

# **AIR QUALITY RESEARCH PROGRAM**

**Texas Commission on Environmental Quality  
Contract Number 582-10-94300  
Awarded to The University of Texas at Austin**

**Quarterly Report**

**December 1, 2011 through February 29, 2012**

**Submitted to**

**David Brymer  
Texas Commission on Environmental Quality  
12100 Park 35 Circle  
Austin, TX 78753**

**Prepared by**

**David T. Allen, Principal Investigator  
The University of Texas at Austin  
10100 Burnet Rd. MC R7100  
Austin, TX 78758**

**March 12, 2012**

## **Texas Air Quality Research Program**

### **Quarterly Progress Report**

**March 12, 2012**

#### **Overview**

The goals of the State of Texas Air Quality Research Program (AQRP) are:

- (i) to support scientific research related to Texas air quality, in the areas of emissions inventory development, atmospheric chemistry, meteorology and air quality modeling,
- (ii) to integrate AQRP research with the work of other organizations, and
- (iii) to communicate the results of AQRP research to air quality decision-makers and stakeholders.

On April 30, 2010, the Texas Commission on Environmental Quality (TCEQ) contracted with the University of Texas at Austin to administer the AQRP. For the 2010-2011 biennium, the AQRP has approximately \$4.9 million in funding available. Following discussions with the TCEQ and an Independent Technical Advisory Committee (ITAC) concerning research priorities, the AQRP released a call for proposals in May, 2010. Forty-five proposals, requesting \$12.9 million in research funding were received by the due date of June 25, 2010. These proposals were reviewed by the ITAC for technical merit, and by the TCEQ for relevancy to the State's air quality research needs. The results of these reviews were forwarded to the AQRP's Advisory Council, which made final funding decisions in late August, 2010. Successful proposers were notified, and subcontracts were initiated. The subcontracting involved two phases. First, a sub-agreement was established with each institution specifying terms and conditions. Second, once a sub-agreement was in place and a project Work Plan was approved, a Task Order was issued authorizing work to commence. As of November 30, 2011, all projects had ended. Final reports on most projects have been posted to the AQRP website. The remaining draft final reports are in the final stages of review. The status of each project is described in this progress report.

In June 2011, the TCEQ renewed the AQRP for the 2012-2013 biennium. Funding of \$1,000,000 for the FY 2012 period was awarded in February 2012.

## Background

Section 387.010 of HB 1796 (81<sup>st</sup> Legislative Session), directs the Texas Commission on Environmental Quality (TCEQ, Commission) to establish the Texas Air Quality Research Program (AQRP).

Sec. 387.010. AIR QUALITY RESEARCH. (a) The commission shall contract with a nonprofit organization or institution of higher education to establish and administer a program to support research related to air quality.

(b) The board of directors of a nonprofit organization establishing and administering the research program related to air quality under this section may not have more than 11 members, must include two persons with relevant scientific expertise to be nominated by the commission, and may not include more than four county judges selected from counties in the Houston-Galveston-Brazoria and Dallas-Fort Worth nonattainment areas. The two persons with relevant scientific expertise to be nominated by the commission may be employees or officers of the commission, provided that they do not participate in funding decisions affecting the granting of funds by the commission to a nonprofit organization on whose board they serve.

(c) The commission shall provide oversight as appropriate for grants provided under the program established under this section.

(d) A nonprofit organization or institution of higher education shall submit to the commission for approval a budget for the disposition of funds granted under the program established under this section.

(e) A nonprofit organization or institution of higher education shall be reimbursed for costs incurred in establishing and administering the research program related to air quality under this section. Reimbursable administrative costs of a nonprofit organization or institution of higher education may not exceed 10 percent of the program budget.

(f) A nonprofit organization that receives grants from the commission under this section is subject to Chapters 551 and 552, Government Code.

The University of Texas at Austin was selected by the TCEQ to administer the program. A contract for the administration of the AQRP was established between the TCEQ and the University of Texas at Austin on April 30, 2010. Consistent with the provisions in HB 1796, up to 10% of the available funding is to be used for program administration; the remainder (90%) of the available funding is to be used for research projects, individual project management activities, and meeting expenses associated with an Independent Technical Advisory Committee (ITAC).

## Research Project Cycle

The Research Program is being implemented through an 8 step cycle. The steps in the cycle are described from project concept generation to final project evaluation for a single project cycle. During the first quarter of AQRP operation, steps 1-5 were completed for the first project cycle. During the second quarter, sub-agreements for most projects were established and Task Orders began to be initiated (step 6 and parts of step 7). In the third quarter, the final sub-agreements were executed and Task Orders were initiated for the majority of the projects. In the fourth quarter, Task Orders were finalized for the remaining Projects and work was in progress on every Project. During the fifth quarter, work progressed on all projects, including the DFW Field Study. On August 31, 2011, six (6) projects were completed and the remaining projects were issued a 90-day contract extension. On November 30, 2011, the remaining projects were completed and reports were submitted.

- 1.) The project cycle is initiated by developing (in year 1) or updating (in subsequent years) the strategic research priorities. The AQRP Director, in consultation with the ITAC, and the TCEQ developed initial research priorities; the research priorities were released along with the initial Request for Proposals in May, 2010. An initial Strategic Plan was released in July, 2010. The Request for Proposals and the Strategic Plan are available at <http://aqrp.ceer.utexas.edu/>
- 2.) Project proposals relevant to the research priorities are solicited. The initial Request for Proposals was released on May 25, 2010. Proposals were due by June 25, 2010. Forty-five proposals, requesting \$12.9 million in funding, were received by the deadline.
- 3.) The Independent Technical Advisory Committee (ITAC) performs a scientific and technical evaluation of the proposals. For the initial round of proposals, the ITAC reviewed the proposals in conference calls and in a meeting held in Austin, Texas. The reviews were completed on July 22, 2010. Twelve proposals were highly recommended for funding; twelve proposals were recommended for funding, and 21 proposals were not recommended for funding.
- 4.) The project proposals and ITAC recommendations are forwarded to the TCEQ. The TCEQ evaluates the project recommendations from the ITAC and comments on the relevancy of the projects to the State's air quality research needs. For the first round of proposals, the TCEQ rated, as highly recommended, the same 12 research projects that were highly recommended by the ITAC. The TCEQ also recommended for funding the same 12 proposals that the ITAC recommended, however, the rank ordering of these 12 recommended proposals differed between the two groups.
- 5.) The recommendations from the ITAC and the TCEQ are presented to the Council for their approval. The Council also provides comments on the strategic research priorities. For the first group of proposals, the Council approved for funding all of the projects that were highly recommended by both the ITAC and TCEQ (12 projects). In addition, the Council approved for funding several projects in the recommended category, which were highly ranked within the recommended category by both the ITAC and TCEQ.

