Focus On: Lead Paint Removal

In recent years, the hazards of lead in and around homes has become an urgent public health issue. In 1971 the federal government established legislation which presented guidelines for lead abatement; since that time a number of states have enacted laws mandating the removal of lead-based paints from houses or apartments where children reside. Illinois is considering such a law.

The use of lead-based paint on buildings began in the late seventeenth century and was a standard treatment until after World War II, though lead continued to be used in some paints. The EPA estimates that lead paint was used in 74 percent of homes built before 1980 and in 90 percent of pre-1940 housing. Lead added durability to paint, and so was used in high concentrations until the 1950s, when the paint industry voluntarily restricted lead levels to no more than 1 percent. Government regulations eliminated its use entirely by 1978.

Many PACA members are do-it-yourselfers who enjoy working on their own house projects, including stripping or sanding paint. But these activities can elevate lead levels in a house leading to problems for the inhabitants, especially young children (under the age of six) and pregnant or child-bearing aged women. Lead exposure can come from a number of sources.

- People may ingest it through the nose and mouth when the painted surface breaks down; household pets can be affected too. This can happen when painted surfaces peel or flake and disintegrate into dust.
- Soil levels around a building may contain a high amount of lead from years of absorption of flaking and chalking exterior paint. Lead is a naturally occurring element found in small amounts nearly everywhere, but the soil near heavily-used streets and roads may contain lead as a result of past use of lead in gasoline. In fact, many believe that lead buildup in soil may be the greatest contributor to high levels of lead in household dust.
- Some water pipes in older homes may be made of lead or contain lead solder, which can get into the drinking water. Imported toys and pottery may contain lead paint or glaze. Lead dust is another source of lead.

Leads can enter the body in the following ways:

- By eating even small chips of lead-based paints or lead-contaminated soil or dust (either directly or from unwashed food or hands).
- By drinking water, tea, or other beverages which contain lead or lead dust.
- By breathing dust particles, causing some of them to get caught in the nose and lungs. If these particles contain lead, the lead can be taken into the blood stream.

In the past, the principal hazard to children was thought to be paint chips containing lead, primarily from peeling paint. Research has shown, however, that lead dust is of special concern, in part because the smaller particles are more easily absorbed by the body. Lead dust is created not only by scraping, sanding, and burning lead paint, but some people feel that even normal abrasion, such as the opening and closing of poorly maintained doors and windows, may create lead dust. Lead dust is especially hazardous to young children because they play on the floor and put things in their mouths. Adults can inhale small particles through the nose and mouth.

Testing for Lead

Property owners of older homes should assume that most architectural paints contain lead. Two processes are used to test for lead on site: by applying a sodium solution to the painted surface (readily available in kits from many paint stores, building centers, and pharmacies), or with a mobile X-ray fluorescence analyzer (this is used by official inspectors, but is not readily available to homeowners). Otherwise, a sample must be sent to a laboratory for analysis.

Two sodium solutions are available for lead testing. An 8 percent sodium sulfide solution is a quick way of finding out if paint does or does not have lead. The chemical is easy to use and the results are easily visible since the paint changes color (darkens—the test turns pink to red) with the application of sodium sulfide if it contains lead. Although this test will indicate whether paint contains lead, it will not tell you how much lead. The biggest drawback with this method of testing is that it cannot be used on dark colors or colors in the red spectrum since results can only be determined when the paint changes to a dark color. Because the chemical has a limited shelf life, the tendency for false results occurs when the test is conducted with old chemicals.

Because of these drawbacks, a new chemical test has been developed using sodium rhodazonate. This test is “lead specific” and picks up very small amounts down to 0.005 percent.

A mobile X-ray fluorescence analyzer gives quick, accurate digital readouts of lead measurements per unit area. The disadvantages of this equipment are cost, its inability to measure the amount of lead present, and its cumbersome size which precludes its access to some areas. It also can not measure curved surfaces and can give false positives for surfaces that have been permanently encapsulated with coverings like aluminum or vinyl siding.

Taking bulk samples and sending them to a laboratory for testing and quantification is the most reliable method of testing for lead. However, one must be very careful in taking the sample and make sure that all layers of paint are included in the
wooden molding profiles if not done with the greatest skill and care. To control the dangerous lead dust created during sanding the area must be effectively sealed off, the painted surface should be dampened with water prior to sanding it with wet/dry sandpaper, and a HEPA (High Efficiency Particulate Air) equipped sander should be used because they collect the dust instantly.

Grit or water blasting is not recommended for historic materials because of its high potential for damaging wood, plaster, and brick surfaces. It is also extremely difficult to prevent dangerous lead particles and chips from escaping into the environment during blasting.

