Neighborhood Air Toxics Modeling Project For Houston and Corpus Christi Case # 2:11-MC-00044

> Phase 1B Monitoring Network Extension

Quarterly Report for the Period

April 1, 2013 through June 30, 2013

Submitted to

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

Ms. Kathleen Aisling United States 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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August 30, 2013

I. Introduction

On February 1, 2008, the United States District Court entered an Order (D.E. 981, Order (pp.1, 7-11)) regarding unclaimed settlement funds in Lease Oil Antitrust Litigation (No.11) Docket No. MDL No.1206. The Court requested a detailed project proposal from Dr. David Allen, the Gertz Regents Professor in Chemical Engineering and the Director of the Center for Energy and Environmental Resources at The University of Texas at Austin (UT Austin), regarding the use of \$9,643,134.80 in the Settlement Fund. The proposal was for a project titled "Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi" (hereinafter "Air Toxics Project"). The Air Toxics Project was proposed in two stages. In Stage 1, UT Austin was to develop, apply, demonstrate and make publicly available, neighborhood-scale air quality modeling tools for toxic air pollutants in Corpus Christi, Texas (Phase 1A) and extend the operation of the air quality monitoring network in Corpus Christi, Texas (Phase 1B). The ambient monitoring results from were to be used in synergy with the neighborhood-scale models to improve the understanding of emissions and the spatial distribution of air toxics in the region.

On February 21, 2008, the United States District Court for the Southern District of Texas issued an order to the Clerk of the Court to distribute funds in the amount of \$4,586,014.92, plus accrued interest, to UT Austin for the purposes of implementing Stage 1 of the Air Toxics Project as described in the detailed proposal submitted to the Court by UT Austin on February 15, 2008 (D.E. 998).

Under the Order to Distribute Funds in MDL No. 1206, on March 3, 2008, at the direction of the Settlement Administrator, \$4,602,598.66 was disbursed to UT Austin for Stage 1 of the Project. This amount includes the interest accrued prior to distribution from the MDL No. 1206 Settlement Fund.

In Stage 2, subject to the availability of funds, it was planned that UT Austin would extend the modeling to the Houston, Texas ship channel region, develop a mobile monitoring station that could be deployed in Corpus Christi and in other regions of Texas and/or further extend the operating life of the existing stationary network in the same or a modified spatial configuration. Based on the decision of the U.S. Court of Appeals for the 5th Circuit on June 27, 2011, UT Austin will not be receiving the Stage 2 funding at any point in the future. Further, work on the modeling portion of Stage 1 (Phase 1A) was completed June 30, 2011. Hence, all future progress reports will describe only work on Stage 1 Phase 1B (extending the operation of the air quality monitoring network).

The air quality monitoring network was originally authorized on October 1, 2003, when the United States 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). Those funds have been expended. Funding for the air quality monitoring network originally created for the COCP Project is now provided through Stage 1 Phase 1B of the Air Toxics Project.

This Stage 1 Phase 1B quarterly report has been prepared pursuant to the requirements of the Air Toxics project and is being submitted to the United States District Court, the United States Environmental Protection Agency (EPA), and the Texas Commission on Environmental Quality (TCEQ).

II. Air Toxics Project – Stage 1 - Phase 1B Overview

A. Scope and Objectives

Phase 1B of the project reserves approximately 65% of the initial Stage 1 project funds, or approximately \$3 million, to extend the operation of the Corpus Christi ambient air monitoring network.

The COCP Project funds were fully expended by January 18, 2013.

B. Goals

Under Phase 1B, the project team will continue the operation of the monitoring network initiated under the Corpus Christi Air Monitoring and Surveillance Camera Project.

III. Air Toxics Project – Stage 1 – Phase 1B Progress Report

The focus of work during the quarter ending June 30, 2013, has been directed to the following activities funded by the Stage 1 Phase 1B extension of the Corpus Christi Air Monitoring network.

A. Operations and Maintenance Phase of the Project

A detailed description of the data analyses for this quarter appears in Appendix A, pages 8 through 23, and a summary of these analyses appears in this section.

The Project currently consists of a network of six (6) 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, on page 4. Table 1, on pages 4 and 5, 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), provide additional data used in these analyses.



