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PREVENTING SILICOSIS AND DEATHS IN CONSTRUCTION WORKERS. K.D. Linch, D. Groce, J. Parker, NIOSH (DRDS) Morgantown, WV

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in controlling exposures to respirable crystalline silica in construction workers. In addition to traditional crystalline silica exposure settings, such as rock drilling and sandblasting, construction workers are involved in a number of activities in which building materials containing crystalline silica are dispersed as fine airborne particulate, that can result in both direct worker exposure and "bystander" worker exposure. NIOSH has received reports of silicosis-related deaths in young construction workers, including a 47 year-old West Virginia rock driller, 37 and 39 year-old construction painters in Ohio, a 41 year-old worker in Indiana, and a 44 year-old construction laborer in North Carolina. NIOSH has observed work sites and measured overexposures in respirable crystalline silica in the following operations: drilling concrete (0.81 mg/m^3 for 212 minutes), cutting pavement (1.64 mg/m^3 for 45 minutes), cutting concrete floors (14.2 mg/m^3 for 350 minutes outside of a disposable respirator), abrasive blasting (0.68 mg/m^3 for 60 minutes inside a blasting hood and 1.83 mg/m^3 outside), and drilling rock (0.80 mg/m for 324 minutes). NIOSH has also observed adequate work site controls during rock drilling and concrete cutting during which overexposures were not detected. At construction site visits, NIOSH has observed a general lack of awareness concerning the potential hazards of respirable silica exposures, as well as inadequate or inappropriate use of engineering controls and respiratory protection practices. In view of existing environmental data and reports of sentinel health events, strategies need to be developed to reduce silica exposures in the construction industry.

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EVALUATING ENGINEERING CONTROLS DURING ASPHALT PAVING USING A PORTABLE TRACER GAS METHOD. R. Mickelsen, K. Mead, S. Shulman, NIOSH, Cincinnati, OH; T. Brumagin, National Asphalt Pavement Association, Lanham, MD

Initiated by the National Asphalt Pavement Association (NAPA), five asphalt paver manufacturers, representing more than 80% of the highway-class paver market, independently designed engineering controls for their respective pavers. Through an agreement with the Department of Transportation (DOT), NIOSH assisted the manufacturers with their prototype designs, then independently evaluated each prototype's performance using qualitative smoke and quantitative tracer gas methods. Video recordings documented each prototype's ability to capture tracer gas under "managed" indoor conditions. Sulfur hexafluoride (SF-sub 6) was the tracer gas used to quantify the capture efficiency and exhaust flow rate for each prototype.

The first phase of this research included stationary tracer gas testing of five different prototype engineering controls installed on asphalt pavers. The stationary tracer gas method called for the release of tracer gas from nine locations below the auger of the paving machine and resulted in capture efficiencies averaging from 7% to 100% indoors and from 0.5% to 81% outdoors. Based on the stationary evaluations, several manufacturers redesigned their controls to improve capture efficiency in preparation for performance evaluations at actual paving sites. During the second phase of the research, laboratory tracer gas methods were modified to be field portable. Tracer gas was released from four locations above the auger during actual asphalt paving operations and provided results within the hour. An industrial hygiene area sampling method was also used to quantify capture efficiency during actual paving operations; however, this method required many weeks of sample processing. During four days of paving, the capture efficiency of one redesigned engineering control was 94% based on 12 tracer gas measurements and 90% based on 4 industrial hygiene measurements. This paper describes the engineering control design, the field tracer gas method, the industrial hygiene method, and the capture efficiency results obtained during actual paving operations.

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EVALUATION OF A WORK SAMPLING METHOD TO ASSESS EXPOSURES TO PARTICULATES IN CONSTRUCTION. A. Kalil, S. Woskie, N. Kozar, Construction Occupational Health Project, University of Massachusetts Lowell, Lowell, MA

Workers are exposed to airborne contaminants from numerous sources during heavy highway construction. Typical particulate sources include diesel exhaust, silica dust from work on concrete structures and the omnipresent construction dust. What makes the exposure settings in construction fundamentally different from those in most other industries is the presence of ever changing work sites coupled with a high degree of variability in the number and type of particulate sources, source intensities and environmental conditions. At times a worker's exposure may occur simply through presence as a bystander to some process. To account for this variability in characterizing worker exposure, an exposure assessment method based on work sampling was developed. The method is a means for producing a systematic survey of all the factors which could effect exposure to particulates. The onsite researcher captures variability in the work site and work activities through 11 observations or snapshots in time which take place at predetermined fixed intervals through the day. During each observation information is collected on over 30 potential exposure determinants including the worker's activity, the tools and machines in use, the material being worked on, the worker's distance from the particulate source, the number of sources, and the source plume direction relative to the worker. Results are consolidated for analysis, producing estimates of the fraction of the workday each exposure determinant occurred. The exposure determinants for Laborers working in utility relocation and slurry wall construction on the Boston Central Artery Tunnel Project were studied. The variability in exposure determinants was considerable, within and between the two construction stages as well as within and between individual laborers. These findings begin to explain the highly variable nature of construction exposures. They also highlight the need to collect information on exposure conditions as well as tasks during the sampling of particulates in construction.

