Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Quarterly Report for the Period

January 1, 2007 through March 31, 2007

Submitted to

Judge 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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May 22, 2007

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 March 31, 2007 has been directed to the following activities.

A. Operations and Maintenance Phase of the Project

A detailed description of some data analyses appear in Appendix A and a summary of these analyses appears in this section.

The COCP consists of a network of seven (7) air monitoring stations with air monitoring instruments and surveillance camera equipment as shown in Table 1, page 3. A map showing locations of COCP monitoring sites along with TCEQ sites and a site operated by Texas A&M at Kingsville (TAMUK) appears in Figure 1, below. TCEQ and TAMUK sites provide some additional data used in analyses.

Figure 1 Corpus Christi Monitoring Sites

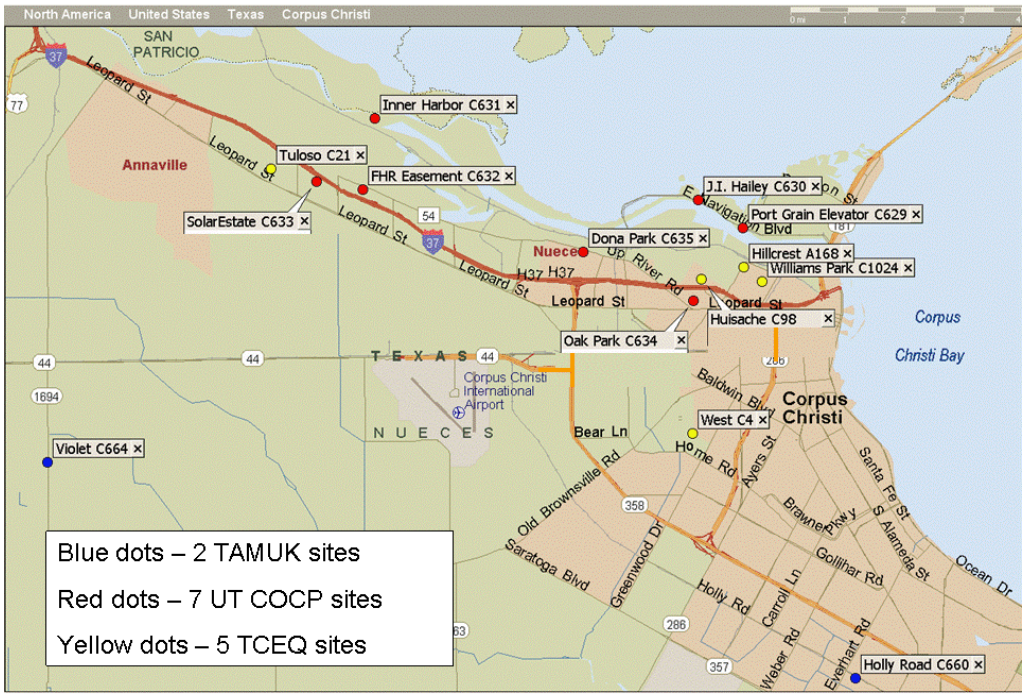

Table 1. Schedule of COCP Air Monitoring Sites, Locations and Major Instrumentation

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 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

During the first quarter of 2007, a handful of notable pollution events were monitored and a discussion appears in the Appendix. Specifically, the Appendix contains the following elements:

- an update on canister sampling and analysis of results;
- a summary of hourly speciated hydrocarbon concentrations measured by automated gas chromatographs (auto-GCs) compared with health effects screening levels;
- updated Total Non-Methane Hydrocarbon (TNMHC) directionality work, in which a comparison is made between direct measurements from the TNMHC instrument and indirect measurements from the two auto-GCs;
- a case study of a hydrogen sulfide (H_2S) event on January 22, 2007.

Canister Sampling and Analysis - During the first quarter of 2007, eight valid canister samples were triggered. For comparison, during the fourth quarter of 2006, eighteen valid canister samples were triggered. Three samples, all taken at J.I. Hailey C630 since December 2006, had benzene concentration values above the TCEQ's short-term Effects Screening Level

(ESL) (25 ppbV), and occurred under westerly winds. These were the only samples over an ESL[1]. An analysis of these events in provided in Appendix A.

Despite not exceeding an ESL, an analysis of data from January 10 was performed. On that date, three canisters were triggered, and simultaneously elevated TNMHC (> 2,000 ppbC canister trigger threshold) levels were measured around the eastern part of the network. More details about the January 10 event and the JIH canisters appear in Appendix A.

Auto-GC Effects Screening Level Summary - In comparing this quarter's hourly auto-GC data to ESLs, only one measurement exceeded an hourly ESL, that being benzene at Oak Park on January 27 at 6 a.m. under northerly winds. The quarterly average for benzene at Oak Park was above the annual ESL, but the rolling average over the past four quarters is below the annual ESL.

Comparison between TNMHC and Auto-GC Measurements – A number of comparisons have been performed between the collocated TNMHC hourly averages and the sum of hydrocarbon measurements at the Solar Estates and Oak Park sites. The variables agree with a modestly good degree of precision. One application – using the data merged with wind data to assess pollutant direction of arrival patterns – is illustrated in the appendix. In addition, a method to adjust the data to better compare with possible upwind source strengths is described and applied.

Analysis at an H_2S Event at FHR - On January 22, 2007, elevated readings of H_2S were measured the FHR C632 site. The site operator and the operator of a nearby business both noticed a strong odor consistent with sulfurous compounds. The H_2S and TNMHC data at nearby sites were examined, and the on-line trajectory tool was used to identify a likely source and to assist the TCEQ Regional Office in quality-assuring an emissions event report. More details appear in the appendix.

B. Scheduled Meetings of the Volunteer Advisory Board

During this quarter the Advisory Board did not meet.

C. Project Management and Planning

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

[1] *Effects Screening Levels are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. They are not ambient air standards. If a concentration measurement exceeds a screening level, it does not necessarily indicate a problem but rather triggers a review in more depth.*

1. **Project Schedule**
   Operations and maintenance of the seven monitoring sites reporting data via the TCEQ LEADS System 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 development, quarterly and annual reports, and at meetings of the Advisory Board.

3. **Budget Monitoring**
   Budget monitoring during the period has focused on project costs for Phase II - Sites Operation and Maintenance costs. Financial reports for the quarter are included at Appendix B, page 26.

4. **Other Contributions**
   There were no other contributions awarded during this reporting period.

III. Financial Report

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

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

The COCP funds received through March 31, 2007 totals $7,224,062.92. This total includes interest earned through March 31, 2007.

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

Expenditures of COCP funds during this quarter totaled $190,495.44. 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, beginning on page 2 of this report.

C. Total Interest Earned on COCP Funds During the Quarter

The interest earned during this quarter totaled $37,840.03. A report providing detailed calculations of the interest earned on the COCP funds during each month of the quarter is included in Appendix B, page 26.

D. Balance as of March 31, 2007, in the COCP Account

The balance in the COCP account, including interest earned totals $4,455,397.05.

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

The expected expenditures for the funds remaining totals $4,455,397.05.

Quarterly Report Distribution List:

U.S. District Court

Ms. Shirley Johnson, Assistant Deputy Chief USPO

Mr. James Martinez, Supervising USPO

Texas Commission on Environmental Quality

Ms. Sharon Blue, Litigation Division – Headquarters

Mr. David Brymer, Laboratory and Mobile Monitoring – Headquarters

Ms. Susan Clewis, Director – Region 14

Mr. David Turner, Air Monitoring Section – 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

January 1, 2007 through March 31, 2007

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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 Quality Project over the period from January 1 through March 31, 2007. The monitoring network is shown in Figure 1 on the following page and described in Table 1 below. This report contains the following elements:

- an update on canister sampling and analysis of results;
- a summary of hourly speciated hydrocarbon concentrations measured by automated gas chromatographs (auto-GCs) compared with health effects screening levels;
- updated TNMHC directionality work, in which a comparison is made between direct measurements from the TNMHC instrument and indirect measurements from the two auto-GCs;
- a case study of a hydrogen sulfide (H_2S) event on January 22, 2007.