Figure 1. Corpus Christi Monitoring Sites, "X" marks site recently terminated

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

TOFO		Monitoring Equipment					
CAMS#	Description of Site Location	Auto GC	TNMHC (T) / Canister (C)	H ₂ S & SO ₂	Met Station	Camera	
634	Oak Park Recreation Center (OAK)	Mar 2005 to date	C: Dec 2004 to Feb 2009 T: Dec 2004 to Apr 2012		Dec 2004 to date		
629	Grain Elevator @ Port of Corpus Christi (CCG)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date		
630	J. I. Hailey Site @ Port of Corpus Christi (JIH)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date		
635	TCEQ Monitoring Site C199 @ Dona Park (DPK)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date	Jan 2005 to date	
632	Off Up River Road on Flint Hills Resources Easement (FHR)		T&C: Dec 2004 to date	Dec 2004 to date	Dec 2004 to date		
633	Solar Estates Park at end of Sunshine Road (SOE)	Mar 2005 to date	C: Dec 2004 to Feb 2009 T: Dec 2004 to Apr 2012	Dec 2004 to date	Dec 2004 to date	Jan 2005 to date	
631	Port of Corpus Christi on West End of CC Inner Harbor (WEH) (terminated)		T&C: Dec 2004 to May 2012	Dec 2004 to May 2012	Dec 2004 to May 2012		

Table 1 (Cont	tinued)
Legend	
CAMS	continuous ambient monitoring station
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 8 through 23. Specifically, the appendix contains the following elements:

- Auto-GC Data Summary In examining the validated <u>first</u> quarter of 2013 hourly auto-GC data from Oak Park, Solar Estates, and TCEQ's Palm sites, no individual measurements were found to have exceeded a short-term air monitoring comparison value (AMCV). The validated <u>first</u> quarter average concentrations were below each compound's long-term AMCVs. For <u>second</u> quarter 2013 data, the preliminary values were also below respective AMCVs. A summary of data appears in Appendix A, pages 13 through 17.
- **Benzene Summary** A review of the nine years of data is presented, with focus on the quarterly means from 2005 through 2013, appear in Appendix A, pages 18 through 21.
- Analysis of Sulfur Dioxide at Several Sites The JIH CAMS 630 site had measured concentrations high enough and often enough to violate the SO₂ annual National Ambient Air Quality Standards (NAAQS), but concentrations have recently declined. Trends from various CAMS sites are examined. These issues are expanded upon in Appendix A, pages 21 through 23.

B. Scheduled Meetings of the Volunteer Advisory Board

The Corpus Christi Project Advisory Board met on May 9, 2013. The meeting notes from that Advisory Board Meeting are found in Appendix B, pages 24 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 six 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, and meetings of a Community Advisory Board.

3. Budget Monitoring

Budget monitoring during the period has focused on projects costs for Stage 1 Phase IB – Sites Operation and Maintenance costs. Financial reports for the quarter are included in Appendix C, pages 27 through 29.

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 28 through 29.

- A. <u>Total Amount of Air Toxics Project Funds and Other Funds Received Under the Project</u> The Air Toxics Project funds received through June 30, 2013 totals \$3,135,235.79. This total includes interest earned through June 30, 2013, in the amount of \$389,864.11.
- B. Detailed List of the Actual Expenditures Paid from Air Toxics Project Funds Stage 1 Phase <u>1B through June 30, 2013</u>
 Expenditures of Air Toxics Project funds during this quarter totaled \$158,053.11. The funds remaining in the Air Toxics account (not spent for Stage 1 Phase 1A) are in a separate account so that separate financial reports can be generated.
- C. <u>Total Interest Earned on Air Toxics Project Funds through June 30, 2013</u> The interest earned during this quarter totaled \$643.38. A report providing detailed calculations of the interest earned on the Air Toxics Project funds is included in Appendix C, pages 28 through 29.
- D. <u>Balance as of June 30, 2013, in the Air Toxics Project Account</u> The balance in the Air Toxics Project account, including interest earned totals \$2,711,020.43
- E. <u>Anticipated Expenditures for the Funds Remaining in the Air Toxics Project Account Stage 1 Phase 1A</u> There are no additional expenditures anticipated for Stage 1 Phase 1A.
- F. <u>Anticipated Expenditures for the Funds Remaining in the Air Toxics Project Account Stage</u> <u>1 Phase 1B</u>

All funds remaining after the close of Stage 1, Phase 1A have been allocated to Stage 1, Phase 1B, and the extension of the operation of the Corpus Christi ambient monitoring network.

The Stage 1 Phase 1A Neighborhood Air Toxics Modeling Project was originally allocated a budget of \$2,277,564. As of June 30, 2011, total and final expenditures on Phase 1A totaled \$1,863,081.22. The remaining funds totaling \$414,482.78, have been transferred, with the Court's permission, to a new account to allow for easier tracking of the expenses as they are utilized for Stage 1 Phase 1B, the extension of the Corpus Christi Air Monitoring Project.

Quarterly Report Distribution List:

APPENDIX A

Data Analysis for Corpus Christi Quarterly Report

April 1, 2013 through June 30, 2013

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Data Analysis for Corpus Christi Quarterly Report

This technical report describes results of monitoring and analysis of data under the Corpus Christi Air Monitoring and Surveillance Camera Installation and Operation Project, currently being funded by Air Toxics, Stage 1 Phase 1B. The primary focus is on the period April 1 through June 30, 2013. The monitoring network is shown earlier in this report in Figure 1, on page 4, 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 first and second quarters of 2013;
- Information on the trends for benzene concentrations at the two project auto-GCs in residential areas, now for a full seven years of data, with eight instances of first quarters and complete second quarters, and at the TCEQ's Palm auto-GC with 34 months of data; and
- A discussion of the sulfur dioxide (SO₂) data from UT and TCEQ sites.

