INFORMATION ONLY

HOMEBUYER'S GUIDE TO COMMON ENVIRONMENTAL HAZARDS

This Guide is a general overview of common environmental hazards that may be found in any residential properties being sold. It is intended to help educate prospective buyers on the potential environmental hazards associated with residential property. This publication is not intended to be inclusive of all environmental hazards and is not intended to be a substitute for pre-sale property inspections. This Guide is not a statement of the law. If a prospective buyer requires legal or other expert/professional assistance, the buyer should obtain the services of such an expert or professional.

ASBESTOS

What is Asbestos?

Asbestos is a generic term, which describes a group of diverse, naturally occurring, fibrous minerals. These minerals occur as bundles of strong, flexible fibers that are chemically inert, do not burn, and have good insulating properties.

Where is asbestos found in the home?

Asbestos has been used in many products found in the home to provide insulation, strength, and fire protection. In 1989, the U.S. Environmental Protection Agency (U.S. EPA) announced a phased ban of asbestos products to be completed by 1996. The most common items in the home that may contain asbestos are:

- vinyl flooring;
- duct wrapping on heating and air conditioning systems;
- insulation on hot water pipes and boilers, especially in homes built from 1920 to 1972;
- some roofing, shingles, and siding;
- ceiling and wall insulation in some homes built or remodeled between 1945 and 1978; and
- in sheetrock taping compounds and some ceiling materials.

Asbestos that has been sprayed on ceilings often has a spongy, "cottage cheese" appearance with irregular soft surfaces. Asbestos troweled on walls has a textured, firm appearance. The manufacturers can provide information on the asbestos content of home products. A Certified Asbestos Consultant can be hired to determine whether or not asbestos is present and to give advice about how to take care of it safely.

How is asbestos harmful?

Intact or sealed (painted or taped over) asbestos is not harmful unless it becomes friable.
Friable means the material can be easily crushed or pulverized to a powder by hand pressure. Friable materials have a higher potential to release fibers. Asbestos fibers that are released into the air and inhaled can accumulate in the lungs and pose a health risk. This risk can be divided into two general categories: 1) risk of asbestosis; and 2) increased risk of cancer. Most persons diagnosed with asbestosis have been exposed to asbestos in the work place. Therefore, this booklet focuses on the increased risk of cancer associated with asbestos exposure.

The U.S. EPA classifies asbestos as a known human carcinogen. If asbestos fibers are inhaled, the likelihood of contracting lung cancer or mesothelioma (cancer of the lining of the chest or abdomen) increases. As more asbestos is inhaled, the risk of developing cancer further increases. Smokers who are exposed to high levels of asbestos have a much greater risk of developing lung cancer than nonsmokers exposed to the same level. Symptoms of cancer may not develop until 10-40 years after the first exposure.

Is there a safe level of asbestos?

In theory, inhalation of one fiber of asbestos can increase the risk of developing cancer. However, from a practical standpoint this statement is misleading since breathing ambient air in an urban area results in the inhalation of about 20,000 asbestos fibers per day. As a result of this exposure to asbestos in ambient air for a lifetime, it is estimated that 3-30 cases of lung cancer and 4-24 cases of mesothelioma will occur for every one million Americans. Those cancer cases are in addition to the numerous lung cancer cases due to other causes, particularly smoking. Obviously, inhalation of additional asbestos fibers increases the risk of developing lung cancer and unnecessary exposure should be avoided.

How can asbestos content in materials be determined?

When asbestos is suspected to be present in building materials, it is important to have the materials tested by a qualified laboratory. Visual inspection alone is not enough to identify the presence of asbestos. However, such testing may not be warranted if the material is in good condition, in which case it is best to leave it in place. If the material is damaged, or will be disturbed during normal household activities or remodeling, it should be tested.

How should asbestos be repaired or removed?

Repair or removal of asbestos by the homeowner may be unwise if the damage is severe, since it may result in unnecessary exposure to airborne fibers. However, small repairs of pipe or duct insulation can be made with paint or duct tape. Other materials, such as sprayed-on acoustical ceilings are not easily repaired by the homeowner. In cases where planned remodeling projects are expected to damage asbestos-containing materials, it is wise to hire a qualified contractor to remove the material. The homeowner should use the following guidelines in choosing a qualified contractor:

- Check to see if the contractor is licensed for doing asbestos work.
- Be aware that some contractors may remove material incorrectly and still charge a substantial fee.

- Require references from the contractor and check them to see if the contractor's work is satisfactory.
- Require the contractor to specify his safety procedures in writing.

The homeowner may expect to pay three times as much for the removal than if asbestos was not present. For a small job, the cost may be more than three times the normal cost, since it is expensive for a contractor to set up all the necessary safety equipment. Consider hiring a certified asbestos consultant to review safety procedures and oversee the performance of the contractor.

Does the law require mitigation?

Asbestos mitigation is at the discretion of the homeowner. Even if the material contains asbestos, the homeowner may choose to leave it alone or, if necessary, repair it.

Hotlines:

** For information concerning the identification and abatement of asbestos hazards in the home, and on the asbestos content of certain consumer products, call the EPA Asbestos Hotline at: (800) 368-5888*

***Publications*:**

** Asbestos in the Home*
This publication is available at no cost from:

American Lung Association
Environmental Health Department
909 12th Street
Sacramento, CA 96814
(800) LUNG-USA [(800) 586-4872]

** The Inside Story -- A Guide to Indoor Air Quality*
This publication is available at no cost from:

Indoor Air Quality Information Clearinghouse
P.O. Box 37133
Washington, D.C. 20013-7133
Telephone: (800) 438-4318
Web: www.epa.gov/iaq/ia_faqs/

FORMALDEHYDE

What is formaldehyde?

