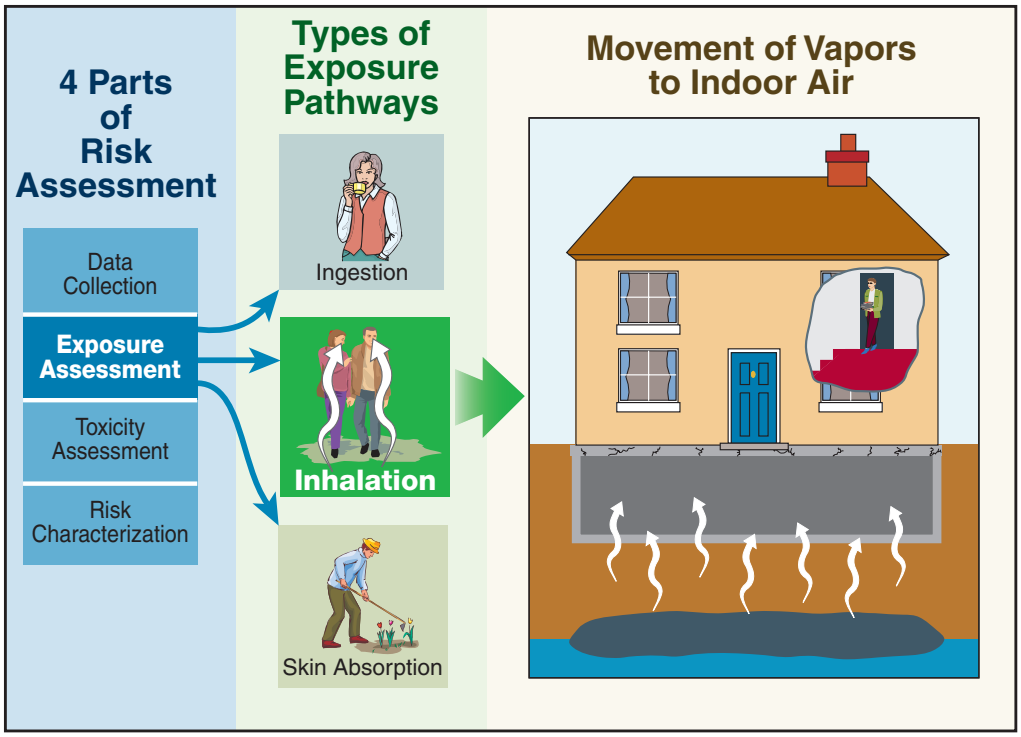
Indoor Air and Risk Assessment

Fact Sheet



What Is Risk Assessment?

Risk assessment is a process used to estimate the likelihood that human health problems are occurring, or will occur, due to chemicals present at a site. It is used to make decisions about a site, including whether cleanup of a site is needed and how much cleanup is needed. Generally, risk assessment involves several steps:

- data collection
- exposure assessment
- toxicity assessment
- risk characterization

Although each of these steps in risk assessment is equally important, this fact sheet is focused on one aspect of risk assessment—exposure assessment. More specifically, this fact sheet focuses on inhalation of indoor air as an exposure pathway, as illustrated in the figure above. General information on risk assessment can be found in the companion fact sheet entitled *Risk Assessment*.

Indoor air quality must be considered when conducting a risk assessment that involves a site where buildings are located above or near contaminated soil or groundwater.

How Does Exposure Assessment Relate to Indoor Air Quality?

Exposure assessment involves determining how much hazardous chemicals we may come into contact with and how we may come into contact with them. The ways people are usually exposed to hazardous chemicals include eating (ingestion), breathing (inhalation), and skin contact (dermal absorption).

If a chemical evaporates easily into the air, or "volatilizes," we may come into contact with it by breathing the chemical in, even if the source is located beneath the ground. For this reason, indoor air quality must be considered when conducting a risk assessment that involves a site where buildings are located above or near contaminated soil or groundwater.

How Do We Estimate the Amount of Chemical that Can Reach Indoor Air?

