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California "Natural Gas Safety and Shutoff Valve Information,"
"Homeowner's Guide to Earthquake Safety,"
"Residential Environmental Hazards,"
California Energy Commission "Home Energy Rating System (HERS)" booklet,
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Buyer Mailing Address _____
Phone # ( ) _____
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Seller Name _____

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Main Office Phone # ( )_____
RE Company Name_____City _____
Initiating Agent _____

Cooperating Agent Information
Main Office Phone # ( )_____
RE Company Name_____City _____
Cooperating Agent _____

Closing Company Information
Closing Company Name_____City _____
Officer _____
Main Office Phone # ( )_____
File #_____Estimated Close_____

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☐ To decline the Optional Coverage benefits of: _____
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2) Coverage is not all inclusive, and contains specific exclusions and limitations.
3) I have read and accept the terms of cancellation and arbitration stated herein.

California Environmental Protection Agency

CDPH California Department of PublicHealth

This guide was originally developed by M. B. Gilbert Associates, under contract with the California Department of Real Estate in cooperation with the California Department of Health Services. The 2005 edition was prepared by the California Department of Toxic Substances Control, in cooperation with the California Air Resources Board and the California Department of Health Services, and meets all State and Federal guidelines and lead disclosure requirements pursuant to the Residential Lead-Based Paint Hazard Reduction Act of 1992. The 2005 edition incorporates the Federal "Protect Your Family from Lead" pamphlet. The 2011 update was developed by the California Department of Toxic Substance Control. This booklet is offered for information purposes only, not as a reflection of the position of the administration of the State of California.

Table of Contents

Chapter I — Asbestos 2
Chapter II — Formaldehyde 4
Chapter III — Hazardous Waste 6
Chapter IV — Household Hazardous Waste 8
Chapter V — Lead 9
Chapter VI — Mold 13
Chapter VII — Radon 18
Chapter VIII — Carbon Monoxide 56
Appendices:
Appendix A— List Of Federal And State Agencies 58
Appendix B — Glossary Of Terms 61
Protect Your Family from Lead in Your Home 62
Renovate Right 81
Sample Pre-Renovation Form 97
Homeowner's Guide to Earthquake Safety 99
Residential Earthquake Hazards Report 149
Sample Claim for Seismic Safety Construction – Exclusion From Assessment 151
What is Your "Home Energy Rating"? 154
Home Buyer's Energy Efficiency Checklist 168-171
What is Your "Home Energy Rating" Sign-off/Receipt 174
Environmental Hazards and Earthquake Safety – Sign-off /Receipt 175

CHAPTER I
ASBESTOS

What is Asbestos?
Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three common types of asbestos are chrysotile, amosite, and crocidolite. Chrysotile, also known as white asbestos and a member of the serpentine mineral group, is the most common. Asbestos can only be identified under a microscope.

Where is asbestos found in the home?
Asbestos has been used in many products found in the home that 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. However, in 1991, the U.S. Fifth Circuit Court of Appeals overturned and remanded the asbestos ban and phase-out rule to EPA. Today, most asbestos products can still be legally manufactured, although production of asbestos containing materials has decreased dramatically since the late 1970s. 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***
* ***Some roofing shingles, and siding***
* ***Vermiculite attic insulation***
* ***Ceiling and wall insulation***
* ***Sheet rock 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. Vermiculite attic insulation, found both in the attic between trusses and in-between walls, also has the potential to contain asbestos. Vermiculite attic insulation is a pebble-like, pour-in product and is usually light-brown or gold in color.

Manufacturers can provide information on the asbestos content of home products. A certified asbestos consultant can be hired to test building material and determine whether or not asbestos is present and to give advice about how to take care of it safely. Current asbestos bulk testing methods may be insufficient to determine the presence of asbestos in vermiculite attic insulation. For more information on vermiculite, reference U.S. EPA's Protect Your Family from Asbestos-Contaminated Vermiculite at www.epa.gov/asbestos/pubs/verm_questions.html.

How is asbestos harmful?
Intact or sealed (painted or taped over) asbestos is not harmful unless it becomes damaged and 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: risk of asbestosis (lung scarring); and increased risk of cancer.

The U.S. EPA classifies asbestos as a known human carcinogen. If asbestos fibers are inhaled, the chance of contracting lung cancer or mesothelioma (cancer of the lining of the chest or abdomen) increases. The more asbestos is inhaled, the greater risk of developing cancer. 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 to asbestos.

Is there a safe level of asbestos?
There is no safe level of asbestos exposure. The more asbestos fibers you inhale, the greater your risk of developing lung cancer and asbestos-related disease. Exposure to asbestos should always be avoided.

How can asbestos content in materials be determined?
When you suspect asbestos is 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.

It is recommended that you contact a certified asbestos consultant to take samples of potential asbestos containing materials and have them tested by a qualified laboratory. A list of asbestos consultants who have been certified by the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) for evaluating building materials and recommending a course of action may be obtained online at www.dir.ca.gov/Databases/doshacru/acruList.asp or by calling (510) 286-7362.

How should the homeowner repair or remove asbestos?
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. 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 by the California Contractors State License Board and registered with the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) 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 can expect to pay three times as much for a small removal job than a large one as it is expensive for a contractor to set up all the necessary safety equipment. You should consider hiring a certified asbestos consultant to review safety procedures and oversee the performance of the contractor.

Does the law require asbestos mitigation?

Asbestos mitigation is at the discretion of the homeowner. Even if material contains asbestos, the homeowner may choose to leave it alone or, if necessary, repair it. If the home owner chooses to do his or her own repairs, the home owner must comply with the law. The free Department of Toxic Substances Control fact sheet "Managing Asbestos Waste" is available on the DTSC website at: www.dtsc.ca.gov/PublicationsForms/upload/OAD_FS_Asbestos1.pdf.

What about naturally occurring asbestos that is found near the home?

Naturally Occurring Asbestos (NOA) includes six regulated naturally occurring minerals (actinolite, amosite, anthophyllite, chrysotile, crocidolite, and tremolite) and is commonly found in California within serpentine and other ultramafic rocks and soils of the Coastal Ranges, Klamath Mountains, and the Sierra Nevada Mountains. The California Geological Survey has produced a map that identifies areas more likely to contain NOA in California. The map may be found online at: www.consrv.ca.gov/cgs/minerals/hazardous_minerals/asbestos/index.htm.

Asbestos fibers may be released into the air as a result of activities which disturb NOA-containing rock or soils. Development construction activities in areas that contain NOA may release asbestos. Also, driving on roads or driveways surfaced with asbestos containing gravel, such as serpentine, may release asbestos. The California Air Resources Board (ARB) has established Asbestos Airborne Toxic Control Measures (ATCMs) to regulate the surfacing of roads with asbestos-containing gravels and construction and grading activities in areas potentially containing asbestos. For more information about naturally occurring asbestos, go to: www.arb.ca.gov/toxics/asbestos/asbestos.htm.

Hotlines:

For information on the identification and abatement of asbestos hazards in the home, and other information about asbestos visit the U.S. EPA Asbestos website at www.epa.gov/asbestos.

For technical assistance and information about:

* ***Toxic Substances Control Act (TSCA);***

* ***Regulations and programs administered under TSCA, including asbestos, lead-based paint, and PCB's; and***

* ***EPA's 33/60 voluntary pollution prevention program;***

Contact the Toxic Substances Control Act Assistance Information Service (T.A.I.S.), Washington, D.C. at:

Telephone: (202) 554-1404
Fax: (202) 554-5603
E-mail: tsca-hotline@epa.gov

Publications:

* ***Indoor Air Quality Infosheet - Asbestos***

This free publication is available from:

American Lung Association
Environmental Health Department
909 12th Street
Sacramento, CA 95814
Telephone: (800) LUNG-USA [(800) 586-4872]

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

* ***Asbestos in Your Home***

These free publications are available from:

U.S. EPA Indoor Air Quality Information Clearinghouse
P.O. Box 37133
Washington, D.C. 20013-7133
Telephone: (800) 438-4318
FAX: (202) 284-1510
Email: iaqinfo@aol.com
Web: www.epa.gov/iaq

* ***Asbestos in the Home and Workplace***
The list is available online from:

California Department of Public Health
Indoor Air Quality Program
www.cdph.ca.gov/programs/IAQ/Documents/IAQ_Asbestos_2000-03.pdf.

* ***List of Certified Asbestos Consultants***
This list is available on the internet or by mail for $8.00 from:

California Department of Industrial Relations
Division of Occupational Safety and Health (Cal/OSHA)
Asbestos Consultant Certification Unit
2211 Park Towne Circle, Suite 1
Sacramento, CA 95825
Telephone: (916) 574-2993
Web: www.dir.ca.gov

* ***List of Asbestos Abatement Contractors***
This list is available for $25.00 from:

California Department of Industrial Relations
Division of Occupational Safety and Health (Cal/OSHA)
Asbestos Contractor Registration Unit
455 Golden Gate Avenue, 10th Floor
San Francisco, CA 94102
Telephone: (415) 703-5190
Web: www.dir.ca.gov

* ***What You Should Know Before You Hire a Contractor***
This free publication is available from:

California Contractors State License Board
9835 Goethe Road
P.O. Box 26000
Sacramento, CA 95827
Telephone: (800) 321-2752 (To receive publication, leave name and address on message phone.)

Note: Telephone numbers and prices were correct at the date of publication of this booklet, but are subject to change.

CHAPTER II
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 building materials, many consumer products, and some fabrics. Formaldehyde is found in the outdoor air at an average concentration of approximately 3 parts per billion (ppb) or 3.7 micrograms per cubic meter of air (ug/m^3).

How is formaldehyde harmful?
The Office of Environmental Health Hazard Assessment (OEHHA) has concluded that exposures to formaldehyde can cause cancer in humans. In 2004, the International Agency for Cancer Research upgraded formaldehyde to a Group I (known human) carcinogen, based on human epidemiology studies of nasopharyngeal cancer. Exposure to airborne formaldehyde may also cause other illnesses, such as irritation to the eyes, skin, and respiratory tract; coughing; sore or burning throat; nausea; and headaches. Formaldehyde may also worsen asthma or allergy symptoms in those with such pre-existing sensitivities. Reducing exposures to formaldehyde will reduce these health risks.

What levels of formaldehyde are found in the home?
The average formaldehyde concentration inside California homes is about 14 ppb (17 ug/m^3) in conventional homes and 37 ppb (45 ug/m^3) in manufactured homes. Formaldehyde concentrations have been measured at levels greater than 200 ppb (246 ug/m^3) in both manufactured and new conventional homes. However, concentrations inside manufactured homes are generally higher than those in conventional homes due to the increased use of composite wood products.

What are the sources of formaldehyde in the home?
Indoor sources are the major cause of exposures to formaldehyde because people spend most of their time indoors, and there are many indoor sources of formaldehyde that typically produce concentrations several times higher than outdoor levels.

Composite wood products are probably the greatest source of formaldehyde in the home. Other sources include other building materials such as some paints, coatings, and wallpaper; some consumer products such as fingernail products; permanent pressed fabric such as clothing and draperies; and combustion sources such as cigarettes and gas appliances.

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 cabinetry, subflooring, shelving, and furniture***
* ***Hardwood plywood - used in paneling, furniture and as a wall covering***
* ***Medium density fiberboard - used in cabinets, doors, table tops, furniture, and shelving***
* ***Oriented strandboard and softwood plywood - used for exterior use and subflooring, which are manufactured using low-emitting phenol-formaldehyde resins***

Why is formaldehyde emitted from these products?

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

Is urea-formaldehyde foam a significant source of formaldehyde in homes?

Urea-formaldehyde foam insulation (UFFI) was installed in the wall cavities of some homes during the 1970s and has been used in the manufacture of mobile homes. The Consumer Product Safety Commission banned the use of UFFI in homes and schools in 1982. Although a Federal Court subsequently removed this ban for procedural reasons, UFFI is not currently being installed in homes in California because it does not meet the insulation standards of the California Energy Commission. In homes where UFFI was installed prior to 1982, formaldehyde concentrations have declined with time to levels that are generally comparable to those in homes without UFFI.

How can formaldehyde be detected and measured?

Levels of formaldehyde can be measured by chemical analysis of air samples collected indoors. In general, ambient air monitoring of formaldehyde is done on a 24-hour or several day 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 or emissions of products. This information can usually be obtained from the manufacturer. In general, you do not need to measure formaldehyde levels if there are few or no materials in the building known to emit high levels of formaldehyde, because levels would then be expected to approach the lower outdoor levels. However, if known or suspected sources are extensively present and cannot be readily removed, it is wise to measure the levels of formaldehyde, to assure that levels are no greater than 27 ppb (9 ug/m^3).

Is there a safe level of formaldehyde?

Most people experience eye and throat irritation when exposed to formaldehyde at levels above 100 ppb (123 ug/m^3). 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 outdoor air may be considered as the lowest levels that can practicably be achieved in the home. OEHHA has established acute (55 ug/m3, or 44 ppb, one-hour average) and chronic (9 ug/m3, or 7 ppb, long-term average) exposure levels to identify the levels at which sensitive individuals might experience adverse non-cancer health effects. For indoor environments, OEHHA has also identified 27 ppb as the eight hour average level that is protective against non-cancer effects for sensitive individuals. Because formaldehyde may cause cancer, and there is no known level that is absolutely risk free, the California Air Resources Board (ARB) recommends that indoor formaldehyde levels be reduced as much as possible.

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 such as bookcases 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 extensive cabinetry, these measures may not be adequate. In those cases, removal of the paneling or coating, or replacement of cabinets may be necessary. Local trade organizations and builders' associations may be helpful in finding a contractor to do this work. You can find additional suggestions for reducing indoor formaldehyde levels in the publications listed below.

Publications:

* ***Formaldehyde in the Home-Indoor Air Quality Guideline #1,*** updated August 2004, www.arb.ca.gov/ research/ indoor/guidelines.htm.

* ***OEHHA, Appendix D Individual Acute, 8 Hour, and Chronic Reference Exposure Level Summaries,*** December 2008, www.oehha.ca.gov/air/hot_spots/2008/AppendixD1_final.pdf#page=128.

* ***Determination of Formaldehyde and Toluene Diisocyanate Emissions from Indoor Residential Sources***, www.arb.ca.gov/research/apr/past/indoor.htm, click on Toxic Air Contaminants, scroll down.

* ***Final Report on the Identification of Formaldehyde as a Toxic Air Contaminant -1992.***

These free publications are available from:

California Air Resources Board, Research Division, Indoor Exposure Assessment Section
P.O. Box 2815
Sacramento, CA 95812
Telephone: (916) 322-8282 (For first two publications listed)
Telephone: (916) 322-7072 (For third publication listed)
Web: www.arb.ca.gov

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

* ***An Update on Formaldehyde***

These free publications are available from:

Indoor Air Quality Information Clearinghouse
P.O. Box 37133
Washington, D.C. 20013-7133
Telephone: (800) 438-4318
FAX: (202) 484-1510
E-mail: iaqinfo@aol.com
Web: www.epa.gov/iaq/

* ***A Consumers Guide to Manufactured Housing***

* ***Manufactured Housing for Families***

These free publications are available from:

California Department of Housing and Community Development, Division of Administration
P.O. Box 31
Sacramento, CA 95812-0031
Telephone: (916) 445-3338
Web: www.hcd.ca.gov

Note: Telephone numbers and prices were correct at the date of publication of this booklet, but are subject to change.

CHAPTER III
HAZARDOUS WASTE

What is hazardous waste?

Hazardous waste is anything left over from a manufacturing process, chemical laboratory, or a commercial product that is dangerous and could hurt people, animals, or the environment. Many industries, such as oil and gas, petrochemical, electronics, dry cleaners, and print shops, generate hazardous waste.

When hazardous waste is properly managed it is shipped to special facilities for treatment, storage, disposal, or recycling. Hazardous waste that is not properly managed may escape into the environment and contaminate the soil, surface and ground water, or pollute the air. Some causes of hazardous waste releases are leaking underground storage tanks, poorly contained landfills or ponds, hazardous waste spills, or illegal dumping directly on land or water.

What is California doing to locate and clean up hazardous waste sites?

The U.S. EPA has targeted about 1,200 sites nationwide for federal cleanup under the federal Superfund Program. Almost 100 of those sites are in California. California is overseeing the cleanup of hundreds of other sites under a state Superfund administered by the California Department of Toxic Substances Control (DTSC). DTSC works jointly with U.S. EPA and other state agencies, such as the California Regional Water Quality Control Boards and local health departments, to manage hazardous waste problems. The primary purpose of site cleanup and mitigation activities at hazardous waste sites is to reduce or eliminate the risks the sites pose to public health or the environment.

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

State law requires certain written disclosures to be made to prospective homeowners. The 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, or contaminated soil or water. You can find additional information on real estate disclosure “Disclosures in Real Property Transactions” available from the California Department of Real Estate. See Appendix A in this document for information on how to contact them.

A prospective homeowner may also get information about hazardous waste sites near a home by consulting the “Hazardous Waste and Substances Sites List” which is maintained by the California Environmental Protection Agency (CalEPA). The list is a comprehensive inventory of hazardous waste sites in California, including contaminated wells, leaking underground storage tanks, and sanitary landfills from which there is a known migration of hazardous waste. It also lists active federal and state hazardous waste sites scheduled for cleanup as well as potential hazardous waste sites.

Information on how you can get a copy of this list is at the end of this chapter. The addresses of federal and state agencies that manage hazardous waste programs are listed in Appendix A.

A homeowner or prospective homeowner may choose to hire a registered environmental assessor to investigate a known or suspected environmental hazard at a property. To obtain a list of registered environmental assessors, contact the Registered Environmental Assessor Program at:

P.O. Box 806
Sacramento, CA 95812-0806
Telephone: (916) 324-6881
FAX (916) 324-1379
Web: www.dtsc.ca.gov/rea/

Internet Resources:

You can learn more about the role of the Department of Toxic Substances Control in protecting Californians from hazardous waste by visiting its website at www.dtsc.ca.gov.

You can also access the DTSC database of potentially contaminated sites (CalSites) at www.dtsc.ca.gov/database/Calsites.

The Federal database of potentially contaminated sites is available at www.epa.gov/superfund/sites/index.htm.

The Hazardous Waste and Substances Sites List (Cortese List) on the locations of hazardous materials release sites is at www.dtsc.ca.gov/database/Calsites/Cortese_List.cfm.

The List of Leaking Underground Storage Tanks is available on the Web at www.geotracker.waterboards.ca.gov.

Hotlines:

**** For information on the federal Superfund program and the National Priorities List (NPL), contact the U.S. EPA RCRA, Superfund, EPCRA hotline at:***

Telephone: (800) 424-9346

Publications:

* ***Disclosures in Real Property Transactions***
This publication is available for $2.00 plus tax from:

California Department of Real Estate Book Orders
P.O. Box 187006
Sacramento, CA 95818-7006 (Mail orders only; a self-addressed envelope is required.)
Web: www.dre.ca.gov/pdf_docs/re6.pdf

* ***List of Registered Environmental Assessors***

This list is free if you are hiring a registered environmental assessor. If you wish to use it as a mailing list, it is available on CD for $6.25 and as a hard-copy printout for $35.00. It's also available free on our Website at www.dtsc.ca.gov/rea.

Department of Toxic Substances Control
Registered Environmental Assessor Program
P.O. Box 806
Sacramento, CA 95812-0806
Telephone: (916) 324-6881

* ***The Toxics Directory: References and Resources on the Health Effects of Toxic Substances***
This publication is available for $9.90 from:

California Department of General Services
Documents and Publications
P.O. Box l015
North Highlands, CA 95660
(Send written request with your name and street address. Make your check out to *Procurement Publications*.)

* ***Ensuring Safe Drinking Water (600M91012)***
This free publication is available from:

U.S. Environmental Protection Agency
Public Information Center
1200 Pennsylvania Ave, N.W.
Washington, D.C. 20460
Telephone: (800) 490-9198

* ***Consumer's Guide to California Drinking Water***
This publication is available for $4.00 (plus 5% shipping charge and tax) from:

Local Government Commission
1414 K Street, Suite #600
Sacramento, CA 95814
Telephone: (916) 448-1198 x307
Web: www.lgc.org

* ***Is Your Drinking Water Safe? (PB94-203387)***

This publication is available for $19.50 plus $4.00 shipping from:

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

Note: Telephone numbers and prices were correct at the date of publication of this booklet, but are subject to change.

CHAPTER IV
HOUSEHOLD HAZARDOUS WASTE

What is household hazardous waste?
Although hazardous waste is usually associated with industrial or manufacturing processes, each year Californians discard tons of hazardous wastes in trash cans or down the drain. To determine whether a product is hazardous, ask yourself these questions:

* ***Is it poisonous when swallowed, touched, or inhaled?***
* ***Does it catch fire easily?***
* ***Is it corrosive? Can it eat through certain containers?***
* ***Is it reactive? Could it explode if it is improperly stored, spilled, or mixed with other products?***

If you answer yes to any these questions, then the product is hazardous. Information about whether a product is hazardous usually can be found on the container label. The words "caustic," "flammable," "toxic," and "ignitable" mean that the product is hazardous.

Some products are hazardous on their own, but can become even more dangerous when they are mixed with other household products. For example, most people know that bleach is poisonous, but when it is mixed with ammonia-based cleaners it releases chlorine and hydrazine gases, both of which are extremely poisonous.

Some other hazardous household products are:

* ***Cleaning products containing ammonia***
* ***Chlorine bleach and cleaning products containing it***
* ***Drain cleaners***
* ***Carpet cleaning products***
* ***Oven cleaners***
* ***Metal polishes***
* ***Garden supplies such as weed and insect killers, rat poison, and fertilizer***
* ***Charcoal lighter fluid, and kerosene***
* ***Automotive supplies such as antifreeze, motor oil, gasoline, batteries and brake fluid***
* ***Paint, varnish, paint removers, glues, and waxes***
* ***Electronic products such as cathode ray tubes, televisions, computers, cell phones***
* ***Universal wastes such as fluorescent lights, small batteries, and products containing mercury***

How should hazardous household products be stored?
Hazardous products should be stored in a cool, dry, secure location. They should be stored in locked cupboards, locked drawers, or on a high shelf out of the reach of children and pets. To prevent hazardous products from spilling during an earthquake, shelves should be firmly secured to the wall and have a restraining bar along the side.

The following guidelines will help you properly store household hazardous products:

* ***Store poisonous products apart from other products.***
* ***Sort products into hazardous waste categories of poisonous, flammable, corrosive, and reactive and store them separately. 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 a separate location.***
* ***Store bleach and ammonia-based cleaners in separate cupboards, so that if there is a spill the products won't get mixed and release poisonous gas.***
* ***Store products in their original containers.***
* ***Make sure labels can be read and won't come off the container.***
* ***Tightly seal containers and check them often to make sure they are not breaking down. If you notice a container is rusting or leaking, put it inside a larger container and label it clearly.***

What is the best way to dispose of household hazardous waste?
The best way to dispose of household hazardous waste is to take it to a community household hazardous waste collection center in your area.

You should never pour unused hazardous household products down the drain. That is illegal in California. It is also illegal to pour used oil and paints on land, down drains, including the storm drains, or to burn them.

Waste motor oil, oil filters, antifreeze, and used batteries can be recycled. You should take them to a recycling center or a household hazardous waste collection center. For information about recycling specific products or about household hazardous waste collection programs in your community, call 1-800-CLEANUP or visit the Department of Resources Recycling and Recovery (CalRecycle) Website at www.calrecycle.ca.gov. You can get additional information on household hazardous waste at www.earth911.org.

Hotlines:
* ***For information on household hazardous waste and used oil collection and recycling centers, information on buying recycled products, the 3 R's - Reduce, Reuse and Recycle, and other environmental tips and events, contact the California Environmental Hotline at:***

Telephone: 1-800-CLEANUP (1-800-253-2687)
website: www.1800cleanup.org

* ***For information on recycling and collection centers and referrals for county and city agencies, call the Department of Resources Recycling and Recovery (CalRecycle) at (916) 322-4027.***

* ***To report hazardous waste violations, call the California Department of Toxic Substances Control Waste Alert hotline at:***

Telephone: (800)-69TOXIC [(800) 698-6942]

* ***For general information on hazardous wastes, call the California Department of Toxic Substances Control at:***

Telephone: (800) 61TOXIC [(800) 618-6942]

Publications:

* ***Household Products Management Wheel***
This product is available for $4.95 from:

Environmental Hazards Management Institute
10 New Market Road
P.O. Box 932
Durham, NH 03824
Telephone: (603) 868-1496
FAX: (603) 868-1547

Note: Telephone numbers and prices were correct at the date of publication of this booklet, but are subject to change.

CHAPTER V
LEAD

How is lead harmful?
Lead is a common environmental toxin that has been used extensively in consumer products such as paint and gasoline. Much of that lead remains in the California environment where people may be exposed to it. Children under the age of six years are particularly at risk. They typically are exposed to lead through the normal hand-to-mouth behavior that occurs as they explore their environment. Crawling or playing on the floor, and putting their fingers, toys, and other items in their mouths can expose a child to lead. Lead poisoning, which is often unrecognized, can result in health effects that are often irreversible, including brain damage, mental retardation, convulsions, and even death. If lead poisoning goes undetected, it may result in behavior problems, reduced intelligence, anemia, and serious liver or kidney damage.

Lead is also harmful to adults. Lead poisoning can cause reproductive problems in both men and women, high blood pressure, kidney disease, 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. If a pregnant woman is lead poisoned, the lead can pass into her baby's blood and poison the baby.

How can I find out if my family has lead poisoning?
The most important step you can take to protect your children is to prevent them from being exposed to lead. Most lead poisoning does not cause acute symptoms, so the only way to know if a person is lead poisoned is by testing the level of lead in his or her blood.

There are many ways a child can be exposed to lead. The law assumes that, at minimum, children are at risk if they are on publicly funded programs for low-income children or if they live in, or spend a lot of time in, a place built before 1978 that has peeling or chipped paint, or that has been recently renovated. These children must be tested for lead at age one and two years. Children below the age of six years, who were not tested at ages one or two, should receive make-up testing as soon as possible. If you have a job or a hobby where you may be exposed to lead, you should be tested regularly. If you are pregnant, ask your doctor about a lead test.

A physician can order this simple test. Some doctors and healthcare centers can perform the test in their offices. Under California law, it must be covered by health insurance plans. Children from families with modest incomes can be tested at no cost through the Child Health and Disability Prevention Program (CHDP). The test is a required part of well-child checkups. For more information on CHDP and to locate an office in your area visit their website at www.dhcs.ca.gov/services/chdp.

Because lead poisoning is the result of contact with lead, the primary treatment is to identify the source of lead, and remove or isolate it. Further medical management may be necessary, depending on factors such as the severity and duration of exposure. Adults and children who become lead poisoned will need regular testing to monitor levels of lead in the body.

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 your 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 large amounts of lead dust. This dust can poison your family.

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

Other Sources: Lead can be found in jobs such as battery repair or recycling, radiator repair, painting or remodeling, and lead smelting. 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 also use lead. These include ceramics, stained glass, fishing weights, and bullet casting or firing. Lead can leach into food cooked, stored, or served in some imported dishes or handmade pottery. Some traditional remedies such as Azarcon, Greta, Pay-loo-ah, Surma, Kohl, and Kandu contain large amounts of lead and present a serious danger. Imported candy, especially chili or tamarind candy or its packaging, is frequently lead contaminated. Lead has been found in painted toys and inexpensive costume jewelry, particularly imported items. Older water systems may have lead pipes or pipes with lead solder.

How can I check my home for lead hazards?

To inspect your home for lead hazards, hire an individual who has been certified by the California Department of Public Health (CDPH). CDPH certification is now required for all those doing lead hazard evaluations, lead abatement plan preparation, lead abatement work and lead clearance inspections for residential and public buildings in California (Title 17 CCR 35001-35050 and 36000-36100). A CDPH-certified inspector/assessor can determine the lead content of painted surfaces in your home and identify sources of lead exposure such as peeling paint, lead contaminated soil, or lead-contaminated dust. The assessment should outline the actions to take to address these hazards.

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

You may have seen home lead test kits in your local hardware store. Recent studies suggest, however, that they are not accurate for testing paint, soil, or dust. They may be used, however, to test pottery and ceramics for the presence of lead.

How can I reduce lead hazards safely?

If your house has lead hazards, you can take action to reduce your family's risk. Most importantly, if you have young children, be sure they receive a blood lead test. This is particularly critical if you live in a unit that has been recently renovated or have remodeled your home.

Second, keep your home as clean and free of dust and deteriorated paint chips as possible. Clean floors, window frames, windowsills, and other horizontal surfaces weekly. Use a mop, sponge, or disposable cloths with a solution of water and an all-purpose cleaner. Rinse out mops and sponges thoroughly after use. Use doormats or remove shoes before entering your home to avoid tracking in lead from bare soil. Have children play in grassy or landscaped areas instead of bare soil.

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 that include 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 regular cleaning and good nutrition, you can **temporarily** reduce lead hazards by repairing damaged painted surfaces and planting grass or using landscaping materials 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 a permanent solution. Hire an individual who has been certified by the CDPH as a Supervisor. CDPH-certified Supervisors and Workers have the proper training to do this work safely. They have the proper equipment to clean up thoroughly. They will also follow strict safety rules set by the state and federal governments.

What precautions should I take when remodeling my 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. To fully protect your family from unsafe renovation hazards, hire a CDPH-certified Supervisor.

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 your 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 the home until the work is completed and the area has been properly cleaned.

You can find out about other safety measures by calling (800) 424-LEAD [(800) 424-5323]. Ask for the brochure "Reducing Lead Hazards when Remodeling Your Home." This brochure explains what to do before, during, and after renovations.

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. However, recently, new chemical agents being used in some water systems have been associated with increased corrosion and have resulted in increased levels of lead in water.

How can lead levels in water be determined?

If you suspect lead contamination in drinking water, you may submit water samples to a laboratory certified by the CDPH. For a list of certified laboratories, see Publications at the end of this chapter. Consult with the laboratory on the proper procedures for sample taking. Information on the possibility of lead contamination in your municipal water supply may be obtained from the water utility serving your area.

How can levels of lead in water be reduced?

Lead levels in water can be reduced by removing lead piping or lead solder, by installing a home treatment system certified by the CDPH, or regularly flushing each tap before consuming the water. Another alternative for homeowners is to purchase bottled water. A detailed discussion of home treatment systems is presented in, "Consumers Guide to California Drinking Water" (see Publications).

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, for about 15 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 other purposes, such as washing clothes or watering plants.

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

If you are planning to buy, rent, or renovate a home built before 1978, federal law requires sellers, landlords, and remodelers to disclose certain information prior to finalizing contracts.

Landlords must:

* ***Disclose known information on lead-based paint hazards.***
* ***Give you a lead hazard pamphlet before leases take effect. Leases must also include a federal form about lead-based paint.***

Sellers must:

* ***Disclose known information on lead-based paint hazards.***
* ***Give you a lead hazard pamphlet before selling a house. Sales contracts must also include a federal form about lead-based paint. Buyers have up to ten days to check for lead hazards.***

Renovators must:

* ***Give you a lead hazard pamphlet before starting to work.***

If you want more information on these requirements, call the National Lead Information Clearinghouse at (800) 424-LEAD [(800) 424-5323].

Hotlines:

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

Telephone: (800) 426-4791

* ***For information on how to protect children from lead poisoning, contact The National Lead Information Center at:***

Telephone: (800) Lead-FYI [(800) 532-3394]

* ***For other information on lead hazards, call The National Lead Information Center Clearinghouse at:***

Telephone: (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:***

Telephone: (800) 638-2772

* ***To request local lists of CDPH-certified inspectors or abatement workers, contact the Lead-related Construction Hotline at:***

Telephone: (800) 597-LEAD [(800) 597-5323] or visit the CDPH website www.cdph.ca.gov

* ***To obtain additional information on lead poisoning, or a list of local county lead programs, contact the CDPH Childhood Lead Poisoning Prevention Branch at:***

Telephone: (510) 620-5600 or visit the CDPH website at www.cdph.ca.gov/programs/CLPPB.

Publications:

* ***List of Certified Laboratories to Perform Hazardous Waste Analysis***

This free list is available from:

California Department of Public Health
Environmental Laboratory Accreditation Program
850 Marina Bay Parkway, Ste. G365/EHL
Richmond, CA 94804
Telephone: (510) 620-2800
Web: www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx

* ***Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing***

This publication is available for $45.00 from:

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

* ***Lead in your Drinking Water***

This publication is available from:

U.S. Environmental Protection Agency
Public Information Center
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460
Telephone: (202) 272-0167

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

This free publication is available from:

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

* ***Consumers Guide to California Drinking Water***

This publication is available for $4.00 (plus 5 percent shipping charge, and tax) from:

Local Government Commission
1414 K Street, Suite #250
Sacramento, CA 95814
Telephone: (916) 448-1198 x 307
Web: www.lgc.org

* ***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

Note: Telephone numbers and prices were correct at the date of publication of this booklet, but are subject to change.

California Department of Public Health (CDPH)

Indoor Air Quality (IAQ) Info Sheet

Mold in My Home—What Do I Do?

Updated July 2012

This info sheet provides basic information on water damage in the home. It describes molds, why they may grow indoors, health concerns related to mold exposure, the detection and prevention of indoor mold, and cleanup procedures for mold-contaminated materials with reference to additional resources and documents.

ABOUT 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 plant and animal material and recycle nutrients in the environment. For molds to grow and reproduce, they need only a food source—any organic matter, such as leaves, wood, or paper—and moisture. Because molds grow by digesting organic material, they gradually destroy whatever they grow on. Sometimes, new molds even grow on old mold colonies. Mold growth on surfaces can often be seen in the form of discoloration, frequently white, gray, brown, or black but also green and other colors.

How am I exposed to indoor molds?

Molds release countless, tiny spores, which travel through the air. Everyone inhales some mold every day without apparent harm. It is common to find mold spores in the air inside homes. In fact, 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 exposure is high. This may occur when there is active mold growth within a home, office, school, or other building in which people live or work for long periods. People also can be exposed to mold by touching contaminated materials and by eating contaminated foods.

Can mold become a problem in my home?

