SAMPLING & MONITORING FOR LEAD

In this chapter you will learn about:

- What a lead inspector does;
- How inspectors test for lead-based painting;
  - Paint chip analysis
  - X-Ray Fluorescence analysis
  - Dust wipe tests
  - Wet chemical field tests
- How air monitoring is done;
- How to find out your lead exposure levels;
- How to understand monitoring results; and
- Risk Assessments.

What a Lead Inspector Does

Lead inspectors must have special training and certification. To start, the lead inspector will get a sketch of the home or building. The inspector will number the rooms to be tested and mark which way is north. The windows and doors can be numbered clockwise from the entrance. The inspector will take samples to test for lead. Each sample must be clearly labeled. The inspector will write down:
1. What room the sample came from;
2. Which part of the room it came from; and
3. Where on the painted surface the test was taken.

For example, an inspector might take a dust sample from the window sill on the north wall of the kitchen. The surface area tested may be 3”x36”. The label might look like this:

<table>
<thead>
<tr>
<th>Sample #</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room #</td>
<td>1</td>
</tr>
<tr>
<td>Part of room</td>
<td>North Wall</td>
</tr>
<tr>
<td>Surface</td>
<td>Window sill</td>
</tr>
<tr>
<td>Area</td>
<td>3x36</td>
</tr>
<tr>
<td>Condition</td>
<td>Smooth</td>
</tr>
</tbody>
</table>

The inspector records this information on a record sheet called a Sample Information form, like the one on the next page. The inspector also writes down the testing method and makes relevant notes, if any.
### SAMPLE INFORMATION

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Room</th>
<th>Part of Room</th>
<th>Surface</th>
<th>Area LxW</th>
<th>Condition</th>
<th>Test Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>North Wall</td>
<td>Window Sill</td>
<td>3x36 inches</td>
<td>Smooth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** Dust Wipe Samples

---

There are all types and sizes of sample information forms. More detailed forms might look like this set of four:

1. ![Diagram 1](image1.png)

2. ![Diagram 2](image2.png)
Tests for Lead in Paint and Dust

An inspector can use a number of ways to test for lead. Each test has advantages and disadvantages. The results are all measured differently. Let's look at each one:

1. Paint Chip Lab Analysis

The inspector takes paint samples from painted surfaces and then sends the samples to a lab. The lab tests the paint samples for lead. The test shows how much lead is in the paint. The test is called **paint chip lab analysis**. The inspector must wear gloves when taking samples and they must be changed after each sample.

**Advantages**

Paint chip analysis is very accurate when the inspector collects the sample correctly. The paint chip sample must include **all the paint layers** of the tested surface – not always easy to do.
Disadvantages

Paint chip analysis is expensive. It costs $10 to $75 per sample, depending on how soon you want the results. It can take two days to two weeks to get them – or longer. To get a sample, you have to disturb the painted surface. Scraped patches in the paint get left behind. You will have to repair and repaint. This is an added expense.

Results

Paint chip analysis measures the amount of lead in the paint by weight. The weight of lead in the sample is compared to the weight of the entire sample. The lead in the sample is reported as a percentage. If the sample is 0.5% lead or higher, HUD says that the surface tested should be considered a lead surface. Lead in paint chips can also be measured in milligrams per square centimeter (mg/cm²).

2. X-Ray Fluorescence (XRF) Analysis

The inspector can also use a machine called an X-Ray Fluorescence analyzer, or XRF. An XRF works a little bit like an X-ray machine at the doctor's office, but the process is different because radioactive waves are used to find the lead in paint. But, instead of taking a picture, the XRF reads all the different metals in the paint and tells us how much lead is in the paint. This test is called XRF analysis.

Advantages

The XRF machine is small (often 1.7-3 pounds) and can be used on site. It can tell right away whether or not lead is in
the paint. It does not damage the painted surface like paint chip lab analysis does. It’s memory can retain and display readings or download them to computer software.

