Downwinders at risk
reducing toxic air pollution in north texas

Applicant Information Form
Sue Pope North Texas Pollution Reduction Program

Organization:	Southern Methodist University
Organization type	non-profit higher education institution
Organization Street Address:	SMU Office of Research Administration 6425 Boaz Lane, Suite 101
City, State, Zip	Dallas, Texas, 75205

Project Officer (Title, First, MI, Last, Suffix):			Dr. Alfredo J. Armendariz		
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Project Name		Identifying State of the Art NOx and PM Control Technologies for Electricity Generating Units in Texas Impacting Urban Areas			
Location of Project		Dallas, Texas			
Project Start Date (MM/DD/YYYY)		09-01-2009			
Project End Date (MM/DD/YYYY)		08-30-2011			

BUDGET: Please summarize your budget request in the space provided. You should also provide a more detailed budget in your preproposal.

Line Item	**Requested Funds**	**Matching Funds**
Salaries and Benefits	$86,861	0.00
Equipment	0.00	0.00
Other:	0.00	0.00
Total:	**$86,861**	**$0.00**

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Preproposals shall be no longer than five pages, and should include a description of the activities for which the applicant requests funding, the deliverables and environmental results, a detailed budget, and project timeline. Applicants should specifically address the two review criteria and identify the project activities that will address each of these criteria. All preproposals should also include the applicant information form (attached to this program announcement).

Identifying State-of-the-Art NOx and PM Control Technologies for Electric Generating Units in Texas Impacting Nonattainment Areas

Al Armendariz, Ph.D., Department of Environmental and Civil Engineering, Lyle School of Engineering, Southern Methodist University, Dallas, Texas.

Background

The Dallas-Fort Worth Metropolitan Area is classified as a moderate non-attainment area for the 84 ppb national ambient air quality standard for ozone. The recent lowering of the standard to 75 ppb adds to the challenge of the area coming into attainment in the future. Most of the other major metropolitan areas in Texas with populations over 400,000 - including the Houston, San Antonio, Austin, El Paso, and Corpus Christi metro areas – have ozone design values above the 75 ppb standard and regulatory pressure exists to lower ozone levels in these other cities. There are two groups of pollutants that are the main contributors to the ozone problem in Texas cities, nitrogen oxides (NOx) and volatile organic compounds.

In addition to ozone/NOx concerns, many of the cities in Texas have ambient levels of fine particulate matter (PM) just below the current national ambient air quality standard of 15 micrograms per cubic meter ($\mu g/m^3$). A recent court victory by environmental groups is likely to result in a tightening of the PM standard, with the health literature suggesting that a value between 12 to 14 $\mu g/m^3$ is likely. A standard at these levels might put the Dallas, Houston, Corpus Christi, El Paso, and possibly other metro areas at or above the PM nonattainment level.

Emissions of NOx and PM come from a variety of sources, but one of the largest sources in Texas are fossil-fueled electric generating units (EGUs). EGUs in Texas fire a variety of fuels, with coal, natural gas, and petroleum coke being three of the most common. Some of the EGUs are in urban areas, such as the Lake Hubbard and North Lake Plants in Dallas County, and others are in rural areas, such as the Big Brown plant in Freestone County and the Sandow Plant in Milam County. Regardless of location, computer modeling shows that most Texas EGUs can impact air quality in one or more urban areas.

Efforts to get the urban areas to get or stay in compliance with ozone and PM standards might require emission reductions of NOx and particulate from the EGUs in Texas beyond control levels of control already obtained. Unfortunately, stakeholders such as cities, counties, regional councils of governments, and environmental groups often have no independent method to verify that the levels of control identified by the utilities as "reasonably available control technology" or "best available control technology" truly represent the state-of-the-art controls that the Clean Air Act intended.

Objectives

The objectives of this study are to identify the current state-of-the-art control technology for NOx and PM emissions from EGUs, for the 2009 – 2010 time period. Controls will be identified which meet the federal requirements for reasonably available control technology and best available control technology. The public policy goal is to empower stakeholders with information that allows them to advocate for and get emission reductions of NOx and PM from existing and new EGUs in Texas, above and beyond what would have been required by state regulators. This will allow for the state to continue to have a reliable and robust electricity generating capacity, while also ensuring that cities already in nonattainment with ozone or particulate are impacted by EGU emissions at the lowest achievable level.

Methods

This study will produce a report with two sections, one on NOx emissions control technology, and a second on PM emissions control technology. The study will contain of an evaluation of current fuels and configurations of the current EGU fleet in Texas, as well as those being proposed or in permitting.

The study will then evaluate the technologies and the emission rates that appear to establish the state of the art in the U.S., and determine their applicability to Texas EGUs. The study will utilize the official EPA RACT/BACT/LAER clearinghouse, the standard reference method used when making control technology determinations during permit decisions.