Yes. Molds will grow and multiply whenever conditions are right, that is, when sufficient moisture is available and organic matter is present. Be on the lookout for the following common sources of moisture inside and outside your home that may lead to mold problems:

- Leaky roof
- Sprinkler spray hitting the house
- Plumbing leaks or overflow from sinks or sewers
- Damp basement or crawl space
- Humidifiers or steam from showers or cooking
- Wet clothes hung indoors or a clothes dryer that exhausts indoors

Warped floors and stains on walls and ceilings can be indications of moisture problems. Condensation on windows or walls also is an important sign of excessive dampness and can be caused by some of the sources listed above. However, condensation also can be caused by an indoor combustion problem. Therefore, inspect fuel-burning appliances annually, and contact your local utility or a professional heating contractor if you have questions. General information on gas appliance safety is available at:

http://www.pge.com/myhome/edusafety/gaselectricsafety/gasappliancesafety/.

Should I be concerned about mold in my home?

Yes, if indoor mold contamination is extensive, it can lead to very high and persistent exposures to airborne spores. Persons exposed to high spore levels can become sensitized and develop allergies to the mold or they may develop other health problems (see below).

Mold growth also can damage your furnishings, such as carpets, chairs and sofas, and cabinets. Clothes and shoes in damp closets can become soiled and start to fall apart.

Unchecked, mold growth can seriously damage the structural elements in your home, for example, floors, walls, and ceilings.

HEALTH EFFECTS

What symptoms can mold cause?

Molds produce health effects through inflammation, allergy, or infection. Allergic reactions (often referred to as hay fever) are the most common responses following mold exposure. Known health risks from mold exposure include: the development of asthma, allergies, and res-piratory infections; the triggering of asthma attacks; and increased wheeze, cough, difficulty breathing, and other symptoms. In addition, evidence is accumulating, although not yet conclusive, that the more extensive, widespread, or severe the water damage, dampness, visible mold, or mold odor, the greater the health risks.

❖ CDPH has released a statement on building dampness, mold, and health that summarizes the evidence-based health risks from indoor dampness and mold.

http://www.cal-iaq.org/phocadownload/statement_on_building_dampness_mold_and%20health2011.pdf

How much mold can make me sick?

It depends. 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, identify and eliminate excess moisture, and cleanup and remove the mold (see below).

❖ **Anyone with a health problem they believe to be due to mold should consult a medical professional.**

Are some molds more hazardous than others?

Perhaps. 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 *Stachybotrys chartarum*) may produce compounds with toxic properties known as *mycotoxins*.

A mold may not always produce mycotoxins, depending on the material on which it is growing, the indoor temperature or humidity, the pH of the material, or other, as yet unknown, factors. When produced, mycotoxins may be present in both living and dead spores as well as materials that were contaminated with mold.

A wet layer encloses *S. chartarum* spores while they are growing, preventing them from readily becoming airborne. However, when the mold dries up, air currents or physical handling can release spores into the air.

At present there is no environmental test to determine whether *S. chartarum* found in buildings is producing toxins, nor can blood or urine tests establish that an individual has been exposed to *S. chartarum* spores or toxins.

Additional fact sheets on mold and health effects, including specifically *Stachybotrys*, are available from the CDPH Environmental Health Investigations Branch webpage, http://www.ehib.org/cma/topic.jsp?topic_key=15:

- *Health Effects of Toxin-producing Molds in California*
- *Fungi and Indoor Air Quality*
- *Stachybotrys chartarum (atra) — A mold that may be found in water-damaged homes*
- *Misinterpretation of Stachybotrys Serology*

The Centers for Disease Control and Prevention (CDC) also has information at www.cdc.gov/mold/stachy.htm (Facts about *Stachybotrys chartarum* and Other Molds).

Are some persons at greater risk if exposed to mold?

Exposure to building-related mold is not healthy for anyone. Therefore, it is best to identify and correct high moisture conditions quickly, before mold grows and health problems develop.

Some persons may have more severe symptoms or become ill more readily than others:

- Individuals with existing respiratory conditions, such as allergies, chemical sensitivities, or asthma
- Persons with weakened immune systems (such as HIV infected persons, cancer chemotherapy patients, and so forth)
- Infants, young children, and older persons

MOLD DETECTION

How can I tell if I have mold in my house?

You may suspect that you have mold 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 also should trigger a more thorough inspection for damp conditions. You may find mold growth underneath water-damaged surfaces (for example, wallpaper) or behind walls, floors, or ceilings.

Should I test my home for mold?

There is consensus among scientists and medical experts that the traditional methods used to identify increased mold exposure do not reliably predict increased health risks. Therefore, CDPH recommends against measuring indoor microorganisms or using the presence of specific microorganisms to determine the level of health hazard or the need for urgent remediation.

Reliable air sampling for mold can be expensive and requires expertise and equipment that is not available to the general public. Private home and apartment owners generally will need to hire a contractor, because insurance companies and public agencies seldom provide this service. Mold inspection and cleanup usually is considered a housekeeping task that is the responsibility of a homeowner or landlord, as are roof and plumbing repairs, house cleaning, and yard maintenance.

The simplest way to deal with a suspicion of mold contamination is:

❖ **If you can see or smell mold, you likely have a problem and should take the steps outlined below to correct it.**

GENERAL CLEAN-UP PROCEDURES

The following information is intended as an overview for homeowners and apartment dwellers. For further details, consult the more thorough documents listed in the USEFUL PUBLICATIONS section below.

Judging how large a problem you have

Small mold problems—total area less than 10 square feet can be handled by the homeowner or apartment maintenance personnel using personal protective equipment (see below). Large contamination problems—areas greater than 100 square feet may require an experienced, professional contractor. For in-between cases, the type of containment and personal protection will be a matter of judgment.

What can I save? What should I toss?

Discard items from which it will be difficult to remove mold completely. Solid materials generally can be kept after they are thoroughly cleaned.

- First, fix the moisture problem and remove excess water.
- A wet/dry vacuum cleaner may help remove water and clean the area.
- Discard porous materials, for example, mold-damaged ceiling tiles, drywall or wallboard, carpeting, drapes, upholstered furniture, and wood products. Spores are more easily released when moldy materials dry out, therefore, remove moldy items as soon as possible.
- Contain the area in which you work to reduce the spread of dust to other areas, for example, close the door or use plastic sheets to separate the room and run a suction fan that exhausts the air outdoors.
- Remove drywall to a level above the high-water mark. Visually inspect the interior, and remove any mold-contaminated material, such as insulation.
- Carpet is often difficult to clean thoroughly, especially when the backing or padding is moldy, in which case it should be discarded.
- If properly bagged or enclosed, mold-contaminated items can be discarded with household trash.
- Clean nonporous materials, for example, glass, plastic, metal, and ceramic tiles
- Wear gloves, an N-95 respirator, and eye protection.
- Use a non-ammonia soap or detergent, or a commercial cleaner, in hot water, and scrub the entire mold-affected area.
- Use a stiff brush or cleaning pad on cement-block walls and other uneven surfaces.
- Rinse cleaned items with water and dry thoroughly.

Disinfection of contaminated materials

Disinfecting agents can be toxic for humans as well as molds; therefore, they should be used only when necessary and should be handled with caution. Disinfectants should be applied only to thoroughly cleaned materials to ensure that the mold has been killed.

- Wear gloves and eye protection when using disinfectants and ventilate the area well.
- A 10% solution of household bleach can be used as a disinfectant. *Use 1½ cups of household bleach per gallon of water.*
- When disinfecting a large structure, make sure that the entire surface is wetted, for example, the floors, joists, and posts.
- Keep the disinfectant on the treated material for the prescribed time before rinsing or drying – *10 minutes typically is recommended for a bleach solution*.
- Properly collect and dispose of extra disinfectant and runoff.

Remember

- ❖ ***Do not use disinfectants instead of, or before, cleaning nonporous materials with soap or detergent.***
- ❖ ***Bleach straight from the bottle is actually LESS effective than diluted bleach.***
- ❖ ***Never mix bleach with ammonia because this may produce toxic fumes.***
- ❖ ***Bleach fumes can irritate the eyes, nose, and throat, and spilled bleach can irritate skin and damage clothing and shoes.***

FIRST AID FOR BLEACH USE

Eye Contact: Hold eye open and rinse with water for 15–20 minutes. Remove contact lenses, after first 5 minutes. Continue rinsing eye. Call a physician.

Skin Contact: Wash skin with water for 15–20 minutes. If irritation develops, call a physician.

Ingestion: Do not induce vomiting. Drink a glassful of water. If irritation develops, call a physician. Do not give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If breathing is affected, call a physician.

MSDS: http://www.thecloroxcompany.com/downloads/msds/bleach/cloroxregularbleach0809_.pdf

Can cleaning up mold be hazardous to my health?

Yes. During the cleaning process, you may be exposed to mold, strong detergents, and disinfectants. Spore counts may be 10 to 1000 times higher than background levels when mold-contaminated materials are disturbed.

Take steps to protect your and your family's health during cleanup.

- Use a respirator when handling or cleaning moldy materials to protect yourself from inhaling airborne spores.
- You can purchase respirators from hardware stores. Select an N-95 respirator that is effective for particle (particulate) removal.
- Wear protective clothing that is easily cleaned or discarded
- Use rubber gloves.
- Clean a test area first.

❖ ***Beware that respirators that remove particles will not protect you from fumes, such as from bleach. When using bleach or other disinfectants, minimize exposure by ventilating the area well.***

If cleaning a test area bothered you, consider hiring a licensed contractor or other experienced professional to carry out the work. The California Department of Consumer Affairs (CDCA) provides information on how to hire a contractor and describes the different classifications of licensed contractors:

What Kind of Contractor Do You Need?
http://www.cslb.ca.gov/Consumers/HireAContractor/

Licensing Classifications.
http://www.cslb.ca.gov/GeneralInformation/Library/LicensingClassifications/

- Ask family members or bystanders to leave areas that are being cleaned.
- Work for short time periods and rest where you can breath fresh air.
- Air out your home well during and after the work.

❖ ***Never use a gasoline engine indoors (e.g., a water pump, pressure washer, or generator) as you could expose yourself and your family to toxic carbon monoxide.***

Can air ducts become contaminated with mold?

Yes. Duct systems may be constructed of bare sheet metal, sheet metal with fibrous glass insulation on the outside, sheet metal with fibrous glass on the inside, or entirely of fibrous glass. Bare sheet metal systems and sheet metal with exterior insulation can be cleaned and disinfected.

Water-damaged fibrous glass liner often will need to be removed and discarded, and ductwork in difficult-to-reach locations may have to be abandoned. If you have questions, contact an air duct cleaning professional or licensed contractor.

Can ozone air cleaners help remove indoor mold or reduce odors?

No. Ozone is not effective in controlling indoor molds and other microbial contamination, even at concentrations far above levels safe for humans. Ozone is a strong oxidizing agent and a known lung irritant and may damage materials in the home, for example, rubber items may become brittle.

❖ **For these reasons, CDPH strongly recommends that you NOT use an ozone air cleaner in any occupied space.** Refer to the Air Resources Board, *Hazardous Ozone-Generating "Air Purifiers"* http://www.arb.ca.gov/research/indoor/ozone.htm.

A particle removing air cleaner should only be used as a short-term means to reduce mold exposure. The underlying moisture problem must be identified, and moldy materials must be removed or cleaned.

How can I <u>prevent</u> indoor mold problems in my home?

Inspect your home regularly for the signs and sources of indoor moisture and mold listed on page one. Take steps to eliminate water sources as quickly as possible. Act immediately if a leak or flooding occurs.

- Stop the source of leak or flooding.
- Remove excess water with mops or wet vacuum.
- Move wet items to a dry, well-ventilated area or place them outdoors to speed drying.
- 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.
- Open wall cavities, remove baseboards, or pry open wall paneling, if necessary, to allow the area to dry thoroughly.
- Run portable fans to increase air circulation.
- Run dehumidifiers to remove moisture from the air.
- Depending on the time of year, determine if a window air conditioner or portable heater would help dry the area.

❖ Do NOT use the home's central blower if it or any of the ducts were flooded because this could spread mold throughout the home.

❖ Do NOT use fans if mold has already started to grow as this also could spread mold.

LOCAL ASSISTANCE

Your city or county health department may be able to answer questions or provide assistance on handling mold problems. For links to local California health departments: http://www.cdph.ca.gov/programs/immunize/Pages/CaliforniaLocalHealthDepartments.aspx.

Other information on local government programs is available at http://www.ca.gov/About/Government.

USEFUL PUBLICATIONS

General Information

U.S. Environmental Protection Agency. ***The Key to Mold Control is Moisture Control.*** http://www.epa.gov/mold/index.html

U.S. Centers for Disease Control and Prevention. ***Mold Information.*** Information on mold and health; an inventory of state indoor air quality programs; advice on assessment, cleanup efforts, and prevention of mold growth; and links to resources. http://www.cdc.gov/mold/default.htm

CDPH Occupational Health Branch. ***Mold in Indoor Workplaces.*** An overview with specific resources for workers. http://www.cdph.ca.gov/programs/IAQ/Documents/moldInMyWorkPlace.pdf

California Research Bureau. ***Indoor Mold: A General Guide to Health Effects, Prevention, and Remediation.*** *A report to the California legislature.* http://www.library.ca.gov/crb/06/01/06-001.pdf

New York City Department of Health. An overview and info sheets on *Facts About Mold*, *Flood Fact Sheet*, *Healthy Homes: Facts About Mold*, *Healthy Homes: Mold Tear-Off*, and *Mold Guidelines.* http://www.nyc.gov/html/doh/html/epi/mold.shtml

Health Canada. ***Fungal Contamination in Public Buildings: Health Effects and Investigation Methods (2004).*** http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/air/fungal-fongique/fungal-fongique_e.pdf

Health Canada. ***Residential Indoor Air Quality Guidelines: Moulds (2007).*** Information on the *Physical and Chemical Properties, Causes of Mold Growth, Health Effects,* and the Canadian *Guideline.* http://www.hc-sc.gc.ca/ewh-semt/pubs/air/mould-moisissure-eng.php

Mould, Dampness, and Humidity. Information on the *Effects of Mould on Health, Mould: Get Rid of It*, and *Mould in Indoor Air*. http://www.hc-sc.gc.ca/ewh-semt/air/in/poll/mould-moisissure/index-eng.php

Clean-up Guidance

U.S. Environmental Protection Agency. ***Mold Remediation in Schools and Commercial Buildings.*** Also applicable to residences. http://www.epa.gov/mold/mold_remediation.html

U.S. Centers for Disease Control and Prevention. ***Prevention and Remediation Strategies for the Control and Removal of Fungal Growth.*** http://www.cdc.gov/mold/strats_fungal_growth.htm

American Red Cross/Federal Emergency Management Agency. ***Repairing Your Flooded Home.*** Guidance for recovery after flooding disasters addressing technical and logistical issues http://www.redcross.org/www-files/Documents/pdf/Preparedness/file_cont333_lang0_150.pdf

New York City Department of Health. Guidelines on Assessment and Remediation of Fungi in Indoor Environments. http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml

Consultants, Laboratories, and Clinics

CDPH Listing of Consultants Offering IAQ Services in California. Self-reported database of contractors and advice on using the list. http://www.cal-iaq.org/get-help/find-a-contractor and http://www.cal-iaq.org/about-iaq/hiring-guidance

American Industrial Hygiene Association. Listing of laboratories accredited in environmental microbiology. http://apps.aiha.org/qms_aiha/public/pages/reports/publicscopeview.aspx?ProgramCode=38

Association of Occupational and Environmental Clinics. Directory of clinics in California and other states. http://www.aoec.org/directory.htm

IAQ PROGRAM INFORMATION

CDPH Indoor Air Quality Section
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850 Marina Bay Parkway (EHLB)
Richmond, CA 94804-6403.

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State of California

Diana S. Dooley, Secretary
Health and Human Services Agency

Ron Chapman, M.D., M.P.H., Director
Department of Public Health

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Home Buyer's and
Seller's Guide to Radon
Sold!
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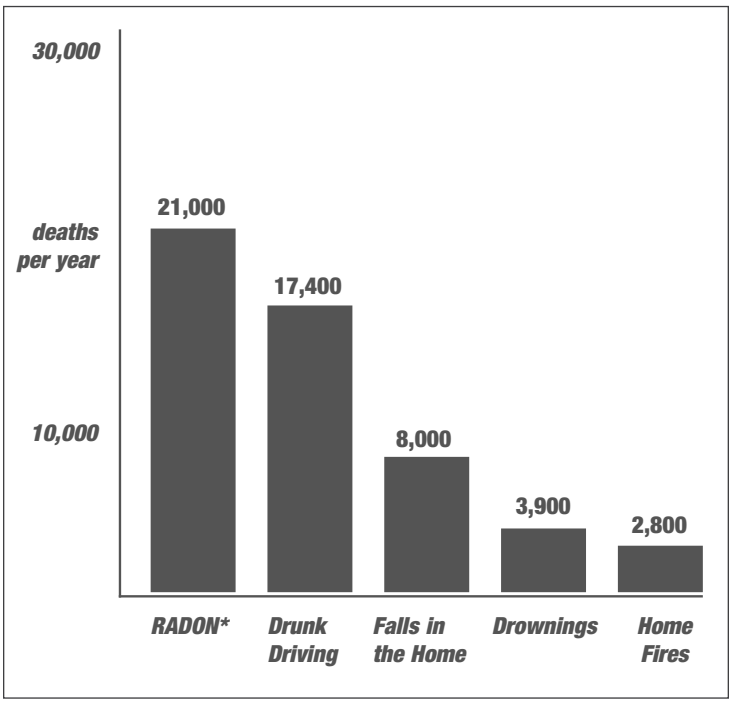
SALE
Indoor Air Quality (IAQ)

EPA RECOMMENDS:

- ☐ If you are buying or selling a home, have it tested for radon.
- ☐ For a new home, ask if radon-resistant construction features were used and if the home has been tested.
- ☐ Fix the home if the radon level is 4 picocuries per liter (pCi/L) or higher.
- ☐ Radon levels less than 4 pCi/L still pose a risk and, in many cases, may be reduced.
- ☐ Take steps to prevent device interference when conducting a radon test.

EPA estimates that radon causes thousands of cancer deaths in the U.S. each year.



**Radon is estimated to cause about 21,000 lung cancer deaths per year, according to EPA's 2003 Assessment of Risks from Radon in Homes (EPA 402-R-03-003). The numbers of deaths from other causes are taken from the Centers for Disease Control and Prevention's 2005-2006 National Center for Injury Prevention and Control Report and 2006 National Safety Council Reports.*

EPA 402/K-13/002 | September 2013 (revised)

Overview

This *Guide* answers important questions about radon and lung cancer risk. It also answers questions about testing and fixing for anyone buying or selling a home.

Radon Is a Cancer-Causing, Radioactive Gas

You cannot see, smell, or taste radon. But it still may be a problem in your home. When you breathe air containing radon, you increase your risk of getting lung cancer. In fact, the Surgeon General of the United States has warned that radon is the second leading cause of lung cancer in the United States today. *If you smoke and your home has high radon levels, your risk of lung cancer is especially high.*

EPA Risk Assessment for Radon in Indoor Air

EPA has updated its estimate of the lung cancer risks from exposure to radon in indoor air. The Agency's updated risk assessment, *EPA Assessment of Risks from Radon in Homes* (EPA 402-R-03-003, June 2003), is available at http://www.epa.gov/radon/pdfs/402-r-03-003.pdf as a downloadable Adobe Acrobat PDF file. EPA's reassessment was based on the National Academy of Sciences' (NAS) report on the *Health Effects of Exposure to Radon* (BEIR VI, 1999). The Agency now estimates that there are about 21,000 annual radon-related lung cancer deaths, an estimate consistent with the NAS Report's findings.

You Should Test for Radon

Testing is the only way to find out your home's radon levels. EPA and the Surgeon General recommend testing all homes below the third floor for radon.

You Can Fix a Radon Problem

If you find that you have high radon levels, there are ways to fix a radon problem. Even very high levels can be reduced to acceptable levels.

If You Are Selling a Home...

EPA recommends that you test your home before putting it on the market and, if necessary, lower your radon levels. Save the test results and all information you have about steps that were taken to fix any problems. This could be a positive selling point.

EPA 402/K-13/002 | September 2013 (revised)

If You Are Buying a Home...

EPA recommends that you know what the indoor radon level is in any home you consider buying. Ask the seller for their radon test results. If the home has a radon-reduction system, ask the seller for any information they have about the system.

If the home has not yet been tested, you should have the house tested.

If you are having a new home built, there are features that can be incorporated into your home during construction to reduce radon levels.

The radon testing guidelines in this *Guide* have been developed specifically to deal with the time-sensitive nature of home purchases and sales, and the potential for radon device interference. These guidelines are slightly different from the guidelines in other EPA publications which provide radon testing and reduction information for *non-real estate* situations.

This *Guide* recommends three short-term testing options for real estate transactions. EPA also recommends testing a home in the lowest level that could be used regularly, since a buyer may choose to live in a lower area of the home than that used by the seller.

EPA 402/K-13/002 | September 2013 (revised)

1. Why Should I Test for Radon

a. Radon Has Been Found In Homes All Over the United States

Radon is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock, and water and gets into the air you breathe. Radon typically moves up through the ground to the air above and into your home through cracks and other holes in the foundation. Radon can also enter your home through well water. Your home can trap radon inside.

Any home can have a radon problem. This means new and old homes, well-sealed and drafty homes, and homes with or without basements. In fact, you and your family are most likely to get your greatest radiation exposure at home. That is where you spend most of your time.

Nearly one out of every 15 homes in the United States is estimated to have an elevated radon level (4 pCi/L or more). Elevated levels of radon gas have been found in homes in your state. Contact your state radon office for information about radon in your area.

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b. EPA and the Surgeon General Recommend That You Test Your Home

Testing is the only way to know if you and your family are at risk from radon. EPA and the Surgeon General recommend testing all homes below the third floor for radon.

U.S. SURGEON GENERAL HEALTH ADVISORY

"Indoor radon is the second-leading cause of lung cancer in the United States and breathing it over prolonged periods can present a significant health risk to families all over the country. It's important to know that this threat is completely preventable. Radon can be detected with a simple test and fixed through well-established venting techniques." January 2005

You cannot predict radon levels based on state, local, and neighborhood radon measurements. Do not rely on radon test results taken in other homes in the neighborhood to estimate the radon level in your home. Homes which are next to each other can have different indoor radon levels. Testing is the only way to find out what your home's radon level is.

In some areas, companies may offer different types of radon service agreements. Some agreements let you pay a one-time fee that covers both testing and radon mitigation, if needed. Contact your state radon office to find out if these are available in your state.

2. I'm Selling a Home. What Should I Do?

a. If Your Home Has Already Been Tested for Radon...

If you are thinking of selling your home and you have already tested your home for radon, review the *Radon Testing Checklist* to make sure that the test was done correctly. If so, provide your test results to the buyer.

No matter what kind of test was done, a potential buyer may ask for a new test, especially if:

☐ The *Radon Testing Checklist* items were not met;

☐ The last test is not recent, e.g., within two years;

☐ You have renovated or altered your home since you tested; or

☐ The buyer plans to use a lower level of the house than was tested, such as a basement that could be used regularly by the buyer.

A buyer may also ask for a new test if your state or local government requires disclosure of radon information to buyers.

b. If Your Home Has *Not Yet* Been Tested for Radon...

Have a test taken as soon as possible. If you can, test your home before putting it on the market. You should test in the lowest level of the home that could be used regularly. This means testing in the lowest level that you currently live in or a lower level not currently used, but which a buyer might use as a family room or play area, etc.

The radon test result is important information about your home's radon level. Some states require radon measurement testers to follow a specific testing protocol. If you do the test yourself, you should carefully follow the testing protocol for your area or EPA's *Radon Testing Checklist*. If you hire a contractor to test your residence, protect yourself by hiring a **qualified*** individual or company.

You can determine a service provider's qualifications to perform radon measurements or to mitigate your home in several ways. **Check with your state radon office**. Many states require radon professionals to be licensed, certified, or registered. Most states can provide you with a list of knowledgeable radon service providers doing business in the state. In states that don't regulate radon services, **ask the contractor if they hold a professional proficiency or certification credential**. Such programs usually provide members with a photo-ID card, which indicates their qualification(s) and its expiration date. If in doubt, you should check with their credentialing organization. Alternatively, **ask the contractor if they've successfully completed formal training** appropriate for testing or mitigation, e.g., a course in radon measurement or radon mitigation.

* You should first call your state radon office for information on qualified radon service providers and state-specific radon measurement or mitigation requirements. For up-to-date information on state radon program offices, visit **http://www.epa.gov/radon/whereyoulive.html**. EPA's detailed and technical guidance on radon measurement and mitigation is included in Section 8 (p.49); however, state requirements or guidance may be more stringent. **Visit http://www.epa.gov/radon/radontest.html** for links to private sector radon credentialing programs.

EPA 402/K-13/002 | September 2013 (revised)

3. I'm Buying a Home. What Should I Do?

a. If the Home Has Already Been Tested for Radon...

If you are thinking of buying a home, you may decide to accept an earlier test result from the seller or ask the seller for a new test to be conducted by a qualified radon tester. Before you accept the seller's test, you should determine:

- ☐ The results of previous testing;
- ☐ Who conducted the previous test: the homeowner, a radon professional, or some other person;
- ☐ Where in the home the previous test was taken, especially if you may plan to live in a lower level of the home. For example, the test may have been taken on the first floor. However, if you want to use the basement as living space, test there; and
- ☐ What, if any, structural changes, alterations, or changes in the heating, ventilation, and air conditioning (HVAC) system have been made to the house since the test was done. Such changes might affect radon levels.

If you accept the seller's test, make sure that the test followed the *Radon Testing Checklist*.

If you decide that a new test is needed, discuss it with the seller as soon as possible. If you decide to use a qualified radon tester, contact your state radon office to obtain a copy of their approved list of radon testing companies.

EPA 402/K-13/002 | September 2013 (revised)

b. If the Home Has *Not Yet* Been Tested for Radon...

Make sure that a radon test is done as soon as possible. Consider including provisions in the contract specifying:

☐ Where the test will be located;

☐ Who should conduct the test;

☐ What type of test to do;

☐ When to do the test;

☐ How the seller and the buyer will share the test results and test costs (if necessary); and

☐ When radon mitigation measures will be taken, and who will pay for them.

Make sure that the test is done in the lowest level of the home that could be used regularly. This means the lowest level that you are going to use as living space whether it is finished or unfinished. A state or local radon official or qualified radon tester can help you make some of these decisions.

If you decide to finish or renovate an unfinished area of the home in the future, a radon test should be done before starting the project and after the project is finished. Generally, it is less expensive to install a radon-reduction system before (or during) renovations rather than afterwards.

4. I'm Buying or Building a New Home. How Can I Protect My Family?

a. Why Should I Buy a Radon-Resistant Home?

Radon-resistant techniques work. When installed properly and completely, these simple and inexpensive passive techniques can help to reduce radon levels. In addition, installing them at the time of construction makes it easier to reduce radon levels further if the passive techniques don't reduce radon levels to below 4 pCi/L. Radon-resistant techniques may also help to lower moisture levels and those of other soil gases. Radon-resistant techniques:

- ✔ ***Make Upgrading Easy*:** Even if built to be radon-resistant, **every new home should be tested for radon as soon as possible after occupancy**. If you have a test result of 4 pCi/L or more, a vent fan can easily be added to the passive system to make it an active system and further reduce radon levels.
- ✔ ***Are Cost-Effective*:** Building radon-resistant features into the house during construction is easier and cheaper than fixing a radon problem from scratch later. Let your builder know that radon-resistant features are easy to install using common building materials.
- ✔ ***Save Money*:** When installed properly and completely, radon-resistant techniques can also make your home more energy efficient and help you save on your energy costs.

Including passive radon-resistant features in a **new home** during construction usually costs less than fixing the home later. If your radon level is 4 pCi/L or more, consult a qualified mitigator to estimate the cost of upgrading to an active system by adding a vent fan to reduce the radon level. In an **existing home,** the cost to install a radon mitigation system is about the same as for other common home repairs. Check with, and get an estimate from, one or more qualified mitigators before fixing.

b. What Are Radon-Resistant Features?

Radon-resistant techniques (features) may vary for different foundations and site requirements. If you're having a house built, ask your builder if they're using a recognized approach (International Residential Code, Appendix F, ASTM E 1465-08, and ANSI/AARST RRNC 2.0 as examples). If your new house was built (or will be built) to be radon-resistant, it will include these basic elements:

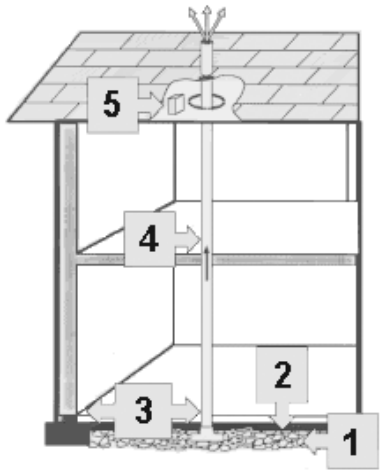
1. **Gas-Permeable Layer:** This layer is placed beneath the slab or flooring system to allow the soil gas to move freely underneath the house. In many cases, the material used is a 4-inch layer of clean gravel. This gas-permeable layer is used only in homes with basement and slab-on-grade foundations; it is not used in homes with crawlspace foundations.

2. **Plastic Sheeting:** Plastic sheeting is placed on top of the gas-permeable layer and under the slab to help prevent the soil gas from entering the home. In crawl spaces, the sheeting (with seams sealed) is placed directly over the crawlspace floor.

3. **Sealing and Caulking:** All below-grade openings in the foundation and walls are sealed to reduce soil gas entry into the home.

4. **Vent Pipe:** A 3- or 4-inch PVC pipe (or other gas-tight pipe) runs from the gas-permeable layer through the house to the roof, to safely vent radon and other soil gases to the outside.

5. **Junction Boxes:** An electrical junction box is included in the attic to make the wiring and installation of a vent fan easier. For example, you decide to activate the passive system because your test result showed an elevated radon level (4 pCi/L or more). A separate junction box is placed in the living space to power the vent fan alarm. An alarm is installed along with the vent fan to indicate when the vent fan is not operating properly.



5. How Can I Get Reliable Radon Test Results?

Radon testing is easy and the only way to find out if you have a radon problem in your home.

a. Types of Radon Devices

Since you cannot see or smell radon, special equipment is needed to detect it. When you're ready to test your home, you can order a radon test kit by mail from a qualified radon measurement services provider or laboratory. You can also hire a qualified radon tester, very often a home inspector, who will use a radon device(s) suitable to your situation. The most common types of radon testing devices are listed below. As new testing devices are developed, you may want to check with your state radon office before you test to get the most up-to-date information.

✔ ***Passive Devices***

Passive radon testing devices do not need power to function. These include **charcoal canisters, alpha-track detectors, charcoal liquid scintillation devices,** and **electret ion chamber detectors,** which are available in hardware, drug, and other stores; they can also be ordered by mail or phone. These devices are exposed to the air in the home for a specified period of time and then sent to a laboratory for analysis. Both short-term and long-term passive devices are generally inexpensive. Some of these devices may have features that offer more resistance to test interference or disturbance than other passive devices. Qualified radon testers may use any of these devices to measure the home's radon level.

✔ *Active Devices*

Active radon testing devices require power to function. These include **continuous radon monitors** and **continuous working level monitors**. They continuously measure and record the amount of radon or its decay products in the air. Many of these devices provide a report of this information which can reveal any unusual or abnormal swings in the radon level during the test period. A qualified tester can explain this report to you. In addition, some of these devices are specifically designed to deter and detect test interference. Some technically advanced active devices offer anti-interference features. Although these tests may cost more, they may ensure a more reliable result.

b. General Information for All Devices

A state or local radon official can explain the differences between devices and recommend the ones which are most appropriate for your needs and expected testing conditions.

Make sure to use a radon measurement device from a qualified laboratory. Certain precautions should be followed to avoid interference during the test period; see the *Radon Testing Checklist* for more information on how to get a reliable test result.

Radon Test Device Placement

EPA recommends that the test device(s) be placed in the lowest level of the home that could be used regularly, whether it is finished or unfinished. Conduct the test in any space that could be used by the buyer as a bedroom, play area, family room, den, exercise room, or workshop. Based on their client's intended use of the space, the qualified testing professional should identify the appropriate test location and inform their client (buyer). Do **not** test in a closet, stairway, hallway, crawl space or in an enclosed area of high humidity or high air velocity. An enclosed area may include a kitchen, bathroom, laundry room or furnace room.

c. Preventing or Detecting Test Interference

There is a potential for test interference in real estate transactions. There are several ways to prevent or detect test interference:

- ☐ Use a test device that frequently records radon or decay product levels to detect unusual swings;
- ☐ Employ a motion detector to determine whether the test device has been moved or if testing conditions have changed;
- ☐ Use a proximity detector to reveal the presence of people in the room which may correlate to possible changes in radon levels during the test;
- ☐ Record the barometric pressure to identify weather conditions which may have affected the test;
- ☐ Record the temperature to help assess whether doors and windows have been opened;
- ☐ Apply tamper-proof seals to windows to ensure closed-house conditions; and
- ☐ Have the seller/occupant sign a non-interference agreement.

Home buyers and sellers should consult a qualified radon test provider about the use of these precautions.

d. Length of Time to Test

Because radon levels tend to vary from day to day and season to season, a short-term test is less likely than a long-term test to tell you your year-round average radon level. However, if you need results quickly, a short-term test may be used to decide whether to fix the home.

There Are Two General Ways to Test Your Home for Radon:

✔ ***Short-Term Testing***

The quickest way to test is with short-term tests. Short-term tests remain in your home from two to 90 days, depending on the device. There are two groups of devices which are more commonly used for short-term testing. The passive device group includes **alpha track detectors, charcoal canisters, charcoal liquid scintillation detectors,** and **electret ion chambers**. The active device group consists of different types of **continuous monitors**.

> Whether you test for radon yourself or hire a qualified tester, all radon tests should be taken for a minimum of 48 hours. Some devices require a longer (minimum) length of time, e.g., a 7-day charcoal canister device.

✔ ***Long-Term Testing***

Long-term tests remain in your home for more than 90 days. **Alpha track** and **electret ion chamber detectors** are commonly used for this type of testing. A long-term test result is more likely to tell you your home's year-round average radon level than a short-term test. If time permits (more than 90 days), long-term tests can be used to confirm initial short-term results. When long-term test results are 4 pCi/L or higher, EPA recommends fixing the home.

e. Doing a Short-Term Test...

If you are testing in a real estate transaction and you need results quickly, any of the following three options for short-term tests are acceptable in determining whether the home should be fixed. Any real estate test for radon should include steps to prevent or detect interference with the test device.

When Choosing a Short-Term Testing Option...