Formaldehyde is a colorless, pungent gas that is soluble in water and most organic solvents. It is used as a raw material in the manufacture of paints, plastics, resins, photographic materials, and in building materials such as fiberboard and some foam insulation. Formaldehyde is found in the outdoor air at an average concentration of approximately 2.9 ppb.

What are the sources of formaldehyde found in residential properties?

Formaldehyde is emitted from products in which formaldehyde has been used in their manufacture. These include composite wood products, urea-formaldehyde foam used in insulation, and curtain and upholstery textiles treated with formaldehyde resins for wrinkle resistance. Formaldehyde may also be emitted from gas stoves and kerosene heaters. Composite wood products are probably the most significant source of formaldehyde in the home.

What are composite wood products?

Plywood, particleboard, and oriented strandboard are Composite wood products that are bound together with formaldehyde-containing resins. The two most commonly used resins are urea-formaldehyde and phenol-formaldehyde. Composite wood products used within the home include:

- particleboard, used for sub-flooring, shelving, and in furniture;
- hardwood and plywood paneling, used in furniture and as a wall coveting;
- medium density fiberboard, used as cabinet doors, table tops, furniture, and shelving; and, oriented strand-board and softwood plywood, for exterior use and sub-flooring; both are manufactured using phenol-formaldehyde resins.

Why is formaldehyde emitted from these products?

In the production of the resins, not all formaldehyde is bound as urea-formaldehyde or phenol-formaldehyde. Unbound or free formaldehyde can be released later as a gas from composite wood products. Formaldehyde emissions are highest from new products and decrease as the product ages. Emissions ordinarily decrease to undetectable levels over time. If properly manufactured, composite wood products that incorporate phenol-formaldehyde resins do not release significant amounts of formaldehyde. Urea-formaldehyde resins have higher emission rates than phenol-formaldehyde resins.

How is formaldehyde harmful?

The Office of Environmental Health Hazard Assessment has concluded that exposures to formaldehyde can cause cancer in humans. Exposure to airborne formaldehyde may also cause non-cancer symptoms, such as irritation to the eyes, skin and respiratory tract, coughing, sore or burning throat, nausea and headaches. Reducing exposures to formaldehyde will reduce these health risks.

How can formaldehyde be detected and measured?

Levels of formaldehyde can be measured by chemical analysis of air samples. In general, ambient air monitoring of formaldehyde is done on a 24-hour basis using standard analytical techniques and methods established by federal and state agencies. A useful indicator of the presence of indoor formaldehyde is knowledge of the formaldehyde content of products. This information can be obtained from the manufacturer.

Is there a safe level of formaldehyde?

Most people experience eye and throat irritation when exposed to formaldehyde at levels above 0.1 ppm. Because people differ in their sensitivity to toxic effects, it is difficult to precisely define a concentration of formaldehyde that would be harmless to all people under all circumstances. Levels in the outside air may be considered as the safest and lowest levels that can practicably be achieved in the home. There are no safe levels for carcinogenic effects. The Office of Environmental Health Hazard Assessment has established an acute (94 ug/m3) and chronic (3 ug/m3) level to address the levels at which one might experience adverse non-cancer health effects.

What can be done to reduce indoor formaldehyde levels?

Immediate measures include opening windows to increase ventilation and reducing the number of new composite wood products in a home. Where possible, replace composite wood products with products made from solid wood or non-wood materials. Formaldehyde emissions increase with increasing humidity and temperature. Therefore, reducing the temperature and humidity in the home will reduce formaldehyde levels. Where the source of formaldehyde is wood paneling or sub-flooring, these measures may not be adequate. In this case, removal of paneling and sub-flooring may be necessary. Local trade organizations and builder's associations may be helpful in finding a contractor to do this work.

Publications:

* *The Inside Story -- A Guide to Indoor Air Quality*
**An Update on Formaldehyde*
These publications are available at no cost from:

Indoor Air Quality Information Clearinghouse
P. O. Box 37133
Washington, D.C. 20013-7133
Telephone: (800) 438-4318
Web: www.epa.gov/iaq/ia_faqs/

* *Formaldehyde in the Home-Indoor Air Quality Guideline #1 and Supplement*—**www.arb.ca.gov/research/indoor/formald.htm**

HAZARDOUS WASTES

What are hazardous wastes?

Hazardous waste means a waste that has the potential to harm human health or the environment. The characteristics that make a waste hazardous are that it may be toxic, corrosive, ignitable, or reactive. Many different industries such as oil and gas, petrochemical, electronics, and smaller businesses such as dry cleaners and print shops generate hazardous waste.

Following the generation of hazardous waste, most of it is treated where it was generated. The remainder is shipped to off-site facilities for treatment or storage. Disposal must be in a special type of landfill designed only for hazardous waste. Hazardous waste that is not properly managed may escape into the environment and contaminate soil or ground or surface water, or pollute the air. These hazardous waste releases can occur through leaking underground storage tanks, poorly contained landfills or ponds, hazardous waste spills, or illegal dumping directly on land.

How can the prospective homeowner determine whether a home is affected by a hazardous waste site?

State law requires certain written disclosures to be made to prospective buyers of residential property. Under many state laws, a seller is required to disclose whether he or she is aware that the property has any environmental hazards such as asbestos, formaldehyde, radon, lead-based paint, fuel or chemical storage tanks, and/or contaminated soil or water.

