Soil and Dust

Soil and dust act as pathways to children for lead deposited from paint, gasoline, and industrial sources.

The long-term efficacy and cost-effectiveness of different measures to reduce lead levels in soil need to be evaluated.

Reduction of dust lead is important both as part of deleading and as a means of interim risk reduction.

Soil and dust act as pathways to children for lead deposited by primary lead sources such as lead paint, leaded gasoline, and industrial or occupational sources of lead. Since lead does not dissipate, biodegrade, or decay, the lead deposited into dust and soil becomes a long-term source of lead exposure for children. For example, although lead emissions from gasoline have largely been eliminated, an estimated 4-5 million metric tons of lead used in gasoline remain in dust and soil, and children continue to be exposed to it (ATSDR, 1988).

Because lead is immobilized by the organic component of soil, lead deposited from the air is generally retained in the upper 2-5 centimeters of undisturbed soil (EPA, 1986). Urban soils and other soils that are disturbed or turned under may be contaminated down to far greater depths. Soil lead levels within 25 meters of roadways are typically 30-2,000 parts per million (ppm) higher than natural levels, with some roadside soils having concentrations as high as 10,000 ppm. Soils adjacent to houses painted with exterior lead paints may also have lead levels above 10,000 ppm. Measured lead levels in soil adjacent to smelters range as high as 60,000 ppm (EPA, 1986).

As part of normal play and hand-to-mouth exploratory activities, young children may inhale or ingest lead from soil or dust. Ingestion of dust and soil during meals and playtime activity appears to be a more significant pathway than inhalation for young children (EPA, 1986).

Different investigators have found widely varying relationships between levels of lead in soil and dust and children's blood lead levels. Blood lead levels generally rise 3-7 µg/dL for every 1,000-ppm increase in soil or dust lead concentrations (EPA, 1986; Bornschein et al., 1986; ATSDR, 1988). Particle size and the chemical form of lead may affect the bioavailability of lead in soil and dust; access to soil, behavior patterns, presence of ground cover, and a variety of other factors also influence this relationship (Barltop and Meek, 1979).

Even if ongoing deposition of lead into soil and dust is eventually halted, measures will have to be taken to reduce exposures from lead- contaminated soils and dusts. Until data demonstrating the efficacy and cost-effectiveness of permanent soil and dust abatement measures are available, interim risk reduction steps will be needed in some places. Dust control via wet mopping and frequent hand washing has been shown to reduce the blood lead levels of children with high blood lead levels (Charney et al., 1983), but this is not a permanent solution so long as the source of the lead in the dust remains. For urban and smelter communities, where outdoor soil can be a major source of lead in house dust (Diemel et al., 1981; Yankel et al., 1977), indoor dust abatement may not be effective unless abatement of soil lead is also conducted. Soil abatement may consist of either establishing an effective barrier between children and the soil or the removal and replacement of at least the top few centimeters of soil. Grass cover, if properly maintained, may be an effective means of limiting exposure to dusts originating from lead-contaminated soil (Jenkins et al., 1988).