There are trade-offs among the short-term testing options. Two tests taken at the same time (simultaneous) would improve the precision of this radon test. One test followed by another test (sequential) would most likely give a better representation of the seasonal average. Both active and passive devices may have features which help to prevent test interference. Your state radon office can help you decide which option is best.

Short-Term Testing Options	What to Do Next
Passive: Take two short-term tests at the same time in the same location for at least 48 hours.	Fix the home if the average of the two tests is 4 pCi/L or more.
or	
Take an initial short-term test for at least 48 hours. Immediately upon completing the first test, do a second test using an identical device in the same location as the first test.	Fix the home if the average of the two tests is 4 pCi/L or more.
Active: Test the home with a continuous monitor for at least 48 hours.	Fix the home if the average radon level is 4 pCi/L or more.

f. Using Testing Devices Properly for Reliable Results

✔ ***If You Do the Test Yourself***

When you are taking a short-term test, close windows and doors to the outside and keep them closed, except for normal entry and exit. If you are taking a short-term test lasting less than four days, be sure to:

☐ Close your windows and outside doors at least 12 hours before beginning the test;

☐ Do not conduct short-term tests lasting less than four days during severe storms or periods of high winds;

☐ Follow the testing instructions and record the start time and date;

☐ Place the test device at least 20 inches above the floor in a location where it will not be disturbed and where it will be away from drafts, high heat, high humidity, and exterior walls;

☐ Leave the test kit in place for as long as the test instructions say; and

☐ Once the test is finished, record the stop time and date, reseal the package, and return it immediately to the lab specified on the package for analysis.

You should receive your test results within a few days or weeks. If you need results quickly, you should find out how long results will take and, if necessary, request expedited service.

✔ ***If You Hire a Qualified Radon Tester***

In many cases, home buyers and sellers may decide to have the radon test done by a qualified radon tester who knows the proper conditions, test devices, and guidelines for obtaining a reliable radon test result. They can also:

☐ Evaluate the home and recommend a testing approach designed to make sure you get reliable results;

☐ Explain how proper conditions can be maintained during the radon test;

☐ Emphasize to a home's occupants that a reliable test result depends upon their cooperation. Interference with, or disturbance of, the test or closed-house conditions will invalidate the test result;

☐ Analyze the data and report the measurement results; and

☐ Provide an independent test result.

Your state radon office may also have information about qualified radon testers and certification requirements.

g. Interpreting Radon Test Results

The average indoor radon level is estimated to be about 1.3 pCi/L; roughly 0.4 pCi/L of radon is normally found in the outside air. The U.S. Congress has set a long-term goal that indoor radon levels be no more than outdoor levels. While this goal is not yet technologically achievable for all homes, radon levels in many homes *can* be reduced to 2 pCi/L or less. A radon level below 4 pCi/L still poses a risk. Consider fixing when the radon level is between 2 and 4 pCi/L.

Radon and Smoking

RADON RISK IF YOU SMOKE

Radon Level	If 1,000 people who smoked were exposed to this level over a lifetime*. . .	The risk of cancer from radon exposure compares to**. . .	WHAT TO DO: Stop Smoking and. . .
20 pCi/L	About 260 people could get lung cancer	250 times the risk of drowning	Fix your home
10 pCi/L	About 150 people could get lung cancer	200 times the risk of dying in a home fire	Fix your home
8 pCi/L	About 120 people could get lung cancer	30 times the risk of dying in a fall	Fix your home
4 pCi/L	About 62 people could get lung cancer	5 times the risk of dying in a car crash	Fix your home
2 pCi/L	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing between 2 and 4 pCi/L
1.3 pCi/L	About 20 people could get lung cancer	(Average indoor radon level)	(Reducing radon levels below 2 pCi/L is difficult)
0.4 pCi/L	About 3 people could get lung cancer	(Average outdoor radon level)	

Note: If you are a former smoker, your risk may be lower.

RADON RISK IF YOU HAVE NEVER SMOKED

Radon Level	If 1,000 people who never smoked were exposed to this level over a lifetime*. . .	The risk of cancer from radon exposure compares to**. . .	WHAT TO DO:
20 pCi/L	About 36 people could get lung cancer	35 times the risk of drowning	Fix your home
10 pCi/L	About 18 people could get lung cancer	20 times the risk of dying in a home fire	Fix your home
8 pCi/L	About 15 people could get lung cancer	4 times the risk of dying in a fall	Fix your home
4 pCi/L	About 7 people could get lung cancer	The risk of dying in a car crash	Fix your home
2 pCi/L	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing between 2 and 4 pCi/L
1.3 pCi/L	About 2 people could get lung cancer	(Average indoor radon level)	(Reducing radon levels below 2 pCi/L is difficult)
0.4 pCi/L		(Average outdoor radon level)	

Note: If you are a former smoker, your risk may be higher.
*Lifetime risk of lung cancer deaths from *EPA Assessment of Risks from Radon in Homes* (EPA 402-R-03-003).
**Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.

EPA 402/K-13/002 | September 2013 (revised)

Sometimes short-term tests are less definitive about whether the radon level in the home is at or above 4 pCi/L; particularly when the results are close to 4 pCi/L. For example, if the average of two short-term tests is 4.1 pCi/L, there is about a 50 percent chance that the year-round average is somewhat below, or above, 4 pCi/L.

However, EPA believes that any radon exposure carries some risk; no level of radon is safe. Even radon levels below 4 pCi/L pose some risk. You can reduce your risk of lung cancer by lowering your radon level.

As with other environmental pollutants, there is some uncertainty about the magnitude of radon health risks. However, we know more about radon risks than risks from most other cancer-causing substances. This is because estimates of radon risks are based on data from human studies (underground miners). Additional studies on more typical populations are under way.

Your radon measurement will give you an idea of your risk of getting lung cancer. Your chances of getting lung cancer from radon depend mostly on:

- ✔ Your home's radon level;
- ✔ The amount of time you spend in your home; and
- ✔ Whether you are a smoker or have ever smoked.

Smoking combined with radon is an especially serious health risk. If you smoke or are a former smoker, the presence of radon greatly increases your risk of lung cancer. If you stop smoking now and lower the radon level in your house, you will reduce your lung cancer risk.

EPA 402/K-13/002 | September 2013 (revised)

Radon Testing Checklist

For reliable test results, follow this *Radon Testing Checklist* carefully. Testing for radon is not complicated. Improper testing may yield inaccurate results and require another test. Disturbing or interfering with the test device, or with **closed-house conditions***, may invalidate the test results and is illegal in some states. If the seller or qualified tester cannot confirm that all items have been completed, take another test.

✔ ***Before Conducting a Radon Test*:**

☐ Notify the occupants of the importance of proper testing conditions. Give the occupants written instructions or a copy of this *Guide* and explain the directions carefully.

☐ Conduct the radon test for a minimum of 48 hours; some test devices have a minimum exposure time greater than 48 hours.

☐ When doing a short-term test ranging from 2-4 days, it is important to maintain closed-house conditions for at least 12 hours before the beginning of the test and during the entire test period.

☐ When doing a short-term test ranging from 4-7 days, EPA recommends that closed-house conditions be maintained.

☐ If you conduct the test yourself, use a qualified radon measurement device and follow the laboratory's instructions. Your state may be able to provide you with a list of do-it-yourself test devices available from qualified laboratories.

☐ If you hire someone to do the test, hire only a qualified individual. Some states issue photo identification (ID) cards; ask to see it. The tester's ID number, if available, should be included or noted in the test report.

*Closed-house conditions means keeping all windows closed, keeping doors closed except for normal entry and exit, and not operating fans or other machines which bring in air from outside. Fans that are part of a radon-reduction system or small exhaust fans operating for only short periods of time may run during the test.

EPA 402/K-13/002 | September 2013 (revised)

Radon Testing Checklist

(continued)

☐ The test should include method(s) to prevent or detect interference with testing conditions or with the testing device itself.

☐ If the house has an active radon-reduction system, make sure the vent fan is operating properly. If the fan is not operating properly, have it (or ask to have it) repaired and then test.

✔ ***During a Radon Test*:**

☐ Maintain closed-house conditions during the entire duration of a short-term test, especially for tests shorter than one week in length.

☐ Operate the home's heating and cooling systems normally during the test. For tests lasting less than one week, operate only air-conditioning units which recirculate interior air.

☐ Do not disturb the test device at any time during the test.

☐ If a radon-reduction system is in place, make sure the system is working properly and will be in operation during the entire radon test.

✔ ***After a Radon Test*:**

☐ If you conduct the test yourself, be sure to promptly return the test device to the laboratory. Be sure to complete the required information, including start and stop times, test location, etc.

☐ If an elevated radon level is found, fix the home. Contact a qualified radon-reduction contractor about lowering the radon level. EPA recommends that you fix the home when the radon level is 4 pCi/L or more.

☐ Be sure that you or the radon tester can demonstrate or provide information to ensure that the testing conditions were not violated during the testing period.

EPA 402/K-13/002 | September 2013 (revised)

6. What Should I Do if the Radon Level is High?

a. High Radon Levels Can Be Reduced

EPA recommends that you take action to reduce your home's indoor radon levels if your radon test result is 4 pCi/L or higher. It is better to correct a radon problem before placing your home on the market because then you have more time to address a radon problem.

If elevated levels are found during the real estate transaction, the buyer and seller should discuss the timing and costs of radon reduction. The cost of making repairs to reduce radon levels depends on how your home was built and other factors. Most homes can be fixed for about the same cost as other common home repairs. Check with and get an estimate from one or more qualified mitigators.

b. How to Lower the Radon Level In Your Home

A variety of methods can be used to reduce radon in homes. Sealing cracks and other openings in the foundation is a basic part of most approaches to radon reduction. EPA does not recommend the use of sealing alone to limit radon entry. Sealing alone has not been shown to lower radon levels significantly or consistently.

In most cases, a system with a vent pipe(s) and fan(s) is used to reduce radon. These "sub-slab depressurization" systems do not require major changes to your home. Similar systems can also be installed in homes with crawl spaces. These systems prevent radon gas from entering the home from below the concrete floor and from outside the foundation. Radon mitigation contractors may use other methods that may also work in your home. The right system depends on the design of your home and other factors.

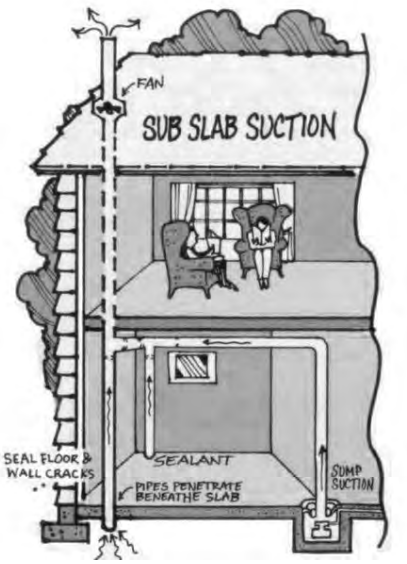
Techniques for reducing radon are discussed in EPA's *Consumer's Guide to Radon Reduction*. As with any other household appliance, there are costs associated with the operation of a radon-reduction system.

Radon and Home Renovations

If you are planning any major renovations, such as converting an unfinished basement area into living space, it is especially important to test the area before you begin.

If your test results indicate an elevated radon level, radon-resistant techniques can be inexpensively included as part of the renovation. Major renovations can change the level of radon in any home. Test again after the work is completed.

You should also test your home again after it is fixed to be sure that radon levels have been reduced. If your living patterns change and you begin occupying a lower level of your home (such as a basement), you should retest your home on that level. In addition, it is a good idea to retest your home sometime in the future to be sure radon levels remain low.



c. Selecting a Radon-Reduction (Mitigation) Contractor

Select a qualified radon-reduction contractor to reduce the radon level in your home. Any mitigation measures taken or system installed in your home must conform to your state's regulations. In states without regulations covering mitigation, EPA recommends that the system conform to ASTM E 2121.

EPA recommends that the mitigation contractor review the radon measurement results before beginning any radon-reduction work. Test again after the radon mitigation work has been completed to confirm that previous elevated levels have been reduced. EPA recommends that the test be conducted by an independent, qualified radon tester.

d. What Can a Qualified Radon-Reduction Contractor Do for You?

A qualified radon-reduction (mitigation) contractor should be able to:

- ☐ Review testing guidelines and measurement results, and determine if additional measurements are needed;
- ☐ Evaluate the radon problem and provide you with a detailed, written proposal on how radon levels will be lowered;
- ☐ Design a radon-reduction system;
- ☐ Install the system according to EPA recommended standard, or state and local codes; and
- ☐ Make sure the finished system effectively reduces radon levels to acceptable levels.

Choose a radon mitigation contractor to fix your radon problem just as you would for any other home repair. You may want to get more than one estimate, and ask for and check their references. Make sure the person you hire is qualified to install a mitigation system. Some states regulate or certify radon mitigation services providers.

Be aware that a potential conflict of interest exists if the same person or firm performs the testing and installs the mitigation system. Some states may require the homeowner to sign a waiver in such cases. If the same person or firm does the testing and mitigation, make sure the testing is done in accordance with the *Radon Testing Checklist*. Contact your state radon office for more information.

e. Radon In Water

The radon in your home's indoor air can come from two sources, the soil or your water supply. Compared to radon entering your home through the water, radon entering your home through the soil is a much larger risk. If you've tested for radon in air and have elevated radon levels **and** your water comes from a private well, have your water tested. The devices and procedures for testing your home's water supply are different from those used for measuring radon in air.

The radon in your water supply poses an inhalation risk and an ingestion risk. Research has shown that your risk of lung cancer from breathing radon in air is much larger than your risk of stomach cancer from swallowing water with radon in it. Most of your risk from radon in water comes from radon released into the air when water is used for showering and other household purposes.

Radon in your home's water is not usually a problem when its source is surface water. A radon in water problem is more likely when its source is ground water, e.g., a private well or a public water supply system that uses ground water. Some public water systems treat their water to reduce radon levels before it is delivered to your home. If you are concerned that radon may be entering your home through the water and your water comes from a public water supply, contact your water supplier.

If you've tested your private well and have a radon in water problem, it can be fixed. Your home's water supply can be treated in one of two ways. **Point-of-entry** treatment can effectively remove radon from the water before it enters your home. Point-of-entry treatment usually employs either granular activated carbon (GAC) filters or aeration devices. While GAC filters usually cost less than aeration devices, filters can collect radioactivity and may require a special method of disposal. **Point-of-use** treatment devices remove radon from your water at the tap, but only treat a small portion of the water you use, e.g., the water you drink. Point-of-use devices are not effective in reducing the risk from breathing radon released into the air from all water used in the home.

For information on radon in water, testing and treatment, and existing or planned radon in drinking water standards, or for general help, call EPA's Drinking Water Hotline at (800) 426-4791 or visit **http://water.epa.gov/lawsregs/rulesregs/sdwa/radon/index.cfm**, an EPA web site. If your water comes from a private well, you can also contact your state radon office.

EPA 402/K-13/002 | September 2013 (revised)

7. Radon Myths and Facts

***MYTH* #1**: Scientists are not sure that radon really is a problem.

FACT: Although some scientists dispute the precise number of deaths due to radon, all the major health organizations (like the Centers for Disease Control, the American Lung Association, and the American Medical Association) agree with estimates that radon causes thousands of preventable lung cancer deaths every year. This is especially true among smokers, since the risk to smokers is much greater than to non-smokers.

***MYTH* #2**: Radon testing devices are not reliable and are difficult to find.

FACT: Reliable radon tests are available from qualified radon testers and companies. Active radon devices can continuously gather and periodically record radon levels to reveal any unusual swings in the radon level during the test. Reliable testing devices are also available by phone or mail-order, and can be purchased in hardware stores and other retail outlets. Contact your state radon office for a list of qualified radon test companies.

***MYTH* #3**: Radon testing is difficult and time-consuming.

FACT: Radon testing is easy. You can test your home yourself or hire a qualified radon test company. Either approach takes only a small amount of time and effort.

***MYTH* #4**: Homes with radon problems cannot be fixed.

FACT: There are solutions to radon problems in homes. Thousands of home owners have already lowered their radon levels. Most homes can be fixed for about the same cost as other common home repairs. Contact your state radon office for a list of qualified mitigation contractors.

***MYTH* #5**: Radon only affects certain types of homes.

FACT: Radon can be a problem in all types of homes, including old homes, new homes, drafty homes, insulated homes, homes with basements, and homes without basements. Local geology, construction materials, and how the home was built are among the factors that can affect radon levels in homes.

EPA 402/K-13/002 | September 2013 (revised)

***MYTH* #6**: Radon is only a problem in certain parts of the country.

FACT: High radon levels have been found in every state. Radon problems do vary from area to area, but the only way to know a home's radon level is to test.

***MYTH* #7**: A neighbor's test result is a good indication of whether your home has a radon problem.

FACT: It is not. Radon levels vary from home to home. The only way to know if your home has a radon problem is to test it.

***MYTH* #8**: Everyone should test their water for radon.

FACT: While radon gets into some homes through the water, it is important to first test the air in the home for radon. If your water comes from a public water system that uses ground water, call your water supplier. If high radon levels are found and the home has a private well, call the Safe Drinking Water Hotline at (800) 426-4791 for information on testing your water. Also, call your state radon office for more information about radon in air.

***MYTH* #9**: It is difficult to sell a home where radon problems have been discovered.

FACT: Where radon problems have been fixed, home sales have not been blocked. The added protection will be a good selling point.

***MYTH* #10**: I have lived in my home for so long, it does not make sense to take action now.

FACT: You will reduce your risk of lung cancer when you reduce radon levels, even if you have lived with an elevated radon level for a long time.

***MYTH* #11**: Short-term tests cannot be used for making a decision about whether to reduce the home's high radon levels.

FACT: Short-term tests can be used to decide whether to reduce the home's high radon levels. However, the closer the short-term testing result is to 4 pCi/L, the less certainty there is about whether the home's year-round average is above or below that level. Keep in mind that radon levels below 4 pCi/L still pose some risk and that radon levels can be reduced to 2 pCi/L or below in most homes.

EPA 402/K-13/002 | September 2013 (revised)

8. Need More Information about Radon?

If you have a radon-related question, you should contact your state radon office. The following web sites, hotlines, and publications are your best sources of information. Visit our Frequent Questions web site at **http://iaq.supportportal.com**. You can also find indoor air quality information and publications on EPA's many web sites.

a. World Wide Web Sites (EPA)

These are EPA's most important web sites for information on radon and indoor air quality in homes. All the EPA publications listed in this section are available on EPA's web sites.

☐ **http://www.epa.gov/radon/**. EPA's main radon page. Includes links to the NAS radon report, radon-resistant new construction, the map of radon zones, radon publications, hotlines, and more.

☐ **http://www.epa.gov/iaq/whereyoulive.html**. Provides detailed information on contacting your state's radon office, including links to some state web sites. State indoor air quality contacts are also included.

☐ **http://www.epa.gov/iaq/radon/pubs/index.html**. Offers the full text version of EPA's most popular radon publications, including the *Home Buyer's and Seller's Guide to Radon*, the *Consumer's Guide to Radon Reduction*, and the *Model Standards and Techniques for Control of Radon in New Residential Buildings*, and others.

☐ **http://www.epa.gov/iaq**. EPA's main page on indoor air quality. Includes information on indoor risk factors, e.g., asthma, secondhand smoke, carbon monoxide, duct cleaning, ozone generating devices, indoor air cleaners, flood cleanup, etc.

☐ **http://water.epa.gov/lawsregs/rulesregs/sdwa/radon/index.cfm**. EPA's main page on radon in water. Includes information on statutory requirements and links to the drinking water standards program.

EPA 402/K-13/002 | September 2013 (revised)

b. Radon Hotlines (Toll-Free)

EPA supports the following hotlines to best serve consumers with radon-related questions and concerns.

☎ **1-800-SOS-RADON (767-7236)**.* Purchase radon test kits by phone.

☎ **1-800-55RADON (557-2366)**.* Get live help for your radon questions.

☎ **1-800-644-6999**.* Radon Fix-It Hotline. For general information on fixing or reducing the radon level in your home.

☎ **1-866-528-3187**.* Línea Directa de Información sobre Radón en Español. Hay operadores disponibles desde las 9:00 AM hasta las 5:00 PM para darle información sobre radón y como ordenar un kit para hacer la prueba de radón en su hogar.

☎ **1-800-426-4791**. Safe Drinking Water Hotline. For general information on drinking water, radon in water, testing and treatment, and standards for radon in drinking water. Operated under a contract with EPA.

*Operated by Kansas State University in partnership with EPA.

EPA 402/K-13/002 | September 2013 (revised)

c. Printed Documents

Radon Risk and Testing

☐ ***Home Buyer's and Seller's Guide to Radon***
(EPA 402/K-09/002, January 2009).
Everything you need to know about effectively dealing with radon during a residential real estate transaction. This publication can be viewed at **http://www.epa.gov/radon/pubs/hmbyguid.html** and is available as a portable document format (pdf) file. The publication is in the public domain and may be reproduced or reprinted in its entirety and without changes. A franking/imprint space for organizations and businesses is available on the lower half of the back cover. This publication was prepared by EPA's Indoor Environments Division (IED), Office of Radiation and Indoor Air (6609-J), 1200 Pennsylvania Avenue, N.W., Washington, D.C. 20460.

Single copies are available ***free*** from the following sources (multiple copies may be available in some instances; ask for details):

✓ State radon offices; see **http://www.epa.gov/radon/whereyoulive.html**.

✓ National Service Center for Environmental Publications (NSCEP) at 1-800-490-9198, **http://www.epa.gov/nscep/** or via email at nscep@bps-lmit.com.

Single or multiple copies are available for a ***fee*** from the following sources (ask for details):

✓ The Conference of Radiation Control Program Directors (CRCPD) at (502) 227-4543 (multiple copy orders only).

✓ The American Association of Radon Scientists and Technologists (AARST) at (866) 772-2778 (multiple copy orders only).

✓ The National Radon Safety Board (NRSB) at (866) 329-3474 (multiple copy orders only).

☐ ***A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family From Radon*** (EPA 402/K-09/001, January 2009).
Provides basic information on radon, sources of radon, radon health risks, and how to test when you're *not* in a real estate transaction.

☐ ***A Radon Guide For Tenants*** (EPA 402-K-98-004, August 1998).
Provides tenants with basic information about radon, testing, and fixing. It also contains information directed to building owners and landlords. This document is only available online – **http://www.epa.gov/radon/pubs/tenants.html.**

Reducing Radon Levels In a Home

☐ ***Consumer's Guide to Radon Reduction*** (EPA 402-K-06-094, December 2006).
The consumer's basic source of information on how to reduce radon levels in a home's indoor air. It includes information about the key mitigation system components, installation and operating costs, radon health risks, and testing (when not in a real estate transaction).

Building a New Home to Be Radon-Resistant

☐ ***Appendix F: Radon Control Methods (IRC, 2003)***.
Published in the International Residential Code by the International Code Council (ICC) as a guide to building radon-resistant homes. Available from the ICC, 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041-3401. Contact information: 1-888-ICC-SAFE, or via the Internet at http://www.iccsafe.org

☐ ***Radon Control Methods (Section 49.2.5)***
Published in the National Fire Protection Association's (NFPA, 2003) Building Construction and Safety Code: NFPA 5000. NFPA, 1 Batterymarch Park, Quincy, Massachusetts 02169-7471. Contact information: 617 -770-3000, or via the Internet at www.nfpa.org

☐ ***Standard Practice for Radon Control Options for the Design and Construction of New-Low Rise Residential Buildings*** (ASTM E 1465-08, EPA 402-K-08-004*).
This consensus standard provides technical details on how to make radon-resistant features an integral part of a new home during construction. A must for builders or anyone building a new or custom home.

Radon Technical Guidance

☐ ***Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings*** (ASTM E 2121-03, EPA 402-K-03-007*). This consensus standard provides technical details on mitigating existing buildings. A must for professional mitigators.

☐ ***Protocols for Radon and Radon Decay Product Measurements in Homes*** (EPA 402-R-92-003, June 1993).
This document is intended for use by qualified radon measurement technicians and testers, and laboratories that analyze radon devices and prepare radon test results reports. These protocols were written to guide routine radon measurements (*Citizen's Guide*) and those made in conjunction with real estate transactions (*Home Buyer's and Seller's Guide*).

☐ ***Indoor Radon and Radon Decay Product Measurement Device Protocols*** (EPA 402-R-92-004, July 1992).
This document is intended for use by qualified radon measurement technicians and testers. It contains detailed technical information on the types of radon measurement devices, their proper use and maintenance, and quality assurance procedures. These protocols were written to guide routine radon measurements (*Citizen's Guide*) and those made in conjunction with real estate transactions (*Home Buyer's and Seller's Guide*).

*A single copy of ASTM E 2121 and E 1465 is free on request from EPA's National Service Center for Environmental Publications (NSCEP); 1-800-490-9198, http://www.epa.gov/nscep/, or via email at nscep@bps-lmit.com.

EPA 402/K-13/002 | September 2013 (revised)

9. State Radon Offices
(www.epa.gov/iaq/whereyoulive.html)

Up-to-date information on how to contact your state radon office is available on the web (above). You will also find a list of state hotlines, state indoor air coordinators, and state web sites (if available). Some states can also provide you with a list of qualified radon services providers. Native Americans living on Tribal Lands should contact their Tribal Health Department or Housing Authority for assistance.

EPA 402/K-13/002 | September 2013 (revised)

10. EPA Regional Offices (www.epa.gov/radon/whereyoulive.html)

REGION	STATES	PHONE / FAX
US EPA New England/ **Region 1** One Congress Street, Suite 1100 John F. Kennedy Federal Bldg. Boston, MA 02114-2023	CT, MA, ME, NH, RI, VT	617-918-1630 617-918-4940-fax
US EPA/ **Region 2** 290 Broadway, 28th Floor New York, NY 10007-1866	NJ, NY, PR, VI	212-637-3745 212-637-4942-fax
US EPA/ **Region 3** 1650 Arch Street Philadelphia, PA 19103	DC, DE, MD, PA, VA , WV	800-438-2474 Toll-free 215-814-2086 215-814-2101-fax
US EPA/ **Region 4** 61 Forsyth Street, SW Atlanta, GA 30303-3104	AL, FL, GA, KY, MS, NC, SC, TN	404-562-9145 404-562-9095-fax
US EPA/ **Region 5** 77 West Jackson Blvd., (AE-17J) Chicago, IL 60604	IL, IN, MI, MN, OH, WI	312-353-6686 312-886-0617-fax
US EPA/ **Region 6** 1445 Ross Avenue (6PD-T) Dallas, TX 75202-2733	AR, LA, NM, OK, TX	800-887-6063 Toll-free 214-665-7550 214-665-6762-fax
US EPA/ **Region 7** 901 North 5th Street (ARTD / RALI) Kansas City, KS 66101	IA, KS, MO, NE	913-551-7260 913-551-7065-fax
US EPA/ **Region 8** 999 18th Street, Suite 500 (8P-AR) Denver, CO 80202-2466	CO, MT, ND, SD, UT, WY	800-227-8917 Toll-free 303-312-6031 303-312-6044-fax
US EPA/ **Region 9** 75 Hawthorne Street (Air-6) San Francisco, CA 94105	AZ, CA, HI, NV, GUAM	415-744-1046 415-744-1073-fax
US EPA/ **Region 10** 1200 Sixth Avenue (OAQ-107) Seattle, WA 98101	AK, ID, OR, WA	206-553-7299 206-553-0110-fax

EPA 402/K-13/002 | September 2013 (revised)

U.S. SURGEON GENERAL HEALTH ADVISORY

"Indoor radon is the second-leading cause of lung cancer in the United States and breathing it over prolonged periods can present a significant health risk to families all over the country. It's important to know that this threat is completely preventable. Radon can be detected with a simple test and fixed through well-established venting techniques." January 2005

Consumers need to know about the health of a house they are considering purchasing, including whether there is a radon problem, and if so, how to fix it. The *Home Buyer's and Seller's Guide to Radon* provides practical consumer information that every home buyer needs to know.

Consumer Federation of America Foundation

AMERICAN LUNG ASSOCIATION

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

NACO National Association of Counties

ASHI

American Society of Home Inspectors

ENVIRONMENTAL LAW • INSTITUTE®

GREEN CROSS FOR SAFETY

National Safety Council

EPA
United States
Environmental Protection
Agency

Indoor Environments Division (6609J)
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CHAPTER VIII

CARBON MONOXIDE

Carbon Monoxide can be a silent killer

Replace batteries annually in carbon monoxide alarms and detectors!

The California Air Resources Board (ARB) urges residents to guard against carbon monoxide poisoning by having a carbon monoxide detection device installed and replacing batteries annually for those devises that are operated by batteries. Carbon monoxide is a silent killer and having a working carbon monoxide detector is a small investment that can help save lives.

Californians are also urged to have gas appliances inspected annually to ensure they are working properly. More than half of all carbon monoxide poisoning deaths result from malfunctioning or improperly vented gas appliances in homes. The others come from a variety of combustion sources including: charcoal grills, automobile exhausts, space heaters, generators and fireplaces.

The State of California requires by law that every home in California with an attached garage or fossil fuel source appliance have an operational carbon monoxide detector or alarm installed. Beginning in 2015, California law also requires community care facilities, including residential care facilities for the elderly and infirm, and public and family day care centers to have at least one functioning carbon monoxide detector. Carbon monoxide poisoning can strike wherever combustion occurs in enclosed areas, including: homes, recreational vehicles, cabins, tents and houseboats. Vigilance is the key to avoiding tragedy.

"Carbon monoxide deaths are preventable," said ARB Chairman Mary D. Nichols. "Having the required alarms working properly and your gas appliances inspected are simply steps that will protect you and your family."

Accidental deaths occur each year from carbon monoxide poisoning and several hundred Californians go to emergency rooms due to non-lethal exposures. Warning signs of exposure include headache, drowsiness, nausea and inability to concentrate; any person experiencing these symptoms should be immediately moved to a location with fresh air and be seen by a doctor in case treatment is needed.

Carbon monoxide inhibits the blood's ability to carry oxygen to body tissues including vital organs such as the heart and brain. It is especially dangerous for young children and individuals with heart disease, so it is crucial that people take preventative measures such as having a properly working carbon monoxide detector.

ARB recommends the following:

- Properly use and maintain appliances that produce a flame such as gas stoves, ovens, furnaces and heaters;
- Never use gas ovens to heat the home;
- Never use kerosene and propane space heaters, charcoal grills, barbecues or unvented gas logs indoors;
- Use caution when heating with propane appliances, older wall or floor gas furnaces and fireplaces;
- Obtain annual check-ups of all gas appliances by a qualified professional;
- Use State Fire Marshal approved carbon monoxide detectors that sound an alarm;
- Place emergency generators outdoors away from windows and doors to prevent fumes from entering the home; and
- Be especially careful with appliances in recreational vehicles, cabins and houseboats, and use carbon monoxide detectors specifically made for these locations.

In addition, do not operate cars or other internal combustion engines in enclosed spaces or attached garages. Carbon monoxide poisoning deaths are often the result of accidental exposure from vehicles running in closed garages.

ARB data show that outdoor carbon monoxide levels rise through California between the months of November and March because of periodic stagnant weather conditions when there is no wind or breezes which would disperse the pollutant. These elevated levels have been measured in covered garages and at busy intersections.

Links to Additional Information on Carbon Monoxide:

US EPA, An Introduction to Indoor Air Quality (IAQ),
Basic Information on Pollutants and Sources of Indoor Air Pollution,
Carbon Monoxide

www.epa.gov/iaq/co.html

OEHHA, Impacts of Criteria Air Pollutants
on the Respiratory Health of Children

www.oehha.ca.gov/public_info/public/kids/pdf/balmes.pdf

USFA, DHA, Exposing an Invisible Killer:
The Dangers of Carbon Monoxide

www.usfa.dhs.gov/citizens/co/fswy17.shtm

Centers for Disease Control and Prevention (CDC),
Carbon Monoxide Poisoning Fact Sheet

www.cdc.gov/co/faqs.htm

Agency for Toxic Substances Disease Registry,
CDC, ToxFAQs for Carbon Monoxide

www.atsdr.cdc.gov/toxfaqs/tf.asp?id=1163&tid=25

American Lung Association, Carbon Monoxide Indoors

www.lungusa.org/healthy-air/home/resources/
carbon-monoxide-indoors.html

US Consumer Product Safety Commission (CPSC),
Carbon Monoxide Questions and Answers

www.cpsc.gov/cpscpub/pubs/466.html

APPENDIX A

List of Federal and State Agencies

Contact information provided was correct as of the date of publication, but is subject to change.

Federal Agencies

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

HUD helps people build and maintain communities of opportunity.

U.S. Environmental Protection Agency (U.S. EPA)
Public Information Center
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460
Telephone: (202) 272-0167
Web: www.epa.gov

The U.S. EPA is a regulatory agency responsible for implementing federal laws designed to protect our air, water, and land from past and future environmental hazards.

State Agencies

California Air Resources Board
Research Division
Indoor Exposure Assessment Section
1001 I Street
P.O. Box 2815
Sacramento, CA 95814
Telephone: (916) 322-8282
Web: www.arb.ca.gov

California Contractor's State License Board
9821 Buisness Park Drive
P.O. Box 26000
Sacramento, CA 95827
Telephone: (800) 321-2752
Web: www.contractorslicense.com

This board is responsible for licensing contractors, including asbestos abatement.

California Department of Industrial Relations Division of Occupational Safety and Health (Cal/OSHA)
Asbestos Consultant Certification Unit
2211 Park Towne Circle, #1
Sacramento, CA 95825
Telephone: (916) 574-2993
Web: www.dir.ca.gov

Cal/OSHA is the state equivalent to the Federal Occupational Safety and Health Administration (OSHA) and regulates protection of workers.

California Department of Public Health
Call your local county health department listed in the front of the white pages or, on the internet, visit www.cdph.ca.gov.

California Department of Public Health
Indoor Radon Program, MS 7404
1616 Capitol Avenue, 2nd Floor
P.O. Box 997377
Sacramento, CA 95899-7377
Telephone: (800) 745-7236
Web:
www.cdph.ca.gov/HealthInfo/environhealth/Pages/Radon.aspx

This branch provides publications and information about radon hazards.

California Department of Public Health
Environmental Lab Accreditation Program
850 Marina Bay Parkway
Building P, Third Floor
Richmond, CA 94804-6403
Telephone: (510) 620-5600

This office may provide information about test procedures for analyzing environmental pollutants.

