AIR QUALITY RESEARCH PROGRAM

Texas Commission on Environmental Quality
Contract Number 582-22-20017
Awarded to The University of Texas at Austin

Quarterly Report
May 15, 2022 – August 14, 2022

Submitted to

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TABLE OF CONTENTS

Texas Air Quality Research Program

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May 15, 2022 – August 14, 2022

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.

PROGRAM ACTIVITIES FOR THE QUARTER

Between May 15, 2022 and August 14, 2022, the Air Quality Research Program (AQRP) efforts were focused primarily addressing inquiries regarding the Request for Proposals (RFP) , Independent Technical Advisory Committee (ITAC) proposal assignments and ranking, corresponding with RFP Principal Investigators (PI) to address questions and concerns from the ITAC and Advisory Council, hosting the Advisory Council Meeting to finalize funding options, and grant management tasks to ensure contractual and financial report deliverable deadlines were met.

Proposals for the 2022-2023 biennium were due May 26, 2022, at 5:00 PM CT. Each proposal was assigned a Proposal Number based on the order of submission. The AQRP Director and TCEQ reviewers were given access to all proposals. Each proposal was assigned three primary reviewers and the AQRP Director, Dr. Dave Allen, notified ITAC members of their primary reviewer assignments on May 31st. ITAC members returned their assigned rankings on June 14th. The ITAC members met remotely on June 21st to discuss the preliminary selections of proposals. On June 22nd, the ITAC finalized the proposal ratings and rankings and proposals were sent the TCEQ for their review. The ITAC ranked projects in four categories: (1) Highly Recommended, (2) Recommended, (3) Recommended if Funding is Available, and (4) Not Recommended.

Highly Recommended projects included 22-003, 22-008, and 22-023. Recommended projects included 22-006, 22-009, 22-010, 22-019, and 22-020. Recommended if Funding is Available projects included 22-001, 22-005, 22-011, 22-015, 22-016. Not Recommended projects included 22-002, 22-004, 22-007, 22-0012, 22-013, 22-014, 22-017, 22-018, 22-021, 22-022. The finalized ITAC rankings are available in Appendix A.

The Advisory Council met remotely on July 27th to discuss funding options. All eight (8) Council Members were present, with Erik Gribbin from TCEQ as a proxy for Laurie Barker. The Advisory Council members voted unanimously to approve projects 22-023, 22-008, 22-003, 22-010, 22-020, 22-006, and 22-019 for funding. The Advisory Council's approval utilized $1,219,704.60 of the $1,222,500 budget available. The TCEQ was notified of the Advisory Council decision on July

27th. PIs of proposals approved for funding were notified on August 2nd and given a deadline of August 15th at 12:00 PM CT to submit Workplans, which consist of a Scope of Work, Budget, Budget Justification, and Quality Assurance Protection Plan documents (QAPP). The AQRP Director assigned AQRP Project Managers and an AQRP QAPP Officer to all projects. The TCEQ assigned Project Liaisons and a QAPP Officer to projects. The AQRP QAPP Officer is Vincent Torres. The TCEQ QAPP Officer is Chris Owen. Projects approved for funding, Advisory Council approved budgets, AQRP Project Mangers, and TCEQ Liaisons are listed in Appendix B. All projects are pending Subaward Agreement execution.

Due to contractual budgetary limits, PIs were asked to reduce travel budgets to one conference for one attendee for an equitable travel allowance across all awards. Several projects were asked to justify, reduce, expand, and/or modify various other budget categories. Modified project budgets are reflected in the total approved budget for each project in Appendix B. Full details of these projects are also listed in Appendix B. Once Subaward Agreements are fully executed, all projects will be posted on the AQRP website (https://aqrp.ceer.utexas.edu/projects.cfm).

