

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

*Activity Summary for the period from
October 2, 2004 through October1, 2005*

A. ADVISORY BOARD

1. An eight member Advisory Board was appointed in December, 2003.

The members follow:

Ms. Gretchen Arnold	Member-at-Large and Co-Chair
Mr. Ron Barnard	Near Non-Attainment Area Liaison and Co-Chair
Dr. Eugene Billiot	Measurement Technologies Expert
Dr. Ardys Boostrom	Local Public Health
Ms. Lena Coleman	Neighborhood Organization and Recording Secretary
Mr. Vinay Dulip	Local Educator
Dr. K. Glen Kost	Member-at-Large
Ms. Pat Suter	Local Advocacy Group

2. Three meetings of the Advisory Board were held during the second year of the Project:
Highlights from these meetings follow:

- a. On October 25, 2004 a meeting of the Advisory Board was held at Texas A&M University in Corpus Christi, Texas.

- Seven Board Members and representatives from the University of Texas at Austin, the U.S. District Court, and the Texas Commission on Environmental Quality attended.
- An update on the progress of the installation of the seven monitoring stations was presented.
- The process for the selection of the Phase II operations and maintenance contractors and the transition plan from the installation phase of the project to the operations and maintenance phase of the project was discussed.
- Preparation of an outline detailing the content and presentation of the annual report to the US District Court was discussed.
- Possible future funding sources for the Corpus Christi Air Monitoring Project from TCEQ's Supplemental Environmental Projects Program were discussed.
- Meeting notes were prepared and distributed to the attendees and project personnel.

- b. On April 21, 2005 a meeting of the Advisory Board was held at Texas A&M University in Corpus Christi, Texas.
 - Seven Board Members and representatives from the University of Texas at Austin, the Texas Commission on Environmental Quality, and the Phase II operations and maintenance contractors attended.
 - An update on the completion of the installation phase of the seven monitoring stations was presented.
 - An introduction of and brief presentations were made by Orsat, L.L.C. and Air Quality Solutions, Inc., the Phase II Operations and Maintenance Contractors.
 - The TCEQ and University websites were demonstrated followed by discussions about content and improvements to be considered.
 - An update on the funding of Supplemental Environmental Projects followed by a presentation of the Trajectory Tool was provided.
 - Meeting notes were prepared and distributed to the attendees and project personnel.

- c. On June 15, 2005 a meeting of the Advisory Board was held at Texas A&M University in Corpus Christi, Texas.
 - Five Board Members and representatives from the University of Texas at Austin, the U.S. District Court, and the Texas Commission on Environmental Quality attended.
 - A presentation on the data resulting from event sampling, canister data, and the regulatory standards and guidelines for trigger levels was provided.
 - Notification tool models, notification processes, parameters and required approvals for a notification tool were included in the discussions.
 - Air Quality Indicators were discussed.
 - The University has been requested to present data on the Corpus Christi Air Monitoring and Surveillance Camera Project at the September 2005 Corpus Christi Citizen's Advisory Council. It was the desire of the Board and representatives that the University participate in such community meetings.
 - Meeting notes were prepared and distributed to the attendees and project personnel

3. A statement from the Advisory Board Spokespersons will be presented and distributed at the November 9, 2005 meeting in the U.S. District Court in Corpus Christi, Texas.

4. Late in this reporting period three Advisory Board Members resigned for various reasons. The University, with input and direction from the TCEQ and the Advisory Board will begin the process of reappointing the five remaining Board Members and filling the vacancies on the Board.

B. PHASE I: SITE INSTALLATION

Air Monitoring Station Schedule and Equipment

Phase 1.a. The installation of the first three (3) monitoring stations

Phase 1.a. Sites	Description of Site Location and CAMS No.	Monitoring Equipment				
		Auto GC	Event Triggered Samplers	Sulfur Compound Monitors	Meteorology Station	Surveillance Camera
1.a	Oak Park Recreation Center CAMS 634	Yes	Yes		Yes	
1.d	TCEQ Monitoring Site C199 @ Dona Park CAMS 635		Yes	Yes		Yes
1.g	Solar Estates Park at end of Sunshine Road CAMS 633	Yes	Yes	Yes	Yes	Yes

Phase 1.a. Sites were completed and acceptance tested as of February 28, 2005

Phase 1.b. The installation of the remaining four (4) monitoring stations

Phase 1.b. Sites	Description of Site Location and CAMS No.	Monitoring Equipment				
		Auto GC	Event Triggered Samplers	Sulfur Compound Monitors	Meteorology Station	Surveillance Camera
1.b	Grain Elevator @ Port of Corpus Christi CAMS 629		Yes	Yes	Yes	
1.c	J. I. Hailey Site @ Port of Corpus Christi CAMS 630		Yes	Yes	Yes	
1.e	Port of Corpus Christi building on west end of CC Inner Harbor CAMS 631		Yes	Yes	Yes	
1.f	Off Up River Road on Flint Hills Resources Easement CAMS 632		Yes	Yes	Yes	

Phase 1.b. Sites were completed and acceptance tested as of March 1, 2005.

C. PHASE II: OPERATIONS AND MAINTENANCE OF SITES

Summary of Initial Data from Monitoring Sites

Quality assurance work is ongoing, and results to date are preliminary and subject to change. We have measured a few elevated values for several parameters. Canister samples show some elevated levels of hydrocarbons including benzene and 1-butene, but Texas Commission on Environmental Quality toxicologists must interpret these further. Hourly hydrocarbon monitors have recorded two benzene concentrations above the TCEQ's short-term effects screening levels. Total nonmethane hydrocarbon measurements are comparable to those taken in Houston. No sulfur dioxide or hydrogen sulfide regulatory exceedances have been measured; however monitoring shows H₂S levels above the various published odor thresholds and above the 5 part per billion low-limit notification threshold for TCEQ. A more detailed summary of the early findings and data analysis are found in [Appendix A](#) to this report.

D. PROJECT MANAGEMENT AND PLANNING

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

1. **Project Schedule**

Installation of the air monitoring sites were completed in March 2005 and began reporting data via the web on schedule.

2. **Communication**

Information about the status of the Project has been communicated through:

- a. Advisory Board Meetings,
- b. Project Website which is operational with portions under development,
- c. Quarterly Technical and Financial Reports to the Court and Advisory Board, and
- d. Presentations to the Corpus Christi Community Advisory Council.

3. **Budget Monitoring**

Budget monitoring during the period has focused on:

- a. Project costs for Phase I-Site Installation and Phase II-Sites Operation and Maintenance,
- b. Administration and oversight costs incurred by the University, and
- c. Financial reports included at Appendix B.

4. **Other Contributions**

The University of Texas at Austin was awarded funding for two Supplemental Environmental Projects (SEP) from the Texas Commission on Environmental Quality, one of which will allow this project to operate one additional year and fund the development of a Trajectory Tool, which will aid in the understanding of the origination of pollutant sources. A second SEP funded the purchase of additional canisters to be deployed to the seven monitoring stations.

APPENDIX A

Data Analysis

Early Findings from Corpus Christi Air Quality Project

Summary

Quality assurance work is ongoing, and results to date are preliminary and subject to change. We have measured a few elevated values for several parameters. Canister samples show some elevated levels of hydrocarbons including benzene and 1-butene, but Texas Commission on Environmental Quality toxicologists must interpret these further. Hourly hydrocarbon monitors have recorded two benzene concentrations above the TCEQ's short-term effects screening levels. Total nonmethane hydrocarbon measurements are comparable to those taken in Houston. No sulfur dioxide or hydrogen sulfide regulatory exceedances have been measured; however monitoring shows H₂S levels above the various published odor thresholds and above the 5 part per billion low-limit notification threshold for TCEQ.

Report

The University of Texas at Austin (UT) and Texas Commission on Environmental Quality (TCEQ) combined monitoring network includes scheduled sampling and event-triggered canister sampling for 55 volatile organic compounds (VOCs), semi-continuous monitoring at one hour time resolution for 40-50 speciated hydrocarbons, continuous monitoring at 5 minute time resolution for meteorology, hydrogen sulfide (H₂S), sulfur dioxide (SO₂), and unspicated total non-methane hydrocarbons (TNMHC). The network can be thought of as having two clusters of sites, one to the west and one to the east. Each cluster presents a dense monitoring network on the scale of a few square miles.

UT and TCEQ staff members are examining data from seven monitoring sites in Corpus Christi run by UT plus five sites run by TCEQ for both quality assurance (QA) purposes and ambient air quality assessment purposes. The QA work must precede the air assessment work to prevent mischaracterization of the air; however, using the precautionary principle, we are looking at all high readings as being legitimate until proven otherwise. In addition to studying the data to flag and correct problems, other recent QA efforts include preparing a quality assurance project plan to be approved by TCEQ and other decision makers, developing standard operating procedures for analyzing and managing the data, and creating a communication plan for guiding interactions between the TCEQ Corpus Christi Region and UT.