In addition to the information contained in this booklet, a homeowner or prospective homeowner may hire a registered environmental assessor to further investigate a known environmental hazard at a property.

Hotlines:
* *For information on the federal Superfund program and the National Priorities List (NPL), contact the US EPA RCRA, Superfund, EPCRA hotline at:* (800) 424-9346

Publications:

* Ensuring Safe Drinking Water (600M91012)
This publication is available at no cost from:

U.S. Environmental Protection Agency
Public Information Center
401 M Street, SW
Washington, D.C. 20468
Telephone: (800) 490-9198

** Is Your Drinking Water Safe? (PB94-203387)*
This publication is available for $19.50 plus $4 shipping from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: (800) 553-6847
Web: www.ntis.go

HOUSEHOLD HAZARDOUS WASTE

What is household hazardous waste?

Although generation of hazardous wastes is associated with industrial processes, each year residential properties are responsible for discarding tons of hazardous waste in trashcans or down drains. To determine whether a product is hazardous, the following factors may be considered.

- Is it poisonous when ingested, touched, or inhaled?
- Does ignite easily?
- Is it corrosive?
- Could it explode if it is improperly stored, spilled, or mixed with other products?

If the answer is “yes” to any question, then the product is hazardous. Generally, information about a product's hazardous properties can be found on the container label. The words “caustic”, “flammable”, “toxic”, and “ignitable” indicate that the product is hazardous. Some products are hazardous in more than one-way: For example, bleach is poisonous, and when mixed with ammonia-based cleaners releases hydrazine, a poisonous gas. Other examples of household products that are hazardous are listed below. In many cases, non-hazardous materials can be used instead.
Examples of household hazardous products are:

- cleaning products: ammonia, drain cleaners, rug cleaners, oven cleaners, metal polishes, and bleaches;
- garden supplies: weed and insect killers, rat poison, fertilizer, charcoal lighters, kerosene, and gasoline;
- automotive supplies: antifreeze, motor oil, gasoline, batteries and brake fluid, and
- paint supplies: paint, varnish, paint removers, glues, and waxes.

How should hazardous household products be stored?

Safe storage of hazardous products requires a cool, dry and secure location. Places to store hazardous products include locked cupboards, locked drawers, or a high shelf out of the reach of children and pets. To prevent spillage during an earthquake, shelves should be firmly secured to the wall and have a restraining bar along the side. The following guidelines will help in the proper storage of household hazardous products.

- Sort the products into hazardous waste categories (i.e., poisonous, flammable, corrosive, and reactive) and store them as separate categories. For example, flammable products such as charcoal lighter and waste oil should be stored apart from corrosive products such as drain cleaner and acid batteries. It is important to store reactive products in separate locations.
- Thus, bleach and ammonia-based cleaners should be stored in separate cupboards so that, if a spill does occur, mixing and release of poisonous gas is avoided.
- Poisonous products should always be stored apart from other products.
- Where possible, products should be stored in the original container. Household hazardous products should not be transferred to a previously used container, in order to avoid reaction with incompatible products.
- Labels should be legible and securely affixed to the container.
- Containers should be tightly sealed and regularly inspected for deterioration. Where rust or leaking is observed, the deteriorating container should be placed inside a larger container and clearly labeled.

What is the best way to dispose of household hazardous waste?

The best way to dispose of household hazardous wastes is to sort them into categories according to their hazardous properties and take them to the community household hazardous waste collection center. Unused supplies of hazardous products should not be disposed of by pouting them down the drain. In most states, it is illegal to dispose of used oil and paints by pouting them down the drain, including the storm drain, onto land, or by burning. Waste motor oil, oil filters, antifreeze and used batteries can be recycled and should be taken to a recycling center.

Publications:

** Household Products Management Wheel*
This publication is available at a cost of $4.95 from:

Environmental Hazards Management Institute
10 New Market Road
P. O. Box 932

KEYSTONE ASSET MANAGEMENT INC

100 West Main Street, Suite 310
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LEAD

How is lead harmful?

Lead is a common environmental toxin that was used extensively in consumer products such as paint and gasoline. Much of that lead remains in residential environments where people may become exposed. Children are commonly exposed to lead through normal hand-to-mouth behavior, which occurs as they explore their environment. When children crawl or play on the floor, put toys in their mouths, or suck on their fingers, they may ingest lead dust. This kind of daily, frequent exposure can result in lead poisoning. Some children eat paint chips, which can cause severe poisoning with irreversible health effects, including brain damage, mental retardation, convulsions, and even death. As lead poisoning can go undetected, it may result in behavior problems, reduced intelligence, anemia, and serious liver or kidney damage. Children under the age of six are particularly susceptible to lead poisoning.

Lead is also harmful to adults. Lead poisoning can cause reproductive problems (in both men and women), high blood pressure, digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain. Adult lead poisoning is most often the result of occupational exposure, or exposure following unsafe home renovation.

Where is lead found in the home?

Many houses and apartments built before 1978 have paint that contains lead. In 1978, the Consumer Product Safety Commission banned paint containing high levels of lead for residential use. If a home or apartment was built before 1978, you should assume it has lead paint.

Lead-based paint that is peeling, chipping, chalking, or cracking is a hazard and needs immediate attention. Lead-based paint may also pose a hazard on surfaces children can chew, or in areas with heavy wear. These areas include windows, windowsills, doors and doorframes, stairs, railings, banisters, porches, and fences. When painted surfaces bump or rub together they generate lead dust. Likewise, dry-scraping, sanding, or heating lead paint during repainting or remodeling also creates huge amounts of poisonous lead dust. This lead dust can poison your family.

