were reduced by 96%, from 136 +/- 51 ppm to 6 +/- 4 ppm, and from 125 +/- 47 ppm to 5 +/- 3 ppm, respectively. Potential failures of the emission controls were also identified and included air filter blockage, spark plug malfunction, and faulty alarm function design. While the addition of emission controls significantly reduces the CO exposure risk, the burnishers are still capable of producing excessive CO emissions under certain conditions, and CO may accumulate to unsafe levels when burnishers are used in areas with inadequate ventilation. Recommendations for safe use are provided. Electric burnishers are advised if guidance is not strictly followed or later proves inadequate.

334

Paper Withdrawn by Author

335

FREQUENTLY ASKED QUESTIONS ABOUT OSHA'S HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200). T. Towers, OSHA, Washington, DC

More than 10 years after the implementation of the Hazard Communication Standard by OSHA, there exists a lack of understanding as to the responsibilities of the various members of the regulated community in complying with the provisions of the standard. This is evidenced by the number and substance of inquiries received by OSHA on the subject. This paper examines the distribution of inquiries by provision and attempts to provide guidance to those who need to know more about hazard communication or "right to know." The information was obtained by telephone message records maintained by the author and from others in the agency who routinely respond to inquiries. The records were collected over a 4-year period.

Typical questions which are frequently asked involved obtaining, preparing, and maintaining material safety data sheets; acceptability of various electronic storage methods; content of labels; roles of manufacturers and distributors; and the use of one format in preference to another for material safety data sheets and labels. Responses are provided for several of the more frequently asked questions, along with information on obtaining assistance from various sources. Recent developments, such as the recommendations of the National Advisory Committee on Occupational Safety and Health (NACOSH), which address several of the frequently asked questions, are presented.

336

RECOMMENDED OCCUPATIONAL EXPOSURE LEVELS FOR LACTATE ESTERS. J. Clary, Bio Risk, Midland, MI; V. Feron, TNO-Toxicology, Zeist, The Netherlands; J. van Velthuijsen, PURAC biochem bv, Gorinchem, The Netherlands

Lactate esters, finding new uses as nonozone-depleting and biodegradable solvents, have a low order of acute oral and inhalation toxicity, but are potential eye and skin irritants. Ethyl lactate in rats did not produce any developmental effects or other signs of toxicity other than skin irritation (dams) in a dermal development study. In an aerosol study of 2-ethylhexyl lactate no signs of maternal toxicity or teratogenic effects were noted. Delayed ossification observed in the treated fetuses was likely due to stress induced by the combination of exposure conditions and the irritant nature of 2-ethylhexyl lactate.

Subacute inhalation studies (ethyl, isobutyl, and 2 ethylhexyl lactate) produced degenerative changes in the nasal cavity in all studies. The NOAEL in the vapor studies (ethyl, isobutyl) was 200 mg/m^3. Lactates do not appear to cause systemic toxicity, except at very high concentrations (2500 mg/m^3 for ethyl lactate and 1800 mg/m^3 for 2-ethylhexyl lalctate). This would suggest that sensory irritation and local toxicity data may be used to establish suitable workplace vapor exposure levels. Respiratory irritation tests (RD50) were conducted on ethyl and butyl lactate.

A workplace vapor level below 75 mg/m^3 should prevent sensory irritation. The NOAEL for local toxicity in the vapor inhalation studies also supports a workplace level of 75 mg/m^3 (safety factor of 3). However, aerosol exposure to 2-ethylhexyl lactates produced minimal changes in the nasal cavity at 75 mg/m^3, and therefore aerosol exposure should be minimized. The low vapor pressure and low odor threshold of lactate esters make it very unlikely that humans would be exposed to irritating vapor or aerosol levels.