Before describing results, we wish to stress a few important principles in the use of air monitoring results. First, quality assurance is an on-going process, and numbers we report may change from time to time as we find problems or resolve uncertainties. Second, one should consider that the number and location of monitoring sites affects the count of high-value days, so comparing between cities based on the number of "exceedance days" is not simple. Third, a user must *interpret* pollutant and meteorological measurements in several contexts, and the following list is not necessarily exhaustive:

- Sample duration is important, and a moderate concentration averaged over a long time period may be as serious as a high concentration taken over a short time period.
- Proximity is important, and a small nearby emission source can produce higher concentrations at a site than a large source farther away.
- Being near an emission source is not enough to guarantee high long-term readings. One must consider positioning relative to the source's height, possible obstructions, and the daily variation in prevailing winds.

- If a plume of pollution affects a monitor, then the concentration of the pollution is likely higher upwind into the plume and crosswind toward the plume centerline.
- Wind direction measurement is problematic in urban areas, so users of trajectories and wind directionality analyses should be cautious in linking ambient readings to specific upwind sources.

Data Analyses

We have begun to examine data collected since late 2004, with greater attention paid to data collected since May 2005. At that point most equipment had been installed and many early QA problems had been addressed. Much of the early analysis has been done on H₂S, SO₂, TNMHC, and meteorological data. Some limited work has been done on the speciated hydrocarbon data from canister samplers (cans) and the automated gas-chromatographs (auto-GCs).

TNMHC concentrations in rural areas are generally in the tens of parts per billion carbon (ppbC) range. In urban areas, levels are generally one to two orders of magnitude higher on average. Since an important instrument adjustment in May, the average TNMHC readings among the eight sites taking continuous measurements varied from 800 parts per billion carbon at the FHR CAMS 632 site (in close range of a small adjacent emission source) -- to 300 ppbC at the J.I Hailey CAMS 630 and Inner Harbor CAMS 631 industrial sites -- to around 100 ppbC at the more upwind and residential sites. These values should change over the winter, as prevailing winds change and some upwind sites become downwind sites.

By merging the ensemble of measurements of a particular pollutant species at a site with coincident wind readings, we can calculate the average pollutant concentration as a function of wind direction. We then can use this result to try to identify which sources contribute most to elevated concentrations. In the first attempt at doing this in Corpus Christi with TNMHC, SO₂, and H₂S, we see a clear “directionality” at most sites, which points back to industrial areas. We can provide the Court with graphs of the directionality for TNMHC, SO₂, and H₂S when requested.

Elevated levels of TNMHC automatically trigger short-duration canister samples in the UT network. The FHR CAMS 632 has triggered most of the samples (39) out of the 67 canisters examined from July and August. As noted above, the TNMHC at the FHR CAMS 632 site appears to be heavily affected by small nearby sources, and thus we may have to consider changing the operation of this site so that we trigger canister samples under specific wind conditions to avoid repeated sampling from the same small source.

Interpreting the results of the canisters will be complex and will be carried out with the assistance of TCEQ toxicologists. The difficulty comes from the issue of varying sample durations, coupled with the fact that high TNMHC preceding the canister triggering may or may not have the same relative composition as the species measured during the can sample. We are studying each canister result with coincident TNMHC, wind direction, and wind speed, to try to determine how to best map the varying short duration samples to the TCEQ’s short-term effects screening level (ESL), or to other measures of toxicity. However, from our first look at the data we do see elevated benzene and 1-butene in several industrial site samples.

Neither of the two auto-GC sites has seen significantly high average values that would cause concern. However, each site does show that moderately elevated benzene levels are associated with particular directions back to industrial areas, and each has recorded one hour of data above the TCEQ’s short-term ESL.

Sulfur dioxide and hydrogen sulfide levels appear to be similar to those measured in other industrial areas in Texas. The range of average concentrations in Corpus Christi for SO₂ is 0.6 to 1.3 ppb, which falls in the range of 0.2 to 6.5 observed statewide. The range of average concentrations for H₂S is 0.2 to 0.95 ppb, which falls in the range of 0.2 to 1.9 observed statewide, with one significant outlier of 23 ppb at a site in El Paso. The state has 30-minute standards for SO₂ and H₂S that are triggered when one facility causes a high enough concentration. Neither SO₂ nor H₂S has exceeded the levels of the standards to date. There was an elevated H₂S reading at the industrial Inner Harbor CAMS 631 site that may have caused concern had it been measured in a residential area.

The odor threshold for H₂S spans a wide range in the scientific literature, often cited as being between 0.5 and 300 ppb. The TCEQ system triggers a notification when a value of 5 ppb is measured for 30 minutes, indicating a possible odor issue. Several of these have been triggered at the Corpus Christi sites near industries.

In later analyses, we will look at variations in pollutant levels by time of day, to assess the effects of nighttime inversions and wind-flow reversals. The extent to which pollutant concentrations change with time of day can help isolate the effects of motor vehicle activity, which is heaviest during rush hours, from base-load industrial activity that is continuous. Similarly, we will look at variations in concentrations by day of the week. Heavy industries operate 24/7 while the level of motor vehicle activity can be separated into categories as Monday-Thursday, Friday, Saturday, and Sunday. This allows a second means to separate pollution from industry from pollution from motor vehicles. We will also examine the effects of the change in seasons, which affects the larger scale wind direction patterns as well as many human activities. Further, when enough data are compiled we will look at trends for all the species.

APPENDIX B

Financial Reports

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

Financial Summary

A. PROJECT EXPENDITURES

Prior Year Expenditures (10/2/03-9/30/04)	\$ <u>663,448.81</u>
Current Year Expenditures (10/1/04-9/30/05)	\$ <u>1,291,272.21</u>
Total Project Expenditures (10/2/03-9/30/05)	\$ <u>1,954,721.02</u>

* Summary of Expenditures found in *Exhibit A*, attached.

B COCP FUNDS REMAINING

Initial deposit on 10.2.03	\$ 6,761,718.02
Less expenditures through 9/30/05	(\$ 1,954,721.02)
Plus interest earned as of 9/30/05*	\$ 207,790.18
Total	\$ <u>5,014,787.18</u>

COCP FUNDS REMAINING AS OF 9/30/05 **\$ 5,014,787.18**

*Interest earned through 8/31/05 is \$207,790.18. Interest earned for the month of September 2005 is estimated to be \$14,428.85 and is included in this amount. The exact amount of interest earned for September 2005 will be posted to The University of Texas at Austin's General Ledger on or before November 15, 2005 and will be reported to the U.S. District Court with the next Corpus Christi Air Monitoring and Surveillance Camera Quarterly Project Report. The estimated September 2005 interest earned amount is provided for purposes of completing this Annual Report.

EXHIBIT A

Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project

Expenditure Summary for the Project Period 10/2/03 through 9/30/05

DESCRIPTION	First Year ALLOCATION	Prior Year Expenditures	Current Year Expenditures	TOTAL EXPENDITURES	BALANCE from First Year ALLOCATION
SALARIES & WAGES	71,574.00	73,936.90	(2,724.00)	71,212.90	361.10
CEER ADMIN SALARIES	4,800.00	4,731.90	0.00	4,731.90	68.10
FRINGE BENEFITS	19,094.00	16,496.86	(553.56)	15,943.30	3,150.70
SUPPLIES	10,000.00	0.00	0.00	0.00	10,000.00
OTHER EXPENSES	7,532.00	3,176.42	6,448.66	9,625.08	(2,093.08)
SUBCONTRACT	1,800,000.00	477,412.00	1,119,678.00	1,597,090.00	202,910.00
TRAVEL	2,000.00	1,154.22	0.00	1,154.22	845.78
EQUIPME NT	85,000.00	0.00	0.00	00.00	85,000.00
TOTAL DIRECT COSTS	2,000,000.00	576,908.30	1,122,849.10	1,699,757.40	300,242.60
INDIRECT COSTS /15% TDC	300,000.00	86,540.51	168,423.11	254,963.62	45,036.38
TOTAL EXPENDITURES	\$2,300,000.00	\$663,448.81	\$1,291,272.21	\$1,954,721.02	\$345,278.98

CORPUS CHRISTI AIR MONITORING AND SURVEILLANCE CAMERA PROJECT

University of Texas at Austin Annual Audit Report Results

Period: October 1, 2004 - September 30, 2005

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

<http://www.sao.state.tx.us/reports/main/05-555.pdf> Financial Portion

<http://www.sao.state.tx.us/reports/main/05-319.pdf> Federal Portion

Attached is a copy of The University of Texas at Austin's Certification Statement for the Office of Management and Budget (OMB) Circular A-133 Audit conducted during the 2003/2004 fiscal year. The OMB Circular A-133 Audit for the 2004/2005 fiscal year is currently being conducted. The results of the 2004/2005 Audit will be made available at the above website. It is anticipated the audit results will be posted in late Spring 2006.

