TOWSON UNIVERSITY

LEAD PAINT MANAGEMENT PLAN

Department of Environmental Health & Safety

Phone: (410) 704-2949
Fax: (410) 704-2993
Emergency: (410) 704-4444
Email: Safety@towson.edu
Website: www.towson.edu/ehs/index.html

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I. INTRODUCTION

This document is the official University position on procedures and operations involving the use, maintenance, and disturbance of lead-containing substance.

"Lead Containing Substance" means any paint, plaster or other surface encapsulation material containing more than 0.50 percent lead by weight as lead metal in the dried solid, or more than 0.7 milligrams per square centimeter."

This document was developed to assure that lead and lead-containing substances are properly maintained handled and disposed of. The procedures outlined in this policy will promote the safe management of lead and lead-containing substances at TU. They will also help assure compliance with regulations applicable to lead.

The Department of Environmental Health & Safety (EHS) is designated as the University's representative regarding issues involving lead. EHS will conduct sampling, monitoring and inspections as deemed necessary to protect employee health and safety, and ensure compliance with regulatory requirements. EHS will prepare technical specifications for lead abatement projects and manage campus lead abatement projects. Any questions concerning lead or items specified in this policy shall be directed to EHS at (410) 704-2949or via E-mail at safety@towson.edu.

II. SCOPE

This policy applies to any work where TU and/or contractor personnel may be exposed to lead or lead-containing materials. Any coating that contains 0.5% lead by weight as determined by laboratory analysis or >0.7 milligrams per square centimeter (mg/cm^2) as measured by X-ray fluorescence analyzer (XRF) is considered lead containing and falls under the scope of this document. Occupationally, lead exposures may include:

- Demolition or salvage of structures where lead-containing materials may be present (e.g., lead pipes, lead painted metal or wood, etc.)
- Removal or encapsulation of materials containing lead (e.g. lead pipes and paints)
- New construction, alteration, repair or renovation of items containing lead
- Installation of materials containing lead
- Lead contamination or emergency cleanup
- Maintenance operations involving the disturbance of lead or lead-containing materials
- Indoor firing range operations

Unless working in a relatively new building (built since 1978), all paint shall be treated as lead-containing unless sampling shows otherwise.

III. PURPOSE

The purpose of this document is to provide information and guidance concerning the disturbance of lead-containing substances. Disturbance as used in this context would include scraping, washing, dry and limited wet sanding, grinding, sand blasting, welding, drilling, small surface cutting for installation of equipment, repainting activities, cleaning activities, and minor surface modifications.

This document is NOT intended to act as a guideline for lead paint abatement. "Lead paint abatement" means a set of measures designed to eliminate or reduce lead-based paint hazards in residential, public or commercial buildings, bridges, or other structures or superstructures in accordance with standards established by MDE.

When a project requires lead abatement, more stringent and detailed specifications will be supplied by EHS on a project-by-project basis.

IV. HEALTH HAZARDS OF LEAD

Health effects from lead exposure continue to be a concern both at the workplace and in the home. Since the ban on lead in gasoline, lead levels detected in areas near roadways have decreased dramatically; however, lead based paint used in buildings and housing prior to 1978 continue to serve as significant sources of exposure.

Lead poisoning can result from a single high level (acute) exposure or through a number of smaller repetitive (chronic) exposures. Most adults are exposed to lead through occupational sources, while children and infants are exposed primarily through surface dust and soil. Floors, chewable surfaces and soil contaminated with lead serve as primary exposure sources for children.

Lead has no beneficial effect on humans. Once it has been ingested into the body, lead is distributed in the bloodstream to red blood cells, soft tissues and bone. Lead in the body is eliminated very slowly, mainly by the kidneys and digestive tract. Irreversible kidney damage may have already developed by the time high blood lead levels are identified and treated, making avoidance to exposure and medical surveillance extremely important.

Acute lead poisoning symptoms usually include abdominal pain as in a gall bladder attack or appendicitis. Other non-specific complaints include irritability, fatigue, and weakness and muscle pain. In rare instances, damage to the brain and central nervous system also may occur. Chronic lead poisoning may result after lead has accumulated over time in the body and has been deposited mostly in the bone. Stored lead in the bone may be released to the blood stream to produce health effects such as defective hemoglobin synthesis, nervous system abnormalities, hypertension, effects in the reproductive system (including impotency) and damage to a developing fetus.

The measurement of blood lead level is the most reliable method of evaluating lead exposure. It indicates the amount of lead in the bloodstream, which is often a measure of recent exposure to lead. The present CDC "Level of Concern" in children (0-6 years) and pregnant women is 10 micrograms of lead per deciliter (mcg/dl) of blood. The current OSHA blood-lead standard for adult workers is 50 mcg/dl.

V. TRAINING

All TU employees involved, or have the potential to be involved, in the disturbance of lead-containing materials (e.g. lead based paint) as part of regular work activities must be properly trained. Typical job classifications needing lead training include painters, carpenters, custodial personnel, welders, electricians, plumbers and building maintenance personnel. EHS can provide Lead Awareness Training to these individuals. Employees involved in lead abatement activities must receive more extensive EPA/Maryland Department of the Environment (MDE) approved lead abatement worker and/or supervisor level training. At an MDE/EDA approved training facility. All lead based paint training will be coordinated through EHS.

Employees who may be exposed to lead in excess of 30 mcg/ml (OSHA Action Level) on any day during a given year must attend Lead Awareness Training. Training must be repeated each year that the employee may have such an exposure. This category would include employees who have the *potential* to disturb lead containing paints in the course of normal work activities such as carpenters, painters, plumbers, welders, electricians, and building maintenance workers.

The Lead Paint Abatement Worker Training Course is a 7-hour (1 day) hands-on training course for all employees involved in the disturbance of lead-based paints. The course must be repeated every 3 years.

All employees who will supervise employees performing lead based paint removal, maintenance or remediation work must attend a 28-hour initial Lead Paint Abatement Supervisors Course and have at lease 2 years professional trade experience as a carpenter, painter or in other skilled construction trade. A 7-hour (1 day) refresher course is required every 2 years.

All employees who will identify and measure lead content in paint must complete a 21-hour MDE approved initial Lead Paint Inspector Course. An additional 14-hours of training (Risk Assessor Course) are required for individuals who will assess the condition of lead based paints and inspect a site following a lead abatement project. A 7-hour (1 day) refresher course is required for both certifications every 2 years.

All employees who attend off-campus MDE approved lead paint training courses will send copies of their certificates to EHS immediately upon course completion.

VI. MEDICAL SURVEILLANCE

All TU employees involved in the disturbance of lead-containing materials (e.g., lead based paint) as part of regular work activities must be enrolled in the TU Occupational Medical Monitoring Program which is coordinated by EHS.

Employees will have blood lead levels checked initially, then at least annually thereafter. Blood lead levels should also be checked at the termination of employment. The ultimate frequency of blood screening will be dictated by the amount of lead related work each affected employee performs and on advice from the Occupational Medicine Physician.

VII. RESPIRATORY PROTECTION

All workers engaged in the disturbance of lead based paint shall be provided with respiratory protective equipment. Respiratory protection will be required under the following conditions:

- When industrial hygiene air monitoring indicates anticipated exposures in excess of the OSHA Permissible Exposure Limit (PEL) of 50 micrograms per cubic meter (mcg/m^3) of air,
- As required by the TU Project Manager,
- When the employee voluntarily chooses to wear the respirator for lead-based paint work regardless of documented exposure

The use of respiratory protection shall be in accordance with the University's Respiratory Protection Program. All workers must be medically evaluated to determine the ability of the worker to perform the work while wearing a respirator. Training in the care, use and fitting of the respirator and quantitative fit-testing of the respirator will be conducted by EHS for only those employees who are medically qualified to wear a respirator. Any worker who is not medically justified will be prohibited from engaging in activities which may expose the worker to airborne lead if exposures are anticipated to exceed the OSHA permissible exposure level.

All employee respirators worn at the work site must be placed in a plastic bag prior to leaving the site and thoroughly cleaned before being worn again. Cleaning shall include inspection of the respirator and replacement of worn parts. Fit-checks shall be done each time the respirator is worn. The medical exam, quantitative fit-test and respirator training must be repeated annually.

VIII. SAMPLING

Any painted surfaces (including stained and varnished) in buildings constructed prior to 1978 must be sampled before any significant disturbance takes place. Any other materials (i.e. window glazing, putties, and plumbing) that are suspected to contain lead must also be sampled before disturbance takes place.

To conduct a thorough investigation, each different surface should be sampled separately (examples include doors, windows, moldings, walls, ceilings, etc.). The primary lead paint sampling methods include:

- Spot Chemical Testing:

  Spot chemical testing is a qualitative test method that involves a process where a small amount of solution (typically sodium rhodonzonate) is placed on a sampling surface, and if lead is present, a colorimetric change will take place. This method involves a certain amount of paint destruction in order to test a complete cross section of paints and has proven to be the least reliable of the three listed methods.

- X-Ray Fluorescence (XRF):

  XRF analysis is a direct field reading instrument that will provide immediate results. EHS currently maintains an RMD Model LPA-1 XRF spectrum analyzer. The RMD uses a non-destructive analysis method which automatically adjusts for the substrate. As with the other analyses, different surfaces should be sampled separately. Because the RMD utilizes a radioactive source to measure lead content, occupants must be out of both the area to be tested and areas directly adjacent to the surfaces being tested (i.e. adjacent offices). Equipment operators must receive special training and participate in a radiation dosimetry program. At the present time, there is no correlation between results from laboratory analysis and XRF measurement.