- 6.) All Investigators are notified of the status of their proposals, either funded, not funded, or not funded at this time, but being held for possible reconsideration if funding becomes available.
- 7.) Funded projects are assigned a Project Manager at UT-Austin and a Project Liaison at TCEQ. The project manager at UT-Austin is responsible for ensuring that project objectives are achieved in a timely manner and that effective communication is maintained among investigators involved in multi-institution projects. The Project Manager has responsibility for documenting progress toward project measures of success for each project. The Project Manager works with the researchers, and the TCEQ to create an approved work plan for the project. The Project Manager also works with the researchers, TCEQ and the Program's Quality Assurance officer to develop an approved QAPP for each project. The Project Manager reviews monthly, annual and final reports from the researchers and works with the researchers to address deficiencies. All respondents to the RFP have been notified of their award status. A Project Manager has been assigned to all projects and they have made initial contact with their PIs. TCEQ has assigned a TCEQ Project Liaison to each project.
- 8.) The AQRD Director and the Project Manager for each project describes progress on the project in the ITAC and Council meetings dedicated to on-going project review. Six projects have been completed, having met project objectives, as of August 31. All projects were reviewed by the ITAC at a Data Workshop held in Austin on September 27 and 28, 2011.
- 9.) The project findings will be communicated through multiple mechanisms. Final reports will be posted to the Program web site; research briefings will be developed for the public and air quality decision makers; an annual research conference/data workshop will be held.

## **Program Timeline, May 1, 2010-November 30, 2011**

May 2010: Finalize membership in Council and ITAC; solicit project proposals

June 2010: Proposals due; send proposals to ITAC for review.

July 2010: ITAC conducts review and ranking of proposals; TCEQ to review immediately after ITAC ratings are complete, Council to meet to approve projects immediately after TCEQ work is complete.

August 2010: Council to meet to approve projects immediately after TCEQ work is complete.

September 2010 – February 2011: Issue contracts and Task Orders for approved projects

September 2010-April 2011: Project reports and deliverables completed on an on-going basis

September 2010: Program quarterly report due to TCEQ

December 2010: Program quarterly report due to TCEQ

March 2010: Program quarterly report due to TCEQ

April 2011: Project progress report to ITAC and TCEQ; strategic plan review.

May 2011: Project progress reports to Council; strategic plan review. Program quarterly report due to TCEQ.

May 2011-November 2011: Projects continue with ITAC, TCEQ, and Council input; project reports and deliverables completed on an on-going basis

August 2011-November 2011: Project completion; Project final report completed. Contract Extensions granted, if needed.

September 27 and 28, 2011: AQRP Data Workshop

November 30, 2011: Project completion date for all extended projects.

## **RESEARCH PROJECTS**

During the seventh quarter of operation, Program Administration focused on the close-out and final payment of invoices for projects, as well as the completion of reporting activities. Project Managers worked with the Principal Investigators (PIs) to finalize reports. Project Managers and TCEQ Liaisons are in the final stages of reviewing the Final Reports.

Once all reviews are complete the Final Report for each project is posted on the AQRP website at <http://aqrp.ceer.utexas.edu/projects.cfm>.

A State of the Science project was initiated in February to help determine the high priority scientific and technical issues that could be addressed in the 2012-2013 biennium.

A summary of the status of the projects approved for funding for FY 2010-2011 follows.

---

**Project 10-006**

**STATUS: Active – February 16, 2011**

**Completed - November 30, 2011**

---

***Quantification of Industrial Emissions of VOCs, NO<sub>2</sub> and SO<sub>2</sub> by SOF and Mobile DOAS***

Chalmers University – Johan Mellqvist  
University of Houston – Bernhard Rappenglück

AQRP Project Manager – Dave Sullivan  
TCEQ Project Liaison – John Jolly

**Funded Amount:** \$484,662  
(\$262,179 Chalmers, \$222,483 UH)

**Expended Amount:** \$480,128.11  
(\$262,179 Chalmers, \$217,949.11 UH)

**Amount Returned to AQRP:** \$4,533.89  
(\$0 Chalmers, \$4,533.89 UH)

**Project Status:**

Project 10-006 is complete and the Final Report is posted to the AQRP website.

As a future activity, the project Investigators plan to submit 2 or 3 papers to the Journal of Geophysical Research utilizing results from this campaign. The papers are currently in the early stages of development.

---

**Project 10-008**

**STATUS: Active – October 21, 2010**

**Completed - September 30, 2011**

---

***Factors Influencing Ozone-Precursor Response in Texas Attainment Modeling***

Rice University – Daniel Cohan  
ENVIRON International – Greg Yarwood

AQRP Project Manager – Elena McDonald-Buller  
TCEQ Project Liaison – Jim Smith

**Funded Amount:** \$178,796  
(\$128,851 Rice, \$49,945 ENVIRON)

**Expended Amount:** \$176,567.10  
(\$126,622.32 Rice, \$49,944.78 Environ)

**Amount Returned to AQRP:** \$2,228.90  
(\$2,228.68 Rice, \$0.22 Environ)

**Project Status:**

Project 10-008 is complete and the Final Report is posted to the AQRP website.

The following paper is currently under development:

*Constraining ozone-precursor responsiveness using ground-based measurements*

A. Digar, D.S. Cohan, X. Xiao, K.M. Foley, B. Koo, G. Yarwood

In preparation for Journal of Geophysical Research

---

**Project 10-009**

**STATUS: Active – September 8, 2010**

**Completed - November 30, 2011**

---

***Additional Flare Test Days for TCEQ Comprehensive Flare Study***

University of Texas at Austin – Vincent Torres

AQRP Project Manager – Cyril Durrenberger  
TCEQ Project Liaison – Russell Nettles

**Funded Amount:** \$591,332

**Expended Amount:** \$591,306.66

**Amount Returned to AQRP:** \$25.34

**Project Status:**

Project 10-009 is complete and the Final Report is posted to the AQRP website.