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

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Legend

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TNMHC	total non-methane hydrocarbon analyzer (all except 634 & 633 also have canister hydrocarbon samplers)
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Met Station	meteorology station consisting of measurement instruments for wind speed, wind direction, ambient air temperature and relative humidity
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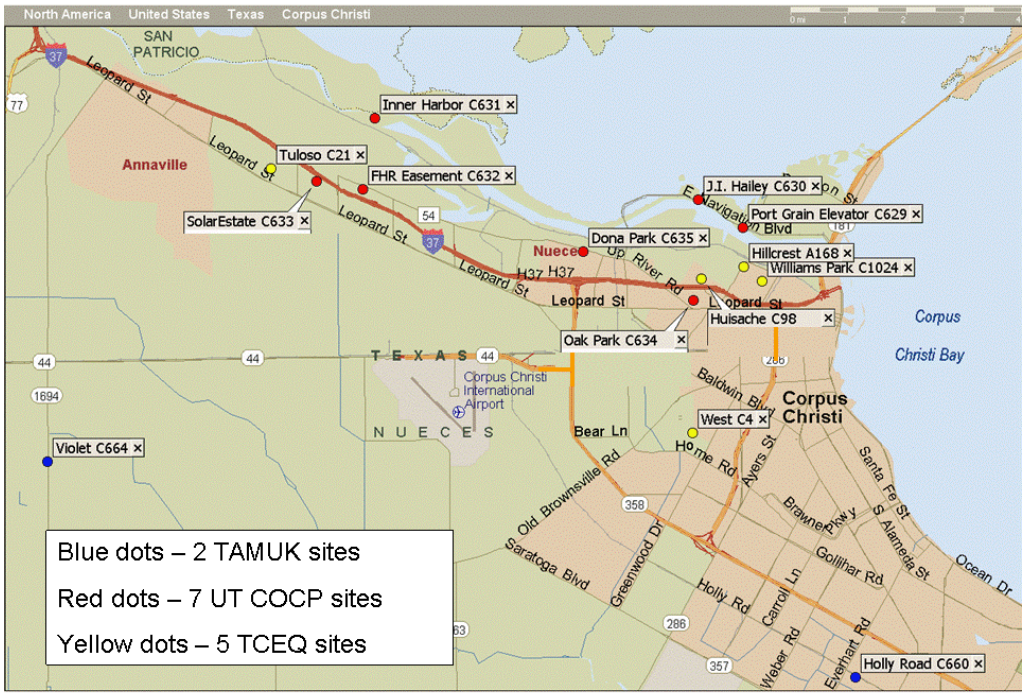
Figure 1 Corpus Christi Monitoring Sites



Glossary

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 butene 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.
- **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** – Stainless steel canisters are filled with air samples when an independent sensor detects that elevated levels of hydrocarbons (TNMHC) are present. Samples are taken for various lengths of time (generally 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 50 – 55 hydrocarbon species. Canister samplers have operated at all seven UT/CEER sites, but this quarter only at five (CAMS 629,630,631,632, and 635).
- **Effects Screening Levels (ESLs) –** From the TCEQ Web site: ***"****Effects Screening Levels are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. ESLs are based on data concerning health effects, the potential for odors to be a nuisance, effects on vegetation, and corrosive effects. They are not ambient air standards. If predicted or measured airborne levels of a constituent do not exceed the screening level, adverse health or welfare effects are not expected.* ***If ambient levels of constituents in air exceed the screening levels, it does not necessarily indicate a problem but rather triggers a review in more depth****."* (Emphasis added.) (Accessed on January 22, 2007) http://www.tceq.state.tx.us/implementation/tox/esl/ESLMain.html .)

Canister Sampling and Analysis

During the fourth quarter of 2006 and first quarter of 2007, valid canister samples were triggered at the locations, dates, and times shown in Table 2, page 11. The time shown is Central Standard Time (CST), 0:00=midnight, 23:00=11 p.m. The benzene concentration in the canister sample is also shown in ppbV units, with values above the 1-hour ESL (25 ppbV) in red text.

Table 2 Valid Canister Samples, sorted by site, 4Q2006 & 1Q2007

Site name	Start time	benzene ppbV
CCG CAMS 629	10/17/06 5:14	7.3
CCG CAMS 629	*11/18/06 1:15*	6.0
CCG CAMS 629	12/11/06 23:19	4.6
CCG CAMS 629	**1/10/07 4:52**	7.1
CCG CAMS 629	3/4/07 23:15	13.9
DPK CAMS 635	*11/18/06 2:21*	1.5
DPK CAMS 635	**1/10/07 6:08**	1.2
DPK CAMS 635	2/13/07 4:14	1.1
FHR CAMS 632	11/12/06 23:39	4.8
FHR CAMS 632	11/17/06 1:11	3.2
FHR CAMS 632	*11/18/06 23:46*	1.2
FHR CAMS 632	11/20/06 20:25	2.3
FHR CAMS 632	12/13/06 9:29	5.8
FHR CAMS 632	1/9/07 5:46	4.2
JIH CAMS 630	10/16/06 1:29	12.5
JIH CAMS 630	10/19/06 3:10	5.5
JIH CAMS 630	10/29/06 1:02	3.7
JIH CAMS 630	11/6/06 2:25	4.3
JIH CAMS 630	*11/18/06 0:49*	5.1
JIH CAMS 630	11/27/06 7:27	4.5
JIH CAMS 630	12/12/06 18:16	***132.9***
JIH CAMS 630	**1/10/07 4:40**	6.7
JIH CAMS 630	1/27/07 18:41	***392.8***
JIH CAMS 630	3/6/07 4:02	***407.3***
WEH CAMS 631	11/16/06 21:40	16.7
WEH CAMS 631	12/12/06 18:23	12.1

Canisters January 10, 2007 and November 18, 2006

The Port Grain C629 (CCG), Dona Park C635 (DPK), and J. I. Hailey C630 (JIH) canister samplers all were triggered early on Wed. January 10, 2007. The TNMHC measurements that led to canister triggering were among the highest measurements recorded since the March 2005 onset of monitoring. The one-hour TNMHC values from the eastern part of the network, including the TCEQ Williams Park C1024 site, are shown in Table 3, page 12, for the period from 10 p.m. January 9 through 10:59 a.m. CST, January 10. In addition, Oak Park C634 measured that site's second and third highest one-hour TNMHC averages to date. Table 4, page 12, lists the rank for the maximum TNMHC value during this overnight-morning period compared with all measurements taken since March 1, 2005.

Table 3 Jan. 9-10, 2007 overnight and morning TNMHC (ppbC), eastern CC Network*

Date	Time	C629	C630	C634	C635	C1024
1/9/2007	20:00	484.25	192.75	675.21	373.10	762.11
1/9/2007	21:00	612.85	188.83	724.79	464.73	997.46
1/9/2007	22:00	563.84	103.36	641.19	605.41	1,487.27
1/9/2007	23:00	942.11	279.54	525.72	586.71	1,642.35
1/10/2007	0:00	1,173.34	406.88	618.02	447.94	2,666.05
1/10/2007	1:00	1,088.72	335.79	489.45	458.53	2,584.15
1/10/2007	2:00	843.25	567.80	498.72	452.04	1,888.65
1/10/2007	3:00	865.45	453.54	582.91	479.01	1,997.31
1/10/2007	**4:00**	2,375.17	1,876.53	793.05	513.73	1,795.24
1/10/2007	**5:00**	2,203.00	2,858.62	2,930.53	1,470.62	4,070.75
1/10/2007	**6:00**	1,044.32	1,281.69	2,957.28	2,204.57	3,273.43
1/10/2007	7:00	949.65	1,195.34	1,700.69	1,722.39	2,563.05
1/10/2007	8:00	689.51	751.40	1,324.47	1,297.09	1,030.94
1/10/2007	9:00	410.10	354.11	398.11		475.44
1/10/2007	10:00	313.76	116.87	133.94		244.74

*Values over 2,000 ppbC are highlighted in yellow, area-wide overall peak hours are in red text.

Table 4 Comparison of Jan. 10, 2007 event to all monitored values collected since March 2005

Statistic	C629	C630	C634	C635	C1024
Number of Observations*	17,973	17,606	16,040	17,245	9,917
Rank of max value Table 3	35th	87th	2nd	9th	2nd
Percentile for max value	0.195%	0.494%	0.012%	0.052%	0.020%

* Number of hourly TNMHC values since March 1, 2005

During the hours from 4:00 through 6:59 CST, the concentrations at four of the five sites are within a relatively narrow range: 2,203 to 2,957 ppbC. Furthermore, concentrations are flat in the 2,500 ppbC proximity for about two hours at each of the four sites. This suggests that the air is well mixed over the area. Because the Williams Park C1024 site sees the highest concentrations and also sustains the high levels (>2,000 ppbC) longer than the other sites, a hypothesis may be that the source is closest to this site.