The AQRP website redesign project was approved by the TCEQ. Ten thousand dollars of AQRP Director salary, fringe, and associated Indirect Costs (IDC) was rebudgetted for a full redesign of the AQRP website to ensure Americans with Disability Act (ADA) compliance, as well as provide a modern design with advanced search features. A Budget Revision Review Form (BRRF) was submitted and approved by TCEQ. The website redesign project is estimated to begin in late September 2022. The approved BRRF figures are reflected in Table 3.

The AQRP Grant Manager completed drafting ten Subaward Agreements for all project institutions in preparation for partial execution to be delivered when Workplans are approved by the AQRP and TCEQ. AQRP Project Manager and QAPP Officer salary allocation costings have been calculated for the 2022-2023 budget period. AQRP Project Manager salary expenditures will be reflected in the August 2022 FSR.

The Financial Status Report (FSR) section of this report includes accounting through July 2022 from Fiscal Year 2022-2023 (FY 22-23). The month of August expenses cannot be reported until the University accounting month closes in early September 2022.

Throughout the reporting period, the AQRP Program Manager communicated regularly with the TCEQ Project Manager regarding program deadlines, deliverables, program updates, submission of monthly FSRs, and provided any addition information as requested by the TCEQ.

BACKGROUND

Section 387.010 of House Bill (HB) 1796 (81st Legislative Session), directs the Texas Commission on Environmental Quality (TCEQ) to establish the Texas Air Quality Research Program (AQRP). The University of Texas at Austin (UT) was selected by the TCEQ to administer the program. A contract for the administration of the AQRP was established between the TCEQ and UT. 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).

A new AQRP contract was executed for the 2022-2023 biennium and funding of $750,000 per year was awarded.

RESEARCH PROJECT CYCLE

The Research Program is implemented through a nine-step cycle each biennium. The steps in the cycle are described from project concept generation to final project evaluation for a single project cycle.

1) The project cycle is initiated by developing (in year 1) or updating (in subsequent years) the research priorities. The Air Quality Research Program (AQRP) Director, in consultation with the Independent Technical Advisory Committee (ITAC), the Advisory Council (the Council) and the Texas Commission on Environmental Quality (TCEQ), develop research priorities; the research priorities are released along with a Request for Proposals (RFP).
2) Project proposals relevant to the research priorities are solicited. The RFP will be found at http://aqrp.ceer.utexas.edu/ once released.
3) The ITAC performs a scientific and technical evaluation of the proposals.
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 of Texas's air quality research needs.
5) The recommendations from the ITAC and the TCEQ are presented to the Council and the Council selects the proposals to be funded.
6) All Investigators are notified of the status of their proposals, either intent to fund, not funded, or contingent (not funded at this time, but being held for possible reconsideration if funding becomes available).
7) Intent to fund projects are assigned an AQRP Project Manager at UT Austin and a Project Liaison at TCEQ. The AQRP Project Manager 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 AQRP Project Manager has responsibility for documenting progress toward project measures of success for each project. The AQRP Project Manager works with the researchers, and the TCEQ, to create an approved work plan for the project.

   The AQRP Project Manager also works with the researchers, TCEQ, and the Program's Quality Assurance officer to develop an approved Quality Assurance Project Plan (QAPP) and Work Plan for each project. Subaward Agreements are issued. The AQRP Project Manager reviews monthly, annual, and final reports from the researchers and works with the researchers to address deficiencies.
8) The AQRP Director and the AQRP Project Manager for each project describe progress on the project in the ITAC and Council meetings dedicated to on-going project review.
9) The project findings are communicated through multiple mechanisms. Final reports are posted to the AQRP web site (http://aqrp.ceer.utexas.edu/); research briefings are developed for the public and air quality decision makers; and a bi-annual research conference/data workshop is held.

During this quarter, the AQRP performed steps 2 through 7.