The following papers were submitted to Industrial & Engineering Chemistry Research for a Special Issue on Industrial Flaring:

*Emissions of Nitrogen Oxides from Flares Operating at Low Flow Conditions*

Torres, Vince; Herndon, Scott; Wood, Ezra; Al-Fadhli, Fahad; Allen, David

Status: In review

*Impacts Of Emission Variability and Flare Combustion Efficiency on Ozone Formation in the Houston-Galveston-Brazoria Area*

Pavlovic, Radovan; Al-Fadhli, Fahad; Kimura, Yosuke; Allen, David; McDonald-Buller, Elena

Status: In review

*Detecting fugitive emissions of 1,3-butadiene and styrene from a petrochemical facility: An application of a mobile laboratory and a modified proton transfer reaction mass spectrometer - NO+ PTR-MS*

Knighton, W.; Herndon, Scott; Wood, Ezra; Fortner, Edward; Onasch, Timothy; Wormhoudt, Joda; Kolb, Charles; Lee, Ben; Zavala, Miguel; Molina, Luisa; Jones, Marvin

Status: In revision

*Comparison of remote sensing and extractive sampling measurements of flare combustion efficiency*

Wormhoudt, Joda; Herndon, Scott; Franklin, Jonathan; Wood, Ezra; Knighton, W.; Evans, Scott; Laush, Curtis; Sloss, Mark; Spellicy, Robert

Status: In review

*Direct measurement of volatile organic compound emissions from industrial flares using real-time on-line techniques: Proton Transfer Reaction Mass Spectrometry and Tunable Infrared Laser Differential Absorption Spectroscopy.*

Knighton, W.; Herndon, Scott; Franklin, Jon; Wood, Ezra; Wormhoudt, Joda; Brooks, William; Fortner, Edward; Allen, David

Status: In revision

*Combustion and Destruction/Removal Efficiencies of in-use Chemical Flares in the Greater Houston area*

Wood, Ezra; Herndon, Scott; Fortner, Edward; Onasch, Timothy; Wormhoudt, Joda; Kolb, Charles; Knighton, W.; Lee, Ben; Zavala, Miguel; Molina, Luisa; Jones, Marvin

Status: In revision

*Particulate Emissions Measured During the TCEQ Comprehensive Flare Emission Study*

Fortner, Edward; Brooks, William; Onasch, Timothy; Canagaratna, Manjula; Massoli, Paola; Jayne, John; Franklin, Jon; Knighton, W.; Wormhoudt, Joda; Worsnop, Douglas; Kolb, Charles; Herndon, Scott

Status: In revision

*Industrial flare performance at low flow conditions: Part 1. Study Overview*

Torres, Vince; Herndon, Scott; Kodesh, Zach; Allen, David

Status: In revision

*Industrial flare performance at low flow conditions: Part 2. Steam- and Air-Assisted Flares*

Torres, Vince; Herndon, Scott; Allen, David

Status: In revision

*Application of the carbon balance method to flare emissions characteristics*

Herndon, Scott; Nelson, David; Wood, Ezra; Knighton, W.; Kolb, Charles; Kodesh, Zach; Torres, Vince; Allen, David

Status: In revision

*Impact of flare destruction efficiency and products of incomplete combustion on ozone formation in Houston, Texas*

Al-Fadhli, Fahad; Kimura, Yosuke; McDonald-Buller, Elena; Allen, David

Status: Accepted

*Temporal Variability in Flaring Emissions in the Houston-Galveston Area*

Allen, David; Pavlovic, Radovan; McDonald-Buller, Elena

Status: Accepted

The following presentations will be given at the Air & Waste Management Association June 2012 Conference, and papers will be published in the Conference Proceedings:

*Overview of the Texas Commission on Environmental Quality 2010 Flare Study*

Torres, Allen, Herndon, Kodesh

*NOx Emissions from Industrial Flaring*

Torres, Fahad M. Al-Fadhli, Allen, Herndon, Ezra Wood

---

**Project 10-015**

**STATUS: Active – March 4, 2011**

**Completed - November 30, 2011**

---

***An Assessment of Nitryl Chloride Formation Chemistry and its Importance in Ozone Non-attainment areas in Texas***

ENVIRON International – Greg Yarwood

AQRP Project Manager – Elena McDonald-Buller  
TCEQ Project Liaison – Mark Estes

**Funded Amount:** \$201,280

**Expended Amount:** \$201,278.63

**Amount Returned to AQRP:** \$1.37

**Project Status:**

Project 10-015 is complete and the Final Report is posted to the AQRP website.

The following papers are currently under development:

*Measurements of Nitryl Chloride in Several Metropolitan Areas and Comparison with Regional Models*

J.M. Roberts, H. Osthoff, E.J. Williams, B. Lerner, J.A. Neuman, J.B. Nowak, S.B. Brown, W.P. Dube, N.L. Wagner, T.B. Ryerson, I.B. Pollack, J.S. Holloway, A. Middlebrook, R. Bahreini, B. Koo, G. Yarwood

In preparation for Journal of Geophysical Research

*Hydrochloric acid at the Pasadena ground site during CalNex 2010 and its role as a source of aerosol chloride*

J.M. Roberts, P.R. Veres, A.K. Cochran, C. Warneke, J. de Gouw, R. Weber, R. Ellis, T. Vandenboer, J. Murphy, B. Koo, G. Yarwood

In preparation for Journal of Geophysical Research

---

**Project 10-020**

**STATUS: Active – March 5, 2011**

**Completed - November 30, 2011**

---

***NO<sub>x</sub> Reactions and Transport in Nighttime Plumes and Impact on Next-Day Ozone***

ENVIRON International – Greg Yarwood

AQRP Project Manager – Elena McDonald-Buller  
TCEQ Project Liaison – Dick Karp

**Funded Amount:** \$202,498

**Expended Amount:** \$202,493.48

**Amount Returned to AQRP:** \$4.52

**Project Status:**

Project 10-020 is complete and the Final Report is posted to the AQRP website.

Several papers are expected to be published based on this Project. Their titles and current status are below:

Accepted in Journal of Geophysical Research:

*The Effects of NO<sub>x</sub> Control and Plume Mixing on Nighttime Chemical Processing of Plumes from Coal-Fired Power Plants.*

Steven S. Brown, William P. Dubé, Prakash Karamchandani, Greg Yarwood, Jeff Peischl, Thomas B. Ryerson, J. Andrew Neuman, John B. Nowak, John S. Holloway, Rebecca A. Washenfelder, Charles A. Brock, Gregory J. Frost, Michael, Trainer, David D. Parrish, Frederick C. Fehsenfeld and A. R. Ravishankara

In preparation for Journal of Geophysical Research:

*Biogenic VOC Oxidation and Organic Aerosol Formation within an Urban Nocturnal Boundary Layer – Aircraft Vertical Profiles in Houston, TX.*

Steven S. Brown, William P. Dubé, Roya Bahreini, Ann M. Middlebrook, Charles A. Brock, Carsten Warneke, Joost A. de Gouw, Rebecca A. Washenfelder, Elliot Atlas, Jeff Peischl, Thomas B. Ryerson, J. Andrew Neuman, Jonathan B. Nowak, Michael Trainer, David D. Parrish, Frederick C. Feshenfeld and A. R. Ravishankara

In preparation for Atmosphere:

*Reactive Plume Modeling to Investigate NO<sub>x</sub> Reactions and Transport at Night*

Prakash Karamchandani, Shu-Yun Chen, Greg Yarwood, Steven S. Brown, David Parrish

In preparation for Atmosphere:

*Modeling Overnight Power Plant Plume Impacts on Next-Day Ozone Using a Plume-in-Grid Technique*

Greg Yarwood, Chris Emery, Steven S. Brown, David Parrish

---

**Project 10-021**

**STATUS: Active – October 11, 2010**

**Completed - August 31, 2011**

---

***Dry Deposition of Ozone to Built Environment Surfaces***

University of Texas at Austin – Richard Corsi

AQRP Project Manager – Gary McGaughey  
TCEQ Project Liaison – Jim Smith

**Funded Amount:** \$248,786

**Expended Amount:** \$248,786.41

**Amount Returned to AQRP:** -\$0.41

**Project Status:**

Project 10-021 is complete and the Final Report is posted to the AQRP website.

