ABATEMENT/REMEDIATION PLANNING & METHODS

Before beginning a lead remediation project, a property owner must develop a written plan for the safe elimination of lead poisoning hazards. The owner of property identified as a potential source of lead exposure to a child with confirmed lead poisoning is required to submit a written remediation plan to the local health department within 14 days of receiving notification of lead poisoning hazards. In addition to complying with the state requirements for hazard remediation, the plan must be consistent with federal remediation standards developed by the EPA and HUD, the worker protection standards of OSHA and N.C. Department of Labor and all state and federal waste disposal requirements. The plan must clearly establish the relationship and responsibilities of the owner and contractors, describe methods to be used, and establish timeliness for completion.

The remediation plan must include information on the method to be used for each hazard identified, containment procedures to prevent environmental contamination or exposure to occupants, procedures to protect workers from excessive lead exposure, methods for final cleanup and clearance testing, and waste disposal methods to be used. The remediation plan may be in the form of a contract with a qualified lead abatement contractor describing the details of the work to be done or may be in the form of a letter to the health department describing the methods to be used.

The local health department will evaluate the remediation plan to determine that lead poisoning hazards will be remediated without excessive risk to workers, occupants or the environment and must approve the plan before work begins. The owner or managing agent of the dwelling or facility must notify the occupants and the health department of the dates of lead remediation activities. All work must be completed within 60 days of plan approval unless written application for a 30-day extension is approved by the local health department.

Owners who choose to remediate lead poisoning hazards on property that has not been identified as a potential source of exposure to a lead poisoned child are not required to obtain plan approval, but should develop a similar written remediation plan. Improper work practices could cause excessive environmental contamination, damage the health of workers, and expose occupants to excessively high levels of lead-contaminated dust. Once a home becomes contaminated with lead-contaminated dust, it can be very difficult or even impossible to eliminate contamination and make the dwelling safe for occupancy. Many potentially costly pitfalls can be avoided through proper planning.

HUD has developed a set of guidelines entitled "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" that is the industry standard for lead abatement activities in both public and private housing. Copies of the guidelines can be obtained by calling HUD USER at (800) 245-2691. A number of environmental consultants are now specializing in lead hazard abatement planning or project design and can help property owners select the most effective methods.

The Consumer Product Safety Commission warns homeowners against do-it-yourself projects. Proper remediation of lead poisoning hazards requires knowledge of special precautions to be taken and requires special equipment such as respirators and vacuum cleaners equipped with high efficiency particulate air (HEPA) filters. Certification requirements for lead abatement contractors, workers, designers, inspectors, and risk asessors went into effect in August 1998 in North Carolina. Many certified asbestos abatement contractors are trained in lead hazard abatement since much of the specialized equipment and methods used are the same. A list of certified lead abatement professionals is included in Appendix 10.

Methods

"Remediation" is the term used to describe any set of measures designed to permanently eliminate or control lead poisoning hazards. It includes "abatement" methods for eliminating the hazard, interim controls, as well as all associated preparation, cleanup, worker protection, disposal and post-clearance testing activities.

A remediation plan should include both the methods to eliminate or control hazards identified and to protect occupants, workers and surrounding areas from contamination during remediation. Final cleanup and clearance testing methods should also be part of a complete remediation plan.

Standard methods for abatement of lead poisoning hazards have been developed by HUD for guidance on lead abatement activities and are provided in a document entitled "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing." Copies of that document can be obtained from HUD user, telephone (800) 245-2691. The HUD guidelines have become the industry standard for lead abatement activities nationwide. Lead investigation and remediation activities in North Carolina are based on the HUD guidelines.

A major factor affecting the success of a remediation project is the competency of contractors performing the work. Special training is necessary to safely remediate most lead poisoning hazards. Under the provisions of Title X, the Residential Lead-Based Paint Hazard Reduction Act of 1992, the EPA has developed standards for training and certification of contractors involved in lead-based paint abatement.

North Carolina has also recently adopted training and certification requirements for lead inspectors, risk assessors, project designers, contractors, and workers. Information on these requirements and on upcoming training courses can be obtained from:

Health Hazards Control Unit
DHHS
1912 Mail Service Center
Raleigh, NC 27699-1912
(919)733-0820

This is the North Carolina agency that enforces EPA standards for training and certification.

Containment Procedures

A safe and complete remediation project requires the containment of all lead within the work site to prevent the dispersement of lead into adjacent areas. Proper containment procedures should be followed whenever lead-contaminated dust is generated by the disturbance of leaded surfaces. If remediation does not break or disturb lead painted surfaces, containment measures should only be used as needed to protect surfaces, furniture and personal possessions from damage. The following materials will be needed for containment:

Polyethylene (plastic) sheets at least 6 mil thick;
Heavy duty tape (e.g., duct tape) to fasten plastic sheets;
Staple gun with heavy duty staples for fastening plastic sheets.

