Colorado Department of Public Health and Environment

Arsenic in Residential Soils in Metro Denver

In 1998, the Colorado Department of Public Health and the Environment (CDPHE) and the U.S. Environmental Protection Agency (USEPA) began sampling yards in northeast Denver neighborhoods for arsenic and lead. Initially, it was thought that elevated levels of metals in residential soils were the result of historic smelter activity. However, health agencies became aware that products containing high levels of arsenic and lead may have been used to control crabgrass and lawn pests and could be contributing to elevated levels of metals in residential soils. These lawn care products were available to residents not just in northeast Denver, but also throughout the metro area and elsewhere prior to 1973. Residual arsenic and lead levels in yards could pose a health concern to residents.

Currently, EPA, CDPHE, and the Denver Department of Environmental Health (DEH) are working together to better identify how widespread this arsenic problem may be, if there is a health risk and where it may have come from. In the meantime, there are a number of simple steps you can take to protect yourself and your family.

Frequently asked Questions about Arsenic in Metro-Area Residential Soils

Q: What is arsenic and where does it come from?

A. Arsenic is a mineral, occurring naturally in soils and in some foods. All of us have a small amount of arsenic in our bodies. Elevated levels of arsenic in soils are commonly associated with mining and smelting activities. However, a source of the arsenic found in some metro-area yards may come from pesticides widely available prior to 1973. While arsenic is still present in some products in and around the home, it is now regulated and it is in a less toxic form.

Q: Why should I be concerned about arsenic?

A. Studies show that people who are exposed to arsenic for long periods of time may be susceptible to certain types of cancer. They may also experience health problems other than cancer. It is important to note that most of these studies have focused on arsenic in food or water, not in soil.

Q. Could my property be contaminated?

A. Possibly. The only way to know for sure is to sample your property. A fact sheet on how to sample your property and a list of laboratories that can analyze your samples are available from CDPHE. Please contact Barbara O'Grady at (303) 692-3395 or at 1 (888) 569-1831 (3395), or by e-mail at barbara.ogrady@state.co.us for more information.

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Q. Is it safe to garden?

A. Gardens that were sampled had lower levels of arsenic than yards, and vegetables even lower levels than gardens. Remember to thoroughly wash garden soil from vegetables after taking them from the garden. A fact sheet on gardening is available from CDPHE.

Q. Are my pets safe?

A. Though it is rare, pets can be at risk from soils with high levels of arsenic because of their contact with the soil through playing in the yard and licking their paws and fur. If you are concerned, keep your pets out of areas with exposed soil.

Q. What can I do to protect my family and myself from exposure to arsenic that might be in our soil?

A. There are a number of things you can do. Outside, a variety of landscaping tips help reduce direct contact with soil and dust. Cover bare spots with grass or landscaping materials (e.g., wood chips, gravel, stepping stones, or ground cover plants). Inside, basic cleaning techniques can reduce the amount of soil and dust in your home including washing children's hands and toys often, and removing or wiping shoes and boots before entering your house. Keep windows and doors closed when it is windy. Change air conditioner and furnace filters at least every six months. Wash your hands after petting an animal that spends time outside. Avoid smoking and eating when your hands are dirty.

Q: Can you sample my property?

A. If you live in the City and County of Denver, DEH will sample your property free of charge. Funding is limited, so sampling will be done on a first come/first served basis until resources are depleted. Otherwise, homeowners can sample their own property. Refer to the fact sheet on sampling procedures available from CDPHE, which includes information about many local laboratories that can run low cost arsenic analysis.

Q. Can you clean up my property?

A. At this time, there is not enough information to know what cleanup measures are needed or even if they are necessary. If you sample your property, CDPHE will provide information about what your results mean and what steps need to be taken next, if any.

Q. Can lead be a problem, too?

A. Lead has frequently been associated with arsenic pesticides, so there could also be residual levels of lead in soil from past pesticide use. There are many other sources of lead in soil including old house paint and residues from leaded gasoline emissions. If you are concerned about lead in soil and you live in the City and County of Denver, contact Gene Hook, DEH at 720-865-5452 for more information; otherwise contact your local health department.

Q: What role do different agencies play in the response to Metro arsenic issues?

A. DEH, CDPHE, and EPA are working together to develop a workable response to this issue that will protect all residents in the Metro Denver area and throughout the state.

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Arsenic Fact Sheet

What is arsenic?

Arsenic is a naturally occurring element found in soil and rock. Small amounts of arsenic are naturally present in many foods. The major uses of arsenic are as wood preservatives and as agricultural pesticides.

How might I be exposed to arsenic?

- Eating food, drinking water, or breathing air with arsenic or arsenic dust in on or in it
- Eating dirt that has arsenic in it
- Breathing sawdust or smoke from wood treated with arsenic
- Living in areas with unusually high natural levels of arsenic in rock

How can arsenic affect my health?

- High levels of arsenic can cause: nausea and vomiting, weakness, anemia (problems in making enough red and white blood cells), abnormal heart beat, damage to blood vessels, and numbness in hands and feet.
- Eating or breathing low levels of arsenic for a long time can cause changes in skin color and the appearance of small "corns" or "warts" on the palms, soles, and torso.
- Skin contact with arsenic may cause redness and swelling.