The Project Investigators plan to present findings from this project at the Air & Waste Management Association June 2012 Conference. The title of the submitted abstract is *Dry Deposition of Ozone to Built Environment Surfaces* and the authors are Yosuke Kimura, Dustin Poppendeck, Erin Darling, Elena McDonald-Buller, and Richard Corsi

---

**Project 10-022**

**STATUS: Active – February 16, 2011**

**Completed - November 30, 2011**

---

***Development of Speciated Industrial Flare Emission Inventories for Air Quality Modeling in Texas***

Lamar University – Daniel Chen

AQRP Project Manager – Vincent Torres  
TCEQ Project Liaison – Jim MacKay

**Funded Amount:** \$150,000

**Expended Amount:** \$132,790.80

**Amount Returned to AQRP:** \$17,209.20

**Project Status:**

Project 10-022 is complete and the Final Report is posted to the AQRP website.

The following paper was submitted to Industrial & Engineering Chemistry Research for a Special Issue on Industrial Flaring:

*Optimal Reduction of the C1-C3 Combustion Mechanism for the Simulation of Flaring*

Lou, Helen; Chen, Daniel; Martin, Christopher; Li, Xianchang; Li, Ku-Yen; Vaid, Hitesh; Singh, Kanwar Devesh; Gangadharan, Preeti

Status: In revision

The Project Investigators also plan to submit an article to the Journal of Clean Technologies and Environmental Policy.

---

**Project 10-024**

**STATUS: Active – February 16, 2011**

**Completed - September 30, 2011**

---

***Surface Measurements and One-Dimensional Modeling Related to Ozone Formation in the Suburban Dallas-Fort Worth Area***

Rice University – Robert Griffin  
University of Houston – Barry Lefer  
University of New Hampshire – Jack Dibb  
University of Michigan – Allison Steiner  
NCAR – Withdrawn

AQRP Project Manager – Vincent Torres  
TCEQ Project Liaison – Doug Boyer

**Funded Amount:** \$458,957

(\$225,662 Rice, \$98,134 Houston, \$70,747 New Hampshire \$64,414 Michigan)

**Expended Amount:** \$444,001.74

(\$223,769.99 Rice, \$88,914.46 Houston, \$70,719.78 New Hampshire, \$60,597.51 Michigan)

**Amount Returned to AQRP:** \$14,955.26

(\$1,892.01 Rice, \$9,219.54 Houston, \$27.22 New Hampshire, \$3,816.49 Michigan)

**Project Status:**

Project 10-024 is complete and the Final Report is posted to the AQRP website.

The Project Investigators plan to submit articles to the following journals:

Environmental Science & Technology  
Atmospheric Environment

---

**Project 10-029**

**STATUS: Active – December 1, 2010**

**Completed - November 30, 2011**

---

*Wind Modeling Improvements with the Ensemble Kalman Filter*

Texas A&M University – John Nielsen-Gammon      AQRP Project Manager – Gary McGaughey  
TCEQ Project Liaison – Bright Dornblaser

**Funded Amount:** \$80,108

**Expended Amount:** \$78,276.97

**Amount Returned to AQRP:** \$1,831.03

**Project Status:**

A Draft Final Report has been submitted for review. The Project Investigator has reported a problem with the model being developed under this project. The team is currently working to correct the problem and will submit an updated draft of the Final Report once the model has been updated.

---

**Project 10-032**

**STATUS: Active - February 9, 2011  
Completed - November 30, 2011**

---

***SHARP Data Analysis: Radical Budget and Ozone Production***

University of Houston – Barry Lefer  
UCLA – Jochen Stutz  
University of New Hampshire -

AQRP Project Manager – Cindy Murphy  
TCEQ Project Liaison – John Jolly

**Funded Amount:** \$248,652  
(\$176,314 UH, \$23,054 New Hampshire, \$49,284 UCLA)

**Expended Amount:** \$242,335.97  
(\$176,314 UH, \$18,850.65 New Hampshire, \$47,171.32 UCLA)

**Amount Returned to AQRP:** \$6,316.03  
(\$0.00 UH, \$4,203.35 New Hampshire, \$2,112.68 UCLA)

**Project Status:**

A Final Report has been submitted and is currently being reviewed by the TCEQ.

The Project Investigators plan to submit the following article for publication in Atmospheric Environment:

*Atmospheric Oxidation Chemistry and Ozone Production: Results from SHARP 2009 in Houston, Texas*

Xinrong Ren, Diana van Duin, Maria Cazorla, Shuang Chen, Jingqiu Mao, William H. Brune, James H. Flynn, Nicole Grossberg, Barry L. Lefer, Bernhard Rappenglück, Kam W. Wong, Catalina Tsai, Jochen Stutz, Jack E. Dibb, B. Thomas Jobson, Winston T. Luke, and Paul Kelley

---

**Project 10-034**

**STATUS: Active – February 2, 2011**

**Completed - November 30, 2011**

---

***Dallas Measurements of Ozone Production***

University of Houston – Barry Lefer

AQRP Project Manager – Dave Sullivan  
TCEQ Project Liaison – Doug Boyer

**Funded Amount:** \$195,054

**Expended Amount:** \$186,657.54

**Amount Returned to AQRP:** \$8,396.46

**Project Status:**

The Final Report has been submitted and reviewed. The authors are currently working on requested revisions.

---

**Project 10-042**

**STATUS: Active – October 8, 2010**

**Completed - November 30, 2011**

---

***Environmental Chamber Experiments to Evaluate NO<sub>x</sub> Sinks and Recycling in Atmospheric Chemical Mechanisms***

ENVIRON International – Greg Yarwood

AQRP Project Manager – Elena McDonald-Buller  
TCEQ Project Liaison – Mark Estes

**Funded Amount:** \$237,481

**Expended Amount:** \$237,479.31

**Amount Returned to AQRP:** \$1.69

**Project Status:**

Project 10-042 is complete and the Final Report is posted to the AQRP website.