California Department of Public Health
Division of Drinking Water and Environmental Management
Drinking Water Technical Program Branch
Sacramento Headquarters
1616 Capital Avenue, MS 7400
P.O. Box 997413
Sacramento, CA 95899-7413
Telephone: (916) 449-5600

This division collects and evaluates water quality information on drinking water in California and supervises the activities of all public water systems. It also provides assistance to local health departments, water purveyors, and the general public on issues related to water quality, water supply, and water treatment.

Northern California Section

Sacramento District
8455 Jackson Road, Room 120
Sacramento, CA 95826
Telephone: (916) 229-3126

Lassen, Valley, Klamath & Shasta Districts
415 Knollcrest Drive, Suite 110
Redding, CA 96002
Telephone: (916) 224-4800

North Coastal Section

San Francisco & Santa Clara Districts
2151 Berkeley Way, Room 458
Berkeley, CA 94704
Telephone: (510) 540-2158

Mendocino & Sonoma Districts
50 D Street, Suite 200
Santa Rosa, CA 95404-4752
Telephone: (707) 576-2145

Monterey District
1 Lower Ragsdale, Bldg. 1, Suite 120
Monterey, CA 93940
Telephone: (831) 655-6939

Central California Section

Merced & Visalia Districts
1040 East Herndon Avenue, Suite 205
Fresno, CA 93720-3158
Telephone: (559) 447-3300

Stockton District
31 E. Channel Street, Room 270
Stockton, CA 95202
Telephone: (209) 948-7696

Tehachapi District
1200 Discovery Drive, Suite 100
Bakersfield, CA 993309
Telephone: (661) 335-7315

Southern California Section

Los Angeles District & Metropolitan Districts
1449 W. Temple Street, Room 202
Los Angeles, CA 90026
Telephone: (213) 580-5723

Santa Barbara District
1180 Eugenia Place, Suite 200
Carpinteria, CA 93013
Telephone: (805) 566-1326

South Coastal Section

San Bernardino District
464 West 4th Street, #437
San Bernardino, CA 92401
Telephone: (909) 383-4328

San Diego & Riverside Districts
1350 Front Street, Room 2050
San Diego, CA 92101
Telephone: (619) 525-4159

Santa Ana District
28 Civic Center Plaza, Room 325
Santa Ana, CA 92701
Telephone: (714) 558-4410

California Department of Toxic Substances Control
1001 I Street
P.O. Box 806
Sacramento, CA 95812-0806
Telephone: (916) 324-1826
Web: www.dtsc.ca.gov

DTSC issues permits for treatment, storage, and disposal of hazardous wastes; inspects facilities; maintains a Superfund list; and has a site cleanup program.

Northern California Regional Offices

Sacramento Office
8800 Cal Center Drive
Sacramento, CA 95826-3268
Telephone: (916) 255-3618

Clovis Office
1515 Tollhouse Road
Clovis, CA 93611-0522
Telephone: (559) 297-3901

Berkeley Office
700 Heinz Avenue, Suite #200
Berkeley, CA 94710-2721
Telephone: (510) 540-2122

Southern California Regional Offices

Chatsworth Office
9211 Oakdale Avenue
Chatsworth, CA 91311-6505
Telephone: (818) 717-6500

Cypress Office
5796 Corporate Avenue
Cypress, CA 90630-4732
Telephone: (714) 484-5300

San Diego Office
9174 Skypark Court, Suite 150
San Diego, CA 92123
Telephone: (858) 637-5531

California Department of Housing and Community Development

Division of Administration - Manufactured Housing
1800 Third Street, Room 260
P.O. Box 31
Sacramento, CA 95814
Telephone: (916) 445-3338

Administration of codes and statutes relating to mobile homes. It also allocates grants and loans for low-income housing, house rehabilitation, and disaster relief.

California Department of Real Estate (DRE)

Fresno District Office
Department of Real Estate
2550 Mariposa, Room 3070
Fresno, CA 93721-2273
Telephone: (559) 445-6153

Oakland District Office
Department of Real Estate
1515 Clay Street, Room 702
Oakland, CA 94612-1462
Telephone: (510) 622-2552

Los Angeles Executive Office
Department of Real Estate
320 W. 4th Street, Suite 350
Los Angeles, CA 90013-1150
Telephone: (213) 620-2072

San Diego District Office
Department of Real Estate
1350 Front Street, Room 3064
San Diego, CA 92101-3687
Telephone: (619) 525-4375

Sacramento Principal Office
Department of Real Estate
2201 Broadway
P.O. Box 187000
Sacramento, CA 95818-7000
Telephone: (916) 227-0864

This unit provides information on lead toxicity and treatment of lead toxicity in children.

APPENDIX B
Glossary

AERATION: A technique by which air is introduced into a liquid; bubbles and aerosols are generated and dissolved gases released. For example, water aerated by passing through a shower head 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 the 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, and salts, which make water hard.

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 full year.

CARCINOGEN: A substance that causes cancer.

CATHODE RAY TUBE: The cathode ray tube, or CRT, is the display device used in most computer displays, video monitors, and televisions.

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 the solution and condensing the steam. The resultant distilled water has a reduced salt 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 undissolved solids or sediment by passing the water through a filter or sieve. Filtration does not remove dissolved salts or organic contaminants.

FRIABLE: Easily crumbled, pulverized, or reduced to a powder by hand.

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 four liters.

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

MITIGATION: Mitigation means any action taken to reduce or eliminate the risk to human health and the environment from hazardous waste.

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 air, i.e. 1,000 liters air. Also, water which contains1 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.

REACTIVE: A solid waste that is normally unstable, reacts violently with water, or generates toxic gases when exposed to water or other materials.

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.

Protect Your Family From Lead in Your Home

United States Environmental Protection Agency

United States Consumer Product Safety Commission

United States Department of Housing and Urban Development

September 2013

Are You Planning to Buy or Rent a Home Built Before 1978?

Did you know that many homes built before 1978 have **lead-based paint**? Lead from paint, chips, and dust can pose serious health hazards.

Read this entire brochure to learn:

- How lead gets into the body
- About health effects of lead
- What you can do to protect your family
- Where to go for more information

Before renting or buying a pre-1978 home or apartment, federal law requires:

- Sellers must disclose known information on lead-based paint or lead-based paint hazards before selling a house.
- Real estate sales contracts must include a specific warning statement about lead-based paint. Buyers have up to 10 days to check for lead.
- Landlords must disclose known information on lead-based paint and lead-based paint hazards before leases take effect. Leases must include a specific warning statement about lead-based paint.

If undertaking renovations, repairs, or painting (RRP) projects in your pre-1978 home or apartment:

- Read EPA's pamphlet, *The Lead-Safe Certified Guide to Renovate Right,* to learn about the lead-safe work practices that contractors are required to follow when working in your home (see page 75).

Simple Steps to Protect Your Family from Lead Hazards

If you think your home has lead-based paint:

- Don't try to remove lead-based paint yourself.
- Always keep painted surfaces in good condition to minimize deterioration.
- Get your home checked for lead hazards. Find a certified inspector or risk assessor at epa.gov/lead.
- Talk to your landlord about fixing surfaces with peeling or chipping paint.
- Regularly clean floors, window sills, and other surfaces.
- Take precautions to avoid exposure to lead dust when remodeling.
- When renovating, repairing, or painting, hire only EPA- or state-approved Lead-Safe certified renovation firms.
- Before buying, renting, or renovating your home, have it checked for lead-based paint.
- Consult your health care provider about testing your children for lead. Your pediatrician can check for lead with a simple blood test.
- Wash children's hands, bottles, pacifiers, and toys often.
- Make sure children avoid fatty (or high fat) foods and eat nutritious meals high in iron and calcium.
- Remove shoes or wipe soil off shoes before entering your house.

Lead Gets into the Body in Many Ways

Adults and children can get lead into their bodies if they:

- Breathe in lead dust (especially during activities such as renovations, repairs, or painting that disturb painted surfaces).
- Swallow lead dust that has settled on food, food preparation surfaces, and other places.
- Eat paint chips or soil that contains lead.

Lead is especially dangerous to children under the age of 6.

- At this age, children's brains and nervous systems are more sensitive to the damaging effects of lead.
- Children's growing bodies absorb more lead.
- Babies and young children often put their hands and other objects in their mouths. These objects can have lead dust on them.

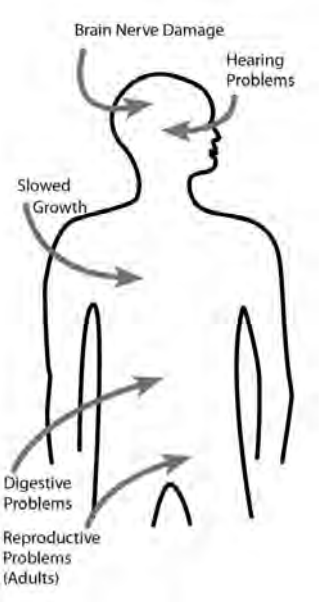
Women of childbearing age should know that lead is dangerous to a developing fetus.

- Women with a high lead level in their system before or during pregnancy risk exposing the fetus to lead through the placenta during fetal development.

Health Effects of Lead

Lead affects the body in many ways. It is important to know that even exposure to low levels of lead can severely harm children.

In children, exposure to lead can cause:



- Nervous system and kidney damage
- Learning disabilities, attention deficit disorder, and decreased intelligence
- Speech, language, and behavior problems
- Poor muscle coordination
- Decreased muscle and bone growth
- Hearing damage

While low-lead exposure is most common, exposure to high amounts of lead can have devastating effects on children, including seizures, unconsciousness, and, in some cases, death.

Although children are especially susceptible to lead exposure, lead can be dangerous for adults, too.

In adults, exposure to lead can cause:

- Harm to a developing fetus
- Increased chance of high blood pressure during pregnancy
- Fertility problems (in men and women)
- High blood pressure
- Digestive problems
- Nerve disorders
- Memory and concentration problems
- Muscle and joint pain

Check Your Family for Lead

Get your children and home tested if you think your home has lead.

Children's blood lead levels tend to increase rapidly from 6 to 12 months of age, and tend to peak at 18 to 24 months of age.

Consult your doctor for advice on testing your children. A simple blood test can detect lead. Blood lead tests are usually recommended for:

- Children at ages 1 and 2
- Children or other family members who have been exposed to high levels of lead
- Children who should be tested under your state or local health screening plan

Your doctor can explain what the test results mean and if more testing will be needed.

Where Lead-Based Paint Is Found

In general, the older your home or childcare facility, the more likely it has lead-based paint.[1]

Many homes, including private, federally-assisted, federally-owned housing, and childcare facilities built before 1978 have lead-based paint. In 1978, the federal government banned consumer uses of lead-containing paint.[2]

Learn how to determine if paint is lead-based paint on page 70.

Lead can be found:

- In homes and childcare facilities in the city, country, or suburbs,
- In private and public single-family homes and apartments,
- On surfaces inside and outside of the house, and
- In soil around a home. (Soil can pick up lead from exterior paint or other sources, such as past use of leaded gas in cars.)

Learn more about where lead is found at epa.gov/lead.

[1] "Lead-based paint" is currently defined by the federal government as paint with lead levels greater than or equal to 1.0 milligram per square centimeter (mg/cm), or more than 0.5% by weight.

[2] "Lead-containing paint" is currently defined by the federal government as lead in new dried paint in excess of 90 parts per million (ppm) by weight.

Identifying Lead-Based Paint and Lead-Based Paint Hazards

Deteriorating lead-based paint (peeling, chipping, chalking, cracking, or damaged paint) is a hazard and needs immediate attention. **Lead-based paint** may also be a hazard when found on surfaces that children can chew or that get a lot of wear and tear, such as:

- On windows and window sills
- Doors and door frames
- Stairs, railings, banisters, and porches

Lead-based paint is usually not a hazard if it is in good condition and if it is not on an impact or friction surface like a window.

Lead dust can form when lead-based paint is scraped, sanded, or heated. Lead dust also forms when painted surfaces containing lead bump or rub together. Lead paint chips and dust can get on surfaces and objects that people touch. Settled lead dust can reenter the air when the home is vacuumed or swept, or when people walk through it. EPA currently defines the following levels of lead in dust as hazardous:

- 40 micrograms per square foot ($\mu g/ft^2$) and higher for floors, including carpeted floors
- 250 $\mu g/ft^2$ and higher for interior window sills

Lead in soil can be a hazard when children play in bare soil or when people bring soil into the house on their shoes. EPA currently defines the following levels of lead in soil as hazardous:

- 400 parts per million (ppm) and higher in play areas of bare soil
- 1,200 ppm (average) and higher in bare soil in the remainder of the yard

Remember, lead from paint chips—which you can see—and lead dust—which you may not be able to see—both can be hazards.

The only way to find out if paint, dust, or soil lead hazards exist is to test for them. The next page describes how to do this.

Checking Your Home for Lead

You can get your home tested for lead in several different ways:

- A lead-based paint **inspection** tells you if your home has lead-based paint and where it is located. It won't tell you whether your home currently has lead hazards. A trained and certified testing professional, called a lead-based paint inspector, will conduct a paint inspection using methods, such as:
  - Portable x-ray fluorescence (XRF) machine
  - Lab tests of paint samples

- A **risk assessment** tells you if your home currently has any lead hazards from lead in paint, dust, or soil. It also tells you what actions to take to address any hazards. A trained and certified testing professional, called a risk assessor, will:
  - Sample paint that is deteriorated on doors, windows, floors, stairs, and walls
  - Sample dust near painted surfaces and sample bare soil in the yard
  - Get lab tests of paint, dust, and soil samples
- A combination inspection and risk assessment tells you if your home has any lead-based paint and if your home has any lead hazards, and where both are located.

Be sure to read the report provided to you after your inspection or risk assessment is completed, and ask questions about anything you do not understand.

Checking Your Home for Lead, continued

In preparing for renovation, repair, or painting work in a pre-1978 home, Lead-Safe Certified renovators (see page 75) may:

- Take paint chip samples to determine if lead-based paint is present in the area planned for renovation and send them to an EPA-recognized lead lab for analysis. In housing receiving federal assistance, the person collecting these samples must be a certified lead-based paint inspector or risk assessor
- Use EPA-recognized tests kits to determine if lead-based paint is absent (but not in housing receiving federal assistance)
- Presume that lead-based paint is present and use lead-safe work practices

There are state and federal programs in place to ensure that testing is done safely, reliably, and effectively. Contact your state or local agency for more information, visit epa.gov/lead, or call **1-800-424-LEAD (5323)** for a list of contacts in your area.[3]

[3] Hearing- or speech-challenged individuals may access this number through TTY by calling the Federal Relay Service at 1-800-877-8399.

What You Can Do Now to Protect Your Family

If you suspect that your house has lead-based paint hazards, you can take some immediate steps to reduce your family's risk:

- If you rent, notify your landlord of peeling or chipping paint.
- Keep painted surfaces clean and free of dust. Clean floors, window frames, window sills, and other surfaces weekly. Use a mop or sponge with warm water and a general all-purpose cleaner. (Remember: never mix ammonia and bleach products together because they can form a dangerous gas.)
- Carefully clean up paint chips immediately without creating dust.
- Thoroughly rinse sponges and mop heads often during cleaning of dirty or dusty areas, and again afterward.
- Wash your hands and your children's hands often, especially before they eat and before nap time and bed time.
- Keep play areas clean. Wash bottles, pacifiers, toys, and stuffed animals regularly.
- Keep children from chewing window sills or other painted surfaces, or eating soil.
- When renovating, repairing, or painting, hire only EPA- or state-approved Lead-Safe Certified renovation firms (see page 75).
- Clean or remove shoes before entering your home to avoid tracking in lead from soil.
- Make sure children avoid fatty (or high fat) foods and eat nutritious meals high in iron and calcium. Children with good diets absorb less lead.

Reducing Lead Hazards

Disturbing lead-based paint or removing lead improperly can increase the hazard to your family by spreading even more lead dust around the house.

- In addition to day-to-day cleaning and good nutrition, you can **temporarily** reduce lead-based paint hazards by taking actions, such as repairing damaged painted surfaces and planting grass to cover lead-contaminated soil. These actions are not permanent solutions and will need ongoing attention.
- You can minimize exposure to lead when renovating, repairing, or painting by hiring an EPA- or state-certified renovator who is trained in the use of lead-safe work practices. If you are a do-it-yourselfer, learn how to use lead–safe work practices in your home.
- To remove lead hazards permanently, you should hire a certified lead abatement contractor. Abatement (or permanent hazard elimination) methods include removing, sealing, or enclosing lead-based paint with special materials. Just painting over the hazard with regular paint is not permanent control.

Always use a certified contractor who is trained to address lead hazards safely.

- Hire a Lead-Safe Certified firm (see page 75) to perform renovation, repair, or painting (RRP) projects that disturb painted surfaces.
- To correct lead hazards permanently, hire a certified lead abatement professional. This will ensure your contractor knows how to work safely and has the proper equipment to clean up thoroughly.

Certified contractors will employ qualified workers and follow strict safety rules as set by their state or by the federal government.

Reducing Lead Hazards, continued

If your home has had lead abatement work done or if the housing is receiving federal assistance, once the work is completed, dust cleanup activities must be conducted until clearance testing indicates that lead dust levels are below the following levels:

- 40 micrograms per square foot (µg/ft^2) for floors, including carpeted floors
- 250 µg/ft^2 for interior windows sills
- 400 µg/ft^2 for window troughs

For help in locating certified lead abatement professionals in your area, call your state or local agency (see pages 77 and 78), or visit epa.gov/lead, or call 1-800-424-LEAD.

Renovating, Remodeling, or Repairing (RRP) a Home with Lead-Based Paint

If you hire a contractor to conduct renovation, repair, or painting (RRP) projects in your pre-1978 home or childcare facility (such as pre-school and kindergarten), your contractor must:

- Be a Lead-Safe Certified firm approved by EPA or an EPA-authorized state program
- Use qualified trained individuals (Lead-Safe Certified renovators) who follow specific lead-safe work practices to prevent lead contamination
- Provide a copy of EPA's lead hazard information document, *The Lead-Safe Certified Guide to Renovate Right*

RRP contractors working in pre-1978 homes and childcare facilities must follow lead-safe work practices that:

- **Contain the work area.** The area must be contained so that dust and debris do not escape from the work area. Warning signs must be put up, and plastic or other impermeable material and tape must be used.
- **Avoid renovation methods that generate large amounts of lead-contaminated dust.** Some methods generate so much lead-contaminated dust that their use is prohibited. They are:
  - Open-flame burning or torching
  - Sanding, grinding, planing, needle gunning, or blasting with power tools and equipment not equipped with a shroud and HEPA vacuum attachment and
  - Using a heat gun at temperatures greater than 1100°F
- **Clean up thoroughly.** The work area should be cleaned up daily. When all the work is done, the area must be cleaned up using special cleaning methods.
- **Dispose of waste properly.** Collect and seal waste in a heavy duty bag or sheeting. When transported, ensure that waste is contained to prevent release of dust and debris.

To learn more about EPA's requirements for RRP projects visit epa.gov/getleadsafe, or read *The Lead-Safe Certified Guide to Renovate Right.*

Other Sources of Lead

While paint, dust, and soil are the most common sources of lead, other lead sources also exist:

- **Drinking water.** Your home might have plumbing with lead or lead solder. You cannot see, smell, or taste lead, and boiling your water will not get rid of lead. If you think your plumbing might contain lead:
  - Use only cold water for drinking and cooking.
  - Run water for 15 to 30 seconds before drinking it, especially if you have not used your water for a few hours.

  Call your local health department or water supplier to find out about testing your water, or visit epa.gov/lead for EPA's lead in drinking water information.
- **Lead smelters** or other industries that release lead into the air.
- **Your job.** If you work with lead, you could bring it home on your body or clothes. Shower and change clothes before coming home. Launder your work clothes separately from the rest of your family's clothes.
- **Hobbies** that use lead, such as making pottery or stained glass, or refinishing furniture. Call your local health department for information about hobbies that may use lead.
- Old **toys** and **furniture** may have been painted with lead-containing paint. Older toys and other children's products may have parts that contain lead.[4]
- Food and liquids cooked or stored in **lead crystal** or **lead-glazed pottery or porcelain** may contain lead.
- Folk remedies, such as **"greta"** and **"azarcon,"** used to treat an upset stomach.

[4] In 1978, the federal government banned toys, other children's products, and furniture with lead-containing paint (16 CFR 1303). In 2008, the federal government banned lead in most children's products. The federal government currently bans lead in excess of 100 ppm by weight in most children's products (76 FR 44463).

For More Information

The National Lead Information Center
Learn how to protect children from lead poisoning and get other information about lead hazards on the Web at epa.gov/lead and hud.gov/lead, or call **1-800-424-LEAD (5323).**

EPA's Safe Drinking Water Hotline
For information about lead in drinking water, call **1-800-426-4791**, or visit epa.gov/lead for information about lead in drinking water.

Consumer Product Safety Commission (CPSC) Hotline
For information on lead in toys and other consumer products, or to report an unsafe consumer product or a product-related injury, call **1-800-638-2772,** or visit CPSC's website at cpsc.gov or saferproducts.gov.

State and Local Health and Environmental Agencies
Some states, tribes, and cities have their own rules related to lead-based paint. Check with your local agency to see which laws apply to you. Most agencies can also provide information on finding a lead abatement firm in your area, and on possible sources of financial aid for reducing lead hazards. Receive up-to-date address and phone information for your state or local contacts on the Web at epa.gov/lead, or contact the National Lead Information Center at **1-800-424-LEAD.**

Hearing- or speech-challenged individuals may access any of the phone numbers in this brochure through TTY by calling the toll-free Federal Relay Service at **1-800-877-8339**.

U. S. Environmental Protection Agency (EPA) Regional Offices

The mission of EPA is to protect human health and the environment. Your Regional EPA Office can provide further information regarding regulations and lead protection programs.

Region 1 (Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont)

Regional Lead Contact
U.S. EPA Region 1
5 Post Office Square, Suite 100, OES 05-4
Boston, MA 02109-3912
(888) 372-7341

Region 2 (New Jersey, New York, Puerto Rico, Virgin Islands)

Regional Lead Contact
U.S. EPA Region 2
2890 Woodbridge Avenue
Building 205, Mail Stop 225
Edison, NJ 08837-3679
(732) 321-6671

Region 3 (Delaware, Maryland, Pennsylvania, Virginia, DC, West Virginia)

Regional Lead Contact
U.S. EPA Region 3
1650 Arch Street
Philadelphia, PA 19103
(215) 814-2088

Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)

Regional Lead Contact
U.S. EPA Region 4
AFC Tower, 12th Floor, Air, Pesticides & Toxics
61 Forsyth Street, SW
Atlanta, GA 30303
(404) 562-8998

Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)

Regional Lead Contact
U.S. EPA Region 5 (DT-8J)
77 West Jackson Boulevard
Chicago, IL 60604-3666
(312) 886-7836

Region 6 (Arkansas, Louisiana, New Mexico, Oklahoma, Texas, and 66 Tribes)

Regional Lead Contact
U.S. EPA Region 6
1445 Ross Avenue, 12th Floor
Dallas, TX 75202-2733
(214) 665-2704

Region 7 (Iowa, Kansas, Missouri, Nebraska)

Regional Lead Contact
U.S. EPA Region 7
11201 Renner Blvd.
WWPD/TOPE
Lenexa, KS 66219
(800) 223-0425

Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming)

Regional Lead Contact
U.S. EPA Region 8
1595 Wynkoop St.
Denver, CO 80202
(303) 312-6966

Region 9 (Arizona, California, Hawaii, Nevada)

Regional Lead Contact
U.S. EPA Region 9 (CMD-4-2)
75 Hawthorne Street
San Francisco, CA 94105
(415) 947-4280

Region 10 (Alaska, Idaho, Oregon, Washington)

Regional Lead Contact
U.S. EPA Region 10
Solid Waste & Toxics Unit (WCM-128)
1200 Sixth Avenue, Suite 900
Seattle, WA 98101
(206) 553-1200

Consumer Product Safety Commission (CPSC)

The CPSC protects the public against unreasonable risk of injury from consumer products through education, safety standards activities, and enforcement. Contact CPSC for further information regarding consumer product safety and regulations.

CPSC
4330 East West Highway
Bethesda, MD 20814-4421
1-800-638-2772
cpsc.gov or saferproducts.gov

U. S. Department of Housing and Urban Development (HUD)

HUD's mission is to create strong, sustainable, inclusive communities and quality affordable homes for all. Contact HUD's Office of Healthy Homes and Lead Hazard Control for further information regarding the Lead Safe Housing Rule, which protects families in pre-1978 assisted housing, and for the lead hazard control and research grant programs.

HUD
451 Seventh Street, SW, Room 8236
Washington, DC 20410-3000
(202) 402-7698
hud.gov/offices/lead/

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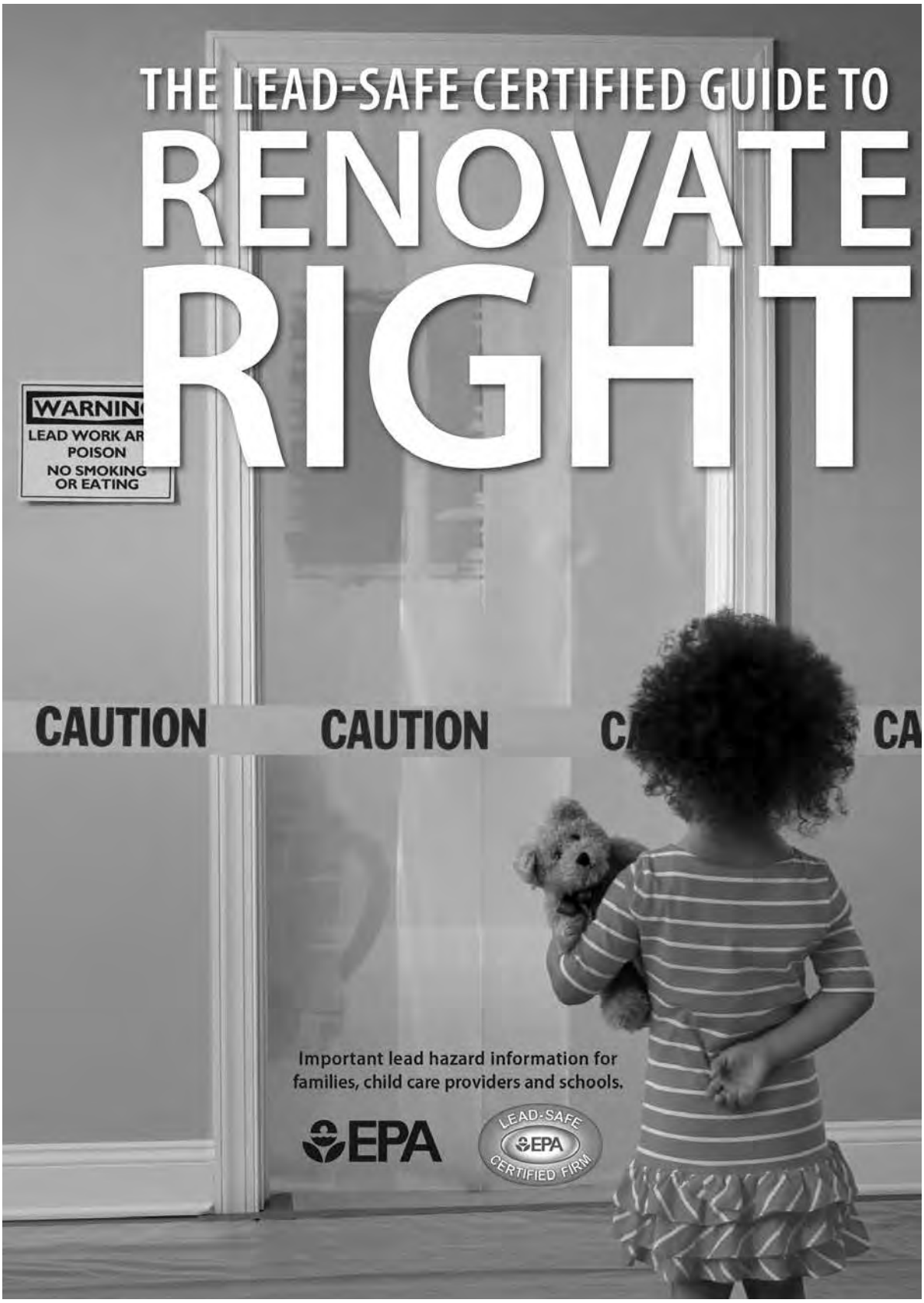
U. S. EPA Washington DC 20460
U. S. CPSC Bethesda MD 20814
U. S. HUD Washington DC 20410

EPA-747-K-12-001
September 2013

IMPORTANT!

Lead From Paint, Dust, and Soil in and Around Your Home Can Be Dangerous if Not Managed Properly

- Children under 6 years old are most at risk for lead poisoning in your home.
- Lead exposure can harm young children and babies even before they are born.
- Homes, schools, and child care facilities built before 1978 are likely to contain lead-based paint.
- Even children who seem healthy may have dangerous levels of lead in their bodies.
- Disturbing surfaces with lead-based paint or removing lead-based paint improperly can increase the danger to your family.
- People can get lead into their bodies by breathing or swallowing lead dust, or by eating soil or paint chips containing lead.
- People have many options for reducing lead hazards. Generally, lead-based paint that is in good condition is not a hazard (see page 73).


THE LEAD-SAFE CERTIFIED GUIDE TO
RENOVATE RIGHT
WARNIN
LEAD WORK AR
POISON
NO SMOKING
OR EATING
CAUTION
CAUTION
Important lead hazard information for families, child care providers and schools.
EPA
LEAD-SAFE
EPA
CERTIFIED FIRM

IT'S THE LAW!

Federal law requires contractors that disturb painted surfaces in homes, child care facilities and schools built before 1978 to be certified and follow specific work practices to prevent lead contamination. Always ask to see your contractor's certification.

Federal law requires that individuals receive certain information before renovating more than six square feet of painted surfaces in a room for interior projects or more than twenty square feet of painted surfaces for exterior projects or window replacement or demolition in housing, child care facilities and schools built before 1978.

- Homeowners and tenants: renovators must give you this pamphlet before starting work.
- Child care facilities, including preschools and kindergarten classrooms, and the families of children under six years of age that attend those facilities: renovators must provide a copy of this pamphlet to child care facilities and general renovation information to families whose children attend those facilities.

WHO SHOULD READ THIS PAMPHLET?

This pamphlet is for you if you:

- Reside in a home built before 1978.
- Own or operate a child care facility, including preschools and kindergarten classrooms, built before 1978, or
- Have a child under six years of age who attends a child care facility built before 1978.

You will learn:

- Basic facts about lead and your health.
- How to choose a contractor, if you are a property owner.
- What tenants, and parents/guardians of a child in a child care facility or school should consider.
- How to prepare for the renovation or repair job.
- What to look for during the job and after the job is done.
- Where to get more information about lead.

This pamphlet is not for:

- **Abatement projects.** Abatement is a set of activities aimed specifically at eliminating lead or lead hazards. EPA has regulations for certification and training of abatement professionals. If your goal is to eliminate lead or lead hazards, contact the National Lead Information Center at **1-800-424-LEAD (5323)** for more information.
- **"Do-it-yourself"** projects. If you plan to do renovation work yourself, this document is a good start, but you will need more information to complete the work safely. Call the National Lead Information Center at **1-800-424-LEAD (5323)** and ask for more information on how to work safely in a home with lead-based paint.
- **Contractor education.** Contractors who want information about working safely with lead should contact the National Lead Information Center at **1-800-424-LEAD (5323)** for information about courses and resources on lead-safe work practices.

RENOVATING, REPAIRING, OR PAINTING?

- Is your home, your building, or the child care facility or school your children attend being renovated, repaired, or painted?
- Was your home, your building, or the child care facility or school where your children under six years of age attend built before 1978?

If the answer to these questions is YES, there are a few important things you need to know about lead-based paint.

This pamphlet provides basic facts about lead and information about lead safety when work is being done in your home, your building or the child care facility or school your children attend.

The Facts About Lead

- Lead can affect children's brains and developing nervous systems, causing reduced IQ, learning disabilities, and behavioral problems. Lead is also harmful to adults.
- Lead in dust is the most common way people are exposed to lead. People can also get lead in their bodies from lead in soil or paint chips. Lead dust is often invisible.
- Lead-based paint was used in more than 38 million homes until it was banned for residential use in 1978.
- Projects that disturb painted surfaces can create dust and endanger you and your family. Don't let this happen to you. Follow the practices described in this pamphlet to protect you and your family.

LEAD AND YOUR HEALTH

Lead is especially dangerous to children under six years of age.

Lead can affect children's brains and developing nervous systems, causing:

- Reduced IQ and learning disabilities.
- Behavior problems.

Even children who appear healthy can have dangerous levels of lead in their bodies.

Lead is also harmful to adults. In adults, low levels of lead can pose many dangers, including:

- High blood pressure and hypertension.
- Pregnant women exposed to lead can transfer lead to their fetuses. Lead gets into the body when it is swallowed or inhaled.
- People, especially children, can swallow lead dust as they eat, play, and do other normal hand-to-mouth activities.
- People may also breathe in lead dust or fumes if they disturb lead-based paint. People who sand, scrape, burn, brush, blast or otherwise disturb lead-based paint risk unsafe exposure to lead.

What should I do if I am concerned about my family's exposure to lead?

- A blood test is the only way to find out if you or a family member already has lead poisoning. Call your doctor or local health department to arrange for a blood test.
- Call your local health department for advice on reducing and eliminating exposures to lead inside and outside your home, child care facility or school.
- Always use lead-safe work practices when renovation or repair will disturb painted surfaces.

For more information about the health effects of exposure to lead, visit the EPA lead website at epa.gov/lead/pubs/leadinfo or call **1-800-424-LEAD (5323)**.

There are other things you can do to protect your family every day.

- Regularly clean floors, window sills, and other surfaces.
- Wash children's hands, bottles, pacifiers, and toys often.
- Make sure children eat a healthy, nutritious diet consistent with the USDA's dietary guidelines, that helps protect children from the effects of lead.
- Wipe off shoes before entering the house.

WHERE DOES THE LEAD COME FROM?

Dust is the main problem.

The most common way to get lead in the body is from dust. Lead dust comes from deteriorating lead-based paint and lead-contaminated soil that gets tracked into your home. This dust may accumulate to unsafe levels. Then, normal hand to-mouth activities, like playing and eating (especially in young children), move that dust from surfaces like floors and window sills into the body.

Home renovation creates dust.

