well as particle size appear to be associated with the prevalence of CBD and BeS. In contrast, mean or median airborne concentrations of beryllium, cumulative dose, and exposure duration have not provided consistent dose-response associations. Fifth, CBD and BeS are observed among workers who are employed in areas where airborne beryllium concentrations are generally greater than 0.2 µg/m3. Based on what has been learned in recent years, increased risk of BeS and CBD is likely derived from a combination of factors such as particle size, chemical form of beryllium, and peak exposure, which are important to consider when setting an OEL for beryllium.

276.
ANALYSIS OF BERYLLIUM EXPOSURE AMONG BERYLLIUM SENSITIZATION AND CHRONIC BERYLLIUM DISEASE WORKERS IN A BERYLLIUM METAL MACHINING PLANT: IMPLICATIONS FOR AN OCCUPATIONAL EXPOSURE LIMIT.

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The current occupational exposure limit (OEL) for beryllium has been in place for more than 50 years and was believed to be protective until medical diagnostic techniques in the 1980s identified beryllium sensitization (BeS) and chronic beryllium disease (CBD) in the absence of physical symptoms. A major challenge in identifying a revised OEL for beryllium is that previous studies have used inconsistent sampling and exposure assessment methodologies and definitions for BeS and CBD. These differences have prevented direct comparisons between studies as well as the identification of a clear exposure-response relationship. Industrial hygiene and health surveillance data from a beryllium metal machining facility were analyzed to assess whether this information provides insight into the exposure-disease relationship for BeS and CBD, which could be useful in identifying an OEL that is protective of worker health. Airborne beryllium concentrations for different job titles were evaluated, historical trends of personal and ambient beryllium levels were compared for pre- and post-engineering control measures (implemented in the 1990s), and average and upper bound exposure estimates were developed for workers identified as BeS or with CBD. This assessment included the analysis of 3,833 personal lapel and 614 general area samples and other new data collected by plant health and safety staff at the facility. Results of this analysis showed that all workers diagnosed with CBD were exposed to beryllium concentrations of 0.2 $\mu g/m^3$ (95th percentile) or greater. The prevalence of BeS among surveyed workers exposed below a 95th percentile beryllium concentration of 0.2 $\mu g/m^3$ was consistent with the anticipated background rate of BeS of 1–2%. It was concluded based on this analysis of BeS and CBD workers in a beryllium metal machining plant, concentrations maintained below 0.2 $\mu g/m^3$ 95% of the time will likely prevent BeS and CBD in nearly all beryllium workers.

277.
RESPIRATOR USE AND PRACTICES BY NATIONAL DEMOLITION ASSOCIATION MEMBER COMPANIES.

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Respiratory illnesses caused by airborne hazards at the workplace can be prevented by adequate control measures. In the absence of adequate engineering and administrative controls, proper respirator selection and use is essential. NIOSH conducted eight focus groups during March–November 2004 arranged by the National Demolition Association. The association represents the majority (approximately 80%) of U.S. demolition work in terms of revenue. The objectives of the focus groups were to identify the types of airborne hazards present at workplaces, control measures used to reduce these hazards, types of respirators used, and barriers impacting respirator use. Participants reported exposures to abrasive blasting agents, arsenic, asbestos, cadmium, carbon monoxide, chlorine, concrete dust and silica, dust from drywall, diesel, and gasoline fuels, fluorine, hydrogen sulfide, lead, man-made mineral fibers, mold, pigeon droppings, PCBs, ionizing radiation, and welding fumes. Engineering control measures included using water sprays, mechanization, longer torches and standing upwind when cutting, local ventilation, enclosed equipment cabs, and scrubbers on diesel-powered front-end loaders for interior work. Respirators were used where the feasible engineering controls could not reduce the exposures below acceptable limits. Barriers to proper respirator use included high ambient temperatures, fogging of full facepiece respirators, difficulty wearing other personal protective equipment with respirators, reduced peripheral vision, difficulty communicating and breathing, cultural differences with non-English speakers, low literacy, high worker turnover, and short duration of employment for laborers. Overall, participants were knowledgeable about and had implemented OSHA respirator program elements. This poster will describe the focus group findings and the current NIOSH education and intervention strategies to overcome the barriers identified. The findings and conclusions in this abstract have not been formally disseminated by NIOSH and should not be construed to represent any agency determination or policy.

278.
PERFORMANCE OF A NEWLY DEVELOPED BREATH-SYNCHRONIZED PAPR.

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Compared with negative pressure respirators, a Powered Air Purifying Respirator (PAPR) equipped with a battery-operated blower provides several advantages with respect to the human protection against contaminated air. It enhances the protection characteristics and lowers the inhalation resistance because the forced air always maintains a pressure above the ambient air pressure level inside the facepiece. Most PAPRs, however, are designed only to maintain a large amount of air blowing that corresponds to the peak inhalation flow of wearers in operation. This necessitates frequent filter replacement resulting in high running costs and causes other problems associated with high exhalation resistance and other factors. In order to solve these problems, we have developed a new PAPR with the built-in Breath-Synchronized Flow System (BSFS-PAPR) that supplies the necessary amount of air on wearer's inspiration at once and reduces the air supply at the expiration. The BSFS is a small electronic module that allows the real-time detection of the wearer's respiration basis and controlling the air volume supplied from the blower fan. The BSFS-PAPR continuously maintains a positive pressure inside the facepiece when tested with a breathing machine operated at 24 respirations per minute (volumetric rate = 40 liters per minute), and demonstrates high synchronous performance, even for shallow respiration. Furthermore, it can provide a superior performance by reducing the exhalation resistance and help avoid wasting of filters and battery capacity compared with the traditional continuous flow PAPRs (CF-PAPRs). This presentation communicates the evaluation data on the BSFS-PAPRs' synchronous performance. The authors also discuss the protection data obtained with human subjects as well as the results of the comparative study involved with the traditional CF-PAPRs.

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