**Disadvantages**

They cost from $10,000 to $20,000. XRF inspectors must have radiation safety training and special training on how to use the machine. After this training, they must get a permit to use an XRF. Permits, training, and replacement parts (batteries, cadmium-109 isotope \(^{109}\text{Cd}\) core with a half-life of 463 days, etc.) can be expensive – about $4,000 per year.

Many things can interfere with XRF readings. Brick, metal, and other building materials that the lead-based paint is on can effect the XRF readings. Calibration for each sample taken is required, but it only takes seconds. Substrate correction may also be needed. Your better **Spectrum** and **XL Spectrum** models make this correction automatically while other, less expensive models, require extra steps. Humidity, temperature, radio waves, and vibration can cause false readings. Some surfaces – like corners and narrow edges – cannot be measured by an XRF.

**Results**

XRF readings tell how much lead is in the tested surface area. Results are reported in **milligrams (mg) per square centimeter (cm\(^2\))**. A milligram is one-thousandth of a gram. A square centimeter is about the size of your thumbnail.

Usually more than one XRF reading is taken for each surface. **If the average of those readings is greater than 1.0 mg/cm\(^2\), HUD recommends that the surface be considered lead.** Check your state and local laws.

**Back-up Testing Method**

An inspector may take a paint chip test sample from the
same surface area to confirm the XRF readings. The paint chip lab results will be compared with the XRF results.

3. Dust Wipe Test
Dust wipe tests measure lead dust on surfaces. High levels of surface lead dust are an immediate danger. Wipe tests do not determine the presence of lead-based paint that is several layers down. They show whether there is lead in the dust.

The inspector collects dust from surfaces with commercial wipes. Inspectors must wear disposable gloves to protect them from lead dust. Inspectors should change their gloves after each sample to prevent sample contamination. The dust wipes are sent to a lab where they are tested for lead dust.

Advantages
The dust wipe analysis is an easy test to do. The cost of processing is from about $15 to $30 per test. The results tell you whether lead is in the dust. It gives you a good indication if there is a lead dust hazard.

Disadvantages
The dust wipe test cannot tell you exactly how much lead is in the paint. It cannot tell you which surfaces will need to be abated. It can tell you only if lead dust is present and give you an idea of how much. Lead dust may be coming from sources other than lead-based paint.

Results
Results are measured in micrograms of lead per square foot (ug/ft²). A microgram is one-millionth of a gram.

Dust wipe tests are taken at two times. First, they are used to test for immediate lead hazards. These dust tests are crucial in preventing lead poisoning. It is common for a lead-painted window well to have lead dust levels above 10,000 ug/ft².

Homes often cannot be abated right away. While the family
waits, they can do things to reduce the amount of lead dust. These actions are called **interim controls**. When lead dust is reduced, the source of lead poisoning is reduced. **Dust wipe tests can show if interim controls are helping.**

**Second,** dust wipe tests are used at the end of a lead abatement job for the **clearance test or final inspection**. The dust samples show whether the abatement and cleanup were done well enough.

HUD and many states require dust wipe clearance testing of floors, window sills and wells, and exterior smooth surfaces. **If the dust levels are higher than 40 ug/ft² for floors, 250 ug/ft² for window sills, and 400 ug/ft² for window troughs, then the work is not done.**

The Baltimore City Department of Health used wipe sampling to do a study of 20 houses that were lead abated. The average results are below. The use of heat guns and dry scraping were not allowed.

<table>
<thead>
<tr>
<th>Surface</th>
<th>Before abatement</th>
<th>After chemical stripping</th>
<th>After replacement encapsulation and enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors</td>
<td>1,300 ug/ft²</td>
<td>59 ug/ft²</td>
<td>44 ug/ft²</td>
</tr>
<tr>
<td>Window sills</td>
<td>7,634 ug/ft²</td>
<td>125 ug/ft²</td>
<td>17 ug/ft²</td>
</tr>
<tr>
<td>Window wells</td>
<td>59,202 ug/ft²</td>
<td>252 ug/ft²</td>
<td>49 ug/ft²</td>
</tr>
</tbody>
</table>

