

Results: Radioactivity concentrations of NORM in stream sediments were generally lower than NORM levels in the lake and well below action levels (180 Bq/kg). Levels of uranium-238 and uranium-234 in the lake were less than 25 Bq/kg. Levels of lead-210 (98-125 Bq/kg) and polonium-210 (110-163 Bq/kg) were significantly elevated over levels of radium-226 (52-65 Bq/kg). Levels of NORM in water samples were in the low mBq/L range.

Conclusions: We found levels of lead-210 and polonium-210 in sediments of a lake receiving treated unconventional drilling liquid wastes were 3-5 fold higher than levels of the supporting radionuclide, radium-226. This work suggests that lead-210 and polonium-210 cannot be assumed in equilibrium with radium-226. Risk, exposure, and environmental impact assessments to NORM liberated by unconventional drilling should consider radium-226 decay products.

SR-126-02

Erionite as an Occupational and Environmental Hazard in the Western U.S.

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Objective: The objective of this study is to evaluate the presence and hazard potential of the fibrous zeolite mineral erionite in the western states.

Methods: Samples containing erionite have been collected from several areas. Cliffs in north-west Oregon were sampled at various horizons and examined under an optical microscope in the field. Approximately 10 kg of rock with the greatest concentration of erionite fibers (about 80%) were collected and transferred to RTI International to be made available as a research material. Cliffs in the Custer National Forest of South Dakota and Montana were also sampled. The Arikaree Formation (Palaeogene) contained up to 20% erionite. Finally, "woolly" erionite was collected near Austin, Nevada. These materials have been examined by phase-contrast and polarized light microscopy, scanning and transmission electron microscopy (with energy-dispersive spectroscopy) and x-ray diffraction. Preliminary toxicological experiments have been carried out to provide data on which to base a more comprehensive study.

Results: Rome, OR erionite is now available in 10 gm vials from RTI International. Erionite is seen to be a highly diverse mineral, with a range of morphologies, and a considerable range of cation chemistry between sources, and also between individual particles from a single source. A cation content methodology for identifying erionite could not be supported and a method based on polarized-light microscopy and x-ray diffraction appears necessary. Finally, preliminary studies point to possible differences in toxicity between materials from different locations.

Conclusions: Exposures to erionite have already been documented in aggregate mineral extraction and road construction and maintenance. However, the hazard posed by erionite may vary from location to location.

SR-126-03

Association of Urinary 8-hydroxy-2'-deoxyguanosine Levels with Aging and Increased Fractional Exhaled Nitric Oxide in Elder Chinese Women

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Objective: Indoor air pollutants from environmental tobacco smoke and cooking oil fumes can cause respiratory problems in Chinese women, lead to the releases in proinflammatory cytokines and oxidative DNA damage. However, effects of normal ageing and increased fractional exhaled nitric oxide on urinary 8-OHdG levels in elderly Chinese women are unknown.

Methods: Subjects were derived from the baseline survey of a cohort study. Among 3053 participants, those with missing data on FeNO, urinary 8-OHdG levels, height and weight and certain diseases (such as cancer, stroke, diabetes, ischemic heart disease, chronic obstructive pulmonary disease and asthma) were excluded. Finally, a total of 2224 adults (779 males and 1445 females) were included in this study. Information on personal social-demographic characteristics, occupational history, personal medical history, life habit and living conditions, type of cooking fuel used, coal kitchen ventilation ways was obtained by interviewing study subjects using structured questionnaires. Physical examination (such as height, weight, waist and hip circumference) and blood and urinary sample investigations (urinary 8-OHdG levels) for all participants were conducted. Factors affecting urinary 8-OHdG levels were analyzed using multiple linear regression analysis.

Results: The results from multiple linear regression models show that there was a relative increase in urinary 8-OHdG levels in females aged ≥ 64 years without active and passive smoking and with lower FeNO (59.7% [95% CI: 5.0-142.9%]) or higher FeNO (71.5%, 95% CI: 23.5-138.0%), compared to females aged < 64 years without active and passive smoking and with lower FeNO. After adjusting for potential confounders, we found a relative increase in urinary 8-OHdG levels ($\Delta\%$ of urinary 8-OHdG: 74.1% [95% CI: 17.7-157.4%]) in females aged ≥ 64 years with higher FeNO and self-catering using LPS only, without active and passive smoking, compared to females aged < 64 years with lower FeNO and self-catering using fuel LPS only, without active and passive smoking.

Conclusions: Cooking-related pollutants may chronically induce inflamed state in Chinese women aged ≥ 64 years without active and passive smoking, and increased the urinary 8-OHdG levels, synchronously, ageing also enhanced the health impact.

CS-126-04

Meeting the Challenge of Measuring Health and Safety Performance Globally: ASTM Standard E2920 - 14 for Recording Occupational Injuries and Illnesses

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Situation/Problem: As U.S.-based companies have expanded their operations globally, accurate accounting of occupational injuries and illnesses in non-U.S.-based locations has proven difficult. In seeking a means to standardize measurement of their worldwide safety and health performance, many have faced the challenge of imposing the U.S. OSHA recordkeeping requirements throughout their sites. This has created confusion and inaccuracy due largely to the differing definitions of medical treatment in different cultures. Less-serious cases have gone unreported in cultures that place a high value on conforming to the norm. In addition, work relatedness of cases as set forth by OSHA has been difficult to understand and apply consistently across the globe.

Resolution: ASTM Standard E2920 - 14, Standard Guide for Recording Occupational Injuries and Illnesses was drafted "to establish definitions and criteria for recording



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