

BOARD MEETING DATE: November 4, 2016

AGENDA NO. 2

PROPOSAL: Execute Contracts for Conducting Studies With Sensors and Advanced Optical Remote Sensing Technologies

SYNOPSIS: Emerging novel technologies, such as air quality sensors and optical remote sensing (ORS), allow reliable measurement of both particle and gaseous air pollutants in real time. However, field data obtained using these monitoring methods is scarce and significant work is needed to gather long-term data to ascertain their feasibility, accuracy and cost-effectiveness. In addition, sensors are starting to be used by "citizen scientists" to measure air quality in their communities with limited information about their applications, operations and data interpretation. This action is to execute contracts in an amount not to exceed \$720,500 to educate California communities in the use and operation of sensors and conduct field measurements using sensors and ORS methods.

COMMITTEE: Technology, October 21, 2016; Recommended for Approval

RECOMMENDED ACTION:

Authorize the Chairman to execute the following contracts from Science & Technology Advancement's (Org 43) FY 2016-17 Budget:

- A. FluxSense, Inc., in an amount not to exceed \$280,000 to conduct long-term measurements to better characterize air toxic emissions from refineries and assess potential impacts in surrounding communities;
- B. Sonoma Technology, Inc., in an amount not to exceed \$150,000 over three years to develop new methods to engage, educate and empower local communities on the use and applications of sensors;
- C. University of California Los Angeles (UCLA), specifically Dr. Yifang Zhu's research group, in an amount not to exceed \$140,500 over three years to help deploy sensors in multiple California communities and perform a thorough validation and interpretation of the collected data;
- D. Center for Community Action and Environmental Justice (CCA EJ) in an amount not to exceed \$50,000 over three years to help recruit communities and individuals willing to operate air quality sensors in Southern California; and

- E. Communities for a Better Environment (CBE) in an amount not to exceed \$100,000 over three years to help recruit communities and individuals willing to operate air quality sensors in Central and Northern California.

Wayne Natri
Acting Executive Officer

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Background

Sensor Project under U.S. EPA Science to Achieve Results Grant

In 2014, SCAQMD applied for a competitive U.S. EPA Science to Achieve Results (STAR) grant and was awarded \$749,820 to provide local California communities with the knowledge necessary to appropriately select, use and maintain sensors and correctly interpret sensor data. On October 7, 2016, the Board authorized the recognition of \$749,820 in revenue into the General Fund and the appropriation of \$670,500 to Science & Technology Advancement's FYs 2016-17, 2017-18 and 2018-19 Budgets, Services and Supplies/Capital Outlays Major Objects, (\$79,320 is already included in Salaries and Benefits within Science & Technology Advancement's budget), to conduct a comprehensive study focusing on the following specific aims:

1. Develop new methods to engage, educate and empower local communities on the use and applications of sensors;
2. Conduct field and laboratory testing to characterize the performance of commercially available sensors and identify candidates for field deployment;
3. Deploy the selected sensors in multiple California communities and perform a thorough validation and interpretation of the collected data; and
4. Communicate the lessons learned to the public and organize outreach activities.

Advanced Optical Remote Sensing Study under U.S. EPA Community-Scale Air Toxics Ambient Monitoring

In 2015, SCAQMD applied for U.S. EPA "Community-Scale Air Toxics Ambient Monitoring" funds and was awarded \$569,682 to study air toxic emissions from refineries and the potential impact of such emissions over local communities, utilizing next generation monitoring technologies. On October 2, 2015, the Board authorized the recognition of \$569,682 in revenue into the General Fund and the appropriation of \$508,729 to Science & Technology Advancement's FYs 2015-16, 2016-17 and/or 2017-18 Budget, Services and Supplies/Capital Outlays Major Objects, (\$60,953 is already included in Salaries and Benefits within Science & Technology Advancement's budget), to conduct a comprehensive study focusing on the following specific objectives:

1. Long-term use of sensors for assessing the impact of industrial air toxic emissions on surrounding communities; and

2. Long-term use of Solar Occultation Flux (SOF), an optical remote sensing (ORS) method, to monitor air toxic emissions from refineries and estimate their annual VOC emissions.

Proposal

This action is to execute contracts with FluxSense, Inc., Sonoma Technology, Inc. (STI), the University of California Los Angeles (UCLA), specifically Dr. Yifang Zhu's research group, the Center for Community Action and Environmental Justice (CCA EJ), and the Communities for a Better Environment (CBE) to perform the work described below.