A collection of "normalized" bar graphs of the species sampled on January 10 appears in Figure 2 on the following page. The bars are "normalized" in the sense that the height of each bar represents the percent of mass presented by the species in making up the total sample ppbC concentration. This allows a comparison of the composition of the samples to assess the likelihood that the same type of source or same individual source produced the hydrocarbons sampled. As was reported in the Quarterly Report for the period ending December 31, 2006, an event with emissions similar in composition occurred on November 18, 2006, and this date is shown in italics in Table 2 on the previous page. For comparison, a "normalized" bar graph for the canisters at CCG and JIH from November 18, 2006, is shown in Figure 3 on the following page. Species names in Figures 2 and 3 are printed in small font and may be hard to read – the intent of these graphs is simply to demonstrate how closely the concentration patterns match.

Figure 2

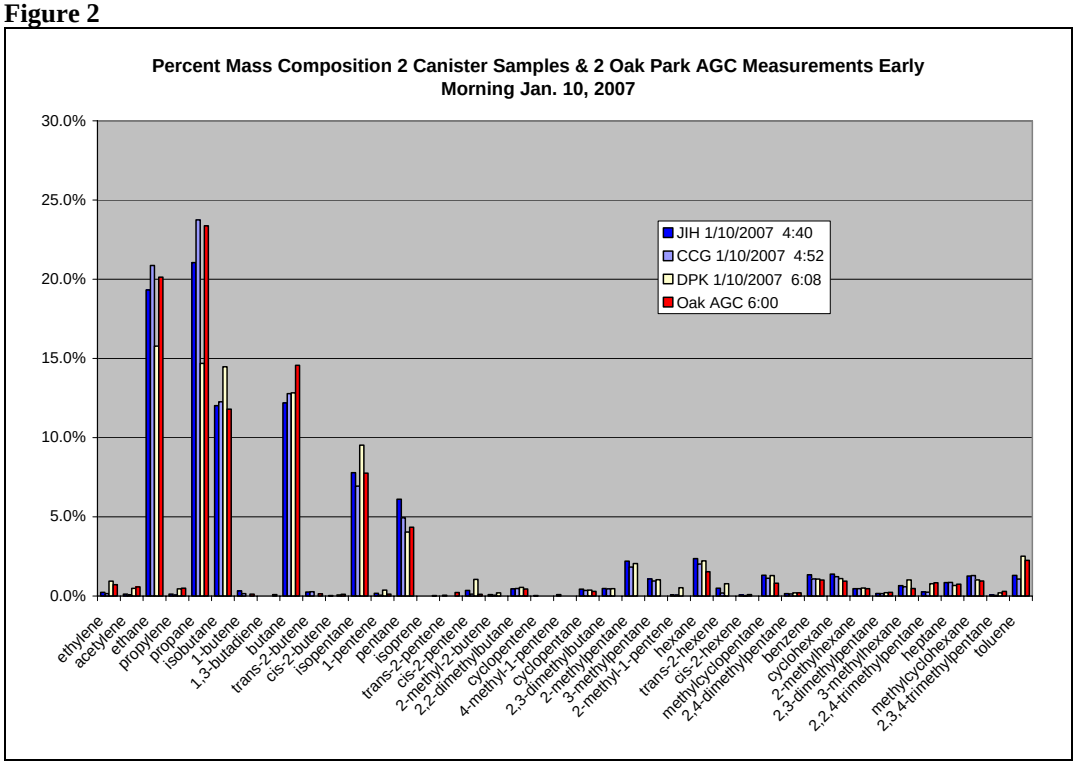
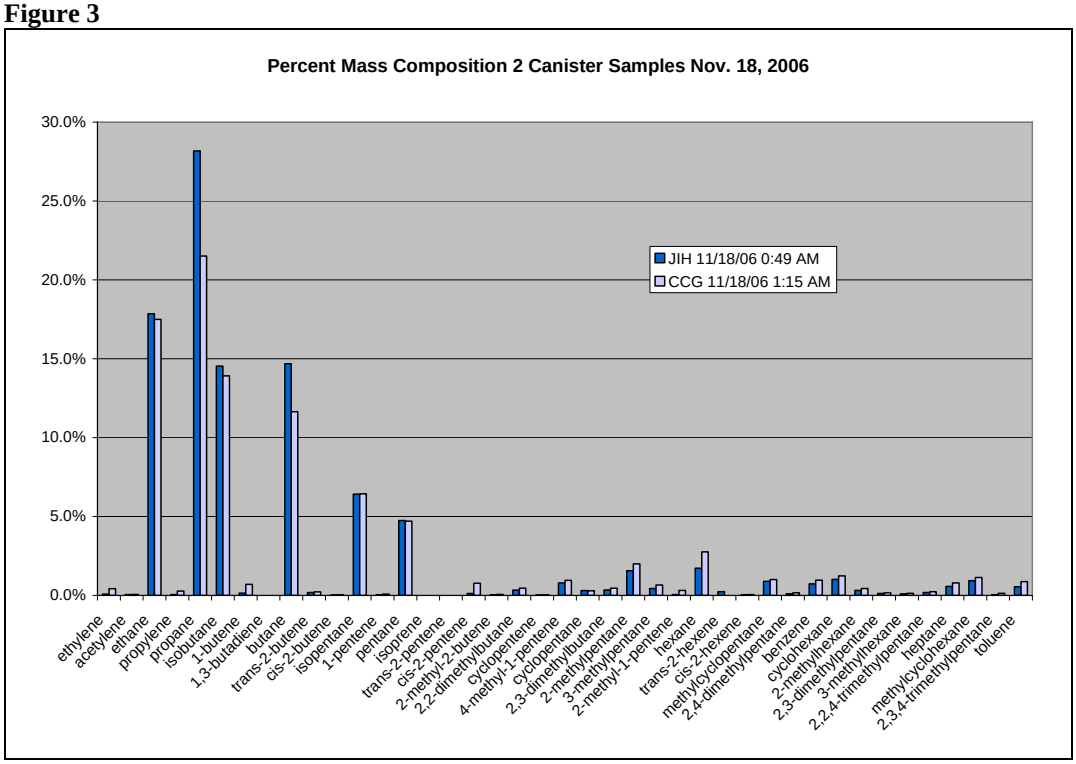


Figure 3



In both graphs, the rank of percent mass is shown in Table 5 on the next page to illustrate the most common compounds.

Table 5 Species most prevalent in 11/18/06 and 1/10/07 canisters at JIH and CCG

Compound	JIH 1/10/07 4:40	CCG 1/10/07 4:52	JIH 11/18/06 0:49	CCG 11/18/06 1:15
propane	21.1%	23.8%	28.2%	21.5%
ethane	19.3%	20.9%	17.8%	17.5%
butane	12.2%	12.8%	14.7%	11.6%
isobutane	12.0%	12.3%	14.5%	13.9%
isopentane	7.8%	6.9%	6.4%	6.4%
pentane	6.1%	4.9%	4.8%	4.7%
hexane	2.4%	2.0%	1.7%	2.8%
2-methylpentane	2.2%	1.8%	1.6%	2.0%
cyclohexane	1.4%	1.2%	1.0%	1.2%

An examination of the data from November 18, 2006, and January 10, 2007, suggests that the same chemical emissions may have been responsible for the resulting hydrocarbon distribution and concentrations. It is difficult to draw conclusions about the source, however. For the Nov. 2006 case a maintenance operation with associated hydrocarbon releases was taking place at a refinery in the area. In the January 2007 case, there are no reported emission events in Nueces County. If the sampled gases represent gasoline vapor, then the source is likely to have been a refinery, a storage tank, or a pipeline. Winds during the morning of January 10 were exceptionally light and variable, and the on-line trajectory tool suggests a flow reversal that moved air from the refinery row out over the Nueces Bay and back, thus confounding one's ability to use the trajectory tool in source location estimation.

