institution through evaluation of their Pre-Construction Risk Assessment (PCRA) program. We also looked to provide an exemplary construction safety framework for other healthcare institutions.
Methods: As our measure of intervention, we extracted information on PCRA permitting from 2007 to 2011. This data was compared to safety violations and business interruptions that occurred over the same period of time. The contracting group performing the work, the severity of the violation, and the root cause of the business interruption were taken into account during analysis.
Results: Though an inverse relationship between the number of PCRA permits issued and the volume of violations was expected, the number of permits issued per month decreased. Safety violations also declined by 84% from 2007, and business interruptions did not follow a distinct trend.
Conclusions: The volume of PCRA permits may not be the best indicator for Construction Safety efficacy in this hospital, and further investigation is needed for identifying risk factors for business interruptions and violations. These issues must be addressed before this risk assessment process can be considered by other institutions.

26. Verification of the DiSCmini Personal Monitor for Welding Fume

J.B. Mills, T.M. Peters, J.H. Park, University of Iowa, Iowa City, IA

Introduction: Welding fume is a submicrometer aerosol with a substantial fraction of particles smaller than 100 nm. Robust, lightweight and reliable direct reading instruments (DRIs) have been unavailable for nanoparticles. The DiSCmini (DM) operates by diffusion charging and an electrometer to enable nanoparticle detection which provides a direct reading of particle number concentration and mean particle diameter. However, the DM has not been evaluated for occupationally-relevant aerosols, such as welding fume.
Objective: Compare the performance of DM with two reference instruments, the condensation particle counter (CPC) and the scanning mobility particle sizer (SMPS).
Methods: Sodium chloride particles (NaCl) were nebulized from solution, and metal particles were generated with a spark system using welding rod electrodes to produce poly-dispersed aerosols. For certain tests, a differential mobility analyzer was used to classify these aerosols into mono-dispersed particles of three sizes (30, 100, and 300 nm). Particle number concentrations were measured by the DM, CPC, and SMPS for a total of 24 test conditions. Both mono- and poly-dispersed particles were controlled in three different steady-state concentration ranges ($<10^3$, 10^3-10^4, and $>10^4$ particles/cm^3).
Results: The number concentrations measured by DM were within 80–115% of SMPS data for mono-dispersed and poly-dispersed particles, except for 300-nm, mono-dispersed particles. For these test aerosols, number concentrations measured by DM were 130–230% higher than by SMPS. The mean particle size reported by the DM was within +/- 84% of that reported by the SMPS for all test aerosols.
Conclusion: The accuracy of the DM is reasonable when compared to the CPC and SMPS and exhibits reliability for measurement of welding fume. The DM is appropriate to measure personal exposure to welding fume for both size and number concentration in task-based monitoring.

27. Wintertime Factors Affecting Contaminant Concentration in Farrowing Barns

K. Reeve, T.R. Anthony, University of Iowa, Iowa City, IA
Objectives: To assess wintertime contaminant concentration in a farrowing barn. Concentrations were evaluated to determine the effect of pit ventilation, change in concentration over a sample day (5 hr), and whether three data

collection methods produce different respirable dust concentrations.
Method: Respirable dust, carbon dioxide, ammonia, hydrogen sulfide, and carbon monoxide concentrations were measured using fixed area monitoring and contaminant mapping in a 19-crate farrowing room in winter. Direct-reading instruments were used with fixed area stations and contaminant mapping to evaluate concentrations during five sample days over a three week farrowing cycle.
Results: Mean area contaminant concentration, with the exception of CO, was significantly higher when the pit fan was off ($p<0.001$). Respirable dust concentration increased 79% from 0.30 mg/m^3 to 0.54 mg/m^3 with the pit fan off, CO_2 concentration increased 35%, NH_3 increased from 0.03 ppm to 10.8 ppm, and H_2S concentrations increased from 0.03 ppm to 0.67 ppm. A significant change in area respirable dust ($p<0.001$) and CO_2 ($p<0.001$) mean concentrations occurred over time throughout a sample day. Respirable dust concentrations were highest in the beginning of the sample day and decreased by 77% (pit fan off) to 87% (pit fan on) over a five-hour sample period. When the pit fan was off, mean area CO_2 concentrations increased 24% by the end of the sample day. The three data collection methods similarly ranked daily mean respirable dust concentrations (highest to lowest); however, method differences were seen in concentration magnitude, and using seven fixed area monitors resulted in the highest mean concentrations.
Conclusion: Contaminant concentration did not exceed occupational exposure limits. However, recommended agricultural health limits suggested in the literature were exceeded for respirable dust, CO_2, and NH_3, indicating a need to consider personal exposures and control options to reduce contaminant concentrations in production facilities.