Common renovation activities like sanding, cutting, and demolition can create hazardous lead dust and chips.

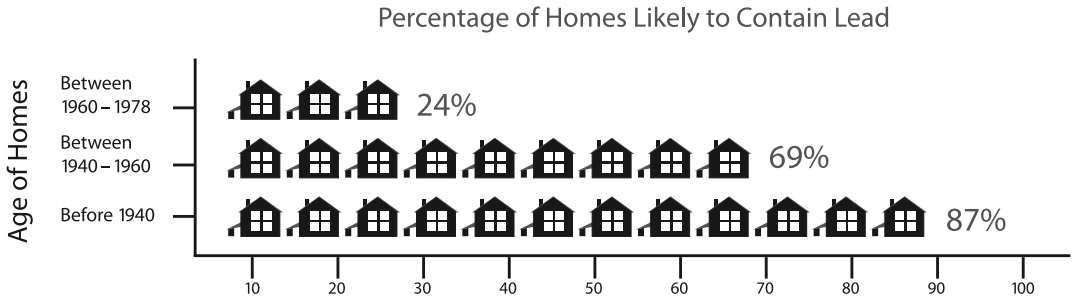
Proper work practices protect you from the dust.

The key to protecting yourself and your family during a renovation, repair or painting job is to use lead-safe work practices such as containing dust inside the work area, using dust-minimizing work methods, and conducting a careful cleanup, as described in this pamphlet.

Other sources of lead.

Remember, lead can also come from outside soil, your water, or household items (such as lead-glazed pottery and lead crystal). Contact the National Lead Information Center at **1-800-424-LEAD (5323)** for more information on these sources.

CHECKING YOUR HOME FOR LEAD-BASED PAINT



Older homes, child care facilities, and schools are more likely to contain lead-based paint.

Homes may be single-family homes or apartments. They may be private, government-assisted, or public housing. Schools are preschools and kindergarten classrooms. They may be urban, suburban, or rural.

You have the following options:

You may decide to assume your home, child care facility, or school contains lead. Especially in older homes and buildings, you may simply want to assume lead-based paint is present and follow the lead-safe work practices described in this brochure during the renovation, repair, or painting job.

You can hire a certified professional to check for lead-based paint.
These professionals are certified risk assessors or inspectors, and can determine if your home has lead or lead hazards.

- A certified inspector or risk assessor can conduct an inspection telling you whether your home, or a portion of your home, has lead-based paint and where it is located. This will tell you the areas in your home where lead-safe work practices are needed.
- A certified risk assessor can conduct a risk assessment telling you if your home currently has any lead hazards from lead in paint, dust, or soil. The risk assessor can also tell you what actions to take to address any hazards.
- For help finding a certified risk assessor or inspector, call the National Lead Information Center at **1-800-424-LEAD (5323)**.

You may also have a certified renovator test the surfaces or components being disturbed for lead by using a lead test kit or by taking paint chip samples and sending them to an EPA-recognized testing laboratory. Test kits must be EPA-recognized and are available at hardware stores. They include detailed instructions for their use.

FOR PROPERTY OWNERS

You have the ultimate responsibility for the safety of your family, tenants, or children in your care.

This means properly preparing for the renovation and keeping persons out of the work area (see pg 90). It also means ensuring the contractor uses lead-safe work practices.

Federal law requires that contractors performing renovation, repair and painting projects that disturb painted surfaces in homes, child care facilities, and schools built before 1978 be certified and follow specific work practices to prevent lead contamination.

Make sure your contractor is certified, and can explain clearly the details of the job and how the contractor will minimize lead hazards during the work.

- You can verify that a contractor is certified by checking EPA's website at epa.gov/getleadsafe or by calling the National Lead Information Center at **1-800-424-LEAD (5323)**. You can also ask to see a copy of the contractor's firm certification.
- Ask if the contractor is trained to perform lead-safe work practices and to see a copy of their training certificate.
- Ask them what lead-safe methods they will use to set up and perform the job in your home, child care facility or school.
- Ask for references from at least three recent jobs involving homes built before 1978, and speak to each personally.

Always make sure the contract is clear about how the work will be set up, performed, and cleaned.

- Share the results of any previous lead tests with the contractor.
- You should specify in the contract that they follow the work practices described on pages 91 and 92 of this book.
- The contract should specify which parts of your home are part of the work area and specify which lead-safe work practices will be used in those areas. Remember, your contractor should confine dust and debris to the work area and should minimize spreading that dust to other areas of the home.
- The contract should also specify that the contractor will clean the work area, verify that it was cleaned adequately, and re-clean it if necessary.

If you think a worker is not doing what he is supposed to do or is doing something that is unsafe, you should:

- Direct the contractor to comply with regulatory and contract requirements.
- Call your local health or building department, or
- Call EPA's hotline **1-800-424-LEAD (5323)**.

If your property receives housing assistance from HUD (or a state or local agency that uses HUD funds), you must follow the requirements of HUD's Lead-Safe Housing Rule and the ones described in this pamphlet.

FOR TENANTS AND FAMILIES OF CHILDREN UNDER SIX YEARS OF AGE IN CHILD CARE FACILITIES AND SCHOOLS

You play an important role ensuring the ultimate safety of your family.

This means properly preparing for the renovation and staying out of the work area (see pg 90).

Federal law requires that contractors performing renovation, repair and painting projects that disturb painted surfaces in homes built before 1978 and in child care facilities and schools built before 1978, that a child under six years of age visits regularly, to be certified and follow specific work practices to prevent lead contamination.

The law requires anyone hired to renovate, repair, or do painting preparation work on a property built before 1978 to follow the steps described on pages 91 and 92 unless the area where the work will be done contains no lead-based paint.

If you think a worker is not doing what he is supposed to do or is doing something that is unsafe, you should:

- Contact your landlord.
- Call your local health or building department, or
- Call EPA's hotline **1-800-424-LEAD (5323)**.

If you are concerned about lead hazards left behind after the job is over, you can check the work yourself (see pg 92).

PREPARING FOR A RENOVATION

The work areas should not be accessible to occupants while the work occurs.

The rooms or areas where work is being done may need to be blocked off or sealed with plastic sheeting to contain any dust that is generated. Therefore, the contained area may not be available to you until the work in that room or area is complete, cleaned thoroughly, and the containment has been removed. Because you may not have access to some areas during the renovation, you should plan accordingly.

You may need:

- Alternative bedroom, bathroom, and kitchen arrangements if work is occurring in those areas of your home.
- A safe place for pets because they too can be poisoned by lead and can track lead dust into other areas of the home.
- A separate pathway for the contractor from the work area to the outside in order to bring materials in and out of the home. Ideally, it should not be through the same entrance that your family uses.
- A place to store your furniture. All furniture and belongings may have to be moved from the work area while the work is being done. Items that can't be moved, such as cabinets, should be wrapped in plastic.
- To turn off forced-air heating and air conditioning systems while the work is being done. This prevents dust from spreading through vents from the work area to the rest of your home. Consider how this may affect your living arrangements.

You may even want to move out of your home temporarily while all or part of the work is being done.

Child care facilities and schools may want to consider alternative accommodations for children and access to necessary facilities.

DURING THE WORK

Federal law requires contractors that are hired to perform renovation, repair and painting projects in homes, child care facilities, and schools built before 1978 that disturb painted surfaces to be certified and follow specific work practices to prevent lead contamination.

The work practices the contractor must follow include these three simple procedures, described below:

1. **Contain the work area.** The area must be contained so that dust and debris do not escape from that area. Warning signs must be put up and plastic or other impermeable material and tape must be used as appropriate to:
   - Cover the floors and any furniture that cannot be moved.
   - Seal off doors and heating and cooling system vents.
   - For exterior renovations, cover the ground and, in some instances, erect vertical containment or equivalent extra precautions in containing the work area.

These work practices will help prevent dust or debris from getting outside the work area.

2. **Avoid renovation methods that generate large amounts of lead-contaminated dust.** Some methods generate so much lead-contaminated dust that their use is prohibited. They are:
   - Open flame burning or torching.
   - Sanding, grinding, planing, needle gunning, or blasting with power tools and equipment not equipped with a shroud and HEPA vacuum attachment.
   - Using a heat gun at temperatures greater than 1100°F.

There is no way to eliminate dust, but some renovation methods make less dust than others. Contractors may choose to use various methods to minimize dust generation, including using water to mist areas before sanding or scraping; scoring paint before separating components; and prying and pulling apart components instead of breaking them.

3. **Clean up thoroughly.** The work area should be cleaned up daily to keep it as clean as possible. When all the work is done, the area must be cleaned up using special cleaning methods before taking down any plastic that isolates the work area from the rest of the home. The special cleaning methods should include:
   - Using a HEPA vacuum to clean up dust and debris on all surfaces, followed by
   - Wet wiping and wet mopping with plenty of rinse water.

When the final cleaning is done, look around. There should be no dust, paint chips, or debris in the work area. If you see any dust, paint chips, or debris, the area must be re-cleaned.

FOR PROPERTY OWNERS: AFTER THE WORK IS DONE

When all the work is finished, you will want to know if your home, child care facility, or school where children under six attend has been cleaned up properly.

EPA Requires Cleaning Verification.

In addition to using allowable work practices and working in a lead-safe manner, EPA's RRP rule requires contractors to follow a specific cleaning protocol. The protocol requires the contractor to use disposable cleaning cloths to wipe the floor and other surfaces of the work area and compare these cloths to an EPA-provided cleaning verification card to determine if the work area was adequately cleaned. EPA research has shown that following the use of lead-safe work practices with the cleaning verification protocol will effectively reduce lead-dust hazards.

Lead-Dust Testing.

EPA believes that if you use a certified and trained renovation contractor who follows the LRRP rule by using lead-safe work practices and the cleaning protocol after the job is finished, lead-dust hazards will be effectively reduced. If, however, you are interested in having lead-dust testing done at the completion of your job, outlined below is some helpful information.

What is a lead-dust test?

- Lead-dust tests are wipe samples sent to a laboratory for analysis. You will get a report specifying the levels of lead found after your specific job.

How and when should I ask my contractor about lead-dust testing?

- Contractors are not required by EPA to conduct lead-dust testing. However, if you want testing, EPA recommends testing be conducted by a lead professional. To locate a lead professional who will perform an evaluation near you, visit EPA's website at epa.gov/lead/pubs/locate or contact the National Lead Information Center at **1-800-424-LEAD (5323).**

- If you decide that you want lead-dust testing, it is a good idea to specify in your contract, before the start of the job, that a lead-dust test is to be done for your job and who will do the testing, as well as whether re-cleaning will be required based on the results of the test.

- You may do the testing yourself. If you choose to do the testing, some EPA-recognized lead laboratories will send you a kit that allows you to collect samples and send them back to the laboratory for analysis. Contact the National Lead Information Center for lists of EPA-recognized testing laboratories.

FOR ADDITIONAL INFORMATION

You may need additional information on how to protect yourself and your children while a job is going on in your home, your building, or child care facility.

The National Lead Information Center at **1-800-424-LEAD (5323)** or epa.gov/lead/nlic can tell you how to contact your state, local, and/or tribal programs or get general information about lead poisoning prevention.

- State and tribal lead poisoning prevention or environmental protection programs can provide information about lead regulations and potential sources of financial aid for reducing lead hazards. If your state or local government has requirements more stringent than those described in this pamphlet, you must follow those requirements.
- Local building code officials can tell you the regulations that apply to the renovation work that you are planning.
- State, county, and local health departments can provide information about local programs, including assistance for lead-poisoned children and advice on ways to get your home checked for lead.

The National Lead Information Center can also provide a variety of resource materials, including the following guides to lead-safe work practices. Many of these materials are also available at epa.gov/lead/pubs/brochure

- Steps to Lead Safe Renovation, Repair and Painting.
- Protect Your Family from Lead in Your Home
- Lead in Your Home: A Parent's Reference Guide

For the hearing impaired, call the Federal Information Relay Service at 1-800-877-8339 to access any of the phone numbers in this brochure.

EPA CONTACTS

EPA Regional Offices

EPA addresses residential lead hazards through several different regulations. EPA requires training and certification for conducting abatement and renovations, education about hazards associated with renovations, disclosure about known lead paint and lead hazards in housing, and sets lead-paint hazard standards.

Your Regional EPA Office can provide further information regarding lead safety and lead protection programs at epa.gov/lead.

Region 1
(Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont)
Regional Lead Contact
U.S. EPA Region 1
Suite 1100
One Congress Street
Boston, MA 02114-2023
(888) 372-7341

Region 2
(New Jersey, New York, Puerto Rico, Virgin Islands)
Regional Lead Contact
U.S. EPA Region 2
2890 Woodbridge Avenue
Building 205, Mail Stop 225
Edison, NJ 08837-3679
(732) 321-6671

Region 3
(Delaware, Maryland, Pennsylvania, Virginia, Washington, DC, West Virginia)
Regional Lead Contact
U.S. EPA Region 3
1650 Arch Street
Philadelphia, PA
19103-2029
(215) 814-5000

Region 4
(Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)
Regional Lead Contact
U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303-8960
(404) 562-9900

Region 5
(Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)
Regional Lead Contact
U.S. EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3507
(312) 886-6003

Region 6
(Arkansas, Louisiana, New Mexico, Oklahoma, Texas)
Regional Lead Contact
U.S. EPA Region 6
1445 Ross Avenue,
12th Floor
Dallas, TX 75202-2733
(214) 665-7577

Region 7
(Iowa, Kansas, Missouri, Nebraska)
Regional Lead Contact
U.S. EPA Region 7
901 N. 5th Street
Kansas City, KS 66101
(913) 551-7003

Region 8
(Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming)
Regional Lead Contact
U.S. EPA Region 8
1595 Wynkoop Street
Denver, CO 80202
(303) 312-6312

Region 9
(Arizona, California, Hawaii, Nevada)
Regional Lead Contact
U.S. Region 9
75 Hawthorne Street
San Francisco, CA 94105
(415) 947-8021

Region 10
(Alaska, Idaho, Oregon, Washington)
Regional Lead Contact
U.S. EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101-1128
(206) 553-1200

OTHER FEDERAL AGENCIES

CPSC

The Consumer Product Safety Commission (CPSC) protects the public from the unreasonable risk of injury or death from 15,000 types of consumer products under the agency's jurisdiction. CPSC warns the public and private sectors to reduce exposure to lead and increase consumer awareness. Contact CPSC for further information regarding regulations and consumer product safety.

CPSC
4330 East West Highway
Bethesda, MD 20814
Hotline 1-(800) 638-2772
cpsc.gov

CDC Childhood Lead Poisoning Prevention Branch

The Centers for Disease Control and Prevention (CDC) assists state and local childhood lead poisoning prevention programs to provide a scientific basis for policy decisions, and to ensure that health issues are addressed in decisions about housing and the environment. Contact CDC Childhood Lead Poisoning Prevention Program for additional materials and links on the topic of lead.

CDC Childhood Lead Poisoning Prevention Branch
4770 Buford Highway, MS F-40
Atlanta, GA 30341
(770) 488-3300
cdc.gov/nceh/lead

HUD Office of Healthy Homes and Lead Hazard Control

The Department of Housing and Urban Development (HUD) provides funds to state and local governments to develop cost-effective ways to reduce lead-based paint hazards in America's privately-owned low-income housing. In addition, the office enforces the rule on disclosure of known lead paint and lead hazards in housing, and HUD's lead safety regulations in HUD-assisted housing, provides public outreach and technical assistance, and conducts technical studies to help protect children and their families from health and safety hazards in the home. Contact the HUD Office of Healthy Homes and Lead Hazard Control for information on lead regulations, outreach efforts, and lead hazard control research and outreach grant programs.

U.S. Department of Housing and Urban Development
Office of Healthy Homes and
Lead Hazard Control
451 Seventh Street, SW, Room 8236
Washington, DC 20410-3000
HUD's Lead Regulations Hotline
(202) 402-7698
hud.gov/offices/lead/

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

SAMPLE PRE-RENOVATION FORM

This sample form may be used by renovation firms to document compliance with the Federal pre-renovation education and renovation, repair, and painting regulations.

Occupant Confirmation

Pamphlet Receipt

❑ I have received a copy of the lead hazard information pamphlet informing me of the potential risk of the lead hazard exposure from renovation activity to be performed in my dwelling unit. I received this pamphlet before the work began.

Printed Name of Owner-occupant

Signature of Owner-occupant | Signature Date

Renovator's Self Certification Option (for tenant-occupied dwellings only)

Instructions to Renovator: If the lead hazard information pamphlet was delivered but a tenant signature was not obtainable, you may check the appropriate box below.

❑ **Declined** – I certify that I have made a good faith effort to deliver the lead hazard information pamphlet to the rental dwelling unit listed below at the date and time indicated and that the occupant declined to sign the confirmation of receipt. I further certify that I have left a copy of the pamphlet at the unit with the occupant.

❑ **Unavailable for signature** – I certify that I have made a good faith effort to deliver the lead hazard information pamphlet to the rental dwelling unit listed below and that the occupant was unavailable to sign the confirmation of receipt. I further certify that I have left a copy of the pamphlet at the unit by sliding it under the door or by (fill in how pamphlet was left).

Printed Name of Person Certifying Delivery | Attempted Delivery Date

Signature of Person Certifying Lead Pamphlet Delivery

Unit Address

Note Regarding Mailing Option — As an alternative to delivery in person, you may mail the lead hazard information pamphlet to the owner and/or tenant. Pamphlet must be mailed at least seven days before renovation. Mailing must be documented by a certificate of mailing from the post office.

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

Before Earthquake

Homeowner's Guide to Earthquake Safety

2005 Edition

Damage from magnitude 6.7 earthquake

Additional damage from aftershocks

Published by
The California
Seismic Safety
Commission

State of
California
Arnold
Schwarzenegger,
Governor

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Publishing Information

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Legislation

This guide has been developed and adopted by the California Seismic Safety Commission as required by Assembly Bill 2959, authored by Assemblyman Johan Klehs (Chapter 1499, Statutes of 1990), and Assembly Bill 200, authored by Assemblyman Dominic Cortese (Chapter 699, Statutes of 1991).

Ordering Information

Copies of this booklet are available from the California Seismic Safety Commission, 1775 Creekside Oaks Drive, Suite 100, Sacramento, CA 95833. To order call (916) 263-5506 or download via our website at http://www.seismic.ca.gov/sscpub.htm

On the cover:

Taken in Coalinga, California, the pictures of this single family home show the destruction caused by the Coalinga Earthquake on May 2, 1983. The 6.7 magnitude earthquake inflicted severe damage to the unreinforced masonry porch, forcing the occupants to evacuate. Numerous aftershocks occurred within the next few days, causing portions of the already weakened structure to collapse.

CONTENTS

Page

INTRODUCTION.....103
- Your Home and the Law.....104
- Recommendations.....105
- Summary of Major California Laws.....106
- Property Tax and Insurance.....107
- Examples of Damage to Single Family Homes.....108

EARTHQUAKE MAPS OF CALIFORNIA.....109
- Damaging Earthquakes in California.....109
- Major Earthquake Faults in California.....110
- Simplified Earthquake Shaking Potential Map for California.....111

ADDITIONAL RESOURCES.....112

EARTHQUAKE WEAKNESSES.....113
- Unbraced Water Heaters.....114
- Home Not Anchored to Foundation.....116
- Weak Cripple Walls.....118
- Pier and Post Foundations.....120
- Unreinforced Masonry Foundations.....122
- Homes Built on Steep Hillsides.....124
- Unreinforced Masonry Walls.....126
- Rooms over Garages.....128

Page

OTHER EARTHQUAKE-RELATED CONCERNS.....130
- Unreinforced Masonry Chimneys.....130
- Foundations.....132
- Homes with Unique Designs.....133

NATURAL GAS SAFETY.....134

GETTING THE WORK DONE.....136

GEOLOGIC HAZARDS.....138

WHAT TO DO *DURING* AN EARTHQUAKE.....141

WHAT TO DO *BEFORE* AN EARTHQUAKE...142

WHAT TO DO *AFTER* AN EARTHQUAKE.....144

RESOURCE ORGANIZATIONS.....146

RESIDENTIAL EARTHQUAKE HAZARDS REPORT.....149

SAMPLE TAX EXCLUSION FORM.....151

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Southern California Gas Company/Sempra
Structural Engineers Association of California
Committee on Earthquake Safety Issues for Gas Systems

Disclaimer: The effects, descriptions, recommendations, and suggestions included in this document are intended to improve earthquake preparedness; however, they do not guarantee the safety of an individual or a structure. The Seismic Safety Commission takes responsibility for the inclusion of material in this document. The State of California, the Seismic Safety Commission, and all contributors to this document do not assume liability for any injury, death, property damage, loss of revenue, or any other effect of an earthquake.

INTRODUCTION

Earthquakes, especially major ones, are dangerous, inevitable, and a fact of life in California. Sooner or later another "big one" will occur.

Earthquakes:

- Occur without warning
- Can be deadly and extremely destructive
- Can occur at any time

As a current or potential owner of a home*, you should be very concerned about the potential danger to not only yourselves and your loved ones, but also to your property.

The major threats posed by earthquakes are bodily injuries and property damage, which can be considerable and even catastrophic.

Most of the property damage caused by earthquakes ends up being handled and paid for by the homeowner.

- Earthquakes have caused over $55 billion in losses in California since 1971.
- Large earthquakes in or near major urban centers in California will disrupt the local economy and can disrupt the economy of the entire State.

However, proper earthquake preparation of your home can:

- Save lives
- Reduce injuries
- Reduce property damage

As a homeowner, you can **significantly reduce** damage to your home by fixing a number of known and common weaknesses.

This Booklet is designed to assist you in filling out the Residential Earthquake Hazards Report *(See page 149)* when you sell your home.

This booklet is also a good start to begin strengthening your home against earthquake damage.

It describes:

- Common weaknesses that can result in your home being damaged by earthquakes, and
- Steps you can take to correct these weaknesses.

There are no guarantees of safety during earthquakes, but properly constructed and strengthened homes are far less likely to collapse or be damaged during earthquakes. The California Seismic Safety Commission advises you to act on the suggestions outlined in this booklet and make yourself, your family, and your home safer.

*For the purpose of this document, "home" includes single family residences, duplexes, triplexes, and fourplexes.

YOUR HOME AND THE LAW

California State Law requires the seller to:

- Inform the buyer about known home weaknesses (*See Earthquake Weaknesses, beginning on page 113)*.
- Strap the water heater, reducing the chance of it falling during an earthquake and possibly causing gas and water lines to break.
- Deliver a copy of this booklet to the buyer if the home was built before 1960 *(Your real estate agent is required to give the seller a copy of this booklet)*.
- Deliver to buyers a Natural Hazards Disclosure form *(See page 106)*. The disclosure will tell buyers whether the home is in an Earthquake Fault Zone or in a Seismic Hazard Zone *(See page 140).*
- Complete the *Residential Earthquake Hazards Report*, to be provided to the buyer *(See page 149).*

California State Law does not require the seller to:

- Hire someone to evaluate your home.
- Strengthen your home before selling it.

This Booklet:

- Describes the most common weaknesses that can cause damage to homes, in the event of an earthquake.
- Enables the seller to meet the State Law requiring this booklet be given to every buyer of homes built before 1960.
- Enables the seller to disclose to the buyer the typical earthquake weaknesses in homes built before 1960.
- Provides the homeowner with basic information about finding and fixing earthquake-related weaknesses in the home.
- Provides general information about earthquake risks and directions for finding more information on earthquake safety.

RECOMMENDATIONS...

If You Are Selling

Before you sell your house, the following steps are recommended:

- If you list your house for sale through a real estate broker or agent, give the agent the completed disclosure form *(See page 149)* as soon as practical. Your agent can give the booklet and the form to the buyer for you.
- You are not required to hire someone to answer the questions on the disclosure form.
- You are not required to remove siding, drywall, or plaster to answer the questions.
- You are not required to fix the weaknesses before you sell your home.
- However, if you wish, you may get assistance from a certified home inspector, or a licensed contractor, architect, or engineer.
- Keep a copy of the form, signed by the buyer, as evidence that you have complied with the earthquake disclosure requirement.

You may find that you will get a better price for your house if you strengthen earthquake weaknesses before you sell.

If You Are Buying

Before you agree to buy a house, consider the following recommendations:

- Have a certified home inspector, licensed building contractor, architect, or engineer inspect the house and give you an opinion regarding existing earthquake weaknesses and an estimate of costs to strengthen these weaknesses.
- Consider the location of the home: Is it in or near an Earthquake Fault Zone or in an area where it might be damaged by a landslide, liquefaction, or a tsunami? You may wish to hire a licensed geotechnical engineer and/or engineering geologist to check the stability of the land under the house.
- Negotiate the cost of strengthening, if any is required, with the seller. The law does not require either you or the seller to strengthen the home, but if these weaknesses are not fixed, you may find that repair costs after a damaging earthquake can amount to more than your equity in the house.

SUMMARY OF MAJOR CALIFORNIA LAWS RELATED TO SEISMIC SAFETY

Full wording of all California codes is available at: http://www.leginfo.ca.gov.

Delivering this guide

Sellers of homes built before 1960, with one to four units of conventional light-frame construction, must deliver to the buyer, "as soon as practicable before the transfer," a copy of *The Homeowner's Guide to Earthquake Safety* (this booklet) and disclose certain earthquake deficiencies according to *Government Code,* Section 8897.1 to 8897.4. The seller's real estate agent must provide the seller with a copy of this booklet to give to the buyer. This is also specified in *Government Code,* Section 8897.5.

Water heater bracing

All water heaters are required to be anchored or strapped to resist falling during an earthquake. The seller must certify to the potential buyer that the water heater is properly braced in accordance with *Health and Safety Code,* Section 19211.

Disclosing weaknesses

Sellers of real property must disclose known defects and deficiencies in the property—including earthquake weaknesses and hazards—to prospective buyers in accordance with *Civil Code,* Section 1102 and following sections.

Disclosing natural hazards

Sellers of real property must disclose whether the property is within any of the seven mapped natural hazard areas, including the earthquake fault, potential landslide and potential liquefaction areas. The required Natural Hazards Disclosure Form can be found in *Civil Code,* Section 1103 and following sections. When filled out, this statutory form will reveal whether the home is within a mapped geologic, flood or hazard area.

Earthquake faults

The Alquist-Priolo Earthquake Fault Zoning Act prohibits building for human occupancy astride active faults. *Public Resources Code,* Section 2621 and following sections, requires sellers of existing residences to disclose to potential buyers on a Natural Hazards Disclosure Form if the property is located in a designated fault zone.

Landslide and liquefaction

The Seismic Hazards Mapping Act requires the state to prepare maps of the zones in California most susceptible to landslide and liquefaction hazards during earthquakes. *Public Resources Code,* Section 2694 and following sections, states that sellers must disclose to buyers, on a Natural Hazards Disclosure Form, whether the property is in such a zone, after the map for that area has been issued officially.

Publishing this guide

The Seismic Safety Commission is required to develop, adopt, update, and publish *The Homeowner's Guide to Earthquake Safety* containing information on geologic and seismic hazards, explanations of structural and nonstructural earthquake hazards, and recommendations for mitigating these hazards, as required by the *Business and Professions Code,* Section 10149.

PROPERTY TAX AND INSURANCE

Property Tax Reappraisal Exclusion

California law allows homeowners to strengthen their homes with approved seismic strengthening techniques without the improvement being included in reappraisals that usually raise the property value and the tax owed, according to the *Revenue and Tax Code,* Section 74.5.

If you make an addition, such as a swimming pool or a new den to your home, your property tax bill will increase. But a strengthening project to help your home resist earthquakes will not add to your property taxes.

To receive the exclusion you must file a claim form with your county assessor. The work must also be approved as appropriate seismic strengthening by your local building department.

A sample form from the County of Santa Clara is attached on page 151. This form may vary by county.

Earthquake Insurance

Earthquake insurance is typically not part of your homeowner insurance policy. All insurance companies that sell residential property insurance in California are required by law to offer earthquake insurance to homeowners when the policy is first sold and every two years afterward.

The cost of the earthquake policy you are offered is based on a number of factors, including your home's location, age, construction type, and value. One thing to consider would be to compare the expected damage versus the deductible that is applicable to your policy. You may wish to consult a licensed civil or structural engineer for more specific information on your potential for damage.

Each homeowner should consider his/her individual risk factors and then weigh the cost of earthquake coverage against the benefits. The California Earthquake Authority (CEA) website has an online calculator to help estimate your premium based on your ZIP Code, insured value, dwelling type, and desired coverage and deductible.

The California Earthquake Authority is required to provide, and the insurance companies are required to disclose the availability of, discounts on earthquake insurance premiums for older homes that have been strengthened to resist earthquake damage. For more information, contact your insurance agent, who can also help you locate an earthquake insurer and estimate your annual premium.

California Earthquake Authority:
www.EarthquakeAuthority.com

California Department of Insurance:
www.insurance.ca.gov

EXAMPLES OF DAMAGE TO SINGLE FAMILY HOMES

Pacific Fire Rating Bureau

Figure 1 - San Fernando Earthquake, Feb. 9, 1971 Severely damaged split level 1 and 2 story wood frame dwelling. The one story portion dropped about 3 feet.

Robert A. Eplett, OES

Figure 2 - Loma Prieta Earthquake, Oct. 17, 1989 Home moved off of its foundation and was considered a total loss.

FEMA

Figure 3 - Northridge Earthquake, Jan. 17, 1994 Single family residence damaged due to failure of multiple elements.

FEMA News Photo

Figure 4 - Northridge Earthquake, Jan. 17, 1994 Chimney Collapse - common type of damage to unreinforced masonry.

Dane Golden, FEMA News Photo

Figure 5 - San Simeon Earthquake, Dec. 22, 2003 This home slid two feet off its foundation due to inadequate nailing of walls to its sill plates.

Guna Selvaduray

Figure 6 - San Simeon Earthquake, Dec. 22, 2003 The collapsed porch was not adequately attached to this single family residence.

EARTHQUAKE MAPS OF CALIFORNIA

DAMAGING EARTHQUAKES IN CALIFORNIA

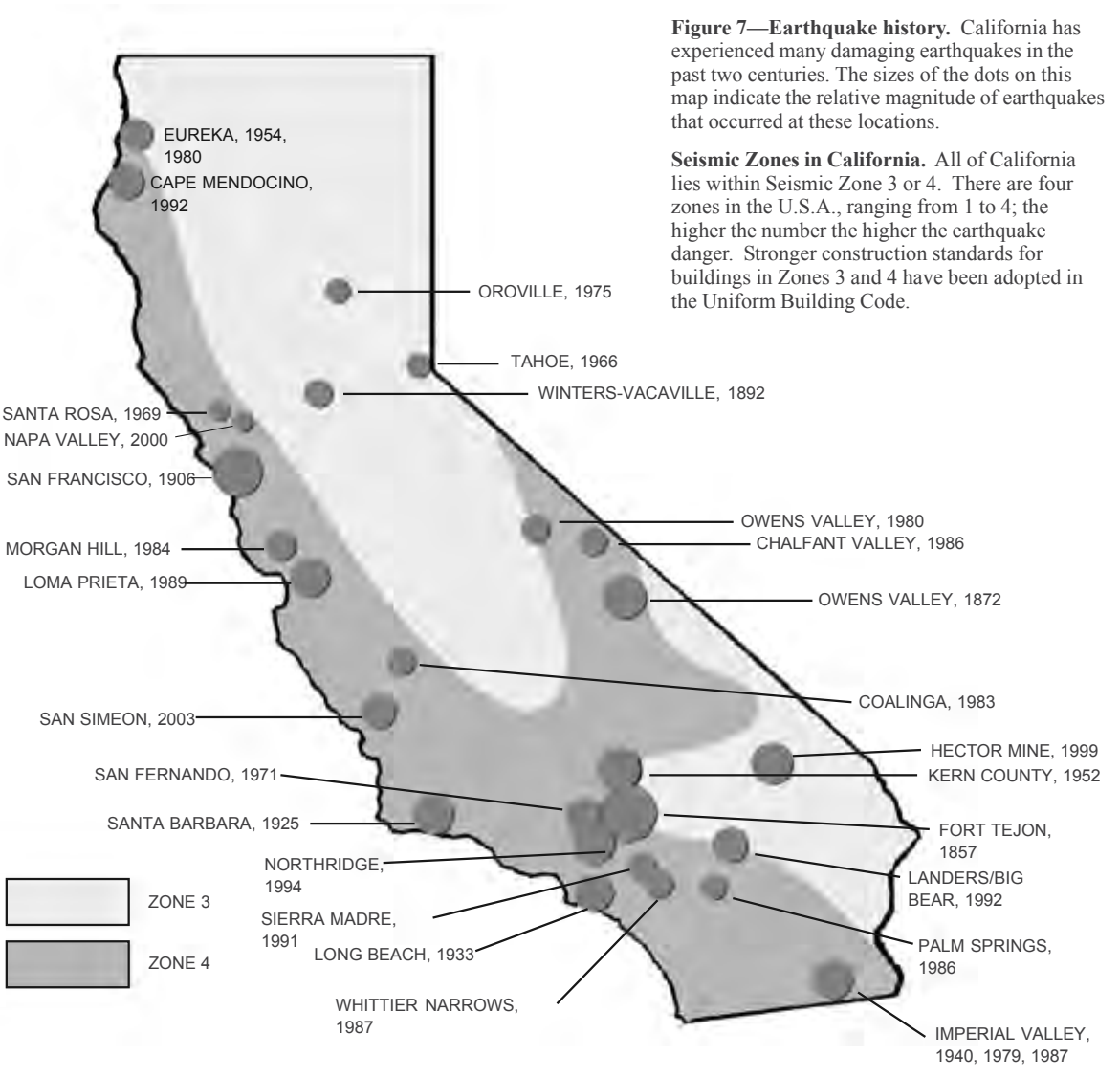


Figure 7—Earthquake history. California has experienced many damaging earthquakes in the past two centuries. The sizes of the dots on this map indicate the relative magnitude of earthquakes that occurred at these locations.

Seismic Zones in California. All of California lies within Seismic Zone 3 or 4. There are four zones in the U.S.A., ranging from 1 to 4; the higher the number the higher the earthquake danger. Stronger construction standards for buildings in Zones 3 and 4 have been adopted in the Uniform Building Code.

Source: California Geological Survey, 1986; Earthquake History of the U.S., U.S. Department of Commerce and Interior, 1982; Records of California Office of Emergency Services; compiled and revised by California Seismic Safety Commission, 2004; International Code Council, Uniform Building Code 1997 Edition.

