of exposure conditions (each house). Results are presented geographically on a map of the Borough.

216 ESTIMATING INTER-INDIVIDUAL VARIABILITY IN BLOOD LEAD LEVELS FROM MULTIPLE STUDIES IN THE SALT LAKE VALLEY.

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The USEPA Integrated Exposure Uptake Biokinetic (IEUBK) Model estimates a mean and distribution of blood lead levels in children exposed to environmental lead. This distribution of blood lead levels is a function of the inter-individual geometric standard deviation (GSD) parameter in the IEUBK model and represents the variability in children's blood lead levels as a result of behavioral or physiological differences. This variability was examined for three blood lead studies conducted in the Salt Lake Valley area of Utah; Bingham Creek, Sandy, and Magna. The studies were similar in design and conduct, sources and pathways of lead exposure and population demographics, so meta-analytic and combined data set approaches were evaluated. At each of these sites, paired environmental and blood lead data were collected for each child. Variability due to environmental lead concentrations was controlled and a number of statistical techniques such as box models, structural equation and nonlinear regression modeling were used to assess the GSD. The presence of siblings, extent of mouthing behaviour, age, and socio-economic status were also evaluated for their impact on the GSD. GSD's ranging from 1.4 – 1.6 were calculated depending on the statistical method used. Each statistical method contains assumptions about data sets which should be evaluated in context of the study design, sources of lead exposure, and population demographics and behavior to select the most appropriate measure of variability for a given population.

217 A NEW PROBABILISTIC METHODOLOGY FOR SELECTING SOIL CLEAN-UP GOALS: A CASE STUDY OF A LEAD RISK ASSESSMENT FOR A SUPERFUND SITE IN MURRAY, UT.

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A common goal of Superfund site risk assessments is to provide adequate information for risk managers to select preliminary remediation goals (PRGs) for contaminants in soil. Current deterministic risk assessment methodologies use back-calculations of risk algorithms in order to identify a soil concentration that corresponds to an acceptable, or threshold risk level. Monte Carlo analysis has been widely used to estimate distributions of risks based on variability and/or uncertainty in exposure inputs, including spatial variability in soil concentrations. However, limitations in the use of probabilistic methods to incorporate variability and uncertainty in the calculation of PRGs continues to pose a challenge to risk assessors. Here we present a case study of an uncertainty analysis of childhood lead (Pb) exposures for the Murray Smelter site. A new probabilistic methodology is presented that combines information from site sampling data with estimates of risk associated with different post-remediation exposure scenarios. A Monte Carlo exposure model linked to the biokinetic module of EPA's IEUBK model was run iteratively, with each simulation using a different distribution of soil Pb concentrations. A "decision matrix" is presented to risk managers that shows how risk estimates vary as a function of both the arithmetic mean and the expected spatial variability in exposure point concentrations after remediation. Results are compared with simulations using other probabilistic methods, including 1) inputting a fixed risk level in the back-calculation of PRGs; and 2) iteratively truncating the distribution of soil Pb concentrations in Monte Carlo simulations until the probability of PbBs exceeding 10 µg/dL is below 5%. The proposed methodology can incorporate geostatistical information from sites with limited sampling data, and can be applied to risk assessments of other contaminants of concern in soil.

218 8-HYDROXYDEOXYGUANOSINE AS A BIOMARKER OF OXIDATIVE DNA DAMAGE IN STUDIES OF OCCUPATIONAL EXPOSURE TO CARCINOGENS.

