

PAHs were monitored and identified. These PHAs were detected at a trace level on filter fractions. By coupling microflow LC to APCI of Q-TOF MS, the new approach of collision-induced dissociation of fragmentation pathway leading to a characteristic fragmentation pattern for selected target analytes was used to further clarify the trace amount of PAHs present in simulated road paving asphalt fumes. These results demonstrate that asphalt fume compositions can be characterized and individual priority PAHs can be identified at trace levels using this developed method. Such a method is suitable for support of simulated occupational exposure for inhalation toxicity studies. (This research work was supported, in part, by NIEHS/NTP)

102 MEASUREMENT AND CHARACTERIZATION OF AEROSOLS FROM CONSUMER SPRAY CLEANER PRODUCTS WITH CONVENTIONAL AIR SAMPLERS AND A REAL TIME DEVICE.

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The objective of this investigation was to measure and characterize aerosols of spray cleaners in the breathing zone of a potential user with conventional air samplers and a real time device, i.e., an Aerodynamic Particle Sizer (APS). Real time devices allow to reflect more realistically consumer use while not requiring time consuming analytical programs. Sampler performance measuring consumer respiratory exposure was determined using the human use simulation model. In the model, the sprayer nozzle was targeted at the center of a vinyl tile, mounted vertically. Multistage samplers, an Andersen cascade impactor (ADS) and a Personal Dust Spectrometer (PIDS) as well as the sampling tube of an APS, were mounted next to each other on a ringstand at a defined distance from the tile. Sprayers were operated automatically according to sequence mimicking consumers' practices. Following each test, aerosol samples collected from the ADS and PIDS were recovered for assay. The model was shown to accurately simulate consumer exposure to aerosols generated by trigger sprayers. To evaluate the effectiveness of the samplers and the APS, aerosol mass levels and cumulative mass distribution d50 values were compared for particle size ranges (ISO definitions for health related sampling). The results, particularly for the APS, showed very low inter-run variability, with airborne aerosol concentrations in the range 0.5-6mg/m³. The performance of ADS, PIDS and the APS were equivalent for particles with an aerodynamic diameter (AD) of ≤10µm. PIDS and the APS produced similar results for aerosol particles of ≤15µm AD. The APS underestimated aerosol masses of particles >15µm AD. While conventional air sampling techniques are already well established for measuring water-based aerosols, this investigation lends support to the usefulness of the APS in assessing consumer exposure to sprayer aerosols.

103 APPLICATION OF QUANTITATIVE STRUCTURE ACTIVITY RELATIONSHIP (QSAR) AND PHYSIOLOGICALLY BASED PHARMACOKINETIC (PBPK) MODELING TO PREDICT THE CONTRIBUTION OF SOIL EXPOSURE TO PCB LEVELS IN HUMAN SERUM.

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The major route of human exposure to polychlorinated biphenyls(PCBs) is through ingestion of contaminated food. Nationally, the average range of PCBs is 4-7µg/l in human serum. However, a much higher range of total PCBs levels (76.3 to 187.5 µg/l) was found in the serum of some residents living in a highly-contaminated residential area. Total PCB soils levels in this area ranged from 17.4 to 840 mg/kg. The purpose of this project was to estimate the contribution of exposure by soil ingestion to the levels of serum PCBs in this residential area. Physiologically based pharmacokinetic (PBPK) models are useful in relating environmental exposure to biological markers such as blood levels. Human PBPK models of the 25 most common PCB congeners were developed for the oral route. Parameters such as partition coefficients and metabolic constants used in the PBPK models were determined using quantitative structure activity relationships (QSAR). All simulations were run using a soil ingestion default rate of 50 mg/day for a life-time exposure scenario. To address exposure variability in the highly contaminated residential area, a probabilistic distribution model for contaminant levels was derived based on actual PCB soil measurements. This distribution was then applied to the 25 PBPK models to derive a distribution of total PCBs in blood for life-time exposure sce-

narios. The derived distribution of blood levels was superimposed on the actual distribution of measured serum levels estimated in the same community. The distribution of actual blood levels for 9 out of 10 persons falls within the modeled exposure range. This suggests that the PCBs from heavily contaminated soil in this residential area can significantly contribute to the overall elevated serum levels of PCBs.