Heat methods. The biggest problem with heat-removal methods is the risk of fire. Fire extinguishers should always be kept nearby during removal. The primary methods used are torch, heating coils/plates and hot air guns. Removal by torch is dangerous and never acceptable on an older building. In addition to the risk to workers from the flames and airborne lead compounds (high heat levels cause the lead to vaporize), torches cause fires easily. Heating coils/plates and hot air guns can be effective in some cases, but present the risk of fire. Ideally, only a controlled, low-level heating element that produces a temperature not exceeding 700 degrees Fahrenheit should be considered for paint removal. Heating elements can successfully soften paint for removal with hand tools. Because high levels of airborne lead can be produced and dispersed by heat guns, respirator protection is required throughout the removal process.

A new heat-type removal system based on superheated steam is expected to be available in the near future. Steam, heated to extremely high temperatures, softens the paint layers just as in the other heat-based systems but reduces the risk of fire to low levels.

Chemical methods. Two ways to utilize chemical removal methods are off-site and on-site. Both methods provide the advantage of allowing for preservation. Most on-site chemical paint stripping materials are potentially hazardous and should be used with care. Standard paint removers available in hardware stores contain either solvent-based chemicals (methylene chloride) or caustics (containing sodium or potassium hydroxide).

Methylene chloride is an effective paint remover and is particularly encouraged for use on older buildings because it is not harmful to wood. However, it is toxic, and protective clothing and respirators are essential since methylene chloride can cause severe burns, liver and heart damage, and possibly cancer. Caution is recommended when applying caustic paint removers to wood. While not as carcinogenic as or toxic as solvent-based strippers, caustics have been known to pit wood surfaces, and raise wood grain. If any of their alkalies remain in the wood, they may cause future paint failure. In addition, the combination of caustics and scraping tools may produce a less-than-satisfactory appearance.

Disposal of lead-based paint debris is difficult. Federal regulations require its disposal as a solid waste, but that presents problems for the average homeowner. Bag the debris (including the dust collected in vacuum cleaner filter bags) in heavy-duty trash bags. Seal the plastic and put the bags in cardboard boxes to they won't break. The waste can sit in your basement until a proper disposal avenue becomes available if it is kept inaccessible to children. Call the Hazardous Waste Research Center for dates and places of the next state-sponsored hazardous waste disposal collection; they are usually held in the spring and fall.

An alternative chemical method is to have elements removed from a building and taken to a commercial stripping business, where they are immersed in tanks of chemical (either solvent-based or caustic) remover, scrubbed down, and returned. This method will not create the dust or fumes that can be a major problem during abatement. The success of off-site dipping depends upon the quality of the shop doing the work, the chemicals used, and how often they are changed. The dimensions of the tanks should allow for architectural elements to be submerged.

Encapsulation. It is possible to protect children from lead paint hazards without paint removal by covering or "enclosing" the paint surfaces until young children have grown or do not reside in the building. Acceptable encapsulation should be made easily reversible, using durable materials (wallboard, fiberglass sheets, sheet metal, or heavy vinyl wall coverings) that can be securely affixed to the wall. Strong, nonsoluble adhesives may damage plasterwork and should be avoided. Conventional wallpaper does not constitute proper encapsulation, although some authorities allow painting over lead paint coated surfaces with a top-quality primer and two coats of top-quality latex house paint, epoxy paint, or a special encapsulating paint. Vinyl siding, technically acceptable for exterior encapsulation, is not recommended for historic buildings since it often requires the removal of architectural elements and decorative treatments. In addition, it diminishes the clarity of a building by obscuring architectural features and important visual characteristics.

Replacement. If there is no alternative except replacement of historic building parts, it is recommended that at least a representative piece of each element be photographed in place, then indelibly marked with a description of its former location, and stored on the property in a place inaccessible to children. Alternatively, all the elements can be removed, labeled, and stored to be reinstalled after the children have grown or no longer reside in the house.

The issue of lead paint removal echoes the early stages of the asbestos removal issue. Most people have come to believe that it is better to leave the old paint alone unless it is actively peeling and chipping. The removal process itself may make the problem worse. Whatever a homeowner decides to do, it is probably worth while to read up on the lead paint issue and on different abatement techniques before starting the job. The following bibliography is a good starting place; articles available from PACA are marked by an asterisk (*).

