

Society of Toxicology
43rd Annual Meeting
Baltimore, Maryland

THE TOXICOLOGIST

a supplement to
TOXICOLOGICAL SCIENCES

An Official Journal of the Society of Toxicology

Volume 78, Number S-1, March 2004

522 FREQUENCY OF EXPOSURE TO CONTAMINANT MIXTURES AT HAZARDOUS WASTE SITES.

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To determine the need for information on the joint effects of chemicals, the Chemical Mixtures Program of the Agency for Toxic Substances and Disease Registry (ATSDR) seeks to answer, "How often does exposure to chemical mixtures of environmental contaminants occur?" The frequency of exposure to mixtures was studied by analyzing contaminants found in completed exposure pathways (CEPs) in ATSDR's HazDat database (see www.atsdr.cdc.gov). CEPs are documented pathways that have led to exposure at hazardous wastes sites (HWSs). Evaluation of data from 1,706 HWSs reveals that CEPs occurred at 743 (44%) of the sites. Of these, 588 sites had two or more substances in a CEP. Thus, exposure to mixtures occurred at 79% of the 743 sites with exposure. However, sites often have more than one pathway, and pathways with a single contaminant are common. The number of exposure pathways with two or more chemicals is estimated to be approximately half of all CEPs. This does not include exposure *via* multiple pathways/routes, so the extent of exposure to multiple chemicals at HWSs might be higher. Further analysis revealed that exposure to simple mixtures consisting of 3, 4, and 5 components occurred at 475, 390, and 321 sites, respectively. Although two chemicals constitute a mixture, 64% of the 743 sites had 3 in a CEP, 52% had 4 in a CEP, and 43% had 5 in a CEP. Exposure to mixtures by specific media was as follows: water, 413 sites; soil, 255 sites; air, 113 sites; and biota (mainly fish), 53 sites. Overall, water pathways had mixtures more often for lower numbers of chemicals (2 to 8 chemicals), but the number of sites with mixtures in soil pathways surpassed the counts for water at (and above) nine chemicals in the mixture. The maximum number of chemicals in a CEP was 62. In conclusion, this study shows that about four-fifths of HWSs with CEPs have chemical mixtures in a CEP, and, more importantly, that about half of all CEPs have a chemical mixture. Thus, exposure to mixtures of chemicals is quite common at HWSs.

523 FIBER GLASS AND ROCK/SLAG WOOL EXPOSURE OF PROFESSIONAL INSTALLERS.

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This study estimates the average cumulative lifetime exposure (fiber-months/cc) of professional installers of fiber glass (FG) and rock/slag wool (RSW) insulation and compares these estimates to the cumulative exposure of workers in plants that manufacture these materials. Key inputs to the exposure model include the frequency and duration of exposures, occupational tenure, mix of insulation types (e.g., FG, RSW) and forms (e.g., blown/loose fill, batts/blankets) installed, workplace concentrations, and extent of respirator usage. Based on best estimates/ranges for these inputs, the average cumulative exposures to FG (from 4 to 7 fiber-months/cc) and RSW (from 2 to 3.3 fiber-months/cc) are considerably less than the cumulative exposures experienced by manufacturing cohorts. Published epidemiological studies of FG and RSW manufacturing cohorts in the United States have shown that there is no significant increase in respiratory system cancer (RSC) compared to appropriate reference populations. The cumulative exposures of the manufacturing cohorts vary with insulation type and plant; maximum (benchmark) values are 23.5 fiber-months/cc for FG plants and 40 fiber-months/cc for RSW plants. Thus, based on fiber exposure, the professional installer cohort is unlikely to experience increased respiratory system cancer. Sensitivity analyses indicate that this conclusion is robust to estimation errors in key inputs.

