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Lead Precautionary Measures

Introduction

Exposure to lead is an important health concern, especially for young children and pregnant women.

An awareness of lead hazards has resulted in an overall decrease in exposure for North Americans. In fact, average blood lead levels have significantly declined by more than two-thirds since the removal of lead from gasoline. While the average exposure level has gone down, there are still situations when householders may need to take precautions.

Lead may be found in a number of places in the home, most notably in:

- drinking water - from lead pipes or the leaded solder used to join copper pipes
- dust and dirt - from outside areas that have been exposed to leaded gasoline exhaust
- leaded crystal, pewter, and glazes on certain china and pottery ware
- dust generated from leaded paint, especially dunng a renovation

This publication deals specifically with this last source, offering information for those considering a home renovation where lead-based paint is or may be a factor. It is intended to give the reader an overview of concerns related to renovations involving leaded paints.

Summary of Contents

A comprehensive summary of the report is given here. Those readers wishing further details can request this publication and the others referred to here.

Historical Use of Lead in Paints

Lead has historically been used in oil-based paints for its drying, colour, and adhesive qualities. Oil based paints before the 1950's contained as much as 50% lead.

Recent laws restrict lead concentrations in interior paints to 0.5% Exterior paints are not restricted in their lead quantities but most consumer paints sold today have little or no appreciable amounts of lead.

Health Concerns

Lead can be absorbed by the body and, mistaken for calcium, deposited in bones and vital organs where it can accumulate. This is especially serious for young children and pregnant women. Young children have higher metabolisms and absorb more minerals (hence lead) for growth and development. As well, they have more hand-to-mouth activities which can increase the chances of ingestion of leaded dust. Studies indicate that even at low levels, lead concentrations in the blood are linked to a reduction of IQ levels in children, amongst other health concems. Lead in pregnant women can be transferred to the baby.

Because the effects of lead exposure are cumulative, individuals who have high exposure to lead in the workplace are also at risk. The higher the blood lead level, the more serious the potential health consequences, including fatigue, high blood pressure, kidney damage, anaemia, and problems associated with the central nervous system.

Planning a Renovation

When considering a renovation on an older home, a number of issues should be examined. A decision tree is provided (Figure 1) to help the homeowner plan the most appropriate renovation based on answers to the following questions:

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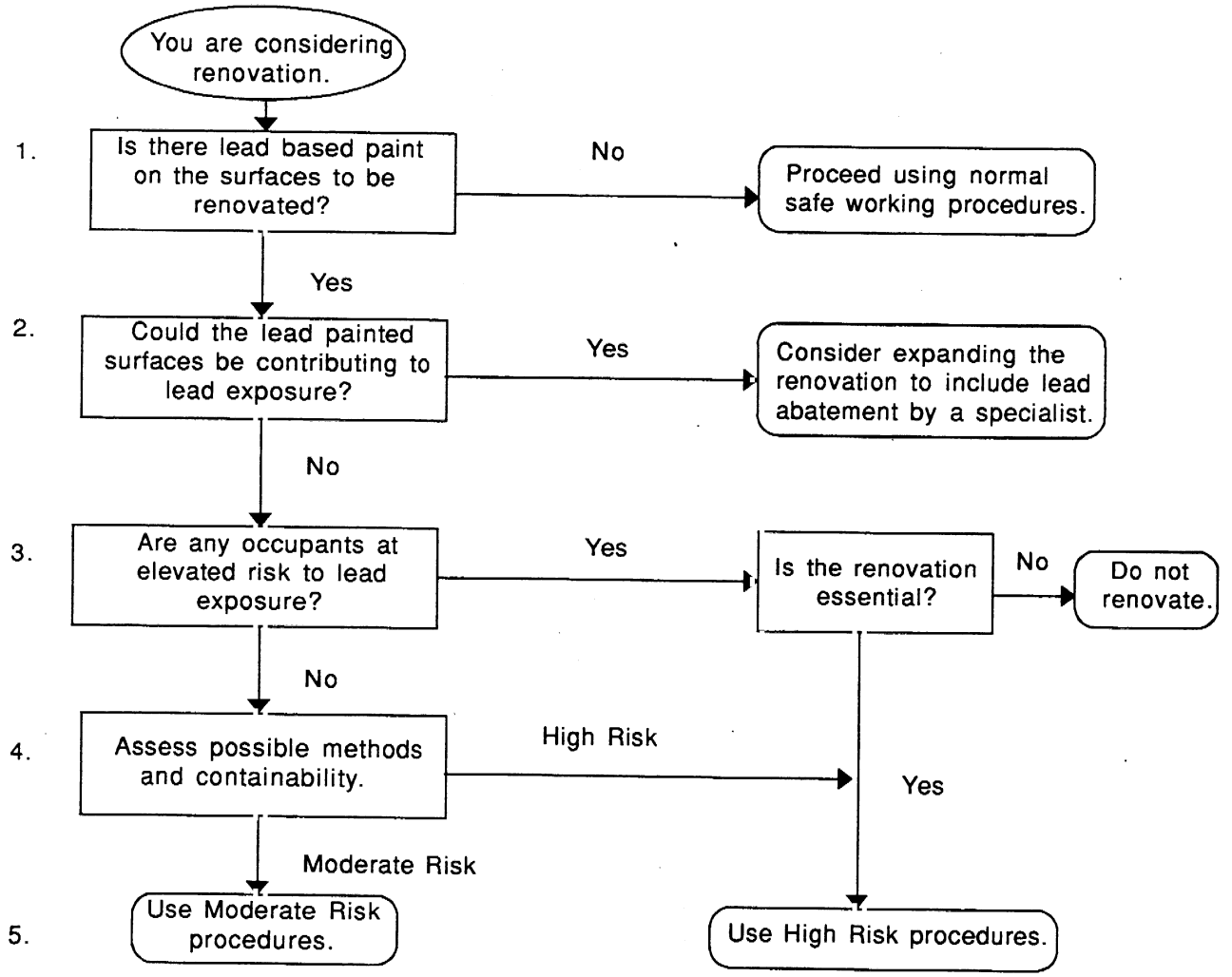
Figure 1
Decision Making Process



1. *Testing for Leaded Paint*

Testing methods for lead in paint include:

- do-it-yourself chemical test kits
- X-ray fluorescence (XRF)
- laboratory analysis

A detailed summary of each type of test procedure can be found in the CMHC report, "Testing of Canadian Sources for Lead Analysis" (1992). They are briefly summarized here.

Chemical Test Kits

Chemical test kits are the cheapest option. They can be used by the homeowner but are only marginally useful. All layers of paint, down to the substrate, must be tested since the chemicals act only on the exposed layer. Dark surfaces are difficult to test since test kits indicate positive results by darkening. A positive reading will indicate the presence of lead but will not indicate the amount present. As well, other metals in the paint may cause it to read a false positive.

XRF

XRF machines can measure the various levels of lead in house paint and can read through multiple layers of paint. However, this service is not readily available in Canada at present.

Laboratory Analysis

Lab analysis requires that the homeowner submit a paint chip (including all layers of paint) from the surface to be renovated. This method is the most accurate testing method. Costs vary from $10 to $50 per sample depending on the laboratory, and tumaround time ranges from days to weeks.

2. *Determining Occupant Lead Exposure*

A simple blood test will indicate whether or not there is reason for concern. If lead levels are found to be high (over 10 micrograms/dL) then testing the house for possible sources is suggested. It is important to remember that even if there is an incidence of high blood lead in an occupant and there is a presence of. leaded paint, this may not be the offending source. If the lead painted surfaces are in good shape and there is no chipping, peeling, or abrasion it is reasonable to look at other sources.