In addition to the clearinghouse, the study will also include an evaluation of control technologies and emission rates reported in the most recent energy-focused conferences (such as those sponsored by the EPA, DOE, EPRI, and AWMA), which are sometimes too recent to be included in the clearinghouse database. An assessment will also be made of the emission rates being achieved and technologies being used by EGUs in other modern industrialized countries such as Canada, UK, Germany, and other EU states.

Finally, the report will evaluate the emission levels being achieved in the US by other heavy industrial boilers, incinerators, commercial heaters, and similar units. While not all technologies will directly transfer from one unit type to another (like an EGU), some technologies might work well across a range of process units. Discussions with control technology manufacturers should provide insight into the likelihood of success of these kinds of technologies.

Emissions Reductions, Schedule, Public Impact

This study has the potential to provide stakeholders with information necessary to achieve significant emission reductions. For example, a new or existing EGU could be controlling or proposing to control their NOx emissions at 75% and emit 3 tons NOx/day. If the utility, state, federal government, or administrative law judge were to require 90% controls because of the demonstrated availability of better technology, emissions would be reduced to only 1.2 tons NOx/day. The benefit would be 1.8 tons/day or 650 tons/year of NOx controlled because of the application of more advanced technology. And once established in a permit or SIP revision, these cuts would be permanent.

A draft report will be produced by SMU nine months after commencement of the project, for review and comment by scientists and engineers working for the U.S. DOE, U.S. EPA, and control technology vendors. A final report will be produced 18 months after commencement of the project, addressing comments received from the draft report and the latest technology advances. This schedule will make the report available for the RACT policy discussions that will occur in D-FW, Houston, and other Texas urban areas regarding the new 75 ppb ozone standard in the 2011 time frame.

From 18 to 24 months after project start, the principal investigator will organize and participate a series of public meetings, one each in Dallas, Fort Worth, and 2 more in other cities, coordinated by the regional councils of governments or other appropriate body, to communicate the results of the report, and provide stakeholders with information on the additional levels of NOx and PM controls that can be achieved from Texas EGUs, if any.

Budget Explanation, Qualifications, and Grant Management

This preproposal is requesting funding to cover the time and labor expenses of the Principal Investigator, Dr. Al Armendariz, while working on this project as a member of the faculty at Southern Methodist University. If funded, this project will be one of the main research activities of Dr. Armendariz, along with his duties teaching, doing public and university service, and working on other environmental engineering research projects. The requested budget will cover 25% of his normal annual salary and benefits during the first calendar year, and 50% of his normal annual salary during the second calendar year, plus 8% university overhead. Because of the nature of this project, there are no additional expenses for laboratory supplies, analytical equipment, computers, or other materials. Routine report preparation, mailing, telephone, and other miscellaneous office expenses are covered by the university, partially with funds drawn from university overhead receipts.

Dr. Al Armendariz is a native Texan, born in El Paso, and a current resident of Dallas. He is an experienced air quality researcher, with a background directly relevant to the primary objectives of the research project. He is an M.I.T.-trained chemical engineer, with graduate training specifically in air quality issues from the University of Florida and the University of North Carolina. He has been the principal authors of numerous proposals to agencies such as the National Science Foundation, the Centers for Disease Control and Prevention (CDC), and also to several local/state/tribal entities such as the Cherokee Nation (Oklahoma) Office of Environmental Affairs. He is serving as the principal investigator on a $300,000+ project funded by the CDC to develop air pollution control systems for diesel exhaust vehicles. Throughout his consulting, research, and teaching career, his focus has focused on air pollution control and soil analysis projects. He has presented his work at numerous conferences, including those of the Air and Waste Management Association and the American Industrial Hygiene Conference and Exposition, and he has published in peer-reviewed journals.

Based on the most recent Carnegie Foundation classifications, Southern Methodist University (SMU) belongs to the class of "Doctoral/Research Universities – Extensive", institutions which graduate more than 50 doctoral candidates in at least 15 disciplines per year. Research productivity is required of faculty members in all disciplines. Institutional commitment is for excellence in both teaching and research. About 520 full-time faculty members generate more than original 50 books and 600 journal articles per year.

Grant application and funding management for all research projects at SMU are under the supervision of Dr. Jim Quick, Dean of Graduate Studies and Associate Vice President for Research. Dr. Quick has a long and distinguished scientific and research management career, including over 25 years at the U.S. Geological Survey

(USGS), where he attained the rank of Program Coordinator and managed a program with an annual research budget of over $26 million. He now uses this expertise to manage research and graduate education at SMU. Day to day management of the proposal, budget, and research administration tasks in this project will be handled by Alicia Brossette, Director of Research Administration at SMU, who will work closely with the principal investigator and Dean Quick to insure that all administrative aspects of the project are handled according to SMU and Sue Pope Fund requirements.