524 AN OCCUPATIONAL EXPOSURE DATABASE FOR SYNTHETIC VITREOUS FIBERS (SVFS).

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This poster presentation will describe an occupational exposure database for synthetic vitreous fibers that contains the largest number of exposure samples for fiber glass and mineral wool insulation products ever assembled. This exposure database has been created by the North American Insulation Manufacturers Association (NAIMA) and its members as part of the Health and Safety Partnership Program (HSPP), a comprehensive voluntary occupational safety and work practice partnership being implemented by the SVF industry under OSHA's oversight. The database now contains over 10,000 validated exposure samples, which are individually classified by numerous parameters including fiber type, product type, industrial

sector, job function, and respirator use. This capability to sort the exposure data by particular parameters can be used for several purposes, including (i) to provide a robust estimate of expected exposure levels for a particular occupational exposure scenario; (ii) to track changes in exposure levels over time; and (iii) to identify occupational exposure scenarios where additional protection (e.g., respirator use) may be needed or may no longer be needed. Cumulative exposure data are presented for the manufacturing, fabrication, installation, and demolition sectors for the major fiber types, along with data stratified for some specific product type/job function combinations that may be of particular interest (e.g., installation of blowing wool insulation). The overall and stratified data show that exposure levels in the industry are generally well below the 1 f/cc 8-hour TWA voluntary standard, with a relatively small number of specific exposure scenarios where exposures approach or exceed 1 f/cc.

525 OCCUPATIONAL EXPOSURE TO AIRBORNE CHRYSOTILE ASBESTOS DURING USE AND REMOVAL OF MASTICS, COATING, AND ADHESIVES (CIRCA 1940S-PRESENT DAY).

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In recent years, questions have been raised about the health risks to persons who used asbestos-containing products from the 1940s to present day. Modern era sampling and analytical techniques are often needed to quantify exposure for many of these products, and exposure simulation studies have more frequently been used to estimate the historical airborne concentrations resulting from these products. This research measured the release of chrysotile asbestos during the physical manipulation of coatings, mastics, and an adhesive, which contained 1-8% asbestos within a tarry or a water-based medium. The purpose was to understand whether these products generated any measurable amount of airborne asbestos concentrations that workers or bystanders might be exposed during the use or manipulation of these products. These products were often used to adhere insulation to pipes and boilers or to cover the insulation so as to protect it from direct contact with water, as well as wear and tear. Tests were conducted to evaluate fiber release from such activities as application, spill cleanup, sanding, removal/cutting, and sweep cleaning. Each test activity was performed for 30 minutes, often in triplicate. Personal, area, and background/clearance air samples were collected during the tests, and analyzed for total fiber concentrations using phase contrast microscopy (PCM) and transmission electron microscopy (TEM). No asbestos fibers were identified in 446 of 452 samples collected during these activities. The calculated 8-hour time-weighted average (TWA) airborne concentration for the remaining six samples using hypothetical work scenarios ranged from 0.009 to 0.03 f/cc. Thus, actual and predicted airborne concentrations were well below the current and contemporaneous occupational exposure limits for chrysotile asbestos. Based on these results, these products did not pose an asbestos-related health risk to those who applied or interacted with them.

526 MERCURY BODY BURDEN AND INTAKE IN TWO CANADIAN COASTAL COMMUNITIES: GRAND MANAN AND ST ANDREWS/ST STEPHEN.

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Mercury exposure in two Canadian coastal communities, Grand Manan and St Andrews/ St Stephen, New Brunswick, Canada was assessed with hair samples and sources of exposure through dietary methods identified. Mean arithmetic concentration of total mercury in hair was 0.7 +/- 0.55 mg/Kg at Grand Manan and 0.419 +/- 0.15 mg/Kg for St Andrews/St Stephen. All participants incurred daily total mercury ranging from near zero to 0.286 ug/kgbw/day which is below the 0.73 ug/kgbw/day provisional tolerable daily intake of Health Canada. The low intakes and body burdens can be explained by the low level of mercury found in the species being consumed and their frequency of consumption. The top contributors to mercury intake included haddock, canned tuna, lobster, pollock and lake trout. The correlation between hair mercury and intake (defined as micrograms of mercury per spring season) yielded a 0.32 correlation coefficient. This supports the view that estimating mercury levels in hair using a focused food frequency questionnaire coupled with the 24 hour recall is a reliable technique. To our knowledge, this is the first reported study examining mercury body burden in human populations living along the Bay of Fundy and the first to report trends of fish and seafood consumption from that area. Mercury body burden and mercury intake show that, even though fish and seafood are consumed on a regular basis, particularly at Grand Manan, mercury intake is not a serious problem because the species being consumed contain low levels of mercury.