MAJOR EARTHQUAKE FAULTS IN CALIFORNIA

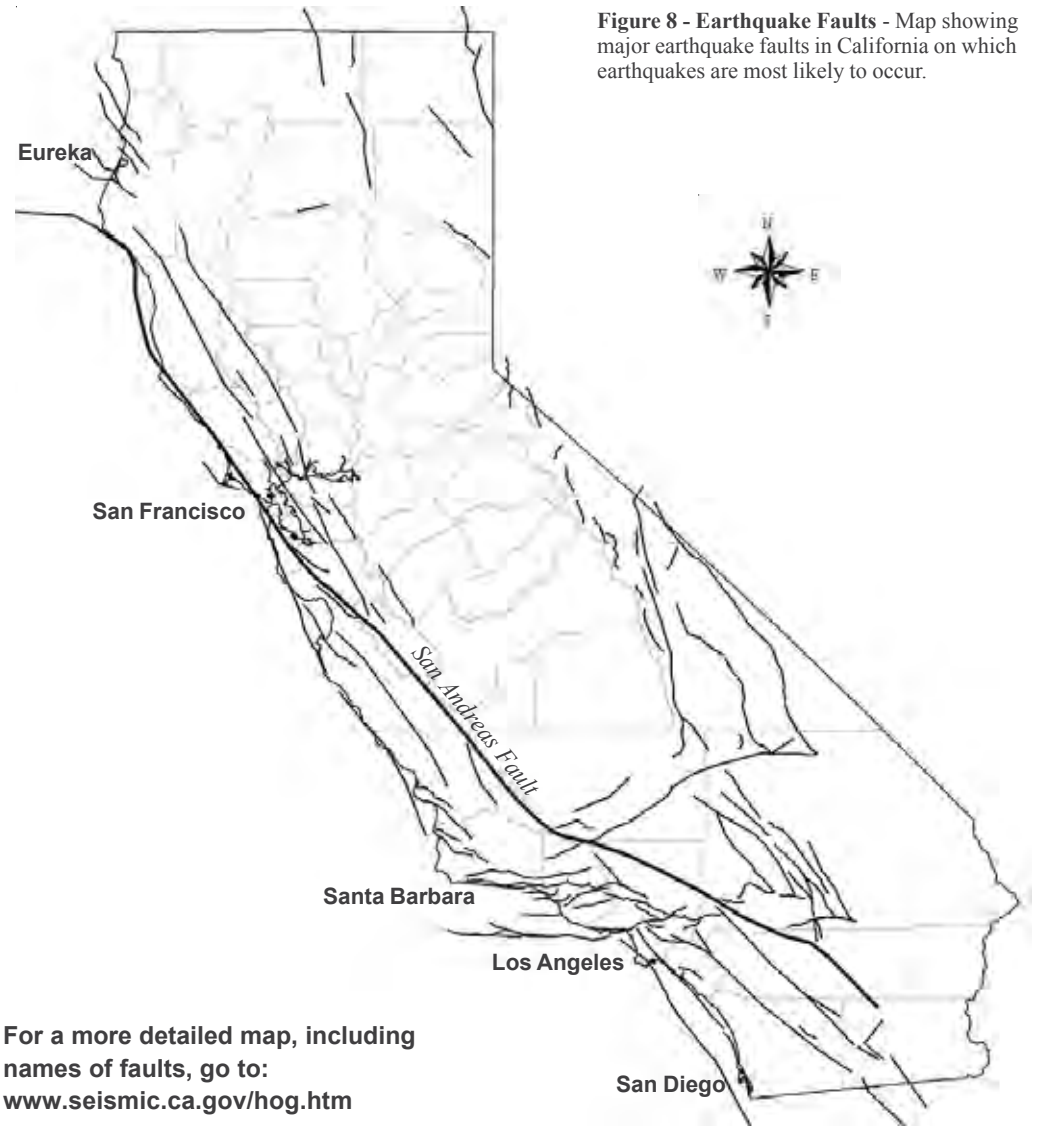


Figure 8 - Earthquake Faults - Map showing major earthquake faults in California on which earthquakes are most likely to occur.

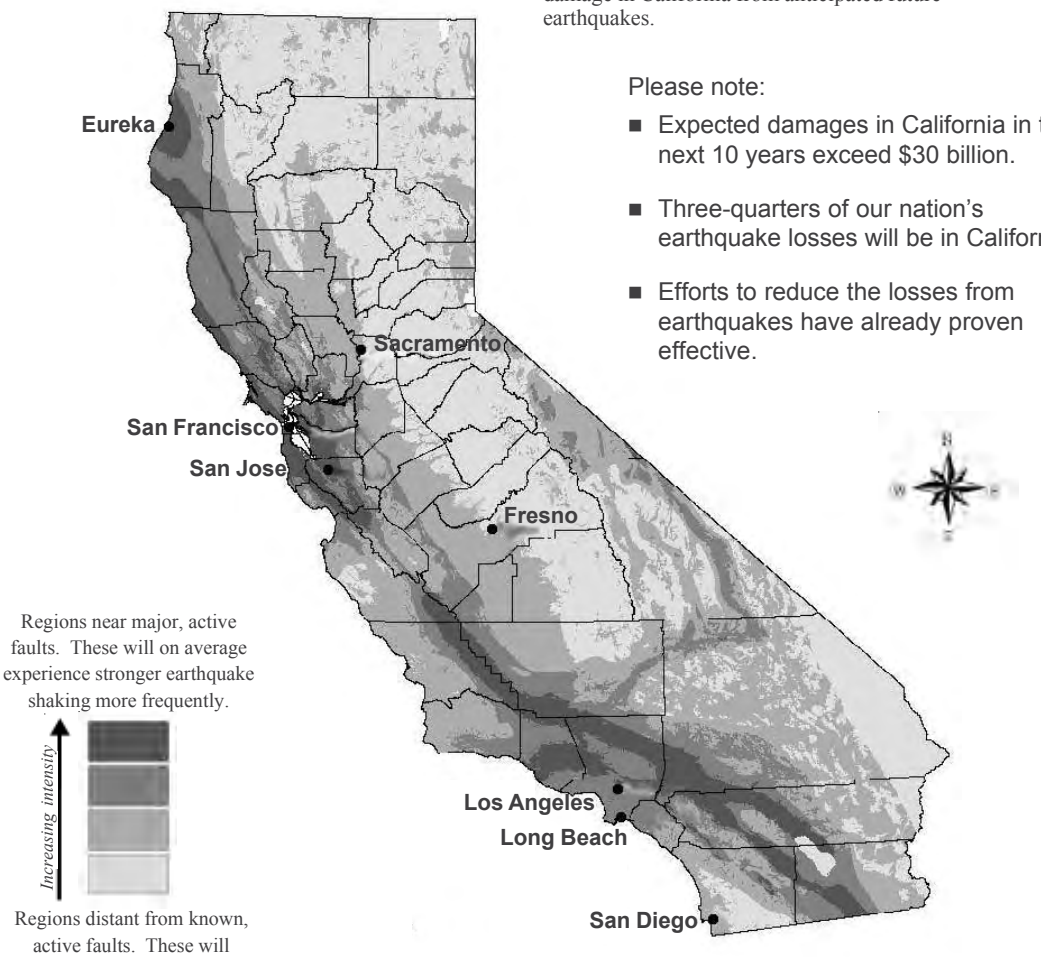
Map courtesy of California Geological Survey. Fault locations modified from seismic sources used in Revised 2002 California Probabilistic Seismic Hazard Maps.

SIMPLIFIED EARTHQUAKE SHAKING POTENTIAL MAP FOR CALIFORNIA

Figure 9 - Earthquake Shaking Potential Map - This map shows the relative intensity of ground shaking and damage in California from anticipated future earthquakes.

Please note:

- Expected damages in California in the next 10 years exceed $30 billion.
- Three-quarters of our nation's earthquake losses will be in California.
- Efforts to reduce the losses from earthquakes have already proven effective.



Regions near major, active faults. These will on average experience stronger earthquake shaking more frequently.

Increasing intensity

Regions distant from known, active faults. These will experience lower levels of shaking less frequently.

For a full color version go to: www.seismic.ca.gov/hog.htm

Data source: California Seismic Safety Commission, California Geological Survey, Governor's Office of Emergency Services, and United States Geological Survey, April, 2003, Earthquake Shaking Potential for California, California Seismic Safety Commission Publication No. 03-02.

ADDITIONAL RESOURCES

There are many additional resources available. Some are web sites and some are books or pamphlets.

- The California Seismic Safety Commission has created a webpage that provides links to other sites that are appropriate for homeowners interested in improving the earthquake safety of their homes.

  Visit www.seismic.ca.gov/hog.htm

- FEMA also provides a wide variety of information suitable for the homeowner, including the availability of, and registration for, federal disaster aid programs after a damaging earthquake or other disasters.

  Visit www.fema.gov

EARTHQUAKE WEAKNESSES

The earthquake weaknesses identified in this section, if not corrected, can result in one or more of the following:

- Injury to occupants
- Severe damage to your home
- Broken gas and utility lines
- Fires from broken gas lines
- Damage to floors, walls, and windows
- Damage to the contents in the house
- Damage to the foundations

Please remember that:

- Retrofitting before an earthquake is relatively cheap.
- Doing major structural repairs to your home after an earthquake is very expensive.
- Sometimes the damage is extensive enough to require the entire house to be demolished.
- After an earthquake, there is usually a shortage of available licensed contractors and engineers in the impacted area, because of the sudden high demand for their services.
- An appropriate seismic retrofit will reduce damage and save you money.

Please consult your local Building Department and/or a licensed architect or engineer for more detailed information.

Unbraced Water Heaters

The Problem

If water heaters are not properly braced, they can topple over during an earthquake causing:

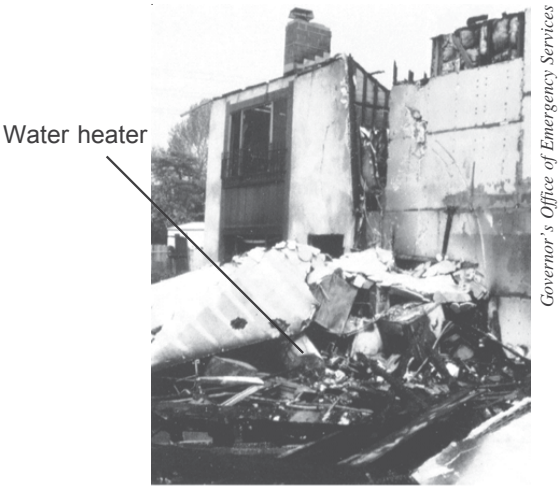
- Broken gas lines and gas leaks
- Fires causing major damage to homes
- Broken water lines and flooding

How to Identify

- ✓ Is the water heater free-standing?
- ✓ Are there straps or other types of restraints securing the water heater?
- ✓ Are there straps or restraints bolted to the studs?
- ✓ Are there flexible pipes for water and gas connected to the water heater?

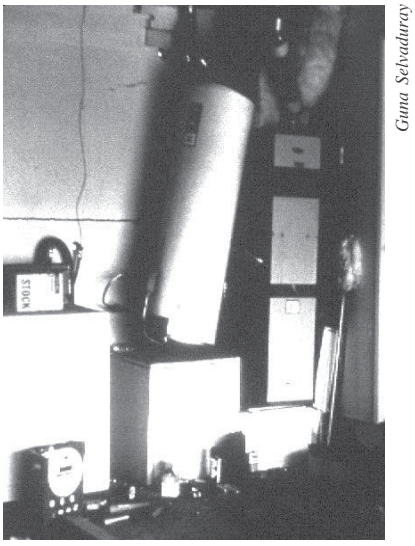
Remember

- Replacing a water heater after an earthquake can cost more than $500.
- Repairing fire damage and flooding damage can cost several thousand dollars, including the entire cost of your home!
- There are many different ways of strapping a water heater. One example is shown on the next page. *(See page 115)*
- Check with your local Building Department for details of local requirements.
- Know where your main water valve is so that you can shut it off if you have a water leak.
- Know where your main gas valve is so that you can shut it off if you hear or smell a gas leak. *(See page 134)*



Governor's Office of Emergency Services

Figure 10 - The unbraced water heater in this home fell during an earthquake; the resulting fire destroyed the home.



Guna Selvaduray

Figure 11 - This unstrapped water heater tipped over during the 1984 Morgan Hill Earthquake. Fortunately gas and water lines were not ruptured.

HOW-TO

Brace Water Heaters

Water heaters must be braced (securely attached) to the studs in a wall. California law requires water heaters to be braced at the time of sale, or when a new water heater is installed.

The Solution

There are many solutions – all relatively inexpensive.

- Purchase and install a strap kit or bracing kit from your local hardware store. Be sure the kit is certified by the State Architect.

Other options include:

- Have a licensed plumber strap your water heater according to code.
- Use metal tubing or heavy metal strapping and lag screws and washers to secure the water heater to the wall studs.

The gas and water lines should also have flexible pipes. These are safer than rigid pipes during an earthquake.

Be sure to check the straps once a year. They may come loose due to vibrations, or other causes.

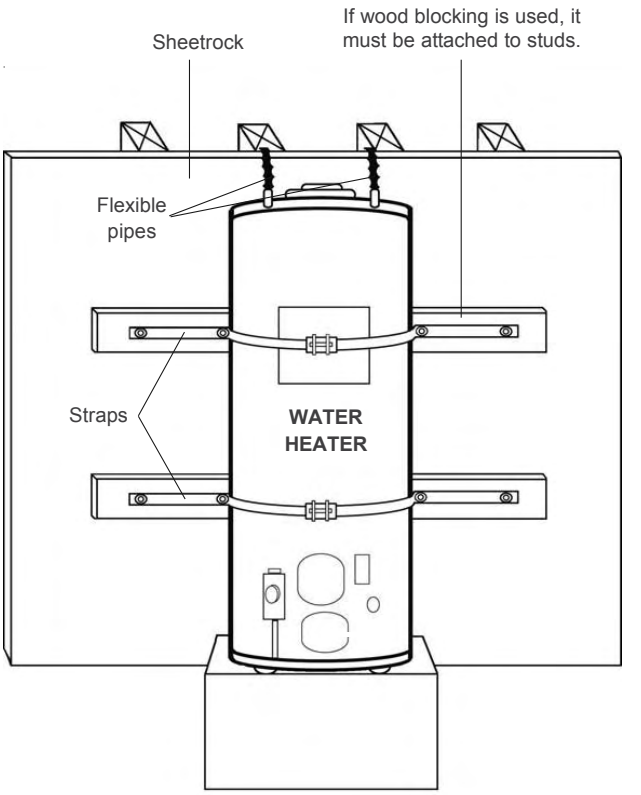


Figure 12: One Method of Water Heater Bracing. Straps and screws visible with water heater in a garage installation. You may need to add wood blocking.

How-to Resources

- Your local home improvement store
- How to Brace Your Water Heater, City of Los Angeles, Department of Building & Safety, Information Bulletin #P/PC 2002-003, June 14, 1999.
- Guidelines for Earthquake Bracing of Residential Water Heaters, Department of General Services, Division of State Architect, August 11, 2004.
- How to Secure Your Water Heater, Governor's Office of Emergency Services, 2003.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$20 to $200	$500 to total value of home (if completely destroyed).

Home Not Anchored to Foundation

The Problem

Houses that are not bolted to the foundation can move off their foundations during earthquakes.

How to Identify

- ✓ Go down into the crawl space – the area between the first floor and the foundation – to find out if your house is bolted to its foundation.
- ✓ Look for the heads of anchor bolts that fasten the sill plate – the wooden board that sits directly on top of the foundation – securely to the foundation. *(See Figure 14a, page 117)*
- ✓ You should be able to see the large nuts, washers, and anchor bolts, installed at least every 4 to 6 feet along the sill plate. Steel plates are sometimes used instead of anchor bolts. *(See Figure 14b, page 117)*

Remember

- It is very expensive to lift a house, and place it back on its foundation.
- Homes moving off their foundations can cause gas lines to rupture, which in turn can result in fires.

Office of Emergency Services

Figure 13 - This home wasn't bolted and slid off its foundation. Sometimes the damage can be so bad that houses have to be demolished.

If your home has no foundation, or an old concrete foundation, see page 132.

Slab Foundations

Some homes are built directly on concrete slabs. These houses do not have crawl spaces and cripple walls.

Nearly all homes with slab foundations that were originally built to code will have anchor bolts or straps.

However, if the house is not bolted to the slab, you have an earthquake weakness.

Newer homes generally have anchor bolts or straps.

If you have an unfinished garage, you may be able to see the anchor bolts.

You are not required to remove siding, drywall or plaster to determine if your house has anchor bolts.

The Solution

Drill holes through the sill plate into the foundation and install anchor bolts. *(See Figure 14a)*

If there is not enough room to drill, you can attach steel plates to hold the sill plate to the foundation. *(See Figure 14b)*

Anchor bolts have to be installed properly for them to be effective.

You must obtain the proper permits from your local Building Department before beginning work.

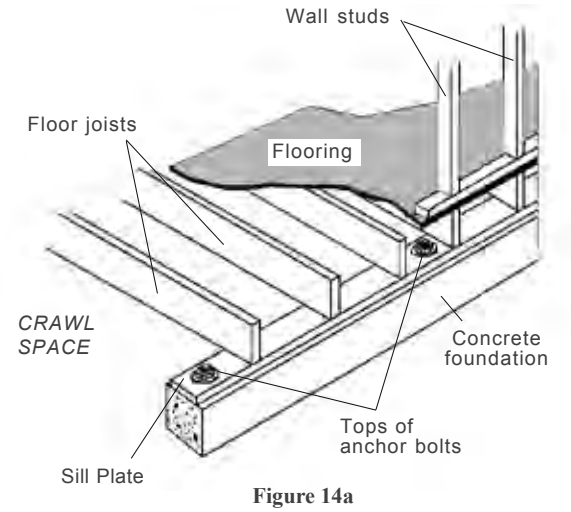


Figure 14a

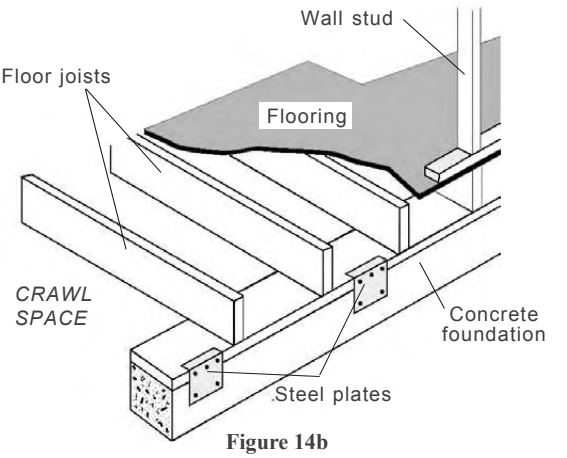


Figure 14b

Figure 14 —Anchor bolts or steel plates. A home's crawl space may be formed by a cripple wall *(see next page for description)* between the foundation and the floor joists or the floor joists may rest directly on the sill plate. In either case, you should be able to see the heads of anchor bolts or steel plates installed at appropriate intervals. These fixtures fasten the sill plate to the foundation.

How-to Resources

- Detailed information for do-it-yourselfers or engineers can be found in the International Existing Building Code, published by the International Code Council.
- Publication: How You Can Strengthen Your Home for the Next Big Earthquake in the Los Angeles Area, City of Los Angeles, Department of Building & Safety, October 2001.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$250 to $5,000	$25,000 to total value of home (if completely destroyed).

Weak Cripple Walls

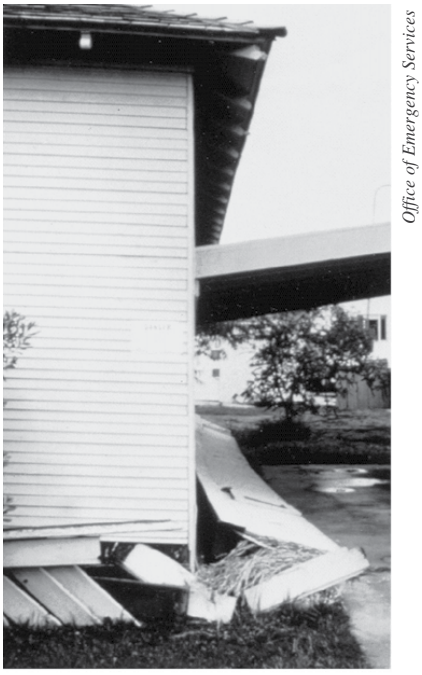
The Problem

Wooden floors and stud walls are sometimes built on top of an exterior foundation to support a house and create a crawl space. *(See Figure 17, page 119)*

These are called cripple walls and they carry the weight of the house.

During an earthquake, these walls can collapse if they are not braced to resist horizontal movement.

If the cripple wall fails, the house may shift or fall.



Office of Emergency Services

Figure 15 - Damage to home due to cripple wall failure.

How to Identify

- ✓ Go under the house through the crawl space, to see if there are any cripple walls.
- ✓ If there are cripple walls, check to see if they are braced.
- ✓ There should be plywood panels adequately nailed to the studs OR there should be diagonal wood sheathing. *(See Figure 16)*
- ✓ If you have neither of these, the cripple walls are probably insufficiently braced or unbraced.
- ✓ Horizontal or vertical wood siding is not strong enough to brace cripple walls.

Remember

- It is very expensive to lift a house, repair the cripple wall, and put it back on its foundation

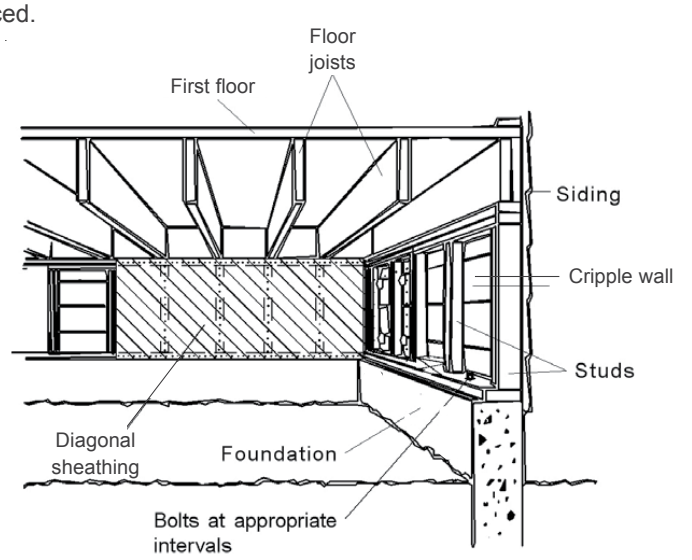


Figure 16 - Diagonal Sheathing. Common in older homes.

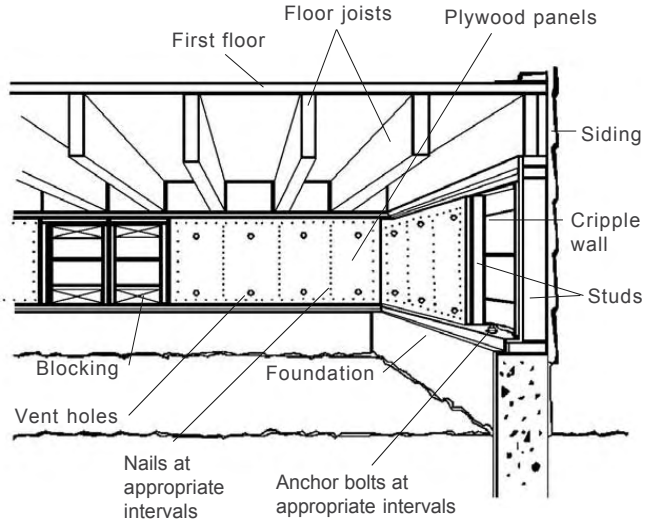
The Solution

Plywood, or other wood products allowed by code, should be nailed to the studs.

The following are important:

- Type of wood product used
- Plywood thickness
- Nail size and spacing
- Do not cover vents.

Consult your local Building Department for permit requirements before starting work.



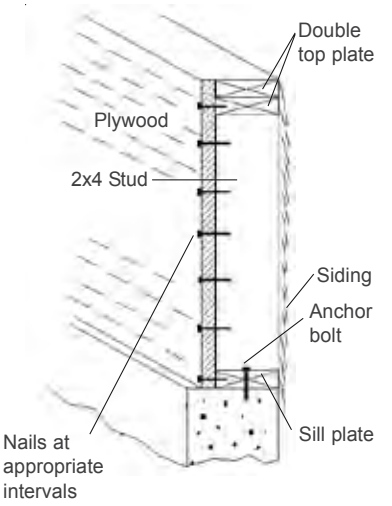


Figure 17—Plywood or diagonal sheathing strengthens weak cripple walls. If your home has a cripple wall between the foundation and the first floor, and the wall is not braced with plywood or diagonal sheathing, the house may fall or shift off its foundation during an earthquake.

How-to Resources

- Detailed information for do-it-yourselfers or engineers can be found in the International Existing Building Code, published by the International Code Council
- Publication: How You Can Strengthen Your Home for the Next Big Earthquake in the Los Angeles Area, City of Los Angeles, Department of Building & Safety, October 2001.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$500 to $2,500	$25,000 to total value of home (if completely destroyed).

Pier-and-Post Foundations

The Problem

The outside of the house is supported by wood posts resting on unconnected concrete piers. Siding is often nailed to the outside of the posts, making them not easily visible.

During an earthquake these posts can fail, if they are not braced against swaying.

If the posts fail, the house may shift or fall.

California Seismic Safety Commission

How to Identify

- ✓ Go under the house to see if there is a continuous foundation under the outside walls.
- ✓ If you do not see a continuous foundation you may have an earthquake weakness.
- ✓ If you see only unconnected concrete piers and wood posts, or only wood posts, supporting the outside walls, you have an earthquake weakness.

Remember

- Horizontal or vertical wood siding is not strong enough to brace pier-and-post foundations.
- Major structural repairs, like lifting an entire house to repair the posts and putting it back, are very expensive.

California Seismic Safety Commission

Figure 18 - The pier-and-post foundation under this home shifted during a recent earthquake.

Strengthen Pier-and-Post Foundations

The Solution

Consult a licensed architect or engineer, and a licensed building contractor who specializes in foundations, to fix this problem.

It may be possible to make the foundation safer by bracing the posts.

You might be better off to add a new foundation and plywood walls in the crawl space to make sure that the house will not shift or fall off its foundation during an earthquake.

How-to Resource

- Detailed information for engineers can be found in the International Existing Building Code, published by the International Code Council.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$1,000 to $25,000	$20,000 to total value of home (if completely destroyed).

Unreinforced Masonry Foundations

The Problem

Unreinforced masonry—brick, concrete block, or stone—foundations often cannot resist earthquake shaking. They may break apart, or be too weak to hold anchor bolts. Homes may shift off such foundations during earthquakes, damaging the walls, floors, utility lines, and home contents.

How to Identify

- ✓ If your home's foundation is brick or stone, and looks like one of the foundations shown in the photos here, it is probably unreinforced.
- ✓ If there is a space filled with grout between the inner and outer faces of a brick foundation (where anchor bolts and reinforcing steel could be installed), it may be reinforced.
- ✓ If the outside of the foundation is covered, you may have to look under the house to see the type of foundation you have.
- ✓ If you are not sure what to look for, seek the services of a licensed engineer to determine if your foundation is reinforced or not.

Remember

- It is cheaper to do this before an earthquake damages the house than after.

California Seismic Safety Commission

Figure 19 - This is an unreinforced stone foundation. They typically fail during earthquakes.

California Seismic Safety Commission

Figure 20 - Note the bricks exposed in this unreinforced masonry foundation.

The Solution

There are several ways to fix this problem.

The most common approach is to replace all or part of the existing foundation with a poured reinforced concrete foundation.

Another solution is strengthening the unreinforced brick or stone foundation, which is generally expensive.

Seek the help of a licensed architect or engineer, and a licensed foundation contractor or general contractor.

How-to Resource

- Detailed information for engineers can be found in the International Existing Building Code, published by the International Code Council.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$15,000 to $50,000	$15,000 to total value of home (if completely destroyed).

Homes Built on Steep Hillsides

The Problem

Houses built on the sides of steep hills are often set on exposed posts or columns, as shown in the photographs.

The potentially hazardous conditions that are unique to homes on steep hillsides are:

- Stilt-type posts with or without diagonal bracing
- Walls with very different heights or that are stepped or sloped down the hillsides.

If these posts or walls are not properly braced, they may collapse during an earthquake.

Sometimes, the supports on the downhill side will be hidden behind a tall wall that encloses a large unfinished space. (This is similar to, but taller than, a crawl space under a typical house built on flat ground.)

Office of Emergency Services

Figure 22 - This hillside home was built on an unbraced tall wall that failed.

How to Identify

- ✓ Is the house located on a slope?
- ✓ Are the columns or walls supporting the home braced?
- ✓ If you are not sure if there is bracing or if the bracing is adequate, consult a licensed engineer.

Remember

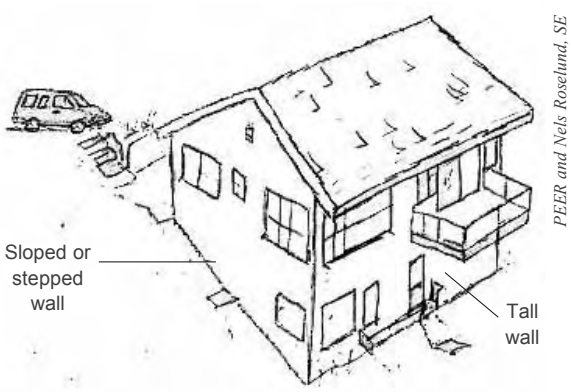
- It is very expensive to lift a house, repair the posts, and put it back.

Office of Emergency Services

Figure 23 - This photograph shows an interior detail of a home similar to the one above, showing substantial damage to a building with an unbraced tall wall.

The Solution

Consult a licensed architect or engineer, and a licensed contractor, to fix this problem.



PEER and Nels Roselund, SE

Figure 24 - Hillside homes with sloped and tall walls or posts require special engineering.

How-to Resources

- Detailed information can be found in the International Existing Building Code, published by the International Code Council.
- Voluntary Earthquake Hazard Reduction in Existing Hillside Buildings, City of Los Angeles Municipal Code, Chapter IX, Article 1, Division 94.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$1,000 to $50,000	$10,000 to total value of home (if completely destroyed).

Unreinforced Masonry Walls

The Problem

Houses built of unreinforced masonry – bricks, hollow clay tiles, stone, concrete blocks, or adobe – are very likely to be damaged during earthquakes.

The mortar holding the masonry together is generally not strong enough to resist earthquake forces.

Anchorage of walls to the floor and the roof is critical.

These houses are weak (brittle) and can break apart.

Walls may fall away or buckle, resulting in damage.

California Seismic Safety Commission

Figure 25 - The plaster-covered brick walls of this building collapsed during a recent earthquake.

How to Identify

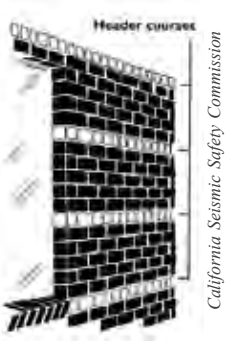
- ✓ Can bricks or stone be seen from the outside (unless the walls are covered with stucco)?
- ✓ Do the brick walls have “header courses” of bricks turned endways every five or six rows? *(See Figure 26)*
- ✓ Was the house built before 1940?

If you cannot tell from the outside, turn off the power and take the cover plate off one of the electrical outlet boxes on an outside wall and look for brick or other masonry.

If the wall is concrete or concrete block, it is very difficult to find out if reinforcing steel was added during construction.

You will then need:

- The house’s plans, which may be on file with the Building Department, or
- To consult a licensed engineer to make the determination.



California Seismic Safety Commission

Figure 26 - Header courses of bricks are usually placed endwise every six or so rows in unreinforced masonry walls to tie the outer layer of bricks to the layers inside the wall.

Remember

- It is very expensive to shore up a house, remove damaged walls, and put in new walls.

The Solution

Consult a licensed architect or engineer to fix this problem.

One solution may involve:

- Tying the walls to the floor and roof
- Installing a steel frame and bolting the wall to it.

Jessica Tran

Figure 27 - Unreinforced masonry wall strengthened by installing a steel frame inside.

Jessica Tran

Figure 28 - Bolting of unreinforced masonry wall to steel frame on the inside.

How-to Resource

- Detailed information can be found in the International Existing Building Code, published by the International Code Council.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
Project and Repair costs can vary widely.	

Rooms over Garages

The Problem

The large opening of a garage door and the weight of a second-story room built over the garage can result in the walls being too weak to withstand earthquake shaking.

When the narrow sections of the wall on each side of the opening are not reinforced or braced, the weakness is worse.

Office of Emergency Services

Figure 29 - This mountain home was built over a garage, and its walls were not strong enough to withstand an earthquake.

How to Identify

- ✓ Is the garage door opening in line with the rest of the house? *(See Figure 30)*
  - ➢ If this is the case, additional bracing ***may not*** be needed.
- ✓ Is the house shaped like *Figure 31*? If this is the case, are there braces or plywood panels around the garage door opening?
  - ➢ If there are no braces or plywood panels, strengthening may be needed.
- ✓ Consult a licensed architect or engineer to determine the strengthening required.

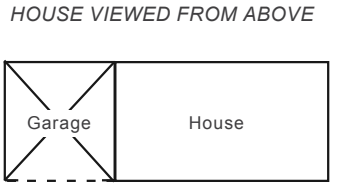


Figure 30 - If the wall of the main house is in line with the wall containing the door of a garage with a room over it, the adjoining wall may help brace the garage.

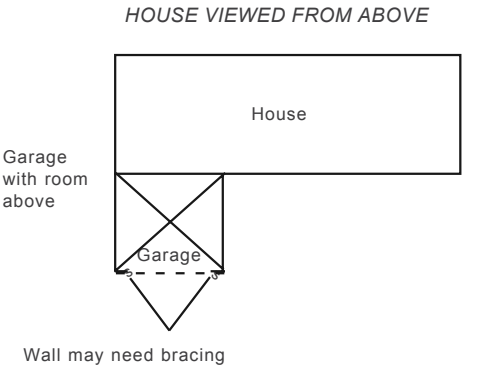


Figure 31—Additional bracing. Home configuration where there is no in-line wall. Additional bracing may be appropriate in this situation.

Remember

- Many homes with this weakness have been severely damaged in past earthquakes.

