State of California
AIR RESOURCES BOARD

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

May 22, 2008
9:00 a.m.

ADVANCE AGENDA

Draft Final Reports

1. "Evaluation of the Proposed New European Methodology for Determination of Particle Number Emissions and its Potential in California for In-Use Screening," University of California, Riverside, $250,000, Contract No. 05-320

This project evaluated the utility of a method developed in Europe, as part of their Particle Measurement Program, for measuring particle number from diesel engines. The current mass measurement has a detection limit that is adequate for current emission levels from heavy duty engines, but it is expected that many new engines equipped with wall-flow diesel particle filters (DPF) will emit 90-95 percent below the mass-based 2007 standard. These very low emission levels may be below the mass detection limit and new metrologies are needed. The study found the coefficient of variance to be greater than 50 percent for repeated mass measurement and only 10-20 percent for the particle number measurement from a heavy duty diesel truck exercised on a typical cycle and equipped with a wall flow DPF. During the study several new research needs were identified. The particle number measurement appears to be the best metrology for accurately measuring PM emissions from diesel vehicles equipped with advanced aftertreatment and emitting significantly below the current mass standard.

2. "How New Chemistry Findings Affect Our Understanding of the Weekend Effect – A Modeling Study," University of California, Irvine, $150,000, Contract No. 04-333

Emissions caused by human activities vary during the week, and thus affect the cycle of ambient pollutants. The observation that ozone concentrations are typically higher on weekends than on weekdays, despite lower atmospheric levels of ozone precursors on weekends, has been long recognized as the Weekend Effect. This modeling study addresses issues relating to the weekend effect by examining four major scenarios: renoxification processes, chlorine chemistry, the influence of distributed generation (DG), and pollutant dynamics aloft. In this study, the University of California, Irvine–California Institute of Technology (CIT) atmospheric chemical transport model was used

to investigate the air quality impact of variations in the above factors. The model employs an updated version of the CIT atmospheric chemistry mechanism that incorporates, for the first time, new heterogeneous reactions involving nitrogen oxides and chlorine.

Results demonstrate that both renoxification and chlorine chemistry lead to a net decrease in the average intensity of weekend effect. The results also show emissions from DG have a limited influence on the weekend effect. Finally, the increasing weekend effect from ground level to altitudes up to 670 meters is heavily attributed to the decrease in oxides of nitrogen (NO_X) emissions and the increase in the volatile organic compounds to NO_X ratios in altitudes between 40–300 meters from weekdays to weekends. This project provided the first detailed analysis and conclusions on the influence that a transition from central to distributed power generation might have on the ozone cycle during weekends. Moreover, examining renoxification and the quantitative analysis of other processes like NO_X emission variation and ozone recirculation aloft fundamentally contributed to our understanding of weekend ambient pollutant dynamics.