State of California
AIR RESOURCES BOARD

Research Screening Committee Meeting
Cal/EPA Headquarters Building
1001 I Street
Conference Room 510, 5ᵗʰ Floor
Sacramento, California 95814
(916) 445-0753

May 30, 2014

9:00 a.m.

ADVANCE AGENDA

I.   Approval of Minutes of Previous Meeting:

      March 28, 2014 meeting

II.   Discussion of New Research Projects:

   1) "Association Between Long-Term Ultrafine Particulate Matter Exposure and Premature Death," University of California, Davis, $849,115, Proposal No. 2775- 279

      There is a large body of literature showing that fine particulate matter (PM2.5) is associated with premature death, with the most persuasive evidence coming from long term epidemiological studies. The epidemiological evidence for a similar relationship with ultrafine particles (UFP) is limited and inconclusive; the proposed study aims to help fill this research gap. The overall objective of the proposed study is to determine whether any feature of UFP's (number, surface area, or mass) is positively associated with premature death in California. The proposed study, which will combine statewide modeling of UFP distribution with monitoring data, will greatly strengthen the exposure analysis for UFPs relative to previous work that relied on central site monitors. The results of this study will provide ARB with a clearer understanding of the health impacts associated with exposure to UFP, including health risk at ambient concentrations.

   2) "Behavioral and CNS Pathology Associated with Ultrafine Particle Exposure in an a-Syn Transgenic Mouse Model of Parkinson' Disease," University of California, Los Angeles, $500,000, Proposal No. 2776-279

      Emerging evidence suggests that environmental factors, including exposure to air pollutants such as particulate matter (PM), may play a role in neurodegenerative diseases (ND) such as Alzheimer's and Parkinson's disease. These conditions primarily affect the elderly. The cause of these disorders is not understood, and

genetic factors alone seem insufficient to explain their prevalence. Ultrafine particulate matter (UFPM) is an important size fraction to examine because several reports in the literature have shown that these small particles are transported directly into the brain. The proposed study will investigate the effects of ambient UFPM exposure in a mouse model of Parkinson's disease, including innate immune responses in the brain, changes in brain pathology, and changes in cognition or behavior. The proposed study will help clarify the role of UFPM exposure in the progression of neurodegenerative disease, and will assist ARB in its mission of protecting public health, particularly in the elderly.

3) "Ozone in the Lower Atmosphere and its Contribution to High Ozone Concentrations at Ground-Level in the Southern San Joaquin Valley," University of California, Davis, $300,021, Proposal No. 2777-279

The San Joaquin Valley (SJV) is one of two areas in the nation that have an "Extreme" nonattainment classification with respect to the National Ambient Air Quality Standard (NAAQS) for ozone. To attain the standard expeditiously, it is imperative to better understand how the various sources of ozone contribute to the high ozone concentrations. In addition, air quality models frequently have difficulty replicating the conditions associated with temperature inversions and the mixing processes that break them. This research proposes to extensively sample the lower 1500 meters of the atmosphere during four critical periods of the diurnal cycle using an instrumented research aircraft. Air quality and meteorological measurements will be made to characterize conditions aloft during five 3-day sampling campaigns when high ozone concentrations are forecast to occur in the southern SJV. By using two teams, each consisting of a pilot and flight scientist, the flights will collect nearly 10 hours of research data during each 24 hour period. The data to be collected and quality-assured include horizontal winds, relative humidity, temperature, ozone, nitrogen dioxide, methane, and ethane. This data set, along with an ozone budget analysis, will provide observational constraints for evaluating the performance of ozone modeling for the State Implementation Plan (SIP) with respect to how well it characterizes critical atmospheric processes generating high ozone concentrations in the southern SJV.