Alternate products include:

polyethylene spray instead of plastic sheeting (the dry film can be removed later by peeling);
spray glue in aerosol can for fastening plastic sheets.

1. Interior Containment

After all movable objects have been removed, the work area must be sealed from nonwork areas. If the work area is a room or group of rooms within the unit, it must be sealed off from all other portions of the unit. If the work area consists of multiple units within a building, the units must be sealed off from the rest of the building.

Work areas can be sealed off by using 6-mil polyethylene sheeting to seal off all doorways and entrances. The plastic can be attached to framing, if necessary. Effective barriers at openings between work and non-work areas can be created by using two layers of 6-mil plastic sheeting. One sheet is attached to the top of the opening and one side. The second is attached at the top and the opposite side, creating an S-shaped entryway that helps deter the dispersion of lead-contaminated dust. After sealing off the work area the following steps should be taken: cover all nonmovable objects with 6-mil polyethylene sheeting and seal with tape; cover floors with at least two layers of 6-mil polyethylene sheeting; and shut down forced air heating and air conditioning systems and seal all air intake and exhaust point of these systems. Polyethylene sheets 6 mils thick should be used to cover all nonmovable objects that are not being abated (including radiators, refrigerators, large pieces of furniture, shelves, cabinets, built-in furniture, and stoves), floors, and forced air ventilation points. It is important to fasten the plastic securely with heavy duty tape and/or heavy duty staples, making sure that surfaces are not damaged. Before applying plastic to floors, it may be necessary to use a HEPA vacuum to remove debris that can tear or puncture plastic sheeting.

Certain methods may require additional measures to protect adjacent surfaces. Particular attention needs to be paid to surfaces adjacent to areas abated on-site using heat gun, chemical, and caustic stripping methods. Masking tape and plastic can be used to help protect surfaces from chemical or caustic strippers. It may be difficult, however, to protect adjacent painted surfaces or wall paper adequately while using a heat gun.

If a common area (i.e., stairways, hallways) is a work area, and there are no alternative entrances and exits located outside of the work area, the contractor should create a protected passage through the common area. For example, in the case of a common hallway, one side should be designated as the work area and the other the safe passage area. Safe passage areas are created by building frames and attaching 6-mil polyethylene sheets. If a safe passage cannot be created and alternative entrances and exits do not exist, then remediation in common areas should be conducted between established and posted hours and the work area should be cleaned with a HEPA vacuum at the end of each working day until all surfaces are free of all visible dust and debris. Occupants should be provided with disposable shoe covers for use while in common areas.

2. Exterior Containment

Exterior remediation may generate large quantities of liquid and/or dry waste. If precautions are not taken, this waste can directly contaminate the outside environment and adjacent units. For this reason, uncontrolled water and abrasive blasting are unacceptable methods of remediation.

Before remediating lead -based paint on an exterior work surface, the following procedures should be used:

For Liquid Waste

Place polyethylene plastic sheeting (6 mils thick) as close to the building foundation as possible. Extend the edge of the sheets a sufficient distance to contain the runoff and raise the outside edge of the sheets (e.g., with two by fours) to trap liquid waste. Have available appropriate containers to hold liquid waste for later transfer and disposal. Where seams occur, they must be sealed with tape and edges must be raised (e.g., with two by four framing) and a new section of plastic sheeting and framing should be added as needed. Liquid waste can be pumped, vacuumed or

bailed for transfer to disposal facility.

For Dry Waste

Place polyethylene plastic sheeting (6 mils thick) as close to the building foundation as possible. Extend the sheeting out from the foundation a distance of 3 feet per story being abated with a minimum of 5 feet and a maximum of 20 feet. Weight the sheeting at the foundation and along the edges and seams. Erect vertical shrouds if constant wind speed exceeds 15 mph or there is visible movement of debris beyond the ground sheeting.

3. Limited Access to Work Area

To avoid unnecessary exposures to lead and limit the tracking of lead-contaminated dust and debris, the contractor must limit access of nonworkers to work areas. The work crew supervisor is responsible for enforcing limited access. Only the persons included in the following list should enter the work area prior to satisfactory clearance testing:

The contractor and his employees;

State, county, or local enforcement officials or their designees;

The homeowner or an inspector who represents the homeowner; and

A federal, state or local official, or his/her designee, engaged in research on lead.

