BOARD MEETING DATE: February 7, 2014 AGENDA NO. 8

PROPOSAL: Execute Contract for Second Year of Research to Develop Quantitative Assays for Air Pollutant Toxicity

SYNOPSIS: In April 2012, the Board approved funding for the first year of a two-year proposal submitted by the University of California, Los Angeles to study the toxicity of motor vehicle emissions in Southern California. The research for the first year has been successfully conducted, and this action is to fund the second year of the study "Development of Quantitative Cellular Assays for Use in Understanding the Chemical Basis of Air Pollutant Toxicity" in an amount not to exceed $319,553 from the Clean Fuels Fund (31).

COMMITTEE: Technology, January 24, 2014, Recommended for Approval

RECOMMENDED ACTION:
Authorize the Chairman to execute a contract with the University of California, Los Angeles (UCLA) for the second year of the study "Development of Quantitative Cellular Assays for Use in Understanding the Chemical Basis of Air Pollutant Toxicity" in an amount not to exceed $319,553 from the Clean Fuels Fund (Fund 31).

Barry R. Wallerstein, D.Env.
Executive Officer

JO:mt

Background
Current regulatory efforts are focused on reduction of emissions of motor vehicles, including diesel-fueled vehicles involved with goods movement in Southern California. These reductions are aimed at meeting ambient air quality standards for PM_{10} and $PM_{2.5}$ as well as reducing exposure to toxic air contaminants. As lower emitting technologies are deployed and the mass of particle emissions go down, however, a question remains as to the toxicity of the remaining emissions, such as ultrafine particles and vapor phase substances. Although advanced technologies are very effective at lowering the mass of emissions, there are concerns that other substances such as volatile and semi-volatile organic compounds may be emitted that have potential health effects.

Proposal
The objective of this research is to develop a biological mechanism-based analytical procedure to characterize the toxicity air pollutants under the direction of Dr. Arthur Cho as Principal Investigator and Dr. John Froines as Co-Principal Investigator. The study is developing and characterizing a standard in quantities sufficient to be employed in subsequent toxicity analyses of vehicle emissions and ambient pollutants. UCLA is working with researchers at the University of California Riverside Center for Environmental Research and Technology (CE-CERT) to collect a large quantity of diesel exhaust, including both particulate and vapor phase, from a well-characterized engine using low sulfur fuel as the standard. Quantitative dose response toxicity assays can then be conducted with, for example, emissions from advanced technology engines to compare with results from assays using the standard diesel emissions. This will provide a measure of the relative toxic potency of vehicle emissions that can be directly compared in standard assays.

This project builds upon the toxicity assays developed under the auspices of the Southern California Particle Center, which was sponsored by U.S. EPA. The assays target specific biochemical pathways and proteins that are thought to be involved in the toxicity of pollutants. The pathways include inflammation, cellular oxidation potential and chemical reactions with cellular proteins. Specific chemical assays will be used, as well as specific macrophage cell lines that have been used in previous air pollution toxicity studies. Standard protocols are being developed that can be applied to collected pollutant samples.

The initial phase of the research has successfully developed several laboratory toxicity assays and has applied them to previously collected ambient samples to demonstrate their usability and quantitative outputs. These procedures can now be used to address questions such as which specific chemicals in pollutant samples are associated with cellular toxicity, to assess the relative effects of particulate versus vapor phase of emissions and to compare toxic responses of emissions from different fuel types. These results will be important in forming the scientific basis to quantify how reducing emissions and promoting alternate technologies may improve public health.

This request is to approve funding for the second year of the originally submitted two-year proposal. The second year covers the further development and application of the toxicity assays to both particulate and vapor phase pollutant samples.

Benefits to SCAQMD
The results of this project will provide information to help understand the linkage between sources, chemical composition and the toxicity of emissions from motor vehicles, which will provide a strong scientific basis on which to develop and to assess strategies designed to protect the public from exposure to motor vehicle emissions. Specifically, this project will help understand the benefits to be derived from switching to

alternate technologies, including clean fuel technologies, to reduce emissions. SCAQMD is required to consider health effects when determining which clean fuels projects to fund. Previous studies have shown that reducing motor vehicle particulate mass can result in an increase in ultrafine particle number emissions. This study will provide advanced tools for assessing the relative toxicity of emissions sources and which technologies may be more important in reducing potential health effects from exposures to particles as well as to semi-volatile organic substances. These tools can then be used to quantify the benefits of using alternate and advanced technology to reduce emissions derived from motor vehicles and from other emissions sources.

Additionally, development of these toxicity assays will be an invaluable resource to particulate matter exposure and health studies in the Los Angeles Basin and is included in the *2013 Clean Fuels Plan Update* under "Health Impacts Studies".

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 a 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, clause B.2.d.(1): Projects including cost sharing by multiple sponsors; clause B.2.d.(8): Research and development efforts with educational institutions or nonprofit organizations; and B.2.c.(1): The unique experience and capabilities of the proposed contractor or contractor team. This project has been leveraged with other ongoing research efforts in collaboration with the Southern California Particle Center, funded by the U.S. EPA ($235,000). Additionally, the toxicity assays were developed by the principal investigators and colleagues working under the Southern California Particle Center and are unique to their laboratories in terms of providing conditions that permit exact comparisons between chemical and biological responses.

Resource Impacts

The cost for completion of the second year of this project is $319,553 for a total cost of $688,010 for the entire project. Funds are available from the Clean Fuels Fund (31), 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. This project is related to the Clean Fuels Program because ultrafine particulates are directly emitted by fuel combustion and formed in the atmosphere from gaseous precursors emitted from motor vehicles and other sources.