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TOPO		Monitoring Equipment showing month/year of operations						
CAMS#	Description of Site Location	Auto- GC	TNMHC (T) / Canister (C)	H ₂ S & SO ₂	Met Station	Camera		
634	Oak Park Recreation Center (OAK)	3/05 to date	C: 12/04 to 2/09 T: 12/04 to 4/12		12/04 to date			
629	Grain Elevator @ Port of Corpus Christi (CCG)		T&C: 12/04 to date	12/04 to date	12/04 to date			
630	J. I. Hailey Site @ Port of Corpus Christi (JIH)		T&C: 12/04 to date	12/04 to date	12/04 to date			
635	TCEQ Monitoring Site C199 @ Dona Park (DPK)		T&C: 12/04 to date	12/04 to date	12/04 to date	1/05 to date		
632	Off Up River Road on Flint Hills Resources Easement (FHR)		T&C: 12/04 to date	12/04 to date	12/04 to date			
633	Solar Estates Park at end of Sunshine Road (SOE)	3/05 to date	C: 12/04 to 2/09 T: 12/04 to 4/12	12/04 to date	12/04 to date	1/05 to date		
631	Port of Corpus Christi on West End of CC Inner Harbor (WEH) (terminated)		T&C: 12/04 to 5/12	12/04 to 5/12	12/04 to 5/12			

Table 2. Schedule of air monitoring sites, locations and major instrumentation

Legend

Logena	
CAMS	continuous ambient monitoring station
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 $(pp\underline{m}V)$ or ppb-volume $(pp\underline{b}V)$ 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 the sample for a target list of 46 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 the sites that do not take continuous hydrocarbon measurements with auto-GCs (CAMS 629, 630, 632, and 635).
- **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 and 12 chlorinated species. Canister samplers operate at the four active sites that do not take continuous hydrocarbon measurements with auto-GCs (CAMS 629, 630, 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.texas.gov/toxicology/AirToxics.html (accessed July 2013). 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.

- Rationale for Differences between ESLs and AMCVs A very specific difference between the permitting program and monitoring program is that permits are applied to one company or facility at a time, whereas monitors may collect data on emissions from several companies or facilities or other source types (e.g., motor vehicles). Thus, the protective ESL for permitting is set lower than the AMCV in anticipation that more than one permitted emission source may contribute to monitored concentrations.
- 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 Act¹. 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 24hours, 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

¹ See <u>http://epa.gov/air/criteria.html</u> accessed July 2013

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.

A more detailed description of NAAQS can be found on the TCEQ's Website at <u>http://www.tceq.texas.gov/airquality/monops/naaqs.html</u> (accessed July 2013).

One species measured by this project and regulated by a NAAQS is sulfur dioxide (SO₂). Effective June 2, 2010, EPA modified the SO₂ 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. There is also a secondary SO₂ standard of 0.500 ppm (500 ppb) over three hours, not to be exceeded more than once in any one year.

- 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 SO₂, 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 SO₂ 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 H₂S and SO₂, 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 – UT's Solar Estates CAMS 633, UT's Oak Park CAMS 634, and TCEQ's Palm CAMS 83 – 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 near the TCEQ's Hillcrest and Williams Park sites in Figure 1, on page 4, is generally downwind under northerly and westerly winds. In examining aggregated data one observes similar patterns of hydrocarbons at all three sites.

Table 3, below, lists the data completeness from the project auto-GCs from January 2011 through early 2013 for months for which data validation has been completed.

Date	Oak Park	Solar Est.	Date	Oak Park	Solar Est.	Date	Oak Park	Solar Est.
Jan 2011	100	96	Jan 2012	94	99	Jan 2012	100	100
Feb 2011	84	77	Feb 2012	90	98	Feb 2012	94	99
Mar 2011	100	95	Mar 2012	97	100	Mar 2012	97	100
Apr 2011	100	80^{*}	Apr 2012	94	100	Apr 2012		100
May 2011	78	100	May 2012	77*	96			
Jun 2011	69 [*]	93	Jun 2012	65	97			
Jul 2011	95	96	Jul 2012	98	93*			
Aug 2011	56	95	Aug 2012	99	93*			
Sep 2011	92	78	Sep 2012	99	100			
Oct 2011	99	83	Oct 2012	98	93			
Nov 2011	97	94	Nov 2012	99	88			
Dec 2011	100	100	Dec 2012	97	99			
						Average	91	94

 Table 3. Percent data recovery by month, 2011-2013, validated data only

* Months with planned preventive maintenance

Table 4, on page 15, summarizes the <u>validated</u> average data values from the <u>first</u> quarter of 2013. Data in this table are available to TCEQ staff at <u>http://rhone3.tceq.texas.gov/cgi-</u>

<u>bin/agc_summary.pl</u> (accessed July 2013). Table 5, on page 16, summarizes the as-yet-unvalidated average data values from the <u>second</u> quarter of 2013.