**How to Collect Dust Samples**

**Materials:** commercial wipes, ruler, marking pen, plastic vials with caps or ziplock® bags, disposable gloves, Sample Information form, and labels. See checklist on the next page.
<table>
<thead>
<tr>
<th>Step</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lay out the sample area</td>
</tr>
<tr>
<td></td>
<td>• Tapes down template; or</td>
</tr>
<tr>
<td></td>
<td>• Lays out sample area using tape</td>
</tr>
<tr>
<td>2.</td>
<td>Uses Clean Technique</td>
</tr>
<tr>
<td></td>
<td>• Puts gloves on after set-up</td>
</tr>
<tr>
<td></td>
<td>• Has adequate method for handling wipe</td>
</tr>
<tr>
<td></td>
<td>• Removes wipe and shakes open correctly</td>
</tr>
<tr>
<td>3.</td>
<td>First Swipe: side–to–side</td>
</tr>
<tr>
<td></td>
<td>• Presses down firmly – palms &amp; finger</td>
</tr>
<tr>
<td></td>
<td>• S-like motions</td>
</tr>
<tr>
<td></td>
<td>• Pressure adequate</td>
</tr>
<tr>
<td></td>
<td>• Wipes entire surface</td>
</tr>
<tr>
<td></td>
<td>• Does not cross boundary tape</td>
</tr>
<tr>
<td>4.</td>
<td>Second Swipe: top–to–bottom</td>
</tr>
<tr>
<td></td>
<td>• Folds in half, wipes on clean side</td>
</tr>
<tr>
<td></td>
<td>• Does not shake out contents during folding</td>
</tr>
<tr>
<td></td>
<td>• S-like motion</td>
</tr>
<tr>
<td></td>
<td>• Wipes entire surface</td>
</tr>
<tr>
<td></td>
<td>• Does not cross boundary tape</td>
</tr>
<tr>
<td>5.</td>
<td>Folds and Inserts into Container</td>
</tr>
<tr>
<td></td>
<td>• Does not touch other objects</td>
</tr>
<tr>
<td></td>
<td>• Does not lose surface debris</td>
</tr>
<tr>
<td>6.</td>
<td>Measures and Records Accurately</td>
</tr>
<tr>
<td>7.</td>
<td>Completes Form and Labels Container</td>
</tr>
</tbody>
</table>
# Field Sampling Form for Dust

Name of Sampling Technician: **Russ Domino**

Name of Property Owner: **Keith Shanks**

Property Address: **2229 Poplar Street, Oakland, CA 94607 Apt. # C55**

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Room (name of room used by owner)</th>
<th>Surface Type* (mark one)</th>
<th>Dimensions of Sample Area (in x in)</th>
<th>Area (ft²)</th>
<th>Lab Results (ug/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04-1</td>
<td>Upstairs lg. Bedroom</td>
<td>FL WS WT</td>
<td>12 x 12</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>04-2</td>
<td>Upstairs lg. Bedroom</td>
<td>FL WS WT</td>
<td>24 x 25</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>04-3</td>
<td>Upstairs sm. Bedroom</td>
<td>FL WS WT</td>
<td>12 x 12</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>04-4</td>
<td>Upstairs sm. Bedroom</td>
<td>FL WS WT</td>
<td>24 x 3.0</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>04-5</td>
<td>Kitchen</td>
<td>FL WS WT</td>
<td>12 x 12</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>04-6</td>
<td>Kitchen - above sink</td>
<td>FL WS WT</td>
<td>24 x 2.25</td>
<td>0.38</td>
<td></td>
</tr>
</tbody>
</table>