Soil can become contaminated with lead from deteriorating exterior paint, and from leaded gasoline emissions. Lead in soil can be a hazard to children who play in bare soil. It can also contaminate the home when people bring soil into the house on their shoes.

Other Sources: Lead can be found in jobs such as battery repair or recycling, radiator repair, palming or remodeling, lead smelting, etc. Lead from the workplace poses a hazard for workers' families. Workers can bring lead into their homes on their work clothes, shoes, and bodies without knowing it. Some hobbies use lead. These include ceramics, stained glass, fishing weights, and bullet casting or firing. Lead can leech into food cooked, stored, or served in certain imported dishes or handmade pottery. Lead can be present in drinking water of older homes that have plumbing with lead or lead solder.

How can I check a home for lead hazards?

To inspect a home for lead hazards, hire an individual or contractor who has been certified by the relevant state agency. A certified inspector/assessor can determine the lead content of every painted surface in a home and identify any sources of serious lead exposure (such as peeling paint and lead dust). The assessment should outline the actions to take to address these hazards.

A certified inspector/assessor may use a variety of methods to assess lead hazards in a home. These include visual inspection of paint condition; laboratory tests of paint samples, surface dust tests, and/or a portable x-ray lead testing (fluorescence) machine.

You may have seen home lead test kits in your local hardware store. Recent studies suggest, however, that they are not always accurate. To protect your family's safety, do not rely on these kits. They are not always dependable.

How can I reduce lead hazards safely?

If a house has lead hazards, you can take action to reduce your family's risk. First and foremost, if you have young children, be sure they are tested for lead. This is particularly important if a home has recently been renovated or remodeled.

Second, a home should be kept as clean and dust-free as possible. Clean floors, window frames, windowsills and other surfaces weekly. Use a mop and regular detergent. Use paper towels to clean windows and window wells.

Wash children's hands often, especially before meals and bedtime. Keep play areas clean. Wash bottles, pacifiers, toys, and stuffed animals regularly. Feed your children nutritious meals with foods high in iron and calcium. Give children regular meals and snacks. Children with full stomachs and nutritious diets tend to absorb less lead.

How can I significantly reduce lead hazards?

In addition to dust control and good nutrition, you can temporarily reduce lead hazards by repairing damaged painted surfaces and planting grass to cover soil with high lead levels. These actions are not permanent solutions and need ongoing attention.

To **permanently** remove lead hazards, you should hire a lead "abatement" contractor. Abatement methods include removing, sealing or enclosing lead-based paint with special materials. Simply painting over lead-based paint with regular paint is not enough. Hire a certified individual or contractor. They have the proper equipment to clean up thoroughly. They will employ trained and certified workers. They will also follow strict safety roles set by the State and federal government. These safety measures will protect you and your family from lead hazards.

What are my responsibilities if I am selling, renting, or remodeling a home built before 1978?

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In general, if you are planning to buy, rent, or renovate a home built before 1978, federal law requires sellers, landlords, and re-modelers to disclose certain information prior to finalizing contracts.

Landlords must:

1) Disclose known information on lead-based paint hazards; and,
2) Give you a lead hazard pamphlet before leases take effect. Leases will also include a federal form about lead-based paint.

Sellers must:

1) Disclose known information on lead-based paint hazards; and,
2) Give you a lead hazard pamphlet before selling a house. Sales contracts will also include a federal form about lead-based paint. Buyers will have up to 10 days to cheek for lead hazards.

Renovators must:

Give you a lead hazard pamphlet before starting to work.

What precautions should I take when remodeling a home?

Before you begin any remodeling or renovations that will disturb painted surfaces (such as scraping or sanding paint, or tearing out walls) test the area for lead-based paint first. To fully protect your family from unsafe renovation hazards, hire a certified individual or contractor.

Never use a dry scraper, belt-sander, propane torch, or heat gun to remove lead-based paint. These actions create large amounts of poisonous lead dust and fumes. This lead dust can remain in a home long after the work is done, and can make your family very sick. It is important to move your family (especially children and pregnant women) out of a home until the work is completed, and the area has been properly cleaned.

What is the source of lead in water?

The source of lead in water is most likely to be lead in water pipes, lead solder used on copper pipes, and some brass plumbing fixtures. Lead pipes are generally found only in homes built before 1930. The use of lead-based solder in plumbing applications in homes and buildings was banned in 1988. However, many homes built prior to 1988 may contain plumbing systems that use lead solder. The levels of lead in water from these homes are likely to be highest during the first five-years after construction. After five years there can be sufficient mineral deposit, except where the water is soft, to form a coating inside the pipe; this coating prevents the lead from dissolving.

How can lead levels in water be determined?

If lead contamination in drinking water is suspected, samples of water may be submitted to a certified laboratory. Consult with the laboratory on the proper procedures for sample taking.
Information on the corrosivity of household water, which may result in lead being leached from household plumbing, may be obtained from the water utility serving your area.

What level of lead is considered safe in drinking water?