As noted in the preceding paragraph, Tables 4 and 5 show the averages (arithmetic mean of measured values) for 27 hydrocarbon species for the periods of interest, and Table 4 also shows the maximum one-hour values and the maximum 24-hour average concentrations for the first guarter's validated data. 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). The average data columns in Table 4 for the validated first quarter 2013 data and Table 5 for the as-yet-unvalidated second quarter 2013 data are shown graphically in Figures 2 and 3, respectively, on page 17. Figures 2 and 3 are plotted on the same y-axis scale, so they can be compared directly. Mean concentrations for all 27 species measured consistently above their respective method detection limits are generally comparable for the second and third quarters each year (late spring, summer, early fall), and are generally lower than the first and fourth quarters (winter, early spring, late fall). Increased maritime southerly flow in the spring and summer is a contributor to lower concentrations in the second and third quarters. Lower wind speeds and more northerly winds contribute to higher concentrations in the first and fourth quarters. As can be observed by comparing Figures 2 and 3, average concentrations for all species were significantly different between recent first and second quarters, with second quarter being lower.

The rows for *benzene* are bold-faced in Tables 4 and 5 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.

Units ppbV	Oak 1Q13		Solar 1Q13			Palm 1Q13			
Species	Peak 1hr	Peak 24hr	Mean	Peak 1hr	Peak 24hr	Mean	Peak 1hr	Peak 24hr	Mean
Ethane	150.423	39.590	11.710	138.725	34.944	11.291	258.56	48.95	13.76
Ethylene	41.602	6.642	0.832	52.205	7.109	0.511	37.698	5.994	0.679
Propane	138.359	25.936	7.725	74.099	25.530	7.131	249.57	47.2	8.852
Propylene	40.777	2.510	0.326	4.598	0.787	0.201	355.45	21.05	0.623
Isobutane	53.434	7.898	2.378	25.814	6.122	2.007	96.604	15.61	2.971
n-Butane	60.822	11.792	3.937	59.049	10.888	3.200	139.71	25.55	4.893
t-2-Butene	0.541	0.257	0.063	1.945	0.156	0.025	2.265	0.455	0.07
1-Butene	7.104	0.414	0.056	8.480	0.539	0.056	5.909	0.903	0.113
c-2-Butene	0.640	0.236	0.044	1.449	0.121	0.017	1.281	0.363	0.051
Isopentane	25.718	6.101	1.948	19.312	3.569	1.329	46.59	9.134	2.092
n-Pentane	18.693	4.025	1.305	9.345	3.019	1.000	37.723	7.17	1.341
1,3-Butadiene	0.390	0.086	0.039	25.445	1.410	0.038	0.485	0.087	0.031
t-2-Pentene	1.845	0.273	0.056	1.115	0.077	0.010	4.099	0.614	0.08
1-Pentene	1.015	0.154	0.032	0.733	0.059	0.009	2.125	0.287	0.043
c-2-Pentene	0.890	0.119	0.025	0.546	0.037	0.004	2.108	0.301	0.038
n-Hexane	13.537	2.548	0.542	4.436	0.953	0.365	12.008	2.091	0.465
Benzene	6.389	1.035	0.398	3.219	0.616	0.201	22.022	1.835	0.364
Cyclohexane	4.682	1.046	0.241	2.636	0.664	0.175	13.822	1.15	0.173
Toluene	8.458	1.750	0.474	1.913	0.578	0.211	4.52	1.291	0.38
Ethyl Benzene	5.920	0.385	0.053	0.396	0.078	0.024	0.663	0.137	0.032
m&p -Xylene	8.529	0.757	0.157	6.514	0.802	0.161	2.737	0.569	0.148
o-Xylene	0.908	0.156	0.049	1.129	0.129	0.030	0.854	0.183	0.045
Isopropyl Benzene	1.175	0.340	0.027	0.986	0.075	0.009	0.8	0.2	0.012
1,3,5- Trimethylbenz	0.212	0.046	0.013	0.454	0.108	0.016	0.663	0.103	0.017
1,2,4- Trimethylbenz	0.589	0.144	0.042	0.473	0.131	0.028	1.323	0.207	0.043
n-Decane	0.651	0.153	0.037	0.927	0.232	0.041	1.508	0.191	0.028
1,2,3- Trimethylbenz	0.159	0.044	0.011	0.169	0.037	0.006	0.187	0.043	0.012