- Laboratory Testing:

  Laboratory analysis provides the most reliable information but it can take as long as three weeks to receive results. The steps listed below should be followed when collecting bulk samples:

  1. All paint samples shall be collected in a new plastic zip-lock bag. Samples shall be labeled with a sample number, the surface sampled, the color of the paint sample, the sample location, the date sampled and the name of the person doing the sampling.

  2. For proper laboratory analysis, approximately 5 grams of paint chips must be collected. (For reference, a nickel weighs approximately 5 grams.)

  3. Samples must represent a cross section of materials down to the substrate. Care should be taken to collect as little substrate as possible. (For example, a paint sample on a wood door should contain paint down to the bare wood surface, but should not contain a significant amount of the wood itself.)

  4. Samples shall be sent to a laboratory accredited for lead paint analysis. Copies of all analysis reports shall be immediately sent to EHS.

IX. CONTRACTED LEAD ABATEMENT PROJECTS

As part of any renovation project, paint and other lead suspect materials must be analyzed in all sites to be disturbed. Spot and/or full abatement of leaded surfaces (lead containing materials) may be required before renovation or demolition can take place.

EHS must be contacted at least 14 working days in advance to conduct sampling prior to any activity that involves significant disturbance of materials potentially containing lead. For jobs involving the welding or cutting of painted surfaces or extensive removal of lead-containing plumbing material, more specific personal protective equipment as well as ventilation may be required.

X. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal protective equipment (PPE) is required when disturbing lead-containing materials. This equipment would include but not be limited to:

- Disposable or cleanable work gloves
- Coveralls (Tyvek or similar) with foot covering
- Goggles or face shields
- Properly fitted half-mask respirators with HEPA cartridges

Once removed, any disposable materials must be gathered and disposed of as lead waste. Specific requirements are outlined in **Section XVII- Disposal of Waste Materials.**

Work procedures not previously monitored will require personal air sampling to determine airborne lead levels and the adequacy of respiratory protection. Air samples will be collected by EHS, and then forwarded to an accredited laboratory for analysis. Employees must be trained in the use, fitting and limitations of their PPE as per OSHA's Personal Protective Equipment Standard (29CRF 1910.132-138).

XI. HYGIENE FACILITIES

Personal hygiene is critical in the control of lead exposure for employees working with lead containing materials. Hygiene facilities with soap, water and disposable towels must be provided for employees. If jobs are extensive or large in scope, or if the paint being disturbed has a high lead content, the waste water may have to be gathered and placed in drums for further analysis. Collection could take place until a correlation between the lead content of waste water, lead levels in paint and the activities performed could be established. Smoking, chewing tobacco, gum or food is prohibited in the work area. Employees must wash hands and face thoroughly before all breaks and at the end of the work shift.

XII. OPERATIONS & MAINTENANCE ACTIVITIES

In many instances, routine painting and repair jobs will disturb materials that contain lead. Lead-containing paint and window glazing are just two types of materials that may be encountered. A small amount of care can significantly decrease the potential for exposure to lead during maintenance activities that involve the disturbance of lead-containing materials.

The guidelines in this section should be used when the primary purpose of the work is not to remove lead-containing materials, but to conduct a small scale repair or maintenance activity. As an example, these guidelines would be used when scraping loose paint in preparation for a repainting job, but would not be appropriate in an instance where all paint from a surface (loose and intact) would be removed.

The following procedures shall be employed for operations and maintenance activities where prior sampling has confirmed the presence of lead. Employees conducting these types of activities must be included in the TU Medical Monitoring and Respiratory Protection Program and have attended an MDE approved Lead Paint Abatement Worker training class and MUST be supervised by a supervisor who has attended an MDE approve Lead Paint Abatement Worker Supervisor class.

A. INTERIOR WORK

1. Conduct work involving lead-containing materials at times when the area is unoccupied.

2. Remove all furnishings from the work area or cover with poly. Place 6-mil polyethylene sheeting (poly) a minimum of 6 feet horizontally out in all directions from the work area to cover the floor.

3. Seal all HVAC supply and return air ducts/plenums into the work area. If necessary, turn off the HVAC system to the area where work is planned.

4. Personal protective equipment (PPE) must be used, and at a minimum should include half-mask respirator with HEPA cartridges, full body disposable clothing (e.g., Tyvek suits) and gloves. Shoe covers shall be worn to avoid tracking lead dust and waste outside the immediate work area.

5. HEPA vacuums, disposable towels and wash-up facilities must be available to employees at the work site. Clean-up materials should be kept away from the immediate work area, but must be close enough to allow quick clean-up of employees and equipment. All reusable equipment (HEPA vacuums, scrapers, screwdrivers, etc.) must be properly cleaned at the end of each day's work and before leaving the job site.

6. The work area itself must be demarcated and barricaded using disposable danger tape and "Lead Danger" warning signs bearing the following legend:

Warning
Lead Work Area
Poison
No Smoking or Eating

7. Using a HEPA vacuum, vacuum any accumulated dust from the work area prior to beginning the maintenance activity. Do not sweep or brush potential lead containing dust.

8. Use care to minimize the production of dust from scraping or sanding. Use either wet sanding/scraping or HEPA filtration fitted equipment.

9. At break periods or when finished, workers must immediately proceed to assigned clean-up areas to decontaminate. The decontamination areas must be within the barricaded areas and must have polyethylene drop cloths or plastic tarpaulins as a floor. Upon completion of clean-up, discarded PPE will be gathered into 6 mil plastic bags or into drums for proper disposal. Waste PPE shall be kept separate from paint chips, dusts and debris to allow appropriate disposal. Specific waste characterization and disposal information is outlined in **Section XVII -Disposal of Waste Materials.**

10. When activities are complete, clean up any debris using HEPA vacuums. Working surfaces and the immediate work area shall then be wet wiped using disposable towels and a tri-sodium phosphate (TSP) detergent solution. Gather and containerize paint chips, dust and debris as lead-containing waste. Remove surface polyethylene and final clean the area again using wet methods and HEPA vacuuming. All used towels must be gathered and disposed of as contaminated waste. Surface polyethylene can then be HEPA vacuumed, rolled inwards and disposed of as general (non-hazardous) waste.

11. Waste generated in preparation activities (paint chips, glazing, etc.) shall be collected and deposited in an appropriate container. Specific waste characterization and disposal information is outlined in **Section XVII- Disposal of Waste Materials.**

12. Environmental monitoring (both area and personal) by EHS will be necessary until exposure potentials are determined.

B. EXTERIOR WORK

1. Wherever possible, work should be performed during off hours to minimize exposure to nearby pedestrians.

2. Building occupants shall be notified to close windows and doors within 25-feet of the work area. Any HVAC intakes within 25 feet must be turned off and sealed.

3. Pre-clean paint chips, dust and debris from existing surfaces (using HEPA vacuums and wet cleaning methods) before the job begins. Place reinforced polyethylene plastic catch sheeting or tarpaulins below the work area to collect falling debris and at least 10 feet out in all directions from the working surfaces. When working on elevated surfaces, an additional 6 feet of poly catch sheeting is required per floor above the first floor to a maximum of 25 feet. Individual catch sheets or tarpaulins shall be overlapped a minimum of 18 inches and taped or glued to each other. Prepping should not take place on windy days. Catch sheets or tarps should be weighted or secured to the ground.

4. All windows, doors and other openings in the work area shall be sealed using polyethylene on the inside. Care should be taken not to disturb interior surfaces which may also contain lead. Barrier tape will be used to isolate the work area in such a way that no member of the public can get within 10 ft. of the work area. (This requirement may need to be adjusted for work on elevated surfaces.) The work area itself must be demarcated and barricaded using disposable danger tape and "Lead Danger" warning signs bearing the following legend:

Warning
Lead Work Area
Poison
No Smoking or Eating

5. Personal protective equipment (PPE) must be used, and at a minimum should include a half-mask respirator with HEPA cartridges, disposable clothing and gloves. Shoe covers shall be worn to avoid tracking lead dust and waste outside the immediate work area.

6. HEPA vacuums, disposable towels and wash-up facilities must be available to employees at the work site. Clean-up materials should be kept away from the immediate work area, but must be close enough to allow quick clean-up of employees and equipment. All reusable equipment (HEPA vacuums, scrapers, screw drivers, etc.) must be properly cleaned at the end of each day's work and before leaving the job site.

7. When preparation activities are completed, working surfaces and the immediate work area shall be wet wiped using disposable towels and a tri-sodium phosphate (TSP) detergent solution. All used towels must be gathered and disposed of as contaminated waste. Surface polyethylene will then be HEPA vacuumed, wet wiped and then rolled inwards and disposed of as general waste.

8. At break periods or when finished, workers must immediately proceed to assigned clean-up areas to decontaminate. The decontamination areas must be within the barricaded areas and must have polyethylene drop cloths or plastic tarpaulins as a floor. Upon completion of clean-up, discarded PPE will be gathered into 4-6 mil plastic bags or into drums for proper disposal. Waste PPE should be kept separate from paint chips, dust and debris to allow appropriate disposal (see Section XVII- Disposal of Waste Materials).

9. Waste generated in preparation activities (paint chips, glazing, etc.) shall be collected and deposited in an appropriate container. Specific waste characterization and disposal information is outlined in **Section XVII- Disposal of Waste Materials.**

10. Environmental monitoring (both area and personal) by EHS will be necessary until exposure potentials are determined.

XIII. LEAD REMOVAL METHODS

A. ACCEPTABLE METHODS

The removal methods listed below are acceptable for operations and maintenance or abatement activities by personnel that have had the proper training, medical surveillance, and have completed the appropriate work area set-up outlined earlier.