337

POLYMER FUME FEVER AT AN INDUSTRIAL VALVE MANUFACTURER. A. Echt, F. Bresler, R. Hughes, C. Hayden, NIOSH, Cincinnati, OH

National Institute for Occupational Safety and Health (NIOSH) investigators performed an evaluation at a plant where fluorocarbon polymer-lined valves were produced following a management request concerning polymer fume fever. Polymer fume fever has been described as shaking chills, muscle pain, shortness of breath, chest tightness, and a feeling of ill health, with or without fever, which occurs near the end or soon after a work shift; symptoms completely resolve within 24 hours. The principle concerns in occupational exposure to the decomposition products of fluorocarbon polymers is their potential for causing polymer fume fever and respiratory tract injury. Exposure to the decomposition products of fluorocarbon polymer results from inhalation of fluorocarbon polymer, or from inhalation of a single or several decomposition products.

Confidential health interviews were conducted with 11 employees in the lined-valve production area. The interviews assessed individual practices regarding smoking and eating at work and evaluated the occurrence of polymer fume fever over the 2 years preceding the survey. The 2-year cutoff was chosen because of process and ventilation changes 2 years before the evaluation. Ten of 11 employees interviewed reported symptoms associated with polymer fume fever. Five of these 10 symptomatic employees had polymer fume fever episodes during the 2 years preceding the survey, 4 of whom reported episodes the past year.

Nine personal breathing zone (PBZ) and five general area (GA) air samples were collected for fluorides using NIOSH Method 7902. Five of nine PBZ samples had detectable hydrogen fluoride, with 8-hour TWA concentrations of 0.005 ppm to 0.010 ppm. Eight-hour TWA concentrations of HF in the GA samples ranged from 0.004 ppm to 0.008 ppm.

The investigators determined that a health hazard existed from exposure to fluorocarbon polymer decomposition products and recommended ventilation changes, including enclosing extrusion presses; and practice changes such as prohibiting smoking in the work area.

338

A CHARACTERIZATION OF PAINT EXPOSURES DURING TREE-MARKING OPERATIONS. B. Reh, NIOSH, Cincinnati, OH

The National Institute for Occupational Safety and Health (NIOSH) and the United States Forest Service (USFS) is currently conducting an epidemiologic study to assess the potential that exposures to tree-marking paint might be causing reproductive problems. Since exposures during tree-marking operations have never been quantified, an industrial hygiene survey was conducted at two USFS regions to characterize current exposures to these paints. Seven bulk paint samples were analyzed for volatile organic compounds (VOCs) and elements, and the results were used to select specific compounds for personal exposure assessment based on whether the compounds have had any documented association with reproductive health effects and whether a method for assessment existed. The personal exposure assessment consisted of collecting full-shift personal breathing zone (PBZ) air samples during tree-marking operations and spot urine samples at the end of the shift from 10 workers (5 per region). PBZ samples were analyzed for toluene, xylene, ethyl benzene, propylene glycol monomethyl ether acetate, n-butyl acetate, methyl isobutyl ketone (MIBK), a total hydrocarbon measurement (based on Stoddard solvent), elements, and total particulate. Urine samples were analyzed for hippuric acid (toluene metabolite), o-cresol (also a toluene metabolite), total methylhippuric acids (xylene metabolites), mandelic acid (ethyl benzene metabolite), methyl ethyl ketone (MEK), and MIBK. The results suggest that paint exposures as a result of marking trees are quite low. Except for low concentrations of Stoddard solvent (1.02 to 6.3 mg/m^3) and xylene (0.07 to 0.12 ppm), inhalation exposures to VOCs were not quantifiable. This is not surprising, since the work is outside. The results are similarly low or not detected for inhalation exposures to elements. The urine sampling results suggest that internal doses received from paint exposure also range from not detected to quite low. In both locations, the hippuric acid concentrations were all well below the 1.5 grams per gram of creatinine (g/g Cr) which is normally found in urine. o-Cresol was not detected in workers from one region, but was detected in workers from the other at concentrations just above the analytical limit of detection and the refer-

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