The following articles are in progress:

In preparation for Atmospheric Environment: *Development of version 6 of the carbon bond (CB6) chemical mechanism*

Greg Yarwood, Gookyoung Heo, Elena C. McDonald-Buller, David T. Allen, Gary Z. Whitten

In preparation for Atmospheric Environment: *Environmental chamber experiments to evaluate NO<sub>x</sub> removal and recycling represented in atmospheric mechanisms for air quality modeling*

Gookyoung Heo, William Carter, Greg Yarwood, Gary Z. Whitten, David T. Allen

In preparation for Atmospheric Environment: *Evaluation of mechanisms for modeling ozone formation from isoprene in SAPRC-07 and CB6 using environmental chamber data with low initial NO<sub>x</sub>*

Gookyoung Heo, William Carter, Greg Yarwood

In preparation for Atmospheric Environment: *Evaluation of CB05, CB6 and SAPRC-07 using EUPHORE chamber data: evaluation of mechanisms for modeling ozone formation from toluene*

Gookyoung Heo, William Carter, Greg Yarwood, Gary Z. Whitten

---

**Project 10-044**

**STATUS: Active – March 25, 2011**

**Completed - November 30, 2011**

---

*Airborne Measurements to Investigate Ozone Production and Transport in the Dallas-Fort Worth (DFW) Area during the 2011 Ozone Season*

University of Houston – Maxwell Shauck

AQRP Project Manager – Gary McGaughey  
TCEQ Project Liaison – Erik Gribbin

**Funded Amount:** \$279,642

**Expended Amount:** \$277,846.38

**Amount Returned to AQRP:** \$1,795.62

**Project Status:**

Project 10-044 is complete and the Final Report is posted to the AQRP website.

---

**Project 10-045**

**STATUS: Active - January 22, 2011**

**Completed - September 30, 2011**

---

***Quantification of Hydrocarbon, NO<sub>x</sub>, and SO<sub>2</sub> emissions from Petrochemical Facilities in Houston: Interpretation of the 2009 FLAIR dataset***

UCLA – Jochen Stutz  
UNC - Chapel Hill – William Vizueté  
Aerodyne – Scott Herndon  
Washington State University – George Mount

AQRP Project Manager – Cindy Murphy  
TCEQ Project Liaison – Marvin Jones

**Funded Amount: \$398,042**

(\$149,773 UCLA, \$33,281 UNC, \$164,988 Aerodyne, \$50,000 Washington State)

**Expended Amount: \$391,199.38**

(\$142,930.28 UCLA, \$33,281 UNC, \$164,988.10 Aerodyne, \$50,000 Washington State)

**Amount Returned to AQRP: \$6,842.62**

(\$6,842.72 UCLA, \$0.00 UNC, -\$0.10 Aerodyne, \$0.00 Washington State)

**Project Status:**

The Final Report for Project 10-045 is currently being reviewed by the TCEQ.

This project has resulted in the following publications:

Wood, E.; Herndon, S.; Fortner, E. C.; Onasch, T.; Wormhoudt, J.; Kolb, C. E.; Knighton, W. B.; Lee, B.; Zavala, M.; Molina, L.; Jones, M., "*Combustion and Destruction/Removal efficiencies of in-use chemical flares in the greater Houston area*". Industrial and Engineering Chemistry Research, submitted 2011, revision in preparation.

Olga Pikelnaya, Catalina Tsai, Barry Lefer, James H. Flynn, Dejian Fu, and Jochen Stutz, "*Imaging DOAS: a tool for monitoring of emission fluxes from small individual sources*", in preparation for Atmospheric Measurement Techniques

Olga Pikelnaya, Jochen Stutz, Scott Herndon, Ezra Wood, Oluwayemisi Oluwole, George Mount, Elena Spinei, William Vizueté, Evan Causo, "*Formaldehyde and Olefin from Large Industrial Sources (FLAIR) in Houston, TX – Campaign Overview*", in preparation for Industrial and Engineering Chemistry Research

Olga Pikelnaya, George Mount, Elena Spinei, and Jochen Stutz, "*Dual MAX-DOAS approach to determine facility-averaged emissions of pollutants from petrochemical facilities*", in preparation for Atmospheric Measurements Techniques

---

**Project 10-DFW & 11-DFW**

**STATUS: Active - February 1, 2011**

**Completed - August 31, 2011**

---

*Dallas – Fort Worth Field Study*

UT-Austin – Vincent Torres

AQRP Project Manager – Jim Thomas  
TCEQ Project Liaison – Raj Nadkarni

**Funding Awarded:** \$88,809

(\$37,857 10-DFW (FY 10 Funds) \$50,952 11-DFW (FY 11 Funds))

**Expended Amount:** \$66,951.17

(\$37,689.42 10-DFW, \$29,261.75 11-DFW)

**Amount Returned to AQRP:** \$21,857.83

**Project Status:**

Project 10-DFW and 11-DFW are complete and the Final Report is posted to the AQRP website.

Once all the remaining project funds are released, the 10-DFW award will be increased by \$29,094.17 from \$37,857 to \$66,951.17. All expenditures on the 11-DFW will be transferred to the 10-DFW account.

Of the \$50,952 budgeted to 11-DFW, \$22,036 will be returned to FY 11 Project Management Funds and the remaining \$28,916 will go the Contractual holding account with the remaining FY 11 funds. A portion of these combined funds will then be used to fund the State of the Science Project.

---

**Project 11-State of the Science**

**STATUS: Active - February 8, 2012**

**End Date - March 31, 2012**

---

***Dallas – Fort Worth Field Study***

UT-Austin – David Allen

AQRP Project Manager – David Sullivan  
TCEQ Project Liaison – Mark Estes

**Funded Amount: \$36,000**

**Executive Summary:**

A State of the Science assessment is being prepared for the AQRP program. The Assessment will consist of 3 parts: (i) an overview of the current understanding of key scientific and technical issues, relevant to Texas, in emissions inventory development, atmospheric chemistry, meteorology and air quality modeling; (ii) a summary of AQRP activities in the 2010-2011 biennium and how those activities improved understand of key scientific and technical issues; and (iii) identification of a set of high priority scientific and technical issues that could be addressed in the 2012-2013 biennium. The draft document will be reviewed by TCEQ, and after TCEQ comments are addressed, the assessment will be forwarded to the AQRP's Technical Advisory Committee (ITAC) for their comments. After ITAC comments are addressed, the document will be posted on the AQRP web site. Investigators planning to respond to AQRP requests for proposals during the 2012-2013 biennium will be directed to the assessment for guidance in identifying research areas in which proposals are sought.

**Project Description:**

The Work Plan for the State of the Science Project was approved on February 8, 2012. Work is underway on developing the assessment document.

## **Financial Status Report**

Initial funding for fiscal year 2010 was established at \$2,732,071.00. In late May 2010 an amendment was issued increasing the budget by \$40,000. Funding for fiscal year 2011 was established at \$2,106,071, for a total award of \$4,878,142 for the FY 2010/2011 biennium. In February 2012, funding of \$1,000,000 was awarded for FY 2012. To date, no FY 2012 have been expended.