1. Small Scale Operations and Maintenance Removal Methods:

- Manual wet scraping with scrapers and wire brushes
- Limited dry sanding with accompanied ventilation (e.g. HEPA vacuum)
- Limited wet sanding

For purposes of this document, "Small Scale" is defined as:

- $\leq 2ft^2$ of damage on components or large surfaces; or,
- $\leq 10\%$ of damage of total surface area or small components; or
- $\leq 10\%$ of damage on large exterior surfaces.

2. Abatement Removal Methods:

- Chemical paint strippers that are approved by EHS (e.g., methylene chloride-free solutions)
- Manual scraping with the aid of approved chemical solvents (e.g., not containing methylene chloride)
- Paste formulations containing potassium or sodium hydroxide
- Mechanized sanding equipment with dedicated HEPA filtered exhaust systems

B. PROHIBITED METHODS

The following list of removal methods for either operations and maintenance or abatement activities are prohibited and will not be allowed:

- Use of heat guns
- Open flame torching
- Dry abrasive blasting using sand, grit or any other particulate
- Use of chemical strippers not approved by EHS
- Mechanized sanding without dedicated HEPA filtered collection systems

XIV. ROUTINE CLEANING OF LEAD PAINTED SURFACES

The following items apply to personnel involved in sweeping or wall cleaning in areas where paint chips or dusts are present. This would primarily apply to housekeeping personnel and any other University employee(s) cleaning areas potentially contaminated with lead paint or dust.

1. Employees should attend a Lead Awareness Training Class
2. Report peeling paint or paint in poor condition to Facilities Maintenance.
3. Assume paint is lead-containing unless testing shows otherwise
4. Cleaning of lead painted surfaces shall be performed using HEPA vacuums dedicated for lead, followed by wet methods (i.e. use wet towels, sponges or cloths). To specifically clean lead dusts from surfaces, a detergent containing TSP such as "Spic and Span" is recommended
5. Disposable gloves must be worn during cleaning. Respirators are not considered necessary for small cleaning jobs. Larger cleaning jobs may require respirators. HEPA vacuums shall be used whenever possible to minimize exposure.
6. Gloves, sponges, disposable towels and other non-cleanable materials used in the cleaning of lead painted or contaminated surfaces must be placed in plastic bags, labeled as "Lead Paint Contaminated Cleaning Materials" and dated. The waste will be collected by EHS. See **Section XVII- Disposal of Waste Materials** for proper handling of waste materials.

XV. LEAD ABATEMENT PROJECTS

Activities resulting in the disturbance of lead containing materials for the purpose of removing lead based paint or çde-leading surfaces will require special conditions and considerations not outlined in this document. At minimum, abatement of lead paint will be performed either by:

1. TU Employees who:

   - Are participating in and qualified under the TU Occupational Medical Monitoring and Respiratory Protection Programs; and,
   - Have successfully completed an MDE approved Lead Paint Abatement Worker training course in the last three (3) calendar years; and,

- Are under the direct supervision of an individual who has successfully completed an MDE Lead Paint Abatement Supervisors training course and whose certification is current; OR

2. MDE Licensed Contractors

Work area set-ups will be unique to each project and will be handled on a job-by-job basis. Individual departments disturbing lead based paint must contact EHS at (410) 704-2949 or via E-mail at safety@towson.edu before beginning the job to ensure all surfaces have been tested and to schedule personal monitoring. Any significant disturbance (> Small Scale) or abatement of lead-containing materials must be accompanied by air sampling. EHS will designate both the types and numbers of samples necessary on a job by job basis. Final wipe sampling shall be required to allow for re-occupation at the completion of a project. EHS will evaluate the need to conduct clearance sampling and the scope of the required sampling. The analysis of these samples could be a lengthy process, sometimes taking up to three weeks. It is critical that appropriate time be scheduled for this type of delay.

XVI. OTHER LEAD ACTIVITIES

A. WELDING AND CUTTING OF METAL SURFACES

All painted metal surfaces (I-beams, pipes, etc.) shall be assumed to be lead-containing unless sampling or a manufacturer's specifications show otherwise. Industrial coatings often contain other hazardous ingredients in addition to or in place of lead. These might include, but are no limited to, chromium, cadmium and mercury. When welding and/or cutting lead painted surfaces, powered air purifying respirators (PAPR's) with HEPA filters are required. PAPR's are recommended for all welding and cutting operations unless ventilation is in place to control contaminants. If welding or cutting is done in an occupied building, proper exhaust ventilation must be supplied. Similar guidelines apply to soldering of sheet metal, tubing, piping, or sewer piping involving lead solder or other lead containing materials.

The cutting, welding, sanding or abrasive blasting of painted metal surfaces is considered by OSHA to be so inherently dangerous that full worker protection to include respirators, protective clothing, wash-up facilities and a prohibition of eating, drinking and smoking in the workplace is required until airborne exposure monitoring indicates that it is not necessary.

At least five (5) business days prior to cutting, welding, sanding or abrasive blasting of any painted metal surfaces, EHS must be contacted (410) 704-2949 or safety@towson.edu) to schedule exposure monitoring.

B. LEAD CABLE SPLICING

Sampling during the splicing of lead jacketed electrical lines has shown the potential for exposures to lead at or above the action level. Any soldering or heating of lead jacketed materials shall be conducted using proper engineering controls (i.e. ventilation), personal hygiene, PPE, and personal monitoring. EHS can assist in identifying the specific controls that are needed.

XVII. DISPOSAL OF WASTE MATERIALS

A. PACKAGING AND LABELING OF WASTE MATERIALS

The University shall provide DOT 30 or 55-gallon steel drums, or DOT 5-gallon plastic containers and hazardous waste labels required for the proper disposal of hazardous wastes. The contractor shall provide 6-mil plastic drum liners when necessary. The contractor is responsible for obtaining the required drums, containers, and labels from EHS and returning sealed and labeled containers of waste to EHS between 8:30 a.m. and 4:30 p.m., Monday through Friday (except on University Holidays) EHS can be reached at (410) 704-2949 or via E-mail at safety@towson.edu.

1. Paint Chips, Flakes, Dust, Debris and Residues

a) Place these wastes in a 55-gallon NA 1A2 (or equivalent) open-top drum.
b) Fill drum to capacity, install gasket on lid, apply lock ring, seal drum.
c) Apply a Hazardous Waste Label to the drum side.
d) Enter the Proper Shipping Name on the label as follows:

RQ, Environmentally Hazardous Substance, Solid, NOS, 9, UN3077, III, (Lead Paint Waste, D008)

e) Write the date on which the waste was first placed in the drum on the label.
f) Write the campus location where the waste was generated on the label.
g) Place nothing else in this drum.

2. **Lead Contaminated Structures, Fixtures, Frames (Minimum Quantities)**

   a) Cut debris to fit into a 55 gallon NA 1A2 (or equivalent) open-top drum.

   b) Fill drum to capacity, install gasket on lid, apply lock ring, seal drum.
   c) Apply a Hazardous Waste Label to the drum side.
   d) Enter the Proper Shipping Name on the label as follows:

      RQ, Environmentally Hazardous Substance, Solid, NOS, 9, UN3077, III, (Lead Paint Waste, D008)

   e) Write the date on which the waste was first placed in the drum on the label.
   f) Write the campus location where the waste was generated on the label.
   g) Place nothing else in this drum.

3. **Contaminated Disposable Tools, Brushes, Wipes, Polyethylene, Tape, Tyvek Suits and Safety Gear Contaminated with Chemical Stripping Product or Chemical Neutralizer. (Waste types may be mixed in the same drum.)**

   a) Place waste material inside a heavy plastic bag ($\geq$4 mil). Place bagged waste inside a 55 gallon NA 1A2 (or equivalent) open-top drum.
   b) Fill drum to capacity, install gasket on lid, apply lock ring, seal drum.
   c) Apply a Hazardous Waste Label to the drum side.
   d) Enter the Proper Shipping Name on the label as follows:

      RQ, Waste Corrosive Solids, Basic, Inorganic, NOS, 8, UN3262, II (DO02, D008)

   e) Write the date on which the waste was first placed in the drum on the label.
   f) Write the campus location where the waste was generated on the label.
   g) Place nothing else in this drum.

4. **Waste Oil Based Paint/Primer, Solvent and Deglosser Residues from Emptied Containers (Waste types may be mixed in the same drum)**

a) Pour waste into a 30 or 55 gallon NA 1A1 (or equivalent) closed-head drum. Leave a three inch (3") head space in the drum. (Use 5 gallon containers if less than 20 gallons of waste is produced.)
b) Secure all drum closures.
c) Apply a Hazardous Waste Label to the drum side.
d) Enter the Proper Shipping Name on the label as follows:

RQ, Waste Flammable Liquids, NOS, 3, UN1993, II (DO01, F005, D008)

e) Write the date on which the waste was first placed in the drum, adjacent on the label.
f) Write the campus location where the waste was generated on the label
g) Place nothing else in this drum.