SUBRECIPIENT AUDIT FORM
(including financial reports and internal controls)
FOR FISCAL YEAR
ENDING AUGUST 31, 2004

SUBRECIPIENT'S LEGAL ENTITY NAME AND ADDRESS

The University of Texas at Austin
Office of the Controller
The University of Texas at Austin
P.O. Box 7487
Austin, TX 78713-7487

- Our audit report for the subject fiscal year has been completed. Reportable conditions, instances of noncompliance, or findings related to the management of sub-award(s) made to The University of Texas at Austin were noted.

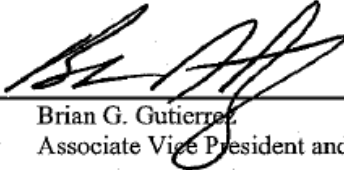
Attached is a listing of findings and current course of action by the University to address noted concerns for the Research and Development Cluster. Findings are related to business process and are not specific to any individual award. Additional findings related to Federal financial aid were also noted during the audit. A complete listing of the non-Research and Development related findings is available in the Federal portion of the report; a link is provided below.

A complete copy of the State of Texas Financial Portion of the Statewide Single Audit Report for the Year Ended August 31, 2004 (Report Number 05-555) and the State of Texas Federal Portion of the Statewide Single Audit Report for the Year Ended August 31, 2004 (A Report by KPMG, LLP) (Report Number 05-319) can be viewed at

<http://www.sao.state.tx.us/reports/main/05-555.pdf> Financial Portion

<http://www.sao.state.tx.us/reports/main/05-319.pdf> Federal Portion

Authorizing Signature: _____


Brian G. Gutierrez
Associate Vice President and Controller

Date: _____

5-6-05

Research and Development Cluster

Reference No. 05-56

Cash Management

(Prior Audit Issue – 04-52 and 03-06)

Reportable Condition Control and Non-Compliance

The University's methodology used for drawdown of Federal awards through Letters of Credit (LOC) was questioned. The auditor's recommendation recognized the following:

Effective September 1, 2004, the University of Texas at Austin modified their payable methodology to pay all expenses associated with letter of credit transactions within one business day of being entered into the accounts payable system. Upon testing of the new process, the system was found to be properly designed and operating effectively to ensure that federal transactions were paid prior to draw requests being presented to the federal government.

Implementation of the new draw methodology by The University of Texas at Austin resolves this audit issue.

Reference No. 05-57

Matching and Program Income

(Prior Audit Issue – 04-53, 03-09, and 02-48)

Reportable Condition Control

The University's process of monitoring Matching and Program Income was questioned. The University implemented a new procedure for capturing cost sharing/matching in June 2003 which addresses both mandatory and voluntary committed cost sharing/matching. The auditor questioned the University's ability monitor the occurrence of matching in a given year. The University also enhanced the research database to include notation of program income and an expected amount associated with the award.

Reference No. 05-55

Procurement and Suspension and Debarment

Reportable Condition Control

The auditor noted the University's delayed implementation of the \$25,000 threshold (previously \$100,000) for certification by contractors and subrecipients that the organization and its principals are not suspended or debarred. The new threshold was effective November 26, 2003; however, the University did not fully implement until January 2004. The auditors review of vendor files prior to implementation found no instances where a vendor had been suspended or debarred.

Implementation of the new threshold in January 2004 by The University of Texas at Austin resolves this audit issue.

Corpus Christi Air Monitoring and Surveillance Camera Project

Second Annual Report to the US District Court

November 9, 2005

by

THE UNIVERSITY OF TEXAS AT AUSTIN



Today's Presentation

- Introductions
- Project Status
- Project Financial Status
- Statement by Representatives of the Project Advisory Board
- Early Findings from the Network
- Q & A

Air Monitoring Network, Site Designations and Major Instrumentation

Contract Reference	TCEQ CAMS No.	Description of Site Location	Major Monitoring Equipment/Systems				
			Auto GC	Event Triggered Sampler	H2S & SO2 Monitor	Meteorology Station	Surveillance Camera
1.a	634	Oak Park Recreation Center	Yes	Yes		Yes	
1.b	629	Grain Elevator @ Port of Corpus Christi		Yes	Yes	Yes	
1.c	630	J. I. Hailey Site @ Port of Corpus Christi		Yes	Yes	Yes	
1.d	635	TCEQ Monitoring Site C199 @ Dona Park		Yes	Yes	Yes	Yes
1.e	631	West End of CC Inner Harbor @ Port of Corpus Christi		Yes	Yes	Yes	
1.f	632	Off Up River Road on Flint Hills Resources easement		Yes	Yes	Yes	
1.g	633	Solar Estates Park at end of Sunshine Road	Yes	Yes	Yes	Yes	Yes

Air Monitoring Network Site Locations



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Project Status

- All seven monitoring stations are fully operational and have been reporting data since April 1, 2005
- Data from the continuous monitors (SO₂, H₂S, TNMHC, AutoGC, and Met) are reported through the TCEQ LEADS system on the web (TCEQ & UT Austin)
- Have met 3 times this year with Advisory Board

Project Financial Status

Expenditures

Prior year expenditures	\$663,448.81
Current year expenditures	\$1,291,272.21
Total expenditures to date	\$1,954,721.02

Funds Remaining

Initial deposit (10/2/03)	\$6,761,718.02
Less expenditures to date	(\$1,954,721.02)
Plus interest earned to date	\$207,790.18
Project funds remaining*	\$5,014,787.18

*It is estimated the remaining funds will allow the Project to operate for six years, assuming no extra ordinary cost factors.

Statement by Representatives of the Volunteer Advisory Board

STATEMENT FROM THE ADVISORY COMMITTEE FOR
ANNUAL REPORT TO THE U.S. DISTRICT COURT FOR THE
CORPUS CHRISTI AIR MONITORING AND SURVEILLANCE CAMERA PROJECT

November 9, 2005

The project has been moving on schedule.

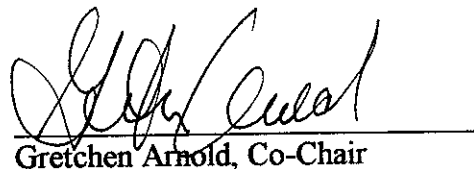
Advisory board activities that have taken place since the last reporting period of September 30, 2004 include meetings with the UT project team on October 25 of 2004 and April 21, and June 15 of 2005. Meetings included updates by the UT team on the project status. Input from the advisory board was solicited by UT on the various components of the project such as formatting of information presented on the public web site, the installation of a back-trajectory tool on the web site, data gathered and data dissemination. The resulting website and presentation can be found at http://www.utexas.edu/research/ceer/ccaqp/about_CCAQP.htm (copy attached)

Three of the eight advisory board members have recently resigned and efforts are currently underway to replace those members.

Respectfully submitted:



Ron Barnard, Co-Chair



Gretchen Arnold, Co-Chair

Ron Barnard and Gretchen Arnold Co-Chair the advisory committee for the project. Both were appointed in December of 2003 and both were present and made statements at the first annual report to this court on December 16, 2004.