*Surface types: FL = Floor; WS = Window Sill; WT = Window Trough

Total number of samples on this page: **6**

Date Sample Collection: **2/25/2004**  
Date Shipped to Lab: **2/27/2004**

Shipped by: **Russ Domino**  
Received by: **______________________**

Shipped by: **______________________**  
Received by: **______________________**

Shipped by: **______________________**  
Received by: **______________________**

Shipped by: **______________________**  
Received by: **______________________**

Page **1** of **1**
## Dust Sampling Results Form

<table>
<thead>
<tr>
<th>Date of Clearance:</th>
<th>2/5/99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling Technician:</td>
<td>Russ Domino</td>
</tr>
<tr>
<td>Client:</td>
<td>Keith Shanks</td>
</tr>
<tr>
<td>Property Address:</td>
<td>2229 Poplar St., Apt. CSS, Oakland, CA 94607</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Location</th>
<th>Surface</th>
<th>Dimensions of Sample Area</th>
<th>Total (ug) Lead</th>
<th>(ug/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04-1</td>
<td>Upstairs large bedroom</td>
<td>Floor</td>
<td>12” x 12”</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>04-2</td>
<td>Upstairs large bedroom</td>
<td>Front facing inter. window sill</td>
<td>24” x 3.0”</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>04-3</td>
<td>Upstairs small bedroom</td>
<td>Floor</td>
<td>12” x 12”</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>04-4</td>
<td>Upstairs small bedroom</td>
<td>Side facing inter. window sill</td>
<td>24” x 3.0”</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td>04-5</td>
<td>Kitchen</td>
<td>Floor</td>
<td>12” x 12”</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>04-6</td>
<td>Kitchen</td>
<td>Window above sink inter. sill</td>
<td>24” x 3.0”</td>
<td>211</td>
<td>422</td>
</tr>
</tbody>
</table>

### 4. Wet Chemical Field Tests (like Lead Check®)

Some inspectors use wet chemical field tests (spot tests) to find out if paint contains lead. The sodium sulfide test and the sodium rhodizonate test are two examples. The reliability of these tests has not been proven, so their use is not recommended.
The chemical test solutions are clear liquids. To do the test, the inspector scrapes the painted surface down to the wall surface or substrate. All the layers of paint must be exposed. Then the inspector puts a drop of test solution on the painted surface.

**Results**
If lead is in the paint, sodium sulfide turns grey, brown, or even black. Sodium rhodizonate (swabs) turns pink when lead is present.

**Advantages**
This is a quick, easy test to do. It's done on site. It's inexpensive.

**Disadvantages**
1. Sodium sulfide works well only with white paint. Colored paints are hard to read.
2. The changes in color can be missed.
3. Other metals can cause the same color change that lead does.
4. These tests do not tell how much lead is in the paint.
5. These tests only test exposed layers of paint. These tests will not tell you if coats of paint that are not exposed have lead in them.
6. Sometimes these tests say lead is present when it is not.
7. Dirt on plaster can hide a color change.

**MONITORING**

**What is Air Monitoring?**
Air monitoring for lead must be done by a trained industrial hygienist. Monitoring can be done by measuring the air in a fixed location in the work area *(area monitoring)* or by placing the monitoring equipment on individual workers and measuring the amount they are exposed to *(personal monitoring)*. Usually on
lead jobs personal monitoring is done to determine worker exposures and area monitoring is only done outside the work area to see if any lead dust is escaping.

**How is Air Monitoring Done?**

To do personal monitoring, a small pump is placed on your belt and a filter cassette is clipped on your collar with a flexible tube running between them. The filter should be located as close as possible to your **breathing zone** (the air in front of your nose and mouth which you breathe in).

The pump pulls air through the filter, which traps the lead dust. After the sample has been taken, the filter is sent to a laboratory. The lab uses atomic absorption to measure the amount of lead on the filter. It may take several days or longer before the results are ready from the laboratory. The results will be reported as mg/m$^3$ or ug/m$^3$. Levels above 50 ug/m$^3$ require use of respirators.

**How Can You Find Out What Levels of Lead You Were Exposed To?**

Under the federal laws there is an OSHA standard (29 CFR 1910.1020/1926.33) which gives you access to employer records of any exposure monitoring done in your workplace. Your steward may have to ask to see exposure results, but once you ask, your employer can not legally refuse to show them to you. This includes monitoring done in the general area or of co-workers.
What Use is it if They Monitor Someone Other Than Me?