5. **Spent Caustic Chemical Stripping Product Peeled from Structures, Stripping Product Container Residues, and Spent Chemical Absorptive Cloth or Paper (Waste types may be mixed in the same drum)**

a) Place waste material inside a heavy plastic bag (≥4 mil). Place bagged waste inside a 30 or 55 gallon NA 1A1 (or equivalent) open-top drum.
b) Fill drum to capacity, install gasket on lid, apply lock ring, seal drum.
c) Apply a Hazardous Waste Label to the drum side.
d) Enter the Proper Shipping Name on the label as follows:

RQ, Waste Corrosive Solids, Basic, Inorganic, NOS, 8, UN3262, II (DO02, D008)

e) Write the date on which the waste was first placed in the drum, on the label.
f) Write the campus location where the waste was generated on the label.
g) Place nothing else in this drum.

6. **Spent Chemical Neutralizer, Chemical Neutralizer Container Residues, and Contaminated Rinse Water (Waste types may be mixed in the same drum)**

a) Pour waste into a 30 or 55 gallon NA 1A1 (or equivalent) closed-head drum. Leave a three inch (3") head space in the drum.
b) Secure all drum closures.
c) Apply a Hazardous Waste Label to the drum side.
d) Enter the Proper Shipping Name on the label as follows:

RQ, Waste Corrosive Solids, Basic, Inorganic, NOS, 8, UN3262, II (DO02, D008)

e) Write the date on which the waste was first placed in the drum, on the label.
f) Write the campus location where the waste was generated on the label.
g) Place nothing else in this drum.

B. REMOVAL OF HAZARDOUS WASTES

Containers of hazardous waste may remain at the job-site while they are being filled or if partially filled, until completion of the job, provided that each waste container is properly labeled and closed at all times except to add waste. Bulk liquid waste containers will be stored in secondary containment devices such as pans or basins to contain spills and/or labs.

The contractor shall transport filled containers from the job-site to the TU Hazardous Waste Storage Facility between 8:30 a.m. and 4:30 p.m., Monday through Friday (except University Holidays). The contractor shall contact EHS at (410) 704-2949 or via E-mail at safety@towson.edu to assure someone is available to accept wastes. No drums or containers may be delivered without an EHS employee present to accept the waste.

The contractor is responsible for security and short term storage of all hazardous wastes generated at the job-site until the waste has been transferred to the TU Hazardous Waste Storage Facility. The contractor is responsible for all environmental dangers arising from improper stored hazardous wastes.

C. BACK-CHARGES

Where the contractor fails to fulfill packaging, labeling, handling, waste segregation or disposal requirements previously mentioned, the University will charge all costs associated with that hazardous waste, to include but not be limited to, packaging, handling, segregation and disposal in accordance with EPA and DOT regulations to the responsible contractor.

XIV. SUMMARY

The TU Lead Paint Management Plan applies to any work where TU and/or contractor personnel may be exposed to lead or lead-containing materials. Activities covered by this guideline include (but are not limited to) demolition, renovation, encapsulation, maintenance operations and paint-prepping.

All TU employees involved in the disturbance of lead-containing materials and lead based paint as part of regular work activities must be trained to the appropriate level at an MDE approved training class and must be enrolled in the TU Occupational Medical Monitoring and Respiratory Protection Programs. TU employees exposed to airborne lead above the OSHA Action Level of 30mcçg/m^3 must have medical surveillance.

EHS will conduct necessary sampling, monitoring and inspections to ensure compliance with regulations as well as to protect employee health and safety. EHS will provide guidance to departments regarding lead, lead exposure, and if necessary, lead abatement and will prepare technical specifications for lead abatement projects. EHS will manage lead abatement projects.

Any questions concerning lead or items specified in the guideline should be directed to EHS at (410) 704-2949 or via E-mail at safety@towson.edu.

XIX. LEAD FACT SHEET

(See Next Page)

Introduction

Workers have been poisoned by lead for thousands of years. Most lead over exposures in the construction industry are found in the trades such as plumbing, welding and painting. In building construction, lead is frequently used for roofs, cornices, tank linings and electrical conduits. In plumbing, an alloy of lead/tin had been used extensively for soldering tin-plate and pipe joints. Use of lead solders in plumbing systems is now prohibited by law. Lead-based paint had also been used extensively for residential and commercial applications but has been banned for residential use since 1978 by the Consumer Product Safety Commission. Lead-based paint may still be used on metal structures (bridges, railways, beams, etc.) to prevent corrosion, although substitute coatings are now available.

Significant lead exposures can arise during stripping or demolition of structures containing lead-based paint. Due to increases in highway work such as bridge repairs, residential remodeling and lead abatement, the potential for exposure to lead has become more common. The types of work with the greatest potential for lead exposure include iron work, demolition, painting, plumbing, electrical, lead-based paint abatement, heating/air conditioning and carpentry/renovation activities.

University Policy

It is Towson University policy to comply with all Federal and State regulations.

Applicable Regulations

29 CFR 1.910.1025 - Lead (OSHA - General Industry)
29 CFR 1926.62 - Lead (OSHA - Construction)
COMAR 26.02.07 - Procedures for Abating Lead Containing Substances from Buildings
COMAR 26.16.01 - Accreditation and Training for Lead Paint Abatement Services
COMAR 26.16.92 - Reduction of Lead Risk in Housing

Summary of Requirements

- Contractors performing lead abatement must be licensed by the Maryland Department of the Environment (MDE)
- Prior to the performance of any demolition or renovation activities, materials must be assessed for the presence of lead
- Representative and periodic air monitoring must be conducted for all employees with airborne (fume, dust) lead exposure
- Employees with 8-hour time weighted average (TWA) exposures over 30 çg/m^3 (Action Limit) for thirty days per year must be enrolled in a lead medical surveillance program
- All employees with potential exposure to lead must receive lead awareness training
- Employees with lead exposure in excess of the Permissible Exposure Limit (PEL) of 50 çg/m^3 as an 8-hour TWA must be provided appropriate protective clothing and respiratory protection
- Engineering controls must be implemented, if feasible, to reduce lead exposures below the PEL
- A written, compliance plan must be implemented if airborne concentrations of lead exceed 50 çg/m^3 as an 8-hour TWA
- Surfaces must be maintained as free as possible from accumulation of lead dust.
- Signs must be posted outside areas where employees' lead exposures exceed the PEL
- Certain work practices such as open flame burning, heat guns, dry sanding and dry scraping of lead-containing substances are not permitted
- Specific containment procedures are stipulated to control emissions from interior and exterior lead abatement sites
- Surfaces in lead abatement sites must be cleaned
- Lead-containing wastes must be handled, transported of and disposed per DOT and EPA/MDE regulations
- Specific surface lead dust testing must be performed in residential properties following lead abatement to verify an adequate cleanup

Training

- All employees with potential exposure to lead must receive basic awareness training.
- Individuals performing certain lead-related functions must receive MDE-accredited initial and refresher training. The training classes are:

    - Lead Paint Abatement Worker
    - Lead Paint Abatement Contractor
    - Lead Paint Abatement Supervisor
    - Lead Abatement (Residential) Project Designer
    - Lead Paint Inspector
    - Lead Paint Risk Assessor

Reporting

- A facility owner is required to notify residential occupants of all planned contractual lead abatement.
- Licensed contractors must notify EPA/MDE of all lead abatement projects.

Written Program

A written compliance program must be developed for each lead abatement activity. It must be reviewed every six months and be available for on-site inspection. The following items are major components:

- regulatory information
- description of emission activities
- PEL compliance technologies
- air monitoring program
- work practices
- administrative control program
- personnel protection program
- medical surveillance/removal
- information and training
- signage
- record keeping

Inspections

- Building materials must be assessed for the presence of lead prior to all demolition and renovation operations.

- EPA/MDE may inspect lead abatement projects at any time to determine regulatory compliance and adequacy of work.

Record Keeping

- Facilities will maintain specific records relative to each lead abatement project.
- Exposure monitoring and medical surveillance records must be maintained per requirements of 29 CFR 1910.20.

University Resources

Department of Environmental Health & Safety (EHS):	(410) 704-2949
EHS E-mail:	safety@towson.edu
EHS Fax No:	(410) 704-2993

APPENDIX A

WIPE SAMPLING FOR SETTLED LEAD-CONTAINING DUST

Appendix 13.1: Wipe Sampling for Settled Lead-Contaminated Dust

Wipe samples for settled leaded dust can be collected from floors (both carpeted and uncarpeted), interior and sash/sill contact areas, and other reasonably smooth surfaces. Wherever possible, hard surfaces should be sampled. Wipe media should be sufficiently durable so that it is not easily torn, but can be easily digested in the laboratory. Recovery rates of between 80-120% of the true value should be obtained for all media used for wipe sampling. Blank media should contain no more than 25 µg/wipe (the detection limit using Flame Atomic Absorption). Additional standards for wipe sampling can be found by consulting ASTM ES 30-94.

1. **Wipe Sampling Materials and Supplies**

   a. Type of disposable wipe: Any wipe material that meets the following criteria may be used:

      (i) Contains low background lead levels (less than 5 µg/wipe)
      (ii) Is a single thickness
      (iii) Is durable and does not tear easily (do not use Whatman™ filters)
      (iv) Does not contain aloe
      (v) Can be digested in the laboratory
      (vi) Has been shown to yield 80-120% recovery rates from samples spiked with leaded dust (not lead in solution)
      (vii) Must remain moist during the wipe sampling process (wipes containing alcohol may be used as long as they do not dry out)

      Examples of acceptable wipe media include: "Little Ones Baby Wash Cloths™," "Little Ones Baby Wipes Natural Formula™," or "Little Ones Baby Wipes Lightly Scented™," available at K-Mart Stores. This product is also available under the brand names "Pure and Gentle Baby Wipes™" and "Fame Baby Wipes™." Individually-packaged "Wash'n Dri Wipes" are also acceptable. "Wet Wipes," which are available at Walgreens and other stores, may also be used. Other brands are also acceptable if equivalence in both lead contamination (analysis of blanks) and laboratory digestion recoveries (analysis of wipes spiked with known amounts of leaded dust, not lead in solution) can be established. The wipes listed above have proven to be sufficiently durable under field use and to have acceptable recovery rates. Do not use "Little Ones Diaper Wipes," also available at K-Mart stores, or any other brand of wipes for which recovery data have not been established. Do not use wipes that contain aloe. Wipes that contain alcohol may be used as long as they do not dry out during the wipe process.

   b. Non-sterilized non-powdered disposable gloves. Disposable gloves are required to prevent cross-sample contamination from hands.

