation, "Air Monitoring Data for Corpus Christi, November 18, 2010." He provided copies of the presentation to the Advisory Board members. He explained the new EPA sulfur dioxide standard and summarized how CoCP monitor readings compare with the standard. One site, J.I. Hailey, does not comply with the new sulfur dioxide standard, and can be described as being in a state of "noncompliance." He also showed how 1,3-butadiene concentrations had significantly declined at Solar Estates.

III. Neighborhood Air Toxics Modeling Project

A. Update on Corpus Christi Neighborhood-Scale Air Toxics Modeling Project

Dr. Elena McDonald-Buller gave her presentation, "Dispersion Modeling of Air Toxics in Corpus Christi." She provided copies of the presentation to the Advisory Board members. This presentation summarized the results of the dispersion modeling of benzene and 1,3-butadiene using the EPA regulatory models, AERMOD and CALPUFF. The modeling results were discussed in comparison with observations from the CCAQP network. Air quality modeling allows pollutant concentrations to be estimated in areas without monitors and can provide insights into emissions inventories for the region. In addition, it can indicate areas of interest for future investigation and monitoring.

After the completion of the 2 presentations time for questions and answers was provided. Rev. Williams inquired if the Hillcrest site was one of the monitoring sites. Dr. Sullivan responded that it was one of the TCEQ's sites, and it was not a site operated by the University of Texas.

IV. Discussion of Development of Plan for Continued Operation of Monitoring Network

A. Overview of Approach to Develop Path Forward

Mr. Torres transitioned the meeting from data analysis and monitoring operations, to a discussion on the Development of a Plan for Continued Operation of the Monitoring Network after Sept. 30, 2011, when the Court Order Condition of Probation Project funding will run out.

The development of the plan will require the project team to focus on technical issues as well as financial issues. Mr. Torres also stated the plan will be developed with Advisory Board input and approval prior to submittal of the proposed plan during the Annual Report presentation to the Honorable Judge Jack in Spring 2011.

Mr. Torres began the discussion with 5 technical guiding questions that must be considered.
1) Should we continue monitoring for the same chemicals?
2) Should we consider adding any chemicals to the list?
3) Should we continue to operate all seven sites?
4) Should we relocate any monitoring stations?
5) When will we need to replace equipment?

B. Technical Issues

Mr. Torres introduced Dr. David Allen, who gave his presentation, "Revisions to the National Ambient Air Quality Standards (NAAQS) and Implications for Air Quality Monitoring in Corpus Christi." The presentation highlighted the change to the SO_2 NAAQS and the anticipated changes to the ozone NAAQS. These 2 changes to the NAAQS have the potential to change the ability of the Corpus Christi region to meet all of the standards. In particular the J.I. Hailey monitor is currently in non-compliance with the new SO_2 NAAQS. Following Dr. Allen's presentation the Advisory Board asked questions and a discussion ensued.

Dr. Allen explained that co-location of NOx monitors near VOC monitoring stations could be helpful in obtaining information regarding ozone formation. Ms. Pat Suter inquired about the expense of NOx monitors? Mr. Torres replied that they are approximately $25,000 each installed plus operating costs.

Dr. Glen Kost inquired if we had access to mobile sampling. Dr. Allen replied that The University of Texas at Austin does have the capability for mobile sampling.

Ms. Suter inquired about whether The University of Texas at Austin believes there are one or more sites that aren't providing needed information? Dr. Allen responded that Flint Hills Easement (FHR) could potentially be such a site. A pump jack and tank battery are located near the site, which dominate the results when the winds blow from that direction. Ms. Sutter suggested that UT remove the least informative site(s).

Dr. Allen returned to the topic of the new NAAQS for SO_2. The new primary standard was set to reduce exposure to high short-term (5-minutes to 24-hours) concentrations of SO_2, which have been associated with adverse respiratory effects. The J.I. Hailey site, in Corpus Christi is currently not in compliance with the new SO_2 NAAQS. Therefore, UT recommends the following actions with respect to sulfur measurements:

1) Retain current sulfur monitors
2) Perform reconciliation of the emission inventory with the ambient monitoring data
3) Assess modeling needs after quality assurance of the emission inventory; report to Advisory Board at next meeting – **Action Item**

After addressing questions and the discussion that followed, Dr. Allen invited the Advisory Board to submit questions and ideas on network configuration options, i.e., addition or removal of sites, to Mr. Torres. These changes and/or suggestions will be addressed and information provided at the next board meeting, when UT will present one or more scenarios for continued operation of the network to the Advisory Board for review, discussion, and action. – **Action Item**

The goal is to have a Board approved plan to submit to the Honorable Judge Jack at the annual report in the spring.