Historically, the standard for lead in drinking water was based on the level of lead in the source water being used by the water utility. This standard was 50 parts per billion. It was very rare for this level to be exceeded ha source water since lead is only infrequently a contaminant in nature. A much more common source of lead in drinking water is the result of the lead being leached from household plumbing. Based on this fact, the U.S. EPA promulgated the federal Lead and Copper Rule that became effective on January 1, 1992. Unlike any other federal drinking water standard, this rule applies to the quality of water as it comes from the household tap rather than the quality of the water at the source. Public water systems are to take corrective action to control corrosion when it results in increases in lead (or copper) in the tap water due to the lead being leached from the household plumbing. The water system is to take such action when the concentration of lead in a first draw tap sample (collected after the water has stood unused for at least 6 hours) exceeds 15 parts per billion in a specified percentage of the homes designated as being most susceptible to corrosion of lead from household plumbing.

How can levels of lead in water be reduced?

Lead levels can be reduced by removing lead piping or lead solder, by installing a home treatment system, or regularly flushing each tap before consuming the water. Another alternative for homeowners is to purchase bottled water. Home treatment methods that are effective ha removing some or all lead ha water include distillation and reverse osmosis. The cost for a home treatment system varies depending on the type of system and whether the system is designed for a single tap or the entire house.

Where there are elevated lead levels in water, homeowners who choose not to install a treatment system or use bottled drinking water should flush each tap before the water is consumed. Water which has been standing in the water pipes for more than six hours should be flushed from the tap until the temperature changes and then about fifteen seconds more. Because lead is more soluble in hot water, the homeowner should not drink or prepare food using hot water from the tap. The flushed water should be saved and used for non-consumptive purposes such as washing clothes or watering plants.

How can I protect my family from lead poisoning?

The most important step you can take to protect your children is to have them tested for lead poisoning.

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A simple blood test can measure levels of lead in the blood. All children age 5 and under should be tested. Family members who might have high levels of lead should also be tested.

Your doctor or health center can conduct this test. The test is covered by health insurance plans. Children from families with modest incomes can be tested at no cost through CHDP--the Child Health and Disability Prevention Program. The test is part of well-child checkups.

Poisoning is the result of contact with lead. The "treatment" begins with identifying the source of lead, and then removing or isolating it. Medical management depends on many factors, including the severity, and duration of exposure. Adults and children with lead poisoning need regular testing to monitor levels of lead in the body.

Hotlines:

***** *For more information on lead in drinking water and federal regulations about lead in drinking water, contact the U.S. EPA Safe Drinking Water Hotline in Washington, D.C. at: (800) 426-4791*

** For information on how to protect children from lead poisoning contact The National Lead Information Center at: (800) Lead-FYI [(800) 532-3394]*

** For other information on lead hazards, call The National Lead Information Center Clearinghouse at:(800) 424-LEAD [(800) 424-5323]*

** To request information on lead in consumer products, or to report an unsafe consumer product or a product-related injury, contact the Consumer Product Safety Commission at: (800) 638-2772*

Publications:

** Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing*
This publication is available for $45 from:

Department of Housing and Urban Development (HUD)
Information Services, HUD User
PO. Box 6091
Rockville, MD 20849
Telephone: (800) 245-2691
Web: www.huduser.org

** Lead in your Drinking Water*
This publication is available at no cost from:

U.S. Environmental Protection Agency
Public Information Center
401 M. Street, SW
Washington, D.C. 20460
Telephone: (202) 260-2080

** The Inside Story. A Guide to Indoor Air Quality*
This publication is available at no cost from:

Indoor Air Quality Information Clearinghouse
P.O. Box 37133
Washington, D.C. 20013-7133
Telephone: (800) 438-4318
Web: www.epa.gov/iaq/

** Lead Poisoning Prevention Wheel*
This publication is available for $3.95 from:

Environmental Hazards Management Institute
10 New Market Road
P.O. Box 932
Durham, NH 03824
Telephone: (603) 868-1496
Web: www.ehmi.org

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MOLD

What are molds?

Molds are simple, microscopic organisms, present virtually everywhere, indoors and outdoors. Molds, along with mushrooms and yeasts, are fungi and are needed to break down dead material and recycle nutrients in the environment. For molds to grow and reproduce, they need only a food source -- any organic material, such as leaves, wood, paper, or dirt -- and moisture. Because molds grow by digesting the organic material, they gradually destroy whatever they grow on. Sometimes, new molds grow on old mold colonies. Mold growth on surfaces can often be seen in the form of discoloration, frequently green, gray, brown, or black but also white and other colors. Molds release countless tiny, lightweight spores, which travel through the air.

How am I exposed to indoor molds?

Everyone is exposed to some mold on a daily basis without evident harm. It is common to find mold spores in the air inside homes, and most of the airborne spores found indoors come from outdoor sources. Mold spores primarily cause health problems when they are present in large numbers and people inhale many of them. This occurs primarily when there is active mold growth within a home, office or school where people live or work. People can also be exposed to mold by touching contaminated materials and by eating contaminated foods. Molds will grow and multiply whenever conditions are right: when sufficient moisture is available and organic material is present. The following are common sources of indoor moisture that may lead to mold problems:

- Flooding
- Leaky roofs
- Sprinkler spray hitting the house
- Plumbing leaks ':
- Overflow from sinks or sewers
- Damp basement or crawl space
- Steam from shower or cooking
- Humidifiers
- Wet clothes drying indoors or clothes dryers exhausting indoors
- HVAC Units

Warping floors and discoloration of walls and ceilings can be indications of moisture problems. Condensation on windows or walls is also an important indication, but it can sometimes be caused by an indoor appliance and air circulation problems.

What symptoms are commonly associated with mold exposure?