"Working with Lead in the Construction Industry," Departments of Labor, OSHA, and HHS (April, 1991).
"Lead Prevention Guide" (Owner/Contractor edition). Lead Free Kids, Box 8595, Minneapolis, MN 55408; 612/377-4304
"Preventing Lead Poisoning in Young Children," Public Health Service, Centers for Disease Control, Atlanta, GA 30333.
The Champaign-Urbana Public Health program details.

accurate percentage of lead content by sample. Laboratory testing gives the most
vide their clients with immediate results.

methods. The disadvantage of this
weight, and can verify results from other

of lead paint; contact them at 352-7961 for

Minimizing Exposure
It is generally agreed that intact lead
poses little risk to children and adults. Regular inspection and main-
tenance will keep paint intact. There are precautions you can take, however, to
minimize exposure to lead in your home.

- Thoroughly wash walls, woodwork,
windows, and windowsills to remove
dust. Use a household cleaning
product and change the water fre-
quently. Wet wipe surfaces and ledges
on regular basis instead of dusting.

- Thoroughly clean furniture, carpets,
and drapes; this may include frequent
vacuuming and steam cleaning to
remove settled dust and dirt. Be sure
to clean corners and crevices where
dust is most likely to settle. Mop floors
instead of sweeping them.

- Hose off sidewalks, porches, and steps
often so that lead-containing soil or
dust isn’t tracked into the house. Peri-
odically cleaning doormats can also
help reduce the tracking of dirt and
soil into the home.

- Cover exposed soil in the yard by
planting grass or ground cover.

- Pay close attention to where children
play and what goes into their mouths.

- Touch up painted surfaces before they
deteriorate to flaking and peeling con-
dition.

- Avoid scraping and sanding activities
of any kind in a room where un-
protected people are present.

- Good housekeeping practices should
be continued over a long period of
time to keep lead dust from returning.
A “one-time” cleaning is not enough.

- If you suspect that there are high
levels of lead in your house, have your
family members’ blood lead levels
tested to see if anyone has been af-
ected, especially children under the
age of six.

Abatement
Extensive paint removal can adversely af-
fect older buildings through:

- outright loss of historic features from
removal or destruction;

- surface damage to wood, plaster, or
other materials from inappropriate
paint removal methods or poor
craftsmanship during paint removal;

- loss of paint layers, which may offer in-
valuable information about a
building’s history.

Generally, it is important to remove
paint rather than replace architectural fea-
tures. The highest standards of craftsman-
ship are essential for successful lead
abatement. As a rule of thumb, when
using any abatement method, the sub-
strate should be kept as intact as possible.
Plaster surfaces should not be marrad,
and wooden moldings and carvings
should retain their original profiles.

Each period of a building’s history
since construction is represented by its
paint layers. In recent years, there has
been much interest in the study and
replication of original or early interior
and exterior paints; however, authentic
colors can be ascertained only from com-
plete samples of paint layers. During
paint research, it is often necessary to lo-
cate thick drips trapped in cracks or
obscure spots to determine the original
colors of paints mixed with unstable pig-
ments. Lead paint abatement, because it
can be very thorough, could remove all
this evidence and thus inadvertently
erase a building’s history.

Owners of older buildings also find
that paint layers are useful in dating ar-
chitectural features or to research altera-
tions that have occurred in a building.
For example, studying the number and
colors of paint layers on a baseboard and
an adjacent mantel may reveal, that one
was a later addition, while, in another
case, molding profiles of an earlier but
missing element can be found preserved
in a paint layer.

When considering lead abatement, it is
recommended that you first investigate
for evidence of decorative painting, such
as false wood graining or marbleizing,
and, if any is found, to protect represen-
tative samples. Leaving intact paint
layers on upper areas of woodwork or on
flat surfaces of lower areas will greatly
benefit any future study; full paint layer-
ing sequences are necessary for a com-
plete understanding of a building and its
history.

The analysis of nails is another useful
method for dating older buildings. If ar-
chitectural elements are removed tem-
porarily during the abatement process,
this evidence can be lost. To conserve nail
evidence and to prevent the surface
splintering that can occur when nails are
hammered out, nails should be cut from
behind with side cutters and each ele-
ment returned to its exact former location.