To determine the amount of chemical that may reach indoor air, we need information on the properties of the soils underneath the site and the chemicals present at the site. This information is used to estimate how these chemicals may move through the underground as a vapor to reach the inside of a

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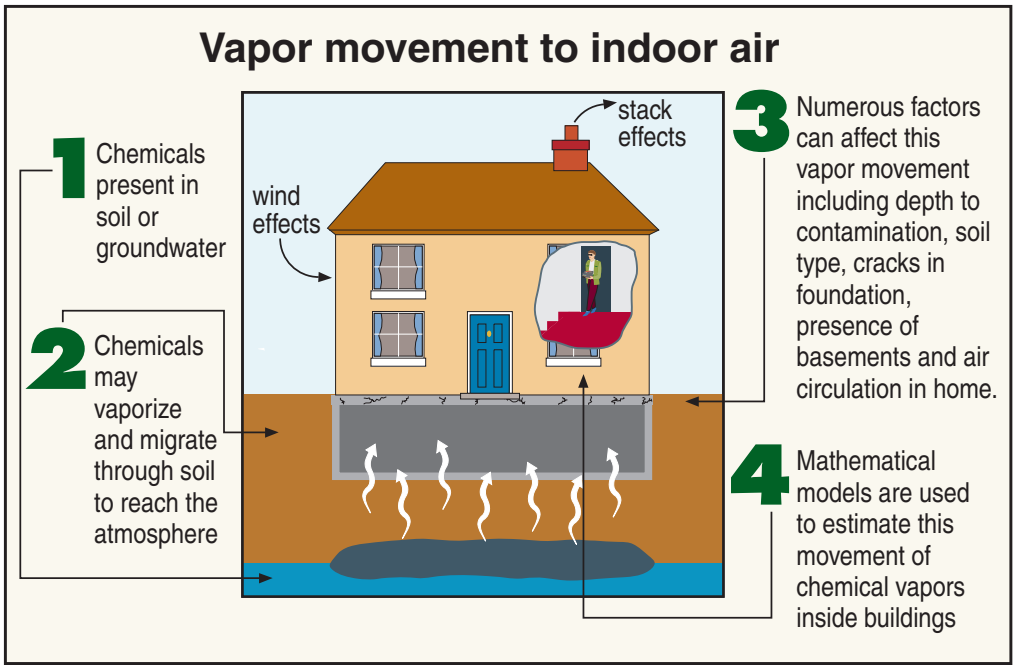

building. In addition to properties of the soil and chemicals, additional information may be needed:

- building size
- size and number of cracks in foundations
- depth of building basement
- air circulation within a building

It can sometimes be difficult to determine the amount of contact people may have with a contaminant when the chemical moves through the environment and reaches us indirectly through the air. To estimate the amount of chemicals reaching the indoor air, scientists use "exposure models." Exposure models are simply groups of equations that describe mathematically how we believe chemicals move in the environment to reach us (for example, how chemicals move from soil to air.) One accepted model developed by the U.S. Environmental Protection Agency used to estimate the movement of chemicals from underground to indoor air is called the Johnson-Ettinger model (JEM).

How Does the Johnson-Ettinger Model (JEM) Work?

JEM is a widely used and accepted exposure model for determining the amount of contaminants that may reach indoor air. By using groups of equations that mathematically describe how chemicals may move in the environment, JEM can estimate the amount of contact a person might have with a chemical. JEM provides only an estimate; it is not an exact measure of chemical movement and cannot be used in every risk assessment scenario

Why Don't We Just Measure the Amount of Chemical Present in Indoor Air?

Often, in conjunction with estimating chemicals in indoor air through modeling, scientists will also physically measure the amount of chemicals in air. This step is often taken to help verify the results of the indoor air modeling. However, physically measuring the amount of a chemical that is present in indoor air is only a "snapshot" in time. Indoor air quality can change due to seasonal variations as well as the presence and activities of people inside a home at any particular time. For these reasons, modeling is used as an additional tool to predict chemicals in indoor air over various time frames.

For more information on risk assessment and indoor air modeling contact:

AFIERA companion fact sheet "Risk assessment"

Other contacts...

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