Future research is needed to investigate the aethalometer as a surrogate for Method 5040. Until then, those conducting CNT exposure assessments should use a 25-mm cassette and increase the volume sampled to achieve a reporting limit lower than the NIOSH recommended CNT REL of 7 µg/m³.

52. Evaluating Exposure Variance of Inhalable Agricultural Dust among Dairy Farm Workers

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Objectives: The aim of this study was to: 1. Determine if there is a significant difference in the mean concentrations of inhalable dust samples collected using paired Button samplers on opposite shoulders of each subject; 2. Determine if there is significant within-worker exposure variance of inhalable agricultural dust concentrations among dairy farm workers by using repeat exposure measures, and 3. Determine how much variance of inhalable agricultural dust concentrations can be explained by temperature and relative humidity.
Methods: This was a field-based study of inhalable dust exposure among individuals working as milkers or pushers on dairy farms in the Midwestern U.S. A total of 62 dairy farm workers on nine farms participated in this study, and 18 of these workers participated in repeat measurements. Two personal breathing zone samples were collected continuously from each worker during one work shift using Button Aerosol Samplers, amounting to 160 inhalable dust measurements. The filters were analyzed gravimetrically and the time-weighted average (TWA) of inhalable airborne dust exposure was calculated for each subject and reported in mg/m³. Statistical analyses were used to examine exposure variance.
Results: The results of the statistical analyses did not indicate any significant differences in exposure variances between paired sampler groups, with p-values of 0.793, 0.617, and 0.619. A repeat measures ANOVA analysis of within-worker variance found no significant differences, with p-values of 0.702 and 0.744 for sampler location and sampling day, respectively. Results of simple linear regression analyses suggested that inhalable dust concentrations are not influenced by temperature or relative humidity.
Conclusions: Analyses of the study results indicate that exposure to inhalable agricultural dust does not vary significantly among dairy farm workers. These results indicate that sampling a portion of the dairy farm worker population can provide a precise estimate of exposure to inhalable agricultural dust of the general dairy farm worker population.

53. Effect of Loaded Polydispersed Particles on Collection Efficiency of Respirable Cyclones

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Introduction: Workplace aerosol sampling has been used to assess exposure to airborne materials which are known to cause adverse health effects in the respiratory system. Respirable cyclones are a common instrument used to monitor occupational exposures to respirable particles and are designed to have a collection efficiency similar to the definition for the respirable fraction. However, particle loading may influence the collection efficiency of cyclones.
Objective: Determine if there is a difference in collection efficiencies of a clean cyclone compared to a loaded cyclone.
Methods: Glass beads (Count Median Diameter CMD 3.3 µm, Geometric Standard Deviation GSD 1.7) were used to test a clean cyclone. The cyclone was then loaded by sampling with three dust types for three hours at concentrations of at least three mg/m³: Arizona Road Dust (CMD 1.04 µm, GSD 1.57), Organic Dust (CMD 2.90 µm, GSD 1.77), and Titanium Oxide (CMD 0.85 µm, GSD 1.28). After the cyclone was loaded, glass beads were used to retest the collection efficiency. Collection efficiencies were measured using the Aerosol Particle Sizer (APS, TSI 3321).
Results: Particle loading on the walls of the cyclone caused a shift in the collection efficiency compared to clean samplers. When the cyclone was loaded with Arizona Road Dust, the collection efficiency was significantly increased over the range of APS channels between 3.523 to 4.958 µm ($P \leq 0.03$). Loading with Organic Dust significantly

ABSTRACTS

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