Contact Information for Project Personnel

Principal Investigator - Dr. David T. Allen

Phone: 512-471-0049

allen@che.utexas.edu

Project Manager - Vincent M. Torres

Phone: 512-471-5803

vmtorres@mail.utexas.edu

Quality Assurance Officer – Dr. David Sullivan

Phone: 512/471-7805

Sullivan231@mail.utexas.edu

Contracts Manager - MaryAnn Foran

Phone: 512-232-5040

ma_foran@mail.utexas.edu

Project Web Site: <http://www.utexas.edu/research/ceer/ccaqp>

Early Findings from the Corpus Christi Air Quality Project

Dave Sullivan

UT CEER

Nov. 9, 2005

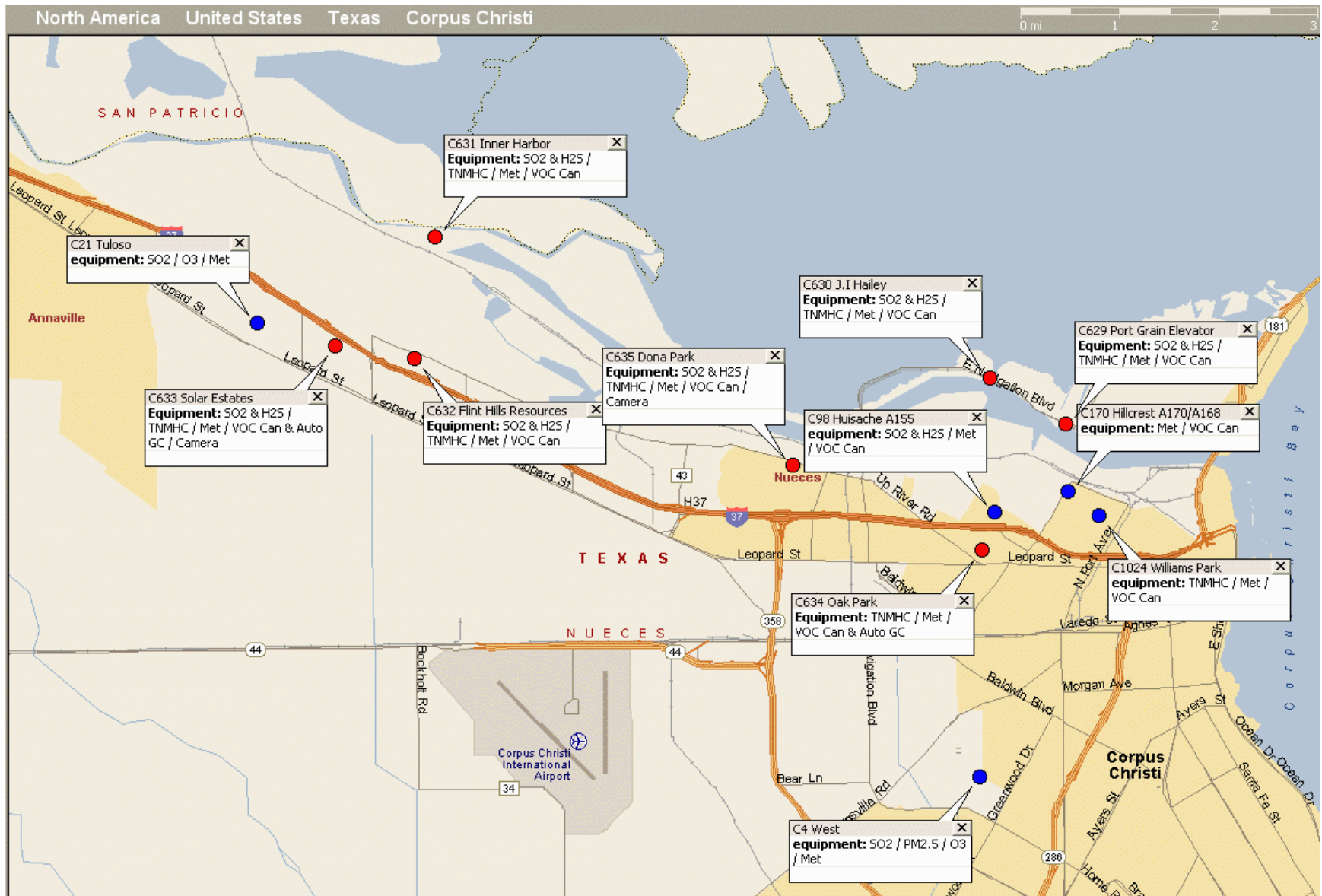
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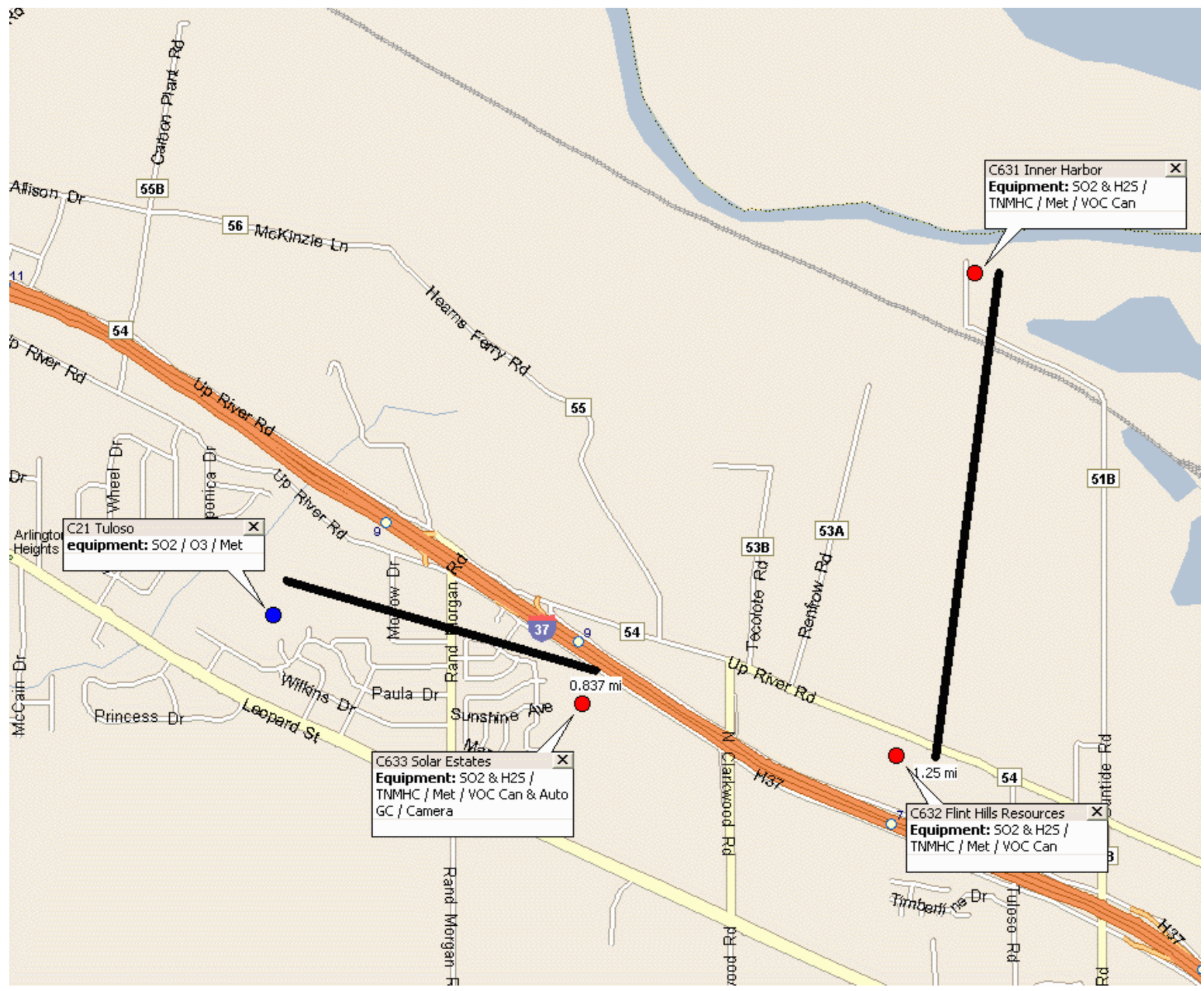
Introduction

- Seven sites in Corpus Christi run by UT.
- Five sites run by TCEQ.
- Scheduled sampling and event-triggered sampling for 55 VOCs.
- Semi-continuous monitoring @ 1 hr resolution.
 - 40-50 speciated hydrocarbons.
- Continuous monitoring @ 5 min. resolution.
 - Meteorology, H₂S, SO₂, & unspeciated total non-methane hydrocarbons.