4) "Characterization of PM2.5 Episodes in the San Joaquin Valley Based on Data Collected During the NASA DISCOVER-AQ Study in the Winter of 2013," $200,000, University of California, Davis, Proposal No. 2778-279

Although substantial progress has been made in improving the air quality in the San Joaquin Valley (SJV), wintertime PM2.5 air pollution in the Valley continues to be the worst in the State. Models used in air quality planning for the region are inconsistent in their ability to predict PM2.5 concentrations, which suggests a gap in understanding and in the overall conceptual model for PM2.5 formation in the SJV. National Aeronautics and Space Administration (NASA) chose the SJV for one of its Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality (DISCOVER-AQ) campaigns – a $30 million NASA study to improve the ability of satellites to measure surface air quality. This measurement program created an extensive set of vertically resolved aircraft measurements of PM2.5 and important gaseous species for the SJV in

January/February 2013. The aircraft measurements were complemented by a network of ground sites at which basic information on PM2.5 concentrations was collected and a ground "supersite" at ARB's Fresno-Garland monitoring station which provided more detailed measurements of PM2.5 composition and properties. The objective of this project is to conduct advanced analysis of aircraft and supersite measurements made during DISCOVER-AQ with the goal of improving the conceptual model of the origin, evolution, and spatial distribution of PM2.5 in the SJV. Comparison of the data analysis results with ARB's modeling will help identify strengthens and weaknesses in ARB's conceptual model of PM episode formation in the SJV. The enhanced understanding of PM2.5 formation in the SJV will be of immediate value for developing air quality attainment strategies.

5) "The Dynamics of Plug-in Electric Vehicles in the Secondary Market and Their Implications for Vehicle Demand, Durability, and Emissions," University of California, Davis, $300,000, Proposal No. 2779-279

Plug-in electric vehicles are expected to play a major role in achieving the reductions of greenhouse gas emissions and criteria pollutants required by California's Low Emission Vehicle (LEV III) program, the California Global Warming Solutions Act of 2006 (AB 32), and increasingly stringent National Ambient Air Quality Standards. This project will characterize the dynamics of the secondary market for plug-in electric vehicles (PEVs) in California to improve estimates of the emission benefits of PEVs and projections of the overall emissions from the light-duty fleet. Researchers will employ surveys, interviews, and an economic model to evaluate the impact of factors such as battery life, energy prices, infrastructure availability, attributes and prices of new vehicle offerings, and economic conditions, on the demand and prices of used PEVs and on their usage. Results will inform future decisions by ARB policymakers on the treatment of PEVs by various ARB programs, such as incentives, durability requirements, or vehicle crediting.

6) "Potential to Build Current Natural Gas Infrastructure to Accommodate the Future Conversion to Near-Zero Transportation Technology," University of California, Davis, $250,000, Proposal No. 2780-279

Research is needed to determine what natural gas infrastructure would be economically and technologically ideal for both natural gas in the near-term, and alternative fuels in the long term. The original design of the Low Carbon Fuels Standard (LCFS) provides time for the development of advanced, near-zero technologies. However, having infrastructure already in place to deliver alternative fuels to fleets, once more alternative fuels are already in place, will ease the future transition to zero or near-zero transportation technology (e.g. biofuels, electric and fuel cell technology). This proposed project will complement ARB's on-going work by exploring how the near-term development of natural gas infrastructure, in the heavy-duty transportation sector, can be implemented to include technology that can best facilitate the long-term conversion to near-zero technology. Alternative fuels that will be considered in this analysis include hydrogen, renewable diesel, renewable natural gas, and dimethyl ether (DME). Results will provide essential data that will inform future refinements to the State's LCFS program and other climate change and air quality initiatives.

7) "The Development of Lifecycle Data for Hydrogen Fuel Production and Delivery," University of California, Davis, $250,000, Proposal No. 2781 279

The Low Carbon Fuel Standard (LCFS) currently includes several pathways for hydrogen fuels. However, more pathways are needed, especially for the production of renewable hydrogen and pathways that include novel technology. This project will analyze lifecycle GHG emissions for the production and delivery of hydrogen to light and heavy duty vehicles in California for processes not currently included in published LCFS pathways. The results from this project's literature review and life cycle analysis will allow ARB staff to develop new hydrogen pathways for the LCFS regulation. While hydrogen usage in the transportation sector can help reduce GHG emissions, the potentially low initial market demand may result in a barrier to commercialization. This project will therefore identify additional hydrogen markets outside of the transportation sector that could be served by hydrogen facilities. If there are barriers to growth in these additional markets, the project will identify strategies and policies to overcome these barriers. These additional markets and strategies to overcome low hydrogen demand can help fuel companies to meet the target goals in the LCFS regulation.