If the person who was monitored was doing work very similar to what you were doing, then their results will probably be similar to yours. You both should take precautions, such as upgraded respiratory protection, until further monitoring indicates that levels have been reduced.

How Can You Use Monitoring Results to Select Protective Equipment?

Personal protection should include respirators, coveralls, proper decontamination, and work methods that minimize the generation of airborne lead. It is important to use these forms of protection at all times on deleading jobs since monitoring results are available only after the fact and you should generally minimize your exposure.

Monitoring results can be used to select the type of respirator that you need on a job by providing you with a comparison value which can be matched against a respirator’s MUC. The MUC for a respirator is the PF of the respirators times the PEL of the contaminant, in this case, lead.

Exposure Monitoring Results are Averages Over the Day

Usually exposure monitoring results are the average exposure for an eight hour work day – called a Time Weighted Average (TWA). This means that lead levels could have been higher for parts of the day and lower for other parts of the day. Imagine you were exposed to the following amounts of lead in one 8-hour day on a deleading job:

- $20 \, \text{ug/m}^3$ for 2 hours
- $400 \, \text{ug/m}^3$ for 0.5 hours
- $25 \, \text{ug/m}^3$ for 1 hour
- $0 \, \text{ug/m}^3$ for 4 hours
Your 8-hour TWA would be calculated by multiplying each exposure by the time it lasted and then dividing by the total amount of time in the work day: This is equal to:

\[
(20 \text{ ug/m}^3 \times 2 \text{ hr}) = 40 + \\
(400 \text{ ug/m}^3 \times 0.5 \text{ hr}) = 200 + \\
(25 \text{ ug/m}^3 \times 1 \text{ hr}) = 25 + \\
(0 \text{ ug/m}^3 \times 4 \text{ hr}) = 0 = 265 \text{ ug/m}^3
\]

\[
265 \text{ ug/m}^3 \text{ divided by } 8 \text{ hours} = 33.125 \text{ ug/m}^3
\]

The 8-hour Time Weighted Average (TWA) equals about 33 ug/m\(^3\). So even though you were exposed to 400 ug/m\(^3\) (8 times the acceptable level) for half an hour, your overall exposure for the eight hours is within the legal OSHA PEL. Lead has no ceiling limit.

Even if you only work for a couple of hours, the TWA would be calculated by averaging in the rest of the day at zero exposure. This reduces the TWA significantly.

The exposure values that you get from your employer will be expressed as TWAs and you will generally not be able to determine if you got a high exposure for a short time or a low exposure over the entire day. The more samples you have during your shift, the closer you get to determining which work yields the lowest – and the highest – lead exposures.

If you work a longer day, lead concentration you can legally be exposed to is decreased. For a 12-hour day, divide by 12:

\[
\frac{50 \text{ (PEL)} \times 8 \text{ (normal workday)}}{400} = 33.3 \text{ ug/m}^3
\]

\[
\frac{400}{12 \text{ (hrs)}} = 33.3 \text{ ug/m}^3
\]

**Is It Worth It to Try to Reduce the TWA?**

It is important to understand what a TWA is because it may be that a small part of your job is resulting in a high exposure, while
the TWA remains much lower. In the example above, workers were exposed to 400 ug/m³ for 0.5 hours. If this exposure were reduced, the workers would have greatly lowered their exposure. It is possible that simply changing a work practice, such as using water to keep dust down, would make a big difference.

Although 50 ug/m³ is the limit of lead in air that is generally accepted, it is still an exposure to lead and any level of lead may pose some health risk. Your employer should try to reduce your exposure as far as is possible and is feasible. So the answer to the questions is – **Yes**.

**Risk Assessment**

An inspection tells you where the lead-based paint is in a home. A risk assessment tells you if the lead-based paint could be a health hazard to the people who live in the home. A risk assessment looks at:

- Lead-based paint hazards;
- How these hazards can be controlled; and
- The people who live in the home.

The person who does a risk assessment is called a risk assessor. A risk assessor has to get special training and be licensed.

**Lead Hazards**

The risk assessor first looks at the places where lead-based paint is in the home. This is the information that the inspector collected. Then the risk assessor figures out which lead-painted surfaces create lead hazards. Risk assessors are required to get special training and certification.

