5UA.7

Effects of Truck Retrofit/Replacement Program on Diesel Engine Emissions at the Port of Oakland. CHELSEA PREBLE, Timothy Dallmann, Steven DeMartini, Nathan Kreisberg, Susanne Hering, Robert Harley, Thomas Kirchstetter, *University of California, Berkeley*

To reduce pollutant emissions from trucks around ports and rail yards, the California Air Resources Board's Drayage Truck Regulation required replacement of trucks with pre-1994 engines and retrofit with diesel particulate filters (DPFs) of trucks with newer engines. We measured pollutants in the exhaust plumes of individual heavy-duty trucks at high time resolution (1-2 Hz) as they drove by a mobile lab that was parked on a bridge above the traffic en route to the Port of Oakland. This study adds to prior fieldwork at the Port that demonstrated 50 and 40% reductions in fleet-average emissions of black carbon and nitrogen oxides (NOx), respectively, resulting from the first phase of the emission control rule. Emissions of ultrafine particles (number and size distribution), black carbon, and nitrogen dioxide (NO2), in addition to the NO2/NOx emission ratio, were measured in this study and linked on a truck-by-truck basis to detailed information about each engine and installed emission control equipment. This analysis examines the distribution of pollutant emissions across all Port trucks, and among various subpopulations (e.g., specific engine years, types of emission controls). The current age distribution indicates that the majority of trucks are now equipped with DPFs. A fraction of trucks have DPFs that are several years old, and a significant portion of the Port truck fleet is now also equipped with selective catalytic reduction systems. The results of this study are significant as a similar regulation targeting emissions from all on-road trucks and buses in California is being implemented, and other states are likely to follow California's lead.

5UA.8

Ultrafine Particle Exposure of Street Users Walking, Cycling, and Driving Along an Urban Residential Roadway. DAVID QUIROS, Eon Lee, Yifang Zhu, Rui Wang, *University of California, Los Angeles*

Elevated concentrations of ultrafine particles (UFPs, < 0.1 micro-meters), which have been linked to adverse health effects, are commonly found near roadways. We measured particle number concentration (PNC) across three transportation modes on an urban residential street in Santa Monica, CA: walking, cycling, and driving with windows open and windows closed. We repeated measurements concurrently for nine days during the morning (7:30-9:00), afternoon (12:30-14:00), and evening (17:00-18:00). We observed ~60% PNC reductions when driving with closed with recirculation, relative to modes with direct contact to the outside air (cycling, walking, and driving with windows open). Afternoon and evening period PNC was ~75% lower than morning period PNC. We found nearly four times higher exposure to commuters cycling and walking due to higher ventilation rates and longer durations per round trip. We found positive associations between PNC and road grade and proximity to intersections. We classified on-roadway fleet by vehicle type from video recorded footage, and found our measured PNC originated ~30% from older (before 1980) gasoline vehicles, ~40% from newer gasoline vehicles, and ~30% from diesel trucks (school buses, garbage trucks, and heavy-duty diesel trucks). This is one of the first transportation mode comparison studies in the United States for assessment of commuter exposure to UFPs and other air pollutants. The study site is currently under redesign construction and when completed will meet the California Complete Streets Act standards. Our study serves as a baseline condition for UFP exposure across all street users.

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