Molds produce health effects through inflammation, allergy, or infection. Allergic reactions (often referred to as hay fever) are most common following mold exposure. Typical symptoms that mold-exposed persons report (alone or in combination) include:

- Respiratory problems, such as wheezing, difficulty breathing, and shortness of breath
- Nasal and sinus congestion
- Eye irritation (burning, watery, or reddened eyes)
- Dry, hacking cough
- Nose or throat irritation
- Skin rashes or irritation
- Headaches

How much exposure to mold is hazardous?

For some people, a relatively small number of mold spores can trigger an asthma attack or lead to other health problems. For other persons, symptoms may occur only when exposure levels are much higher. Nonetheless, indoor mold growth is unsanitary and undesirable. Basically, if you can see or smell mold inside a home, steps should be taken immediately to identify and eliminate the excess moisture and to cleanup and remove the mold.

Are some molds more hazardous than others?

Allergic persons vary in their sensitivities to mold, both as to the amount and the types to which they react, in addition to their allergic properties, certain types of molds, such as *Stachybotris chartarum*, may produce compounds that have toxic properties, which are called mycotoxins. Mycotoxins are not always produced, and whether a mold produces mycotoxins while growing in a building depends on what the mold is growing on, conditions such as temperature, pH, humidity or other unknown factors. When mycotoxins are present, they occur in both living and dead mold spores and may be present in materials that have become contaminated with molds. While Stachybotrys is growing, a wet slime layer covers its spores, preventing them from becoming airborne. However, when the mold dies and dries up, air currents or physical handling can cause spores to become airborne.

At present there is no environmental test to determine whether *Stachybotrys* growth found in buildings is producing toxins. There is also no blood or urine test that can establish if an individual has been exposed to *Stachybetrys chartarrum* spores or its toxins.

As a prospective homebuyer, should I be concerned about indoor mold?

Yes, if indoor mold contamination is extensive, it can cause very high and persistent airborne spore exposures. Persons exposed to high spore levels can become sensitized and develop allergies to the mold or other health problems. Mold growth can damage

furnishings, such as carpets, sofas and cabinets. Clothes and shoes in damp closets can become soiled. In time, unchecked mold growth can cause serious damage to the structural elements in a home.

When purchasing a new construction, certain implied warranties that the property is fit for its intended use may apply. This is not the case when purchasing a property from a seller who is not also the builder. In such instances, the property is often sold "as is," placing the burden on the buyer to perform all necessary inspections and to identify any defects in the property that may impact the property's value. As detailed below, inspection for mold is a difficult task and can be complicated by an improper or incomplete remediation previously performed. For example, a previous homeowner or resident may have simply cleaned or painted over a patch of mold without eliminating the source of moisture. Such an instance would make detection of mold at a buyer's inspection very difficult and without elimination of the source of moisture, the mold growth is likely to return.

How can the presence of mold a residential property be determined?

You may suspect the presence of mold on visual inspection if you see discolored patches or cottony or speckled growth on walls or furniture or if you smell an earthy or musty odor. You also may suspect mold contamination if mold-allergic individuals experience some of the symptoms listed above when in the house. Evidence of past or ongoing water damage should also trigger more thorough inspection. You may find mold growth underneath water-damaged surfaces or behind walls, floors or ceilings.

Should I have a home tested for mold in connection with the buyer's inspection?

Reliable air sampling for mold can be expensive and requires expertise and equipment that is not available to the general public. Owners of individual private homes and apartments generally need to pay a contractor to carry out such sampling, because insurance companies and public health agencies seldom provide this service. Mold inspection and cleanup is usually considered a housekeeping task that is the responsibility of homeowner or landlord, as are roof and plumbing repairs, house cleaning and yard maintenance.

Most state health departments do not recommend testing for mold contamination because there are few available standards for judging what is an acceptable quantity of mold. In all locations, there is some level of airborne mold outdoors. If sampling is carried out in a home, an outdoor air sample also must be collected at the same time as the indoor samples, to provide a baseline measurement. Because individual susceptibility varies so greatly, sampling is at best a general guide.

The simplest way to deal with a suspicion of mold contamination is, if you can see or smell mold, the property likely has a problem and steps should be taken as outlined below. Mold growth is likely to recur unless the source of moisture that is allowing mold to grow is removed and the contaminated area is cleaned.

Assessing the Size of a Mold Contamination Problem:

No mold problem should be ignored. Certain published guidelines suggest that there will be a significant difference in the approach used for a small mold problem – total area affected is less than 10 square feet -- and a large contamination problem -- more than 100 square feet. In the case of a relatively small area, the homeowner using personal protective equipment should be able to handle the cleanup. However, for much larger areas, published guidelines recommended that an experienced, professional contractor be retained. For medium cases, between 10 and 100 square feet, the type of containment and personal protection equipment to be used will be a matter of judgment.

General Cleanup Procedures:

- Identify and eliminate sources of moisture
- Identify and assess the magnitude and area of mold contamination
- Clean and dry moldy areas -- use containment of affected areas
- Bag and dispose of all material that may have moldy residues, such as rags, paper, leaves, and debris.

Clean-up should begin after the moisture source is fixed and excess water has been removed. Wear gloves when handling moldy materials. Spores are more easily released when moldy materials dry out, so it is advisable to remove moldy items as soon as possible. Detailed cleanup procedures are available in the New York Department of Health's *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, which can be found online at www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html.

How can indoor mold problems be prevented?