Canisters December 12, 2006, January 27, 2007, and March 6, 2007

Table 2 on page 11 shows that three recent samples at J. I. Hailey C630 (JIH) contained benzene concentrations higher than the TCEQ's short-term ESL of 25 ppbV. In each of these cases the wind was from the west, which is in the lowest frequency wind sector for the region. Table 6, below, shows the times and wind speed and direction for each sample. The time shown is Central Standard Time (CST), 0:00=midnight, 23:00=11 p.m.

Table 6 Recent canister samples at JIH with benzene > ESL

Site	Date	Time	Winds
JIH	12/12/06	18:16	WNW, 6mph
JIH	1/27/07	18:41*	W, 4mph
JIH	3/6/07	4:02	W, 4mph

* TNMHC ranged from 2000 – 32,000 ppbC for some 2+ hours during this event.

Graphs of the data for 12/12/06, 1/27/07, and 3/6/07 are shown in Figure 4, page 15 and Figure 6, page 16. Units are in ppbC. Each figure notes the other species that comprise the majority of the mass in the sample.

Figure 4

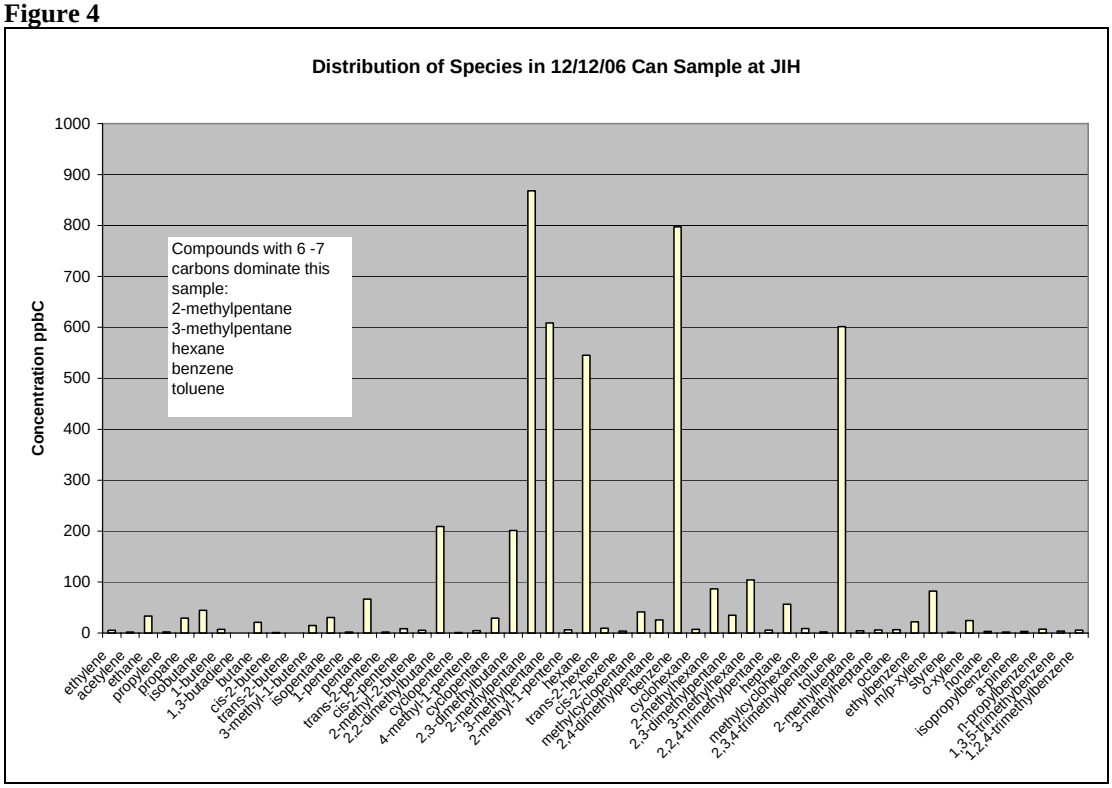


Figure 5

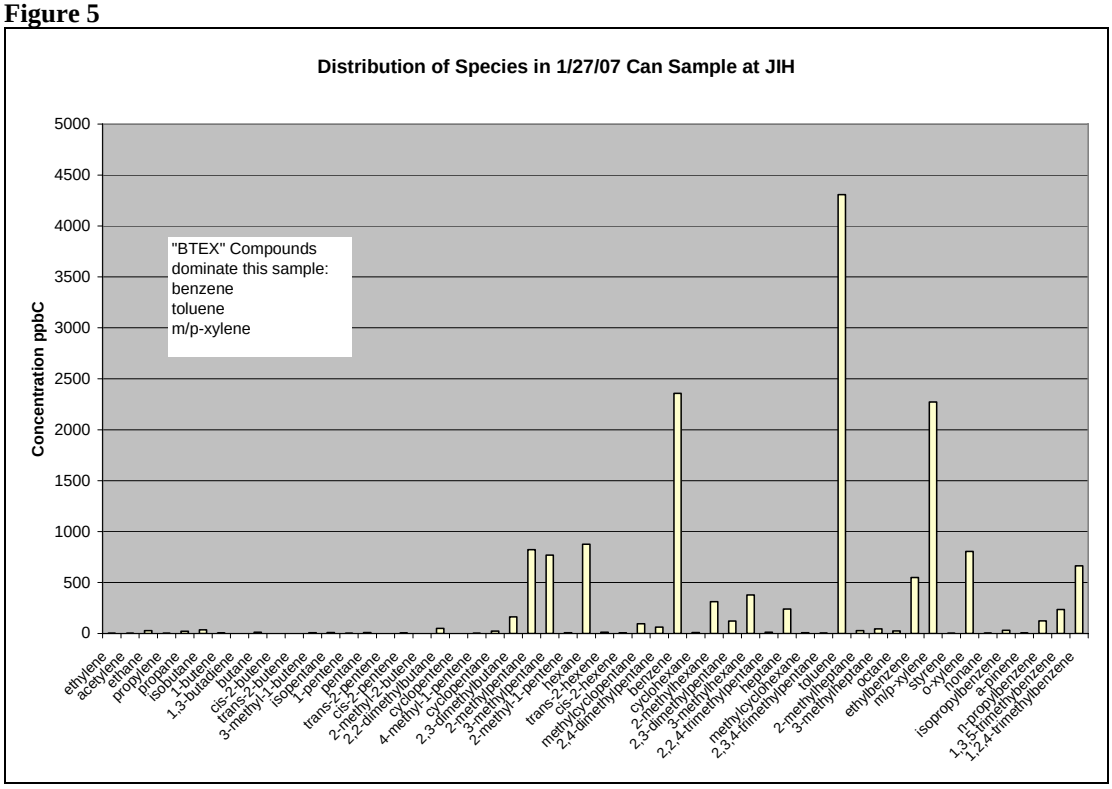
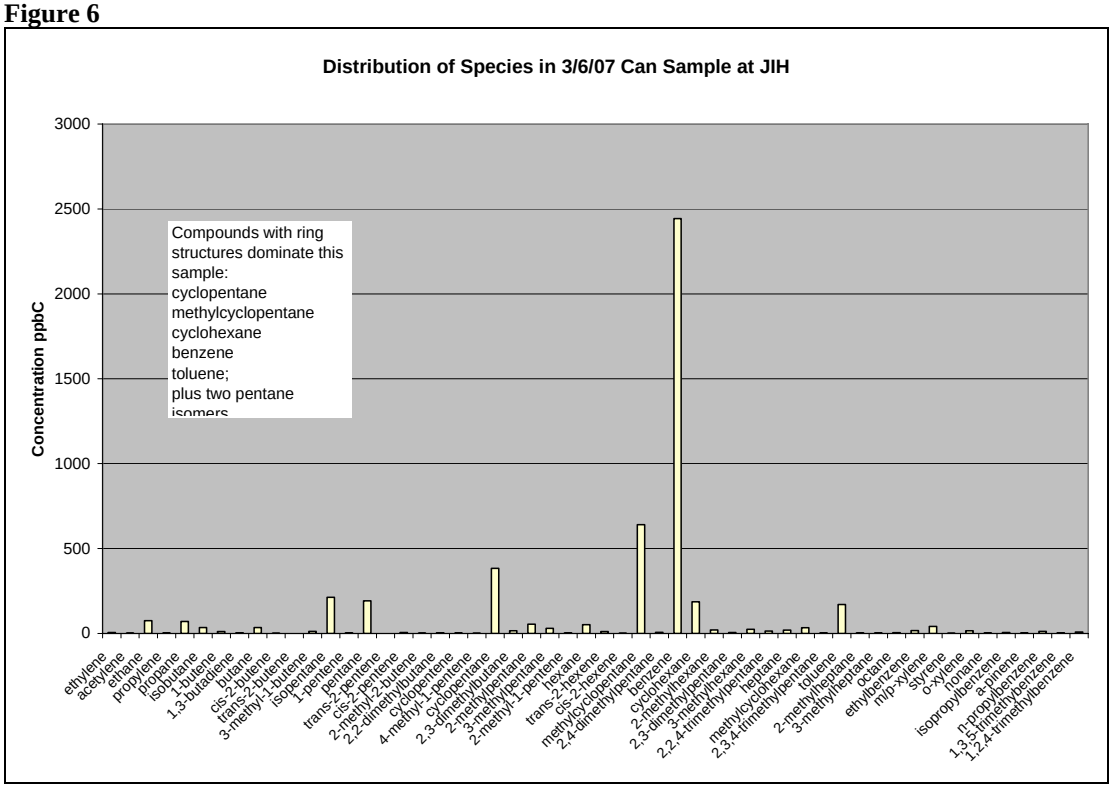