4. Limiting Tracking of Dust and Debris

All persons entering a work area during a lead abatement project that involves breaking or disturbing lead-painted surfaces must wear disposable shoe covers that should be removed upon leaving the work area and disposed of with other waste. Any persons entering a work area during lead paint removal activity during replacement or during the cleanup process should wear appropriate respiratory protection.

5. Program of Ongoing Cleanup

An important part of the control of lead-contaminated dust and debris is implementing a program of ongoing cleanup in the work area. The frequency and intensity of cleaning will be the greatest with on-site paint removal methods and methods that create a lot of construction debris. Ongoing cleanup should include the regular cleaning of all tools, equipment, and worker protection gear to minimize worker exposure and the risk of transferring lead to other job sites.

6. Maintenance of Containment system

In order to produce the safest possible remediation and make cleanup easier, the containment system must be kept intact for as long as it is needed. All tears and breaks in the containment system should be repaired as they occur, otherwise all the benefits of containment are lost. In addition to routine repairs, the contractor is responsible for inspecting the containment system on a daily basis or more often as needed to ensure its integrity. Damaged floor sheeting should be covered with new layers and not removed. Contractors must be particularly careful to ensure that the bottom layer of floor covering is not torn or broken. Damaged plastic sheeting (for exterior work) should be replaced.

Planning a Lead Remediation Project

Owners of residential housing units and child-occupied facilities identified as potential sources of lead exposure to a lead-poisoned child are required to remediate all lead poisoning hazards found on the property. A written remediation plan must be prepared and submitted to the local health department within 14 days of receiving notice of the lead poisoning hazards. The following are some of the key points that must be addressed in an acceptable remediation plan.

Remediate all lead poisoning hazards

A lead poisoning hazard is any lead-bearing substance, such as lead-based paint or soil contaminated with lead, that is readily accessible to young children. Some typical lead poisoning hazards include:

- Deteriorated lead-based paint
- Lead-based paint on chewable surfaces such as window sills and railings
- Lead-based paint on friction surfaces such as windows, floors and stair treads
- Lead-based paint on impact surfaces such as door jambs and edges
- Lead-contaminated soil and dust

Use approved methods

An owner of a residential housing unit may choose to either abate or implement interim controls to address lead poisoning hazards. In either case, safe work practices must be used to assure the protection of workers, occupants, and the environment. **Safe work practices** include:

- taking precautions to prevent the spread of lead-contaminated dust by limiting access to the work area to workers only until final cleanup is completed and by having workers remove protective clothing such as gloves and shoes before leaving the work area;
- covering the work area including doorways and sealing floors, closets, and cabinets with heavy duty polyethylene plastic secured with duct tape or the equivalent;
- For exterior surfaces, securing heavy duty polyethylene plastic on the ground from the foundation extending 10 feet beyond the perimeter of the work area;
- shutting off the heating, ventilation, and cooling system and covering heating, ventilation, and cooling registers with heavy duty polyethylene plastic secured with duct tape or the equivalent;
- protecting workers by providing necessary protective equipment, training, and cleanup equipment and by not allowing eating, drinking, chewing gum or tobacco, or smoking in the work area;
- protecting occupants which may include temporary relocation as necessary;
- protecting occupants' belongings by covering with heavy duty polyethylene plastic secured with duct tape or the equivalent or by removing them from the work area;
- misting interior painted surfaces before disturbing and hand scraping all loose paint, wallpaper, and plaster;
- wet sweeping and collecting and containing visible debris and plastic sheeting in a secure container;
- performing specialized cleaning upon completion of work to remove residual dust and debris;
- removing all materials, tools, and contained debris from the work area and the

- residential housing unit upon completion of maintenance activities; and
- avoiding unsafe practices, including prohibited methods.

Prohibited methods include:

- stripping paint on-site with methylene chloride-based solutions;
- torch or flame burning;
- heating paint with a heat gun above 1,100 degrees Fahrenheit;
- covering with new paint or wallpaper unless all readily accessible lead-based paint has been removed;
- Uncontrolled abrasive blasting, machine sanding, or grinding, except when used with High Efficiency Particulate Air (HEPA) exhaust control which removes particles of 0.3 microns or larger from the air at 99.7 percent or greater efficiency;
- Dry scraping, unless used in conjunction with heat guns, or around electrical outlets, or when treating no more than 2 square feet on interior surfaces, or no more than 20 square feet on exterior surfaces;
- uncontrolled water blasting.

