

Health Consultation

Tom Lea Park

EL PASO COUNTY METAL SURVEY

EL PASO, EL PASO COUNTY, TEXAS

EPA FACILITY ID: TX0000605388

SEPTEMBER 6, 2002

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

Tom Lea Park

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Prepared by:

Texas Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

BACKGROUND AND STATEMENT OF ISSUES

The Texas Department of Health (TDH) and the Agency for Toxic Substances and Disease Registry (ATSDR) were asked to determine the public health significance of the lead and arsenic found in two surface soil samples (0 to 1 inch in depth), composited from five-point aliquots of approximately equal volume, collected from Tom Lea Park. The samples contained 23 and 27 milligrams of arsenic per kilogram of soil (mg/kg) and 190 and 140 mg/kg of lead, respectively.

DISCUSSION

Public Health Implications

Lead

We evaluate the public health significance of lead in soil by estimating the potential impact that it may have on the blood lead levels of potentially exposed populations. For this health consultation we considered potential exposure to adults, children, and the developing fetus of adult females that frequent the park. In general, lead in soil has the greatest impact on preschool-age children as they are more likely to play in dirt and place their hands and other contaminated objects in their mouths. They also are better at absorbing lead through the gastrointestinal tract than adults and are more likely to exhibit the types of nutritional deficiencies that facilitate the absorption of lead. While lead in soil also can have an impact on adults and the developing fetus (through maternal exposure), the potential impact on these populations is low compared to the potential impact on young pre-school age children.

The Centers for Disease Control and Prevention (CDC) has determined that a blood lead level at or above 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) in children indicates excessive lead absorption and is grounds for intervention [1, 2]. While there is no clear relationship between soil lead and blood lead applicable to all sites, a number of models have been developed to estimate the potential impact that lead in soil could have on different populations [3–5]. For children, the predicted 95th percentile blood lead level associated with a soil lead concentration of 500 mg/kg is approximately 10 $\mu\text{g}/\text{dL}$. This means that, except in the most extreme cases (i.e., frequent contact by children exhibiting pica behavior, or desire for unnatural foods such as dirt or ashes), children regularly exposed to soil lead levels of 500 mg/kg should have no more than a 5% probability of having blood lead levels greater than 10 $\mu\text{g}/\text{dL}$. Based on the goal of limiting the probability of exceeding a blood lead level of 10 $\mu\text{g}/\text{dL}$ to no more than 5%, depending on individual exposure situations, the concentrations of lead in soil where children might have regular contact should be less than 500 mg/kg. Exceeding this value should not be taken to imply that the contaminant will cause harm but does suggest that it warrants further consideration.

Critical blood lead levels for adults are less well established. The Occupational Safety and Health Administration (OSHA) recommends the following: workers whose blood lead levels exceed 40 $\mu\text{g}/\text{dL}$ should have medical evaluations and workers whose blood lead levels exceed 60 $\mu\text{g}/\text{dL}$ should be removed from the exposure. In Texas workers, blood lead levels greater than 25 $\mu\text{g}/\text{dL}$ must be reported to TDH. For adults who frequent the park, we based our assessment

on the same goal of limiting the probability of exceeding a blood lead level of 10 $\mu\text{g}/\text{dL}$ to no more than 5%.

The concentrations of lead measured in soil from the park were less than the 500 mg/kg screening value for children. Although a park is an area where both children and adults could contact soil, based on the samples reviewed, the concentrations of lead to which people might be exposed are less than 500 mg/kg and would not pose a risk to children or adults. Any potential risks are further reduced by the fact that our exposure assumptions assume that people contact the soil every day and exposure to soil at this park likely occurs less frequently. Based on these data, we would not anticipate the lead in the soil to present a public health hazard to any of the potentially exposed populations.

Arsenic

To assess the potential health risks associated with arsenic in the soil, we compared the soil concentrations to a health-based screening value specific to arsenic. This screening value represents a level in the soil that is considered safe for human contact. While exceeding this screening value does not imply that the contaminant will cause harm, it does suggest that potential exposure to the contaminant warrants further consideration.

