

BOARD MEETING DATE: November 3, 2017

AGENDA NO. 3

PROPOSAL: Transfer and Appropriate Funds, Authorize Contracts, RFQs and Purchase Orders, and Execute Contracts for Advanced Monitoring During MATES V

SYNOPSIS: In 2018, SCAQMD will conduct the Multiple Air Toxics Exposure Study V (MATES V) to evaluate air toxics health risks in the South Coast Air District. To complement and augment the MATES V study, staff proposes a suite of advanced air monitoring techniques, including aerial and mobile measurements of air toxics. These efforts will generate detailed air toxics maps, near real-time data on emissions and better assessment of community air toxic exposure, especially in environmental justice communities. These actions are to: 1) transfer up to \$3,671,010 from the Rule 1118 Mitigation Fund (54) to the General Fund (01) for the MATES V enhanced monitoring program; 2) appropriate funding to the Science & Technology Advancement and the Planning, Rule Development, and Area Sources budgets over FYs 2017-18, 2018-19, and 2019-20 on an as-needed basis; 3) authorize contracts for advanced air toxics measurements; 4) authorize purchase orders for remote sensing measurement equipment and low-cost sensors; and 5) authorize RFQs and purchase orders for a mobile platform for the remote sensing equipment and for automated gas chromatography equipment and services. Additional expenditures include adding temporary staff services to support additional workload, contract costs for community organizations, mileage and supplies for community meetings, and administrative expenses to support this enhanced monitoring component of MATES V.

COMMITTEE: Administrative, October 13, 2017; Recommended for Approval

RECOMMENDED ACTIONS:

- 1) Transfer up to \$3,671,010 from the Rule 1118 Mitigation Fund (54) to the General Fund (01) on an as-needed basis in FYs 2017-18, 2018-19 and 2019-20 to support the MATES V enhanced monitoring program;

- 2) Appropriate up to \$3,671,010 to the Science & Technology Advancement and the Planning, Rule Development and Area Sources budgets to procure the resources needed to complete the MATES V enhanced monitoring program, which are shown in the attachment, on an as-needed basis in FY 2017-18, 2018-19 and 2019-20;
- 3) Authorize the Executive Officer to execute contracts for advanced air toxics measurements with the following entities to be funded as needed from the Science and Technology Advancement's FY 2017-18, 2018-19 and 2019-20 Budget:
 - a. The Regents of the University of California, Los Angeles for an amount not to exceed \$880,000 to implement an "Optical Tent" system at one refinery
 - b. Aerospace Corporation for an amount not to exceed \$192,000 to conduct Hyperspectral Thermal-Infrared Imaging using aircraft flights and analyze air toxics data for large areas within the South Coast Air Basin
 - c. Qsense, Inc. for an amount not to exceed \$700,000 to deploy a network of air quality sensors in a community near a petroleum refinery, conduct community outreach, and manage the resulting data;
- 4) Authorize the Procurement Manager to issue purchase orders for advanced air toxics monitoring equipment and low-cost sensors with the following entities to be funded from the Science and Technology Advancement's FY 2017-18 and 2018-19 Budget:
 - a. FluxSense, Inc. for an amount not to exceed \$1,300,000 for the purchase of remote sensing measurement equipment, related services and supplies
 - b. PurpleAir for an amount not to exceed \$21,250 for the purchase of air pollution sensors;
- 5) and Authorize the Procurement Manager, in accordance with SCAQMD Procurement Policy and Procedure, to issue the following solicitations and purchase orders for:
 - a. The purchase of a mobile platform for the remote sensing equipment, in an amount not to exceed \$110,000
 - b. The purchase, installation, and operation of an automated gas chromatograph, pre-concentrator, and associated instrumentation, in an amount not to exceed \$300,000.

Wayne Natri
Executive Officer

Background

The Multiple Air Toxics Exposure Study (MATES) study provides unique information on air toxics and their associated health risks based on long-term monitoring at ten fixed locations throughout the South Coast Air Basin (Basin) and a detailed emissions inventory and modeling analysis. The first MATES study was conducted in 1987, and the MATES program continues to be an important component of SCAQMD's environmental justice (EJ) initiatives. Beginning in January 2018, the SCAQMD will conduct the fifth MATES study over a one-year period. Results from this study will provide an assessment of trends in air toxics levels.