Figure 6



In each of these canisters some chemical mix likely to be from a locally refined product enriched with C5 – C8 compounds has been sampled. A preliminary hypothesis may be that product loading at the nearby Port of Corpus Christi facility may have released the gases. A map of the area directly west of the site is shown in Figure 7, page 17. It is known that the TCEQ Monitoring Operations Mobile Laboratory Van was sampling a flare in the area that appeared not to be operating as designed during the March 6 event.

Figure 7 Aerial of possible source area west of JIH C630 (shown by green arrow)

Auto-GC Effects Screening Level Summary

In this section the results of sampling for hydrocarbons at the two auto-GC sites – Oak Park C634 and Solar Estates C633 – are presented.

The contents of this paragraph are a summary of a TCEQ Web page on Effects Screening Levels (ESLs) accessed at http://www.tceq.state.tx.us/implementation/tox/esl/list_main.html on January 23, 2007. The TCEQ establishes ESLs to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. The ESLs are based on data concerning health effects, potential for odors to be a nuisance, effects on vegetation, and corrosive effects, but ESLs are not ambient air standards. If predicted or measured airborne levels of a constituent do not exceed ESL, adverse health or welfare effects are not expected. If ambient levels of constituents in air exceed ESL, it does not necessarily indicate a problem but rather triggers a review in more depth.

Tables 7 through10, pages 19 and 20, summarize both the 1st quarter of 2007 and the most recent rolling four-quarter (annual) period for each site. Each table shows the arithmetic mean of all observations (approx. 2000 quarterly, 8000 annual), the annual ESL, the 90th and 99th percentiles for observed values, the maximum measured value, and the one-hour ESL. Note that not all data have been validated and are thus subject to change. All values in the following tables are in ppbV units. Several ESLs are odor related. The only measurement over an ESL was benzene at Oak Park C634 for one hour on January 27, 2007, at 6:00 a.m. under north-northeast winds.

Table 7 Oak Park 1Q07 Auto-GC Summary ppbV units

Oak Park 1st Quarter 2007	Mean	**Annual ESL**	p90	p95	Max	**1-hour ESL**
124trimethyl benzene	0.08	25	0.19	0.29	1.92	250
13Butadiene	0.09	5	0.14	0.19	11.16	50
1Butene	0.19	7	0.44	0.64	15.36	70
1Pentene	0.06	3	0.14	0.20	2.77	30
Benzene	1.04	1	2.28	4.14	120.16	25
Cumene	0.05	10	0.20	0.37	2.88	100
Cyclohexane	0.29	42	0.81	1.18	9.29	420
Ethane	11.76	1000	24.57	32.78	380.08	10000
EthylBenzene	0.08	46	0.17	0.25	2.24	460
Ethylene	1.10	102	2.75	4.05	11.58	1022
Isobutane	3.18	800	7.91	12.15	110.33	8000
Isopentane	3.17	120	7.60	10.94	170.63	1200
Propane	8.18	1000	18.54	27.00	303.60	10000
Propylene	0.96	---	2.63	4.21	29.64	68100
Toluene	1.08	50	2.38	3.90	58.52	500
c2Butene	0.13	60	0.35	0.56	4.54	600
c2Pentene	0.06	3	0.13	0.19	7.72	30
mpXylene	0.25	48	0.61	0.85	7.18	480
nButane	4.75	800	10.78	16.50	121.68	8000
nHexane	0.74	50	1.60	2.35	122.55	500
nPentane	2.04	120	4.90	7.60	142.94	1200
oXylene	0.08	85	0.19	0.26	2.40	850
t2Butene	0.24	60	0.56	0.81	6.17	600
t2Pentene	0.14	3	0.29	0.38	21.95	30

Table 8 Oak Park Rolling 1-Yr Auto-GC Summary ppbV units

Oak Park Rolling Annual	Mean	**Annual ESL**	p90	p95	Max	**1-hour ESL**
124trimethyl benzene	0.09	25	0.18	0.28	10.33	250
13Butadiene	0.06	5	0.11	0.16	11.16	50
1Butene	0.15	7	0.32	0.66	15.36	70
1Pentene	0.06	3	0.15	0.24	2.77	30
Benzene	0.76	1	1.57	3.26	120.16	25
Cumene	0.03	10	0.08	0.23	2.88	100
Cyclohexane	0.23	42	0.70	1.13	22.43	420
Ethane	8.22	1000	20.25	28.64	380.08	10000
EthylBenzene	0.07	46	0.17	0.25	5.42	460
Ethylene	0.95	102	2.21	3.83	61.39	1022
Isobutane	2.52	800	6.74	11.63	110.33	8000
Isopentane	2.62	120	7.06	11.24	170.63	1200
Propane	6.24	1000	16.85	27.40	303.60	10000
Propylene	0.95	---	2.15	4.68	118.21	68100
Toluene	0.74	50	1.72	2.62	58.52	500
c2Butene	0.13	60	0.24	0.57	6.73	600
c2Pentene	0.06	3	0.12	0.22	7.72	30
mpXylene	0.24	48	0.58	0.88	24.57	480
nButane	3.55	800	9.65	15.04	353.35	8000
nHexane	0.59	50	1.55	2.51	122.55	500
nPentane	1.72	120	4.60	7.83	142.94	1200
oXylene	0.09	85	0.19	0.29	8.59	850
t2Butene	0.21	60	0.39	0.83	9.26	600
t2Pentene	0.11	3	0.24	0.42	21.95	30

Table 9 Solar Estates 1Q07 Auto-GC Summary ppbV units

Solar Estates 1th Quarter 2007	Mean	**Annual ESL**	p90	p95	Max	**1-hour ESL**
124trimethyl benzene	0.06	25	0.16	0.22	1.09	250
13Butadiene	0.07	5	0.09	0.13	7.36	50
1Butene	0.07	7	0.16	0.24	2.13	70
1Pentene	0.03	3	0.08	0.13	1.11	30
Benzene	0.44	1	0.95	1.31	6.24	25
Cumene	0.07	10	0.05	0.15	88.69	100
Cyclohexane	0.33	42	0.75	1.02	5.91	420
Ethane	10.66	1000	21.85	28.80	170.06	10000
EthylBenzene	0.06	46	0.15	0.21	3.82	460
Ethylene	0.62	102	1.47	2.01	9.02	1022
Isobutane	2.13	800	4.71	6.98	39.42	8000
Isopentane	1.78	120	3.99	5.96	34.49	1200
Propane	6.45	1000	13.05	17.70	122.36	10000
Propylene	0.28	---	0.76	1.10	5.84	68100
Toluene	0.53	50	1.03	1.47	136.43	500
c2Butene	0.05	60	0.12	0.22	1.50	600
c2Pentene	0.03	3	0.07	0.12	0.89	30
mpXylene	0.52	48	0.86	2.24	27.49	480
nButane	3.73	800	8.26	12.32	80.82	8000
nHexane	0.46	50	0.93	1.41	8.72	500
nPentane	1.14	120	2.48	3.47	19.10	1200
oXylene	0.08	85	0.16	0.25	20.05	850
t2Butene	0.09	60	0.20	0.30	1.73	600
t2Pentene	0.06	3	0.15	0.24	1.64	30

