

# Pre-Retrofit Assessment of Hazardous Materials

Remove or remediate hazardous materials that will be affected by the retrofit work or that may impact indoor air quality. The U.S. Environmental Protection Agency (EPA) document, [Healthy Indoor Environment Protocols for Home Energy Upgrades](#) [1], provides guidance on a number of hazardous materials including asbestos, lead, polychlorinated biphenals, and radon (along with other soil gases). It also talks about the role that tobacco smoke and home furnishings play as potential sources of indoor pollutants. The protocols provide additional information on all of the materials described here. Other references are included with each topic.

## Asbestos



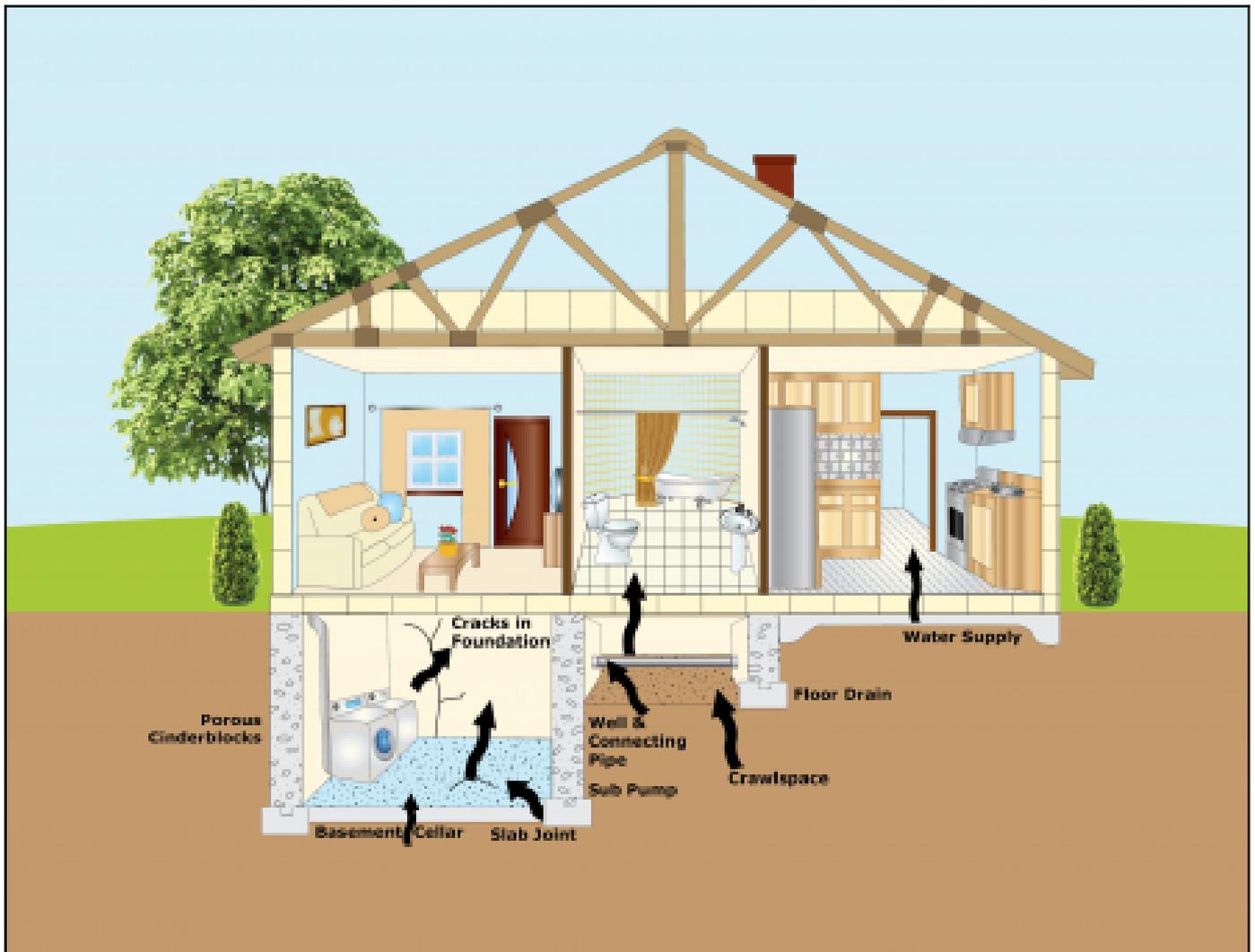
Vermiculite insulation between attic joists (image courtesy of [EPA](#) [2]).

Asbestos is a naturally occurring silicate mineral that has historically been used in building materials. Cutting, tearing or abrasion of asbestos materials can release asbestos fibers into the air. If inhaled, the asbestos particles can cause lung cancer and other forms of [lung disease](#) [3]. Examples of materials that might contain asbestos include vermiculite insulation in attics and walls, tape used to seal old ducts, insulation on steam pipes and ducts, door gaskets in furnaces, plaster in old houses, vinyl flooring, and wall cladding. To find out more about asbestos, see the [EPA's asbestos website](#) [4].

