DPH proposed clean-up guidelines for residential dwellings?

2. What air levels of mercury will citizens in residential settings be exposed to during the clean-up procedure when using the CT DPH proposed clean-up guidelines?

3. Can metallic mercury be effectively removed from porous surfaces such as carpets and upholstery using methods readily available to citizens in residential settings?

Small quantity mercury spills (such as from broken thermometers) on hard, intact surfaces can be effectively cleaned up to below 0.005 mg/m^3 by following the CT DPH guidelines. Data collected during clean-up trials showed the actual breathing zone exposure to the resident did not exceed a time-weighted average of 0.012 mg/m^3 during the time period required to clean up small spills. Our research further demonstrated that complete removal of metallic mercury from porous or nonintact hard surfaces is not possible with methods readily available to citizens in residential settings. It is hoped that the industrial hygiene data gathered during this project will form a basis for policy discussions on clean-up recommendations.

133

DETERMINING TRANSFER EFFICIENCY OF AN HVLP SPRAY GUN. B.L. Gatano, M. Flynn, J. McKernan, University of North Carolina, Chapel Hill, NC

The transfer efficiency of a paint spray gun is the fraction of droplets sprayed that impact on a workpiece. Particles not deposited into the workpiece are termed overspray and have the potential to reach worker's breathing zone. Thus, spray guns with higher transfer efficiencies have lower rates of overspray and a reduced potential for worker exposure to paint mists. This research investigated the transfer efficiency of a high volume low pressure (HVLP) spray gun. A mannequin capable of horizontal arm movement was used in a wind-tunnel to simulate a spray-paint worker and spray booth. In order to mimic a real spray painting operation, the mannequin sprayed a nonvolatile vacuum pump oil onto a flat plate. Oil impacting the plate drained into a collection trough, and the difference in the mass of oil sprayed and the mass collected in the trough was used to calculate the transfer efficiency. Mannequin motion, orientation of the mannequin with respect to the freestream, nozzle pressure, and freestream velocity were varied to assess their effect on transfer efficiency. The measured transfer efficiency varied from 66% to 87%, with the effect of motion decreasing the transfer efficiency. For all cases, transfer efficiency was a decreasing linear function of the mass of air to liquid ratio (mass sub-a/mass sub-l), which in turn, is a function of nozzle pressure. The lower transfer efficiency at higher m sub-a/m sub-l was associated with an increased breathing zone concentration for the mannequin. Mannequin orientation had no effect on transfer efficiency. Additionally, the results of this research were compared with a theoretical impaction model and with the transfer efficiency measured for a conventional high pressure gun. It is concluded that the strong correlation between the m sub-a/m sub-l and the measured transfer efficiency of the HVLP gun may prove important in estimating exposure to workers. The work suggests that the lowest ratios of air to paint flows should be used whenever possible, and that excessive values of this ratio will reduce transfer efficiency and increase worker exposure.

134

CARBON MONOXIDE POISONINGS FROM SMALL, GASOLINE-POWERED, INTERNAL COMBUSTION ENGINES: JUST WHAT IS A "WELL-VENTILATED AREA?" G. Earnest, R. Mickelsen, D. O'Brien, NIOSH, Cincinnati, OH; J. McCammon, Colorado Department of Public Health and the Environment, Denver, CO

Many workers are poisoned each year in buildings or semienclosed spaces by carbon monoxide (CO) produced by small, gasoline-powered engines used on tools, such as high-pressure washers, concrete cutting saws, compressors, and generators. These products are typically sold with an ambiguous warning stating that they should only be used in "well-ventilated areas." Workers have been poisoned by CO because they did not recognize the danger or understand the warning.