Any exposure to lead from contaminated dust, soil, or paint that makes you ill is a lead-based paint hazard. Risk assessors look for sources of lead dust in the home, and may document their findings on a form similar to the one on the next page.
Visual Assessment Form

Date: 2/25/2004

Address: 2229 Poplar St., Oakland, CA 94607 Apt. # CSS

Client: KEITH SHANKS

Technician: RUSS DOMINO

<table>
<thead>
<tr>
<th>Location</th>
<th>Identify visible areas of dust, paint chips, painted debris, and deteriorated paint. (Note location: walls, ceiling, floors, doors, windows trim, cabinets, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Area</td>
<td></td>
</tr>
<tr>
<td>Living Room</td>
<td></td>
</tr>
<tr>
<td>Dining Room</td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>WINDOW ABOVE SASH: DETERIORATED PAINT ON WINDOW SASH</td>
</tr>
<tr>
<td>Common Area</td>
<td></td>
</tr>
<tr>
<td>Bedroom #1</td>
<td>EAST WINDOW DETERIORATED PAINT ON LOWER SASH</td>
</tr>
<tr>
<td>Bedroom #2</td>
<td>OK</td>
</tr>
<tr>
<td>Bath #1</td>
<td></td>
</tr>
<tr>
<td>Exterior</td>
<td></td>
</tr>
<tr>
<td>Other:_______</td>
<td></td>
</tr>
<tr>
<td>Other:_______</td>
<td></td>
</tr>
<tr>
<td>Other:_______</td>
<td></td>
</tr>
</tbody>
</table>

Center To Protect Workers’ Rights 299
Some sources of lead dust hazards the risk assessor will be looking for include:

**Deteriorating Lead-based Paint** – Painted surfaces deteriorate for a number of reasons. The primary reason is moisture. Rain, leaks, condensation, and spills can cause paint to break down. Sun, heat, cold, and wind can wear down paint on exterior surfaces.

Paint will also deteriorate if it is not put on properly. Putting paint on glossy or greasy surfaces or on rotting or termite-damaged wood is not proper application. Sometimes the new layer of paint is incompatible with the old paint layer. This can also cause deterioration.

**Friction Surfaces** – Paint dust also forms any place where a painted surface rubs against another surface. When two surfaces rub against each other, the movement causes friction. Friction causes paint to flake, chip, and form dust. Lead-painted windows are the places where friction most often causes lead dust. Whenever a window goes up or down, it causes friction.

**Impact Surfaces** – Paint can be weakened by impact or forceful contact. This happens when a door closes. A door has many impact points where paint can flake and chip; so do windows, floors, and stairways.

**Accessible or Chewable Surfaces** – These surfaces are interior or exterior surfaces painted with lead-based paint that a young child can mouth or chew. Hard metal substrates and other materials that cannot be dented by the bite of a young child are not considered to be chewable.

**Lead Dust Buildup** – Lead dust is made of tiny lead particles. Lead particles are heavy and they stick to surfaces. They
land close to the surface they came from. When a lead-painted wall is flaking and peeling, the lead dust particles fall close to the wall. Lead dust tends to build up in spaces close to friction surfaces, such as window wells.

Lead dust can also build up in areas that are not cleaned properly. Lead dust gathers in cracks. It builds up behind cabinets, between floor boards, and behind baseboards. The dust may come out of the cracks over time due to air movement, impact, pressure, or even a child picking at the floor.

People Who Live in Houses with Lead-based Paint

Besides looking at possible lead-based paint hazards, the risk assessor looks at the people who live in the home. These are the people who could get lead poisoning. If there is a lot of lead dust, the risk increases that someone will get lead poisoning.

Children and pregnant women are at highest risk for lead poisoning. A home with deteriorating lead-based paint where a young child and a pregnant woman live would be a very high-risk home.
Activity #13: Calculating a TWA

Workers on a deleading job spend 1½ hours in the work area stripping paint and then go through the decon area. They take a ½ break and then return to the work area for 2 hours. They decon again and then take a one hour lunch break. After lunch they spend two more hours in the work area putting up sheetrock, go through decon, and leave for the day.