The screening value that we used for arsenic in soil (20 mg/kg) is based on a child exposure scenario and EPA's reference dose (RfD) for arsenic of 0.3 micrograms per kilogram per day ($\mu\text{g}/\text{kg}/\text{day}$) [6]. RfDs are based on the assumption that there is an identifiable exposure threshold (both for the individual and for populations) below which there are no observable adverse effects. Thus, the RfD is an estimate of a daily exposure to arsenic that is unlikely to cause adverse non-cancer health effects even if exposure were to occur every day for a lifetime. For arsenic, the RfD was derived by dividing the identified no observable adverse effects level (NOAEL¹) of 0.8 $\mu\text{g}/\text{kg}/\text{day}$, obtained from human epidemiologic studies, by an uncertainty factor of three. The lowest observable adverse effects level (LOAEL²) associated with these epidemiologic studies was 14 $\mu\text{g}/\text{kg}/\text{day}$, where exposure to arsenic above this level resulted in hyperpigmentation of the skin, keratosis (patches of hardened skin), and possible vascular complications [6–8]. We used standard assumptions for body weight (15 kg per child) and soil ingestion (200 mg per day per child) to calculate the screening value. Screening values calculated using child exposure scenarios also are conservative (health protective) with respect to protecting adults.

The concentrations of arsenic measured in soil from the park were slightly higher than the 20 mg/kg screening value. A 15 kg child who ate 200 mg of soil from the park every day would receive an estimated daily dose approximately 1.2 times higher than RfD, 2 times lower than the NOAEL, and 390 times lower than the LOAEL. Ingestion of less than 200 mg of soil per day or an exposure frequency less than seven days per week would result in exposures below the RfD.

¹The highest dose at which adverse effects were not observed.

²The lowest dose at which adverse effects were observed.

An adult who ate 100 mg of soil from the park every day would receive an estimated dose approximately 8 times lower than the RfD, 21 times lower than the NOAEL, and 3,630 times lower than the LOAEL. Based on these estimates of exposure it is unlikely that children or adults exposed to soil from this park would experience adverse non-cancer health effects.

EPA also classifies arsenic as a known human carcinogen based on sufficient evidence from human data. An increase in lung cancer mortality was observed in multiple human populations exposed primarily through inhalation. Also, increased mortality from multiple internal organ cancers (liver, kidney, lung, and bladder) and an increased incidence of skin cancer (non-malignant) were observed in populations consuming water high in inorganic arsenic [6]. We used EPA's cancer slope factor (CSF) for arsenic to estimate the potential increased lifetime cancer risks associated with exposure to arsenic in soil from each of these locations. For people exposed to the soil every day for 9 years we estimate there to be no increase in the lifetime risk for cancer. Based on these data we would not anticipate the arsenic in the soil to present a public health hazard to any of the potentially exposed populations.

Uncertainties

General Uncertainties

In preparing this report, we relied on the information provided and assumed adequate quality assurance/quality control (QA/QC) procedures were followed with regard to data collection, chain-of-custody, laboratory procedures, and data reporting. The analysis and conclusions in this report are valid only if the referenced information is valid and complete.

The most likely routes of exposure to the contaminants found in the soil are ingestion (eating the soil) and inhalation (breathing in the soil as windblown dust). Based on the information available for this consult we would not anticipate the inhalation of windblown dust to be a major contributor to exposure even though windblown dust may be common in El Paso. The concentrations of the contaminants in the soil are generally low and would not result in any significant loading of the air with contaminants.

In order for exposure to the contaminants to occur through ingestion, the soil must be physically available. The screening values that we used in this consultation assume that the soil is available and that physical barriers such as grass are not present. The presence of the grass would further reduce the likelihood for exposure. Individual behavior patterns also are important in assessing risk. The amount of soil that a person eats, how often they eat the soil, and the average concentration of the contaminant in the soil that they eat all are important factors in determining potential public health implications. For this consultation we assumed that people eat soil from the park every day and that their total daily consumption of soil and dust comes from the park. In most instances these assumptions overestimate the potential exposures.

Specific Uncertainties

There is considerable controversy with respect to assessing potential risks associated with exposure to arsenic. Both the RfD and the CSF are based on human ecological studies that have

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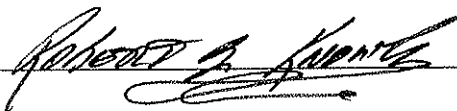
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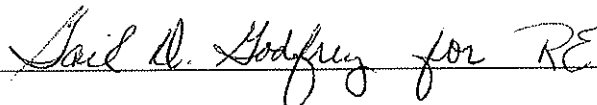
CERTIFICATION

This health consultation was prepared by the Texas Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

A handwritten signature in black ink, appearing to read "Robert G. Smith", is written over a horizontal line.

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation and concurs with its findings.

A handwritten signature in black ink, appearing to read "David W. Godfrey for RE", is written over a horizontal line.

Chief, State Programs Section, SSAB, DHAC, ATSDR

