

AIRBORNE CONCENTRATIONS OF BENZENE DUE TO DIESEL LOCOMOTIVE EXHAUST IN A ROUNDHOUSE

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Concentrations of airborne benzene due to diesel exhaust from a locomotive were measured during a worst-case exposure scenario in a roundhouse. To understand the upper bound human health risk due to benzene, an electromotive diesel and a General Electric four-cycle turbo locomotive were allowed to run for four 30-min intervals during an 8-h workshift in a roundhouse. Full-shift and 1-h airborne concentrations of benzene were measured in the breathing zone of surrogate locomotive repairmen over the 8-h workshift on 2 consecutive days. In addition, carbon monoxide was measured continuously; elemental carbon (surrogate for diesel exhaust) was sampled with full-shift area samples; and nitrogen dioxide/nitric oxide was sampled using full-shift and 15-min (nitrogen dioxide only) area samples. Peak concentrations of carbon monoxide ranged from 22.5 to 93 ppm. The average concentration of elemental carbon for each day of the roundhouse study was 0.0543 and 0.0552 $\mu\text{g}/\text{m}^3$ for an 8-h workshift. These were considered "worst-case" conditions since the work environment was intolerably irritating to the eyes, nose, and throat. Short-term nitrogen dioxide concentrations ranged from 0.81 to 2.63 ppm during the diesel emission events with the doors closed. One-hour airborne benzene concentrations ranged from 0.001 to 0.015 ppm with 45% of the measurements below the detection limit of 0.002–0.004 ppm. Results indicated that the 8-h time-weighted average for benzene in the roundhouse was approximately 100-fold less than the current threshold limit value (TLV) of 0.5 ppm. These data are consistent with other studies, which have indicated that benzene concentrations due to diesel emissions, even in a confined environment, are quite low.