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8-Hydroxydeoxyguanosine (8OHdG) was evaluated as a biomarker of a biologically effective dose in eight published investigations of occupational exposures to nine potential carcinogens (asbestos, benzene, toluene, chromium, azo-dyes, coal dust, auto exhaust, glassworks, and rubber manufacturing). Study results were summarized in order to 1) assess the sensitivity of 8OHdG as a biomarker of oxidative DNA damage, 2) define background levels of 8OHdG, 3) determine sample and study variability, and 4) evaluate smoking, gender and age as confounders. Reviewed studies measured either steady-state damage in lymphocytes or repair products of damage appearing in urine; no study examined both. Lymphocyte data were reported as 8OHdG/10^5 dG and the mean ± SD of controls was 2.95 ± 1.3 with an average coefficient of variation (CV) of 31% in four studies. Units used to express 8OHdG excretion in urine varied among the studies. In the two studies that expressed 8OHdG in µmol/mol creatinine, control values averaged 0.85 and 1.07. The average CV from all urine studies (5) was 38%. All studies reported increased 8OHdG relative to controls, but in three cases the increases were not statistically significant. One study detected increased urinary excretion in retired workers with a history of exposure to mining dusts. However, 8OHdG appears to be most effective as a biomarker when measured within 24 hrs of exposure. This is consistent with animal studies demonstrating rapid repair of oxidative DNA damage. Five of the studies evaluated smoking as a confounder. Two reported a significant increase in 8OHdG in controls who smoked, and one reported that smoking exacerbated the effect of the occupational exposure on 8OHdG levels. Urine or lymphocyte 8OHdG levels were comparable in control men and women but the response to an occupational exposure and/or smoking was generally greater in women than men. Two of three studies that stratified workers by age found it to be a confounder for the 8OHdG adduct.

219 CORRELATION OF DNA ADDUCTS LEVELS IN NORMAL TISSUE OF PHARYNX AND LARYNX WITH ADDUCT LEVELS IN LYMPHOCYTES AND WITH THE AGE OF HUMANS UNDERGOING TUMOR SURGERY.

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Two questions concerning the value of biomonitoring DNA adduct levels were addressed, (i) whether DNA adduct levels in non-tumorous tissue of a tumor target organ could be of predictive value for the individual cancer risk (expressed as time-to-tumor, i.e., age at tumor manifestation), and (ii) whether these DNA adduct levels correlate with those determined in peripheral blood lymphocytes. Normal tissue from pharynx or larynx, clearly separated from the respective tumors, was analysed by P-32 postlabelling for bulky, lipophilic DNA adducts in the diagonal radioactive zone. Adduct levels ranged from 3 to 36 adducts per 10E8 nucleotides, expressed as relative adduct levels (RAL), ages of the patients were between 36 and 79 years. Based on 25 samples analysed so far, the *Spearman* rank correlation analysis showed a negative (inverse) correlation between the age of the patient at surgery and the DNA adduct levels in the normal tissue ($p = 0.12$). Adduct levels in peripheral blood lymphocytes were determined in 9 patients. RAL values ranged from 0.8 to 5.1 adducts per 10E8 nucleotides. The correlation with the adduct levels in the target tissue was again at the border to significance ($p = 0.12$). If the observed trend can be corroberated with additional samples, it could be concluded that under the given conditions DNA adducts levels may have predictive value for the individual cancer risk and that adducts in lymphocytes may be more than an indicator of exposure. (Supported by the German Research Foundation SFB 172)

220 RESIDENTIAL EXPOSURE TO METHYL PARATHION (MP)[1].

R E Grissom[1], E Akin[1], A S Susten[1], B Brackin[3], and T Stilman[2]. *ATSDR[1], US EPA[2], and Mississippi DOH[3].*

The illegal use of MP for indoor pest control has been confirmed in several states. Initially, decision criteria for evacuation and extent of remediation were rapidly developed by federal and state environmental and health agencies. These criteria were based on environmental data (surface wipes) or on a biologic indicator (urinary paranitrophenol (PNP)). Reevaluation of the criteria resulted in decisions based solely on urinary PNP levels. No data were located concerning the rate of environmental degradation of MP in indoor areas. Recent data indicate that MP degrades slowly in indoor environments and that there is appreciable variability in levels of MP and PNP within and between residences. Reports of extremely high PNP levels in urine, e.g. 17,000 ppb, with no clinical symptoms suggest that exposures may be to something other than MP. Thus, environmental levels of MP and urinary levels of PNP alone are inadequate for assessing threats to human health in indoor exposure scenarios. A more integrated exposure strategy