Pilot projects conducted by SCAQMD over the past few years highlighted the powerful capabilities of new optical remote sensing technologies (e.g. FluxSense project) and low-cost sensors (e.g. AQ-SPEC project). These technologies have been demonstrated in a number of SCAQMD special monitoring projects, and MATES V presents a unique opportunity to deploy these technologies to create more refined air toxic exposure maps and provide near real-time air quality data to the community. To help inform the local-scale monitoring studies, and to ensure that the local-scale data is useful to that local community, a community engagement component is included in this effort as well. SCAQMD staff and the Technical Advisory Group have discussed options for enhanced monitoring and/or modeling efforts as part of MATES V. There was broad-based support for providing more detailed air toxic information to people living in EJ communities.

The purpose of the MATES V fixed site monitoring is to characterize long-term regional air toxics levels in residential and commercial areas. The majority of the fixed-site monitoring is not intended to provide real-time data, nor target "hot spots" near major pollution sources. To complement and enhance the fixed site monitoring, the proposed work will apply advanced state-of-the-art monitoring technologies, low-cost sensor networks, and near real-time data and community engagement to conduct enhanced air toxics monitoring at local scales with a focus on EJ communities, especially those near refineries. The motivation behind this effort is to better characterize air toxics levels in highly impacted areas, to provide higher resolution air quality data, and to better understand emissions from petroleum refineries. The monitoring network and user integration will be designed using appropriate technology to suit the long-term goal of community empowerment and further SCAQMD's air pollution education endeavors. Lessons learned from this program will assist with future efforts that will also cultivate mutual trust between SCAQMD and local community members and organizations. These efforts will also provide the foundation for wider deployment of the next generation of monitoring technologies to address air quality challenges in the future.

New instrumentation and contracts for conducting the advanced air pollution measurements is required to complete this project. In addition, the project requires several contractors' unique expertise, equipment, and related technical support services. The current proposed budget includes a description of these resources. Additional costs include the costs of conducting several community meetings, funding support for community partners for their participation, transportation costs related to conducting community needs assessments, as well as administrative costs related to convening the MATES V Technical Advisory Group meetings (including travel costs for Advisory Group members and web-meeting technology services). Additional temporary staff services are required to operate field monitoring equipment.

Proposal

To implement the enhanced and local-scale monitoring efforts for MATES V, and to obtain the necessary equipment and supplies, this action is to transfer and appropriate up to \$3,671,010 to the Science & Technology Advancement and the Planning, Rule Development and Area Sources budgets over FYs, 2017-18, 2018-19, and 2019-20 on an as-needed basis. Descriptions of the contracts and resource needs are provided below and in the attachment, along with the expected time frame for the expenditures. Individual contracts will be brought to the Board as needed, pursuant to the Procurement Policy.

This proposal is to conduct several different types of advanced air monitoring measurements to develop spatially detailed maps and near real-time data in EJ communities, with a focus on communities near refineries. The various advanced technologies and project components will complement and inform one another. The flight-based measurements will provide air toxics data across a large area, which will help guide the target areas for the ground-level mobile monitoring and sensor deployments. Local communities will be able to identify areas within their neighborhoods where air quality is a greater concern, and provide other local information on air pollution sources. This information will help with the design of the sensor network and the interpretation of the data. Measurements of refinery emissions and mobile measurements and sensor data in the nearby community will provide information on potential community impacts.

Proposed Sole-Source Contracts

Aerospace Corporation

Aerospace Corporation's Hyperspectral Thermal-Infrared Imaging is a state-of-the-art technology that utilizes aircraft flights to conduct air toxics measurements over a large area. This technology is suitable for conducting surveys over a large area, and is capable of measuring benzene, toluene, ethylbenzene and xylene (BTEX) compounds, and other air toxics, in addition to SO₂, NO_x. One of its main advantages is to identify potential emissions sources and hot spots that are otherwise difficult to discover with ground-based measurements. Aerospace Corporation has already been conducting

flight-based measurements in the Basin for the past several years, including in the areas near the major petroleum refineries and EJ areas with facilities that are likely emitters of BTEX compounds. These flight measurements will also assist in the selection of locations for enhanced ground-based monitoring with low-cost sensors and mobile measurements using the FluxSense mobile laboratory. The data obtained from the flight-based measurements will enhance the analysis of traditional air toxics monitoring and emissions estimates in the Basin.

