

BOARD MEETING DATE: June 2, 2017

AGENDA NO. 3

PROPOSAL: Execute Contract for Secondary Organic Aerosol Formation Study and Amend Technical Assistance Contracts for In-Use Emissions Testing for Heavy-Duty Vehicles

SYNOPSIS: Secondary organic aerosol (SOA) is an important component of suspended fine atmospheric particulate matter with significant environmental risks. Design of an effective emission control strategy to reduce the risks requires further understanding of the formation of SOA. As part of an in-use emissions test previously approved by the Board, staff is proposing to assess SOA concentrations from heavy-duty diesel and natural gas vehicles. These actions are to execute a contract with University of California Riverside CE-CERT to evaluate the SOA formation from heavy-duty diesel and natural gas vehicles and amend contracts with Gladstein, Neandross & Associates, LLC, and AEE Solutions, LLC, to provide technical assistance for in-use emissions testing for heavy-duty vehicles at a total cost not to exceed \$85,000, \$50,000 and \$50,000, respectively, from the Clean Fuels Fund (31).

COMMITTEE: Technology, May 19, 2017; Recommended for Approval

RECOMMENDED ACTIONS:

Authorize the Executive Officer using the Clean Fuels Fund (31) to:

1. Execute a contract with University of California Riverside CE-CERT to evaluate the SOA formation from heavy-duty diesel and natural gas vehicles in an amount not to exceed \$85,000; and

2. Amend contracts with the following entities to provide technical assistance for in-use emissions testing of heavy-duty vehicles in an amount not to exceed \$50,000, each for a total of \$100,000:
 - a. Gladstein, Neandross & Associates, LLC; and
 - b. AEE Solutions, LLC.

Wayne Natri
Executive Officer

MMM:FM:NB:AAO

Background

On-road heavy-duty vehicles are currently one of the largest sources of NO_x and PM emissions, which are major contributors to secondary organic aerosol (SOA) formation, along with some volatile and semi-volatile organic compounds. SOA formed from atmospheric reactions of organic compounds in the presence of NO_x constitutes an important component of suspended fine atmospheric PM with significant environmental risks, such as respiratory and heart diseases as well as visibility degradation. Design of an effective emission control strategy to reduce SOA emissions and associated risks necessitates further understanding of the formation of SOA in the atmosphere.

In 2014, the Board approved a contract with the University of California Riverside (UCR) CE-CERT to investigate the physical and chemical composition of primary and secondary aerosols from diesel and gasoline direct injection (GDI) vehicles. Now that the SOA from diesel and GDI vehicles have been successfully characterized, similar efforts are being devoted to assess SOA formed by the reaction of gaseous and particulate emissions from heavy-duty diesel and natural gas vehicles. These efforts are further aligned with a recently Board-approved study to conduct in-use emissions testing, fuel usage profile characterization, and an impact assessment of current technology and alternative fuels on fuel consumption and emissions from 200 heavy-duty vehicles.

Proposal

SOA Study

Complementary to the ongoing emissions study to assess in-use emissions from heavy-duty vehicles, UCR CE-CERT proposes to investigate the physical and chemical composition of SOA formed by the reaction of gaseous and particulate emissions from heavy-duty diesel and natural gas vehicles. During the vehicle in-use emissions testing, UCR CE-CERT will collect samples of exhaust gases in a mobile chamber and transport the chamber to an atmospheric processes laboratory where the samples will be photochemically aged and characterized. During the aging process, UCR CE-CERT will also classify the aerosol and measure the size, mass and composition distribution of

the non-refractory aerosol as well as gaseous, particulate size distribution and black carbon emissions. The results of this study will provide valuable information on primary and secondary particulate emissions including SOA from in-use heavy-duty diesel and natural gas vehicles and facilitate a discussion on potential mitigation strategies.

Technical Assistance for In-Use Emissions Study

Gladstein, Neandross & Associates, LLC, (GNA) and AEE Solutions, LLC, will provide technical assistance for the in-use emissions study under existing Board-approved technical assistance contracts. Specifically, GNA and AEE Solutions will assist in the: 1) development of test vehicle selection, activity and emissions protocols, 2) recruitment of 200 heavy-duty test vehicles, 3) preparation of a technology assessment plan to identify the impact of current and near-future technology on engine performance, emissions and fuel usage, 4) identification of engine and aftertreatment issues and how to mitigate them, and 5) matching of vehicle technologies to vocations for which technology benefits can be maximized.

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. This request for sole source award is made under provision B.2.d.: Other circumstances exist which in the determination of the Executive Officer require such waiver in the best interest of the SCAQMD. Specifically, these circumstances are B.2.d.(4): Level-of-effort expert consultation services; B.2.d.(6): Project requiring compatibility with existing specialized equipment; and B.2.d.(8): Research and development efforts with educational institutions or nonprofit organizations. UCR is an educational institution and CE-CERT is their research center with multidisciplinary resources to engage in diverse environmental and transportation research programs including advanced vehicle technologies and systems; emission measurements, analyses and controls; atmospheric measurements and modeling; and renewable energy. In addition, the proposed project requires specialized equipment for the collection and aging of exhaust gases, and UCR CE-CERT has designed and constructed a mobile chamber for the collection of exhaust gas samples as well as built and operated an atmospheric processes laboratory for aging the samples. GNA and AEE Solutions will provide technical assistance for the in-use emissions study under existing level-of-effort contracts.

Benefits to SCAQMD

The proposed projects are included in the *Technology Advancement Office Clean Fuels Program 2017 Plan Update* under “Fuel/Emissions Studies.” SOA formation studies will enhance our ability to model the formation of SOA from unburned diesel and natural gas as well as close the gap between atmospheric measurements and model predictions of PM concentrations. Models equipped with these SOA formation

processes could then be used to help formulate science-based policy for the reduction of ambient PM concentrations. In addition, the in-use emissions study will be used to measure the effectiveness of engine, fuel and aftertreatment technologies, improve emission inventories for air quality modeling and planning, and match vehicle technologies to vocations for which technology benefits can be maximized as well as to develop effective strategies toward achieving the federal ambient air quality standards.

Resource Impacts

The total cost for the proposed projects will not exceed \$185,000 from the Clean Fuels Fund (31) summarized as follows:

Proposed Projects	SCAQMD Funding (<i>requested</i>)
SOA Study	\$85,000
Technical Assistance for In-Use Emissions Study	\$100,000

Sufficient funds are available from the Clean Fuels Program Fund, established as a special revenue fund resulting from the state-mandated Clean Fuels Program. The Clean Fuels Program, under Health and Safety Code Sections 40448.5 and 40512 and Vehicle Code Section 9250.11, establishes mechanisms to collect revenues from mobile sources to support projects to increase the utilization of clean fuels, including the development of the necessary advanced enabling technologies. Funds collected from motor vehicles are restricted, by statute, to be used for projects and program activities related to mobile sources that support the objectives of the Clean Fuels Program.