28. Contamination of Firefighter Personal Protective Gear

B.M. Alexander, C.H. Rice, C.S. Baxter, M.B. Rao, University of Cincinnati, Cincinnati, OH

Objective: In spite of heat, smoke and the risk of building collapse, the most frequent cause of on-duty firefighter deaths is not trauma but cardiac arrest. Firefighters also face a high risk of chronic illnesses, including several cancers. These adverse effects may result from chemical exposures incurred during firefighting, by the routes of inhalation, ingestion and dermal exposure. This research aims to characterize chemical contamination on firefighter personal protective gear. Contact with contaminated gear may result in dermal exposure.
Methods: Chemical contamination on firefighter personal protective gear was characterized by taking wipe samples from firefighter self-contained breathing apparatus (SCBA) facepieces and by cutting swatches from new and used firefighter hoods, gloves and one coat. Wipe samples and swatches were extracted with methylene chloride and analyzed by EPA method 8270 for the presence of semivolatile contaminants, including 20 polycyclic aromatic hydrocarbons (PAHs) and 6 phthalates.
Results: This is the first time that wipe samples from firefighter facepieces have been obtained. Low levels of di-(2-ethylhexyl) phthalate (DEHP) were consistently measured on the facepieces (range: 1.3 to 17 micrograms; n=25). Swatches from gloves, hoods and one coat, discarded after a period of use, exhibited a wide array of PAH and phthalate contamination. Levels of DEHP contamination (range: 50 to 7280 micrograms; n= 8) were from 18 to 215 times higher than levels of any other contaminant. The adverse human health effects of DEHP exposure are poorly understood, but DEHP has been implicated in heart disease and reproductive disorders.

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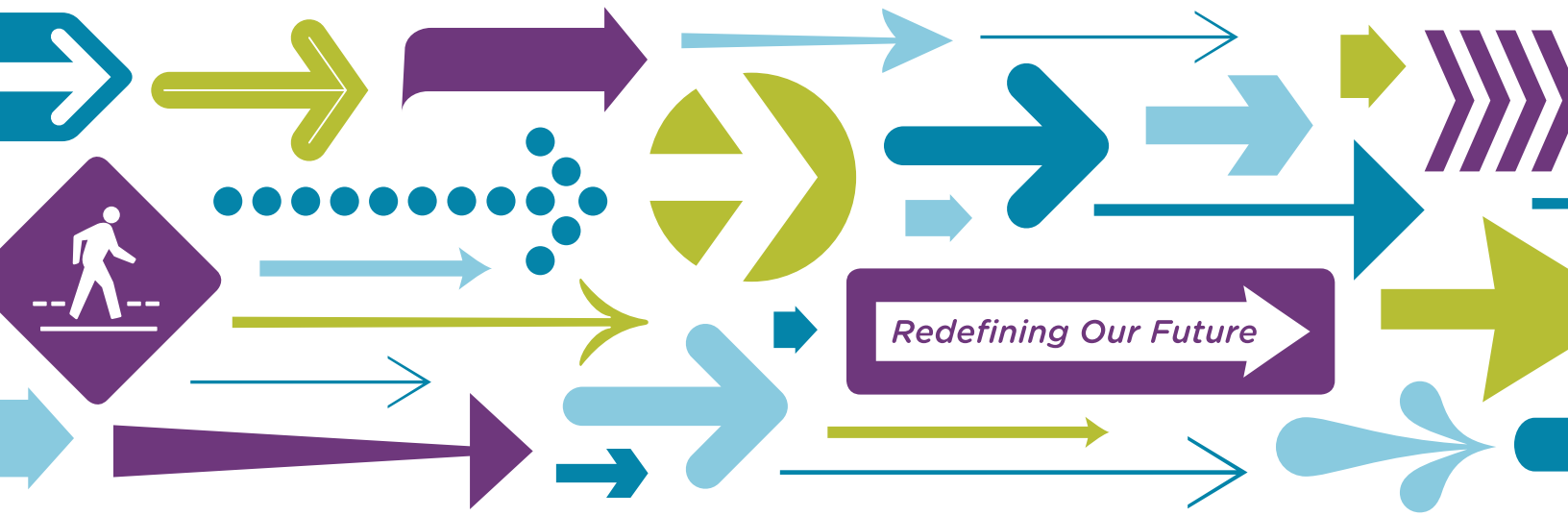

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