For the enhanced monitoring project, staff proposes to have Aerospace Corporation conduct an analysis of the flight-based measurements across large areas within the Basin. District staff will work with Aerospace Corporation on evaluating the data from these flight measurements alongside air toxics measurements conducted by SCAQMD through other efforts. If this work demonstrates that more current data is needed to evaluate emissions from refineries or other air toxics emissions sources, staff proposes to have Aerospace Corporation conduct one aerial measurement campaign in 2018, to include two flights for better measurement validation. To inform and complement the refinery-related monitoring, the flight areas will focus on the portions of Los Angeles County where the six major refineries are located, and their surrounding residential neighborhoods, which may contain other sources of air toxics. Flight-based measurements present a unique opportunity to measure many potential sources of VOCs that are otherwise very difficult to measure.

The Regents of the University of California, Los Angeles

The “Optical Tent” concept proposes to use optical remote sensing technology for near-real time monitoring of benzene, toluene, and xylene (BTX) emissions from a stationary source. The proposed application for the Optical Tent within the MATES V Enhanced Monitoring project is to conduct long-term monitoring within one of the six major refineries in the Basin. This unique technology operates 24 hours a day, seven days a week, and allows for the characterization of long-term emissions from a source, provides near real-time data to evaluate emissions at different times of day, and can also help identify leaks. The data provided by the Optical Tent, in conjunction with flight measurements, mobile measurements, sensor data and meteorological data, will help identify air toxics impacts to the nearby community.

A proposal for the Optical Tent for a refinery was obtained from Dr. Jochen Stutz, Professor of Atmospheric and Oceanic Sciences at the University of California, Los Angeles (UCLA). The proposed Optical Tent requires two long-path differential optical absorption spectrometer (LP-DOAS) instruments, which are operated on a continuous basis, and are fully automated and require no calibration. UCLA will provide the optical tent technology, as well as the installation and data analysis. The proposed project is expected to last two years, with the first six months for constructing and deploying the Optical Tent hardware, followed by 12 months of conducting measurements, and six months for data analysis and reporting of results.

Qsense, Inc.

Qsense, Inc. will implement community outreach and deployment of a high-density network of sensors that measure VOCs, combustion byproducts and meteorological conditions. This network will be deployed in one EJ neighborhood located near a major refinery, in Wilmington, Carson, or Long Beach. The Qsense deployment includes three sets of measurements: 1) the ZooBox sensors, 2) S-Pod sensors, and 3) personal weather stations. These sensors will be connected to the Qsense platform, which is designed to aggregate, unify and analyze air quality and transport data. The ZooBox sensor is a real-time cellular-connected device for measuring combustion-related air pollutants, including sensors for PM 2.5/10, NOx, CO and CO2, barometric pressure, temperature and relative humidity. The “S-Pod” is a sensor for measuring VOCs, and has been evaluated as a low-cost technology for measuring leaks and emissions near oil and gas facilities. A total of 36 ZooBox sensors and 36 S-Pod sensors will be deployed.

Personal weather stations will measure minimum wind speed and direction, to better understand micro-meteorology in that local area. Twenty-five weather stations will be deployed at the same time as the ZooBox deployment. Qsense will also implement a user interface specific to the community where users can create an account, login and navigate geospatial/temporal data from all the sensors integrated in the deployment. Qsense will recruit volunteers in the community to help site and deploy sensors in residential areas and they will manage an online forum where community members can ask questions and receive answers regarding air quality. Trained community volunteers will have the opportunity to co-author summary material to present to local officials and agencies. The proposed project is expected to last 18 months, with the first six months for community outreach, volunteer recruitment, selection of locations, and preparing the hardware. The sensor network will be in operation for a 12 month period, beginning July 2018.

Proposed Sole-Source Purchase Orders

Mobile Community Surveys Laboratory (FluxSense, Inc.)

This proposal is to purchase the FluxSense mobile laboratory to conduct mobile monitoring around major refineries in the Basin, in the communities near these refineries, and in other EJ areas selected for the low-cost sensor deployments. FluxSense, Inc. and District staff will conduct a comprehensive study to characterize and quantify total facility-wide emissions of methane, non-methane VOCs (i.e., alkanes, BTEX and alkenes), NOx, and SO2 using a mobile laboratory equipped with optical remote sensing and in-situ optical measurements around refineries. This technology will be used to characterize refinery emissions and identify leaks, to identify hot-spots and to provide insights on small-scale gradients. Measurements will be carried out at the fence-line of each of the major refineries in the Basin, as well as in the nearby communities to characterize community levels of the same compounds. The surveys around and near each refinery will be carried out on a monthly basis, over a 12 month period. The SCAQMD will work with the refineries and other local authorities to

facilitate the measurements. In addition, the FluxSense unit will be used in the communities selected for sensor deployment, to identify potential hot-spot areas where sensors could be deployed.