Dr. Allen asked the Advisory Board for approval to conduct the SO_2 evaluation. Dr. Kost moved approval of the request and Ms. Suter seconded the motion. The motion was approved unanimously by all Advisory Board Members present.

The project team will develop the Plan in coordination with the City of Corpus Christi, both regional and state TCEQ offices, the Corpus Christi Pollution Prevention Partnership and the Corpus Christi Community as represented by the Advisory Board.

V. Follow up on Old Business/Action Items

VI. Preplanning for the Annual Report before the Honorable Judge Jack

Mr. Torres suggested that we tentatively consider having the annual report presentation in March 2011.

VII. Advisory Board

B. Schedule for the next meeting of the Advisory Board

Mr. Torres suggested that we try to coordinate the next Advisory Board meeting to coincide with the ATSDR report on or about January 27, 2011, or shortly thereafter.

VIII. Other Issues

Invite the Port of Corpus Christi to the next Advisory Board meeting – **Action Item**

IX. Adjourn

The meeting was adjourned at 3:45 pm.

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
10/01/10 - 012/31/10

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

Total Grant Amount:	$6,761,718.02
Total Interest Earned:	$786,991.64
Total Funds Received:	$7,548,709.66

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 10/01/10 - 12/31/10	Encumbrances	Remaining Balance 12/31/2010
Salaries-Prof	12	$216,128.63	$160,652.00	286,279.40	299,633.00	316,499.00	$1,288,192.03	($1,129,600.15)	($12,685.34)	($10,820.34)	$112,883.17
Salaries-CEER	16	$19,603.37	$15,536.00	33,123.00	30,948.00	29,880.00	$144,193.37	($129,192.24)	($5,808.38)	($5,608.50)	$3,584.25
Fringe	14	$47,984.00	$38,753.00	56,333.00	72,728.00	76,643.00	$304,600.00	($253,983.44)	($4,394.52)	($5,879.19)	$40,342.85
Communication	42					900.00	$1,400.00	($855.00)	($225.00)	$0.00	$320.00
Other/C-Analysis	47/68	$60,474.00	$73,500.00	($,656.40)	73,500.00	4,219.00	$112,949.60	($96,264.00)	($16,446.00)	$0.00	$10,239.60
Supplies	50	$66,844.00	$33,500.00	66,676.00	122,662.00	65,388.00	$462,915.73	($419,457.95)	($33,894.18)	($3,857.07)	$5,706.53
	51		$20,300.00	8,000.00		6,170.00	$25,640.27	($17,052.54)	$412.54	$0.00	$8,000.27
Subcontract	62-66	$1,995,693.00	$314,022.00	295,734.00	346,289.00	591,523.00	$3,514,261.00	($3,158,338.98)	($83,646.14)	$0.00	$272,375.88
Travel	75	$2,300.00	$2,000.00	7,719.00	9,000.00	6,712.00	$30,191.00	($26,584.43)	($243.65)	($0.04)	$3,362.88
Equipment	80	$0.00	$0.00	0.00			$0.00	$0.00	$0.00	$0.00	$0.00
Indirect Costs	90	$359,855.00	$98,750.00	112,531.00	143,217.00	164,990.00	$879,352.00	($747,226.58)	($23,525.06)	$0.00	$108,600.37
TOTALS		$2,768,686.00	767,152.00	862,739.00	1,097,997.00	1,264,922.00	$6,741,695.00	($5,968,766.34)	($180,358.72)	($26,166.14)	$566,416.80

C. Interest Earned by COCP Funds as of 12/31/10

Prior Interest Earned:	$777,738.07
Interest Earned This Quarter:	$9,252.57
Total Interest Earned to Date:	$786,991.64

D. Balance of COCP Funds as of 12/31/10

Total Grant Amount:	$6,761,718.02
Total Interest Earned:	$786,991.64
Current Q. Expenses	($180,358.72)
Total Expenditures:	($5,968,755.34)
Remaining Balance:	$1,399,695.80

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

Accounting Certification