specific target organ carcinogen. Furthermore, since an "ALARA" principle is usually applied to carcinogens, it does not appear appropriate to calculate a mixture exposure level as the concentration of these carcinogens should be reduced to the lowest feasible level. This decision-making tool will help industrial hygienists to assess the toxicological risk from mixtures but will not replace professional judgment.

255.

EXPOSURE TO BENZENE AND OTHER GASOLINE HYDROCARBONS AT BULK PLANTS OPERATIONS. A. Ayalp, M. Al-Safwani, J. Ngao, R. Tanita, H. David, P. Atkinson, R. Taylor, Aramco, Dhahran, Saudi Arabia

Occupational health hazard assessment (OHHA) surveys were performed over a period of five years to determine personal exposures to benzene and other gasoline hydrocarbons, and to evaluate effectiveness of bottom loading versus top loading operations throughout the company facilities. The bulk plants are designed to supply gasoline, diesel and kerosene depending on geographical needs. Motor gasoline typically contains approximately 3% of benzene and low percentage of toluene, n-hexane, xylene and methyl tert-butyl ether (MTBE). The objective of this study was focused to evaluate worker exposure to these volatile components of gasoline due to their high toxicity relative to the other gasoline components. The OHHA surveys have been undertaken to observe methods of operation and measure operator-exposure to benzene and other gasoline hydrocarbons, throughout the company facilities. Both large and small bulk plant operations were surveyed with the aim of trying to take into consideration variations in work practices, weather conditions or other factors which may affect exposure. The results indicated that over 22 surveys, 14% of operators' exposure to benzene exceeded the Occupational Exposure Limit of 1 ppm averaged over an 8-hour period during the top loading operations including hose connection/disconnection, gauging, and sampling. Approximately 20% of those surveyed exceeded the company Action Level of 0.5 ppm. However, no excessive exposure was recorded at those facilities where the loading operation was converted to bottom loading. Recommendations were made to install engineering controls for gasoline handling such as bottom loading in conjunction with a sealed collection system to remove vapor generated. Industrial hygiene partnered with the company' engineering department to establish a plan to convert all top loading operations to bottom loading. After completion of successful engineering and work practice controls, benzene exposures were generally reduced to below the time-weighted average (TWA) standard of 1 ppm.

256.

EXPOSURE TO REFORMULATED GASOLINE IN DISTRIBUTION CHAIN. L. Saarinen, K. Lappalainen, M. Hakkola, Finnish Institute of Occupational Health, Helsinki, Finland

Workers in the distribution chain are exposed when transferring volatile gasoline liquid in bulk. The purpose of this study was to measure tanker drivers' occupational exposure to reformulated gasoline (RFG) vapor. The depot workers' exposure was measured during the unloading of railcars and tankers without vapor recovery.

Methods: The exposure to RFG components was measured by sampling the breathing zone with diffusive samplers (ATD-400, Perkin-Elmer). The sampler tubes were filled with 150 mg Tenax GR adsorbent, 35/60 mesh.

Results: In road tanker drivers' work, the mean TWA 8h concentration were oxygenates 1.5 mg/m^3, i.e., the total of methyl tert-butyl ether (MTBE) and methyl tert-amyl ether (MTAE). For benzene, toluene and xylenes, the results were: benzene 0.09 mg/m^3, toluene 0.5 mg/m^3, xylenes 0.4 mg/m^3. The mean concentrations in railcar and tanker unloading work were oxygenates 1.6 mg/m^3. For benzene, toluene and xylenes, the concentrations were: 0.15 mg/m^3, 0.9 mg/m^3 and 0.9 mg/m^3, respectively.

Conclusions: The exposure levels were considerably below the occupational exposure limits in force. The tanker drivers' occupational exposure to benzene was lower than in studies before the introduction of RFG. The diffusive sampling method was convenient to use and results were fairly similar to those collected with the active sampling method. However, very volatile aliphatic components (C3-C4 hydrocarbons) suffered from back diffusion during long shifts.

257.

EVALUATION OF BENZENE AND TOTAL PETROLEUM HYDROCARBON EXPOSURES ON AN OIL PLATFORM IN THE GULF OF MEXICO. L. Burrelli, J. Spencer, Environmental Profiles, Inc., Baltimore, MD

Benzene, a known carcinogen, has been reported as a constituent in crude oil. A study was completed to determine the exposure of oil platform workers to benzene and total petroleum hydrocarbons (TPH) during normal/routine tasks. The workers' tasks included: well head crude oil sampling, crude oil shake-out with benzene, toluene and gasoline, hand gauging tanks for volume determination, pipeline cleaning using the "pig," tank sampling using a "thief," and metering run orifice plate inspection. A spill clean up was also simulated.

Personal and area air monitoring sampling was conducted throughout the oil platform over a two-day period. All samples were collected and analyzed in accordance with NIOSH methodologies. Results indicated that 8-hour TWA exposures for benzene ranged from below the quantification limit of 0.061 ppm to a high measurement of 0.37 ppm; total petroleum hydrocarbon results calculated as 8-hour TWA measurements were below the quantification limit of 0.44 mg/m3 to a high of 23.03 mg/m3. Analysis of the bulk crude oil measured benzene at 844 ppm.