3. *High Risk Occupants*

Pregnant women, young children and adults exposed to high levels of lead in the workplace are most at risk. The effects of lead exposure on these individuals are discussed in Health Concems section.

4. *Methods for. Dealing with Leaded Paint*

The key thing to remember, when planning a renovation involving lead paint, is to try to keep dust generation down to a minimum. This will reduce the potential for exposure. Simple renovations, such as painting a wall or laying a carpet, will not readily disturb a lead painted surface. Others, such as taking down a wall, can create a lot of dust and should be handled with caution.

Methods for treating leaded paint surfaces are categorized under four headings:

- encapsulation
- removal and replacement
- offsite chemical stripping
- onsite stripping

Encapsulation

Encapsulation simply means sealing off leaded paint surfaces to reduce occupant exposure. Methods of this type include covering the painted surface with gypsum board, plywood, plaster or stucco, vinyl wallpaper, or ~an acrylic coating. Latex paint and paper wallpaper are not considered satisfactory. While this is usually effective and cheaper than other methods, lead paint dust can again become an issue if future renovations or damage cause the leaded paint surfaces to become exposed.

Removal and Replacement

The removal and replacement of fixtures, such as doors, windows and trim, can be an option since this generates minimal amounts of leaded dust and can often be done quickly. Drawbacks include the potentially high cost of replacement. This method is advantageous if it can be incorporated with an energy upgrade renovation (such as replacing single-pane windows with more energy-efficient ones).

Offsite Chemical Stripping

This is advantageous since both the chemical strippers and lead paint residue are handled offsite. Exposure depends only on the amount of dust generated when removing the fixtures. Potentially high costs, turnaround time and the logistics of removal can make this a less attractive option.

Onsite Stripping

Onsite stripping methods will generate varying dust levels. Sanding and sandblasting should never be done onsite due to the large amount of leaded paint dust generated. A HEPA (High Efficiency Particle Accumulator) filter attachment on the sander or sandblaster can reduce the amount of dust blown into the air.

Paint removal by open flame or heat gun can produce hazardous emissions, including lead. Sanding, sandblasting, burning and scraping can damage the painted surface.

Chemical stripping is advantageous since it generates minimal amounts of dust and requires less physical exertion than other methods. Unfortunately, such strippers may contain hazardous chemicals (including methylene chloride - a suspected carcinogen). Safe strippers contain less hazardous chemicals but may take longer to work.

A detailed examination of these four methods can be found in the CMHC report, "Advice on the Use of Chemical Strippers to Remove Leaded Paint" (1992).

5. *Preparing for a Renovation when Leaded Paint Is Present*

The scope and size of the renovation will dictate the safety precautions used. Suggested precautions and procedures can be grouped into two categories:

- moderate risk (MR)
- high risk (HR)

There are three types of renovation:

- a localized area (i.e. window)
- an enclosable room
- an essential non-enclosable space (i.e. hallway or stairwell)

Personal Precautions

All high risk persons should be removed from the renovation site if possible. If the renovation involves necessary areas (such as kitchens, toilets, bedrooms) it may be appropriate to have high risk occupants live elsewhere until the renovation is over.

Lead dust exposure can be reduced by the proper use of personal equipment including;

full length coveralls
gloves
hair protection
safety boots
eye protection

It is especially important to wear a suitable, properly fitting respirator equipped with cartridges appropriate for particulate dust and (in the case of chemical stripping) volatile organic fumes.

To keep dust from contaminating the rest of the house, protective clothes should be kept on site and washed separately from the rest of the household laundry. If shoe coverings are not going to be used, bring a clean pair of shoes in a sealed bag to change into when leaving the work area. Renovators should wash hands, face and, if possible, hair before leaving the site. For obvious reasons, workers should never eat, drink, smoke or chew gum onsite.

Site Precautions

The purpose here is to minimize the amount of dust contamination to the rest of the site. This will reduce occupant lead exposure and make clean-up much easier.

A number of precautions are applicable for any type of renovation.