 Table 4. Validated auto-GC statistics 1st quarter 2013

Units ppbV	Oak 2Q13	Solar 2Q13	Palm 2Q13
Species	Mean	Mean	Mean
Ethane	4.369	4.652	5.384
Ethylene	0.313	0.210	0.283
Propane	2.489	2.702	2.959
Propylene	0.215	0.121	0.199
Isobutane	0.929	0.872	1.226
n-Butane	1.396	1.233	1.798
t-2-Butene	0.037	0.012	0.038
1-Butene	0.027	0.029	0.084
c-2-Butene	0.022	0.008	0.027
Isopentane	1.198	0.673	1.184
n-Pentane	0.727	0.469	0.782
1,3-Butadiene	0.023	0.009	0.024
t-2-Pentene	0.040	0.005	0.050
1-Pentene	0.022	0.005	0.034
c-2-Pentene	0.017	0.002	0.027
n-Hexane	0.245	0.173	0.306
Benzene	0.189	0.093	0.167
Cyclohexane	0.117	0.082	0.094
Toluene	0.255	0.104	0.238
Ethyl Benzene	0.023	0.011	0.014
m&p -Xylene	0.078	0.070	0.089
o-Xylene	0.023	0.013	0.025
Isopropyl Benzene	0.009	0.002	0.003
1,3,5-Trimethylbenz	0.006	0.007	0.007
1,2,4-Trimethylbenz	0.027	0.013	0.020
n-Decane	0.020	0.022	0.013
1,2,3-Trimethylbenz	0.015	0.003	0.015

 Table 5. Unvalidated auto-GC mean statistics 2nd quarter 2013



Figure 2. Mean ppbV for 27 species at three auto-GCs, 1st quarter 2013 (validated data)

Figure 3. Mean ppbV for 27 species at three auto-GCs, 2nd quarter 2013 (unvalidated data)



2. Benzene Concentrations in Residential Areas

As has been discussed in past reports, benzene concentrations in the recent years are lower than in the first three years of operation at the two auto-GCs operated at Oak Park CAMS 634 and Solar Estates CAMS 633. Also, in recent years (2008 – 2013), concentration means have generally been relatively constant. No individual one-hour benzene values have been measured above the AMCV since the beginning of monitoring. A time series for hourly benzene in ppbV units with two points annotated by date appears in Figure 4, below, for Oak Park. The two points from 6:00 CST Saturday January 27, 2007 and 4:00 CST Friday November 6, 2009 are identified as statistical outliers in that they are unusually high given the balance of the data. The same graph is reproduced without the two outlier points in Figure 5, on page 19. The time series for Solar Estates appears in Figure 6, on page 19. Note the different y-axis scales for the two sites, as Oak Park does tend to measure higher concentrations than Solar Estates. Figure 7, on page 19, shows the time series for the three-year old TCEQ Palm auto-GC, with an apparent outlier on January 30, 2012 indicated. Note that for all three sites, the data from the second quarter 2013 have not been validated yet.





Figure 5. Oak Park hourly benzene Mar. 2005 – June 30, 2013, ppbV units, two outliers from January 27, 2007 and November 6, 2009 removed



Figure 6. Solar Estates hourly benzene Mar. 2005 – June 30, 2013, ppbV units, no observations greater than the TCEQ's AMCV



Figure 7. TCEQ Palm hourly benzene June 1, 2010 – June 30, 2013, ppbV units, individual elevated value noted, no observations greater than the TCEQ's AMCV



Table 6, on page 21, shows the second quarter average concentrations from the auto-GCs for benzene from 2005 – 2013 (2013 data unvalidated). Because monitoring began in March 2005, this is the first opportunity to look at nine years of one quarter's data. The second quarter means are graphed in Figure 8, on page 21. The means for TCEQ's Palm site are shown for 2011 through 2013 only. The second quarter averages at UT sites from 2008 through 2013 are statistically significantly lower than in the second quarters of the project's first two years, and this finding is similar to findings for other quarters in recent reports on this project; However, over the last two years the quarterly means at Oak Park are higher than in the preceding four years.

2 nd qtr/year	Oak	Solar	Palm
2005	0.203	0.254	
2006	0.307	0.182	
2007	0.316	0.228	
2008	0.137	0.13	
2009	0.173	0.145	
2010	0.137	0.145	
2011	0.129	0.131	0.254
2012	0.208	0.098	0.182
2013	0.189	0.093	0.228

Table 6. Mean statistics for Benzene at Oak Park and Solar Estates, 2nd quarter 2005 – 2013 Palm 2011 – 2013, ppbV units (2013 data unvalidated)

Figure 8. Mean concentrations of benzene during second quarters of each year at Oak Park (red) and Solar Estates (green), 2005 – 2013 with lower values in 2008 – 2013 compared with 2006 – 2007, and Palm (blue) 2011 – 2013 (2013 data unvalidated)



3. Sulfur Dioxide Measurements at Corpus Christi Monitors

Since monitoring of SO_2 began, concentrations have been high enough frequently enough that the JIH CAMS 630 site does not comply with the EPA's current SO_2 NAAQS (described on page 11). However, concentrations appear to have declined over the course of 2012 and 2013 at JIH CAMS 630. If the lower concentrations continue through 2013, then the JIH site would come into compliance with the NAAQS.