Table 10 Solar Estates Rolling 1-Yr Auto-GC Summary ppbV units

Solar Estates Roling Annual	Mean	**Annual ESL**	p90	p95	Max	**1-hour ESL**
124trimethyl benzene	0.06	25	0.14	0.22	2.68	250
13Butadiene	0.09	5	0.08	0.13	24.77	50
1Butene	0.06	7	0.13	0.22	3.26	70
1Pentene	0.03	3	0.07	0.12	3.49	30
Benzene	0.39	1	0.89	1.36	11.66	25
Cumene	0.03	10	0.03	0.07	88.69	100
Cyclohexane	0.29	42	0.71	1.06	6.33	420
Ethane	8.48	1000	18.51	25.61	170.06	10000
EthylBenzene	0.06	46	0.14	0.20	3.82	460
Ethylene	0.48	102	1.20	1.72	9.02	1022
Isobutane	1.99	800	4.49	6.92	44.58	8000
Isopentane	1.72	120	4.14	6.06	37.70	1200
Propane	5.33	1000	12.09	17.26	122.36	10000
Propylene	0.44	---	0.93	2.05	51.13	68100
Toluene	0.44	50	0.98	1.36	136.43	500
c2Butene	0.08	60	0.15	0.25	3.15	600
c2Pentene	0.02	3	0.06	0.11	1.43	30
mpXylene	0.35	48	0.64	1.37	27.49	480
nButane	2.85	800	6.70	10.10	80.82	8000
nHexane	0.44	50	1.01	1.48	21.45	500
nPentane	1.09	120	2.62	3.71	28.99	1200
oXylene	0.07	85	0.15	0.22	20.05	850
t2Butene	0.17	60	0.30	0.40	4.07	600
t2Pentene	0.05	3	0.13	0.24	3.22	30

Comparing Direct TNMHC and Combined Auto-GC Measurements

The following graphs are presented as an illustration of data quality and as a means to relate concentrations to emissions. The two auto-GCs at Solar Estates C633 and Oak Park C634 are collocated with TNMHC analyzers. When the individual hydrocarbon species are summed, the sum should always differ from and slightly underestimate the TNMHC. The sum is less than TNMHC since the sum of 40+ individual hydrocarbons from the auto-GC is not exhaustive of all the hydrocarbon species in the air, but it should represent the majority based on emissions estimates. An additional reason for differences is that any two instruments using different methods but sampling the approximate same air parcels should produce well-correlated results, which are unlikely to exactly agree owing to small within-instrument errors and between-instrument biases. This may partially explain why the between-instrument agreement is better at Oak Park than at Solar, as some minor quality issues have been noted at Solar. Also, hourly TNMHC values represent rolled up 5-minute averages of measurements, while auto-GCs take an integrated 40-minute sample once an hour, so the time periods of sampling do not exactly match. Lastly, one instrument may not be on-line during the same period as the other, so a longer average (e.g., a quarterly mean) or other statistic (e.g., maximum) may differ. Again, this affects Solar more than Oak Park, as the Solar auto-GC has had more data loss than the Solar TNMHC instrument.

In an effort to compare the quality of information derivable by merging hourly values with wind direction and speed to assess pollutant directions of arrival and upwind emissions characterization, both data types have been averaged by 10 degree wind direction bin. Furthermore, an additional step is taken in repeating the average after having multiplied each concentration measurement by the wind speed. Because resulting downwind concentrations are a linear function of the wind speed (and other parameters) in dispersion modeling, multiplying the concentration by wind speed is a first order adjustment in moving toward relating measured concentrations to upwind emissions.

Figures 8 and 9, page 22, are for Oak Park, and Figures 10 and 11, page 23, are for Solar Estates. As has been noted in past reports, Oak Park is affected by two industrial upwind sources, one to the northeast and one to the northwest. Solar Estates is affected by an industrial source to the northeast. As the Solar Estates graphs illustrate (Figures 10 and 11, page 23), westerly winds tend to be light, and thus higher concentrations can result from small local emissions owing to accumulation of pollution. These graphs were presented to the Port Industries of Corpus Christi Technical Committee in April 2007 as part of a suggested approach to checking the accuracy of their emissions inventory and toxics release inventory. Overall, the agreement between the auto-GCs and TNMHC instruments is very good, and they reinforce each other in terms of faith in their directionality results. Other successful comparisons not appearing here also have been made on directionality broken down into shorter time periods, and with scatter plots of hourly values against each other.

Figure 8 Oak Median TNMHC (blue) and Auto-GC (red) in ppbC by 10 deg winds, 2005-2007

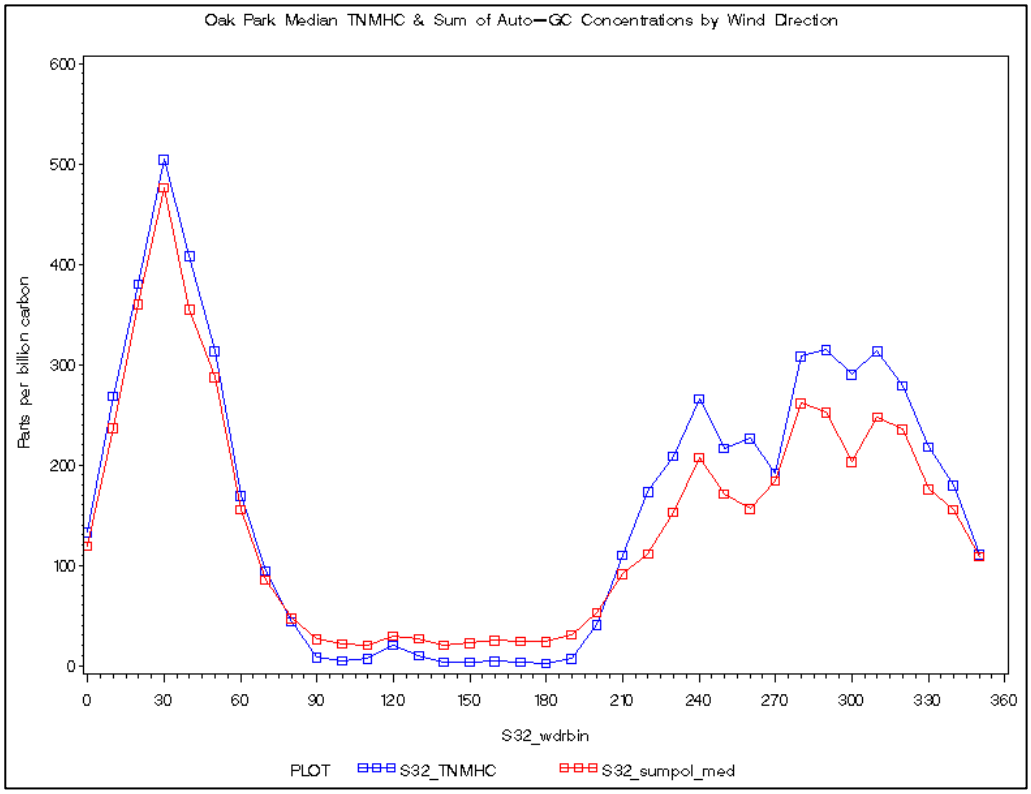


Figure 9 Oak Median "Adjusted" TNMHC (blue), Auto-GC (red) ppbC, 10 deg winds, 2005-2007