Independent Technical Advisory Committee

The Air Quality Research Program (AQRP) funding is to be used primarily for research projects, and one of three groups responsible for selecting the projects is the Independent Technical Advisory Committee (ITAC). The ITAC is composed of between 9 and 15 individuals with scientific expertise relevant to the AQRP. The ITAC is charged with recommending technical approaches, establishing research priorities, and reviewing, commenting, and advising on all projects to ensure that the projects facilitate air quality improvement in Texas. Members of the ITAC consist of the Texas Commission on Environmental Quality (TCEQ) Deputy Director (or designee), and representatives with air quality expertise from research institutions with extensive expertise in air quality research in Texas. The members of the ITAC are listed in Table 1. The members of the ITAC are drawn from Texas universities active in air quality research, national laboratories that have participated in air quality studies in Texas, and institutions that have expertise not available in Texas and that have participated in air quality studies in Texas.

The ITAC membership is intentionally drawn from air quality researchers who have experience in Texas. These researchers and their colleagues will likely have interest in responding to the requests for research proposals issued by the AQRP. This raises potential confidentiality and conflict of interest issues, and the contract between TCEQ and the University of Texas at Austin requires that the AQRP maintain and implement an appropriate written policy on conflict of interest. Specifically, for the ITAC, all members are required to certify:

> *Confidentiality:* As a member of Independent Technical Advisory Committee (ITAC), I understand that I will have access to proposals submitted to the Air Quality Research Program (AQRP). Subject to any legal requirements, I agree to keep the information in these proposals confidential until the selection process is completed and it is appropriate to release information to the public. I understand that there may be certain information that comes to me in my role as a member of ITAC that retains its confidential nature even after the process is concluded. I also understand that I will review said proposals and may have access to the reviews made by other ITAC members. I agree to keep these reviews and the identity of the reviewers confidential until such time as this information is released to the public. (NOTE: For the reviews and reviewers, this information may never be released.)
>
> *Conflict of Interest:* As a member of ITAC, I agree that I will not evaluate, comment on, or vote on proposals in which I or my home institution is involved, including but not limited to, any financial interest, or in which I have another form of conflict of interest. I understand that ITAC members with conflicts of interest must leave the meeting room or the conference line when a proposal with which they have a conflict is discussed, voted on or is otherwise being considered. I understand that I must recuse myself from participating in or attempting to influence at any time the ITAC's or the AQRP Council's consideration or decision concerning such proposals. I agree to bring any issues concerning a possible conflict of interest to the attention of the Director of the AQRP or the TCEQ Air Quality Deputy Director. If there is a question of interpretation regarding whether a conflict of interest exists, I agree that the decision regarding whether a conflict of interest exists will be made by the Director of the Air Quality Research Program or the TCEQ Air Quality Deputy Director.

All members of the ITAC agree to abide by these conflicts of interest and confidentiality provisions prior to participating in the review of proposals. The ITAC members are listed in Table 1.

Table 1. Independent Technical Advisory Committee Members

Name	Title	Organization
David Allen	Professor and Director, AQRP	The University of Texas at Austin
Doug Boyer	Technical Specialist	Texas Commission on Environmental Quality (TCEQ)
Don Collins	Professor	University of California, Riverside
Mark Estes	Atmospheric Scientist	St. Edwards University
Joost de Gouw	Research Physicist, Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado, Senior Scientist and Fellow	National Oceanic and Atmospheric Administration (NOAA)
Tracey Holloway	Gaylord Nelson Distinguished Professor	University of Wisconsin-Madison
Rebecca Sheesley	Associate Professor	Baylor University
Will Vizuete	Professor	University of North Carolina at Chapel Hill (UNC)
Yuxuan Wang	Associate Professor of Atmospheric Chemistry	The University of Houston
Christine Wiedinmyer	CIRES Associate Director, Research Professor	University of Colorado Boulder
Greg Yarwood	Principal	Ramboll
Renyi Zhang	Distinguished Professor of Atmospheric Sciences, Harold J. Haynes Chair in Geosciences	Texas A&M University

TCEQ Relevancy Review

The Texas Commission on Environmental Quality (TCEQ) reviews proposals for relevancy to the State's air quality research needs. TCEQ approval is required for a project to receive funding from the Program.