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c. Non-sterilized polyethylene centrifuge tubes (50 ml size) or equivalent hard-shell container that can be rinsed quantitatively in the laboratory.

d. Dust sample collection forms contained in these Guidelines

e. Camera & Film to document exact locations (Optional)

f. Template Options

i. Masking tape. Masking tape is used on-site to define the area to be wiped. Masking tape is required when wiping window sills and window wells in order to avoid contact with window jambs and channel edges. Masking tape on floors is used to outline the exact area to be wiped.

ii. Hard, smooth, reusable templates made of laminated paper, metal, or plastic. Note: Periodic wipe samples should be taken from the templates to determine if the template is contaminated. Disposable templates are also permitted so long as they are not used for more than a single surface. Templates must be larger than 0.1 ft^2, but smaller than 2 ft^2. Templates for floors are typically 1 ft^2. Templates are usually not used for windows due to the variability in size and shape (use masking tape instead).

g. Container labels or permanent marker.

h. Trash bag or other receptacle (do not use pockets or trash containers at the residence).

i. Rack, bag, or box to carry tubes (optional)

j. Measuring tape

k. Disposable shoe coverings (optional)

2. **Single Surface Wipe Sampling Procedure**

a. Outline Wipe Area:

Floors: Identify the area to be wiped. Do not walk on or touch the surface to be sampled (the wipe area). Apply adhesive tape to perimeter of the wipe area to form a square or rectangle of about one square foot. No measurement is required at this time. The tape should be positioned in a straight line and corners should be nominally perpendicular. When putting down any template, do not touch the interior wipe area.

Window sills and other rectangular surfaces: Identify the area to be wiped. Do not touch the wipe area. Apply two strips of adhesive tape across the sill to define a

wipe area at least 0.1 square foot in size (approx. 4 inches x 4 inches).

When using tape, do not cross the boundary tape or floor markings, but be sure to wipe the entire sampling area. It is permissible to touch the tape with the wipe, but not the surface beyond the tape.

b. Preliminary inspection of the disposable wipes:

Inspect the wipes to determine if they are moist. If they have dried out, do not use them. When using a container that dispenses wipes through a "pop-up" lid, the first wipe in the dispenser at the beginning of the day should be thrown away. The first wipe may be contaminated by the lid and is likely to have dried to some extent. Rotate the container before starting to ensure liquid inside the container contacts the wipes.

c. Preparation of centrifuge tubes:

Examine the centrifuge tubes and make sure that the tubes match the tubes containing the blind spiked wipe samples. Partially unscrew the cap on the centrifuge tube to be sure that it can be opened. Do not use plastic baggies to transport or temporarily hold wipe samples. The laboratory cannot measure lead left on the interior surface of the baggie.

d. Gloves

Don a disposable glove on one hand; use a new glove for each sample collected. If two hands are necessary to handle the sample, use two new gloves, one for each hand. It is not necessary to wipe the gloved hand before sampling. Use a new glove for each sample collected.

e. Initial placement of wipe:

Place the wipe at one corner of the surface to be wiped with wipe fully opened and flat on the surface.

f. First wipe pass - (side-to-side):

With the fingers together, grasp the wipe between the thumb and the palm. Press down firmly, but not excessively with both the palm and fingers (do not use the heel of the hand). Do not touch the surface with the thumb. If the wipe area is a square, proceed to wipe side-to-side with as many "S"-like motions as are necessary to completely cover the entire wipe area. (See step h for non- square areas.) Exerting excessive pressure on the wipe will cause it to curl. Exerting too little pressure will result in poor collection of dust. Do not use only the fingertips to hold down the wipe, because there will not be complete contact with the surface and some dust may be missed. Attempt to remove all visible dust from the wipe area.

g. Second wipe pass - (top-to-bottom):

Fold the wipe in half with the contaminated side facing inward. (The wipe can be straightened out by laying it on the wipe area, contaminated side up, and folding it over.) Once folded, place in the top corner of the wipe area and press down firmly with the palm and fingers. Repeat wiping the area with "S"-like motions, but on the second pass, move in a top-to-bottom direction. Attempt to remove all visible dust. Do not touch the contaminated side of the wipe with the hand or fingers. Do not shake the wipe in an attempt to straighten it out, since dust may be lost during shaking.

h. Rectangular areas (e.g. window sills):

If the surface is a rectangle (such as a window sill), two side-to-side passes must be made over half of this surface, the second pass with the wipe folded so that the contaminated side faces inward. For a window sill, do not attempt to wipe the irregular edges presented by the contour of the window channel. Avoid touching other portions of the window with the wipe. If there are paint chips or gross debris in the window sill, attempt to include as much of it as possible on the wipe. If all of the material cannot be picked up with one wipe, field personnel may use a second wipe at their discretion and insert it in the same container. Consult with the analytical laboratory to determine if they can perform analysis of two wipes as a single sample. When performing single-surface sampling, do not use more than two single surface wipes for each container. If heavily dust-laden, a smaller area should be wiped. It is not necessary to wipe the entire window well but do not wipe less than 0.10 ft^2 (approx 4" x 4").

i. Packaging the Wipe:

After wiping, fold the wipe with the contaminated side facing inward again, and insert aseptically (without touching anything else) into the centrifuge tube or other hard-shelled container. If gross debris is present, such as paint chips in a window well, make every attempt to include as much of the debris as possible in the wipe.

j. Labelling the Centrifuge tube:

Seal the tube and label with the appropriate identifier. Record the laboratory submittal sample number on the field sampling form (see Chapters 5 and 14).

k. Area Measurement:

After sampling, measure the surface area wiped to the nearest eighth of an inch using a tape measure or a ruler. The size of the area wiped must be at least 0.10 ft^2 in order to obtain an adequate limit of quantitation (25 µg/wipe is the typical detection limit with flame AA; 25 µg/0.10 square feet = 250 $µg/ft^2$, which is half of the HUD clearance criterion for interior window sills). No more than 2 square feet should be

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wiped with the same wipe or else the wipe may fall apart. Record specific measurements for each area wiped on the field sampling form.

l. Form Completion

Fill out the appropriate field sampling forms (see Form 5.4 or Form 14.2 in these Guidelines) completely. Collect and maintain any field notes regarding type of wipe used, lot number, collection protocol, etc.

m. Trash Disposal:

After sampling, remove the masking tape and throw it away in a trash bag. Remove the glove; put all contaminated gloves and sampling debris used for the sampling period into a trash bag. Remove the trash bag when leaving the dwelling. Do not throw away gloves or wipes inside the dwelling unit where they could be accessible to young children, resulting in a suffocation hazard.

Repeat steps a. through m. for additional samples in the same dwelling unit.

3. Composite Wipe Sampling

Whenever composite sampling is contemplated, consult with the analytical laboratory to determine if the laboratory is capable of analyzing composite samples. When conducting composite wipe sampling, the procedure stated above should be used with the following modifications:

When outlining the wipe areas (step a), set up all of the areas to be wiped before sampling. The size of these areas should be roughly equivalent, so that one room is not over-sampled.

After preparing the centrifuge tube, put on the glove(s) and complete the wiping procedures for all subsamples (steps e-i). A separate wipe must be used for each area sampled. After wiping each area, carefully insert the wipe sample into the same centrifuge tube (no more than 4 wipes per tube).

Once all subsamples are in the tube, label the tube. Record a separate measurement for each area that is subsampled on the field collection form (see Form 5.4a or Form 14.2a for a sample form). Finally, complete trash disposal (step m), making sure that no masking tape is left behind.

Risk assessors and inspector technicians do not have to remove their gloves between subsample wipes for the same composite sample as long as their gloved hands do not touch an area outside of the wipe areas. If a glove is contaminated, the glove should be immediately replaced with a clean glove.

In addition to these procedural modifications, the following rules for compositing should be observed:

- Separate composite samples are required from carpeted and hard surfaces (*e.g.*, a single

composite sample should not be collected from both carpeted and bare floors).

- Separate composite samples are required from each different component sampled (*e.g.*, a composite sample should not be collected from both floors and window sills).

- Separate composite samples are required for each dwelling

4. Blank Preparation

After sampling the final dwelling unit of the day, but before decontamination, field blank samples should be obtained. Analysis of the field blank samples determines if the sample media is contaminated. Each field blank should be labeled with a unique identifier similar to the others so that the laboratory does not know which sample is the blank (i.e., the laboratory should be "blind" to the blank sample).

Blank wipes are collected by removing a wipe from the container with a new glove, shaking the wipe open, refolding as it occurs during the actual sampling procedure, and then inserting it into the centrifuge tube without touching any surface or other object. One blank wipe is collected for each dwelling unit sampled or, if more than one dwelling unit is sampled per day, one blank for every 50 field samples, whichever is less. Also, collect one blank for every lot used. Record the lot number.