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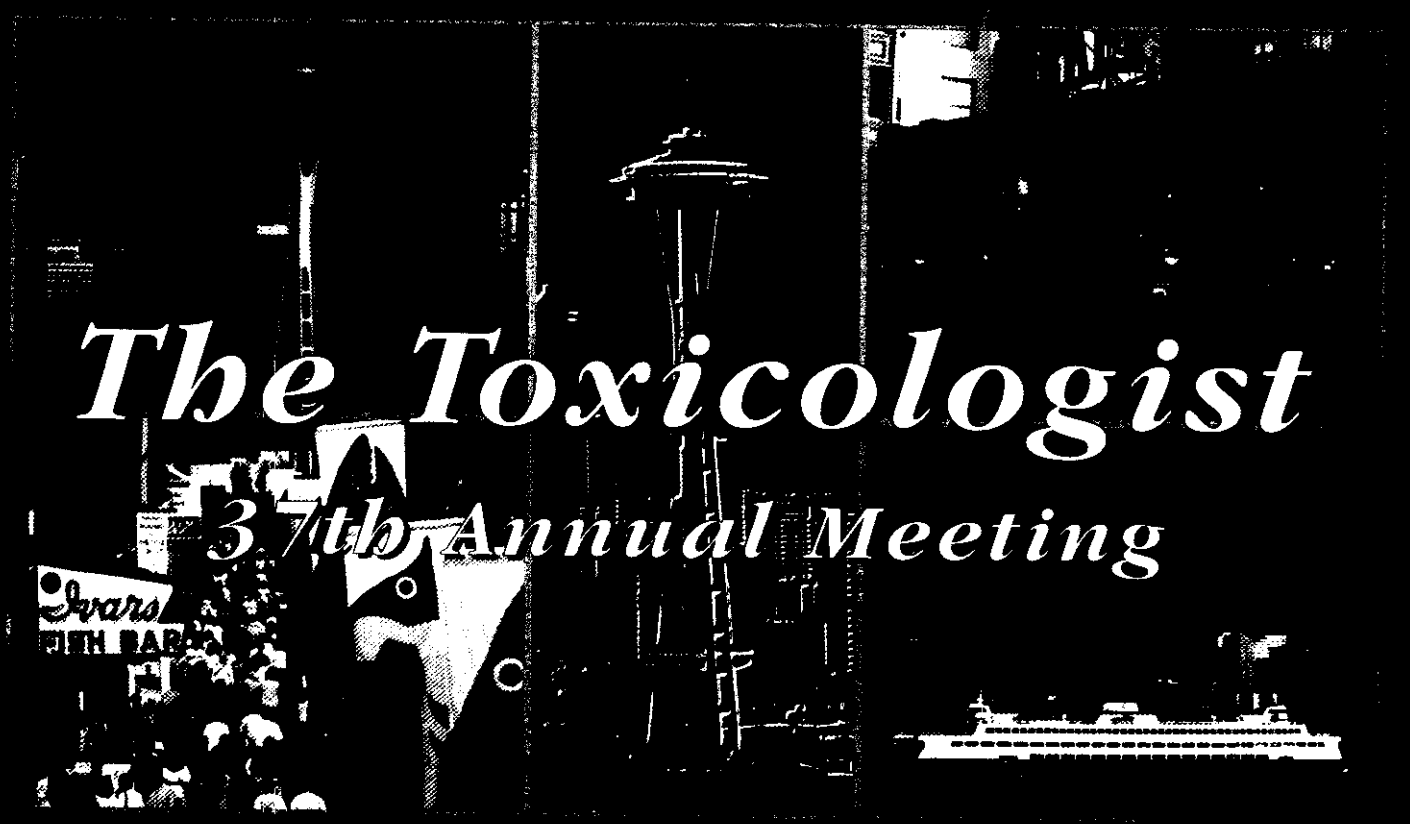

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Preface

This issue of *The Toxicologist* is devoted to the abstracts of the presentations for the symposium, platform, poster / discussion, workshop, roundtable, and poster sessions of the 37th Annual Meeting of the Society of Toxicology, held at the Washington State Convention Center, Seattle, Washington, March 1-5, 1998.

An alphabetical Author Index, cross referencing the corresponding abstract number(s), begins on page 407.

The issue also contains a Keyword Index (by subject or chemical) of all the presentations, beginning on page 433.

The abstracts are reproduced as accepted by the Program Committee of the Society of Toxicology and appear in numerical sequence.

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