## Volatile Organic Compounds

Volatile organic compounds (VOCs) include formaldehyde and a variety of other chemicals, some of which may have short- or long-term adverse health effects. VOCs can be found in insulation, cabinetry, carpets, paints, and stains. The U.S. Environmental Protection Agency's [Indoor airPLUS Program](#) [5] recommends choosing no- and low-VOC versions of these types of products for installation in the home. The Building America Solution Center includes guides to help contractors meet the requirements of the EPA's Indoor airPLUS [checklist](#) [6]. VOC-containing products such as solvents, cleansers, coatings, and fuels are often stored in the garage. Attached garages should be well sealed from living spaces and possibly ventilated with an exhaust fan as described in these [guides](#) [7]. Furnace and air conditioner ducts and air handlers should not be located in garages, which could enable the spread of pollutants throughout the house as described in the guide [No ducts or equipment in garages](#) [8]. Flammable solvents and fuels should not be stored in any part of a residential structure. To find out more about VOCs, visit the EPA's [website on indoor air quality and volatile organic compounds](#) [9].

## Soil Gases including Radon



Radon can move up from the ground into buildings through openings in floors or walls that are in contact with the ground. (Image courtesy of [EPA](#) [10]).

Air sealing to reduce heat loss may also reduce natural air changes in the home that dilute soil gases or indoor air pollutants, leading to increased concentrations of soil gases in the home. Air sealing steps should include air sealing of any cracks in and around the subfloor to minimize soil gas entry. A vapor barrier should be installed over any bare earth floor in a home's basement or crawlspace; the polyethylene sheeting should be taped at all seams and sealed to the walls as described in the guide [Capillary Break at Crawlspace Floors - Polyethylene Lapped Up Walls and Piers or Secured in the Ground](#) [11]. If you are detecting oil, gasoline, or sewer gas odors inside the home, investigate to determine the cause. A plumber or remediation specialists may be needed to mitigate the issue. See Step 2 in the Existing Homes Tool on ensuring fresh air, which includes sections on providing ventilation and radon mitigation. Also see the [Indoor airPLUS checklist](#) [6] in the Building America Solution Center. The EPA has more information on reducing radon and other soil gases at the [Indoor airPLUS program website](#) [5] and the [EPA website on radon](#) [12].

For information on radon mitigation systems see the following guides: [Vertical Radon Ventilation Pipe](#) [13] and [Radon Fan](#) [14].

## Lead

In homes built before 1978, retrofit workers should assume that paint is lead based. Any work on window frames and other painted surfaces should follow all state and federal laws for handling hazardous materials. Follow the most current version of EPA's [Lead Renovation, Repair, and Painting Program Rules](#) [15].

## Safety

During any hazardous materials remediation projects, follow safe work practices to minimize impacts to workers' and occupants' health. See the U.S. Department of Energy's [Standard Work Specifications](#) [17] for more information about hazardous materials in homes.

## More Info.

Access to some references may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our [webmaster](#) if you find broken links.

### References and Resources\*

1. [Healthy Indoor Environment Protocols for Home Energy Upgrades](#)  
**Author(s):** U.S. Environmental Protection Agency  
**Organization(s):** EPA  
**Publication Date:** December, 2014  
*This publication provides a set of best practices for improving indoor air quality in conjunction with energy upgrade work in homes.*
2. [Indoor airPLUS Construction Specifications Version 1 \(Rev. 03\)](#)  
**Author(s):** U.S. Environmental Protection Agency  
**Organization(s):** EPA  
**Publication Date:** October, 2015  
*Document outlining specifications that were developed by the U.S. Environmental Protection Agency (EPA) to recognize new homes equipped with a comprehensive set of indoor air quality (IAQ) features.*
3. [Lead Renovation, Repair and Painting Program Rules](#)  
**Author(s):** U.S. Environmental Protection Agency  
**Organization(s):** EPA  
**Publication Date:** June, 2010  
*EPA's 2008 Lead-Based Paint Renovation, Repair and Painting (RRP) Rule (as amended in 2010 and 2011), aims to protect the public from lead-based paint hazards associated with renovation, repair and painting activities.*
4. [Radon Mitigation Standards](#)  
**Author(s):** U.S. Environmental Protection Agency  
**Organization(s):** EPA  
**Publication Date:** January, 1994  
*Standard providing information on contractors who offer radon control services to homeowners.*
5. [Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers Version 1.1 \(California 01350\)](#)  
**Author(s):** Division of Environmental and Occupational Disease Control  
**Organization(s):** California Department of Public Health (CDHP)  
**Publication Date:** February, 2010  
*Detailed requirements for testing, exposure modeling, and allowable limits for modeled indoor air concentrations.*
6. [Standard Work Specifications for Home Energy Upgrades](#)  
**Author(s):** National Renewable Energy Laboratory  
**Organization(s):** NREL  
**Publication Date:** June, 2017  
*Standard Work Specifications (SWS) are a major component of the Guidelines for Home Energy Professionals project and define the minimum requirements to ensure that the work performed during home energy upgrades is effective, durable, and safe.*
7. [Technical Guidance to the Indoor airPLUS Specifications](#)  
**Author(s):** U.S. Environmental Protection Agency  
**Organization(s):** EPA  
**Publication Date:** October, 2015  
*Website providing technical guidance to help home builders and their subcontractors, architects, and other housing professionals understand the intent and implementation of the specification requirements of the IAQ labeling program.*

\*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

### Contributors to this Guide

The following authors and organizations contributed to the content in this Guide.

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