0.86 C_{glass} for airborne fungi and bacteria, respectively. A correction on the count data is recommended when the plastic dishes are used with the multistage impactor for viable aerosol sampling.

SR-401-03
Historical Outdoor Airborne Asbestos Concentrations Associated with Emission Sources in the United States: A Review of Published and Unpublished Data

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Objective: Historically, airborne asbestos concentrations have been measured in both rural and urban environments in the U.S. The presence of asbestos in the ambient environment is believed to be a result of the weathering and anthropogenic disturbance of naturally occurring asbestos (NOA) deposits, historical mining/milling operations, the manufacture and use of asbestos containing products, the spray insulation of buildings, shipyard work, and the manufacture of friction product, among others. Although the unpublished and published literature contains a considerable number of measured ambient concentrations of asbestos over the last 40–50 years, a thorough review and synthesis of these data has not heretofore been conducted.

Methods: We compiled, summarized, and analyzed historical to present day measurements of ambient asbestos concentrations in outdoor air throughout the U.S., including in rural and urban environments, and near known or potential emission sources. When necessary, mass per unit volume data were converted to fibers per unit volume (e.g., f/cc).

Results: A total of 787 samples (fibers ≥ 5 µm) were identified from 25 different studies. Most samples were collected to characterize concentrations at some distance from a known point source. A total of 160 samples were categorized as collected away from any known source, thus representing “true” background concentrations, with a mean concentration of 0.0050 f/cc. Concentrations associated with several point sources were found to be statistically significantly higher than background (waste disposal, freeway, NOA, shipyard, and unidentified; $p<0.05$). Furthermore, background concentrations in rural areas were significantly lower than in urban areas ($p\leq0.0015$). Ambient concentrations also tended to decrease over time (1973–2008).

Conclusions: No comprehensive, nationwide survey has been conducted to measure outdoor concentrations in the U.S. Existing data indicate that the levels have varied spatially, and that historical emissions from certain point sources significantly increased the level of airborne asbestos in the surrounding area.

SR-401-04
Characterization of a Nano-Aerosol Using a Portable Scanning Mobility Particle Sizer and Electron Microscopy

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Objective: Portable scanning mobility particle sizers (SMPS) offer convenient means to collect information about nano-sized aerosols because they provide real-time distributions. Electron microscopy applied to a filter sample has been considered the traditional method for the sizing and counting of small particles. However, the later method is time consuming. The objectives of this research are to generate a stable and reproducible sodium chloride aerosol and to compare the size distributions obtained from SMPS and electron microscopy.

Methods: A dilute solution of sodium chloride in water was nebulized, dried, and passed through a charge neutralizer before entering the sampling chamber. The size of the generated particles ranged from 20 to 250 nm. The aerosol was mixed with HEPA filtered and humidity controlled air. The consistency of the aerosol concentration was monitored using a CPC. A portable SMPS was used to determine the size distributions of the generated aerosols. Polycarbonate membrane filters were used to collect the aerosols for subsequent electron microscopy analysis. The particle size distributions were determined from photographs of the membrane filters.

SMPS and membrane samples were collected simultaneously.
Results: Background counts, as indicated by CPC before data collection, were less than 0.3 particles/cc. Conditions during data collection showed that target particle size, particle concentration, and relative humidity were well controlled. SMPS data yielded log-normal size distributions with a median diameter between 80 to 100 nm. Electron microscopy analysis of the particles collected also yielded log-normal size distributions with median diameters that were about 20 to 30 nm larger than those obtained by SMPS.
Conclusions: A well characterized aerosol could be generated and reproduced. Physical counting methods using electron microscopy were cumbersome and slightly different than those obtained from SPMS. The differences in the results could be attributed to the sensitivities of the methods used in this study.

SR-401-05
A Nanoparticle Generator Based on Corona Discharge

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Objective: The purpose of this work was to develop and characterize a nanoparticle generator by corona discharge.
Methods: A lab-scale wire-plate positive corona discharger was built for measuring particle and ozone generation. Environmental contaminants were removed by HEPA filter, active charcoal and silica gel. Gold, tungsten, molybdenum, and stainless steel were used as the electrode to study the material dependency. Gas temperature was controlled by a feedback heater. A scanning mobility particle sizer with a nano-differential mobility analyzer was employed to measure the aerosol concentration and size distribution for particle small than 200 nm. Ozone concentration was monitored by an ozone analyzer. The major operating parameters included louver angle, electrode diameter, electrode spacing, electrode material, air velocity, air temperature, applied voltage and current.
Results: The air temperature appeared to have a strong effect on ESP nanoparticle generation. Sputtering on the corona discharger appeared to be the key mechanism of aerosol generation. Particles were generated as soon as the ESP was turned on. Elementary components of the discharge wire were detected on the filter samples collected downstream the ESP and ground plates, indicating that nanoparticles were generated from the discharge wire. The maximum aerosol concentration occurred when the electric field strength was around 8.2, 9.8, and 11.2 kV for electrode diameter of 0.1, 0.2 and 0.3 mm, respectively. Electrode materials did not affect the I-V curve but the particle generation rate and the ozone concentration were clearly material-dependent. Gold was chosen as the discharge electrode because of stable and high sputtering yield.
Conclusions: Compared to other commercial nanoparticle generators, this ESP nanoparticle generator has advantages of short response time, simple structure, and long stable generation.

SR-401-06
Expansion of the Performance Capabilities of the USF Inhalation Challenge Chamber

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Objective: This study enhances the capabilities of a whole-body human exposure chamber and determines the largest particle size that can be generated consistently. Once this size is determined, the inhalable and thoracic fractions of the dust cloud are determined. This chamber is located in the Breath Laboratory of the Sunshine ERC at the University of South Florida, College of Public Health. The chamber is Plexiglass, has a volume of 75 ft^3, and is operated at a flow rate of 33.8 ft^3/min. Both makeup and exhaust air are HEPA filtered.
Methods: Previous work has been conducted with this chamber to generate respirable dust fractions only, using an elutriator to eliminate larger particles. A direct-reading instrument (TEOM) was used to determine particle concentration. In this work the generated

ABSTRACTS

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