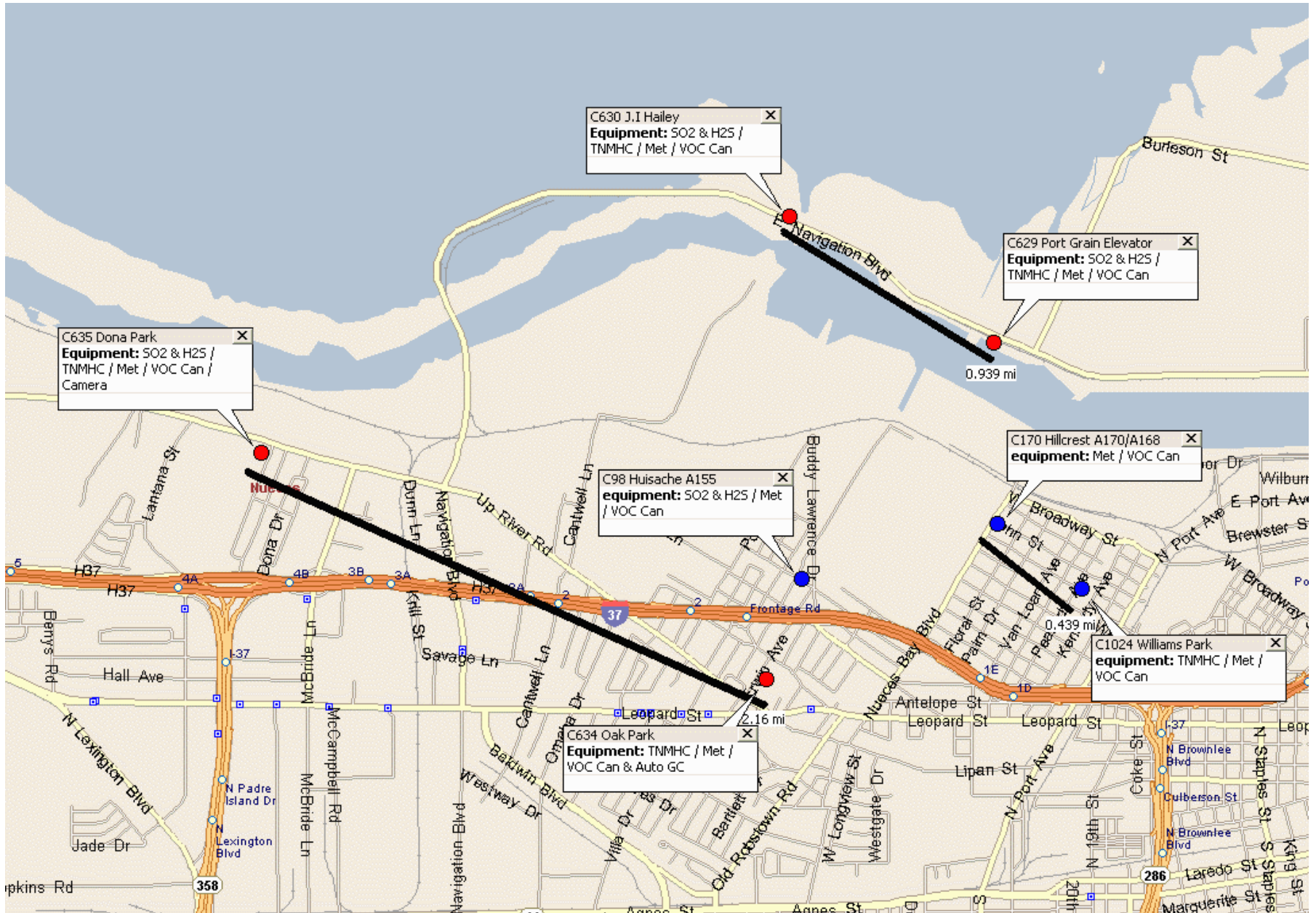
UT & TCEQ Monitoring Networks



West of CC



East CC



Have we seen high readings?

- H₂S: Yes. 1 *near-exceedance* of TX 30-min. standard at Inner Harbor C631 on 1/19. Comparable to other TX industrial areas. Many values exceed odor thresholds (0.5-300 ppb)
- SO₂: Yes. 1 *near-exceedance* of TX 30-min. standard at J.I. Hailey C630 1/27. Comparable to other TX industrial areas.
- TNMHC: Yes. No health standards. Levels comparable to Houston.
- Canisters: too early to assess
- Auto-GCs: each site, 1 benzene value > ESL.

Recent QA Operations

- Ongoing validation of data – some corrections & flagging.
- Written communication plan for interacting with TCEQ Region.
- New revision of QAPP being edited.
- SOP for data management & analysis being edited.
- Plan to put canister data on Web in 2006.

Pollutant Assessment: Directionality

- Directionality assessment based on rounded wind directions into bins, e.g., 0-10, 10-20,... 350-360 degs.,
- Merge binned wind dir w coincident pollutant values,
- Average pollutant readings in bins,
- Graph result.

SO2 Summary

Hourly Stats

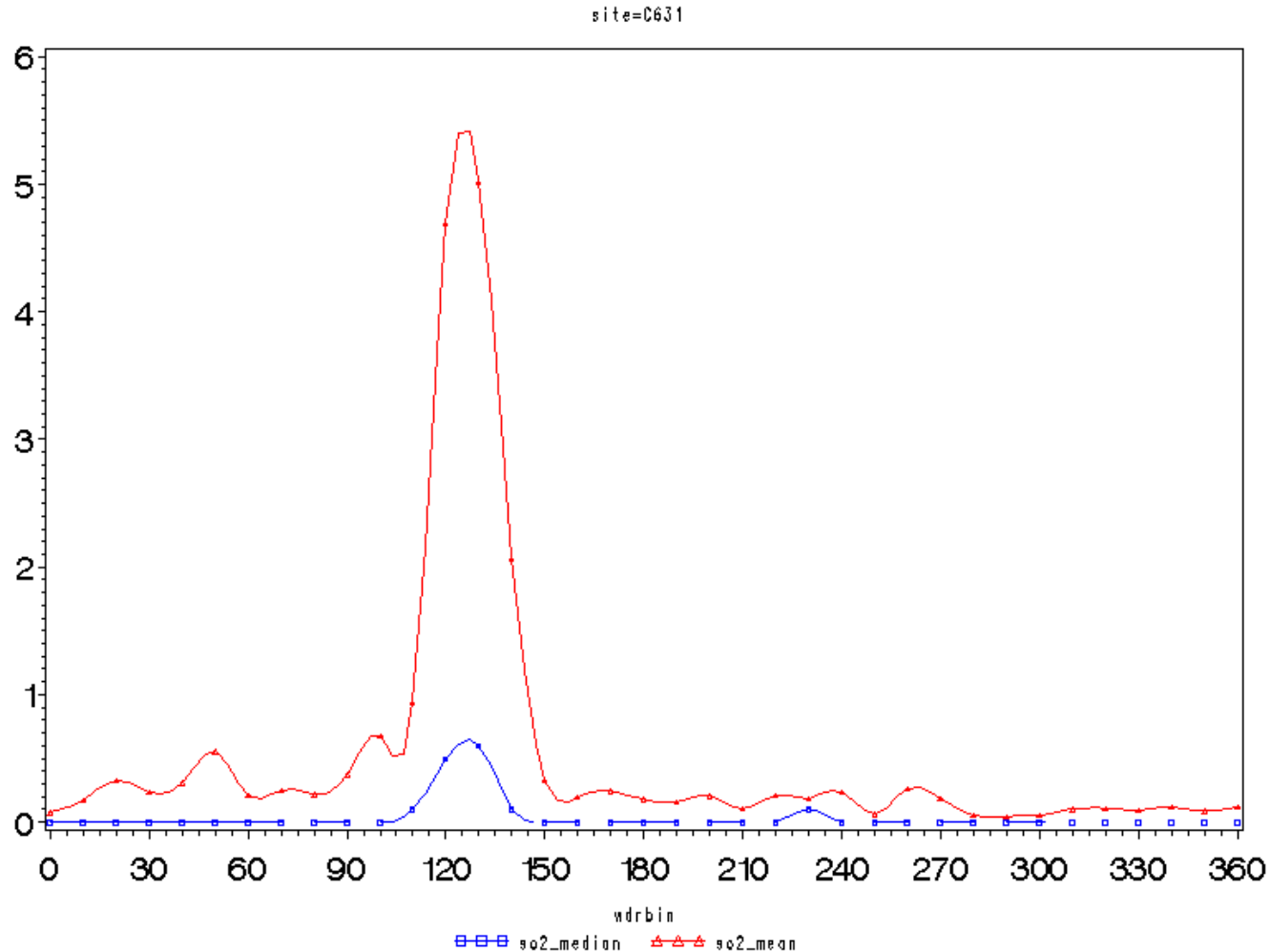
CAMS	yr	median	mean	p95	max
C21	2005	0	0.61	3	19.2
C4	2005	0.6	1.01	2.7	61.5
C629	2005	0	1.06	5	71.9
C630	2005	0	1.26	5.2	249.9
C631	2005	0	0.92	3.8	106.2
C632	2005	0.1	0.68	3.1	24.1
C633	2005	0	1.11	4.4	93.7
C635	2005	0	0.68	3.5	43.2
C98	2005	0.1	1.25	6.8	62.1
AIRS	yr	median	mean	p95	max
481130069	2004	0	0.80	3	14
481390015	2004	0	1.05	5	48
481390016	2004	0	0.99	5	113
481390017	2004	0	0.43	2	24
481410037	2004	0	0.59	3	14
481410053	2004	1	1.72	5	15
481410058	2004	0	0.21	1	11
481670005	2004	1	5.11	26	126
481671002	2004	1	2.70	10	37
481830001	2004	0	1.18	5	92
482010046	2004	2	2.87	7	41
482010051	2004	0	0.97	4	48
482010062	2004	2	3.32	9	78
482010070	2004	1	2.69	11	126
482011035	2004	5	6.49	14	118
482011050	2004	0	1.12	5	60
482450009	2004	1	3.38	17	399
482450011	2004	0	1.69	10	124
482450020	2004	0	2.68	16	132
482570005	2004	0	0.63	3	16
483550025	2004	1	1.38	5	90
483550026	2004	0	0.51	2	22
483550032	2004	0	2.00	10	88
484530613	2004	0	0.33	2	13

- Mean vals range 0.6 - 1.3 ppb
- Other sites in TX range 0.21 - 6.5.
- Max at JI Hailey an outlier?
- NAAQS = 30 ppb annual, 140 ppb 24hr, 500 ppb 3hr
- TX std = 400 ppb 30min

11/09/05

SO2 Directionality

- Inner Harbor sees high avg, but modest median from SE
- Big delta in mean-median reflects presence of many large outliers that skew the distrib.