Research to date has concluded that emissions from ships operating in the Corpus Christi ship channel and docked along the shores are major contributors to elevated SO_2 concentrations at JIH and to some extent at other sites. The main source of SO_2 is believed to be the result of emissions from diesel engines used in dockside ships' auxiliary engines running on high-sulfur

diesel fuel. However, over the course of the last half of 2012 and early 2013, SO₂ concentrations at JIH have been steadily declining. On June 1, 2012 new regulations for sulfur content in diesel fuel for marine vessels went into effect. Thus, both small ships motoring in the ship channel and large ships docked in the ship channel are likely now producing lower emissions of SO₂. The change in measured concentrations is reflected in Figure 9, below, showing the mean concentration of SO₂ at the JIH C630 site by wind direction (5-degree bins) for the second quarter of 2012 and the second quarter of 2013. Concentrations in the peak directions in 2012 were significantly lower in the second quarter of 2013. Similar results are shown in Figure 10, on page 23, showing the mean concentration of SO₂ at the TCEQ's Avery Point site by wind direction (5-degree bins) for the second quarters of 2012 and 2013. Avery Point is directly south across the ship channel from JIH. In both Figure 9 and 10, the peak mean concentration wind directions are noted. The shift in Figure 9 from a peak at 230 degrees to one at 250 degrees may be based on the fact that southwesterly winds in Corpus Christi are more light and variable, and are also relatively infrequent. Thus, wind directionality measurements are not as accurate. UT will continue to study the SO₂ data in the future.

Figure 9. Average JIH CAMS 630 SO_2 by wind direction 2^{nd} quarter 2012 (magenta) and 2013 (red)





Figure 10. Average Avery Point CAMS 630 SO₂ by wind direction 2nd quarter 2012 (magenta) and 2013 (red)

Conclusions from the Second Quarter 2013 Data

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

- No exceedances of the EPA SO₂ NAAQS level were measured this quarter at UT sites or at TCEQ sites, including the TCEQ's Avery Point site. Dockside ship emissions that had affected the UT JIH CAMS 630 site and the Avery Point appear to have diminished for the third quarter in a row, which may be relatable to new federal rules on marine fuel. If trends continue, the JIH site would come into compliance with the SO₂ NAAQS after 2013.
- First quarter 2013 and second quarter 2013 concentrations at the auto-GCs remain well below the TCEQ's AMCVs for all species tracked for this project. Trends in quarterly average benzene concentrations remain relatively flat.
- Periodic air pollution events continue to be measured on a routine basis.

Further analyses will be provided upon request.

APPENDIX B

May 9, 2013 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 2003, NRC Building 12:00 pm – 2:00 pm May 9, 2013

Advisory Board Members	Present:
Ms. Joyce Jarmon	

Corpus Christi Community Council

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Ex-Officio Members of the	Board Present:
Ms Susan Clewis	TCFO

Ms. Susan Clewis	ICEQ - Region 14
Ms. Rosario Torres	TCEQ – Region 14
Ms. Micole Gonzalez – St John	TCEQ – Region 14
Mr. Chris Owen	TCEQ – Region 14

Guests Present: Ms. Tara Capobianco TCEQ

The University of Texas at Austin
The University of Texas at Austin
The University of Texas at Austin

I. Call to Order and Welcome

Mr. Vincent Torres called the meeting to order at 12:10 pm.

II. Project Overview and Status

A. Inner Harbor

Mr. Vincent Torres reminded everyone that, as per directions from the Advisory Board at the meeting held on November 13, 2012, no further effort would be made to find a replacement location for the Inner Harbor site if, once all site locations being considered and suggested by the Board were –investigated, none proved acceptable. This turned out to be the case. So approval to cease looking for a replacement site and use the funding saved to extend the life of the project was sought and obtained from the court.

B. Financial Status of Project

Mr. Torres reported that all of the funds from the original COCP Award have been fully expended. All funding for the project is now coming from the Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi Phase 1B. This funding will allow the project to continue the operation of the six monitoring sites in the network through September 2015.

C. Phase II – Site Operation and Maintenance

Dr. Dave Sullivan gave an update on and analysis of monitoring data collected by the Project for the past 7 years. The Project has now collected 7.5 to 8 years of monitoring data.

It was reported that Windows 7 maybe causing problems with the cameras. Mr. Torres mentioned that he will follow up with the UT CEER IT Specialist to see if that is where the problems is located. **ACTION ITEM**

III. Follow up to Old Business/Action Items

Dr. Sullivan gave a presentation on the Ambient Air Monitoring Program (AAMP) for the Dona Park Neighborhood during the Active Remediation Activities at the former ASARCO/Encycle Facility. Dr. Sullivan reported that the Program had 5 Goals:

1) Supplement current monitoring with particulate matter sized 10 and 2.5 microns (PM_{10} and $PM_{2.5}$) samplers to evaluate emissions controls, mitigate potential for PM at Dona Park exceeding conservative/protective action levels.

