



Environmental Health Information

Arsenic

September 2007

What is arsenic?

Arsenic is a naturally occurring substance found in the earth's crust. Arsenic can be found in air, groundwater, soil, rocks and in metal ores like lead or copper. Arsenic cannot be destroyed, but it can change chemical forms.

Industrial uses of arsenic in the past included pesticides, fertilizers, and 'dips' to protect animals from ticks and other pests. Before 2003, copper-chromated arsenic (CCA) was widely used as a wood preservative in construction of houses, playgrounds, decks and other residential structures. While treated wood containing arsenic has been phased out for these uses, it can still be used for non-residential structures. In addition, older decks and play structures made from CCA-treated wood remain in use.

How can I be exposed to arsenic?

You could be exposed to arsenic by:

- Eating or drinking small amounts in food and water.
- Breathing in sawdust or smoke from wood treated with arsenic that is being cut or burned.
- Applying pesticides or soil supplements that contain arsenic.
- Taking food supplements or medications that contain arsenic.
- Giving animals medications or treatments that contain arsenic.
- Working in jobs like lead or copper smelting, pesticide or fertilizer manufacture or application.
- Swallowing small amounts of soil containing arsenic while playing or gardening.

How can I avoid exposure to arsenic?

- Never burn CCA pressure-treated wood! If you want to burn scrap wood but are not sure whether it is pressure-treated, do not burn it.
- If you have well water, get it tested for arsenic. If you have high levels of arsenic in well water, you may buy treatment systems for your well water. Your local environmental health department can assist you with more information.
- If you have a deck or other home structures made of pressure-treated wood, seal them every six months to two years.
- If your children play on a playground with pressure-treated wood structures, make sure they wash their hands after playing.



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- If the soil in your yard contains elevated levels of arsenic, seed, sod or cover any bare spots. Take your shoes off before coming in the house so that you don't track soil into the house, and vacuum regularly. Always wash your hands before eating or drinking. Use gloves when you garden. Even though arsenic is not easily absorbed by plants, you should thoroughly wash and peel any vegetable grown in this soil to remove any soil dust on the outside.
- Check any old pesticides or soil supplements you have to see if they contain arsenic. If you do not know whether they contain arsenic, do not use them, and contact the Minnesota Department of Agriculture at 651-201-6562 to find out about where you can safely dispose of them. For more information about arsenic and other metals in fertilizers, see Heavy Metals in Fertilizers at <http://www.health.state.mn.us/divs/eh/risk/studies/metals.html>.

What are the health effects of arsenic?

The health effects of arsenic depend on its chemical form, how much enters the body, how it enters the body, how long it stays in the body and the unique health situation of the person.

In nature, pure arsenic is rare. It is usually combined with other elements to form "compounds." Arsenic in compounds containing carbon is called "organic arsenic." When arsenic combines with other elements, such as oxygen, chlorine, or sulfur, it is called "inorganic arsenic." Arsenic in soil, rock, and water is often inorganic.

Usually, organic forms of arsenic are less harmful than inorganic forms. A one-time oral dose of 60,000 micrograms (μg) of inorganic arsenic is fatal for most people. Although this amount is about 1/50 the weight of a penny, it is very large compared to amounts naturally present in water, soil, food, or air. Most people consume about 6 micrograms of inorganic arsenic per day from food and water.

Human epidemiological studies have shown that exposure to relatively high levels of arsenic for many years causes skin problems and increases the risk of cardiovascular disease and certain cancers (e.g., skin, bladder and lung).

Arsenic also naturally occurs in small amounts in some of the foods we eat. About two-thirds of the arsenic in food is in the organic (less harmful) form. Organic arsenic is found in some foods like fish and shellfish. Rice and brown seaweed can contain very small amounts of the inorganic (harmful) form of arsenic.

There is no clear evidence that arsenic benefits humans in any way, but very small amounts are not likely to be harmful.

Are there medical tests to see whether I have been exposed to arsenic?

Although there are tests for measuring arsenic in urine, hair and fingernails, the results of these tests may be difficult to interpret. Tests of hair and fingernails can sometimes be used to measure exposure to very high levels of arsenic over the past several months. However, tests of hair and fingernails are not always reliable because results may come from arsenic in dirt on the outside of the hair or nails rather than from what is actually in the body.

A urine test can look for arsenic exposure only within the last several days. A urine test may also show arsenic if you are eating seafood which has organic arsenic. If a urine test shows a high level of arsenic, you may need to change your diet and be tested again. Or, you can request a

special test that tells which form (organic or inorganic) of arsenic is present. Again, organic arsenic, like in shellfish, is not harmful.

If you have elevated levels of arsenic in your soil or water, the most important action you can take is to limit future contact with arsenic. A medical test for arsenic may be negative, but it cannot rule out or measure what past exposures may have been.

Are there health standards for arsenic?

The EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

Levels of arsenic in soil from 5 ppm up to 20 ppm are generally viewed as safe, even if contact with arsenic at these levels continues for many years. If the level of arsenic in soil is within this range, the potential for any health effect is very small. In fact, contact with arsenic in soil even somewhat above these levels will likely have no health effects. However, if levels do exceed this range, another risk assessment may be done that looks specifically at the site being evaluated to determine what level will be safe for that particular situation.

As the level of arsenic increases, however, there is some slight increase in the likelihood of chronic health effects from contact over many years. This could include a very small increase in the risk of cancer, and cardiovascular disease. These diseases are widespread, have many risk factors and take many years to develop - - so the part that environmental exposure to arsenic plays in the risk of disease is generally quite small.

To decide what level of arsenic is safe for a specific site, risk assessors take into consideration many factors: how the site is used (for homes or industries), how people could come into to contact with arsenic (gardening, tracking into homes, eating soil), how it enters the body (breathing or swallowing), how much arsenic would enter the body (the dose), how the body handles arsenic and other ways (besides through soil) that people might also be coming into contact with arsenic.

While site specific clean up levels for arsenic in soil can fall within a range and still protect public health, contact with arsenic in soil at levels above 100 ppm is a threat to public health and requires action to prevent or reduce children's contact with the contaminated soil. Above this level, if a large amount of arsenic is ingested at one time (such as by a child who intentionally eats soil) there could be health effects such as gastrointestinal distress and facial swelling.

Other metals that may be found in urban environments, such as lead or cadmium, may also be a concern. Information on general soil sampling and testing for metals is available at <http://www.mda.state.mn.us/news/publications/chemfert/incidents/cmc-howtosample.pdf> .

For more information contact:

MDH/Site Assessment and Consultation: (651) 201-4897 or 1 (800) 657-3908, press "4" and leave a message.

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