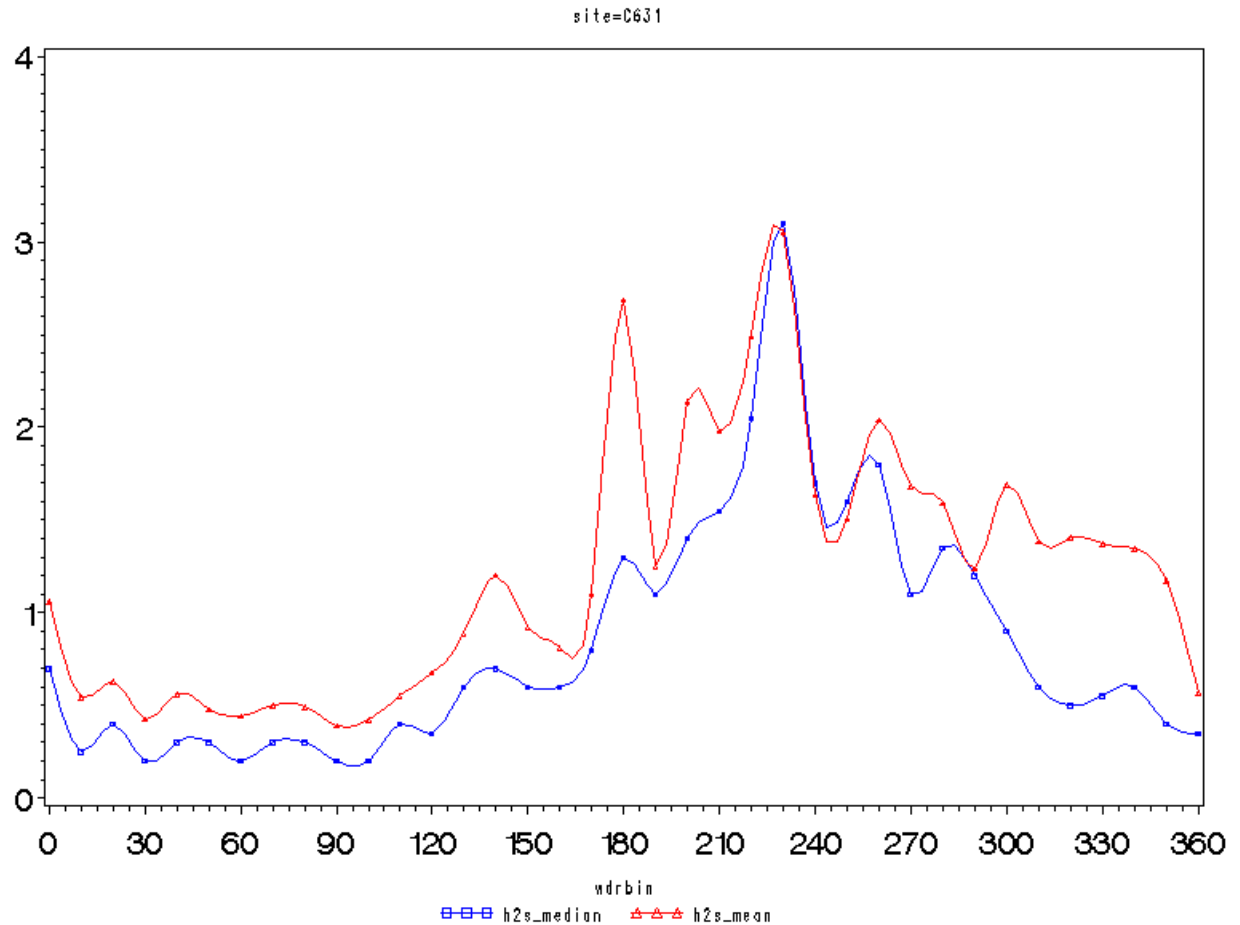
CAMS		median	mean	p95	max
C629	2005	0.2	0.54	2.1	183.3
C630	2005	0.4	0.87	3.1	89.3
C631	2005	0.5	0.95	3.2	76.7
C632	2005	0.1	0.41	1.5	27.4
C633	2005	0	0.22	0.9	8.1
C635	2005	0	0.24	1.2	12.4
C98	2005	0	0.52	2.4	46.3
AIRS	yr	median	mean	p95	max
401430235	2003	2	1.84	4	203
401430235	2004	1	0.96	3	12
401430501	2003	2	1.83	4	11
401430501	2004	1	1.62	4	47
481390015	2003	0	0.53	2	7
481390015	2004	0	0.21	1	3
481390016	2003	0	0.50	1	14
481390016	2004	1	0.68	1	21
481390017	2004	1	0.60	1	3
481410054	2004	4	23.46	115	584
481670005	2004	1	1.93	8	104
481671002	2003	1	1.31	4	217
481671002	2004	1	0.89	3	15
482450020	2003	0	0.75	3	58
482450020	2004	0	0.23	1	78
483550032	2003	0	0.56	3	52
483550032	2004	0	0.60	3	119

H2S Summary Hourly Stats

- Mean vals range 0.22-0.95 ppb
- Other sites in TX & OK range 0.21-1.9, w one outlier
- TX Std. 80/120 ppb 30 min.

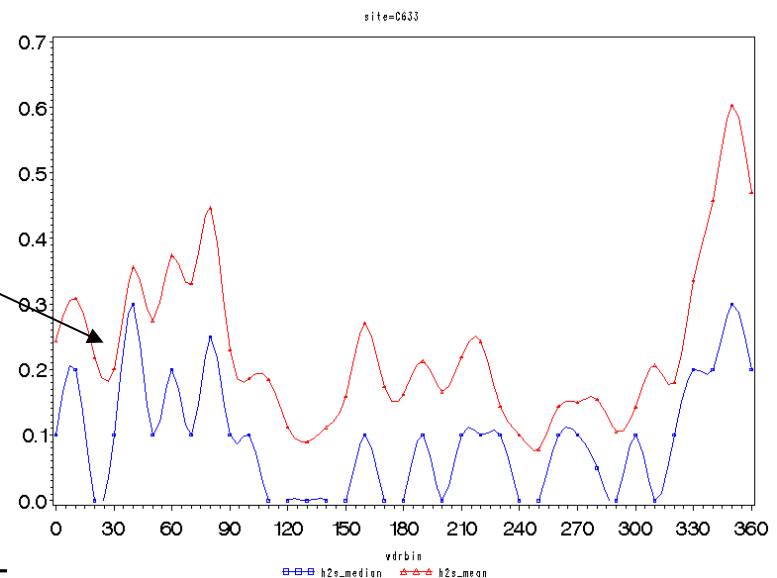
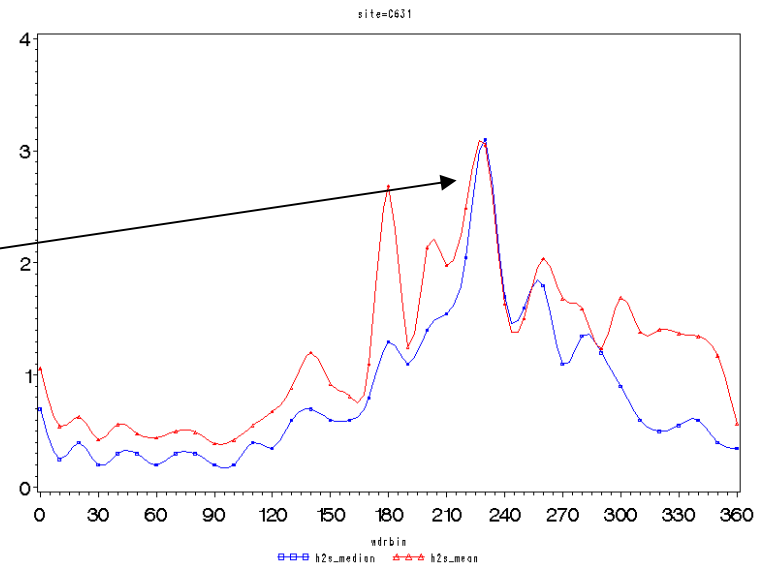
H2S Directionality

- Inner Harbor C631 sees high H2S from SW.
- Agreement of mean & median suggests routine emissions.