2) Supplement current monitoring with speciated metals to mitigate potential for ESL exceedances.

3) Alert TCEQ, WESTON, and Encycle Trustee if real-time PM measurements reach action levels.

4) Deploy mobile "roving" real-time PM_{10} and $PM_{2.5}$ monitors and speciated metals analytical samplers at least 2 times a week, or when winds favor a northerly component.

5) Asbestos air sampling to be performed at the discretion of the TCEQ, based on remediation activities.

There are 2 Project Phases of the AAMP. The first Phase is Demolition. It was in effect from April 11, 2011 through August 15, 2012. The second Phase is Remediation and it is a currently on-going.

TCEQ Toxicologists are reviewing the results while sampling is continuing during the site cleanup and remediation phases. Additional findings will be reported as information becomes available.

IV. Advisory Board

Mr. Torres announced to the Advisory Board that Gretchen Arnold has retired from her position at the Corpus Christi Pollution Prevention Partnership at TAMUCC. He asked the Advisory Board if they would support keeping Gretchen on the Advisory Board because of her expertise in air quality issues. Ms. Joyce Jarmon agreed and thought it was a good idea for Gretchen to remain on the Board. It was also agreed that Gretchen's replacement at TAMUCC, Christina Cisneros be asked if she would like to be on the Advisory Board. All of these actions would be subject to approval by the Court.

V. Adjourn

The meeting adjourned at 2:00pm.

APPENDIX C

Financial Report of Expenditures Financial Report of Interest Earned

Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi - Phase 1B

Accounting Report for the Quarter 04/01/13 - 06/30/13

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

Total Grant Amount:	\$2,745,371.68
Total Interest Earned:	\$389,864.11
Total Funds Received:	\$3,135,235.79

B. Summary of Expenditures Paid by Air Toxics Funds

	ſ	Yr 1	Year 2	Adjustments	Adjustments	Adjusted	Prior Activity	Current Activity	Encumbrances	Remaining Balance
		Budget	Budget	Prior Quarter	This Quarter	Budget		04/01/13 - 06/30/13		04/01/13 - 06/30/13
	-									
Salaries-Prof	12	\$111,654.00	\$183,063.49	(\$29,495.84)		\$265,221.65	(\$37,109.01)	(\$3,570.51)	\$0.00	\$224,542.13
Fringe	14	\$24,563.88	\$40,273.97	\$0.00	\$0.00	\$64,837.85	(\$10,428.93)	(\$2,083.45)	\$0.00	\$52,325.47
Salaries-CEER	15	\$0.00	\$0.00	\$29,495.84		\$29,495.84	(\$9,662.10)	(\$3,725.48)	\$0.00	\$16,108.26
Salary Holding	16	\$133,401.93	\$0.00	(\$133,401.93)		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Quality Assurance	41	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cell Phone Allowance	42	\$0.00	\$300.00	\$60.00		\$360.00	(\$180.00)	(\$90.00)	\$0.00	\$90.00
SEP Reserve	43	\$10,800.00	\$0.00	\$0.00	\$0.00	\$10,800.00	\$0.00	\$0.00	\$0.00	\$10,800.00
Contingency	47	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Monthly M&O	50	\$0.00	\$0.00	\$29,657.32		\$29,657.32	(\$5,949.70)	(\$11,434.23)	(\$4,790.80)	\$7,482.59
Equipment & Spare Parts	51	\$0.00	\$32,584.00	\$0.00	\$0.00	\$32,584.00	(\$5,250.23)	(\$17,780.61)	(\$800.00)	\$8,753,16
Telephone SWB-DSL/RR	52	\$0.00	\$8,454.00	\$1,946.00		\$10,400.00	(\$4,426.88)	(\$2,120.99)	\$0.00	\$3,852.13
Electric	53	\$0.00	\$22,438.00	\$4,062.00		\$26,500.00	(\$11,580.05)	(\$5,164.56)	\$0.00	\$9,755.39
Gases	54	\$0.00	\$10,811.00	\$1,439.00		\$12,250.00	(\$3,656.33)	(\$1,977.81)	(\$4,046.58)	\$2,569.28
Consultant Services - Holding	60	\$80,000.00	\$0.00	(\$80,000.00)		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Consultant Services - ORSAT/TMS	61-62	\$0.00	\$194,750.38	\$163,777.00		\$358,527.38	(\$118,241.06)	(\$85,892.36)	\$0.00	\$154,393.96
Analytical	68	\$0.00	\$27,839.39	\$12,160.61	\$0.00	\$40,000.00	(\$23,930.00)	(\$3,328.00)	\$0.00	\$12,742.00
Travel	75	\$0.00	\$3,000.00	\$300.00	\$0.00	\$3,300.00	(\$1,031.14)	(\$269.48)	(\$0.02)	\$1,999.36
Equipment	80	\$0.00	\$45,000.00	\$0.00	\$45,000.00	\$45,000.00	\$0.00	\$0.00	(\$38,000.00)	\$7,000.00
Indirect Costs	90	\$54,062.97	\$78,527.13	\$0.00	\$0.00	\$132,590.10	(\$34,716.82)	(\$20,615.63)	\$0.00	\$77,257.65
TOT	ALS	\$414,482.78	\$647,041.36	\$0.00	\$45,000.00	\$1,061,524.14	(\$266,162.25)	(\$158,053.11)	(\$47,637.40)	\$589,671.38