It should be remembered that abate-
ment can create high levels of lead dust
and paint debris that can greatly increase
blood lead levels if proper precautions
are not taken. In general, if the amount
of lead paint removal is extensive, it may
be best to hire a contractor who will use the
highest standards of craftsmanship and
who will avoid the removal of historic ele-
ments. However, if homeowners want to
tackle small jobs themselves then it is im-
portant that all necessary precautions be
followed to minimize the dispersal
spread of lead dust. It is most important
that the work area be completely sealed
from any occupied living areas. Large
sheets of plastic are excellent for this
when the edges are sealed with tape. Clos-
ing a door will not adequately contain
lead dust and vapors. Wear a respirator
with a filter specifically designed to filter
lead particles (high-efficiency particulate
air filters or HEPA). Change the filter
often. Ordinary dust masks are not suffi-
cient to filter lead particles. Do not eat,
smoke, or drink in the work area and
wash thoroughly before doing so even
after leaving the area to avoid ingesting
lead. Wear full-length coveralls or work
clothes. Store them in the work area or in
a plastic bag to avoid contaminating the
rest of the house. Wash lead con-
taminated clothing separately. Provide ac-
tive exhaust ventilation for the work area.
Simply opening a window is not suffi-
cient. Limit the duration of exposure to a
half day at a time and less in the cases of
dry sanding. Keep the work area clean;
sweep up paint chips and dust daily.
Damp mop to keep dust down.

Removal Methods
At present there are three categories of
paint removal: mechanical, heat, and
chemical, and two additional approaches
under the broader heading of abatement:
encapsulation and replacement.

Mechanical methods. Mechanical
methods share two major disadvantages:
the production of dangerous residues and
the possibility of damaging the wood (or
other) substrate.

Traditional scraping is a slow process
that can remove lead coatings only with
great effort. Wooden surfaces and mold-
ing profiles are often gouged irreparably.

Sanding is the greatest producer of
dangerous lead dust. It may also damage
Review and Compliance

Protecting a historic, architectural, or archaeological site from harm is one of the Illinois Historic Preservation Agency's primary responsibilities. Those duties are encompassed in the "review and compliance" process, which is carried out under provisions of Section 106 of the National Historic Preservation Act. Section 106 requires that any project funded or licensed by the federal government be examined for its impact on cultural resources—notably historic, architectural, or archaeological sites. A similar law in Illinois requires state agencies to submit their projects for review before they commence.

The Preservation Services Division reviews both federal and state projects—though the scope of review is limited to properties listed on the National Register of Historic Places or places eligible for designation. When archaeological sites are suspected to be within the project area, archaeological surveys are required. Mitigating a project's adverse impact on cultural properties, which can involve a minor or major change in a proposed project, is the goal of Division project reviewers.

The Preservation Services Division reviews about five thousand projects a year. About six hundred archaeological surveys are conducted each year. Most projects do not involve places listed on or eligible for the National Register of Historic Places. But when a project does affect historic, architectural, or archaeological property, reviewers consult with the appropriate agencies to mitigate its impact. In cases where significant archaeological sites might be affected, the project may be altered or archaeological excavations conducted to collect information prior to construction. Because the scope of review involves projects funded by the federal government, the Division deals also with state and local governments that utilize federal funds.

A common misconception about these programs is that the Division's review "stops" a project. In fact, both the state and federal laws authorize the funding agency to make the final decision. The Division's role is to assure that any adverse affects on cultural resources are recognized and that methods of mitigation are proposed and considered and implemented when feasible. This process also assures that the funding agency's activity and its impact on cultural resources is subject to public discussion.

Illinois' own cultural resources protection law—the Illinois State Agency Historic Resources Preservation Act—is modeled after the federal law. The Illinois law, effective January 1, 1990, requires state government agencies to consult with the Preservation Services Division to identify cultural resources affected by their programs and projects. Like the federal law, the goal of the state law is to preserve Illinois' unique cultural resources while best serving the public.

Two projects in Champaign County have recently been reviewed by the Preservation Services Division. The UI's plans for the Engineering Campus/Grainger Engineering Library were extensively reviewed and discussed. Although no prudent or feasible alternative to demolishing historic buildings could be found, the UI was instructed to extensively document the buildings before their demolition. The Hazen Bridge replacement project is still under Division review since plans for the new bridge severely impact on the historic span.

For additional information, contact the Cultural Resources Protection Coordinator, Illinois Historic Preservation Agency, Old State Capitol, Springfield, IL 62701 (217/785-5027). For projects relating to archaeological resources, contact the Archaeology Section, 217/785-4997.

Call for Nominations

Please call or send in your nominations for the 1993 Heritage Awards. Categories include:

- Landmark Heritage Award
- Residential Heritage Award
- Commercial Heritage Award
- Institutional Heritage Award
- Adaptive Use Heritage Award
- Landscape Heritage Award
- Neighborhood Heritage Award
- Special Heritage Award

The committee is always happy to learn of exciting renovation projects, particularly in the Residential or Landscape categories. If you know of an interesting project that needs recognition, please let PACA know.

Membership Application P.A.C.A

MEMBERSHIP CATEGORY:

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<tr>
<th>INDIVIDUAL</th>
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<tr>
<td>Adult</td>
<td>$50.00</td>
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