How likely is arsenic to cause cancer?

- Studies show that arsenic can increase the risk of cancers of the lung, skin, bladder, liver, and kidney.

How does arsenic affect children?

- It is likely that health effects seen in children exposed to high amounts of arsenic will be similar to the effects seen in adults.

How can I minimize exposure to arsenic?

- Wash hands frequently, especially before meals and after petting outdoor animals. Always wash children's hands before snacks and naps.
- Wash children's toys weekly.
- Wipe shoes on doormat or remove shoes before entering the house.
- Bathe pets weekly.
- Keep the inside of the house clean—use damp cloths for dusting. Keep windows and doors closed when it is windy.
- Wash and peel all fruits, vegetables, and root crops.
- Cover bare spots in the yard with grass or landscaping (for example, bushes, wood chips, stepping stones, etc.)
- Apply wood sealer annually to decks and play structures (swing sets etc.) built with arsenic-treated wood.
- When working with wood: use gloves, dust masks. Wash hands often and clean up sawdust by sprinkling with water then sweeping or using a HEPA vacuum.
- Do not burn arsenic-treated wood.

Where can I get more information?

http://www.atsdr.cdc.gov/tfacts2.html

http://www.epa.gov/pesticides/citizens/cca_consumer_safety.htm

Sources: Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for arsenic (Update), Atlanta, GA. U.S. Environmental Protection Agency (EPA) Fact Sheet, September 1998.

Lead Fact Sheet

Lead is a naturally occurring metal that has been used for many years in products found in and around our homes.

Any house built before 1978 can contain lead-based paint.

Primary sources of lead exposure for most children include:

- deteriorating lead-based paint,
- lead-contaminated dust, and
- lead-contaminated residential soil.

People can get lead in their body if they:

- Put their hands or other objects covered with lead dust or lead-contaminated soil in their mouths.
- Eat paint chips or soil that contains lead.
- Breathe in lead dust (especially during house renovations that disturb painted surfaces).

Lead is more dangerous to children than adults because:

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

If not detected early, children with high levels of lead in their bodies can suffer from:

- Damage to the brain and nervous system
- Speech, language, behavior and learning problems
- Slowed development
- Hearing problems
- Most children with lead-poisoning do not have symptoms.

The only way to know if a child has lead-poisoning is to get their blood tested.

Lead is also harmful to adults. Adults can suffer from:

- Difficulties during pregnancy or other reproductive problems (in both men and women)
- Memory and concentration problems

To prevent health damage from lead:

- Wash hands frequently
- Wash children's toys frequently
- Clean floors and window sills with detergent and water weekly
- Cover bare areas in the yard with grass or landscaping
- Take shoes off before entering the house
- Wash garden vegetables before eating them
- Groom pets often
- Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (any house built before 1978)
- Keep children out of work areas when remodeling an older home. Do not dry-sand or scrape lead-based paint. Thoroughly clean the work area with detergent and water when done.
- Run your tap water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes.
- If you are around lead in your work or hobby (e.g., house painter, stained glass), wash and change clothes before going home.

For more information:
http://www.atsdr.cdc.gov/tfacts13.html
http://www.epa.gov/lead

Sources: Agency for Toxic Substances and Disease Registry (ATSDR). 1997. Toxicological profile for lead (Update), Atlanta, GA; U.S.EPA Lead Awareness Program.

Gardening where soil may have high levels of arsenic and lead

Arsenic and lead are natural parts of soil. If the levels of these metals get **too high** they can make you sick. Some weed- and insect-control products used around homes from the 1890s through the early 1970s contained arsenic and lead. The past use of these products may have left arsenic and lead in soils around homes. Health officials now know that levels of arsenic and lead in the soil of some yards and gardens may be high enough to be a health concern. Use these action steps to help make your homegrown foods safer.

- **If the soil in your garden has high levels of arsenic or lead, food grown in that soil could take up these metals at levels that could be a health concern.**

  Action Step: Test your soil. Refer to the fact sheet on testing your yard and garden soil for arsenic available from CDPHE.
  Action Step: Add topsoil and store-bought compost to your garden soil. This will improve your soil and cut down on the amount of arsenic and lead that can be taken up by your plants.
  Action Step: Throw away peelings, plants, grass clippings, and leaves. Do not make compost from them.

- **Soil or dust that has arsenic or lead may stick to fruits, vegetables, shoes, hands, and clothes.**

  Action Step: Wash all homegrown foods well before you eat them.
  Action Step: Wash and peel root vegetables (like carrots or potatoes) before you cook or eat them.
  Action Step: Wash hands as soon as you are done working in the garden or yard.
  Action Step: Take off or wipe your shoes before going into your home.
  Action Step: Wash dirty clothes separate from other laundry after yard work or gardening.

