

port system goals of efficient and consistent strategies and for this reason has specified the two brands and sizes of N-95 air-purifying respirators approved for use at system member institutions as they prepare their TB RPPs. Preparation of a TB RPP is challenging. No methodology has been established for measurement of the hazardous agent, droplet nuclei of *M. tuberculosis*, nor has a TLV or IDLH been established. Operational difficulty is encountered given the nature of health care, e.g., many entries by many different personnel into a hazard area, rather than the relatively finite applications encountered in RPPs in general industry. While regulators acknowledge the difficulty in establishing a TB RPP against an industrially inspired respirator standard, little data have been reported to describe this phenomenon. At this institution 178 employees were initially designated for fit-testing. Of these individuals, 98 (55.1%) were able to be successfully fitted with either of the brands of N-95s selected by the ICC. An additional 61 (34.3%) were able to be fitted with one or the other of the selected brands, but 19 (10.7%) were unable to be fitted with any of the size/brands available. This has substantial potential for impact on the health care careers of these individuals. Given that at this institution no TST conversions have been identified subsequent to unprotected (N-95 respirator not fit-tested) exposure to patients with infectious pulmonary TB in the 2 years of surveillance prior to the institution of the fit-testing program, it appears that other strategies (early detection/isolation, negative-pressure isolation rooms) may have greater value in preventing TB transmission to HCWs.

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A TRACER GAS EVALUATION AT A GARMENT MANUFACTURING FACILITY WITH EXTENSIVE TRANSMISSION OF TUBERCULOSIS. T.A. Seitz, V. Mortimer, K. Martinez, NIOSH, Cincinnati, OH

NIOSH assistance was requested in evaluating ventilation conditions at a garment manufacturing facility after an employee was diagnosed with active cavitary tuberculosis (TB). A contact investigation by local health departments and the Centers for Disease Control and Prevention (CDC) identified an unusually high number of positive tuberculin skin tests among co-workers (174 of 233 workers tested). NIOSH investigators conducted a tracer gas evaluation using sulfur hexafluoride to quantify the extent of containment dispersion and containment removal rate.

The tracer gas evaluation showed that the plant had excellent air mixing and a low air change rate, typically less than 0.4 air changes per hour (ACH). When the tracer gas was released in the middle of the plant, it was detected at the furthest points in the production area (approximately 100 feet away) within 11 minutes. The tracer gas was also detected in the adjacent engineering and main office areas, the cafeteria, and the conference room.

The environmental evaluation determination that ventilation conditions were favorable for TB transmission based on a low air change rate and excellent air mixing within the plant. Thus, TB bacteria would have spread quickly and uniformly throughout the plant, and remained suspended for hours before being removed from the air. It is impossible to predict, howev-

er, to what extent ventilation played a role in TB transmission. Other factors that may have influenced TB transmission in this setting include prolonged infectiousness of the individual and virulence of the organism. The latter factor was subsequently evaluated by researchers at CDC and is believed to have played a major role in the extensive amount of TB transmission in this workplace as well as in the community.

RISK ASSESSMENT/ MANAGEMENT

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METHODOLOGY FOR ASSESSING ENVIRONMENTAL HEALTH RISKS OF MILITARY PERSONNEL DEPLOYED OVERSEAS. N.L. Tran, T.A. Burke, N.M. Shaluta, Johns Hopkins University, Baltimore, MD

The interpretation of multimedia environmental exposure/risk information requires compiling disparate data into a format that is understandable and useful to decision makers and the public. Military personnel deployed overseas may face a wide range of environmental and occupational hazards. This paper presents a methodology being developed to evaluate health risks that may influence military operational success. The approach combines industrial hygiene approach and public health surveillance with risk assessment, and was developed to evaluate health impact in the urban environment. The framework has three tiers. Tier One focuses on acute risks and has three parts: identifying industrial sources, determining hazardous substances, and estimating and prioritizing potential acute risks. The Standard Industrial Classification and Accidental Release Information Program (ARIP) provide indicators for relevant industrial activities and hazardous materials. Risk ranking is based on release quantity and hazard weighting factors. Tier Two builds upon Tier One to develop a comprehensive framework that considers both acute and chronic health risks. This tier presents an informational matrix with sources, pathways, population, exposure, health endpoints, and qualitative/quantitative risk estimates. Tier Three assesses individual exposures and potential health impacts, and complements exposure/health surveillance and epidemiological approaches to understanding and preventing health risks to troops. This methodology will have broad applications for bridging environmental and occupational health risk management paradigms.

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GAUGING THE EFFECTIVENESS OF RISK COMMUNICATION AT A HIGHLY PUBLICIZED FACILITY HANDLING EXTREMELY HAZARDOUS CHEMICALS. T.A. Crawford, J. Lee, D. Lillquist, F. Burton, Rocky Mountain Center for Occupational and Environmental Health, Salt Lake City, UT

A survey was conducted at a highly publicized facility handling extremely hazardous chemicals to gauge the effectiveness of risk communication the facility. Three-hundred and sixty-eight respondents completed a 31-question survey containing questions designed to measure their perceptions on risk and to deter-

mine what demographic group they would fit in. Survey results were then sorted demographically and by patterns of responses to create several comparison groups. Statistical analysis was performed on the comparison groups to determine whether they were statistically different. Results were then summarized by creation of a risk communication index combining the results of several questions into eight index groupings. It was found that a greater understanding of the risks associated with the handling of the facility's hazardous chemicals was needed by certain groups. In addition, informative training is recommended to increase not only knowledge of risks but also knowledge of the engineering and monitoring controls in place to help mitigate those risks. A worker's perception of compliance to facility operating procedures was also found to have a distinct impact on risk perception. Finally, improved risk communication should build the trust and credibility of the work force toward the facility's organizational management.

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EFFECT OF INCORPORATING OCCUPATIONAL REPRODUCTIVE GUIDELINES INTO SCORES FOR 200 SUPERFUND CHEMICALS, USING PURDUE CHEMICAL HAZARD SCORES. D.A. Whaley, P. Adkins, J. Cahoon, R. Fluharty, D. Keyes, B. Zubi, West Virginia University, Morgantown, WV

Two-hundred Superfund chemicals have been newly scored for hazard, based on the Purdue chemical hazard scoring system, previously reported. The Purdue scores include separate worker hazard scores and environmental hazard scores. Results are presented, ranked by worker, environmental, and combined score (average, equally weighted). Purposes of chemical hazard scores are to (1) assist in design of environmentally friendly products; (2) assist in implementation of pollution prevention by selection of safer substitute chemicals for manufacturing; and (3) provide a meaningful measure of progress in pollution prevention.

Scores of 368 chemicals are now available. The scoring process is resource intensive, but the scores are easy to use. The scores include not only acute lethal measures (oral LD₅₀ and inhalation and fish LC₅₀), but also sublethal toxic values, including exposure criteria. These scores have been pilot tested in Indiana to measure progress in pollution prevention. For those unfamiliar with this risk management tool, the score structure and concepts will be reviewed.

For comparison, the Occupational Reproductive Guideline (ORG) values of Jankovic and Drake (1996) have been substituted for standard exposure criteria when the ORG values are lower (more protective). Among these 200 Superfund chemicals, 27 (13.5%) of the ORG values were lower than the exposure criteria originally used for scoring. The changed hazard scores are presented, using these lower criteria. Nine of the 27 altered scores (33%) received very low changed exposure criteria (high hazard), in the #10 microgram to nanogram/m³ range. Yet scores for the 40 (of 200) highest hazard chemicals show little change in rank. Except for a dramatic increase in hazard score for lead, we conclude these scores are quite stable.

Abstracts

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