The purchased laboratory will include Solar Occultation Flux (SOF), Differential Optical Absorption Spectroscopy (DOAS) and Fourier Transformed InfraRed (FTIR) measurements on a mobile platform (a vehicle). This technology allows for concentration mapping and emissions flux measurements within a localized area. Other real-time instruments and sensors can be added to the platform as needed. Measurements will be complemented by wind data from ground wind sensors. This purchase order would include associated training, supplies, and some additional support services. However, this purchase order would not include the mobile platform where the equipment will be installed.

The FluxSense technology has previously been used to evaluate emissions from refineries and other petroleum sources in the Basin, including at the six major refineries. This system has proven useful to provide timely information to identify leaks at a facility, so that these air pollution impacts can be addressed promptly.

Sensor Network Deployments for Enhanced Community Monitoring

Two types of sensor network deployments are proposed: 1) Purple Air sensors and 2) Qsense sensors. Each of these networks will be deployed in EJ communities within the Basin, including at least one community located near a major refinery. These sensor networks will provide a detailed map of how air pollutant levels vary within the community, and also provide near real-time information. The sensor deployments will last several months to one year in order to provide medium-to-long-term data.

Because the focus of these sensor networks is to provide detailed information relevant to the community's concerns, these sensor deployments will be conducted with community input and participation. The deployment and data collection of the Purple Air sensors will consist of a collaborative effort between SCAQMD staff and local organizations, while Qsense will independently deploy their sensors as described in a previously-scored proposal that was received through an RFP.

Purple Air – Low-Cost PM Sensors

This proposal is to purchase 85 low-cost PM sensors from Purple Air. These sensors have been evaluated through SCAQMD's AQ-SPEC program, and are currently being used in SCAQMD's efforts funded by a U.S. EPA STAR grant to conduct community engagement and education efforts in communities across California. These sensors will be acquired as a sole-source purchase order and they will be used in the Community Engagement through Low-Cost Sensor Deployment effort described below.

Community Engagement through Low-Cost Sensor Deployment

This proposal is to conduct community engagement with low-cost sensor networks in two residential communities in the Basin. The main purpose of this work is to engage the community and collect detailed information about potential hot spots and gradients within a community impacted by diesel truck traffic. The focus of this work is based on the previous MATES studies results, which show that diesel particulate matter is the major driver of air toxics health risk in the Basin. One selected community will be near the I-710 corridor, preferably near one of the MATES fixed site stations, and the second community will be in the Inland Empire, near warehouses with diesel truck traffic. The specific criteria for community selection will be discussed with the MATES V Technical Advisory Group.

Community engagement and participation is essential to deploy sensors in locations that will inform the local community about air pollution levels. Within each selected community, a local organization will be identified as a project partner. This organization will be tasked with conducting community outreach, recruiting 25-35 community members to participate in the sensor deployment, organizing and facilitating community meetings, helping with sensor maintenance and troubleshooting, as well as coordinating with SCAQMD in conducting the needs assessment and reporting back to the community. The community organization will also be responsible for managing and distributing a \$100 gift card to each participant upon completion of the project. Each community organization will receive \$40,000 for these efforts, which includes the cost of the gift cards.

Purple Air sensors will be used to measure PM_{2.5} levels in the community, and participants will keep the sensors once the project is completed. We propose to purchase 85 Purple Air sensors, with approximately 70 sensors to be distributed across two communities, and extra units to replace broken sensors. The sensors will be deployed for a 12 month period, starting approximately July 2018.

SCAQMD staff will collaborate with the organization to provide air quality and sensor training, troubleshoot hardware, conduct a needs assessment, gather feedback from the community on sensor data, and report information back to the community. In addition, the local organization will also cooperate with SCAQMD to organize regular meetings with community members, local businesses, and elected officials once sensor data is available. This will facilitate discussion between the District and neighborhood stakeholders to better understand the air quality concerns and brainstorm potential solutions based on health impacts and community feedback. A needs assessment, including a community bus tour, will be conducted to ascertain the community's highest priority air pollution concerns, and prioritize community improvement projects with a nexus to air quality. This phase will give SCAQMD staff an understanding of the community's perspective and will help with the development of practical, real-world solutions to address the community's concerns.