Advisory Council

The final group responsible for selecting Air Quality Research Program (AQRP) research projects is the Advisory Council (the Council). The Council consists of between 7 and 11 members. Two Council members with relevant scientific expertise are nominated by the Texas Commission on Environmental Quality (TCEQ). As defined in the AQRP contract, up to four members of the Council can be county judges from the Houston-Galveston-Brazoria (HGB) and Dallas-Fort Worth (DFW) non-attainment counties. Additional members should have a general background in air quality and business practices, and can include elected officials, business community representatives, environmental group representatives, and members of the general public. The Council's responsibilities are to attend meetings with TCEQ Management and the AQRP to understand the statewide project goals for the funding period, to select for funding the

projects reviewed by the Independent Technical Advisory Committee (ITAC) and ranked by the TCEQ, and to assist with the presentation of project final results at locations throughout the state.

Table 2. Advisory Council Members

Name	Title	Organization
Daniel Baker	Senior Partner	Environmental Reaction Engineering Experts (E REX)
Laurie Barker	Special Counsel	TCEQ
Lyle Hufstetler	Clean Cities Coordinator	Alamo Area Council of Governments (AACOG)
Chris Klaus	Senior Program Manager	North Central Texas Council of Governments (NCTCOG)
Graciela Lubertino	Principal Data Analyst	Houston-Galveston Area Council (H-GAC)
Chris Owen	Senior Technical Specialist	TCEQ
Chris Rabideau	Staff Environmental Scientist	Chevron
Cyrus Reed	Conservation Director	Sierra Club

FINANCIAL STATUS REPORT

The Air Quality Research Program (AQRP) contract was awarded for FY 22-23 for $750,000 per year. Funds were distributed across several different reporting categories as required under the contract with TCEQ. The reporting categories are listed below in detail.

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 Independent Technical Advisory Committee (ITAC) meetings.

Project Management: Limited to 8.5% of the funds allocated for Contractual budget category. Each research project is 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 well as materials and supplies, travel, equipment, and other expenses. This category allows indirect costs in the amount of 10% of salaries and wages.

Dr. David Allen, Principal Investigator and AQRP Director, is responsible for the overall administration of the AQRP. RoseAnna Goewey, AQRP Program and Grant Manager, assists with program management. Randy George, AQRP Information Technology (IT) Manager, assists the Director and Program Manager with all website development updates, data storage, and handling of all other IT related issues.

The University of Texas at Austin's federally negotiated fringe rates for full-time/benefits eligible employees is 30.9% through August 31, 2022. The University of Texas at Austin's Cost Rate Agreement was finalized in June 2022 and can be viewed in detail at https://research.utexas.edu/wp-content/uploads/sites/5/2022/06/FY23_Fringe_Benefit_Rates_063022.pdf.

Fringe rates starting September 1, 2022, will be reduced to 30.0%.

Table 3: Administration Budget FY 22-23

Budget Category	FY22 Budget	FY23 Budget	Total Budget	Expenses*	Remaining Balance
Personnel/Salary	$44,702.77	$51,800.00	$103,600.00	$28,834.64	$67,668.13
Fringe Benefits	$13,812.96	$16,265.00	$32,271.00	$8,909.88	$21,168.08
Supplies	$12,013.99	$1,755.00	$3,769.00	$549.10	$13,219.89
Total Direct Costs	$70,529.72	$69,820.00	$139,640.00	$38,293.62	$102,056.10
Indirect Costs	$4,470.28	$5,180.00	$10,360.00	$2,883.47	$6,766.81
Total Costs	**$75,000.00**	**$75,000.00**	**$150,000.00**	**$41,177.09**	**$108,822.91**

**Expenses as of July 2022*

ITAC

There are no ITAC expenditures in this reporting quarter. Table 4 details the FY 22-23 ITAC budget.