All of these funds were distributed across several different reporting categories as required under the contract with TCEQ. The reporting categories are:

Program Administration – limited to 10% of the overall funding (per Fiscal Year)

This category includes all staffing, materials and supplies, and equipment needed to administer the overall AQRP. It also includes the costs for the Council meetings.

ITAC

These funds are to cover the costs, largely travel expenses, for the ITAC meetings.

Project Management – limited to 8.5% of the funds allocated for Research Projects

Each research project will be assigned a Project Manager to ensure that project objectives are achieved in a timely manner and that effective communication is maintained among investigators in multi-institution projects. These funds are to support the staffing and performance of project management.

Research Projects / Contractual

These are the funds available to support the research projects that are selected for funding.

## **Program Administration**

Program Administration includes salaries and fringe benefits for those overseeing the program as a whole, as well as, materials and supplies, travel, equipment, and other expenses. This category allows indirect costs in the amount of 10% of salaries and wages.

During the reporting period six staff members were involved in the administration of the AQRP. Dr. David Allen, Principal Investigator and AQRP Director, is responsible for the overall administration of the AQRP. James Thomas, AQRP Manager, is responsible for assisting Dr. Allen in the program administration. Maria Stanzione, AQRP Grant Manager, with assistance from Rachael Bushn and Melanie Allbritton assisted with program organization and financial management. This included assisting with the contracting process, invoice review and payment, and other invoicing functions. Denzil Smith is responsible for the AQRP Web Page development and for data management.

Table 1: AQRP Administration Budget

**Administration Budget (includes Council Expenses)**

<b>Budget Category</b>	<b>FY10 Budget</b>	<b>FY11 Budget</b>	<b>Total</b>	<b>Expenses</b>	<b>Pending Expenses</b>	<b>Remaining Balance</b>
Personnel/Salary	\$202,817.55	\$162,837.48	\$365,655.03	\$353,516.49	\$0	\$12,138.54
Fringe Benefits	\$38,665.99	\$31,485.47	\$70,151.46	\$66,523.98	\$0	\$3,627.48
Travel	\$346.85	\$0	\$346.85	\$346.85		\$0
Supplies	\$15,094.05	\$0	\$15,094.05	\$15,094.05		\$0
Equipment	\$0	\$0	\$0			\$0
Other		\$0	\$0			\$0
<b>Total Direct Costs</b>	<b>\$256,924.44</b>	<b>\$194,322.95</b>	<b>\$451,247.39</b>	<b>\$435,481.37</b>	<b>\$0</b>	<b>\$15,766.02</b>
Authorized Indirect Costs 10% of Salaries and Wages	\$20,282.56	\$16,285.05	\$36,567.61	\$35,351.65		\$1,215.96
<b>Total Costs</b>	<b>\$277,207</b>	<b>\$210,608</b>	<b>\$487,815</b>	<b>\$470,833.02</b>	<b>\$0</b>	<b>\$16,981.98</b>
Fringe Rate	22%	22%		18%		

Fringe benefits for the Administration of the AQRP were initially budgeted to be 22% of salaries and wages across the term of the project. It should be noted that this was an estimate, and actual fringe benefit expenses have been reported for each month. The fringe benefit amount and percentage fluctuate each month depending on the individuals being paid from the account, their salary, their FTE percentage, the selected benefit package, and other variables. For example, the amount of fringe benefits are greater for a person with family medical insurance versus a person with individual medical insurance. At the end of the project, the overall total of fringe benefit expensed is expected to be at or below 22% of the total salaries and wages. Actual fringe benefit expenses for the months of December through February are included in the spreadsheet above.

Supplies and materials expenditures included monthly telecom charges, postage, office supplies, a laptop computer, and monitor.

Indirect costs for the months of December through February are included in Table 1.

As discussed in previous Quarterly Reports, the AQRP Administration requested and received permission to utilize the FY 10 funds during FY 11. This is for all classes of funds including Administration, ITAC, Project Management, and Contractual. The intent is to fully expend (or encumber, in the case of the contractual funds) the FY 10 funds, and then begin spending the FY 11 funds.

In June 2011, UT-Austin received a Contract Extension for the AQRP. This extension will continue the program through the end of the 2012/2013 biennium, and will allow the AQRP to utilize the FY 10 funds through April 30, 2012, and the FY 11 funds through April 30, 2013.

The AQRP also requested and was granted a rebudget of the FY 10 and 11 Administration and Project Management funds, to better reflect the expenditures of this portion of the program.

## ITAC

The most recent ITAC meeting was held on the afternoon of September 28, 2011, in conjunction with the Data Workshop. The remaining Travel expenses were paid for ITAC members to attend the meeting. (ITAC members who were involved in research projects with travel funds, had expenses paid from project funds, as part of their participation in the Data Workshop.) The meeting was held in the Commons Learning Center on the J.J. Pickle Campus of The University of Texas at Austin.

Table 2: ITAC Budget

### ITAC Budget

Budget Category	FY10 Budget	FY11 Budget	Total Budget	Expenses	Pending Expenses	Remaining Balance
Personnel/Salary						
Fringe Benefits						
Travel	\$16,500	\$16,600	\$33,100	\$16,295.60	\$0	\$16,804.40
Supplies	\$2,364	\$2,800	\$5,164	\$1,033.34		\$4,130.66
Equipment						
Other						
Contractual						
Total Direct Costs	\$18,864	\$19,400	\$38,264	\$17,328.94	\$0	\$20,935.06
Authorized Indirect Costs						
10% of Salaries and Wages						
<b>Total Costs</b>	<b>\$18,864</b>	<b>\$19,400</b>	<b>\$38,264</b>	<b>\$17,328.94</b>	<b>\$0</b>	<b>\$20,935.06</b>

## Project Management

Project Managers (PMs) have been assigned to each of the research projects. During the period from December 1, 2011 through February 29, 2012, PMs have worked with PIs to ensure that all reporting requirements are met. The primary focus was on the review of the draft final reports.

As none of the Research Projects were approved for funding until the end of FY 10, as with the Project Administration funds, the intent is to utilize the FY 10 and FY 11 funds during FY 11 to cover costs associated with project management. As with the Administration funds, the contract extension will allow the AQRP to utilize the FY 10 funds through April 30, 2012, and the FY 11 funds through April 30, 2013. All FY 10 funds are expected to be fully expended by the deadline.