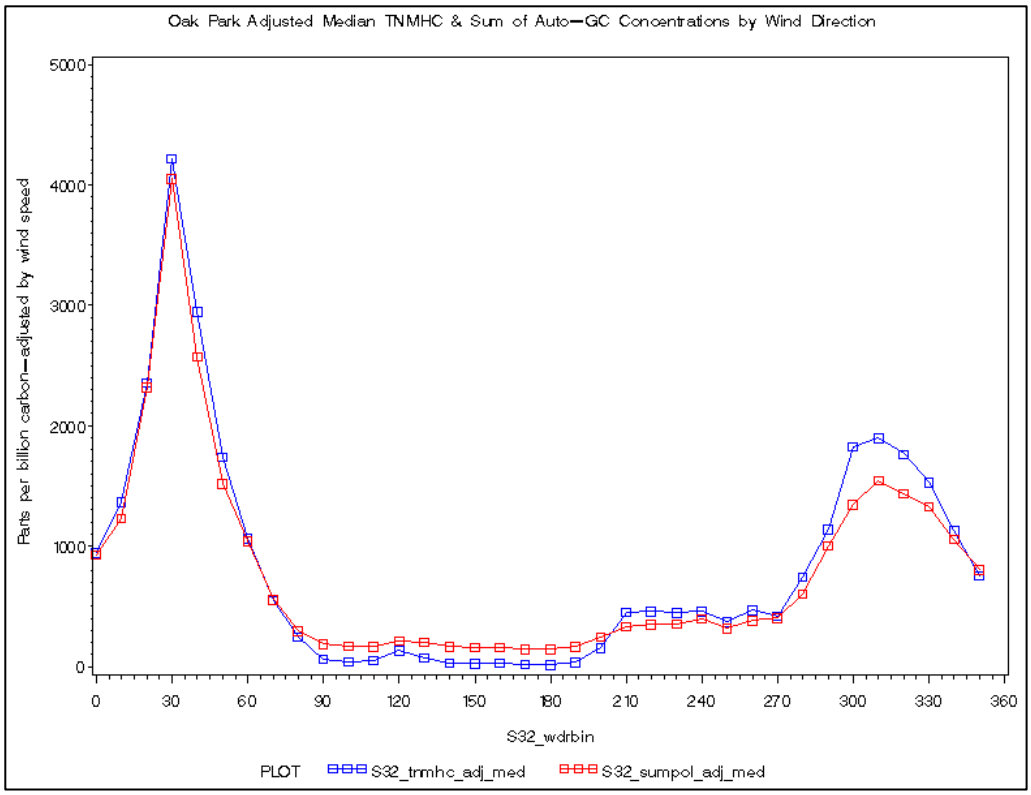


Figure 10 Solar Median TNMHC (blue) and Auto-GC (red) in ppbC by 10 deg winds, 2005-2007

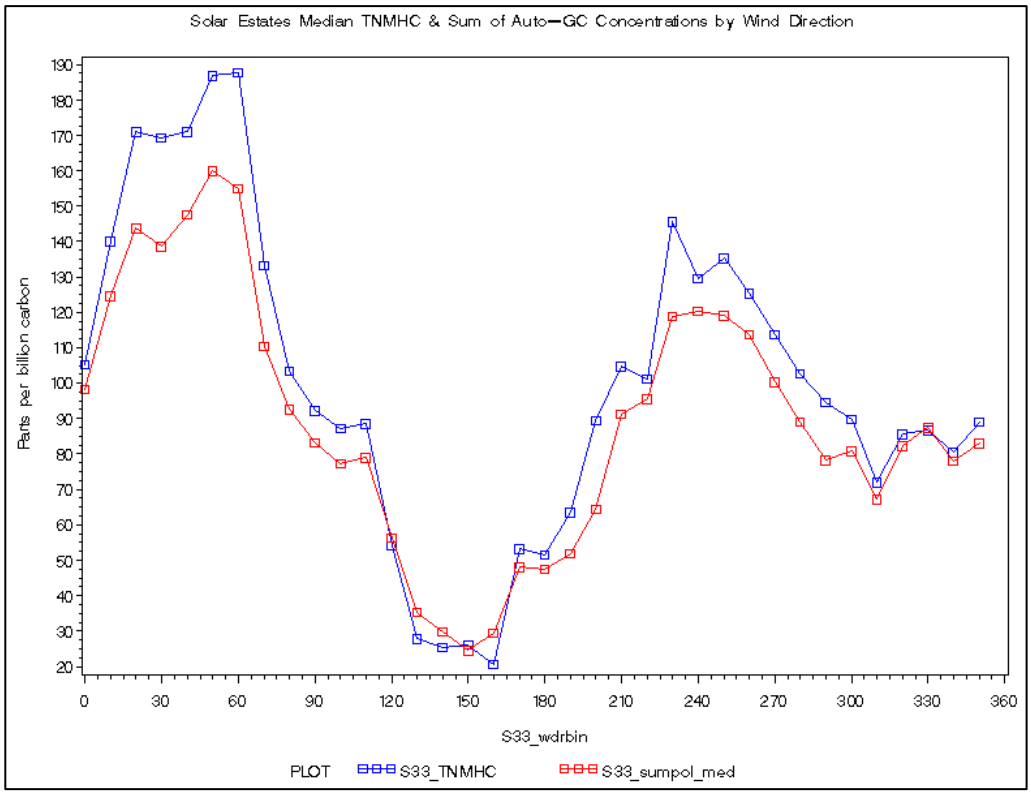
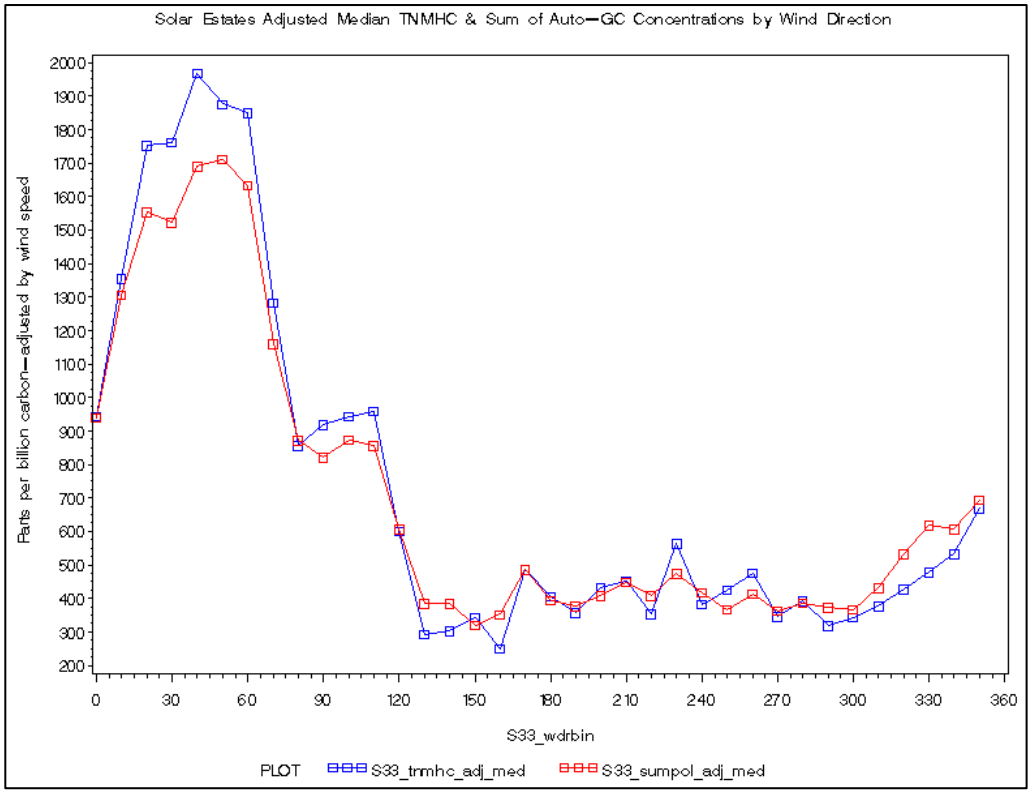


Figure 11 Solar Median "Adjusted" TNMHC (blue), Auto-GC (red) ppbC, 10 deg winds, 2005-2007



Analysis of an H_2S Event at FHR

On January 22, 2007, elevated readings of H_2S measured at the FHR C632 site were noted on the TCEQ's internal data system Web site. The site operator and the operator of a nearby business both noticed a strong odor consistent with sulfuric compounds.

Although only FHR C632 measured concentrations that were noted on the TCEQ's internal Web site, FHR and Solar Estates C633 had daily peak readings for both H_2S and TNMHC relatively close in time, so a hypothesis would be that the same source had affected both sites. By "peak" in this case it is meant that concentration measurements rose to a sharp local maximum and then declined. Concentrations for both parameters were much higher at FHR, supporting a second hypothesis that the source was closer to FHR than Solar. The West End Harbor (WEH) C631 site had much lower readings of both H_2S and TNMHC that morning, and an additional hypothesis fitting the data is that WEH was an upwind site and the source was somewhere between the monitoring sites. A summary of the 5-min. peak measurements appears in Table 11 below.