Table 4: ITAC Budget FY 22-23

Budget Category	FY22 Budget	FY23 Budget	Total Budget	Expenses*	Remaining Balance
Travel	$5,000.00	$5,000.00	$10,000.00	$0.00	$10,000.00
Supplies	$625.00	$625.00	$1,250.00	$0.00	$1,250.00
Total Direct Costs	$5,625.00	$5,625.00	$11,250.00	$0.00	$11,250.00
Indirect Costs	$0.00	$0.00	$0.00	$0.00	$0.00
Total Costs	**$5,625.00**	**$5,625.00**	**$11,250.00**	**$0.00**	**$11,250.00**

**Expenses as of July 2022*

Project Management

There are no Project Management expenditures in this reporting quarter. Table 5 details the FY 22-23 Project Management Budget.

Table 5: Project Management Budget FY 22-23

Budget Category	FY22 Budget	FY23 Budget	Total Budget	Expenses*	Remaining Balance
Personnel/Salary	$38,000.00	$38,000.00	$76,000.00	$0.00	$76,000.00
Fringe Benefits	$11,438.00	$11,932.00	$23,370.00	$0.00	$23,370.00
Supplies	$3,012.00	$2,518.00	$5,530.00	$0.00	$5,530.00
Other	$1,875.00	$1,875.00	$3,750.00	$0.00	$3,750.00
Total Direct Costs	$54,325.00	$54,325.00	$108,650.00	$0.00	$108,650.00
Authorized Indirect Costs *(10% of Salaries and Wages)*	$3,800.00	$3,800.00	$7,600.00	$0.00	$7,600.00
Total Costs	**$58,125.00**	**$58,125.00**	**$116,250.00**	**$0.00**	**$116,250.00**

**Expenses as of July 2022*

RESEARCH PROJECTS

Research projects have not been selected in this reporting quarter. Table 6 shows the FY 22-23 Research Project budget. The FY 22-23 budget allocates $1,222,500.00 for research projects. Although projects have been notified of an intent to fund, until Subaward Agreements are fully executed, project budgets will not be included in Table 6. No projects have fully executed Subaward Agreements in this quarter.

Table 6: FY 22-23 Contractual/Research Project Budget

FY 22 Contractual Funding	**$611,250.00**		
FY 22 Contractual Funding	**$611,250.00**		
Project Number **Institution**	**Amount Awarded**	**Cumulative Expenditures**	**Remaining Balance**
PENDING ***SUBAWARD HOLDING***	*$611,250.00*	*$0.00*	*$611,250.00*
FY 22 Total Funding Awarded	$0.00		
FY 22 Funds Expended		$0.00	
FY 22 Funds Remaining to be Spent			$611,250.00
FY 22 Funding Carry-Forward	**$0.00**		
FY 23 Funding	**$611,250.00**		
FY 23 Total Funding	**$611,250.00**		
Project Number **Institution**	**Amount Awarded**	**Cumulative Expenditures**	**Remaining Balance**
PENDING ***SUBAWARD HOLDING***	*$611,250.00*	*$0.00*	*$611,250.00*
FY 23 Total Funding Awarded	$0.00		
FY 23 Funds Expended		$0.00	
FY 23 Funds Remaining to be Spent			$611,250.00
Total Funding	**$1,222,500.00**		
Total Funding PENDING AWARD	**$1,222,500.00**		
Total Funding Remaining to be Awarded	**$1,222,500.00**		
Total Funds Expended to Date		**$0.00**	
Total Funds Remaining to be Spent			**$1,222,500.00**