Strengthen Rooms over Garages

The Solution

Consult a licensed architect or engineer to design plywood paneling or a steel frame around the door opening *(See Figure 32)*.

Have plans drawn.

Obtain a permit from your local Building Department.

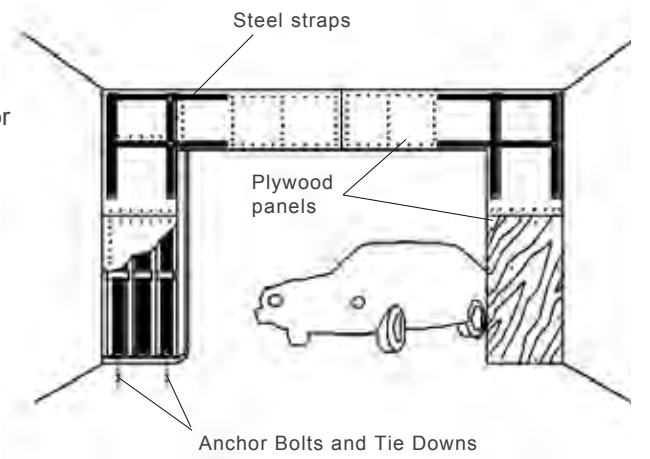


Figure 32—Bracing garage walls. If your house has a room over the garage, the garage walls may not be strong enough to hold up during an earthquake unless they are braced with plywood panels and steel straps.

How-to Resource

- Detailed information can be found in the International Existing Building Code, published by the International Code Council.

Comparison of Cost: Preventing vs. Repairing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$5,000 to $25,000	$15,000 to total value of home (if completely destroyed).

OTHER EARTHQUAKE-RELATED CONCERNS

OTHER CONCERNS | Unreinforced Masonry Chimneys

The Problem

Many chimneys are built of unreinforced brick or stone. During an earthquake these can collapse or break and fall on the roof.

When the chimney fails, the falling stones and bricks can:

- Cause injuries
- Damage the house
- Damage cars

Tall slender chimneys are most vulnerable.

Office of Emergency Services

Figure 33 - This unreinforced chimney fell during a recent earthquake.

How to Identify

- ✓ Check the mortar between the bricks or stones with a screwdriver. If it crumbles when you pick at it, the chimney may be a hazard.
- ✓ Inspect the attic and floor spaces for metal ties that should be holding the chimney to the house.
- ✓ Determining whether a chimney is susceptible to earthquake damage is not always easy. When in doubt, consult a licensed engineer or contractor.

Guna Selvaduray

Figure 34 - Morgan Hill Earthquake. Broken chimney fell on roof.

Remember

- Do not locate patios, children's play areas, or parking spaces near a questionable chimney.
- Tell family members to get away from chimneys and fireplaces during earthquakes.

Strengthen Masonry Chimneys

The Solution

Tear down the old or damaged chimney and replace with a newly constructed chimney.

Several steps can be taken to reduce the risk of damage from falling chimneys, depending upon the type of chimney you have. They include:

- Add plywood panels at the roof or above the ceiling joists to prevent the brick or stone from falling into the house.
  - This can be done by layering plywood above the ceiling, in the house's attic, or nailing plywood under the shingles when reroofing.
- Replace the upper chimney with metal flues.
- Strengthen the existing chimney.
  - This can be a complicated process, depending upon the construction and height of the existing chimney.

Consult your local Building Department and obtain necessary permits first.

California Seismic Safety Commission

Figure 35 - Photo showing damaged chimney removed. Note that the fireplace is now not functional.

How-to Resource

- Reconstruction and Replacement of Earthquake Damaged Masonry Chimneys, City of Los Angeles, Department of Building & Safety, Information Bulletin #P/BC-2002-70.

Comparison of Cost: Preventing vs. Reparing Earthquake Damage	
Project Cost	**Cost to Repair after an Earthquake**
$2,000 to $12,000	$15,000 to total value of home (if completely destroyed).

No Foundation

The Problem Some older houses were built on wood beams laid directly on the ground, without foundations. These houses may shift during earthquakes, causing structural damage and breaking utility lines.

How to Identify Look under the house. If you see no concrete or masonry around the outside walls, the house may lack a foundation.

What Can Be Done You may need to add a foundation to make the house earthquake resistant. Just as when strengthening or replacing an unreinforced masonry foundation, you will require the advice of a licensed architect, engineer, or foundation contractor.

Old Concrete Foundation

The Problem Some older concrete foundations were made with sand or stone that interacted chemically over time, and the concrete eventually crumbles and becomes too soft to withstand earthquake forces.

How to Identify Inspect the foundation for large cracks in the concrete, concrete crumbling off the foundation, or concrete crumbling when you pick at it with a screwdriver.

What Can Be Done You may need to replace some or all of the foundation. You should consult a licensed foundation contractor or an engineer.

OTHER CONCERNS

Homes with Unique Designs

The Problem

The design and construction features of some homes make them vulnerable to earthquake damage, especially if these homes are not specifically designed and built to resist earthquakes. Homes at risk are those with irregular shapes, large windows (which can break in earthquakes and scatter shards of glass), more than two stories, irregular walls, or porches and overhangs.

How to Identify

Many homes with these features are strong enough to withstand earthquakes and it is difficult to tell whether such homes need strengthening. If you have doubts about one or more of these features in your home, or in a home you are planning to buy, you should consult a licensed architect or engineer for an assessment.

What Can Be Done

A professional can advise you on how to identify and fix earthquake weaknesses if necessary. For example, large windows can be made safer by applying plastic film on them.

NATURAL GAS SAFETY

The Problem

Natural gas piping and appliances can be damaged during earthquakes, causing gas leaks.

If ignited, this can result in fires which can burn part of, or, the entire house.

About one in four fires after an earthquake is related to natural gas leaks.

Gas leaks after an earthquake are more likely if:

- There are structural weaknesses
- Gas appliances are not anchored
- Flexible pipe connections are not used.

The primary concern is property loss from fire damage.

The potential for life loss is limited since most single family homes have several safe exits.

How to Identify

✓ Examine all natural gas appliances (water heaters, dryers, stoves, ovens, furnaces) to see if they are anchored to the floor or walls, and have flexible pipe connections.

Plan Ahead

Locate your gas meter outside your home.

Identify the exact location of the shutoff valve and make sure that you have access to it.

Make sure you have a wrench that is readily available to turn off the gas when needed.

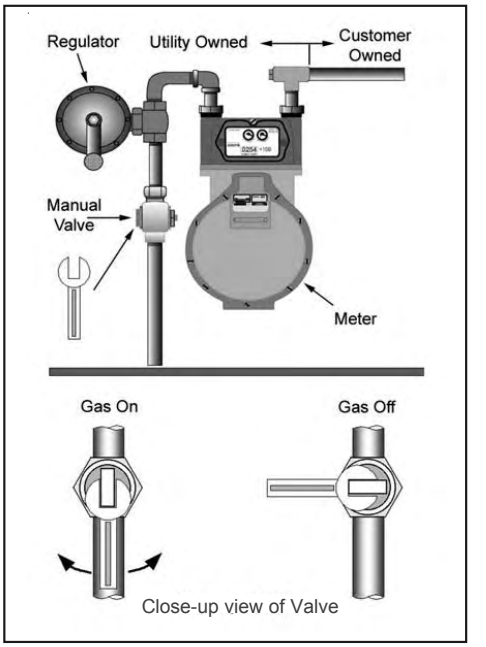


Figure 36—Manual Shutoff Valve Location

Manual Gas Shutoff

- The most cost-effective way to manage the risk from natural gas is to know how and when to manually shut off the gas.
- Use the wrench to turn off the manual valve located at the gas meter *(See Figure 36, page 134)*.
- Shut off your gas only if you:
  - Smell gas
  - Hear gas escaping
  - Suspect a broken gas pipe, appliance, vent, or flue.

Remember

- Once the gas has been shutoff, service can be restored only by utility personnel or qualified plumbers.
- High demands for qualified personnel after an earthquake can lead to substantial delays in restoring natural gas service.

Resources

- Seismic Gas Shut-Off Valve Requirements in Los Angeles, City of Los Angeles, Department of Building & Safety, Information Bulletin #P/PC 2002-001, April 30, 2003.
- Improving Natural Gas Safety in Earthquakes, California Seismic Safety Commission, Publication #CSSC-02-03, July 2002.
- Gas Shutoff Valve Certification Program, Division of the State Architect.

Automatic Gas Shutoff Options

There are a variety of automatic gas shut-off valves available. These cost more than manual shutoff valves and may provide additional safety but may also have some disadvantages.

The types of valves available include:

- Earthquake shake-actuated valves
- Excess flow valves
- Methane detectors
- Hybrid systems
- Others.

These can be installed on the “customer owned” side of the gas meter.

Consult your local Building Department because:

- Some installations will require building permits.
- Some local jurisdictions have adopted ordinances requiring automatic gas shutoff devices at the time of sale or during significant renovations.

GETTING THE WORK DONE

PLANS, PERMITS, AND CONTRACTORS

- Decide which strengthening project or projects you are going to do.
- Get the necessary building permits first.
  - If you are “doing-it-yourself,” you still need the proper permits.
  - For more complex projects, have a licensed architect or engineer draw up the necessary plans and specifications.
    - ✓ Interview two or three architects or engineers.
    - ✓ Ask for references or former clients.
    - ✓ Talk to references or former clients.
    - ✓ Compare experience, ideas, and fees.
  - Submit the plans for approval to your local building department.
  - Remember: the building codes are designed for your safety.

There are many publications that describe strengthening projects in detail.

Visit the California Seismic Safety Commission’s website at www.seismic.ca.gov, which provides many useful links.

- Get the documents that relate to your project and read them.
  - This will help you to better understand what the architect or engineer is doing, and also what the contractor is doing.
- The International Existing Building Code Appendix Chapter 3 contains the best current guidelines. Ask your local Building Department to review a copy.
- Select your licensed contractor.
  - First make sure the contractor is properly licensed.
  - Interview at least two or three contractors.
  - Ask your licensed architect or engineer for recommendations.
  - Ask for references or former clients.
  - Talk to references or former clients.
  - Compare experience, fees, and terms of contract.
  - Get at least three written bids for the construction work.
  - The lowest bid may not be the best bid.
- Keep all plans, permits, and other records of your strengthening project.
  - Provide future buyers of your home with these.

If your home has been designated as “historical,” you also may need to comply with the *California Historical Building Code*.

- Contact your local Building Department for further help with this.

REMEMBER

Whether you do it yourself, or hire a contractor, ***you need permits*** from your local Building Department.

It costs far less to correct earthquake weaknesses before an earthquake than to repair the damage after an earthquake.

If your home is damaged in an earthquake, you will probably also have other costs such as lodging, medical, etc.

DON’T HESITATE – MITIGATE!

AFTER A DISASTER – *HIRE A LICENSED CONTRACTOR!*

The contents of this section have been adapted from “After a Disaster, Don’t Get Scammed” by the Contractors State License Board.

After a Disaster...

DO NOT:

- Rush into repairs, no matter how badly they are needed.
- Hire the first contractor who comes along.
- Accept verbal promises.

DO:

- Get proof that the person you are dealing with is a California licensed contractor appropriate for the work to be done.
- Get the contractor’s license number and verify that it is current and valid.
- Get a written contract that contains all the details of the job to be performed.
- Get at least three bids.
- Check references of other work the contractor has done, if possible, in your area.
- Develop a payment schedule with the contractor.
- Consider a completion bond on large projects.

Contractors must be licensed for any job which costs $500 or more, including materials and labor.

Avoid Payment Pitfalls

- By law, a down payment on a home improvement contract cannot exceed:
  - 10% of the contract price, or
  - $1000

  whichever is less!
- Withhold at least 10% of the total contract price until the project is complete
- Do not make final payment until:
  - The building department has signed off on it,
  - You are satisfied with the job, and
  - You take a final walk-through to make sure work is complete and done correctly.

Useful publications from the Contractor’s State License Board (www.cslb.ca.gov):

- **What You Should Know Before You Hire a Contractor** - *Provides information about hiring and working with contractors.*
- **Home Improvement Contracts: Putting the Pieces Together** - *Provides answers about the legal requirements of home improvement contractors.*

GEOLOGIC HAZARDS

Sellers of real estate in California are required to disclose to buyers certain information regarding natural hazards that can affect the property being sold. In addition to flood and fire hazard information, disclosure of seismic hazards is also required.

Earthquakes are common in California because of the many earthquake faults located throughout the state.

This section:

- Describes briefly the basic geology-related hazards, and
- Introduces the government mapping programs that define which areas are susceptible to those hazards.

Ground Shaking:

- Ground shaking causes 99% of the earthquake damage to California homes.
- Areas near large active faults are more likely to be shaken severely than areas in the rest of the state.

Landslide:

- Earthquakes can also trigger landslides.
- Earthquake shaking can cause the soil and rock to slide off a slope, ripping apart homes on the slope and/or crushing homes downhill *(See Figure 37)*.

Fault Rupture:

- An actual crack forms and the ground is offset along the two sides of a fault during an earthquake *(See Figure 38)*.
- A house built over an active fault can be torn apart if the ground ruptures beneath it.
- If the house is built over a "creeping" fault – one that moves slowly with no earthquakes or a series of very small earthquakes – the damage may not be noticed for some time.

Patrica Grossi and Augustin Rodriguez, EERI

Figure 37 - Landslide. San Simeon Earthquake, December 22, 2003 Landslides on San Gregorio Road in Atascadero, California, only a short distance away from where the homes with the most damage were located.

Robert A. Eplett, OES, CA

Figure 38 - Fault Rupture. Landers Earthquake of June 28, 1992, produced a surface rupture of over 50 miles along faults in the Mojave Desert.

Lateral Spreading:

- Intense shaking during an earthquake can cause the soil to break into blocks which move apart from each other. This can cause damage to the foundation of a house *(See Figure 39)*.

Liquefaction:

- During earthquakes, loose, wet sandy soil can become almost like quicksand, and lose its ability to support structures. This can cause the foundation of a house to sink, break, or tilt *(See Figure 40)*.

Tsunami:

- A tsunami is a series of large sea waves caused by an underwater earthquake or landslide.
- Coastal areas are prone to tsunami damage.
- Tsunami waves can come from a great distance and can cause flooding or wash away houses in low-lying areas along the shore.

Dam Failure:

- Earthquake damage to a dam can cause sudden and devastating flooding of houses downstream.
- During the 1971 San Fernando Earthquake, the Lower San Fernando Dam above the San Fernando Valley was damaged. Had it failed, it would have flooded the homes below, causing many deaths and injuries. *(See Figure 41)*. Risk of an aftershock forced residents in an 11-square mile area to evacuate for the next 3 days.
- California has some of the world's best standards for building and inspecting dams.

Recommendation:

If you live in a low-lying coastal area or a dam inundation zone, become familiar with evacuation routes to higher ground and be prepared to evacuate such areas immediately after an earthquake.

NISEE Clearinghouse Project

Figure 39 - Lateral Spreading. Loma Prieta Earthquake, October 17, 1989. Lateral spreading damage levee road along the San Lorenzo River.

Walt Hayes

Figure 40 - Loma Prieta Earthquake, October 17, 1989. Lateral spreading, liquefaction and sand boils caused extensive damage in the Marina District of San Francisco, about 60 miles away from the epicenter.

Robert A. Page, David M. Boore and Robert F. Yerkes, USGS

Figure 41 - Lower San Fernando Dam that was badly damaged by the 1971 San Fernando Earthquake.

Earthquake Hazard Mapping

Enormous progress has been made in understanding how, why, and where earthquakes occur. This has led to the creation of maps that highlight areas having the highest likelihood of damaging earthquakes.

Five mapping programs have been developed to help Californians lead safer lives in earthquake country.

National Seismic Zones

The U.S. is divided into four major zones, each having a different likelihood of strong ground shaking. The earthquake hazard potential for the U.S., determined through a national program, has been generalized into four seismic zones, numbered Zone 1 through Zone 4. Zone 1 has the lowest earthquake danger and Zone 4 has the highest earthquake danger. **Most of the densely populated parts of California are in Zone 4.** *(See Figure 7, page 109)*

The National Seismic Zone map is published by the International Code Council (ICC) in the California Building Code.

Earthquake Fault Zone Maps

These maps are also known as the *Alquist-Priolo Earthquake Fault Zone Maps*, named after the California legislators who initiated the legislation that mandated these maps. The maps show active earthquake faults prone to surface ruptures and identify a 1,000 ft. wide zone with the fault line at the center.

Seismic Hazard Zone Maps

These maps show areas where landslides and liquefaction are most likely to occur during earthquakes.

Tsunami Inundation and Evacuation Route Maps

Maps for the Pacific Coast show areas where low-lying regions are exposed to tsunami inundation. These maps are in various stages of preparation and availability.

Dam Inundation Maps

These maps show the areas below major dams that may be flooded in the event of their failure.

How are these Maps Used?

The zones defined by the maps are at greatest potential risk when a major earthquake occurs. This is particularly the case when the earthquake occurs during or shortly after a heavy rainfall, which increases the likelihood of liquefaction and landslides.

California law requires that the information from the Earthquake Fault Zone and Seismic Hazard Zone maps be incorporated into local general plans, and any land-use planning or permitting ordinances. Cities and counties must establish regulations governing development within these zones.

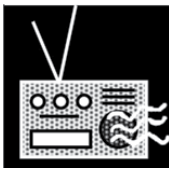
Special geotechnical studies are required before buildings can be built in Earthquake Fault Zones or Seismic Hazard Zones.

Your local building or planning department can show you the National Seismic Zone Map as well as the other maps if they are available for your community.

These maps, if they are available, may be accessed through www.seismic.ca.gov/hog.

The Seller of real estate within a hazard zone must disclose that the property lies within such a zone at the time of sale.

WHAT TO DO *DURING* AN EARTHQUAKE



1. IF YOU ARE **INDOORS**—STAY THERE! "**DROP, COVER AND HOLD ON.**" Get under a sturdy desk or table and hang on to it, or move into a hallway or get against an inside wall. Stay clear of windows, fireplaces, and heavy furniture or appliances. Get out of the kitchen, which is a dangerous place in earthquakes since it's full of things that can fall on you. Don't run downstairs or rush outside while the building is shaking or while there is danger of falling and hurting yourself or being hit by falling glass or debris.
2. IF YOU ARE **OUTSIDE—GET INTO THE OPEN**, away from buildings, power lines, chimneys, and anything else that might fall on you.
3. IF YOU ARE **DRIVING—STOP**, but carefully. Move your car as far out of traffic as possible. Do not stop on or under a bridge or overpass or under trees, light posts, power lines, or signs. Stay inside your car until the shaking stops. When you resume driving, watch for breaks in the pavement, fallen rocks, and bumps in the road.
4. IF YOU ARE ON OR NEAR A **STEEP HILLSIDE—WATCH OUT FOR LANDSLIDES**, falling rock, trees, and other debris that could be loosened by earthquakes.

If You Feel a Strong Earthquake or Receive a Tsunami Warning When You are on the Coast

1. **DROP, COVER AND HOLD ON.** Watch for falling objects until the earthquake is over.
2. **MOVE TO HIGHER GROUND** or inland away from the coast immediately. A tsunami may be coming. Go on foot if possible. The first waves may reach the coast within minutes after the ground shaking stops. The first wave is almost never the largest. Later waves may be spaced tens of minutes apart and can continue arriving for many hours.
3. **THERE MAY BE NO TIME FOR AUTHORITIES TO ISSUE A WARNING.** If you do not hear an evacuation announcement but notice a sudden drop or rise in water level or hear a loud noise coming from the water, nature may be warning you of impending danger.
4. **STAY AWAY FROM THE COAST.** Do not return to the shore after the first wave. Waves may continue to arrive for hours.
5. **LISTEN TO A RADIO FOR AN "ALL CLEAR"** before returning to the shore.

WHAT TO DO *BEFORE* AN EARTHQUAKE

The information contained in this section does not represent weaknesses in the earthquake resistance of homes. It is valuable information to keep in mind to reduce risks to yourself, your family, and your home. These lists are only highlights of the actions you should take.

Gather Emergency Supplies

Be sure you have these basic supplies on hand:

- ❑ Fire extinguisher
- ❑ Adequate supplies of medications that you or family members are taking
- ❑ Crescent and pipe wrenches to turn off gas and water supplies
- ❑ First-aid kit and handbook
- ❑ Flashlights with extra bulbs and fresh batteries
- ❑ Portable battery-powered radio or television and extra fresh batteries
- ❑ Water for each family member for at least three days (allow at least one gallon per person per day) and purification tablets or chlorine bleach to purify drinking water from other sources
- ❑ Canned and packaged foods, enough for three days, and at least an additional four-day supply readily accessible for use if you are confined to home. Don't forget a mechanical can opener and extra pet food!
- ❑ Camp stove or barbecue to cook on outdoors (store fuel out of the reach of children)
- ❑ Waterproof, heavy-duty plastic bags for waste disposal
- ❑ Copies of personal identification, such as driver's licenses, passports, and work identification badges, and copies of medical prescriptions and credit cards
- ❑ An extra set of car keys and house keys
- ❑ Matches in waterproof container
- ❑ Map of the area marked with places you could go and their telephone numbers
- ❑ Cash and coins
- ❑ Special items, such as denture needs, contact lenses and supplies, extra eyeglasses, and hearing aid batteries
- ❑ Items for seniors, disabled persons, or anyone with serious allergies
- ❑ Items for infants, such as formula, diapers, bottles, pacifiers, powdered milk, and medications not requiring refrigeration

Plan Ahead

1. Create a family disaster plan; practice and maintain the plan.
2. Make and complete a checklist.
3. Plan home escape routes.
4. Conduct fire and emergency evacuation drills at least twice a year and include your pets in your evacuation and sheltering drills.
5. Test your smoke alarms once a month (daylight savings time or birthdays) and replace batteries at least once a year in battery-powered smoke alarms.
6. Make sure each member of your family knows what to do no matter where they are when earthquakes occur.
   - Establish two meeting places where you can all reunite afterward: one right outside your home, in case of a sudden emergency, and one outside your neighborhood in case you cannot return home or are asked to leave your neighborhood.
   - Find out about the earthquake plan developed by your children's school or day care.
   - Remember that since transportation may be disrupted, you may have to stay at your workplace for a day or twofollowing a major earthquake. Keep some emergency supplies—food, liquids, and comfortable shoes, for example—at work.
   - Pick two out-of-town contacts:
     - A friend or relative who will be your household's **primary** contact,
     - A friend or relative who will be your household's **alternative** contact.
7. Know where your gas, electric, and water main shutoffs are and how to turn them off if there is a leak or electrical short; if in doubt, ask your utility companies. Make sure that all the older members of your family can shut off the utilities.
8. Locate your nearest fire and police stations and emergency medical facility. Remember that telephones may not work after an earthquake. If you can, use your land line rather than your cell phone to call 911, but only if you need emergency help.
9. Talk to your neighbors—how could they help you, or you help them, after an earthquake?
10. Take a Red Cross first aid and cardiopulmonary resuscitation (CPR) training course.
11. Make arrangements with friends or relatives to temporarily house **your pets** after disasters because emergency shelters will not accept pets.
12. If your home is located near a steep hillside, in an area near the shore of a body of water or below a dam, check with your local building or planning department to see if you are in a landslide, tsunami or dam inundation zone. Plan for how, when, and where your family should evacuate.

WHAT TO DO *AFTER* AN EARTHQUAKE

Wear sturdy shoes to avoid injury from broken glass and debris.
Expect aftershocks.

Check for Injuries

1. If a person is bleeding, put direct pressure on the wound. Use clean gauze or cloth, if available.
2. If a person is not breathing, administer rescue breathing. The front pages of many telephone books contain instructions on how to do it along with detailed instructions on other first-aid measures.
3. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury.
4. Cover injured persons with blankets to keep them warm.
5. Seek medical help for serious injuries.

Check for Hazards

1. *Fire or fire hazards.* Put out fires in your home or neighborhood immediately. Call for help, but don't wait for the fire department.
2. *Gas leaks.* Shut off the main gas valve only if you suspect a leak because of broken pipes or the odor of natural gas. Don't turn it back on yourself—wait for the gas company to check for leaks.
3. *Damaged electrical wiring.* Shut off power at the control box if there is any damage to your house wiring.
4. *Downed or damaged utility lines.* Do not touch downed power lines or any objects in contact with them.
5. *Spills.* Clean up any spilled medicines, drugs, or other potentially harmful materials such as bleach, lye, and gasoline or other hazardous materials.
6. *Downed or damaged chimneys.* Approach chimneys with caution. They may be weakened and could topple during aftershocks. Don't use a fireplace with a damaged chimney—it could start a fire or let poisonous gases into your house.
7. *Fallen items.* Beware of items tumbling off shelves when you open the doors of closets and cupboards.

Check Your Food and Water Supplies

1. If power is off, plan meals to use up foods that will spoil quickly, or frozen foods. If you keep the door closed, food in your freezer should be good for at least a couple of days.
2. Don't light your kitchen stove if you suspect a gas leak.
3. Use barbecues or camp stoves, outdoors only, for emergency cooking.
4. If your water is off, you can drink supplies from water heaters, melted ice cubes, or canned vegetables. Try to avoid drinking water from swimming pools or, especially, spas—it may have too many chemicals in it to be safe.

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Do Not . . .

- **Do not** eat or drink anything from open containers near shattered glass.
- **Do not** turn the gas on again if you turned it off; let the gas company do it.
- **Do not** use matches, lighters, camp stoves or barbecues, electrical equipment—including telephones—or appliances until you are sure there are no gas leaks. They may create sparks that could ignite leaking gas and cause an explosion and fire.
- **Do not** use your telephone, except for a medical or fire emergency. You could tie up lines needed for emergency response.
  If you need help and the phone doesn't work, send someone for help.
- **Do not** expect firefighters, police, or paramedics to help you right away. They may not be available.

RESOURCE ORGANIZATIONS

Some of the organizations listed below have information to help you strengthen your home against earthquakes and help you and your family prepare a personal earthquake response plan. Other resources that can help you may be available in your community; check your local telephone directory.

Home Safety Information

Office of Emergency Services

Main Office
Information and Public Affairs
P.O. Box 419047
Rancho Cordova, CA 95741-9047
Telephone: (916) 845-8400
http://www.oes.ca.gov

Regional Offices:

Coastal Region
1300 Clay Street, Suite 408
Oakland, CA 94612
Telephone: (510) 286-0895

Inland Region
P.O. Box 419047
Rancho Cordova, CA 95741-9047
Telephone: (916) 845-8470

Inland Region South
2550 Mariposa Mall, Room 181
Fresno, CA 93721
Telephone: (559) 445-5672

Southern Region
4671 Liberty Avenue
Los Alamitos, CA 90720
Telephone: (562) 795-2900

California Seismic Safety Commission

1755 Creekside Oaks Drive, Ste. 100
Sacramento, CA 95833
Telephone: (916) 263-5506
www.seismic.ca.gov

California Earthquake Authority

801 K Street, Suite 1000
Sacramento, CA 95814
Telephone: (877) 797-4300
http://www.earthquakeauthority.com

Structural Safety Information

American Institute of Architects

Local chapters have referral lists of licensed architects; consult telephone directory listing for "American Institute of Architects."
http://www.aia.org

Structural Engineers Association of California

1730 I Street, Suite 240,
Sacramento, CA 95814-3017
Telephone: (916) 447-1198
http://www.seaoc.org
Local chapter organizations have referral list for licensed structural engineers as follows:

San Diego	- http://www.seaosd.org
Southern California	- http://www.seaosc.org
Northern California	- http://www.seaonc.org
Central California	- http://www.seaocc.org

American Society of Home Inspectors

932 Lee Street, Suite 101
Des Plaines, IL 60016
Telephone: (800) 743-2744
http://www.ashi.com
Referral list of licensed inspectors.

Building Education Center

812 Page Street
Berkeley, CA 94710
Telephone: (510) 525-7610
http://www.bldgeductr.org

California Real Estate Inspection Association
1445 N. Sunrise Way, Suite 101
Palm Springs, CA 92262
Telephone: (800) 848-7342 (information)
http://www.creia.org/
Call for pamphlet describing house inspection services offered by members and referrals to qualified members.

Consulting Engineers and Land Surveyors of California
1303 J Street, Suite 450
Sacramento, CA 95814
Telephone: (916) 441-7991
http://www.celsoc.org/
A referral list for licensed engineers is available.

International Code Council
5360 Workman Mill Road
Whittier, CA 90601-2298
Telephone: (800) 284-4406
http://www.iccsafe.org

Geologic Information

Association of Bay Area Governments
P.O. Box 2050
Oakland, CA 94604
Telephone: (510) 464-7900
http://www.abag.ca.gov
A consortium of local governments in the San Francisco Bay Area, offering a variety of information, including lists of local resources.

California Geological Survey
California Department of Conservation
801 K Street, MS 12-30
Sacramento, CA 95814
Telephone: (916) 445-1825
http://www.consrv.ca.gov/cgs
The CGS is the state agency responsible for geological research, mapping, and policy. It provides maps and other information to the general public.

Southern California Earthquake Center
University of Southern California
3651 Toursdale Parkway, Suite 169
Los Angeles, CA 90089-0742
Telephone: (213) 740-5843
http://www.scec.org

United States Geological Survey
Earth Science Information Center
345 Middlefield Road
Menlo Park, CA 94025
Telephone: (650) 853-8300
http://www.usgs.gov
This is the federal agency responsible for geological and earthquake hazard research, mapping, and policy. It provides maps and other information to the general public.

Cities and Counties
Consult your telephone directory under city or county government listings for the office of emergency services or disaster management, city or county building and planning department, and city or county government geologist.

Emergency Planning Information

Federal Emergency Management Agency
Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607
Telephone: (510) 627-7100
http://www.fema.gov
FEMA offers a publications lists and referrals to preparedness organizations. FEMA also provides information on Federal Disaster Aid Programs that become available after Federal disasters.

American Red Cross
Consult your telephone directory for the address and phone number of your local chapter.
http://www.redcross.org

HOW TO FILL OUT THE DISCLOSURE FORM

When you sell a home that was built before 1960, you are required to fill out the form shown on the next page.

- Sellers must hand buyers a **completed** disclosure report.
- Sellers must answer the questions to the best of their knowledge.
- If a question on the form describes only part of your house—for example if part of your house is anchored to the foundation and the other part is not—sellers should answer the question with a "NO" because a portion of the house is not properly anchored.
- Sellers are not required to remove siding, drywall, or plaster in order to answer the questions.
- Sellers are not required to hire anyone to inspect their homes.
- Sellers are not required to fix the weaknesses before they sell their homes.

Residential Earthquake Hazards Report **(2005 Edition)**

NAME	ASSESSOR'S PARCEL NO.
STREET ADDRESS	YEAR BUILT
CITY AND COUNTY	ZIP CODE

Answer these questions to the best of your knowledge. If you do not have actual knowledge as to whether the weakness exists, answer "Don't Know." If your house does not have the feature, answer "Doesn't Apply." The page numbers in the right-hand column indicate where in this guide you can find information on each of these features.

	Yes	No	Doesn't Apply	Don't Know	See Page
1. Is the water heater braced, strapped, or anchored to resist falling during an earthquake?	☐	☐	☐	☐	114
2. Is the house anchored or bolted to the foundation?	☐	☐	☐	☐	116
3. If the house has cripple walls:					
• Are the exterior cripple walls braced?	☐	☐	☐	☐	118
• If the exterior foundation consists of unconnected concrete piers and posts, have they been strengthened?	☐	☐	☐	☐	120
4. If the exterior foundation, or part of it, is made of unreinforced masonry, has it been strengthened?	☐	☐	☐	☐	122
5. If the house is built on a hillside:					
• Are the exterior tall foundation walls braced?	☐	☐	☐	☐	124
• Were the tall posts or columns either built to resist earthquakes or have they been strengthened?	☐	☐	☐	☐	125
6. If the exterior walls of the house, or part of them, are made of unreinforced masonry, have they been strengthened?	☐	☐	☐	☐	126
7. If the house has a living area over the garage, was the wall around the garage door opening either built to resist earthquakes or has it been strengthened?	☐	☐	☐	☐	128
8. Is the house outside an Alquist-Priolo Earthquake Fault Zone (zones immediately surrounding known earthquake faults)?	*To be reported on the Natural Hazards Disclosure Report*				
9. Is the house outside a Seismic Hazard Zone (zone identified as susceptible to liquefaction or landsliding)?					

Keep your copy of this form for future reference

If any of the questions are answered "No," the house is likely to have an earthquake weakness. Questions answered "Don't Know" may indicate a need for further evaluation. If you corrected one or more of these weaknesses, describe the work on a separate page.

As seller of the property described herein, I have answered the questions above to the best of my knowledge in an effort to disclose fully any potential earthquake weaknesses it may have.

EXECUTED BY

(Seller) (Seller) Date

I acknowledge receipt of this form, completed and signed by the seller. I understand that if the seller has answered "No" to one or more questions, or if seller has indicated a lack of knowledge, there may be one or more earthquake weaknesses in this house.

(Buyer) (Buyer) Date

This earthquake disclosure is made in addition to the standard real estate transfer disclosure statement also required by law.

BOE-64 (FRONT) REV. 4 (8-02)

CLAIM FOR SEISMIC SAFETY CONSTRUCTION EXCLUSION FROM ASSESSMENT

(Section 74.5 of the Revenue and Taxation Code)

This form must be filed with the Assessor prior to, or within 30 days of, completion of construction.

FOR ASSESSOR'S USE ONLY

☐ Received _____

☐ Approved _____

☐ Denied _____

Reason for denial _____

_____

SAMPLE FORM
for Santa Clara County

PROPERTY DESCRIPTION

Parcel No.(s) _____

_____

Address _____

_____

_____

STATEMENTS

1. As the owner of the property described above, I completed, or will complete, construction on this property on _____, and therefore claim the construction exclusion from assessment provided by section 74.5 of the California Revenue and Taxation Code.
2. I understand this exclusion from assessment is applicable only to seismic retrofitting improvements and improvements utilizing earthquake hazard mitigation technologies, to an existing building or structure and is not applicable to alterations, such as new plumbing, electrical, or other added finishing materials, made in addition to seismic-related work performed on an existing structure.
3. I further understand this exclusion from assessment does not encompass the exclusion provided by Revenue and Taxation Code section 70(d) pertaining to the portion of reconstruction or improvement to a structure, constructed of unreinforced masonry bearing wall construction, necessary to comply with any local ordinance relating to seismic safety during the first 15 years following that reconstruction or improvement.
4. The property owner, primary contractor, civil engineer, or architect ☐ has ☐ has not certified to the building department those portions of the project that are seismic retrofitting improvements or improvements utilizing earthquake hazard mitigation technologies.