- **Where can I get information about testing my garden soil?**

Contact:
Barbara O'Grady
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(303) 692-3395 or 1 (888) 569-1831
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Testing the Soil on Your Property for Arsenic and Lead from Past Use of Lawn Care Products

Some weed and insect control products used around homes from the 1890s through the early 1970s contained arsenic and lead. This fact sheet describes how to sample soil from areas in your yard for arsenic and lead. Get a list of labs from Denver's "Healthy Home Tips" web page at www.denvergov.org/DEH/default.asp. Ask the lab what kind of sample container to use and the best way to get the samples to them. Some of the labs will provide sample jars and labels for you to use.

What tools or items do I need?

- Paper and pen
- A large metal spoon or trowel that has no rust or dirt on it
- A clean stainless steel or glass bowl
- A label or labels or masking tape
- Sample containers from the lab, or a small **clean** glass jar (like a 4 oz baby food jar); one container for each area.

Getting Ready to Sample

Use the pictures on the back of this page as a guide. Draw a picture of **each** area you want to test (front yard, back yard, side yards, or garden). Divide **each** area you want to test into four sections. Mark a spot in the center of every section. This is where you will get the soil for your samples.

Collecting Your Samples

Use the pictures you drew of the areas you want to test as a guide. Do one yard or area at a time.

1. Divide the area into four sections. Then mark the center of each section. If a tree is in the center of a section mark a spot near the tree.
2. Collect soil from the center of each of the four sections. Try to take about the same amount of soil from each of the four holes.
   - Use the gardening trowel or spoon to lift up a patch of grass (with the roots on it) that is about one to two-inches around. Set this patch of grass aside.
   - Use the trowel or spoon to dig a hole that is about two inches deep. Put the dirt from the hole into the bowl.
   - Repeat this at the center of the other three sections. Add the soil from each spot to the bowl.
3. Mix the soil from the four spots in the bowl, using the trowel or spoon.
4. Fill a sample jar with soil from the bowl, using the trowel or spoon. Sample jars (4 oz) should be filled to the top. If there is not enough soil to fill the jar then collect a little more soil from each section, mix together, then add to the jar. Sample jars larger than 4 oz do not need to be filled to the top.
5. Label the jar. Use a pen and masking tape or label. Write the time, date, area (front yard, back yard, garden, etc.), your initials, and "As/Pb" (to tell the lab you want the lab to test the soil for both arsenic and lead).
6. Fill in the holes with any soil that may be left in the bowl. Then put the patches of grass back over each hole.

Do this in each of the areas that you want to test. When you are done, you will have **one** sample from each yard or garden area you want to test. Follow the instructions from the lab to get the samples to them.

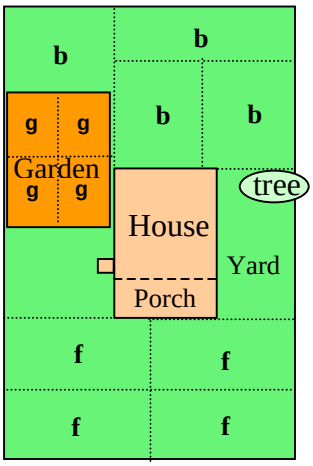
What do the Results Mean?

Contact Barbara O'Grady at the Colorado Department of Public Health and Environment to help you understand what the results mean. Call her at (303) 692-3395 or 1 (888) 569-1831 or send e-mail to barbara.ogrady@state.co.us.

Sampling Soil From Around Your Home

A. Draw a picture of each area you want to sample

B. Divide each area to be sampled into four sections



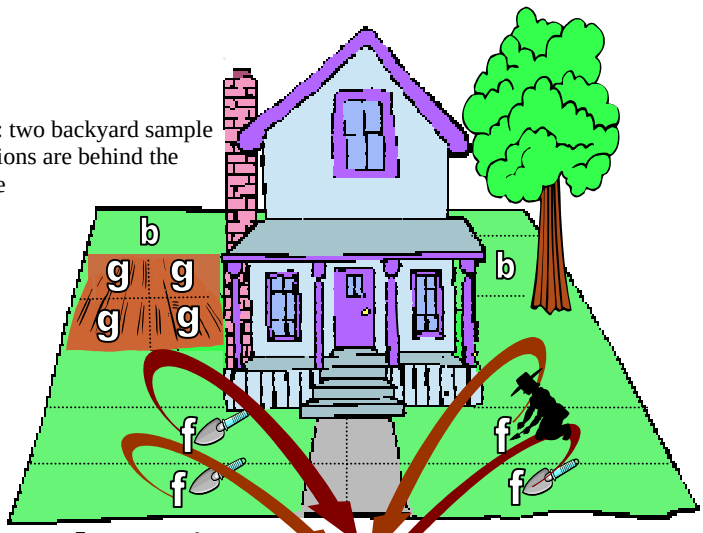
g =garden sample locations

b = back yard sample locations

f = front yard sample locations

C. Mark the center of each section

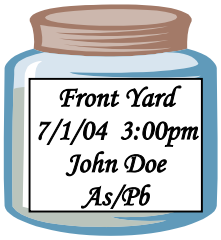
Note: two backyard sample locations are behind the house



D. Put soil from each section into the bowl

E. Mix soil

F. Put soil in sample container



G. Label sample container

H. Take or send sample to lab

I: Repeat steps D through H for each area you want to test