Recurring meetings will be conducted in each of the two communities to complete this work. Interpretation services, AV equipment rental and food will be provided at each community meeting. Once the needs assessment is complete, SCAQMD staff will seek future resources to implement the highest priority community improvement projects. Because these sensor deployments would occur approximately July 2018 - June 2019, this proposal also includes extending the fixed-site monitoring at two MATES sites for an additional six months to coincide with this work, and other components of the proposed advanced monitoring. This budget includes temporary staff that are needed to conduct this additional fixed-site monitoring for six months.

This work will complement the work currently being conducted at SCAQMD through the U.S. EPA STAR grant, but will differ in the scope and target communities. This work also builds upon the Clean Communities Plan (CCP) pilot projects previously conducted by SCAQMD, as part of the EJ initiatives. Examples of community improvement projects conducted through the CCP pilots include home weatherization, auto-body shop equipment exchanges, and school filtration projects.

Proposed Purchase through the RFQ Process

Mobile platform

The mobile platform will be utilized to carry the FluxSense laboratory. The specific requirements for this vehicle are: three doors, seats for two passengers, a sunroof, and rear-wheel drive. An alternative-fueled or electric vehicle is advised to minimize interference from vehicle emissions and the on-board measurements.

Automated Gas Chromatography Monitoring

An automated gas chromatograph (Auto-GC) analyzes and quantifies non-methane organic compounds and speciated VOCs (to include BTEX, and, preferably, the full EPA PAMS GC-FID target list). The proposed application of the Auto-GC monitoring in this project is to complement the low-cost VOC sensor network (Qsense, described above), by deploying traditional air toxics sampling in the same community where these sensors are deployed. Data from the Auto-GC monitoring will be compared to the data from the Qsense VOC sensors, to help interpret the sensor data. This equipment will be deployed beginning in July 2018 for a 12-month period, and provide hourly data on these pollutants.

Outreach

In accordance with SCAQMD's Procurement Policy and Procedure, a public notice advertising the inviting bids will be published in the Los Angeles Times, the Orange County Register, the San Bernardino Sun, and Riverside County's Press Enterprise newspapers to leverage the most cost-effective method of outreach to the Basin. Additionally, bidders will be notified utilizing SCAQMD's own electronic listing of certified minority vendors.

Sole Source Justification

Section VIII, B.2 of the Procurement Policy and Procedure identifies four major provisions under which a sole-source award may be justified.

The request for a sole-source contract with the Regents of the University of California, Los Angeles is made under Section VIII, B.2.c(1): The unique experience and capabilities of the proposed contractor or contractor team. Professor Jochen Stutz at UCLA is uniquely qualified because he is an expert in the investigation of the emissions, formation and chemical transformation of various trace gases in the atmosphere using UV-visible DOAS. He has over 20 years of experience in developing and deploying DOAS remote sensing instruments. His research group has had over two decades of experience with long-path Differential Optical Absorption Spectroscopy (LP-DOAS) and recently they showed in an SCAQMD funded demonstration project, as well as a project funded by Fish and Wildlife Service of the U.S. Department of the Interior, that state of the art LP-DOAS instruments are capable of measuring BTX at mixing ratios below one ppb in near real-time, every one to five minutes. These results have been published in a recent peer-reviewed manuscript in Atmospheric Environment. This method has also been recognized by the U.S. EPA in a recent rule on “Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards.”

The request for a sole-source contract with Aerospace Corporation is made under Section VIII, B.2.c(1): The unique experience and capabilities of the proposed contractor or contractor team. Aerospace Corporation is the only entity in the United States that provides ground level emissions information through remote sensing from an airplane to its level of detail. Aerospace also has significant experience with this technology for the past several years and their ability to leverage existing staff resources, techniques, telecommunications, databases, and data processing and validation software developed for the previous effort. Aerospace Corporation was key in the development of the next-generation sensor which was recently used in test flights over California and Nevada, collecting data on industrial sites, agricultural areas, and other locations of interest.

The request for a sole-source contract with Qsense is made under Section VIII, B.2.c(1): The unique experience and capabilities of the proposed contractor or contractor team. The Qsense proposal was received through the RFP #2017-06 “Supplemental Environmental Project Fund – ExxonMobil Settlement” and received a technical score of 72.35, and a total score of 86.35. The top two proposals were selected for funding through RFP #2017-06 and awarded contracts. The Qsense proposal was ranked third and staff recommends including them in the proposed MATES V enhanced monitoring program because of their ability to deploy progressive high-density VOC sensors for real-time measurements and employ unique in-cloud calibration methods, as well as conduct community outreach.