A residential property should be inspected regularly for the indications and sources of indoor moisture and mold. One should take steps to eliminate sources of water as quickly as possible. If a leak or flooding occurs, it is essential to act quickly:

- Stop the source of leak or flooding.
- Remove excess water with mops or wet vacuum.
- Move wet items to a dry, well-ventilated area. Move rugs and pull up wet carpet as soon as possible.
- Open closet and cabinet doors and move furniture away from walls to increase circulation.
- Run portable fans to increase air circulation. Do NOT use the home's central blower if flooding has occurred in it or in any of the ducts. Do NOT use fans if mold may have already started to grow -- more than 48 hours since flooding.
- Run dehumidifiers and window air conditioners to lower humidity.
- Do NOT turn up the heat or use heaters in confined areas, as higher temperatures increase the rate of mold growth.
- If water has soaked inside the walls, it may be necessary to open wall cavities, remove baseboards, and/or pry open wall paneling.

Publications:

**Biological Pollutants in Your Home*
This publication is available at no cost from:

U.S. Environmental Protection Agency

RADON

What is radon?

Radon is a naturally occurring chemically inert radioactive gas that is formed from radioactive decay of radium and uranium. Since radon cannot be seen, tasted, or smelled, special instruments are necessary for its detection. The unit of measurement for radon is picocuries per liter of air (pCi/L).

Where is radon found?

Radon is typically present in rocks containing uranium such as certain granites and shales. The amount of radon that can enter soils and ground water depends on the concentrations of uranium in the underlying rock. Radon can also be found in the air at very low concentrations. Radon gas can also enter and concentrate in homes and buildings. In the United States, the average level indoors is 1.3 pCi/L, but radon levels have been found to range from 0.25 to over 3,000 pCi/L.

How is radon harmful?

The U.S. EPA classifies radon as a known human carcinogen. Long-term exposure to high levels of radon may increase a person's risk of lung cancer. It is believed that tobacco smokers who are exposed to high radon levels account for a large percentage of the lung cancer deaths believed to be associated with radon exposure in the United States. Therefore, the risk is substantially less for nonsmoker.

Exposure to radon does not result in any immediate symptoms. For example, it does not result in acute respiratory effects such as colds or allergies. Any cancer resulting from inhaling radon is not likely to arise for at least 20-30 years after exposure begins and both the level of exposure and duration of exposure are factors which determine the risk of developing lung cancer.

How does radon enter the home?

Radon enters the indoor air in the home from the soil through cracks and openings in concrete slabs, crawl spaces, floor drains, sumps, and the many tiny pores in hollow-wall concrete blocks. When the pressure within a home is lowered, more radon can be drawn from the soil and enter the home. Indoor air pressure may be lower during colder months when heated air rises from the floor level to the ceiling (or second story) level in the house. Indoor pressure may also be lowered in tightly sealed houses through use of exhaust fans such as those in many kitchens and bathrooms.

If radon is present in tap water, it can be released when water is used indoors for showering, washing dishes, or washing clothes. Radon is of most concern when water is obtained directly from a well that draws water from a source exposed to uranium and radium. Most of the radon in water obtained from a surface source, such as a reservoir or well water stored in an open tank has been released before it reaches the home. Building materials are not a significant source of radon except where they incorporate rocks rich in radium or uranium.

Where are the highest levels of radon in the home?

Generally, the living area closest to the soil surface has the highest level of radon. Upper stories have lower levels of radon. Consequently, radon is rarely a concern in high-rise apartment buildings, other than at ground level.

Do adjacent houses have similar levels of radon?

Because of the variability of the uranium and radium content of soil and differences in house construction and use, it cannot be assumed that houses in the same neighborhood have the same radon levels. In order to determine radon levels in any particular house, measurements must be made.

Is there a safe level of radon?

Although there is consensus that the greater the exposure to radon the greater the risk of developing lung cancer, there is insufficient data to define a radon level which is harmless. Both the length of time during which radon is inhaled and the level of radon in the air are determining the risk of developing lung cancer. It is also believed that important in smoking may be a large contributing factor to lung disease associated with radon exposure.

How can radon levels be measured?

Several types of passive radon detectors or active devices can measure the level of radon in a house. Passive detectors are devices left in place for a period of time that require no ongoing activity or power. To obtain accurate results, the homeowner should carefully follow the manufacturer's instructions. Although short-term measurements of radon levels are more convenient, health risk can be more accurately determined from measurements made over a year.

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Active devices require a source of power and are used by professional radon testers to monitor radon levels. These devices are usually used during real estate transactions.

What actions are required to reduce indoor radon levels?

The U.S. EPA recommends that homeowners should attempt to reduce radon levels in any home that has an annual average level of radon at or above 4 pCi/L. The mitigation method chosen will depend on the construction of the house, extent of radon reduction required, and cost. After installing a mitigation system, it is recommended that radon levels be monitored at regular intervals to verify that the mitigation remains effective.

A qualified contractor should install the radon mitigation system unless the homeowner fully understands the principles of the mitigation system.

When should water be tested for radon?

When indoor levels of radon are at or above 4 pCi/L, homeowners should consider a water test. If the water comes from a water system, information about the source of the water and any radon tests done on it can be obtained from the water company that supplies the water.

If the water comes from a private well, the radon concentration may be measured by analyzing a water sample at a laboratory certified to test for radon in water. It must be emphasized that the method of sample collection is critical.

How can levels of radon in water be reduced?

Radon levels in water can be reduced by 99 percent by installation of a GAC unit (granular activated carbon unit) on the water line entering the house. As radon accumulates in the GAC unit, the unit becomes radioactive as the radon decays. Thus, GAC units installed to remove radon in household water must be shielded or located in areas remote from the house to protect occupants from radiation. The GAC filters also require special handling during replacement and disposal: Aeration may also remove radon from water. This technique may be more costly but avoids the problem of radiation build up.

