# LEAD EXPOSURE BACKGROUNDER

## Introduction

Lead exposure continues to be a serious health problem with young children being at greatest risk for lead poisoning. Exposure during pregnancy and high level exposure for workers are also important concerns. Historically, only severe lead poisoning was considered important. More recent concerns center around lower levels of lead exposure with related health effects occurring at blood levels of 10 to 25 ❍g/dl (micrograms of lead per deciliter of whole blood). All schools require careful attention with regard to lead exposure; however, buildings housing the youngest children in pre-kindergarten, kindergarten, and child care programs should receive the highest priority. The potential sources of lead exposure in schools are paint, dust, soil, water, and instructional materials. Exposure to lead generally occurs through hand-to-mouth behaviors and subsequent ingestion of lead-contaminated dust.

Lead tends to build up in the body over time. A person who takes in only low levels of lead can gradually develop lead poisoning. Lead can affect the brain causing learning disabilities and behavior problems. Lead can also affect the blood, kidneys, and other parts of the body. As lead poisoning becomes serious, some children have stomach aches, loss of appetite, or loss of interest in play. A child may also become overly active or fussy and irritable. The effects of severe lead exposure (greater than 80 ❍g/dl) commonly include irreversible mental retardation, convulsions, coma, and even death.

Lead-based paint inspections, risk assessments, and abatements are regulated by EPA and authorized State lead-based paint programs in child-occupied facilities built prior to 1978 where children six years and under occupy the paint.

The most practical lead analysis technique for facilities. This would include most first grade classrooms, kindergarten class rooms, school lunch rooms, school hallways, gymnasiums, preschools, and day-care facilities.

## Paint

Schools built before 1980 still may have been painted with lead-containing paint. Paint used in schools built before 1950 may have even higher lead concentrations. The condition of the paint is critical, since dust and paint chips are in the form that can be readily consumed by young children. The process of removing lead paint, if improperly conducted, can create hazardous conditions.

School systems should survey all school buildings occupied prior to 1980. The first priority should be the buildings serving prekindergarten, kindergarten, or child care programs. The primary objective is to identify locations of deteriorating paint (cracked, chipped, flaking, alligatoring, chalking, checking) and paint having a high potential for future deterioration.

If testing reveals the lead content of deteriorated paint to be more than 0.5 percent in the dried film (paint chip sampling) or more than 1 milligram per square centimeter (x-ray fluorescence method), abatement is the course of action. The action standard may be lower in some state or local jurisdictions. If the paint is in good condition and the testing reveals the lead content to be more than the action levels described above, then management is the correct action. Management may include periodic inspection, abatement, or other techniques. Maintenance and housekeeping staff should receive training in the potential hazards of lead paint, and the proper procedures for routine cleaning or maintenance that may disturb lead

paint is the portable x-ray fluorescence analyzer method, but this analysis should be conducted by trained specialists. If the paint

has lead levels close to or more than 1 milligram per square centimeter, a back-up test should be conducted on paint scrapings before monies are expended for abatement. Abatement can include replacement or enclosure of the materials, and onsite or offsite paint removal.

Onsite lead paint removal involves careful worksite preparation and work procedures. Under no circumstances should lead paint be removed by open flame burning or torching, heat guns operating above 1100⑤ F, machine sanding or grinding without a HEPA vacuum exhaust tool, abrasive blasting or sandblasting without a HEPA vacuum exhaust tool, or an uncontained hydroblasting or high pressure wash.

## Soil and Dust

Children can be exposed to lead in soil and building dust. The source of lead in soil can be from deteriorating exterior paint, deteriorating or improperly-removed paint from onsite structures or structures adjacent to the school site (water towers, bridges), emissions from the combustion of leaded automobile gasoline, or emissions from factories. Building dust can contain lead originating from deteriorating interior paint or lead-contaminated material tracked in from the outdoors.

If the level of lead in areas of bare soil not used by children is above 2000 ❍g/g (micrograms per gram) the soil should be considered hazardous. For bare soil directly used by children (playgrounds, sandboxes, gardens) the hazardous level is 400 ❍g/g. If the soil contains very high lead levels (greater than 5000 ❍g/g), then permanent abatement must be implemented- soil removal and replacement, rototilling, soil treatment and replacement, or paving with concrete or asphalt. Below 5000 ❍g/g, interim techniques can be employed. A surface covering can be added such as grass, juniper, or ivies. Other controls such as fencing or relocating a play area may be successful.

## Drinking Water

Plumbing constructed of copper piping with lead solder, brass or bronze fixtures, or lead piping may contribute to lead in drinking water. Lead can dissolve in water upon standing for two hours or more if plumbing is less than five years old. Lead dissolves more readily in hot water than in cold. Generally, plumbing more than five years old forms a protective coating of insoluble lead oxide and is usually not a problem unless the water supply is corrosive. Water fountains, irrespective of age or type of materials used in their construction, may contribute to excessive lead levels due to the accumulation of sediments in internal screens and reservoirs. The current action level for the reduction of lead in water is 15 ppb (parts per billion) for a 1 liter first draw sample collected after the water has remained in the piping for at least 6 hours.

School systems should survey their existing buildings for lead exposure in drinking water. When designing new buildings or conducting a major renovation, several steps can be taken to prevent lead exposure. Copper pipe joints are now required to be made with solders and fluxes having a lead content of 0.2 percent or less. School systems should institute an inspection of soldered joints during construction. Test kits are inexpensive and easy to use. When purchasing water coolers, include a requirement for independent testing for lead and use this information as one basis for the acceptance or rejection of the product.

## Instructional Materials

Lead may be a hazard in certain classroom activities such as making ceramics (lead glazes) or using lead containing paint. Lead can be a hazard when spray painting, and soldering, welding, grinding, or sanding lead-containing surfaces. All instructional activities involving lead-containing substances should stress prevailing Occupational Safety and Health Standards.

Instructional materials for pre-kindergarten, and elementary aged children should be lead free. Materials for older students should be lead free or not contain any more than trace amounts of lead. If lead-containing materials are used with older students, care must be

taken to instruct teachers and students in their safe use. Projects brought home by older students that could come in contact with young children should be lead free.

This document has been developed for the H.E.L.P. for Kids Project. Contributing to this backgrounder: Allen Abend, Architect, Baltimore, MD; Bradley Turk, Mountain West Technical Associates.