During the first hour in the lead contaminated area, their exposure was measured as 100 ug/m$^3$. During the two hours before lunch, they were exposed to 30 ug/m$^3$. During the two hours in the afternoon their exposure was 3 ug/m$^3$.

1. If the air was monitored on one of the three person crew, would the measurement be correct for all the workers in the area?

   Yes ___  No ___  Why?

2. If air monitoring was done on one worker who put up sheetrock all day, would that be correct for all the workers on the crew?

   Yes___  No___  Why?

3. For the two hours in the morning was the exposure in violation of the OSHA standard?

   Yes___  No___  Why?

4. Calculate the 8-hour time weighted average exposure that these workers had.

   _____ug/m$^3$
5. Is this exposure over the OSHA legal limit (PEL)?
   Yes___  No____  Why?

   Should these workers have respirators?  Yes___  No___ Why?

---

Activity #14: Evaluating Lab Test Results

Using the analysis provide below on dust wipe samples sent in earlier by Russ Domino, determine (1) where abatement, if any, has to be started or (2) if these samples are clearance tests, has the contractor met the HUD clearance requirements on any or all samples?

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Location</th>
<th>Surface</th>
<th>Dimensions of Sample Area</th>
<th>Total (ug) Lead</th>
<th>(ug/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04-1</td>
<td>Upstairs Large bedroom</td>
<td>Floor</td>
<td>12 x 12</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>04-2</td>
<td>Upstairs large bedroom</td>
<td>Front facing inter. window sill</td>
<td>24 x 3.0</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>04-3</td>
<td>Upstairs small bedroom</td>
<td>Floor</td>
<td>12 x 12</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>04-4</td>
<td>Upstairs small bedroom</td>
<td>Side facing inter. window sill</td>
<td>24 x 3.0</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td>04-5</td>
<td>Kitchen</td>
<td>Floor</td>
<td>12 x 12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>04-6</td>
<td>Kitchen</td>
<td>Window above sink inter. sill</td>
<td>24 x 3.0</td>
<td>211</td>
<td>422</td>
</tr>
</tbody>
</table>
Key Facts for Chapter 8

A lead-based paint hazard is any exposure to lead from contaminated dust, soil, or paint that makes people sick.

Any painted surface can have lead-based paint. HUD guidelines recommend testing all painted surfaces.

Inspections show which paint has lead. Lead inspectors must have special training and certification.

Testing for lead in paint.
1. Paint chip samples must include all paint layers. They are analyzed in a lab. Paint chip analysis measures the amount of lead by weight. Paint chip analysis is used on its own and to back up XRF tests.
2. XRFs are used on site and provide immediate analytical results. XRF readings tell how much lead is in the tested surface area.
3. Dust wipe tests measure lead dust on surfaces. Dust wipe tests may be done as part of the risk assessment process and they are done after every abatement job as the final clearance test for the job.
4. Wet chemical field tests are not analytical and they can only react with the surface(s) they come in contact with.

Area monitoring is the work area sampling of lead dust in the air.

Personal sampling is the use of the personal sampling pump to sample lead dust in the air for an individual or crew (doing same work). The sampling pump is worn on the hip by a worker, with the sampling cassette clipped (at a downward angle) to the protective suit within the
wearer’s personal breathing zone.

Air sampling results taken during a shift are used to calculate the Time Weighted Average exposure for that period of time, usually eight hours.

Risk assessments look at whether lead-based paint in a home is a health hazard to the people who live there. Children and pregnant women are at highest risk for lead poisoning. Sources of lead-based paint dust include:

- Deteriorating lead-based paint;
- Friction;
- Impact;
- Places where lead dust builds up; and
- Chewable surfaces.

For More Information

These publications have more information on the topics covered in this chapter.


EPA. *Methodology For XRF Performance Characteristic Sheets.* EPA 747-R-95-008. (September, 1997).