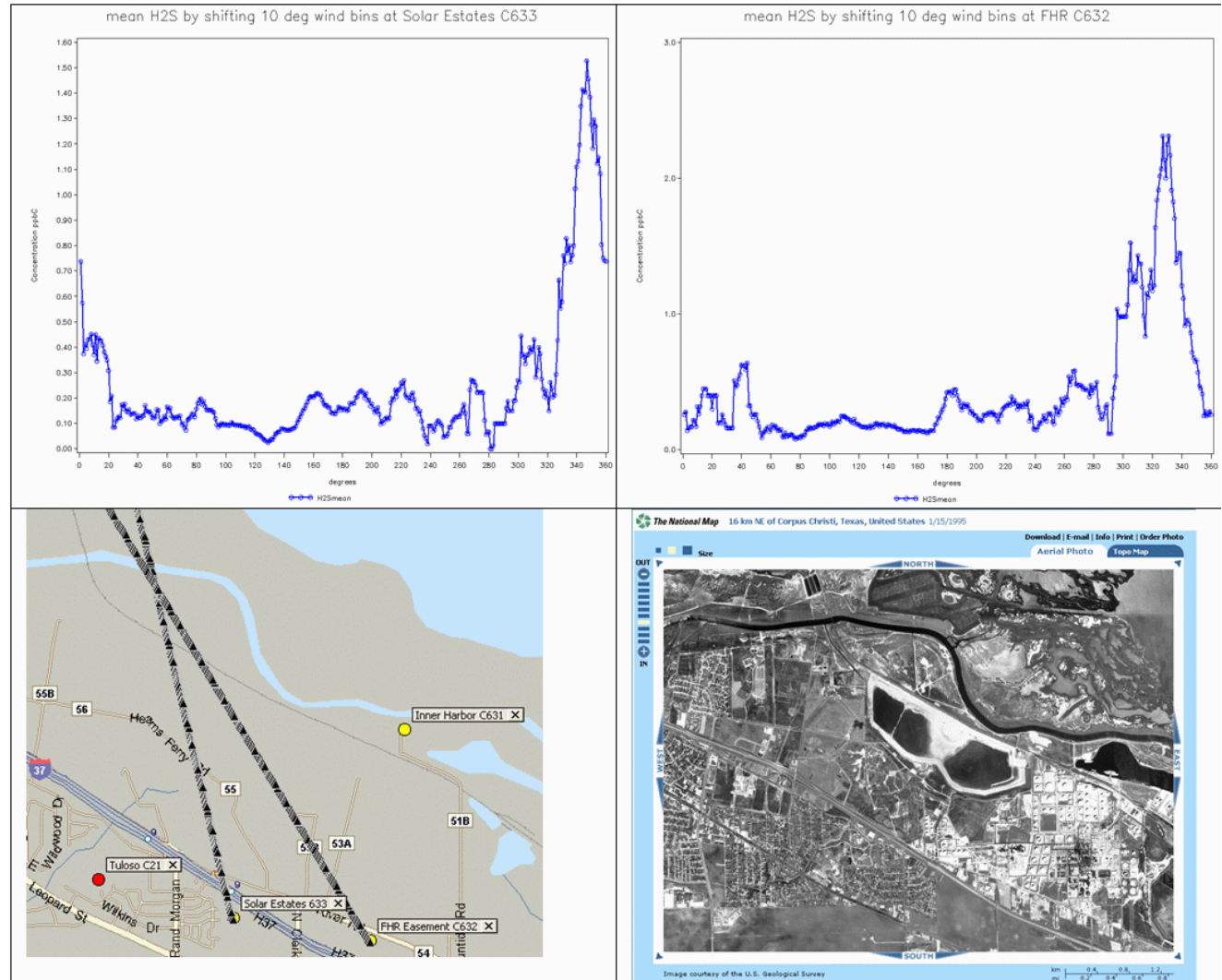
Using Directionality to Find Sources

- Inner Harbor sees peak H2S to SW
- Solar Estates sees some H2S to the NE
- Source must be closer to Inner Harbor



Extended Directionality Potential

- Using subset of data (summer only) and “shifting wind bins”, source ID gets a boost.
- Here, H2S directions from Solar & FHR may point to a source...



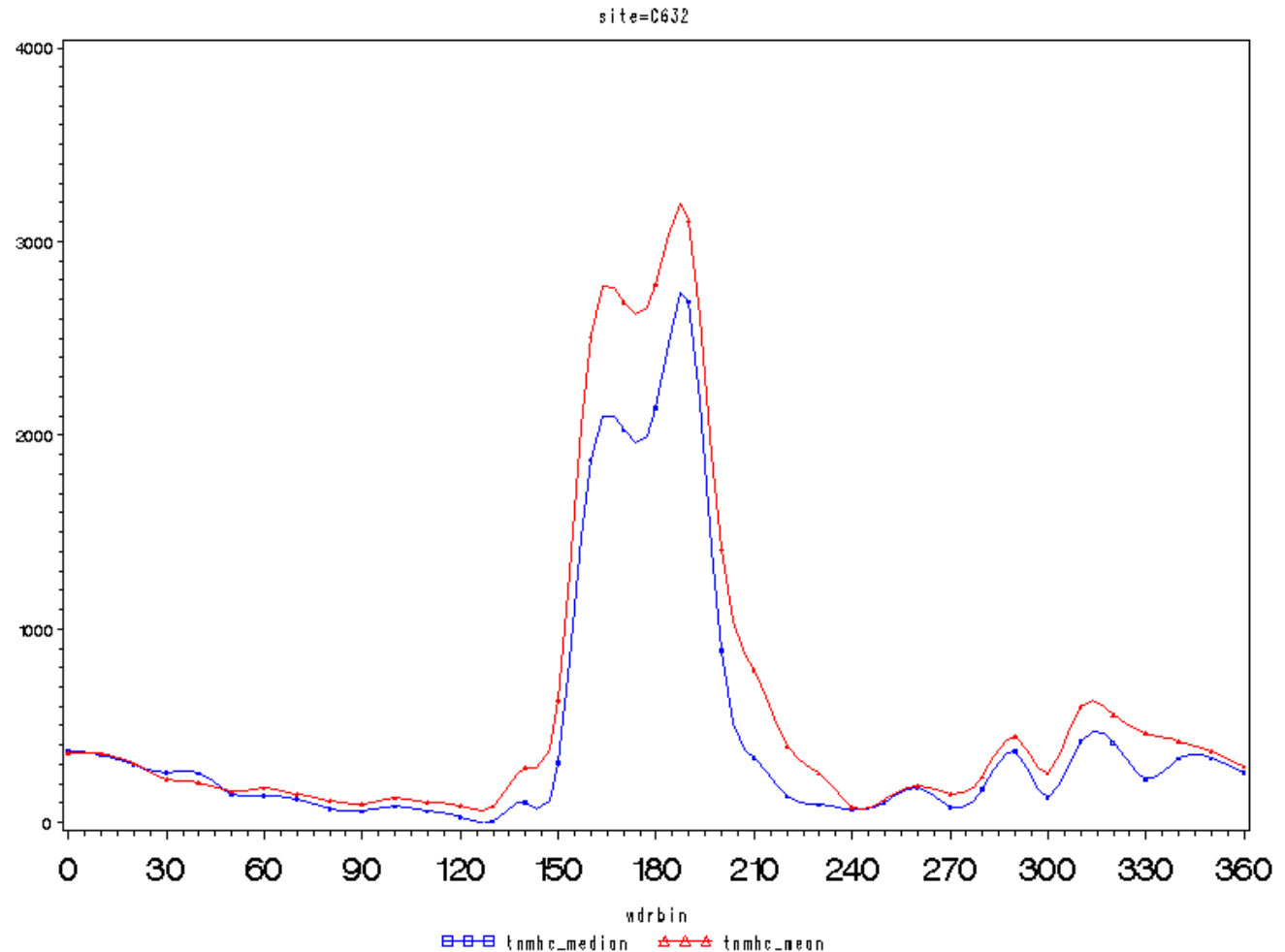
TNMHC Summary

- Wide variation in statistics
- 3 sites markedly high
- C633 has high median, moderate other stats
- C635 low median and p95, high max

Site	CAMS	median	mean	p95	max
Dona Park	C635	21.4	71.9	307	7,879
Oak Park	C634	23.5	112.0	574	3,745
Grain Elevator	C629	24.8	86.4	484	6,314
Williams Park	C1024	29.8	113.7	493	2,006
Solar Estates	C633	58.5	97.2	349	1,596
J.I. Hailey	C630	147.5	242.8	717	> 10,000
FHR Easement	C632	218.2	850.3	4,209	22,769
Inner Harbor	C631	230.6	342.7	1,010	9,696

TNMHC by Wind Direction

- Flint Hills
 - Industry to the north
 - Small well & tank battery to the south
 - Nearby small source dominates site



Sullivan, UT CEER, 11/09/05

Peak TNMHC Directions

- C1024 Williams Park: Distributed clockwise from SSW through W to NE
- C629 Grain Elev: S-SW... but, winds not accurate at this site
- C630 JI Hailey: West.
- C631 Inner Harbor: SE through NW.
- C632 FHR: due S.
- C633 Solar Ests: Diffuse across compass
- C634 Oak Park: NE, also NW
- C635 Dona Park: SW, also E

Canister VOCs

- Observed concentration summary.
 - Some 67 samples are being examined from July & Aug.
 - Will work closely with TCEQ toxicologists to compare to short-term ESLs
 - Will work with TCEQ emissions inventory experts to compare speciation with known emission source signatures.

