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

March 18, 2016
9:00 a.m.

ADVANCE AGENDA

I. Approval of Minutes of Previous Meeting:

December 11, 2015 meeting

II. Discussion of Draft Final Reports:

1) "Emissions of Potent Greenhouse Gases from Appliance and Building Waste in Landfills," California Polytechnic State University, San Luis Obispo, $299,826, Contract No. 11-308

Fluorinated gases (F-gases) are high-global warming potential (high-GWP) greenhouse gases (GHG) contained in waste insulating foam, a potentially significant source of GHG emissions. Previous research estimated that up to half of the annual foam GHG emissions (5 – 7 million metric tons of carbon dioxide equivalents [$MMTCO_2e$]) in California occurred after the insulating foam was landfilled (half of foam GHGs are emitted from off-gassing and shredding losses prior to landfilling). The objective of the research was to measure GHG emissions from waste insulating foam in a representative California landfill, which had not been conducted prior to this research project. The Potrero Hills Landfill in Suisun City was selected as a representative California landfill. Gas samples were collected from various sites of the landfill surface that represented different cover types and ages of waste. Samples were also collected from the landfill gas extraction system before and after flare combustion. F-gas concentrations from the landfill surface varied significantly, depending upon the cover type and conditions. The F-gas emissions form the Potrero Hills Landfill were estimated to be a maximum of 2,600 metric tons of CO_2 equivalents ($MTCO_2e$)/day during the wet season, decreasing to 4 $MTCO_2e$/day during the dry season. F-gas emissions represented 3.4 to 4.1 percent of all GHG emissions from the landfill, with methane and carbon dioxide contributing the remainder. Research findings indicate that F-gas emissions from landfills are significantly lower than previously estimated. The most significant research finding was that the landfill gas flare destruction efficiency was greater than 99.5 percent for all measured F-gases.

2) "Quantification of the Emission Reduction Benefits of Mitigation Strategies for Dairy Silage," University of California, Davis, $400,000, Contract No. 11-325

Dairy silage (dairy feed fermented for presentation) has been identified as a significant source of volatile organic compounds (VOCs) and nitrogen oxides (NO_X), both of which are ozone precursors, and thus may contribute to the extreme ozone nonattainment of the San Joaquin Valley (SJV) where 80 percent of California's 1700 dairy farms are located. This project monitored VOC and NO_X emissions throughout different phases of silage management at dairies, evaluated the mitigation potential of several silage management practices on VOCs recommended by the San Joaquin Valley Air Pollution Control District (SJVAPCD), and developed and validated a new VOC model simulating silage emissions from California dairies. The study indicated that storage of silage in Ag-Bag (a plastic bag manufactured exclusively for silage storage) rather than in conventional piles, removing silage from storage pile (defacing) by lateral- rather than perpendicular- cutting or using raking, and adding water to the feed material (also known as total mixed ration or TMR) resulted in lower emissions of VOCs. Storage of silage in Ag-Bag, however, did not lower NO_X emissions compared to conventional piles. Adding microbial and chemical additives to silage even enhanced VOC emissions, except for potassium sorbate fortified at 0.1 percent (wet silage). A new VOC emission model was developed in this project and incorporated into a whole-farm modeling approach, which was used in evaluating the effect of different mitigation practices on VOC emissions. The simulation results indicated that most of the VOC emissions from silage would occur during feeding rather than the storage phase, and thus mitigation efforts should focus on feed lanes, not the exposed face of silage piles, at dairies. The significance of this conclusion, however, would benefit from further field verification.

3) "Effects of Complete Streets on Travel Behavior and Exposure to Vehicular Emissions," University of California, Los Angeles, $250,000, Contract No. 11-312

With the growing interest in smart growth, climate change mitigation, and social equity, an increasing number of communities have adopted complete street policies to make streets accessible for all users-drivers, transit users, pedestrians, bicyclists, seniors, children, and people with disabilities. Complete streets are planned to reduce vehicle miles traveled (VMT) and associated emissions by enhancing active travel and decreasing dependence on passenger vehicles. However, there is limited data on the actual impacts of complete street on changes in travel behavior and on street users' exposure to air pollutants. This project aimed to provide information in these areas by employing two study designs comparing complete streets to incomplete streets. A neighborhood survey and road side intercept surveys were also conducted to assess travel behavior change and street users' perceptions. Air pollutant exposure data were collected for both study designs. Overall, the study found that complete streets had likely exerted favorable impacts on some, but not all, of the tested parameters. The ultrafine (UFP) and fine particle (PM2.5) concentrations on the complete streets were 1300 particles/cm3 and 0.3 µg/m3 lower than those on the incomplete streets, respectively. Motorized vehicle flow was reduced by 16 percent after the conversion to a complete street. There were limited changes in travel behavior in residents living within a walkable distance to a complete street conversion; however, street users believed that the complete streets provided more shade, were more interesting, easier to cross, and made the pedestrians feel safer. The location and function of the complete street had the

greatest impact on the traffic flow, street usage, and on-road air quality on the street. Overall, the data suggest that complete streets located in densely populated downtown business settings may have more positive impacts than those in other land use contexts. This study provided ARB with an initial analysis on the impact of complete streets on travel behavior and street users' exposure.

4) "Source Speciation of Central Valley GHG Emissions Using In-Situ Measurements of Volatile Organic Compounds," University of California, Berkeley, $360,000, Contract No. 11-315

To guide development of greenhouse gases (GHGs) reduction strategies, California has developed state-wide GHGs emission inventories (EI). ARB has supported research to improve our GHGs EI, developing regional and source specific information for some GHGs. For example, ARB has supported methane and nitrous oxide (N_2O) research programs, including measurements at towers and inverse modeling. In this project, proton transfer mass spectrometry (PTR-MS) was used to continuously measure a suite of volatile organic compounds (VOCs) at 5 elevations on a tall tower in Walnut Grove from summer 2012 through early fall 2013. The VOC data and continuous carbon dioxide (CO_2), methane (CH_4), and carbon monoxide (CO) measurements were analyzed to develop source apportionments for CH_4 and N_2O. Their results confirm that dairies and livestock are the largest regional sources contributing to CH_4 emissions, accounting for 55 – 90 percent of total emissions over different seasons. N_2O agriculture emissions accounted for about 80 – 90 percent of the observed enhancements during fertilizer use in the spring and summer but declined to about 20 percent of the observed enhancements in late fall season when crops are harvested. In contrast, N_2O emissions from the dairy and livestock source were relatively constant across seasons, accounting for more than 80 percent of the total enhancements in fall and winter, and less when agricultural emissions were larger. Likely because of the rural location, the contribution of motor vehicles and hydrocarbon extraction emissions was not significant in the regional inventory observed at Walnut Grove. This is a significant difference from the state-wide GHG EI which includes urban emissions. For GHG sources which have significant seasonal or process variation in emissions, the findings highlight the importance of multi-month measurements to validate the inventory.

III. Other Business:

Update on the Planned Air Pollution Research for FY 2016-2017