Table 11 Summary of peak concentration morning of Jan. 22, 2007

FHR "peaks"	1/22 5:00 CST	
	H_2S	168 ppb
	TNMHC	13,000 ppbC
Solar Estates "peaks"	1/22 2:05 CST	
	H_2S	7.8 ppb
	TNMHC	722 ppbC
West End Harbor		
(no "peak" per se)	H_2S	0.7 ppb
	TNMHC	436 ppbC

The surface trajectory analysis showed air passed over the refinery north of both FHR and Solar Estates under fairly strong winds. The trajectories are shown in Figures 12 and 13 on the following page, and an aerial of the refinery and monitor sites is shown in Figure 14 on the following page.

The TCEQ emission events records do show that the refinery north of FHR (see Figure 14 on the following page) 632 reported excess emissions from a sulfur recovery unit over the period from January 21st – 23rd. The TCEQ Regional Office used the data discussed above to quality-assure the emissions reported by the refinery. The particular "emission event" tracking number is 86263. According to this event report, several sulfur recovery units located in the circled area in Figure 14 on the following page were responsible for the elevated concentrations in the area.

Figure 12 Surface back-trajectory 5:00 a.m. from FHR C632

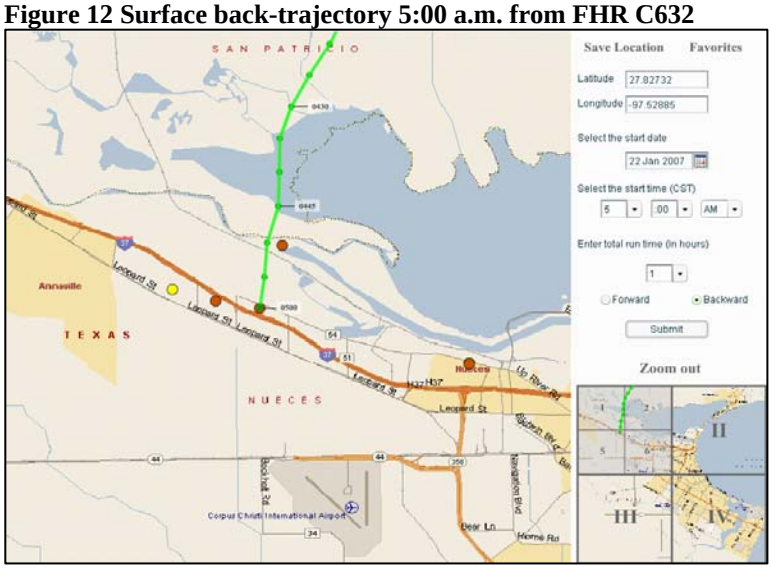


Figure 13 Surface back-trajectory 2:05a.m. from Solar Estates C633

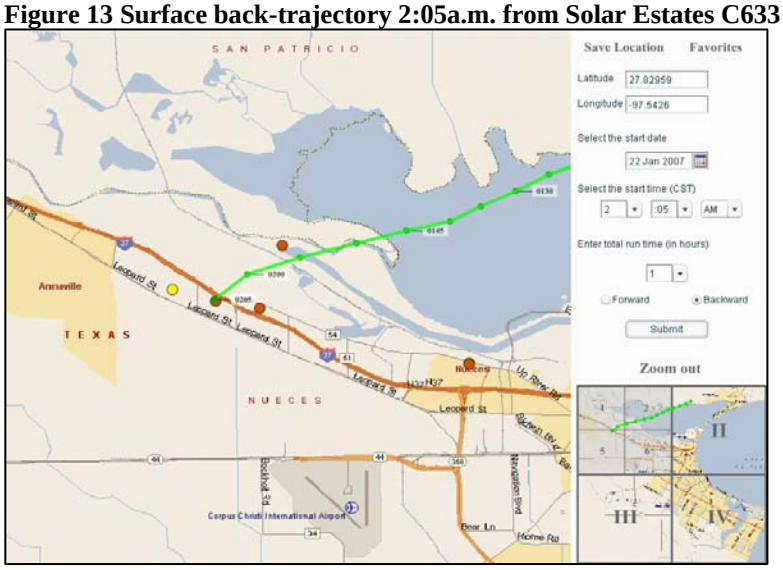


Figure 14 Flint Hills Resources, nearby monitors, 1/22/07 "peak" directions

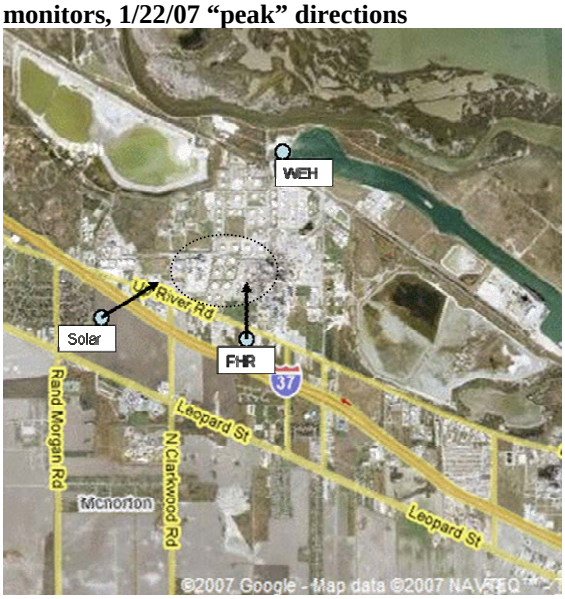


Figure 14 is an aerial image from www.maps.google.com. The image is augmented with the locations of the two monitors to the south with arrows in the upwind direction at the time of the highest short-term concentrations of H_2S, and the monitor to the north that did not measure above-normal concentrations. The area in the oval corresponds to the general area in which sulfur recovery units in the emissions event report are located.

APPENDIX B

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
01/01/07-03/31/07

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

Total Grant Amount:	$6,761,718.02
Total Interest Earned:	$462,344.90
Total Funds Received:	**$7,224,062.92**

B. Summary of Expenditures Paid by COCP Funds

		Year 3 Budget	Year 4 Adjustments	Adjusted Budget	Prior Activity	Current Activity 01/01/07-3/31/07	Encumbrances	Remaining Balance 3/31/2007
Salaries-Prof	12	$216,128.63	160,652.00	$376,780.63	($199,283.38)	($49,777.93)	($58,778.64)	$68,940.68
Salaries-CEER	15	$19,606.37	15,636.00	$35,242.37	($23,483.65)	($4,579.13)	($6,041.72)	$1,137.67
Fringe	14	$47,984.00	38,783.00	$86,767.00	($42,981.55)	($11,967.20)	($13,175.42)	$18,642.83
Supplies	47/68	$60,474.00	73,500.00	$133,974.00	($31,260.00)	$950.00	$0.00	$103,664.00
Other	50	$86,844.00	33,500.00	$120,344.00	($76,724.56)	($11,843.48)	($2,009.22)	$29,766.74
	51		20,300.00	$20,300.00	$0.00	($13,140.00)	$0.00	$7,160.00
Subcontract	62-64	$1,965,693.00	314,022.00	$2,279,715.00	($1,879,267.20)	($82,285.64)	$0.00	$318,162.16
Travel	75	$2,300.00	2,000.00	$4,300.00	($2,251.81)	($1,424.78)	($0.08)	$623.33
Equipment	80	$0.00	0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Indirect Costs	90	$359,855.00	98,759.00	$458,614.00	($322,918.08)	($16,427.28)	$0.00	$119,268.64
TOTALS		**$2,758,885.00**	**757,152.00**	**$3,516,037.00**	**($2,578,170.43)**	**($190,495.44)**	**($80,005.08)**	**$667,366.05**

C. Interest Earned by COCP Funds as of 03/31/07

Prior Interest Earned:	$424,504.87
Interest Earned This Quarter:	$37,840.03
Total Interest Earned to Date:	**$462,344.90**

D. Balance of COCP Funds as of 03/31/07

Total Grant Amount:	$6,761,718.02
Total Interest Earned:	$462,344.90
Current Q. Expenses	($190,495.44)
Total Expenditures:	($2,578,170.43)
Remaining Balance:	**$4,455,397.05** *includes interest

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

Cheryl S. Leutwiller
Accounting Certification