- Furniture, drapes, rugs and other such movable objects should be removed from the worksite.

- Stationary objects (including cupboards and sinks) as well as all flooring should be covered with 0.15mm (6 mil) polyethylene sheeting and sealed with waterproof tape.

- Vents, doors, windows, and return grills should also be covered and sealed in the same manner. One door for access and one window for ventilation should be left unsealed.

- Air should always be moving from the rest of the house to the renovation area - never the other way. This can be accomplished either with a window fan blowing out or (if dust is generated) a remote-exhausting HEPA filter system.
- Bring all required renovation tools and equipment on site.

For large renovations:

- Establish an on-site storage area for lead contaminated waste materials. No children should be allowed access to this area at any time.
- If renovating a non-enclosable space, create a temporary enclosure around the area to be renovated using a wood frame with at least two layers of polyethylene sheeting, taped and sealed at the joints and edges with waterproof tape.
- Create a changing area just outside the entrance to the area using two layers of polyethylene sheeting and waterproof tape. This space should be used as an "intermediate space" where workers can put on and take off protective clothing.
- High risk precaution: Determine whether any hazardous waste will be created (based on renovation methods chosen) and, if so, obtain a storage container to be placed in the renovation area.

During Renovation Process

- Remove and isolate any items to be discarded or treated off-site by bagging or wrapping and taping.
- Collect, bag and seal all waste which could be contaminated as it is generated.
- Hazardous waste items should be promptly placed in a hazardous waste container.

Clean up Procedures at End of Day

CMHC research, as reported in, "Effectiveness of Clean-up Techniques for Leaded Paint Dust" (1992), found that wet mopping or wet sweeping (lightly spraying the surface with water before sweeping) will keep the dust from entering the air. These methods can be as effective as using a vacuum on bare floors.

When cleaning rugs, vacuums with an attached HEPA filter or an agitating head gave much better results than canister-type vacuums.

- Damp mop or vacuum up all paint chips and dust from every surface, starting from top and working downwards. Bag and seal all waste.
- Vacuum dust off all surfaces of items to be removed from the room and place them near the entry door.
- Vacuum protective clothing but bag and leave at the site.
- Remove waste to storage area.

Clean-up Procedures Upon Completion of Demolition

- Bag, seal and remove all waste to storage area.
- Wet-sweep or vacuum, then phosphate wash all surfaces inside enclosure or around the work area, including isolated items to be removed.
- Take down polyethylene sheeting and floor protection by wetting them down to control dust and folding them into themselves. Work form top down, and from the corners in, to avoid spillage of any damp contaminated material. Bag and seal sheets.
- Wet-sweep or vacuum all floors until no visible residue remains.
- Remove and bag protective clothing.

Final Clean-up Procedures

- Vacuum all surfaces, phosphate wash all possible surfaces and vacuum again after drying.
- Remove the vacuum bag and treat it as lead-contaminated, non hazardous waste.
- (HR or if renovation includes the kitchen) Obtain at least 2 dust samples for lab analysis from bare horizontal surfaces at least 24 hours after work has ended. Window wells, sills and floors are suggested as the most critical areas.

Exterior renovations should be given the same level of attention as interior renovations since leaded dust generated outside can contaminate the surrounding soil and be tracked back into the house.

Homeowners concemed about the risks of lead exposure or considering a renovation on an older home should test for leaded paint and plan the renovation accordingly. If there is leaded paint in the house but the painted surfaces are intact, it may be wiser to consider leaving the leaded paint there rather than risk generating leaded dust during a renovation.

Project Manager: Chris Ives
Research Report: Lead Precautionary Measures (1992)
Research Consultant: Morrison Hershfield Limited

A full report on this research project is available from the Canadian Housing Information Centre at the address below.

Housing Research at CMHC

Under Part IX of the National Housing Act, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

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The Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7

Telephone: (613) 748-2367
FAX: (613) 748-2098

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