104 SERUM PCB, PCDD, PCDF AND PESTICIDE LEVELS IN CONSUMERS AND NON-CONSUMERS OF LAKE ONTARIO WILDLIFE.

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Consumption of fish and wildlife from Lake Ontario represents a potential source of excess exposure to persistent halogenated aromatic hydrocarbons (HAHs), including dioxin-like polychlorinated dibenzo-p-dioxins (PCDDs), dibenzofurans (PCDFs), and coplanar polychlorinated biphenyls (PCBs). This study was designed to assess exposure to dioxin-like HAHs and non-coplanar PCBs and pesticides in anglers that consume Lake Ontario fish and wildlife (consumers, n=23) and an age and gender matched control group (non-consumers n = 16) with no history of consumption of Lake Ontario fish. Subjects who participated in this study are members of the New York State Angler Cohort (NYSAC) study that has been an ongoing investigation of fishing license holders, 18 to 40 years of age (as of 1991) who reside in the 16 upstate New York counties with close proximity to Lake Ontario. 2,3,7,8-TCDD, the most potent HAH, was detected at levels from <0.8 to 2.2 ppt (pg/g serum lipid) in non-consumers and at levels from 1.2 to 3.7 ppt in the serum lipid of consumers. 3,3',4,4',5-PentaCB (PCB 126), the most potent PCB, was detected in serum at levels ranging from 3.4 to 45.5 ppt in non-consumers and at levels from 4.2 to 151 ppt in consumers. In addition to these congeners, the serum levels of 1,2,3,7,8-PentaCDD, 1,2,3,7,8-PentaCDF and 2,3,4,7,8-PentaCDF, PCB 169, 20 non-coplanar PCBs, 3 pesticides (mirex, DDE and t-nonachlor) and total dioxin TEQs were significantly higher in consumers as compared to non-consumers. Serum mirex levels were increased about 8-fold in consumers, providing the best exposure marker for the consumption of Lake Ontario wildlife. These results show that consumption of Lake Ontario wildlife results in higher serum levels of persistent HAHs, that could have potential detrimental effects to certain biological functions. (Supported by ATSDR PN92594.)

105 A PROBABILISTIC ASSESSMENT OF HOUSEHOLD EXPOSURES TO MTBE FROM DRINKING WATER.

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The oxygenate methyl tertiary butyl ether (MTBE) has been added to reformulated gasoline in the United States to meet national ambient air quality standards. Although MTBE has provided significant health benefits in terms of reduced criteria and toxic air pollutants, detections of MTBE in some groundwater and drinking water sources have raised concerns about potential human exposures. In fact, a national program to phase out MTBE in gasoline has been proposed. Our analysis finds little scientific justification for this proposal, however, and little is known about potential health risks associated with MTBE alternatives. We examined the frequency and concentration of MTBE detections in drinking water sources in California from 1995 to 1999, and provide a preliminary analysis of the distribution of household exposures to MTBE from water-related activities. Using published data on the toxicity and possible cancer hazard, we estimate the likely cancer and non-cancer risk for the general population in California from past and potential future MTBE exposures. More highly exposed subgroups were also addressed. Our findings indicate that less than 2% of all sampled drinking water sources in California had detectable levels of MTBE in 1999, with average MTBE drinking water concentrations ranging from 0.09 to 4.9 ppb for this year. Both the detection rate for MTBE and average MTBE concentrations have remained relatively stable since 1995, despite increased sampling of drinking water sources in California. The probabilistic analysis suggests that ingestion, inhalation, and dermal exposures to MTBE in drinking water are unlikely to pose a significant health risk for the general population or more highly exposed individuals in California.

106 COMPARISON OF DISINFECTANT BYPRODUCTS CONCENTRATIONS FROM OZONATION AND CHLORINATION OF DRINKING WATER.

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Under the Safe Drinking Water Act, alternative disinfectants such as ozone is becoming popular in the disinfection of drinking water in the United States since the promulgation of the Stage 1 Disinfectant Byproducts (DBP) rule, which included