

## **Attachment F**

### **General toxicological and epidemiological information for lead, arsenic, and polycyclic aromatic hydrocarbons (PAHs)**

#### **Lead**

Lead is a naturally-occurring metal in the environment. However, most of the high levels of lead found in the environment come from human activities. Background levels of lead in soil collected from various locations in Hamden (outside the Newhall Street neighborhood) ranged from 35 mg/kg to 360 mg/kg. These levels are consistent with background levels reported in other urban residential areas (ATSDR 1999).

Lead has many uses, most importantly in the production of batteries. Because of health concerns, lead in gasoline, paints, and ceramic products has been dramatically reduced in recent years. However, lead is still present in the environment. People can be exposed to lead from breathing workplace air or dust, eating contaminated foods and drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in lead-contaminated soil. Lead can affect many organs and systems in the body. The most sensitive is the central nervous system, particularly in children. Lead can cause decreased mental abilities in infants and learning difficulties and reduced growth in young children. Pregnant women exposed to lead can experience premature births and smaller babies (ATSDR 1999). Premature and low birth weight children are more susceptible to various neurological, developmental, learning, behavioral and other chronic health problems such as cerebral palsy, blindness, deafness, slower growth, lower IQ, epilepsy, chronic lung disease, and attention-deficit hyperactivity disorder (Paneth 1995).

In adults, lead exposure (from breathing or swallowing lead) can decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Breathing or swallowing lead may cause anemia (a low number of blood cells), may increase blood pressure in middle-aged men, and may affect sperm or damage other parts of the male reproductive system (ATSDR 1999).

With regard to the cancer causing potential of lead, animals that were given very large amounts of lead developed kidney tumors. However, there is not adequate evidence to demonstrate that lead causes cancer in humans (ATSDR 1999).

A blood test is available to measure the amount of lead in a person's blood and to estimate the amount of exposure to lead. Blood tests are routinely used to screen children for potential lead poisoning. The Centers for Disease Control and Prevention (CDC) considers 10 micrograms per deciliter (10 µg/dL) of lead in children's blood to be a level of concern for possible adverse health effects. CT DPH considers 20 µg/dL to be a level of concern for adults.

## **Arsenic**

Arsenic is found in nature at low levels. National background levels of arsenic in soil range from about 1–40 mg/kg, with an average of about 5 mg/kg (ATSDR 2000). Background samples collected in Hamden (outside the Newhall Street neighborhood) ranged from 3–8 mg/kg. People may be exposed to arsenic by eating food, drinking water, breathing air, or through skin contact with soil or water. Children may be exposed to arsenic by playing in soil.

The most characteristic effect of ingesting arsenic for a long period is a pattern of skin changes. These include a darkening of the skin and the appearance of small “corns” or “warts” on the palms, soles, and torso. These skin growths may ultimately develop into skin cancer. Long-term ingestion of arsenic can also lead to damage of the heart and blood vessels and increases the risk of skin, bladder, kidney, liver, and lung cancer. Breathing large amounts of arsenic for a long time increases the risk of lung cancer and can also cause respiratory irritation, nausea and characteristic skin changes. (ATSDR 2000).

The most reliable test for arsenic exposure is a urine test. Since arsenic stays in the body a short time, the test must be done soon after exposure occurs. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6–12 months. However, these tests are not very useful for low levels exposures (ATSDR 2000).

## **PAHs**

Polycyclic aromatic hydrocarbons (PAHs) are a group of more than 100 different chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. PAHs are usually found as a mixture containing two or more compounds and are commonly found in soot or ash.

People are most likely to be exposed to PAHs that are attached to dust or other particles in the air. Sources include cigarette smoke, vehicle exhaust, asphalt roads, and smoke from wood fires. Cooking meat or other food at high temperatures, which happens during grilling or charring, increases the amount of PAHs in the food. National background levels of PAHs found in soil range from less than 1 mg/kg to 60 mg/kg (ATSDR 1995). Background samples in Hamden (outside the Newhall Street neighborhood) for individual PAHs ranged from 0.5 to 4.2 mg/kg. Total PAHs were as high as 12 mg/kg.

PAHs can be harmful to health under some circumstances. Studies on animals have shown that PAHs can cause harmful effects on the skin, and immune and reproductive systems. These effects have not been seen in people. Some PAHs caused cancer in animals when the PAHs were breathed in air (lung cancer), ingested in food (stomach cancer) or applied to the skin (skin cancer). Some people who breathed or touched mixtures of large amounts of PAHs for long periods of time developed cancer (ATSDR 1995).

In the body, PAHs are changed into other chemicals (called metabolites) that can attach to

substances within the body. The presence of PAHs attached to these substances can then be measured in body tissues or blood after exposure to PAHs occurs. PAHs or their metabolites can also be measured in urine, blood, or body tissues. Although these tests can show that you have been exposed to PAHs, the tests cannot be used to predict whether any health effects will occur or to determine the extent or source of your exposure to PAHs (ATSDR 1995). Because PAHs are so common in the environment, everyone has some PAHs in their body.