Interim controls may be used to comply with the Maintenance Standard. Compliance with this in-place management method requires:

- repairing and repainting areas of deteriorated paint (e.g., paint stabilization) and correcting the cause of deterioration;
- establishing and maintaining a vegetative cover in areas of bare soil within three feet of the unit;
- conducting specialized cleaning on interior horizontal surfaces
- correcting conditions in which painted surfaces are rubbing, binding, or being damaged to prevent the generation of lead dust;
- Subject to the occupant's approval, appropriately cleaning carpets;
- providing smooth and cleanable interior horizontal surfaces by recoating deteriorated hardwood floors with a durable coating, replacing or recovering worn-out linoleum floors, making interior window sills smooth and cleanable, capping window troughs with vinyl or aluminum coil stock, and providing drainage from storm window frames;
- providing occupants with the EPA-developed pamphlet "Protect Your Family from Lead in Your Home", any summaries of reports prepared by a certified lead inspector or a certified lead risk assessor, an educational pamphlet describing the Maintenance Standard and the effects of compliance, and information related to previous certificates of compliance; and
- annual monitoring by a certified lead inspector or risk assessor.

In addition, an owner may choose to abate lead poisoning hazards (abatement is required for child-occupied facilities). There are four **abatement methods** that can be used:

- encapsulation;
- enclosure;
- paint removal; and
- component removal and replacement.

Encapsulation is sealing lead-based paint with a special coating that is generally applied as a liquid to painted surfaces. Special encapsulant materials are more durable than paint and often have bitter tasting chemicals added to discourage chewing. This method is useful on some chewable surfaces, but cannot be used over loose paint or on friction or impact surfaces. If deteriorated paint is present, loose paint must be removed before applying an encapsulant.

Enclosure is accomplished by enclosing painted surfaces with a durable material such as drywall, paneling, metal, or siding. It is a useful method for abating hazards associated with deteriorating paint on walls and for some friction surfaces such as floors and stair treads.

Paint removal is the process of separating lead-based paint from the substrate and disposing of the lead-based paint. It can be accomplished either by on-site scraping or chemical paint removal or by taking painted components such as doors, windows or furniture to an off-site paint stripper.

The use of methylene chloride for on-site paint removal is prohibited because the chemical may cause cancer. If heat guns are used to loosen paint, they must be used on a setting below 1100 degrees Fahrenheit. At higher temperatures, lead fumes will likely be generated and contaminate surrounding areas. Abrasive methods such as sanding are not acceptable because the lead-contaminated dust generated is difficult to control.

If paint removal is used as an abatement method, occupants should be relocated while work is conducted. Dust and debris must be contained by enclosing the work area and by covering all surfaces with plastic sheeting that are not targeted for abatement. Workers involved in work that includes disturbing lead-based paint must have special training and be equipped with respirators and protective clothing.

Component removal and replacement is accomplished by removing and disposing of painted components with the lead-based paint still attached. The removed component is then replaced with new materials that do not contain lead. This is especially useful for permanently eliminating lead-based paint hazards from windows and woodwork that can not be enclosed or easily stripped of paint. If component removal and replacement is used as an abatement method, occupants may need to be relocated while work is conducted. In addition, dust and debris must be contained and workers must be trained and properly protected.

Remediation of lead-contaminated soil is accomplished by placing a barrier over contaminated soil to prevent access from children. This can be done by covering bare soil with four to six inches of topsoil and planting grass or other vegetation to control erosion and to discourage digging. Dirt walkways and driveways can also be paved or covered with gravel to provide a barrier between children and the contaminated soil. Removal of soil is a method of last resort because lead-contaminated soil may be characterized as hazardous waste.

Use properly trained contractors and workers

Since work involving disturbance of lead-based paint can be hazardous to both workers and occupants, certified lead abatement contractors and certified workers with specialized training are recommended to avoid costly and potentially dangerous mistakes. State law requires special training and certification for contractors and workers conducting any of the four lead-based paint hazard abatement methods. Information about certification requirements can be obtained from:

NC Department of Health and Human Services
Health Hazards Control Unit
1912 Mail Service Center
Raleigh, NC 27699-1912
Telephone: (919) 733-0820

The remediation plan should include the names of contractors and mention the type of training or certification they possess.