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ELEVATED ASBESTOS EXPOSURES FROM A BUILDING DEMOLITION WHICH CONTAINED VERMICULITE INSULATION. B.W. Cowan, Government of Manitoba, Brandon, MB, Canada

Vermiculite is a silicate mineral which has been installed in many attics as a building insulation. An asbestos consultant collected bulk insulation samples from several locations scheduled for demolition on a Canadian Forces base. Asbestos concentrations ranging from less then 0.1% to 5-10% Actinolite and/or Tremolite were detected in this proactive survey. The majority of test results were quite low; generally less than 0.1% asbestos, however, the potential existed for asbestos fibers to become airborne during a routine demolition project. Air monitoring was conducted during the demolition work, which utilized no dust suppression, to determine representative worker exposures to airborne asbestos dust. Ten samples were analyzed by transmission electron microscopy (TEM) in accordance with NIOSH Method 7402 and concentrations ranged from 13 to 172 fibers per mL. The results of this study indicated elevated levels of airborne asbestos fibers were generated during the ceiling demolition and appropriate asbestos abatement procedures had to be initiated. These included the installation and operation of a negative pressure ventilation system and a decontamination facility, the wearing of adequate personal protective equipment, the prewetting of the asbestos contaminated material, the proper bagging of all asbestos waste, and regular onsite air monitoring to record the levels of airborne fiber concentrations.

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SAFE USE OF HEAVY EQUIPMENT ON FROZEN LAKES & RIVERS. L.L. Verdier, T. Lockrem, IT Corporation, Cincinnati, OH

Every winter, ice sheets that grow on lakes and rivers in northern states and Canada are used for ice roads, ice bridges, construction platforms, air strips and recreational activities. The purpose of this paper is to determine when the ice is safe to use for these activities. IT Corporation conducted a remedial investigation (RI) that included drilling into the bay/river sediments near Lake Superior using a rotary drill rig and other heavy equipment.

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PRAGMATIC PRINCIPLES FOR AVOIDING MANAGEMENT PITFALLS. M.L. Sanders, Naval Engineering Field Activity, Poulsbo, WA

Making the transition from an industrial hygienist managing programs to a manager programming industrial hygienists can be traumatic and career damaging. Keen technical and verbal skills are common entrance requirements to the people-management arena, but industrial hygienists who desire to make that professional move must be aware of three particularly dangerous pitfalls which neither of those skills will protect against.

One pitfall results from failure to distinguish between leadership and management, another from failing to distinguish between organizational process and function, and the third for failing to recognize the customer. Industrial hygienists must have the insight to recognize and evaluate those pitfalls, avoiding or backfilling in order to walk safely over them.

Specific and succinct descriptions of principles for both the prevention and the resolution of these problem areas have been developed; use of these principles is the catalyst for efficacious management. Whether the professional industrial hygienist is in the private or the public sector, assuming the responsibility for a controlled management response using these principles in the face of business adversity can turn impending failure into resounding success and ensure career growth.

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SCIENTIFIC CONTRIBUTIONS TO THE REVISION OF THE OSHA'S 1,3-BUTADIENE HEALTH STANDARDS. C.T. Chen, OSHA, Washington, DC

The current OSHA's 1,3-butadiene (BD) health standard is an 8-hour time-weighted average (TWA) exposure of 1,000 ppm for workers exposure to BD which is adopted from 1968 American Conference of Governmental Industrial Hygienist's (ACGIH's) threshold limit values (TLVs®) in 1971 to prevent irritation and narcosis effects. Due to the demonstration that BD causes multiple cancers in two animal studies in 1983, OSHA was petitioned by unions in 1984 and referred by EPA in 1985 for regulatory action. In 1990, OSHA published a proposed BD standard with an 8-hour TWA exposure of 2 ppm, a short-term exposure limit (STEL) of 10 ppm, and the ancillary provisions. There are many scientific studies contained in OSHA BD docket which enhanced the completion of a BD standard. Animal bioassays, human epidemiologic studies, experimental investigations on the metabolites and their mechanism in vitro and in vivo systems provides convincing evidence that BD is a probable human carcinogen. Three out of five quantitative risk assessments used NTP study with exposures of 6.25–625 ppm BD to calculate their best estimates of risk. Due to the availability of three breakthrough studies on BD, OSHA was able to allow the use of cartridges and canisters for respiratory protection that would enhance workers' protection, address industry's concerns, and reduce compliance cost. A series of plant visits conducted by the National Institute of Occupational Safety and Health (NIOSH) produced worker exposure profiles and information on technological feasibility which greatly helped in economic analysis. An epidemiologic study sponsored by the International Institute of Synthetic Rubber Producers (IISRP) completed in late 1995 clearly demonstrated an excess risk of cancer among workers exposed to BD which is complementary to the animal studies. This promoted IISRP to engage with unions to reach agreement on a standard with an 8-hour TWA exposure of 1 ppm, a STEL of 5 ppm, and other aspects of standard. This demonstrates that studies from various disciplines of science will greatly enhance the development of a workplace health standard. The opinion expressed here is sole of author.

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CIH PLUS IHIT UTILIZATION BY INDUSTRY OR INDUSTRY GROUP, AND PRELIMINARY PROJECTIONS OF FUTURE NEED FOR SUCH INDUSTRIAL HYGIENE PROFESSIONALS. L.W. Whitehead, CIH University of Texas-Houston Houston, TX, M. West Baylor College of Medicine, Houston, TX

Estimates of future need for public health professionals are very useful for planning educational programs and incentives for graduate education, and for staffing projections. No such estimates are known to exist for