5. Inspector Decontamination:

After sampling, wash hands thoroughly with plenty of soap and water before getting into car. A bathroom in the dwelling unit may be used for this purpose, with the owner's or resident's permission. If there is no running water in the dwelling unit, use wet wipes to clean the hands. During sampling, inspectors must not eat, drink, smoke, or otherwise cause hand to mouth contact.

6. Spike Sample Submission

Samples spiked with a known amount of leaded dust should be inserted into the sample stream randomly by the person conducting field sampling to determine if there is adequate quality control of the digestion process at the laboratory. Dust-spiked wipe samples should be submitted blindly to the laboratory by the individual performing field sampling at the rate of no less than one for every fifty field samples. Any laboratory can spike wipe samples using the procedure in Appendix 14.3. The laboratory performing the analysis of the field samples can also prepare the spike sample as long as the person performing the field sampling makes the spike sample indistinguishable from the field samples. The person conducting the field sampling should take the spike sample prepared in the laboratory and relabel the container with an identifier similar to the other field samples. The spike sample wipe should not be put into another container. Spike samples should be made using the same lot as that used in the field.

A dust-spiked sample is defined as a wipe or filter containing a known weight of lead-based paint dust, measured to the nearest 0.1 µg of leaded dust. A dust-spiked sample is prepared in a laboratory with the amount of lead-based dust present being between 50 - 1000 µg. For wipe

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samples, labs should use NIST Standard Lead Paint Dust (Standard 1578) or an equivalent secondary standard. See Appendix 14.3 for further details.

7. Field Qualifications of Dust Sampling Technicians

All individuals performing dust sampling should have state-certified training. Where possible, field experience in environmental sampling is preferable.

8. Quality Assurance/Quality Control

Blind analysis of spiked samples must fall within 80% - 120% of the true value. If the laboratory fails to obtain readings within the QA/QC error limits:

a. Two more spikes should be sent immediately to the lab for analysis.

b. If the two additional spike samples fail, the sample batch should be considered invalid. A full review of laboratory procedures may be necessary. Additional samples may need to be collected from the dwelling units from locations near the locations previously sampled.

If more than 50 µg/wipe is detected in a blank sample, the samples should be collected again since the media is contaminated. Blank correction of wipe samples is not recommended.

9. Other Information

See Chapter 5 and Chapter 14 for additional information on dust wipe sampling. Also see "Residential Sampling for Lead: Protocols for Leaded Dust and Soil Sampling" from EPA and ASTM ES 30-94 for further information.

APPENDIX B

PAINT CHIP SAMPLING

Appendix 13.2
Paint Chip Sampling

Dust sampling must always be done **before** paint chip sampling in order to minimize the prospect of cross-sample contamination. Paint chip sampling is a destructive method that may release a small quantity of lead dust. Although paint chip samples are to be collected from inconspicuous areas, the occupant must always be notified that paint chip sampling may be necessary.

1. Paint Chip Sampling Tools and Materials

a. Sharp stainless steel paint scraper (such as Proprep™ Scraper, $7.50, 1-800-255-4535) available at many paint stores.

b. Disposable wipes for cleaning paint scraper.

c. Non-sterilized non-powdered disposable gloves.

d. Hard-shelled containers (such as non-sterilized 50-ml polypropylene centrifuge tubes) that can be rinsed quantitatively for paint chip samples if results are to be reported in mg/cm². Ziplock baggies can be used only if results are to be reported in µg/g or percent by weight.

e. Collection device (clean creased piece of paper or cleanable tray).

f. Field sampling and laboratory submittal forms.

g. Tape measure or ruler (if results are reported in mg/cm²).

h. Ladder.

i. Plastic trash bags.

j. Flashlight.

k. Adhesive tape.

l. Heat Gun or other heat source operating below 1100°F to soften the paint before removal.

2. Containment

a. Method One: Plastic Sheeting Underneath Sampling Area

A clean sheet of plastic measuring four feet by four feet should be placed under the area to be sampled to capture any paint chips that are not captured by the collection device or creased piece of paper. Any visible paint chips falling to the plastic should be included in the sample. Dispose of the plastic after each sample is collected by placing the sheeting in a trash bag. Do not throw away the plastic at the dwelling. Wet wipes may be used to clean the area.

b. Method Two: "Glovebag" Approach

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If further containment is deemed necessary, a "glovebag" approach may be used. A durable sheet of plastic is loosely taped to the surface to be sampled, with a paint scraper, collection device, and shipment container housed inside the plastic. There should be enough "play" in the plastic to permit a scraping motion without dislodging the tape holding the plastic to the surface. Large plastic baggies can be used in lieu of the sheet of plastic if paint chips are to be shipped to the lab in plastic baggies. Properly conducted, this method completely seals the surface during the actual scraping operation. A four by four foot sheet of plastic is still required under the glove bag to capture any debris that falls to the ground during the glove bag removal. The tape should be slowly removed from the surface to avoid lifting any additional paint off of the surface.

3. Paint Sample Collection

The paint chip sample need not be more than 2-4 square inches in size (consult with the laboratory for the optional size). Persons collecting paint chips should wear new disposable gloves for each sample.

The most common paint sampling method is to scrape paint directly off the substrate. The goal is to remove all layers of paint equally, but none of the substrate. A heat gun should be used to soften the paint before removal to reduce the chances of including substrate with the sample and to help prevent sample loss. Including substrate in the sample will dilute the lead content if results are reported in µg/g or weight percent. Hold the heat gun no closer than six inches from the surface. Do not scorch the paint. Discontinue heating as soon as softening or blistering is observed.

Use a razor-sharp scraper to remove paint from the substrate. Paint samples collected in this fashion are usually reported in µg/g or % lead only. The sample may be placed in a baggie for shipment to the laboratory.

If the area sampled is measured exactly, and all the paint within that area can be removed and collected, it is possible to also report the results in mg/cm². All of the sample must be placed in a hard-shelled container for shipment to the laboratory. The hard-shelled container is used since the laboratory will analyze the entire sample submitted. The exact dimensions of the area sampled must be recorded on the field sampling form. For mg/cm², including a small amount of substrate in the sample is permitted.

4. Composite Paint Chip Sample Collection

Paint chip samples may be composited by collecting individual subsamples from different surfaces. If results are reported in mg/cm², each subsample should be exactly the same size in surface area. If results are reported in weight percent or µg/g, each subsample should have about the same weight (weighing is done in a laboratory). The result is then compared to the standard for lead-based paint divided by the number of sub-samples (the composite standard). If the result is above this number, one or more of the samples may be above the standard. Each sub-sample should be reanalyzed individually in this case. If the result is below this number, none of the sub-samples can contain lead above the standard. No more than 5 subsamples should be included in the same sample container or ziplock baggie. If both single-surface and composite samples

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are collected side-by-side, the individual samples can be submitted for analysis without returning to the dwelling if the composite result is above the composite standard. If the laboratory does not analyze the entire composite sample, it must use a validated homogenizing technique to ensure that all sub-samples are completely mixed together.

5. Cleanup and Repair

a. All settled dust generated must be cleaned up using wet wipes.

b. The surface can be resealed with new paint if necessary. If desired, apply spackling and/or new paint to repair the area where paint was removed.

c. Personnel conducting paint sampling should avoid hand-to-mouth contact (specifically, smoking, eating, drinking, and applying cosmetics) and should wash their hands with running water immediately after sampling. The inspector should ask to use the resident's bathroom for this purpose. Wet wipes may be used if no running water is available or if the bathroom is not available.

6. Laboratory Submittal

The samples should be submitted to a laboratory recognized by the EPA National Lead Laboratory Accreditation Program. Appropriate sample submittal forms should be used. The field sample number should appear on the field sampling form, the laboratory submittal form, and the container label. The name of the laboratory, the date the samples were sent to the lab, and all personnel handling the sample from the time of collection to the time of arrival at the laboratory should be recorded on a chain of custody form, if appropriate.

See Appendix 14 for the laboratory analytical procedures to be used.

7. Qualifications of Paint Sampling Technicians

All individuals performing paint sampling should be certified. Where possible, field experience in environmental sampling is preferable.

8. Other Information

See ASTM ES 28-94 and ES 37-94 for additional information

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APPENDIX C

SOIL SAMPLING PROTOCOL

Appendix 13.3: Soil Sampling Protocol For Housing

A. Collection Technique General Description

Bare soil samples are typically collected with a coring device or a scooping technique. The device may be used in either of two ways. Most coring devices come equipped with a "T" handle which can be attached to the top of the coring tool or probe. This allows the operator to push the tool into the ground. The coring tool can be twisted with the "T" handle as it is pushed into the ground in order to allow the cutting edge of the soil probe to cut through roots and packed earth. In softer soils, a disposable new plastic syringe at least ½ inch diameter can be used for each composite sample

The other method for using the coring tool is to attach a hammer device to the top of the coring tool. To utilize the coring tool in this manner, the hammer device is first attached to the top of the coring tool and the tip of the probe is placed on the ground where the sample is to be collected. The hammer is then raised and allowed to fall while it is guided by the operator's hands. The hammer attachment may be the most appropriate tool when the nature of the soils is hard and compacted. Otherwise the "T" handle is easier to use.