APPENDIX A. INDEPENDENT TECHNICAL ADVISORY COUNCIL PROPOSAL RANKING

Proj. Nbr.	Project Title	Primary Institution, PI	Rank in Category	Recommendation
22-023	Source-sector NOx emissions analysis with sub-kilometer scale airborne observations in Houston during TRACER-AQ	The George Washington Univ.: Daniel Goldberg	1	Highly Recommended
22-008	Modeling analysis of TRACER-AQ and over-water Measurements to improve prediction of on-land and offshore ozone	Univ. of Houston: Yuxuan Wang	2	Highly Recommended
22-003	Evaluating the Ability of Statistical and Photochemical Models to Capture the Impacts of Biomass Burning Smoke on Urban Air Quality in Texas	Atmospheric and Environmental Research, Inc: Matthew Alvarado	3	Highly Recommended
22-009	Quantification and Attribution of Wildland Fire Smoke Transport to Texas to Assess Air Quality Impacts and Exceptional Events During the 2021 Fire Season	Sonoma Technology, Inc.: Nathan Pavlovic	1	Recommended
22-010	Central Texas Field Study (CenTexFS); Ozone Precursors, Local Sources and Remote Transport Including Biomass Burning	Aerodyne Research, Inc.: Edward Fortner	2	Recommended
22-020	Quantifying the Emissions and Spatial/Temporal Distributions of Consumer Volatile Chemical Products (VCPs) in the Greater Houston Area to Understand Their Impacts on Summertime Ozone Formation	Texas A&M University: Yue Zhang	3	Recommended
22-006	Hydrogen Cyanide for Improved Identification of Fire Plumes in the BC2 Network	Aerodyne Research, Inc.: Tara Yacovitch	4	Recommended
22-019	Refining Ammonia emission using inverse modeling and satellite observations over Texas and the Gulf of Mexico and investigating its effect on fine particulate matter	Univ. of Houston: Yunsoo Choi	5	Recommended
22-015	Integration of In-Situ observations and CTM simulations using explainable Deep Learning and Chemical Transport Models to Accurately Estimate Emissions within Texas and nearby states	University of Houston: Yunsoo Choi	1	Recommended if Funding Avail.
22-005	Developing the pandemic-induced emissions inventory of the State of Texas using satellite observational data and chemical transport model.	George Mason Univ.: Bok Haeng Baek	2	Recommended if Funding Avail.
22-016	Improving Model Over-Water Performance for Texas Air Quality Studies	Univ. of Alabama Huntsville: Arastoo Pour-Bizar	3	Recommended if Funding Avail.
22-011	Assessing the sensitivity of in situ photochemical production of O3 and PM2.5 to VOCs and Nox in the HGB area	Texas A&M Univ.: Renyi Zhang	4	Recommended if Funding Avail.

22-001	Towards an improved modeling of photochemistry-boundary layer interactions: Three-dimensional mapping of Texas air quality using a coupling of large-eddy simulation and Pandora monitoring network	Baylor Univ.: Yang Li	5	Recommended if Funding Avail.
22-021	Improving the temporal allocation of Nox emission in the Houston-Galveston-Brazoria area using satellite and ground observations and source and age-resolved photochemical modeling	Texas A&M Univ.: Qi Ying	1	Not Recommended
22-004	Industrial Emission Events of Volatile Organic Compound: Identification and Sensitivity to Ozone	Sonoma Technology, Inc.: Kenneth Craig	2	Not Recommended
22-014	Five-Year Ozone Estimations Based on Growing Population, Industry, and Clean Fuel Vehicle Adoption in Texas	Texas A&M Univ. - Alice Grossman	3	Not Recommended
22-002	Identify the land-water spatial distributions and boundary-layer behaviors of ozone and key precursors in the Houston Galveston Brazoria (HGB) area	Baylor Univ.: Yang Li	4	Not Recommended
22-013	Improving Methods of Estimating Off-network Activity and Emissions in the Texas State Implementation Plan Emissions Inventories - San Antonio Case Study	Texas A&M Univ. - Madhusudhan Venugopal	5	Not Recommended
22-017	Changing VOC emission patterns in Texas (VOC-TEX)	Univ. of Houston: Bernhard Rappenglueck	6	Not Recommended
22-007	Ozone formation from Texas oil and gas exploration emissions: The role of rural Nox emissions and photochemical Nox sensitivities	Texas A&M Univ.: Gunnar W. Schade	7	Not Recommended
22-012	The Atmospheric Chemistry of Volatile Organic Compounds in Houston: The Removal of VOCs and the Determination of Emission Ratios Based on the TRACER Campaign	Univ. of Houston: Yunsoo Choi	8	Not Recommended
22-022	Identifying weather patterns that transport wind-blown dust to the El Paso area from different sources	Univ. at Buffalo: Stuart Evans	9	Not Recommended
22-018	Determining Nox emission inventory and photochemistry in the San Antonio air shed using isotope techniques	Texas A&M Univ. - Corpus Christi: Joseph David Felix	10	Not Recommended

