Demographic Distribution of Exposure to Diesel Particulate Matter at Selected Harbor Areas

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Background and Objectives: There is current evidence that nearby residents of marine harbor areas are exposed to significantly higher concentrations of pollution, including particulate matter. In March 2008, the U.S. Environmental Protection Agency (EPA) promulgated new emission standards for marine compression ignition engines to help address these issues. The population exposure analysis presented here was performed as part of the technical support for that regulation. The purpose was to estimate the size and demographic composition of populations exposed to enhanced diesel particulate matter (DPM) concentrations resulting from activity in harbor areas across the United States.

Methods: For each of 45 U.S. marine harbor areas, EPA's AERMOD dispersion model was applied to harbor-specific EPA emissions estimates to estimate a 3-year average spatial distribution of DPM concentrations resulting from activity at each of the harbors. Geographic Information System (GIS) analysis and U.S. Census data were used to estimate the total population residing at locations with enhanced DPM concentrations, as well as its demographic composition with respect to household income and race/ethnicity.

Results: The results suggest that more than 630,000 people reside in locations with annual average DPM concentrations exceeding 2.0 $\mu g/m^3$ above urban background levels from emission sources at the 45 harbor areas studied, and approximately 17 million with annual average DPM concentrations exceeding 0.2 $\mu g/m^3$. Low-income households, non-Hispanic blacks, and Hispanics are over-represented in the aggregate affected population compared to the overall U.S. population at both concentration levels.

Conclusion: Low-income households, non-Hispanic blacks, and Hispanics are disproportionately impacted by enhanced DPM concentrations resulting from activities at marine harbors.