Selection of the proper water treatment technology depends primarily upon its removal efficiency (other contaminants in the water may adversely affect this), safety, initial costs, and operating and maintenance costs. Therefore, professional guidance is strongly advised.

Does the law require mitigation?

Mitigation of radon is generally not required by law and is at the discretion of the homeowner.

Publications:

* *A Citizen's Guide to Radon*
* *Homebuyers and Sellers Guide to Radon*
* *How to Reduce Radon Levels in your Home*
* *Model Standards for Radon in New Residential Buildings*

These publications can be downloaded at the EPA Indoor Air Quality website www.epa.gov/faq

* *The Inside Story. A Guide to Indoor Air Quality*

This publication is available at no cost from:

Indoor Air Quality Information Clearinghouse
P. O. Box 37133
Washington, D.C. 20013-7133
Telephone: (800) 438-4318
Fax: (202) 484-1510
Web: www.epa.gov

Additional Information may be found at:

U.S. Department of Housing and Urban Development (HUD)
Office of Lead Hazard Control
451 7th Street, Room B133, SW
Washington, D.C. 20410
Telephone: (202) 755-1785
Web: www.hud.org

U.S. Environmental Protection Agency (US EPA)
Public Information Center
401 M Street, SW
Washington, D.C. 20460
Telephone: (202) 260-2080
Web: www.epa.gov

Note: Telephone numbers, addresses and prices were correct at the date of publication of this Guide, but are subject to change. For local assistance, contact your county or city Department of Health, Housing, or Environmental Health Department.

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GLOSSARY OF TERMS

AERATION: A technique by which air is introduced into a liquid; bubbles and aero are generated and dissolved gases released. For example, water aerated by passing through a showerhead will release dissolved radon gas.

ACTIVATED CARBON: A material made from burnt wood, which is used to remove organic solutes, such as pesticides, and some inorganic solutes, such as chlorine, from water. Dissolved organic solutes are removed from the water by absorption onto activated carbon. The activated carbon must be periodically replaced when it becomes saturated and unable to adsorb any more solute. Activated carbon is not effective in removing heavy metals, such as lead.

ANNUAL AVERAGE LEVEL: The average of measurements taken at different times over the period of one year or the level measured by a device left in place for a year.

CARCINOGEN: A substance that causes cancer.

CERTIFIED LABORATORY: A laboratory that has demonstrated that it can meet the federal and state standards for accuracy and precision for a given analytical procedure.

DISTILLATION: As referenced in this booklet, distillation is a technique used to purify water by removal of inorganic contaminants such as salts through heating solution and condensing the steam. The resultant distilled water has a reduced concentration. Distillation is not effective in removing pesticides and volatile organic contaminants such as chloroform and benzene.

EXPOSURE: Contact with an agent through inhalation, ingestion, or touching. For example, exposure to radon is primarily through inhalation; exposure to lead is primarily through ingestion.

FILTRATION: Purification of water by removing un-dissolved solids or sediment passing the water through a filter or sieve. Filtration does not remove dissolved salts or organic contaminants.

LEVEL: Another term for concentration; also, the amount of a substance in a given volume of air, liquid or solid.

LITER: Metric unit of volume equivalent to 1.057 quarts of liquid. One gallon is equivalent to about 4 liters.

MILLIGRAM: A unit of weight. There are 1,000 milligrams in one gram and about 28 grams in one ounce.

PARTS PER MILLION: A unit of concentration. For example, air that contains 1 part per million formaldehyde contains 1.2 milligrams formaldehyde in 1 million milliliters, i.e., 1,000 liters, of air. Also, water which contains 1 part per million lead contains 1 milligram lead in 1 million milligrams water, i.e., 1 kilogram, water. One part per million can be compared to one cent in ten thousand dollars.

PASSIVE DETECTOR: A measuring device that functions without any energy input or ongoing attention from the user. For example, use of a passive radon detector to measure radon requires only that the detector be left in place for a specified time.

PICOCURIE: A unit of amount used in measurement of radioactive substances. For example, five picocuries of radon are five trillionths of a curie and are equivalent to 11 radioactive radon atoms decaying every minute.

RADIOACTIVE: A term used to describe atoms that are unstable and break down or decay to form another kind of atom. For example, radium breaks down to form radon. In the process of decay some high-energy particles are emitted. The detection of these particles by special instruments indicates that a substance is radioactive. The high-energy particles and gamma rays are called radiation.

REVERSE OSMOSIS: A technology used to purify water by removing the salts from water. Osmosis involves the diffusion of water from a dilute to a concentrated solution across a semi-permeable membrane that allows only the passage of water. In reverse osmosis, water is forced through a semi-permeable membrane from a concentrated solution to a stream of purified water. For example, in the desalination of seawater, reverse osmosis is used to separate the salts from the water generating drinking water and a residue of salts.

RISK: In the context of this booklet, risk indicates the chance of developing a disease after exposure to an environmental hazard. Risk depends on the time period for which a person is exposed to a particular hazard and the level of the hazard.

SOFT WATER: Water that does not contain large amounts of dissolved minerals such as salts containing calcium or magnesium.

SOLDER: A metallic compound used to seal joints between pipes. Until recently, most solder contained about 50 percent lead. Lead solder is now banned for plumbing applications.

TOXICITY: The extent to which a material is toxic.