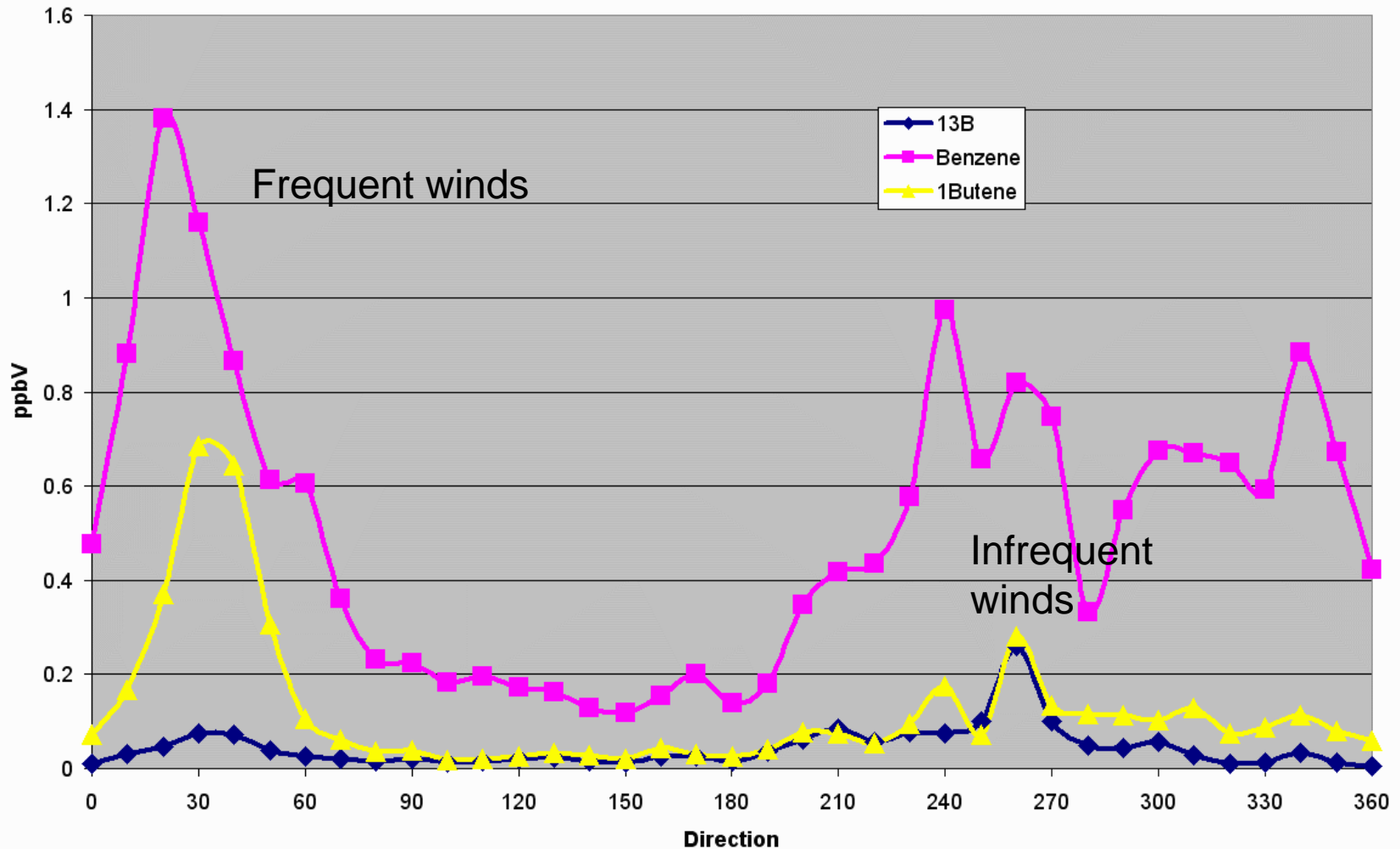
Canister Results (ppbV units)

	Target Compounds	1-butene	1-pentene	benzene	toluene
Varying length samples following 15-min high TNMHC + delay					
DonaPark	Count	3	3	3	3
	Average	33.4	0.5	8.4	17.8
	Maximum	65.9	0.5	17.5	37.0
FHR	Count	39	39	39	39
	Average	127.3	1.8	7.8	10.1
	Maximum	1785.1	12.5	55.4	105.0
GrainElev	Count	7	7	7	7
	Average	17.1	1.9	3.7	68.2
	Maximum	40.7	4.8	6.4	249.1
InnerHarbor	Count	12	12	12	12
	Average	29.7	2.5	43.4	38.1
	Maximum	67.6	10.8	120.5	198.6
J.I.Hailey	Count	6	6	6	6
	Average	22.9	2.8	8.3	14.5
	Maximum	49.3	7.0	15.8	29.3

- Caveats
 - Durations vary 5-20 minutes.
 - Not all QA complete.
 - Need to interpret results...

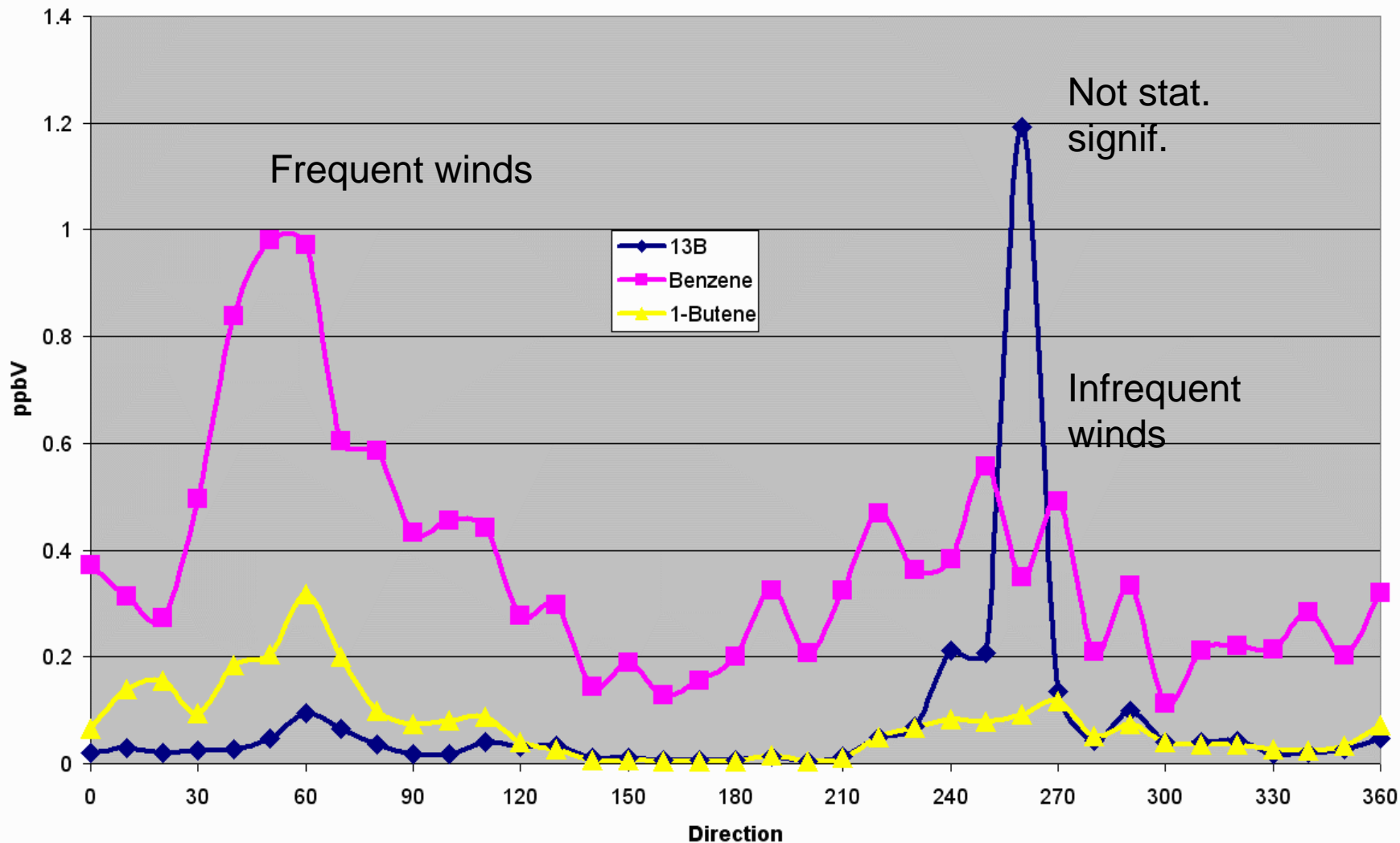
Directionality at Oak Park

Oak Park 1,3-Butadiene, Benzene, 1-Butene, Dec. 2004 - April 2005



Directionality at Solar Estates

Solar Estates 1,3-Butadiene, Benzene, 1-Butene, Dec. 04 - April 05



Summary of Findings

- Cans & auto-GCs show some high levels.
 - FHR can site most active.
- SO₂ and H₂S levels comparable to other TX cities, but exceedances of TX standard may occur.
- TNMHC higher in industrial areas, some high readings at all sites.
- Directionality suggests industrial sources are related to high readings.