C. Interest Earned by Air Toxics Funds as of

04/01/13 - 06/30/13

Prior Interest Earned:	\$389,220.73
Interest Earned This Quarter:	\$643.38
Total Interest Earned to Date:	\$389,864.11

D. Balance of Air Toxics Funds as of 04/01/13 - 06/30/13

Total Grant Amount:	\$2,745,371.68	
Total Interest Earned:	\$389,864.11	
Total Expenditures:	(\$424,215.36)	
Remaining Balance:	\$2,711,020.43	

I certify that the numbers are accurate and reflect acutal expenditures for the quarter 26-7700

Neighborhood Air Toxics Modeling Project for Houston and Corpus Christi - Stage 1 Phase 1A

Accounting Report for the Quarter 04/01/13 - 06/30/13

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

Total Grant Amount:	\$1,863,081.22
Total Interest Earned:	\$344,222.10
Interest Transferred to Phase 1B	(\$344,222.10)
Total Funds Received:	\$1,863,081,22

B. Summary of Expenditures Paid by Air Toxics Funds

	[Yr 1 and Yr2	Year 3	Adjustments	Adjusted	Prior Activity	Current Activity	Encumbrances	Remaining Balance
		Budget	Budget	this Quarter	Budget		10/01/12 - 12/31/12		12/31/2012
Salaries-Prof	12	\$616,882.00	\$228,508.00	(\$95,903.26)	\$749,486.74	(\$749,486.74)	\$0.00	\$0.00	\$0.00
Salaries-CEER	15	\$66,780.00	\$24,045.00	(\$11,435.81)	\$79,389.19	(\$79,389.19)	\$0.00	\$0.00	\$0.00
Fringe	14	\$149,185.00	\$55,852.00	(\$22,669.10)	\$182,367.90	(\$182,367.90)	\$0.00	\$0.00	\$0.00
Supplies	50	\$61,991.00	-\$5,831.00	(\$21,633.36)	\$34,526.64	(\$34,526.64)	\$0.00	\$0.00	\$0.00
Contingency	51	\$6,746.00	\$27,805.00	(\$34,551.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Consultants	60	\$22,500.00	\$2,500.00	(\$25,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Subcontracts	61-63	\$600,000.00	\$0.00	(\$54,943.78)	\$545,056.22	(\$545,056.22)	\$0.00	\$0.00	\$0.00
Modeling/Computer Sv:	67	\$46,500.00	\$12,500.00	(\$59,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Computation Center	68	\$0.00	\$1,800.00	\$0.00	\$1,800.00	(\$1,800.00)	\$0.00	\$0.00	\$0.00
Tuition	71	\$17,727.00	\$0.00	(\$125.00)	\$17,602.00	(\$17,602.00)	\$0.00	\$0.00	\$0.00
Travel	75	\$15,000.00	\$5,000.00	(\$17,403.03)	\$2,596.97	(\$2,596.97)	\$0.00	\$0.00	\$0.00
Equipment	80	\$17,500.00	\$7,500.00	(\$17,755.00)	\$7,245.00	(\$7,245.00)	\$0.00	\$0.00	\$0.00
Indirect Costs	90	\$243,122.00	\$53,952.00	(\$54,063.44)	\$243,010.56	(\$243,010.56)	\$0.00	\$0.00	\$0.00
TOTALS		\$1,863,933.00	\$413,631.00	(\$414,482.78)	\$1,863,081.22	(\$1,863,081.22)	\$0.00	\$0.00	\$0.00

C. Interest Earned by COCP Funds as of 12/31/2012

Prior Interest Earned:	\$344,222.10
Interest Earned This Quarter:	\$0.00
Interest Transferred to Phase 1B	-\$344,222.10
Total Interest Earned to Date:	\$0.00

D. Balance of COCP Funds as of 12/31/2012

Remaining Balance:	\$0.00	
Total Expenditures:	(\$1,863,081.22)	
Total Interest Earned:	\$0.00	
Total Grant Amount:	\$1,863,081.22	

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

8/13/2013