THIS EXCLUSION EXPIRES UPON CHANGE IN OWNERSHIP OF THE PROPERTY

CERTIFICATION

I certify (or declare) under penalty of perjury under the laws of the State of California that the foregoing and all information hereon, including any accompanying statements or documents, is true, correct, and complete to the best of my knowledge and belief.

SIGNATURE

DATE

DAYTIME PHONE NO.

( )

Only the owner or a co-owner of the above-described property (including a purchaser under contract of sale) or his or her legal representative may sign.

If you are buying this property under an unrecorded contract of sale and the Assessor does not have a copy of the contract, you must attach a copy to the claim.

SUPPORTING DOCUMENTS MUST BE FILED WITHIN SIX MONTHS OF COMPLETION OF THE PROJECT.

Notes:

The California ENERGY COMMISSION

What is your Home ENERGY RATING?

know before you buy or sell

- Lower your energy bills
- Enjoy a safer, more comfortable and durable home
- Reduce your impact on the environment
- Increase your home's sales appeal and appraisal value

U P D A T E D F O R 2 0 1 1

What is your Home ENERGY RATING?

> "Whether you are buying or selling a residential property, or staying in your current home, every Californian should know his or her home **energy rating.**"

The California ENERGY COMMISSION

Contents

Know the Facts	156
What Is a Home Energy Rating?	157
Understanding Your HERS Index	158
HERS Recommendations	159
Making Wise Improvements	160
Utility Bills and Ratings	161
Financing Your Improvements	162
Efficiency Adds Value	164
Go Solar California!	165

What is your Home ENERGY RATING?

California is a national leader in promoting energy efficiency. As a result, our energy use per person has remained stable for over 30 years while the national average has steadily increased. Despite this success, we must continue to reduce energy use in our homes. The benefits are highly valuable — reducing energy use not only lowers your energy bills, but helps our electricity system remain reliable, even during high peak-load periods, while also protecting our environment.

In 2006, California established aggressive goals to reduce greenhouse gases that cause global warming. These goals will cut today's carbon emissions by 25 percent, so we can return to 1990 levels by the year 2020. Efforts to accomplish this goal represent important first steps in addressing the threat of global warming. We owe our children and grandchildren nothing less.

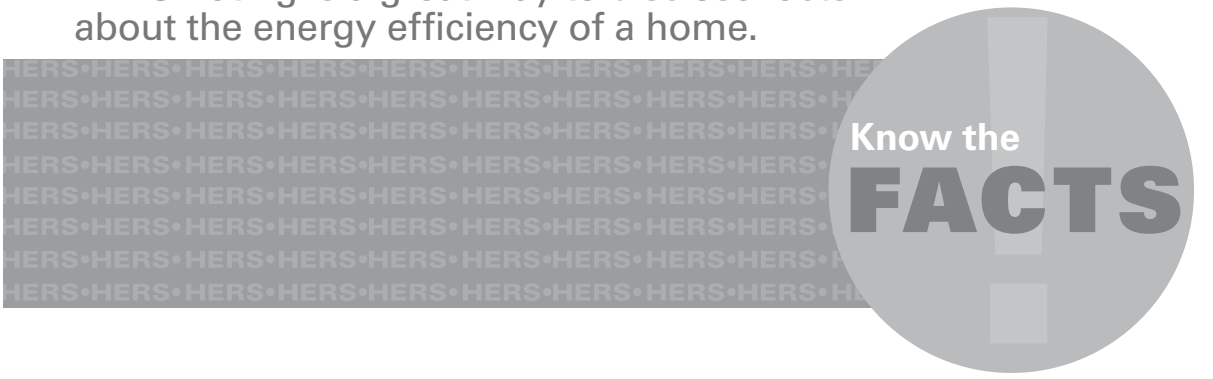
As you consider the sale or purchase of your home, this booklet asks that you recognize what energy efficiency measures have been built into the home, or ways to make further improvements to save energy and reduce peak electricity demand.

Your energy efficiency actions help make California a better, more environmentally sustainable place to raise your families.

Whether you are buying or selling a residential property, or staying in your current home, every Californian should know his or her home energy rating. Wasted energy wastes more than just your money – it changes our climate. The scientific community agrees that we must act now or risk facing an uncertain future.

The California Home Energy Rating System (HERS) Program provides a reliable way to estimate and compare the energy efficiency of California homes and identify wise energy saving improvements. This booklet explains how the HERS program works and helps you find a qualified professional to rate your own home. Once you know your home energy rating, you will be able to choose smart energy upgrades and investments that will benefit your family now… and generations to come.

During a real estate transaction, a California HERS Rating is a great way to disclose facts about the energy efficiency of a home.



Whether you are getting ready to sell your home – or preparing to buy one – knowing the energy efficiency facts about the property is a major consideration. As buyers become more aware of the benefits of an energy-efficient home, homes with a favorable home energy rating may be more attractive to buyers.

Selling?

A HERS rating will:

- Help determine facts about the energy efficiency of your home.
- Identify energy improvements that may make your home more attractive to buyers.
- Alert appraisers to add value for any energy improvements you may have made already.

Buying?

- Use a HERS rating to shop and compare the energy efficiency of homes you are considering.
- Learn about the most cost-effective options for lowering the energy bills in any home you are considering buying.
- Identify and qualify for energy efficiency financing.

Staying in your current home?

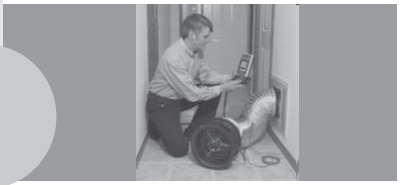
- Find out your HERS rating.
- Discover the best options for lowering your energy bills.
- Identify energy efficiency improvements that may also make your home more comfortable.
- Find resources to help finance your improvements.
- Improve your home's resale value.

Have you checked your ducts?

Heating and cooling ducts in an average California home leak almost 30 percent. That is why when heating or cooling equipment is replaced, testing the system's ducts for leaks is now required by building officials in many parts of the state.

If you are selling your home and had upgrades made without the required permits or duct testing, be sure to disclose this on your Real Estate Transfer Disclosure Statement. If you are preparing to buy a home that had duct work performed after October 2005, ask to see the duct testing report, or an explanation as to why such testing was not required.

For more information, visit:
www.energy.ca.gov/title24/changeout/



You wouldn't buy a new car without knowing its "miles per gallon" rating. So why buy a home without a "home energy rating?"

What is a HOME ENERGY RATING?

A Whole-House Home Energy Rating is a comprehensive evaluation of the efficiency of the entire home. The homeowner receives a written report that includes a numeric score or "rating" of the home, plus recommendations for improvements that will reduce energy bills and make the home more comfortable. Knowing the energy rating of your home is similar to knowing the miles per gallon rating of your car.

The California Energy Commission has developed the California Home Energy Rating System (HERS) Program to cover almost every type of residence in California. This includes new and existing single-family homes and multifamily buildings of three stories or less. Energy Commission-approved HERS Providers train, certify, and oversee a new type of service professional known as a "California Whole-House Home Energy Rater."

Each California HERS Rater must follow standardized energy auditing procedures and use energy analysis software that meets the Energy Commission's technical requirements. The HERS Rater will inspect and assess all the major energy efficiency features of your home:

- Air leaks (sealed or unsealed)
- Cooling system
- Heating system
- Water heating system
- Heating and cooling ducts and/or pipes
- Insulation (attic, walls, floor)
- Windows
- Attached lighting fixtures
- Major appliances
- Solar electricity generating systems (if any)
- Other energy uses

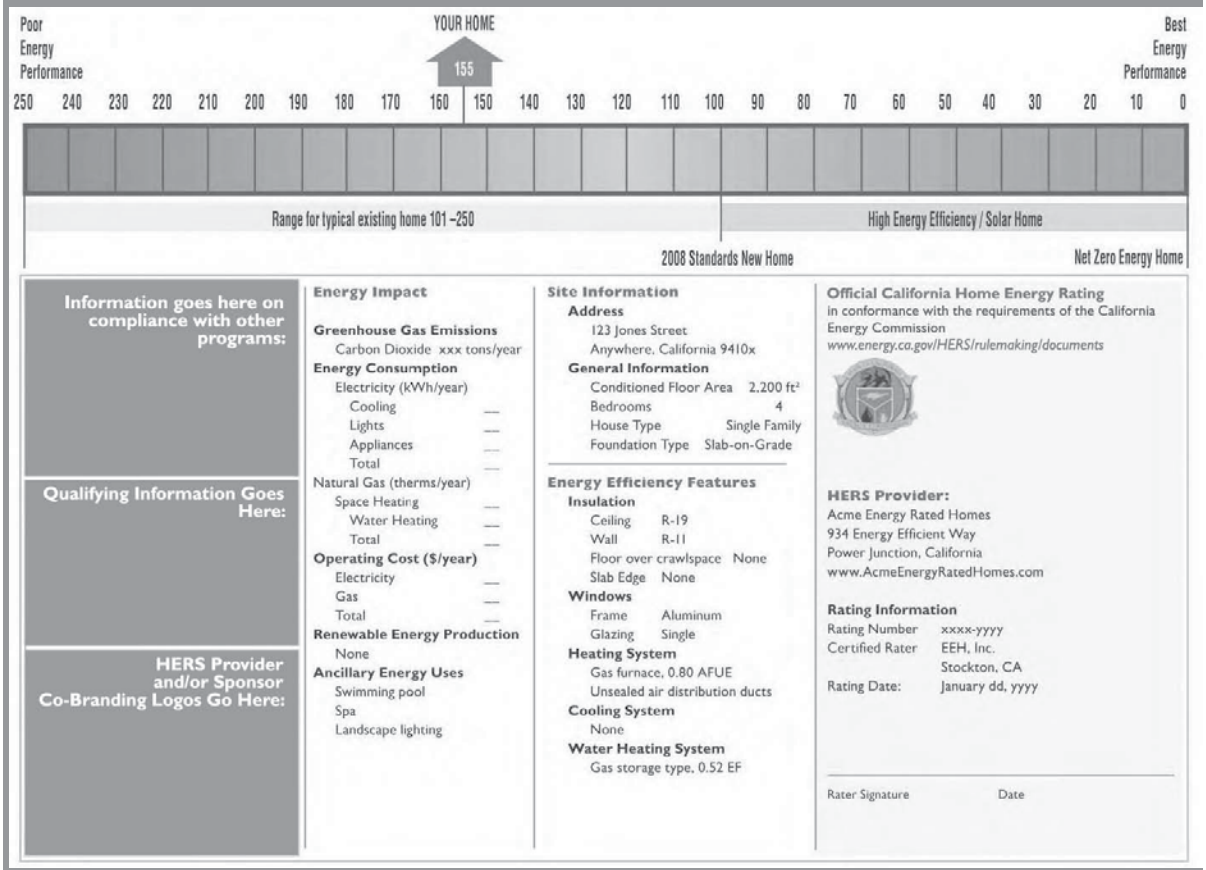
Your HERS report will identify the most cost-effective and appropriate energy efficiency improvements for your home. Only a properly prepared HERS Report will receive an official California Home Energy Rating Certificate with the California Energy Commission's seal.

Rating costs vary depending on factors such as the size and features of your home and the extent of rater services needed. Ask your real estate agent for names of certified HERS Raters in your area or find an Energy Commission-approved HERS Provider at: www.energy.ca.gov/HERS/index.html or call the Energy Hotline at (800) 772-3300.

Your HERS Rating Certificate will:

- Display an official HERS Index efficiency rating on a 0 to 250-point scale.
- Itemize the home's major energy-efficiency features as determined by the HERS Rater.
- Estimate the home's annual energy use, operating cost, and greenhouse gas emissions.
- Calculate the amount of solar or other onsite renewable energy that the home may produce.

Understanding your HERS index



What is your Home Energy Rating?
How low can it go?

A lower HERS Index indicates a more energy efficient home. A home with a HERS Index of:

- "250" or more is likely to have very high energy bills, and many opportunities for efficiency improvements.
- "100" uses the same energy as a new home that meets California's 2008 Building Energy Efficiency Standards.
- "0" is a super-efficient "Net Zero Energy Home" that consumes no more energy than it produces with solar or other onsite renewable sources.

HERS Recommendations

Your HERS report will contain detailed recommendations so that you can learn about all the improvements that are cost-effective and appropriate for your particular home. Here are a few examples:

Test and seal air leaks in building envelope
A pressure test will show where the air is leaking out so you can make your home less drafty.

Increase attic insulation to R-38
Properly installed insulation makes your home quieter and more comfortable.

Test and seal air duct leaks
Almost every home in California has leaky ducts, typically wasting 30 percent or more.

Tune-up the heating and cooling system
Proper maintenance saves energy and improves comfort and safety.

Upgrade to a correctly sized ENERGY STAR® furnace
A new ENERGY STAR® furnace will run more quietly and keep you warm all winter for less money.

Hire a Professional

Don't trust just anyone to make your improvements. Trying to save a little can sometimes cost you more in the long run. Instead, find one or more licensed specialty contractors who have the knowledge, tools, and skills to do each job right. You may want to consider a "building performance" contractor who is a licensed general contractor and is specially trained and certified to help address all of the energy and comfort improvement opportunities in your home and make them work together as an efficient system. The Contractors State License Board website www.cslb.ca.gov provides more information on how to choose a qualified contractor.

Making WISE IMPROVEMENTS

Do it Yourself

Some improvements are so easy and inexpensive, you don't need a HERS rating to know they pay back quickly:

- Replace incandescent bulbs with ENERGY STAR® compact fluorescent lamps (CFLs).
- Replace all nightlights and holiday lights with light-emitting diodes (LEDs).
- Choose ENERGY STAR® appliances, computers, and televisions.
- Install low-flow showerheads and faucet aerators.
- Insulate the first 5 feet of pipes from the cold and hot water heater.
- Add or repair weather stripping on all doors and windows.
- Use caulk and spray foam to fill all visible air gaps.
- Clean or replace furnace air filters monthly.
- Plant shade trees.

Energy Wise HABITS

These no-cost tips will help reduce the energy consumption in your home:

- Turn off lights and computers when not in use.
- Use a power strip for televisions, DVD players, VCRs, and chargers, and turn off power to the strip when not in use.
- Recycle burned-out CFL bulbs, fluorescent tubes, televisions, computer monitors, and all other electronic waste.
- Unplug and recycle any inefficient old refrigerators and freezers.
- Use appliances efficiently. Use your dishwasher and clothes washer for full loads only. Use the cold water setting on your clothes washer when possible.
- Turn down the water heater to 120 degrees Fahrenheit.
- Use your drapes properly. In the summer, close your drapes during the day. In the winter, open your drapes during the day and close your drapes at night.
- Open your windows for natural ventilation on cool summer mornings and nights.

A $100 per month reduction in your utility bills frees up enough cash to pay for a $17,000 increase in your mortgage (assuming 6 percent interest over 30 years).

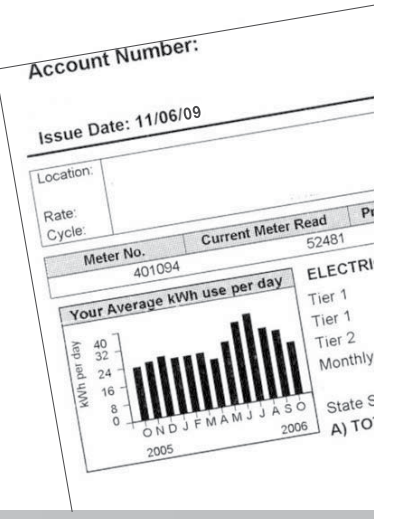
Utility Bills & RATINGS

Home energy efficiency ratings are designed to help you focus on the physical features of the house – not on other factors that can affect energy consumption like unusual weather or personal energy use habits.

Utility bills give a personal perspective: the history of how much energy the occupants of the home actually used over a period. Unless you consider a rating coupled with the utility bills, you may get only half of the story.

As a potential buyer, you should always ask to see the previous occupant's energy bills. While sellers are not obligated to share their utility bills, many will if asked.

If the old bills have not been saved, current occupants can access their records by calling the local utility or by setting up an account on the utility's website. Your HERS Rater can assist you in obtaining the bills and will consider them to establish a more complete picture of your home energy use to make the best recommendations for improvements. A Home Buyers' Energy Checklist that helps buyers ask questions related to the home's energy use is available at: www.energy.ca.gov/HERS/index.html.



Energy efficiency is different than energy consumption. Efficiency depends upon the physical features of the home and all the equipment it contains. Consumption is reduced through efficiency but also depends on the energy use behavior of the occupants. Wasteful habits, unusual weather, or malfunctioning equipment can drive up energy bills, even in the most energy-efficient house in the neighborhood.

After your mortgage payment, your energy bill is often the second largest monthly home ownership expense.

Financing your IMPROVEMENTS

If you are buying or refinancing and looking for a way to finance your energy improvements, you should get advice from a knowledgeable real estate agent or lender about the many new options now available. The federal government, Fannie Mae/Freddie Mac, and many major lenders are introducing new products to help you fund your energy efficiency improvements. Some cities and counties also have programs that allow homeowners to finance efficiency improvements and solar installations over 20 years.

Principal
+ **I**nterest
+ **T**axes
+ **I**nsurance
+ **E**nergy

True cost of owning your home

You may also be able to qualify for an Energy Efficient Mortgage (EEM). An EEM is a loan program that recognizes the importance of the energy efficiency of a home and allows for cost-effective energy upgrades to be financed in the mortgage. A HERS rating is required to qualify for an EEM. These loans provide borrowers the opportunity to make energy efficiency improvements to their homes and gain several desirable benefits including:

- Provide the ability to roll the cost of your efficiency improvements into a low mortgage rate.
- May stretch your debt-to-income qualifying ratio.
- Enjoy your improvements and energy savings right away.
- Earn a higher resale price when you sell.

Best of all, you get to enjoy all the benefits of your home improvements for the same total monthly cost (PITI+E)…or maybe even less.

EEM programs are available from:

- Federal Housing Authority (FHA)
- Veterans Administration (VA)
- Conventional lenders (Fannie Mae, Freddie Mac)
- Other home-buyer or refinancing programs

Combine an EEM with other programs and you may be able to borrow up to $40,000 or more for efficiency improvements. Ask a knowledgeable lender if an EEM is right for you.

Another way to finance energy improvements is through an equity loan or equity line of credit. If your HERS rating is low enough, some lenders may offer a "green" mortgage or equity line of credit at a discount relative to their regular interest rates or points. Shop around to see if these products make sense for you. Utilities also offer financial incentives such as re-bates, for energy smart improvements, such as:

- Added insulation
- ENERGY STAR® appliances
- Refrigerator recycling
- High-efficiency heating and air conditioning systems
- Compact fluorescent light fixtures
- Whole-house fans, cool roofs, swimming pool pump motors, and more

Contact your local utility for information on their program offerings. Manufacturers also offer discounts or rebates on efficient products so check their websites or with a retailer for possible offers.

Efficiency
ADDS VALUE

It's no secret; energy efficiency features may make your home more valuable and sell faster.

Federal tax credits now available include:

10 percent of the cost, up to $500 or a specific amount from $50-$300, through 2011 (existing homes only) for:

- Windows and Doors
- Biomass Stoves
- Insulation
- Roofs
- HVAC
- Water Heaters

30 percent of the cost, with no upper limit through 2016 (existing homes and new construction) for:

- Geothermal Heat Pumps
- Small Wind Turbines (Residential)
- Solar Energy Systems

For more news on energy efficiency tax credits, visit: **www.energystar.gov/taxcredits**

Did You Know?

- A study of energy-efficient homes in The Appraisal Journal showed that a $1 reduction in annual energy bills resulted in more than $10 increase in resale value.
- A past president of the California Association of Real Estate Appraisers recommends that appraisals account for any efficiency improvements because they "so contribute to the habitability, enjoyability and economic stability of the home."
- FHA authorizes the cost of energy efficiency measures to be added to the mortgage.
- Home builders find that homes with efficiency and solar electricity upgrades sell faster and at higher prices than similar homes nearby.

Make sure your real estate agent knows about any efficiency improvements you have made, let buyers know your home is "Energy-Rated," and give the appraiser a copy of your HERS Report.

The energy used in the average home produces roughly twice as much greenhouse gas pollution as the average car (US EPA).

Once you have made all appropriate energy efficiency improvements, you may also want to consider solar electric generation.

If you have already decided on the size of solar electric system, investing in energy efficiency measures first will allow your solar system to power more of your home's electricity need. Plan ahead and don't oversize your new solar electric system to power an energy-inefficient house. Your HERS Rater will show you how.

California has set a goal to generate 3,000 megawatts of new, solar-produced electricity by 2017 — moving the state toward a cleaner energy future and lowering the cost of solar systems for all consumers. The California Solar Initiative offers incentives up to 30 percent off the installed cost of a solar system for a typical home. This discount may be combined with any federal tax credits or other incentives available.

Visit
www.gosolarcalifornia.ca.gov
for details.

Notes:

The California Energy Commission does not endorse any product, supplier, manufacturer, builder or organization.

The text in this booklet is designed to be informational and not all-inclusive.

ACKNOWLEDGEMENTS

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Need Help? Call the Energy Hotline (800) 772-3300 or (916) 654-5106

CEC-400-2009-008-BR-REV1
June 2011

Prepared by:
Architectural Energy Corporation
San Francisco, California
Contract No. 400-05-020

Photo on page 4 courtesy of The Energy Conservatory.
Photos on page 7 courtesy of: National Renewable Energy Laboratory, CertainTeed, and Carrier.

Home Buyer's Energy Efficiency Checklist

☐ Have any energy efficiency improvements been made?

- ☐ Windows
- ☐ Doors
- ☐ Appliances _____
- ☐ Heating/Air Conditioning
- ☐ Water System
- ☐ Insulation
- ☐ Duct Sealing

☐ Has there been an energy inspection/audit/check-up or assessment?

_____

☐ If yes, who performed the audit and was a written report or a score given?

_____

UTILITY BILLS:

☐ Ask the seller for the utility bills of the past 12 months.
If the seller does not have this information, ask them to check with their utility company for a report.

HEATING AND COOLING SYSTEMS:

☐ Have the heating and air conditioning system(s) been replaced?

☐ Does the heating system have an ENERGY STAR® label?
This means that the system exceeds Government energy standards.

☐ Look for the EnergyGuide label on the heating system. If it's missing find the brand and model number on the furnace, then check with the dealer or manufacturer for A.F.U.E. rating.

☐ Is there a programmable thermostat that controls the heating and air conditioning?

INSULATION:

- ☐ Does the homeowner know if there are proper amounts of insulation in the ceiling and attic?
- ☐ Is the attic access insulated and weatherized/sealed?
- ☐ Is the insulation in the attic evenly installed with no holes or gaps except around vents and some recessed light fixtures?
- ☐ Are the outlets, fixtures, and switch plates properly insulated so that you cannot feel air movement when you put a hand in front of them?

WINDOWS AND DOORS:

- ☐ Are the window and doorframes caulked on the inside and weather-stripped? Run your hand around them to see if they are sealed tightly. Can you feel any air coming in? Is there excessive moisture or condensation visible on the glass?
- ☐ *Are the windows* ENERGY STAR®? Do the sellers have manufacturer's information about the windows?
- ☐ Are the windows made of double pane glass? *Double pane insulating glass should be used throughout the house.*
- ☐ If not, are the window frames of good quality? *Window frames and their quality construction and installation are as important as the insulating value of the glass. Wood, vinyl, composite, and fiberglass frames offer the best insulating value today.*
- ☐ Is the entrance door protected from the cold outside air by a storm door or a vestibule?
- ☐ Are the exterior doors insulated and weather-stripped?
- ☐ Is the weather-stripping in place so that it stops air filtration into the house? *Place your hand around the door; you may be able to feel the air coming into the house.*

AIR LEAKAGE:

☐ If there is a fireplace, does the fireplace damper fit tightly so that you cannot see light or a gap around the closed damper? *A great deal of heating and cooling can be lost up the chimney if the damper is not tightly sealed.*

☐ Do kitchen, bath, and laundry exhaust fans have positive-closure dampers?

APPLIANCES:

☐ Look for the ENERGY STAR® label or an Energy Guide label that indicates energy efficiency or consumption on each kitchen appliance.

SHADING & SCREENING:

☐ Is there landscaping around the home that can block the high summer sun and the winter winds?

☐ Are there roof overhangs that help shade the wall and windows?

WATER SYSTEM:

☐ Is the water heater energy efficient? Look for the Energy Guide label to learn the energy consumption. You can also check efficiency by noting the fuel type, brand, and model. Look for the ENERGY STAR® label which ensures energy efficiency.

☐ Are the hot water pipes wrapped with insulation? Is the hot water heater wrapped with an insulating blanket? *Note: Newer models of hot water heaters do not require an insulation blanket.*

☐ Are the showerheads low-flow to save on hot water? *Flow restrictors can cut the flow of water by 40-60 percent.*

☐ Are the faucets free of leaks? Do the faucets have aerators? *Aerators will lower the gallons per minute used by close to 50 percent without sacrificing pressure.*

LIGHTING:

☐ Are there any CFLs in the house? *If there are no CFLs, start by replacing your five most frequently used incandescent bulbs with compact fluorescent light bulbs once you move in. (Go to* ***www.energystar.gov/cfls*** *to download the "CFL Purchasing Guide.")*

ASK YOUR HOME INSPECTOR:

- ☐ Check insulation and confirm R-value.
- ☐ Is the rim joist insulated where the floor joists end at the top of the basement wall?
- ☐ Are the sill plates insulated, sealed, or caulked to reduce infiltration?
- ☐ Are the heating ducts and hot water pipes that pass through unheated areas sealed and insulated and pipes that pass through heated areas sealed? *Energy loss from the duct system can be as much as 15 to 25 percent of the heating and cooling bill.*
- ☐ Are all heating elements operating properly? *After the thermostat is turned up 5 degrees, hot water and steam radiators should provide heat within 15 minutes and all forced or gravity hot-air registers should provide heat in 5 minutes.*
- ☐ Are there outside combustion air intakes for furnaces and fireplaces?
- ☐ Is the attic ventilated using soffit or roof vents?

FINANCIAL:

If the home is energy efficient, you may qualify for an "Energy Efficient Mortgage" (EEM) or special financial incentives. If you choose to make energy efficient improvements (EIM) you may be eligible for special financing options and tax incentives. Ask you real estate agent and/or lender about them. Additional information on financing energy improvements is available in the Booklet, *What Is Your Home Energy Rating?* at: www.energy.ca.gov/HERS/booklet.html.

To learn more about energy resources and how to use them wisely in your home, incentives and rebates, and other consumer tips and videos, visit the Consumer Energy Center at: www.consumerenergycenter.org.

NOTES:

Notes:

CUT HERE

The California ENERGY COMMISSION

Property Address:

_____

_____

I have received a copy of the **WHAT IS YOUR HOME ENERGY RATING?** booklet (CEC-400-2009-008-BR-REV1)

_____ Buyer's Signature	_____ Printed Name	_____ Date
_____ Buyer's Signature	_____ Printed Name	_____ Date
_____ Buyer's Agent Signature	_____ Printed Name	_____ Date
	_____ Broker's Name	
_____ Seller's Signature	_____ Printed Name	_____ Date
_____ Seller's Signature	_____ Printed Name	_____ Date
_____ Listing Agent's Signature	_____ Printed Name	_____ Date
	_____ Broker's Name	

ALL SIGNERS SHOULD RETAIN A COPY OF THIS PAGE FOR THEIR RECORDS

California Civil Code Section 2079.10 states that if this booklet is provided to the buyer by the seller or broker, then this booklet is deemed to be adequate to inform the home buyer about the existence of California Home Energy Rating Program.

For more information, visit: www.energy.ca.gov/HERS/index.html

I found the booklet, *Residential Environmental Hazards and Homeowner's Guide to Earthquake Safety* (with gas shut-off valve update) which includes the Federal Lead booklet and Toxic Mold Update:

- ❑ Helpful
- ❑ Too detailed
- ❑ Clearly written
- ❑ Confusing
- ❑ Not detailed enough

- ❑ The booklet helped me to locate earthquake weaknesses in my home.
- ❑ I have strengthened my home to resist earthquakes.
- ❑ I plan to fix my home's earthquake weaknesses.
- ❑ The booklet helped me to find out that my home did not have any earthquake weaknesses.

The year my home was built _____.

Comments _____

_____

We Want To Hear From You!

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Telephone: (916) 263-5506 • www.seismic.ca.gov

To Whom it May Concern: I have received a copy of the March 2017 edition of the Environmental Hazards and Earthquake Safety booklet which incorporates the Federal "Protect Your Family From Lead" pamphlet, "Renovate Right" guide, California "Mold in My Home" pamphlet, "Home Buyer's and Seller's Guide to Radon," California "Natural Gas Safety and Shutoff Valve Information," "Homeowner's Guide to Earthquake Safety," "Residential Environmental Hazards," California Energy Commission "Home Energy Rating System (HERS)" booklet and the "Home Buyer's Energy Efficiency Checklist."

Property Address: _____

Date_____ **Time**_____		_____ (Received Buyer's Signature)	_____ (printed name)
Date_____ **Time**_____		_____ (Seller's Signature)	_____ (printed name)
Date_____	_____ (Seller's Agent's Signature)	_____ (printed name)	_____ (Broker's name)
Date_____	_____ (Buyer's Agent's Signature)	_____ (printed name)	_____ (Broker's name)

NOTE: For applicable transactions, it is necessary to complete C.A.R. Standard form FLD 11 (Lead-based paint and Lead-based paint hazards Addendum, Disclosure and Acknowledgment).

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To order this book in quantity please write:
ValForms Inc., P.O. Box 2430 Dublin, CA 94568-0242 or call 925-461-0570.

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HOME BUYER COVERAGE

Select Plan Coverage	Standard Coverage	Ultimate Protection	Platinum Protection
	$295	**$425**	**$520**
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– $75 – Trade Call Fee	**$260**	**$375**	
		Home Buyers: Add Washer/Dryer AND Kitchen Refrigerator for only $90 more!	

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Single Family Home	81¢/day	$1.16/day	Not Available
Condo/Townhome/Mobile Home	71¢/day	$1.03/day	

COVERED			
Primary Gas, Oil or Electric Heater	✔	✔	✔
Ductwork	✔	✔	✔
Limited Pest Control	✔	✔	✔
Drain Line Stoppages	✔	✔	✔
Plumbing Pipe Leaks (including Polybutylene)	✔	✔	✔
Toilets	✔	✔	✔
Water Heater	✔	✔	✔
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Recirculating Pump	✔	✔	✔
Instant Hot/Cold Water Dispenser	✔	✔	✔
Garbage Disposal	✔	✔	✔
Water Pressure Regulator	✔	✔	✔
Sump Pump	✔	✔	✔
Electrical System	✔	✔	✔
Exhaust, Attic, Ceiling, Whole House Fans	✔	✔	✔
Garage Door Opener	✔	✔	✔
Central Vacuum	✔	✔	✔
Dishwasher	✔	✔	✔
Trash Compactor	✔	✔	✔
Kitchen Exhaust Fan	✔	✔	✔
Oven/Range/Cooktop	✔	✔	✔
Built-in Microwave Oven	✔	✔	✔
Ultimate Protection			
Air Conditioner/Cooler		✔	✔
Ultimate Enhancements		✔	✔
Refrigerant Recapture, Reclaim and Disposal		✔	✔
Code Upgrades		✔	✔
Permits		✔	✔
Haul Away		✔	✔
Cranes		✔	✔
Platinum Protection			
Increased Coverage for Plumbing items			✔
Increased Coverage for Stoppages			✔
Modification (with Additional Code Upgrades)			✔
Increased Coverage for specific HVAC Systems			✔

OPTIONAL COVERAGE • HOME BUYER ONLY

Ultimate (Air Conditioner Not Included)	$ 85
Air Conditioner/Cooler (Electric)	$ 70
Swimming Pool/Spa Equipment includes Salt Water Circuit Board and Cell (No additional charge if separate equipment)	$ 170
• Solar Pool/Spa Components (Only available with Pool/Spa Equipment Coverage)	$ 250
Solar Hot Water System	$ 250
Limited Roof Leak Repair	$ 100
Washer/Dryer (Per Set)	$ 80
Washer/Dryer/Kitchen Refrigerator (When purchased with **Standard Coverage**)	$ 115
Washer/Dryer/Kitchen Refrigerator (When purchased with **Ultimate** or **Platinum**)	$ 90
Kitchen Refrigerator (Located in Kitchen) Coverage for one Freestanding or one Built-in Unit (Single or Dual Compressor), and Ice Maker.	$ 50
• Additional Refrigeration Units (Only available with Kitchen Refrigerator Option)	$ 50
Ornamental Fountain	$ 75
Water Softener/ Reverse Osmosis Water Filtration System	$ 75
Well Pump	$ 100
Booster Pump	$ 75
Enhanced Slab Leak Limit/ External Pipe Leak Coverage	$ 100
Septic Tank Pumping/Septic System/Sewage Ejector Pump — *Basement Bath? Check out this coverage!*	$ 90

ADDITIONAL PLAN TYPES FOR HOME BUYER ONLY	STANDARD	ULTIMATE PROTECTION
New Construction (Years 1-4 or 2-5)	$ 455	$ 585
Multiple Unit Properties		
Duplex	$ 425	$ 620
Triplex	$ 620	$ 915
Fourplex	$ 825	$1,225

For cost of Optional Coverage for multiple unit buildings, multiply option cost by the number of units
Platinum Protection: Not available to Multiple Units or New Construction

For homes 5,000 sq. ft. or over, or guest homes, please call for quote.

See Old Republic Home Protection Plan for details of coverage.

OLD REPUBLIC HOME PROTECTION

You've come to the right place for superior ***budget protection***, ***convenience***, and ***peace of mind***.

Why choose Old Republic Home Protection?

We've provided caring, dependable service for **more than 40 years**, and our vision of "People Helping People" is reflected in our **A+ rating with the Better Business Bureau.**

How do we earn this distinction? We understand that behind every service request—every dishwasher or water heater failure—are real people with busy lives and pressing needs. We're committed to providing effective, efficient solutions that help you celebrate the joy of homeownership!

When you turn to us, our caring staff and skilled Service Providers make it their mission to get your life back to normal as quickly as possible.

People Helping People℠

We Care – we handle claims on a case-by-case basis: fast, friendly, efficiently.

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