The authors modeled the time required for a gasoline-powered, 5-horsepower (hp), 4-cycle engine to generate CO concentrations exceeding the National Institute for Occupational Safety and Health (NIOSH) recommended 200-ppm ceiling and 1200 ppm immediately dangerous to life and health concentrations for various room sizes and the general ventilation rates. The model was compared to field data collected at a site where two workers had previously been poisoned while operating a 5-hp concrete saw in a bathroom having open doors and an operating ventilation system.

The model and field data indicate that hazardous CO concentrations can develop within minutes. The model indicates that ventilation rates of nearly 5000 cfm (120 air changes per hour) would have been required to prevent the CO concentration from exceeding the 200-ppm ceiling.

Workers need to understand the CO poisoning hazard and should be provided with adequate warning form the manufacturer. Opened windows or doors or an operating fan does not provide sufficient ventilation. These poisonings can occur quickly, even in the presence of what many would consider a well-ventilated area. To prevent CO poisoning from small gasoline-powered engines, the engines should not be operated inside of buildings or in semienclosed spaces. Manufacturers of tools that generate carbon monoxide and could be used in buildings or semienclosed spaces should improve their warnings and begin to develop engineering control options to better protect the users.

Case Study Session III Papers 135–142

135

SILICOSIS, TB, AND SANDBLASTING THE INTERIORS OF TANKS. J. Cocalis, NIOSH (DRDS), Morgantown, WV

Case Study Description: Silicosis prevention among painting subcontractors.

Situation: Follow-up to TB screening, uncovered a case of complicated silicosis at a small industrial painting firm. A physician referred the case to NIOSH.

Problem: A NIOSH investigation found the subcontractor's workers to be overexposed to crystalline silica during sandblasting and clean-up activities. NIOSH also found deficiencies in the subcontractor's respiratory protection and medical surveillance programs.

Resolution: Due to the serious nature of the findings, NIOSH advised the subcontractor of the inadequacies and referred the operation to OSHA for enforcement follow-up.

Benefit to Other Practitioners: Industrial hygienists for prime contractors and/or construction managers will be made aware of the need to select subcontractors with acceptable occupational health programs.

136

EXPOSURE TO LEAD WHEN WELDING GALVANIZED BOX BEAMS. J. Keyes, Minnesota Department of Transportation, St. Paul, MN

Description: Exposure to lead, iron, and zinc was evaluated when galvanized box beams were welded together to form the walls of storage bins.

Situation: Galvanized metal has been reported to be contaminated with lead, as a result of impurities in the ore. Highway workers do extensive welding and torch-cutting of galvanized metal, used for box beams, sign posts, and culverts.

Problems: Whether the amount of lead present in galvanized metal was sufficient to result in overexposure to lead was not known. It is known that zinc fumes from welding are likely to be excessive.

Resolution: Exposure monitoring during the welding operation showed that overexposure to lead was possible under aggressive conditions (monitoring done outside of welding helmet, natural ventilation blocked by the work). Controlling the way the work is done, so that workers are not directly in the smoke fume, will control the lead (and zinc) exposure.

Benefit to Other Practitioners: Lead exposure is not an obvious problem during hot work on galvanized metal, but it must be a consideration for industrial hygienists evaluating and controlling exposure to zinc fumes during that hot work.

137

PRACTICAL GUIDELINES FOR IMPROVING ENVIRONMENTAL HEALTH AND SAFETY PERFORMANCE—EVALUATION. J. Messelbeck, Allergan, Inc., Irvine, CA

Description: This study is intended to pro-

1997
American Industrial Hygiene Conference & Exposition

AIHCE '97
Taking Responsibility
Building Tomorrow's Profession

The premier conference for occupational and environmental health and safety professionals

Conference May 19–23, 1997 • Dallas Convention Center • Dallas, Texas

Abstracts

Co-sponsored by American Industrial Hygiene Association and American Conference of Governmental Industrial Hygienists

1997 Abstracts Index
by Session Topics

Taking Responsibility . . . Building Tomorrow's Profession Papers 1–6

1

Paper Withdrawn by Author

2

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.

3

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.

4

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