Table 3: Project Management Budget

### Project Management Budget

Budget Category	FY10 Budget	FY11 Budget	Total Budget	Expenses	Pending Expenses	Remaining Balance
Personnel/Salary	\$145,619.05	\$89,330.22	\$234,949.27	\$227,851.28		\$7,097.99
Fringe Benefits	\$29,040.64	\$17,683.56	\$46,724.20	\$44,644.53		\$2,079.67
Travel	\$0	\$0	\$0	\$0		\$0
Supplies	\$778.00	\$260.00	\$1,038.00	\$1,037.49		\$0.51
Equipment						
Other						
Contractual						
Total Direct Costs	\$175,437.69	\$107,273.78	\$282,711.47	\$273,533.30	\$0	\$9,178.17
Authorized Indirect Costs	\$14,562.31	\$10,690.22	\$25,252.53	\$22,785.12		\$2,467.41
10% of Salaries and Wages						
<b>Total Costs</b>	<b>\$190,000.00</b>	<b>\$117,964.00</b>	<b>\$307,964.00</b>	<b>\$296,318.42</b>	<b>\$0</b>	<b>\$11,645.58</b>

## **Research Projects**

As of February 29, 2012, all projects had ended and the remaining draft final reports were in the final review stages. Table 4 on the following 2 pages illustrates the funding awarded to each project and the total expenses reported on each project as of February 29, 2012. Please note that this reflects expenses that have posted to the UT-Austin accounting system as of February 29, 2012. There may be additional expenses pending that will not post until the following month.

As of the end of February there was approximately \$85,999 available in Research Project funding (\$63,963 of the original Research funds and \$22,036 transferred from Project Management to fully fund the 11-DFW Project.). Additional expenses of \$10,000 for Data Storage and \$36,000 for the State of the Science Project are pending, leaving \$39,999 remaining. Funds in the amount of \$22,036 will be transferred/returned to the Project Management category. This will leave \$17,963 remaining in the Research category.

Table 4: Contractual Expenses

<b>Contractual Expenses</b>				
<b>FY 10 Contractual Funding</b>		<b>\$2,286,000</b>		
Project Number		Amount Awarded (Budget)	Cumulative Expenditures	Remaining Balance
10-008	Rice University	\$128,851	\$126,622.32	\$2,228.68
10-008	Environ International	\$49,945	\$49,944.78	\$0.22
10-009	UT-Austin	\$591,332	\$591,306.66	\$25.34
10-021	UT-Austin	\$248,786	\$248,786.41	-\$0.41
10-022	Lamar University	\$150,000	\$132,790.80	\$17,209.20
10-032	University of Houston	\$176,314	\$176,314	\$0
10-032	University of New Hampshire	\$23,054	\$18,850.65	\$4,203.35
10-032	UCLA	\$49,284	\$47,171.32	\$2,112.68
10-034	University of Houston	\$195,054	\$186,657.54	\$8,396.46
10-042	Environ International	\$237,481	\$237,479.31	\$1.69
10-045	UCLA	\$149,773	\$142,930.28	\$6,842.72
10-045	UNC - Chapel Hill	\$33,281	\$33,281	\$0
10-045	Aerodyne Research Inc.	\$164,988	\$164,988.10	-\$0.10
10-045	Washington State University	\$50,000	\$50,000	\$0
10-DFW	UT-Austin	\$37,857	\$37,689.42	\$167.58
FY 10 Total Contractual Funding Awarded		\$2,286,000		
FY 10 Contractual Funding Remaining to be Awarded		\$0		
FY 10 Contractual Funds Expended to Date*			\$2,244,813	
FY 10 Contractual Funds Remaining to be Spent				\$41,187

<b>FY 11 Contractual Funding</b>		<b>\$1,736,063</b>		
Project Number		Amount Awarded (Budget)	Cumulative Expenditures	Remaining Balance
10-006	Chalmers University of Tech	\$262,179	\$262,179	\$0
10-006	University of Houston	\$222,483	\$217,949.11	\$4,533.89
10-015	Environ International	\$201,280	\$201,278.63	\$1.37
10-020	Environ International	\$202,498	\$202,493.48	\$4.52
10-024	Rice University	\$225,662	\$223,769.99	\$1,892.01
10-024	University of New Hampshire	\$70,747	\$70,719.78	\$27.22
10-024	University of Michigan	\$64,414	\$60,597.51	\$3,816.49
10-024	University of Houston	\$98,134	\$88,914.46	\$9,219.54
10-029	Texas A&M University	\$80,108	\$78,276.97	\$1,831.03
10-044	University of Houston	\$279,642	\$277,846.38	\$1,795.62
11-DFW	UT-Austin	\$50,952	\$29,261.75	\$21,690.25
FY 11 Total Contractual Funding Awarded		\$1,758,099		
FY 11 Contractual Funding Remaining to be Awarded		-\$22,036		
FY 11 Contractual Funds Expended to Date*			\$1,713,287	
FY 11 Contractual Funds Remaining to be Spent				\$22,776
Total Contractual Funding		\$4,022,063		
Total Contractual Funding Awarded		\$4,044,099		
Total Contractual Funding Remaining to be Awarded		-\$22,036		
Total Contractual Funds Expended to Date*			\$3,958,100	
Total Contractual Funds Remaining to be Spent				\$63,963

\*(Expenditures Reported as of February 29, 2012.)

## **Conclusion**

The Program Administration staff is currently in the process of ensuring that all FY 10 funds are expended by April 30, 2012. The remaining FY 10 Admin funds will be expended in March 2012. The FY 11 Admin funds will be fully expended in the next quarter. The remaining FY 10 Research funds and ITAC funds will be transferred to the Project Management category, and expenses originally charged to FY 11 Project Management will be moved to FY 10 Project Management. This will fully expended the remaining FY 10 funds for all categories. This will be complete by the end of April 2012.

The ITAC FY 11 budget has \$19,400 remaining. These funds will be utilized for ITAC meetings during the current 2012-2013 biennium. It is anticipated that some portion of these funds may be moved to support research projects in the 2012-2013 biennium. The amount will be determined within the next two quarters of the Program.

The Project Management FY 11 budget will have approximately \$37,000 remaining after all adjustments are made. These funds will be used to cover Project Management expenses through April 30, 2013. Use of these funds may allow the release of FY 12 Project Management funds to be used for Research projects. This will be assessed during the next two quarters.

The Research/Contractual category has approximately \$16,000 remaining. These funds will be used to fund research projects in the FY 2012-13 biennium (though they will be fully expended by April 30, 2013.) It should be noted that all FY 10-11 Research funds were allocated to projects, and an additional \$22,036 was moved from Project Management to Research to cover additional expenses related to the DFW Field Study. Several projects returned funds to the AQRP when they concluded, thus the remaining balance. As these funds were committed to Research projects until the projects ended, the AQRP was unable to utilize the funds for any other purpose.

The AQRP fully expects to utilize the remaining FY 10 funds by April 30, 2012, and the FY 11 funds by April 30, 2013.

## **Appendix**

### **Financial Reports by Fiscal Year**

(Expenditures reported as of February 29, 2012.)