The soil samples are collected by driving or pushing the coring tool into the ground, usually about ½ inch deep. The tool is then moved gently from side to side to loosen a plug of soil. The tool is then pulled from the ground and the soil sample is pushed so that the upper part of the soil plug lies between one inch marks made on the coring device. The top one half inch of the soil sample is then cut from the core with a stainless steel knife or cutting tool provided for that purpose. This top one half inch section of the soil core is then transferred to a sample container. All sub-samples are collected in this manner. The collection of subsamples from the sampling line is referred to as a "composite" sample.

After collecting a composite sample, the soil probe should be decontaminated or discarded if disposable core liners are used. This process consists of wiping the end of the probe with wet wipes until no more visible dirt is removed from the probe. Similar cores are then collected from the bottom inch of the six-inch core.

B. Materials and Supplies

1. Core sampling device: Standard soil coring device. Other similar core sampling devices may be used, such as disposable plastic syringes with the end cut off. The plunger is used to remove the soil from the syringe body.

2. Disposable wipes.

3. Non-sterilized 5" x 8" plastic ziplock baggies: Unless baggies are 4 mil industrial strength, they must be double bagged

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4. Non-sterilized non-powdered disposable gloves: For example, Action Scientific (800-678-1033) No. A-105

5. Floor Plan & Property Sketch

6. Soil Sample Collection Form

7. Laboratory submittal form

8. Pre-printed labels or permanent ink pen

9. Trash bag or other receptacle (do not use pockets or trash containers at the residence)

C. **Bare Soil Sampling Procedures**

1. Soil sampling is not recommended when the ground is frozen.

2. The location of soil samples should be recorded on the exterior site plan sketch.

3. Perimeter Sampling Locations: One composite soil sample should be collected so that at least 5 and no more than 10 different aliquots of surface soil are collected from the building perimeter. The aliquots should be collected from all sides of the building where bare soil is present. Each spot should be at least 2 feet distant from each other and 2 feet away from the foundation, unless the bare soil is closer than 2 feet.

4. Play Area Sampling Locations: A second composite sample should consist of at least 5 and no more than 10 aliquots collected along an X-shaped grid in the child's principle play area. Each spot should be at least 1 foot distant from each other. The soil where the aliquots are collected must be bare.

5. The core sampling device should be used to deliver the top ½ inch of soil from each spot to the baggie. No special effort should be made to collect visible paint chips. If paint chips are present, they should not be avoided and should be included in the sample. When sampling play areas, the inspector should make an effort to avoid including grass, twigs, stones, and other gross debris in the sample.

6. When all aliquots of the composite sample have been placed in the baggie, the baggie should be ziplocked. If the baggie is not 4 mil industrial weight, the sample should be double bagged. A label with the sample number should be affixed to the baggie. The number should be recorded on the soil plat form showing the approximate location of each sample and the soil collection field data form.

7. The core sampler should be cleaned with a disposable wipe after each composite sample is collected. If a disposable core sampler is used, it can be used for all sub-samples, but not new composite samples unless it is cleaned thoroughly.

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APPENDIX D

SAMPLING AIRBORNE PARTICULATES FOR LEAD (NIOSH METHOD 7082)

Appendix 13.4: Sampling Airborne Particulate for Lead (NIOSH Method 7082)

Editor's Note: See also ASTM Standard E 1553-93 and ES 33-94

LEAD

Formula: Pb
M.W.: 207.19 (Pb); 223.19 (PbO)

METHOD: 7082
ISSUED: 2/15/84

OSHA: 0.05 mg/m^3
NIOSH: 0.05 mg/m^3 [1]
ACGIH: 0.15 mg/m^3; STEL 0.45 mg/m^3

PROPERTIES: soft metal; d 11.3 g/cm^3; MP 327.5°C; valences +2, +4 in salts

SYNONYMS: vary depending on the chemical form (elemental lead and lead compounds except alkyl lead); CAS #1317-36-8 (PbO); CAS #7439-92-1 (Pb). Editor's Note: This method has not been validated for lead paint chip samples. It is typically used to analyze lead air samples.

SAMPLING

SAMPLE: FILTER
(0.8 µm cellulose ester membrane)

FLOW RATE: 1 to 4 L/min

VOL-MIN: 200 L@ 0.05 mg/m^3
-MAX: 1200L

SHIPMENT: routine

SAMPLE STABILITY: stable

BLANKS: 2 to 10 field blanks per set

ACCURACY

RANGE STUDIES: 0.13 to 0.4 mg/m^3 [2]; 0.15 to 1.7 mg/m^3 (fume) [3]

BIAS: not significant [2]
OVERALL PRECISION (s_r): 0.072 [2]; 0.068 (fume) [3]

MEASUREMENT

TECHNIQUE: ATOMIC ABSORPTION, FLAME

ANALYTE: lead

ASHING: conc. HNO_3, 6 ml; 140° C

FINAL SOLUTION: 10% HNO_3, 10 ml

FLAME: air-acetylene, oxidizing

WAVELENGTH: 283.3 nm

BACKGROUND CORRECTION: D_2 or H_2 lamp

CALIBRATION: Pb++ in 10% HNO_3

RANGE: 10 to 200 µg per sample [3, 8]

ESTIMATED LOD: 2.6 µg per sample [9]

PRECISION (s_r): 0.03 [2]

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APPLICABILITY: The working range is 0.025 to 0.5 mg/m^3 for a 400 L air sample. The method is applicable to elemental lead, including Pb fume, and all other aerosols containing lead. This is an elemental analysis, not compound specific. Aliquots of the samples can be analyzed separately for additional elements.

INTERFERENCES: Use D_2 or H_2 continuum background correction to control flame or molecular absorption. High concentrations of calcium, sulfate, carbonate, phosphate, iodide, fluoride, or acetate can be corrected.

OTHER METHODS: This method combines and replaces P&CAM 173 [8] and S341 [7,9] for lead. Method 7300 (ICP-AES) is an alternate analytical method. Method 7505 is specific for lead sulfide. The following have not been revised: the dithizone method, which appears in P&CAM 102 [4] and the lead criteria document [1]; P&CAM 191 (ASV) [5]; and P&CAM 214 (graphite furnace-AAS) [6].

REAGENTS:

1. Nitric acid, conc.
2. Nitric acid, 10% (w/v). Add 100 ml conc. HNO_3 to 500 ml water; dilute to 1 l.
3. Hydrogen peroxide, 30% H_2O_2 (w/w), reagent grade.
4. Calibration stock solution, 1000 µg Pb/ml. Commercial standard or dissolve 1.00 g Pb metal in minimum volume of (1+1) HCl and dilute to 1 l with 1% (v/v) HCl. Store in a polyethylene bottle. Stable ≥ one year.
5. Air compressed, filtered.
6. Acetylene.
7. Distilled or deionized water.

EQUIPMENT:

1. Sampler: Cellulose ester filter, 0.8 µm pore size, 37 mm diameter; in cassette filter holder.
2. Personal sampling pump, 1 to 4 l/min, with flexible connecting tubing.
3. Atomic Absorption Spectrophotometer with an air-acetylene burner head.
4. Lead hollow cathode lamp or electrode dischargeless lamp.
5. Regulators, two-stage, for air and acetylene.
6. Beakers, Phillips, 125 ml, or Griffin, 50 ml with watchglass covers.*
7. Volumetric flasks, 10 and 100 ml.*
8. Assorted volumetric pipets as needed.*

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REAGENTS:

EQUIPMENT:

9. Hotplate, surface temperature 140°C.

10. Bottles, polyethylene, 100 ml.

* Clean all glassware with conc. nitric acid and rinse thoroughly with distilled or deionized water before use.

SPECIAL PRECAUTIONS: Perform all acid digestions in a fume hood.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.

2. Sample at an accurately known flow rate between 1 and 4 l/min for up to 8 hrs for TWA measurements.[1] Do not exceed a filter loading of ca. 2 mg total dust.

SAMPLE PREPARATION:

NOTE: The following sample preparation gave quantitative recovery (see EVALUATION OF METHOD) [9]. Steps 4 through 9 of Method 7300 or other quantitative ashing techniques may be substituted, especially if several metals are to be determined on a single filter.

3. Open the cassette filter holders and transfer the samples and blanks to clean beakers.

4. Add 3 ml conc. HNO_3, and 1 ml 30% H_2O_2 and cover with a watchglass. Start reagent blanks at this step.

NOTE: If PbO_2 is not present in the sample, the 30% H_2O_2 need not be added [3,9].

5. Heat on hotplate (140°C) until most of the acid has evaporated.

6. Repeat two more times using 2 ml conc. HNO_3 and 1 ml 30% H_2O_2 each time.

7. Heat on 140°C hotplate until a white ash appears.

8. When sample is dry, rinse the watchglass and walls of the beaker with 3 to 5 ml 10% HNO_3. Allow the solution to evaporate to dryness.

9. Cool each beaker and dissolve the residues in 1 ml conc. HNO_3.

[1] Editor's Note: Use a flow rate of 2 liters/minute and a closed-face 37 mm cassette.

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10. Transfer the solution quantitatively to a 10 ml volumetric flask and dilute to volume with distilled water.

NOTE: If the concentration (M) of any of the following is expected to exceed the lead concentration (M) by 10 fold or more, add 1 ml 1 M Na_2EDTA to each flask before dilution to volume: CO, PO_3, I^-, F^-, CH_3COO^-. If Ca^{++} or SO are present in 10-fold excess, make all standards and samples 1% (w/w) in La^{++} [8].

CALIBRATION AND QUALITY CONTROL:

11. Prepare a series of working standards covering the range 1 to 20 µg Pb/ml (1 to 200 µg Pb per sample) by adding aliquots of calibration stock solution to 100 ml volumetric flasks. Dilute to volume with 10% HNO_3. Store the working standards in polyethylene bottles and prepare fresh weekly.