Protect workers from lead exposure

Workers who disturb lead-based paint can become lead poisoned. The Occupational Safety and Health Administration (OSHA) has adopted standards for worker safety from lead at construction sites. Those standards have been adopted by the NC Department of Labor and require special protective clothing including respirators for workers exposed to excessive amounts of lead-contaminated dust. Workers employed to disturb lead-based paint must understand the hazards involved and be trained to use appropriate personal protection equipment. Information about the OSHA workplace standards for lead in construction can be obtained from:

NC Department of Labor
413 North Salisbury Street
Raleigh, NC 27603-1361
Telephone: (800) 522-6762
(919) 733-2486 (in Raleigh)

Contain lead dust and debris in the work area

When lead-based paint or painted components are removed or otherwise disturbed, provisions must be made to prevent lead-contaminated dust from settling on floors and other surfaces. Lead-contaminated dust must not escape the work area and contaminate other rooms or locations. The remediation plan must provide for covering all air intakes, vents, floors and immovable furniture with plastic sheeting to capture dust and debris generated when paint is disturbed. Plastic should also be used to construct barriers between remediation and non-remediation areas and to prevent paint chips and other debris from falling to the ground during remediation of exterior surfaces.

Protect occupants during remediation

If the remediation methods chosen will disturb lead-based paint, precautions must be taken to keep occupants from being exposed to lead-contaminated dust. Generally, interior work may necessitate relocating the occupants until after work is completed and final cleanup is verified. For exterior work, it may be sufficient to seal off doors and windows and to keep occupants away from the work area. The remediation plan should state how occupants will be protected.

Arrange for proper disposal of all wastes

Bulky items such as building components, plastic sheeting and disposable protective clothing must be stored in a protected area and disposed of properly. Wastes containing lead must not be burned or be dumped illegally because lead may be released into the environment. Arrangements should be made for an appropriate landfill or solid waste management company to accept waste as part of the planning for a lead remediation project.

Some waste including paint chips and paint sludge from paint removal that contain high concentrations of lead are hazardous and must be handled and disposed of as hazardous wastes. These wastes must be stored separately and labeled as hazardous. Hazardous waste must be transported and disposed of through an EPA registered Treatment Storage and Disposal (TSD) facility. The TSD facility will provide containers and assistance with the paperwork for proper disposal of hazardous waste. However, the property owner is ultimately responsible for making sure that all solid and hazardous waste regulations are met. For more information on waste disposal requirements contact:

NC Department of Environment and Natural Resources
Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC 27605
Telephone: (919) 733-2178

Provide for a successful final cleanup

Current state law regarding childhood lead exposure control requires that all lead poisoning hazard be reduced to below the following clearance standards:

- floor lead dust levels must be less than 40 micrograms per square foot;
- window sill lead dust levels must be less than 250 micrograms per square foot;
- window trough lead dust levels must be less than 400 micrograms per square foot;
- bare soil lead levels must be less than 400 ppm in play areas, gardens, pet sleeping areas, and within three feet of the foundation;
- bare soil lead levels must be less than 1,200 ppm in other locations; and
- drinking water lead levels must be less than 15 parts per billion.

Since lead-contaminated dust is difficult to clean up, proper containment with plastic sheeting in the work area is necessary. Cleaning with a vacuum utilizing high efficiency particulate air (HEPA) filters and washing or mopping with all an purpose detergent or lead-specific cleaning agent is also necessary to pass the clearance standards for lead-contaminated dust. The property owner is responsible for making certain the clearance standards are met before allowing the property to be reoccupied. The local health department will perform dust sampling to verify compliance before clearing the property for reoccupancy.

Give a timetable for completion of work

Unless the property is vacated, all remediation activities must be completed within 60 days of approval of the remediation plan. It is important that clear timetables be established to coordinate any necessary relocation of occupants, various work tasks, the final cleanup and clearance inspections. All wastes must be removed from the site and final cleanup must be completed before the final inspection is conducted. Once the health department is satisfied that lead poisoning hazards have been remediated and clearance standards have been met, a written clearance for reoccupancy will be provided.

Remediation Plan Checklist:

[ ] Have you specified an approved method for each lead poisoning hazard identified?

[ ] Have you specified who will be doing the work and verified that contractors and workers have been properly trained and have any required certification?

[ ] Have you or your contractor provided for worker protection as required by the OSHA standards for construction sites?

[ ] Does your plan specify containment procedures to keep lead-contaminated dust and debris from settling on nearby surfaces?

[ ] Have you arranged for relocation of occupants or otherwise provided necessary controls to protect occupants during remediation?

[ ] Have you obtained commitment from a landfill or solid waste disposal company to accept waste from your project and arranged for transportation of waste to the disposal site?

[ ] Have you made a determination whether or not any waste generated will be hazardous and have you arranged for proper storage, transportation and disposal of any hazardous waste?

[ ] Have you included plans for daily cleanup and final cleanup of the work area and specified that clearance standards for lead-contaminated dust are to be met?

[ ] Have you given timetables for completion of work and arranged for clearance testing and final inspection of the remediation area?