Comparing these task specific results with the OSHA regulated permissible exposure limits show that oil platform workers are within guidelines for benzene and total petroleum hydrocarbon exposures.

258.

SUCCESSFUL ENGINEERING CONTROLS FOR 1-, AND 2-BROMOPROPANE EXPOSURES IN SPRAY ADHESIVE APPLICATIONS. J. Harney, V. Mortimer, NIOSH, Cincinnati, OH; C. Reh, Gillette Medical Evaluation Laboratories, Needham, MA

Background: NIOSH investigators conducted Health Hazard Evaluations at two companies that fabricate foam seat cushions. Historically, different solvent vehicles, such as methylene chloride and acetone have been used to fabricate cushions. 1-bromopropane (usually with residual amounts of 2-bromopropane present as a contaminant of refinement) has been used due to its favorable flammability properties (compared to acetone) and its potentially reduced toxicity hazard compared to methylene chloride. Because little information is available regarding the toxicological effects of this compound in humans, NIOSH has recommended that workplace exposures be lowered as much as possible.

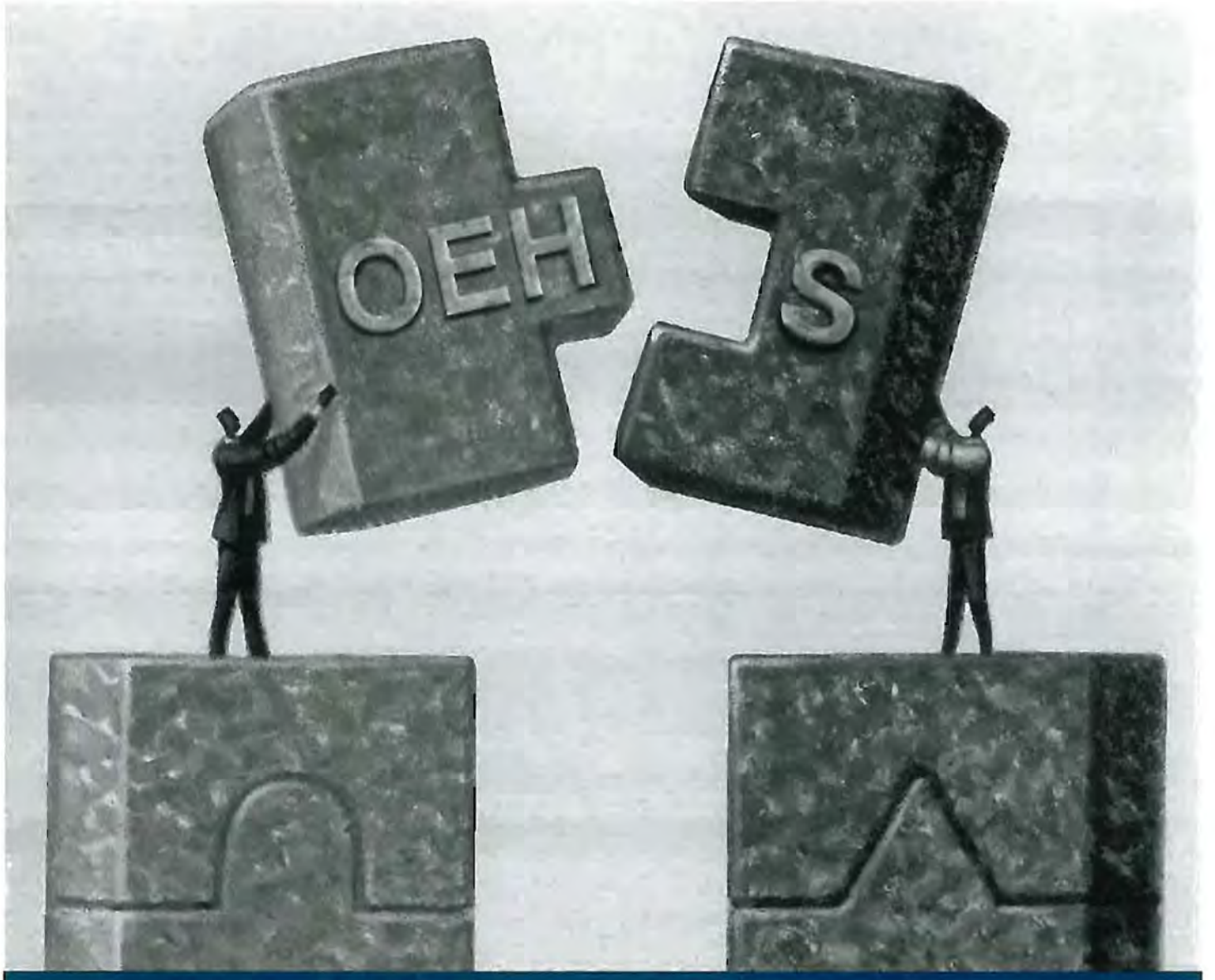
Methods: Full-shift exposures to 1-, and 2-bromopropane for spray booth operators were assessed both before and after local exhaust ventilation controls were improved at two plants. At the second plant, short-term (15 minute) exposures were also assessed before and after improvements to engineering controls were made. All air samples were analyzed according to a NIOSH Draft Method for 1-, and 2-bromopropane.