12. Analyze the working standards together with the blanks and samples (steps 17 and 18).

13. Prepare a calibration graph of absorbance vs. solution concentration (µg/ml).

14. Aspirate a standard for every 10 samples to check for instrument drift.

15. Check recoveries with at least one spiked media blank per 10 samples.

16. Use method of additions occasionally to check for interferences.

MEASUREMENT:

17. Set spectrophotometer as specified by the manufacturer and to conditions on page 13.6-1.

NOTE: An alternative wavelength is 217.0 nm [10]. Analyses at 217.0 nm have slightly greater sensitivity, but poorer signal-to-noise ratio compared to 283.3 nm. Also, non-atomic absorption is significantly greater at 217.0 nm, making the use of D_2 or H_2 continuum correction mandatory at that wavelength.

18. Aspirate standards, samples and blanks. Record absorbance readings.

NOTE: If the absorbance values for the samples are above the linear range of the standards, dilute with 10% HNO_3, reanalyze and apply the appropriate dilution factor in the calculations.

CALCULATIONS:

19. Using the measured absorbances, calculate the corresponding concentrations (µg/ml) of lead in the sample, C_s, and average media blank, C_b, from the calibration graph.

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20. Using the solution volumes (ml) of the sample, V_s, and media blanks, V_b, calculate the concentration, C (mg/m_3), of lead in the air volume sampled, V (L):

$$C = \frac{C_s V_s - C_b V_b}{V}, \text{ mg/m}^3$$

EVALUATION OF METHOD:

Method S241 [7] was issued on October 24, 1975, and validated over the range 0.13 to 0.4 mg/m^3 for a 180 l air sample, using generated atmospheres of lead nitrate [2]. Recovery in the range 18 to 72 µg Pb per sample was 98%, and collection efficiency of 0.8 µm mixed cellulose ester filters (Millipore Type AA) was 100% for the aerosols. Subsequent studies on analytical recovery of 200 µg Pb per sample gave the results [3,9]:

Species	Digestion Method	Analytical Recovery, %
Pb metal	HNO_3 only	92 ± 4
Pb metal	$HNO_3 + H_2O_2$	103 ± 3
PbO	HNO_3 only	93 ± 4
PbS	HNO_3 only	93 ± 5
PbO_2	HNO_3 only	82 ± 3
PbO_2	$HNO_3 + H_2O_2$	100 ± 1
Pb in paint*	HNO_3 only	95 ± 6
Pb in paint*	$HNO_3 + H_2O_2$	95 ± 6

* Standard Reference Material #1579, U.S. National Bureau of Standards.

Additional collection efficiency studies were also done using Gelman GN-4 filters for the collection of Pb fume, which had geometric mean diameter of 0.1 µm [3]. Mean collection efficiency for 24 sampling runs at flow rates between 0.15 and 4.0 l/min was > 97 ± 2%. Overall precision, s_r, was 0.072 for lead nitrate aerosol [2,7] and 0.068 for Pb fume [3,9].

REFERENCES:

[1] Criteria for a Recommended Standard...Occupational Exposure to Inorganic Lead (Revised Criteria), U.S. Department of Health, Education and Welfare, Publ. (NIOSH) 78-158 (1978).

[2] Documentation of the NIOSH Validation Tests, U.S. Department of Health, Education and Welfare, Publ. (NIOSH) 77-185 (1977).

[3] Heavy Metal Aerosols: Collection and Dissolution Efficiencies, Final Report of NIOSH Contract 210-79-0058, W.F. Gutknecht, M.H. Ranade, P.M. Grohse, A. Damle, and D. O'Neal, Research Triangle Institute; available as Order No. PB 83-106740 from NTIS, Springfield, VA 22161 (1981).

D-5

[4] NIOSH Manual of Analytical Methods, 2nd ed., V. 1, P&CAM 102, U.S. Department of Health, Education and Welfare, Publ. (NIOSH) 77-157-A (1977).

[5] Ibid, P&CAM 191.

[6] Ibid, P&CAM 214.

[7] Ibid, V. 3, S341, U.S. Department of Health, Education and Welfare, Publ. (NIOSH) 77-157-C (1977).

[8] Ibid, V. 5, P&CAM 173, U.S. Department of Health, Education and Welfare, Publ. (NIOSH) 77-157-A (1979).

[9] Ibid, V. 7, (revised 3/25/81), U.S. Department of Health, Education and Welfare, Publ. (NIOSH) 82-100 (1982).

[10] Analytical Methods for Atomic Absorption Spectrophotometry, Perkin-Elmer (1976).

METHOD REVISED BY: Mark Millson and R. DeLon Hull, NIOSH/DPSE; S341 originally validated under NIOSH Contract CDC-94-74-45; additional studies under NIOSH Contract 210-79-0058.

APPENDIX E

OSHA LEAD IN CONSTRUCTION STANDARD
(29 CFR 1926.62)

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10641

APPENDIX F

STATE OF MARYLAND REGULATIONS "PROCEDURES FOR ABATING LEAD CONTAINING SUBSTANCES FROM BUILDINGS" (COMAR 26.02.07)

http://www.dsd.state.md.us/comar/26/26.02.07.00.htm
http://www.dsd.state.md.us/comar/26/26.02.07.01.htm
http://www.dsd.state.md.us/comar/26/26.02.07.02.htm
http://www.dsd.state.md.us/comar/26/26.02.07.03.htm
http://www.dsd.state.md.us/comar/26/26.02.07.04.htm
http://www.dsd.state.md.us/comar/26/26.02.07.05.htm
http://www.dsd.state.md.us/comar/26/26.02.07.06.htm
http://www.dsd.state.md.us/comar/26/26.02.07.07.htm
http://www.dsd.state.md.us/comar/26/26.02.07.08.htm
http://www.dsd.state.md.us/comar/26/26.02.07.09.htm
http://www.dsd.state.md.us/comar/26/26.02.07.10.htm
http://www.dsd.state.md.us/comar/26/26.02.07.11.htm
http://www.dsd.state.md.us/comar/26/26.02.07.12.htm
http://www.dsd.state.md.us/comar/26/26.02.07.13.htm
http://www.dsd.state.md.us/comar/26/26.02.07.14.htm
http://www.dsd.state.md.us/comar/26/26.02.07.9999.htm
http://www.dsd.state.md.us/comar/26/26.16.01.07.htm
http://www.dsd.state.md.us/comar/26/26.16.01.11.htm
http://www.dsd.state.md.us/comar/26/26.16.01.18.htm
http://www.dsd.state.md.us/comar/26/26.16.02.05.htm

APPENDIX G

STATE OF MARYLAND REGULATIONS
"ACCREDITATION AND TRAINING FOR LEAD PAINT ABATEMENT SERVICES"
(COMAR 26.01.01)

http://www.dsd.state.md.us/comar/26/26.16.01.00.htm
http://www.dsd.state.md.us/comar/26/26.16.01.01.htm
http://www.dsd.state.md.us/comar/26/26.16.01.02.htm
http://www.dsd.state.md.us/comar/26/26.16.01.02-1.htm
http://www.dsd.state.md.us/comar/26/26.16.01.03.htm
http://www.dsd.state.md.us/comar/26/26.16.01.04.htm
http://www.dsd.state.md.us/comar/26/26.16.01.05.htm
http://www.dsd.state.md.us/comar/26/26.16.01.06.htm
http://www.dsd.state.md.us/comar/26/26.16.01.07.htm
http://www.dsd.state.md.us/comar/26/26.16.01.08.htm
http://www.dsd.state.md.us/comar/26/26.16.01.09.htm
http://www.dsd.state.md.us/comar/26/26.16.01.10.htm
http://www.dsd.state.md.us/comar/26/26.16.01.11.htm
http://www.dsd.state.md.us/comar/26/26.16.01.12.htm
http://www.dsd.state.md.us/comar/26/26.16.01.13.htm
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http://www.dsd.state.md.us/comar/26/26.16.01.18.htm
http://www.dsd.state.md.us/comar/26/26.16.01.19.htm
http://www.dsd.state.md.us/comar/26/26.16.01.20.htm

APPENDIX H

LEAD EXPOSURE STANDARDS

LEAD EXPOSURE STANDARDS

Lead Paint

- XRF Readings >0.7 mg/cm^2 (MDE Limit)
- Paint Chip Analysis ≥ 0.5% or 5,000ppm

Lead Dust (MDE & HUD)

- Floors 40 mcg/ft^2
- Window Sills 250 mcg/ft^2
- Window Wells 400 mcg/ft^2

Lead in Soil (EPA)

- ≥ 400 ppm

Lead in Water (EPA)

- 15.0 ppb (EPA Action Level)

Blood Lead

- Workers — 50mcg/dl (OSHA /HUD Standard for medical removal)
- Children — 10 mcg/dl (CDC "Level of Concern")
- Pregnant Women — No Present Standard. MDE recommended Level of Concern is 10 mcg/dl)

Airborne Lead

- OSHA Action Level 30 mcg/m^3
- OSHA PEL 50 mcg/m^3

Certain activities are considered by OSHA to be so inherently dangerous that full worker protection to include respirators, protective clothing, wash-up facilities and a prohibition of eating, drinking and smoking in the workplace is required until exposure monitoring indicates that it is not necessary:

- Welding, cutting or burning where lead based paint is present; or
- Manual demolition of lead painted components; or
- Machine sanding of lead-based paints; or
- Abrasive blasting of lead based paint.