routes that started and ended at the School of Public Health at University of Illinois at Chicago during morning commutes in the fall of 2012. In addition, these rides were recorded with a GPS enabled video camera. Measured pollutants included fine particle matter (PM2.5) measured with a MIE Personal Data RAM for real-time measurements and PEM samplers with high volume SKC Leland pumps for integrated PM2.5; and carbon monoxide (CO) measured with an Easy Log USB-CO electrochemical sensor.

Results: Camera malfunction prevented measuring vehicle counts on all but two rides. These two rides showed that the bicycle passed or was passed by 9–17 cars per minute and 0.5–1.5 trucks per minute passed the cyclist. PM2.5 concentrations averaged 104 $\mu g/m^3$ (range: 53.7–135 $\mu g/m^3$), but CO concentrations were negligible possibly due to equipment limitations from wind turbulence.

Conclusions: In general, our findings suggest air pollutants from near-road exposure to vehicle traffic are substantially higher than background measurements. In addition, our findings suggest heterogeneity of exposure measurements with varying Chicago landscapes (i.e. proximity to lakefront, highway, urban-structures). Further study is required to evaluate the exposure to near-roadway air pollutants throughout varying city landscapes.

43. Evaluation of an Injury Prevention Program at a Power Generation Company

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Background: Injuries in the workplace can harm workers and negatively affect a company's production. The Utilities sector has a high injury rate in comparison to other industries. Many of these injuries can be attributed to improper body mechanics. The intervention program works to target improper body mechanics at a metropolitan power generation company with the goal of reducing the company's injury rate. If effective, this intervention could be applied to other companies to reduce injury rates within the Utilities sector.

Objective: The current project examines the effectiveness of an intervention program by comparing injury rates and confidence intervals among work crews with and without intervention.

Methods: The program was tested on 13 out of 20 crews. The program was implemented randomly over a period of six years. Interviews were used to ascertain when training was initiated and how training was implemented. Injury data was analyzed for both recordable and total (recordable plus non-recordable) injuries. The effectiveness of the intervention was examined using a mixed regression model. The model tested the relationship of the intervention to the subsequent rate of annual decline in injury rates, which were compared to the Utility sector trends reported by the U.S. Bureau of Labor Statistics.

Results: Overall, there was a borderline significant decline in total injury rates post intervention. Total injury rates declined on average by 110% per year ($p=0.067$). Recordable injury rates showed no significant difference post intervention, with injury rates increased on average by 9.7% per year ($p=0.278$).

Conclusions: Preliminary data suggest the intervention program is an effective means of reducing injuries among utility workers. However, implementation over a longer period of time would yield more definitive information.

44. USEPA's National Air Toxics Assessment: Emissions and Cancer Risk Analysis in Illinois and Cook County

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Objective: The USEPA's National-Scale Air Toxics Assessment (NATA) is an ongoing comprehensive evaluation of 178 Clean Air Act toxics in the US. NATA includes national emissions data from outdoor sources, estimations of ambient exposure concentrations, human exposures, and characterization of public health risk due to inhalation. This study is designed to characterize emissions estimates and cancer risks developed by the 2005 NATA in the state of Illinois and Cook County. By analyzing the chemical emissions and cancer risk data, geographical areas, pollutants, and emissions sources can be evaluated to assess spatial and temporal trends. More importantly, chemicals that should be targeted for further reduction can be delineated to guide future public health policy and reduce the health risk burden on specific locations.

Methods: The 2005 NATA data was downloaded from the USEPA website for all counties in the state of Illinois. The most populated county, Cook County, was examined at the census tract level to determine the location of the highest contributors to air emissions and cancer risk.

Results: Cook, DuPage, Lake, and Will counties had the highest emissions estimates in Illinois, but the major sources of emissions (Point, Non-Point, Mobile, and Non-Mobile) were different in each county. The highest cancer risk estimates were located in Cook County and, more specifically, in the City of Chicago. Benzene and Formaldehyde were the key contributing pollutants to cancer risk, and their concentrations and risks were highest in Downtown Chicago and along major highways. Urban areas tend to have a higher cancer risk then rural areas due to a greater number of mobile sources.

Conclusions: The findings may guide future environmental management policies/rules/regulations for cancer-causing chemicals, assess effectiveness of the current emission controls, identify areas with a high exposure and cancer risks, and provide input to public health agencies about environmental justice areas.

45. Quantifying Response Time in Lascar Carbon Monoxide Monitors to Produce High-Resolution Measurements

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Introduction: Diffusion of carbon monoxide (CO) and the electrochemical reaction in the sensor of CO monitors introduces a time delay into measurements. By quantifying the response time, it is possible to accurately quantify rapid changes in CO concentrations.

Objective: Our objective was to measure the magnitude and repeatability of CO monitor response times. Specifically, LASCAR EL-USB-CO Data Logger was tested.

Methods: We applied a known concentration of CO (57 ppm) to the monitors for 140 s and 40 s, followed by exposure to ambient air. The CO concentration was logged every 10 s. We modeled the instrument response as a first-order exponential process. We calculated r_{rise} when CO was applied, after the monitor had been exposed to ambient air. We calculated r_{decay} when ambient air was applied after the monitor had been exposed to CO. Six monitors were tested in 4-5 experimental replicates.

Results: The mean r_{rise} for each monitor was 13.4-17.9 seconds. The mean r_{decay} was 14.3-19.7 seconds. The null hypotheses that r_{rise} and r_{decay} were the same for all monitors was rejected (ANOVA $p < 0.05$). The coefficients of variation in r_{rise} and r_{decay} for each monitor ranged from 18.6 to 52%. The difference between mean r_{decay} and r_{rise} was -2.3-6.2 seconds.

Conclusions: Though the response time is not equal in all monitors, and shows some variability between experimental replicates, the response time of LASCAR monitors is relatively short, less than two measurement intervals (20 s). The r_{rise} and r_{decay} values can be used to reconstruct the actual CO concentration from measured CO concentrations when high temporal accuracy is required for CO monitoring.

46. Does Wearing a Hat Reduce Exposures? An Examination of Particle Aspiration

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Background: Previous computational fluid dynamics (CFD) studies identified changes in human aspiration efficiency due to protrusions of facial features. In low velocity wind speeds typical of occupational settings (0.1–0.4 m s^{-1}) gravitational settling causes large particles ($\geq$68 μm) to have downward vertical trajectories. It is hypothesized the brim of a hat would also cause a reduction in aspiration efficiency.

Objectives: The objective of this work was to quantify the reduction in human aspiration

ABSTRACTS

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