The request for a sole-source purchase order with FluxSense, Inc. is made under Section VIII, B.2.c(2): The project involves the use of proprietary technology. 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.

The request for a sole-source purchase order with Purple Air is made under Section VIII, B.2.d(6): Projects requiring compatibility with existing specialized equipment. Purple Air sensors are already being used as part of the existing U.S. EPA-funded STAR grant, titled "Engage, Educate and Empower California Communities on the Use and Applications of "Low-cost" Air Monitoring Sensors." To ensure comparability and compatibility with the sensor data from other concurrent efforts at the SCAQMD, we propose to use the same type of sensor in this enhanced monitoring effort.

Benefits to SCAQMD

These advanced monitoring projects conducted during MATES V will provide SCAQMD and stakeholders with cutting-edge capabilities for quantifying air toxics levels in communities with high spatial resolution and near real-time data. This information will help improve emission inventory estimates by narrowing the gap between measured and reported fugitive emission levels from refineries. The monitoring and community needs assessment work will also inform the upcoming work through AB617 to develop community plans and conduct air toxics monitoring. The enhanced monitoring has the potential to discover previously unknown sources of air toxics, which could inform future regulatory activities. The results of this project will also serve as valuable information to better understand the impact of refineries and other sources on EJ communities in the Basin. Through community engagement, the enhanced monitoring efforts will serve as a means of collaboration between SCAQMD and local organizations. The study will provide additional information for the SCAQMD staff to better understand refinery emissions, and inform future efforts to reduce impacts on nearby communities.

Resource Impacts

The Rule 1118 Mitigation Fund (54) will be used to fund the items listed in the attachment that total \$3,671,010 over a three-year project period. The Rule 1118 Mitigation Fund (54) as of September 2017 has a balance of \$22,671,988 excluding any Board actions that have not been encumbered.

Attachment

Proposed Resources for Advanced Monitoring During MATES V

Attachment

Proposed Resources for Advanced Monitoring During MATES V

					Estimated Expenditures by Budget Year		
Description	Division	Qty	Unit Cost	Total Cost	FY 17-18	FY 18-19	FY 19-20
<i>Capital Outlay</i>							
Mobile Platform (Vehicle)	STA	1	\$110,000	\$110,000	\$110,000	\$0	\$0
<i>Temporary Services</i>							
AQ Instrument Specialist	STA	1	\$18,000	\$18,000	\$0	\$18,000	\$0
AQ Chemist	STA	1	\$20,000	\$20,000	\$0	\$20,000	\$0
Lab Technician	STA	1	\$18,000	\$18,000	\$0	\$18,000	\$0
<i>Contracts</i>							
Aerospace Corp	STA	1	\$192,000	\$192,000	\$192,000	\$0	\$0
Qsense	STA	1	\$700,000	\$700,000	\$300,000	\$200,000	\$200,000
UCLA	STA	1	\$880,000	\$880,000	\$400,000	\$240,000	\$240,000
Community Organizations (for Low-Cost Sensor Networks)	PRDAS	2	\$40,000	\$80,000	\$20,000	\$50,000	\$10,000
<i>Other</i>							
Automated gas chromatography monitoring services *	STA	1	\$300,000	\$300,000	\$0	\$150,000	\$150,000
FluxSense Laboratory, Services and Supplies *	STA	1	\$1,300,000	\$1,300,000	\$1,250,000	\$50,000	\$0
Low-Cost Sensors	STA	85	\$250	\$21,250	\$21,250	\$0	\$0
Mileage	STA and PRDAS	4000	\$0.54/mile	\$2,160	\$800	\$1,000	\$360
Administrative	PRDAS	NA	NA	\$4,000	\$2,000	\$1,000	\$1,000
Meeting supplies	PRDAS	NA	NA	\$24,000	\$18,000	\$4,000	\$2,000
Transportation rental	PRDAS	2	\$800 per rental	\$1,600	\$100	\$1,400	\$100
			TOTAL	\$3,671,010	\$2,314,150	\$753,400	\$603,460

* During the procurement process, these items may be categorized as Capital Outlays or Services and Supplies depending on whether the item is purchased, leased, or contracted as a service.