Results: In Plant #1, the construction of ventilation booths that enclosed each spray station resulted in a decrease in 1-bromopropane mean full-shift concentrations from over 160 ppm to below 30 ppm. In Plant #2, fully enclosing the already existing ventilated spray booths resulted in a similar decrease from 62 ppm to 22 ppm. Short-term samples with 1-bromopropane peaks as high as 174 ppm at Plant #1 were reduced to below 56 ppm. Exposures to 2-brompropane were decreased similarly.Conclusions: Personal exposures to 1-bromopropane can be controlled in spray applications by using rather simple engineering control strategies.

The Premier Conference for Occupational and Environmental Health and Safety Professionals

POWERFUL PARTNERSHIPS

Leveraging the power of collaboration to expand knowledge



ABSTRACTS

aihce

American Industrial Hygiene Conference & Expo

Cosponsored by AIHA and ACGIH®

June 1–6, 2002, San Diego Convention Center, San Diego, California

NIOSH LIBRARY SYSTEM

ALICE HAMILTON LIBRARY
4676 COLUMBIA PARKWAY
CINCINNATI, OH 45226

2002 Abstract Index by Session Topic

PF 101 Agricultural Health and Safety

Papers 1–6

1.

RELATIONSHIPS BETWEEN WORK EXPOSURE AND RESPIRATORY OUTCOMES IN POULTRY WORKERS.

S. Kirychuk, J. Dosman, P. Willson, L. Dwernychuk, University of Saskatchewan, Saskatoon, SK, Canada; J. Feddes, A. Senthilselvan, C. Ouellette, University of Alberta, Edmonton, AB, Canada

A pilot study was conducted on 74 poultry barn workers in Western Canada during the winters of 1998–2000. General respiratory health, current, chronic and work related respiratory symptoms; general work duties, and work-site factors were ascertained, pre-exposure, by questionnaire. Personal airborne exposure levels and changes in symptoms and lung function were measured across the work-shift for all workers. Workers were classified according to the type of poultry operation (floor based, n=53; cage based, n=13) in which they worked. There was no significant difference in daily hours spent in the barn between those who worked with caged poultry (5.41±2.35 hours) and those who worked with floor-based poultry (4.42±2.48 hours). Age of birds was 47.10±58.36 days for floor based versus 155.91±63.01 days for cage based facilities. There were no significant differences in personal environmental measurements between cage-based and floor-based facilities (ammonia 13.22±13.70 ppm, 17.34±16.35 ppm; total dust 5.74±4.85mg/m^3, 10.01 ±8.84 mg/m^3; endotoxin 6046±6089 EU/m^3, 5457±5934 EU/m^3 respectively). There were no significant differences in across work-shift change in pulmonary function indices between workers from cage and floor-based operations. For the entire sample total dust dose (work hours/day x total dust) significantly correlated with across-shift change in FEV_1, whereas endotoxin dose and ammonia dose did not. Stocking density was significantly correlated with average ammonia (ppm, p=0.002) and ammonia dose (ppm x work hours/day; p=0.004) in floor based operations and with total dust (particles/ml, p=0.002) in cage based populations. Stocking density was also significantly correlated with chronic cough (p=0.003) and across work-shift cough (p=0.05) and chest tightness (p=0.06) for workers from floor based operations; and with phlegm when working (p=0.018) and chest tightness across the work-shift (p=0.004) for workers from cage based operations. Type of poultry production operation and therefore type of work exposures appear to significantly impact symptoms experienced by workers exposed to these atmospheres.

2.

DUST GENERATION SYSTEM FOR AGRICULTURAL SOIL DUST.

K. Lee, R. Domingo-Neumann, R. Southard, UC Davis, Davis, CA

Agricultural workers are prone to exposure to mixed dust of inorganic and organic compounds. Diverse working conditions and operations in agriculture make direct measurements of the mixed dust exposure difficult. This study was conducted to develop a new dust generation system to determine possible exposure potency indicators of soil samples. The dust generator consists of a blower, a rotating chamber and a settling chamber. The rotating chamber has inner baffles to provide sufficient agitation of the samples while the chamber is rotating. A blower provides air into the rotating chamber, and the suspended dust is moved to the settling chamber through a perforated pipe. A small fan inside the settling chamber helps maintain suspension of the dust. Various size fractions of dust are sampled on filters suspended in the chamber via outlet ports and attached pumps. Air pressure is released through a filter plate mounted on the wall of the settling chamber. Various operating conditions were evaluated: air intake from blower, speed of rotation, soil mass and sampling time. To evaluate the characteristics of dust from the system, we collected dust samples from agricultural fields while the soil was prepared for

2000909