**Administration Budget (includes Council Expenses)**

**FY 2010**

<b>Budget Category</b>	<b>FY10 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary	\$202,817.55	\$199,250.41		\$3,567.14
Fringe Benefits	\$38,665.99	\$37,403.15		\$1,262.84
Travel	\$346.85	\$346.85		\$0
Supplies	\$15,094.05	\$15,094.05		\$0
Equipment	\$0			\$0
Other				
Contractual				
<b>Total Direct Costs</b>	<b>\$256,924.44</b>	<b>\$252,094.46</b>		<b>\$4,829.98</b>
Authorized Indirect Costs	\$20,282.56	\$19,925.06		\$357.50
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$277,207</b>	<b>\$272,019.52</b>	<b>\$0</b>	<b>\$5,187.48</b>

**Administration Budget (includes Council Expenses)**

**FY 2011**

<b>Budget Category</b>	<b>FY11 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary	\$162,837.48	\$154,266.08	\$0	\$8,571.40
Fringe Benefits	\$31,485.47	\$29,120.83	\$0	\$2,364.64
Travel	\$0			\$0
Supplies	\$0			\$0
Equipment				
Other	\$0			\$0
Contractual				
<b>Total Direct Costs</b>	<b>\$194,322.95</b>	<b>\$183,386.91</b>	<b>\$0</b>	<b>\$10,936.04</b>
Authorized Indirect Costs	\$16,285.05	\$15,426.59		\$858.46
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$210,608</b>	<b>\$198,813.50</b>	<b>\$0</b>	<b>\$11,794.50</b>

**ITAC Budget  
FY 2010**

<b>Budget Category</b>	<b>FY10 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary				
Fringe Benefits				
Travel	\$16,500	\$16,068.88	\$226.72	\$204.40
Supplies	\$2,364	\$1,033.34		\$1,330.66
Equipment				
Other				
<b>Total Direct Costs</b>	<b>\$18,864</b>	<b>\$17,102.22</b>	<b>\$226.72</b>	<b>\$1,535.06</b>
Authorized Indirect Costs				
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$18,864</b>	<b>\$17,102.22</b>	<b>\$226.72</b>	<b>\$1,535.06</b>

**ITAC Budget  
FY 2011**

<b>Budget Category</b>	<b>FY11 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary				
Fringe Benefits				
Travel	\$16,600	\$226.72	-\$226.72	\$16,600
Supplies	\$2,800			\$2,800.00
Equipment				
Other				
<b>Total Direct Costs</b>	<b>\$19,400</b>	<b>\$226.72</b>	<b>-226.72</b>	<b>\$19,400</b>
Authorized Indirect Costs				
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$19,400</b>	<b>\$226.72</b>	<b>-\$226.72</b>	<b>\$19,400</b>

**Project Management Budget  
FY 2010**

<b>Budget Category</b>	<b>FY10 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary	\$145,619.05	\$145,337.70		\$281.35
Fringe Benefits	\$29,040.64	\$28,967.49		\$73.15
Travel	\$0	\$0		\$0
Supplies	\$778	\$777.49		\$.51
Equipment				
Other				
<b>Total Direct Costs</b>	<b>\$175,437.69</b>	<b>\$175,082.68</b>	<b>\$0</b>	<b>\$355.01</b>
Authorized Indirect Costs	\$14,562.31	\$14,533.77		\$28.54
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$190,000</b>	<b>\$189,616.45</b>	<b>\$0</b>	<b>\$383.55</b>

**Project Management Budget  
FY 2011**

<b>Budget Category</b>	<b>FY11 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary	\$89,330.22	\$82,513.58	\$0	\$6,816.64
Fringe Benefits	\$17,683.56	\$15,677.04	\$0	\$2,006.52
Travel	\$0			\$0
Supplies	\$260	\$260.00		\$0
Equipment				
Other				
<b>Total Direct Costs</b>	<b>\$107,273.78</b>	<b>\$98,450.62</b>	<b>\$0</b>	<b>\$8,823.16</b>
Authorized Indirect Costs	\$10,690.22	\$8,251.35		\$2,438.87
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$117,964</b>	<b>\$106,701.97</b>	<b>\$0</b>	<b>\$11,262.03</b>

**AQRP Budget  
FY 2010**

Budget Category	FY10 Budget	Cumulative Expenditures	Pending Expenditures	Remaining Balance
Personnel/Salary	\$202,817.55	\$199,250.41	\$0.00	\$3,567.14
Fringe Benefits	\$38,665.99	\$37,403.15	\$0.00	\$1,262.84
Travel	\$346.85	\$346.85	\$0.00	\$0.00
Supplies	\$15,094.05	\$15,094.05	\$0.00	\$0.00
Equipment	\$0	\$0.00	\$0.00	\$0.00
Other	\$0	\$0.00	\$0.00	\$0.00
Contractual	\$2,286,000.00	\$2,244,812.59	\$39,261.75	\$1,925.66
ITAC	\$18,864.00	\$17,102.22	\$226.72	\$1,535.06
Project Management	\$190,000.00	\$189,616.45	\$0.00	\$383.55
<b>Total Direct Costs</b>	<b>\$2,751,788.44</b>	<b>\$2,703,625.72</b>	<b>\$39,488.47</b>	<b>\$8,674.25</b>
Authorized Indirect Costs	\$20,282.56	\$19,925.06	\$0.00	\$357.50
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$2,772,071.00</b>	<b>\$2,723,550.78</b>	<b>\$39,488.47</b>	<b>\$9,031.75</b>

**AQRP Budget**

**FY 2011**

<b>Budget Category</b>	<b>FY11 Budget</b>	<b>Cumulative Expenditures</b>	<b>Pending Expenditures</b>	<b>Remaining Balance</b>
Personnel/Salary	\$162,837.48	\$154,266.08	\$0.00	\$8,571.40
Fringe Benefits	\$31,485.47	\$29,120.83	\$0.00	\$2,364.64
Travel	\$0	\$0.00	\$0.00	\$0
Supplies	\$0	\$0.00	\$0.00	\$0
Equipment	\$0	\$0.00	\$0.00	\$0
Other	\$0	\$0.00	\$0.00	\$0
Contractual	\$1,758,099.00	\$1,713,287.06	\$6,738.25	\$38,073.69
ITAC	\$19,400.00	\$226.72	-\$226.72	\$19,400.00
Project Management	\$117,964.00	\$106,701.97	\$0.00	\$11,262.03
<b>Total Direct Costs</b>	<b>\$2,089,785.95</b>	<b>\$2,003,602.66</b>	<b>\$6,511.53</b>	<b>\$79,671.76</b>
Authorized Indirect Costs	\$16,285.05	\$15,426.59	\$0.00	\$858.46
10% of Salaries and Wages				
<b>Total Costs</b>	<b>\$2,106,071.00</b>	<b>\$2,019,029.25</b>	<b>\$6,511.53</b>	<b>\$80,530.22</b>