APPENDIX B. CONTRACTUAL RESEARCH PROJECTS APPROVED FOR FUNDING (BIENNIUM 2022-2023)

Proj. Nbr.	Project Title	Research Priority Area	PI, *Collab. PI*	Co-PI, *Collab. Co-PI*	Primary Institution, *Collab. Institution*	Institution Budget	Total Project Budget	AQRP Project Manager	TCEQ Liaison, Backup Liaison
22-003	Evaluating the Ability of Statistical and Photochemical Models to Capture the Impacts of Biomass Burning Smoke on Urban Air Quality in Texas	Domestic fire emissions	Matthew Alvarado	n/a	Atmospheric and Environmental Research, Inc (AER)	$161,388.00	$161,388.00	Elena McDonald -Buller	Chola Regmi, Thuy Phi
22-006	Hydrogen Cyanide for Improved Identification of Fire Plumes in the $(BC)^2$ Network	Domestic fire emissions	Tara Yacovitch *Rebecca Sheesley*	n/a *Sascha Usenko*	Aerodyne Research, Inc. *Baylor University*	$51,255.00 *$57,225.00*	$108,480.00	Vincent Torres	Erik Gribbin, Alexander Adame
22-008	Modeling analysis of TRACER-AQ and over-water Measurements to improve prediction of on-land and offshore ozone	TRACER-AQ and over-water measurements	Yuxuan Wang *Paul Walter*	James Flynn *n/a*	University of Houston *St. Edward's University*	$175,621.00 *$6,103.00*	$181,724.00	Elena McDonald -Buller	Barry Exum, Miranda Kosty
22-010	Dallas Field Study (DFS); Ozone Precursors, Local Sources and Remote Transport Including Biomass Burning	Changing emission patterns in Texas	Edward Fortner	n/a	Aerodyne Research, Inc.	$228,418.00	$228,418.00	Vincent Torres	David Westenbarger, Cara Scalpone
22-019	Refining Ammonia emission using inverse modeling and satellite observations over Texas and the Gulf of Mexico and investigating its effect on fine particulate matter	Improve emission inventories	Yunsoo Choi	n/a	University of Houston	$131,366.00	$131,366.00	Elena McDonald -Buller	Khalid Al-Wali, Shay Guerin
22-020	Quantifying the Emissions and Spatial/Temporal Distributions of Consumer Volatile Chemical Products (VCPs) in the Greater Houston Area	Improve emission inventories	Yue Zhang	Qi Ying	Texas A&M University	$160,182.00	$160,182.00	Elena McDonald -Buller	Bipin Sharma, Michael Ege
22-023	Source-sector NOx emissions analysis with sub-kilometer scale airborne observations in Houston during TRACER-AQ	TRACER-AQ and over-water measurements	Daniel Goldberg *Greg Yarwood*	n/a *n/a*	The George Washington University *Ramboll*	$103,425.00 *$144,721.60*	$248,146.60	Elena McDonald -Buller	Madison Knap, Peter Hoholick