Sensor Project under U.S. EPA Science to Achieve Results Grant

STI will develop a toolkit containing informational material about sensors and best practices for data collection and interpretation. The toolkit will promote appropriate use of air quality sensors and help communities use sensors to answer questions about air quality (aim 1). SCAQMD will perform a thorough performance characterization of currently available sensors using both field and laboratory based testing (aim 2). In the field, air quality sensors will be operated side by side with instruments routinely used to measure air pollutants concentrations for regulatory purposes. A "characterization chamber" will be used to challenge the sensors with known concentrations of different particle and gaseous pollutants under different temperature and relative humidity conditions. Sensors that have demonstrated acceptable performance will then be deployed at six communities throughout California by Dr. Yifang Zhu's research group at UCLA (aim 3). Six communities will be specifically targeted in Environmental Justice areas and near specific sources of air pollution. Recruitment efforts will be supported by the CCA EJ and by CBE. Regular public meetings and other outreach activities will be organized by SCAQMD in collaboration with STI, CCA EJ and CBE to educate the public on the capabilities of commercially available sensors and their potential applications and limitations (aim 4). All data collected, documentation developed and testing results will be posted online on SCAQMD's AQ-SPEC website (www.aqmd.gov/aq-spec) and shared with the community at no cost.

Advanced Optical Remote Sensing Study under U.S. EPA Community-Scale Air Toxics Ambient Monitoring

Staff has already designed a sensor device capable of measuring sudden variations in ambient VOC concentrations at the fence line of refineries due to planned/unplanned releases (e.g., flares and leaks). Staff is now preparing to deploy these VOC sensors around one or more refineries in the Carson-Wilmington area and would like FluxSense, Inc., to perform periodic air toxic measurements near the same refineries and in nearby communities to confirm and complement the sensor data. FluxSense, Inc., will conduct continuous mobile measurements of air toxic concentrations around several refineries in the Carson-Wilmington area. Flux measurement surveys of the targeted air pollutants (e.g., propane, ethylene, propylene and ammonia) will be conducted using the SOF method developed by FluxSense, Inc. This method utilizes the sun as the light source,

and gas species that absorb in the infrared portion of the solar spectrum are measured from a mobile platform. Measurements are performed with an infrared spectrometer. From the solar spectra, the path-integrated concentrations (column; in mg/m²) of the targeted species between the sun and the spectrometer are retrieved. The SOF measurement system is built into a van. In order to measure gaseous emissions from a source, the vehicle is driven so that the collected sunlight cuts through the emission plume. Total emissions are then calculated by combining the retrieved trace gas columns with wind direction and speed information. These surveys, each lasting for at least two weeks, will be performed seasonally (i.e., winter, spring, summer and fall) for a period of two years, allowing staff to estimate facility-wide emissions of aromatic hydrocarbons and other important VOCs. The combination of sensor and SOF data will provide invaluable insights on refinery emissions and potential neighborhood VOC exposure over time.

Sole Source Justification

Section VIII. B. 3 of the Procurement Policy and Procedure identifies four major provisions under which, for contracts funded in whole or in part with federal funds, a sole source award may be justified. This request for sole source awards is made under provisions B.3.a (for FluxSense, Inc.) and under B.3.c (for STI, UCLA, CCAEJ, and CBE). B.3.a - The item is available only from a single source. FluxSense's proprietary SOF method is the only one on the market capable of performing mobile VOC measurements in real time and is ideal to fulfill the strict technical requirements of this study. B.3.c - The awarding federal agency authorizes noncompetitive proposals.

Benefits to SCAQMD

This work will promote a better and more responsible use of available sensors within California communities and across the U.S. and help governmental organizations and other policy makers to better understand air quality issues at the community level. It will also provide unprecedented monitoring information on air toxic emissions from refineries and allow mapping of ambient air toxic concentrations in surrounding neighborhoods. Furthermore, it will assist in identifying and addressing specific concerns related to air toxic exposure in the Carson-Wilmington area. Finally, it will serve as a template for developing monitoring strategies and/or studies to provide information on mitigation efforts and their future implementation.

Resource Impacts

There is sufficient funding in Science & Technology Advancement's FYs 2016-17 Budget (Org 43) from the U.S. EPA Community-Scale Air Toxics grant award to fund the contract with FluxSense in an amount not to exceed \$280,000. The U.S. EPA has authorized funding of \$749,820 for the STAR grant and SCAQMD has received an initial award of \$400,000. Funding is available for the contracts with STI, not to exceed \$150,000; with UCLA, not to exceed \$140,500; with CCAEJ, not to exceed \$50,000; and with CBE, not to exceed \$100,000.