

- Avoid working in the yard on windy days, when dust can be stirred up and possibly increase your exposure.
- Consider wearing a mask if you spend time in dusty areas.
- Wash your hands after gardening.
- Wash work clothes to remove dust and dirt.
- Take your shoes off at the door to avoid tracking soil into your home.

Preparing Fruits and Vegetables

- Clean your hands, cutting boards, and kitchen tools with hot, soapy water and rinse well before and after handling your fruits and vegetables.
- Soak garden produce in cool water and rinse thoroughly until the water runs clear. Commercial vegetable-cleaning products are available in supermarkets to help free soil residues from your produce. These products work well with leafy vegetables. Vinegar can also be used for cleaning produce.
- Scrub firm fruits and root crops with a vegetable-cleaning brush to remove dust and dirt before peeling or eating.
- Peel root crops like carrots, rutabagas, radishes, and turnips.
- Wash berry fruits like strawberries and blackberries, and remove the “caps” (the tops of the berries where the stem and leaves attach).

Buy Some, Grow Some

- Eat some fruits and vegetables from your garden and some from the farmer’s market or grocery store. Eating a mix of homegrown and commercial products can help reduce your potential exposure.

Creating Play Areas for Children

- Fill sandboxes with sand or soil from an outside source such as a commercial gardening center.
- Cover bare soil with grass or other material such as mulch.
- Keep children from playing in contaminated soil. The most likely way for children to become exposed to arsenic is from ingesting (eating) dirt.
- Have children wash hands and faces after they play in the yard.



Cleaning Your Home

- Remove work and play shoes before entering your house.
- Damp-mop floors and wipe down counters, tables, and window ledges regularly.
- To reduce dust levels in the home, consider upgrading your vacuum cleaner bags to those that filter better or simply change your bags more often. Some persons may want to buy a vacuum cleaner with a HEPA (high-efficiency particulate air) filter to better reduce dust levels.
- Wash the soil from homegrown fruits and vegetables before bringing them into your home.
- Keep pets out of areas of contaminated soil. Dogs and cats carry contaminated soil on their feet and fur into the home. Bathe your pets frequently.



For more information about ATSDR’s work at Spring Valley, visit our web site at www.atsdr.cdc.gov/sites/springvalley or contact any of ATSDR’s Spring Valley Team members:

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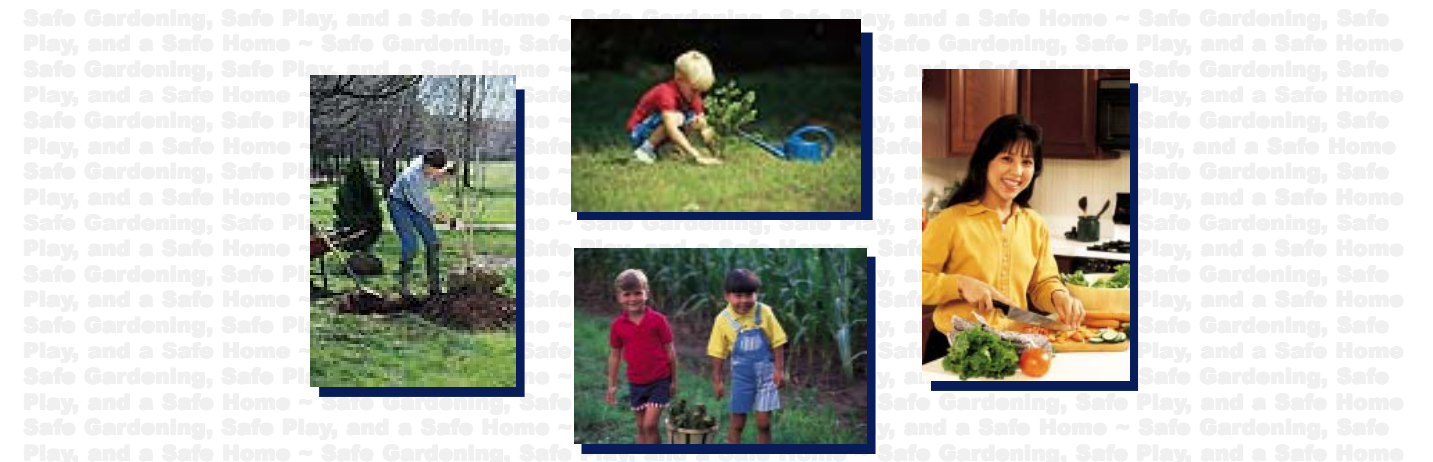
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Safe Gardening, Safe Play, and a Safe Home

An interim guide to reducing arsenic exposure in Spring Valley

This pamphlet was designed for residents of Spring Valley. The purpose is to provide residents with good health practice tips for the home, lawn and garden work, and play. By following the tips in this pamphlet, residents can greatly reduce their exposure to arsenic as well as to other potentially harmful materials such as pesticides and germs that might be in the soil.



Introduction

Approximately 146 properties in the Spring Valley area have some soil arsenic levels greater than 20 parts per million (ppm), a level designated by local and federal officials as a clean-up level for this community. Although the levels of arsenic detected in this community are in some cases elevated in soil, limited exposure studies to date suggest that the arsenic is not getting into residents’ bodies in any greater amounts than what you would find in the general public. Although this is reassuring, it is recognized that some residents may still be concerned until the cleanup of their yards has occurred. For those and other concerned residents, the good practice tips in this pamphlet will be effective in reducing exposures to arsenic, pesticides, and germs that might be present in the soil.

Enjoying Your Lawn and Garden



Eating fruits and vegetables and getting plenty of exercise are essential parts of a healthy lifestyle. People enjoy many activities on their lawn and in their garden, which provide places both for exercise and for growing fresh fruits and vegetables. The levels of arsenic found in the soil of most properties in Spring Valley are at or below background (natural) levels and present no health hazard for people doing lawn or garden activities. Still, some families have arsenic in their soil at levels higher than the clean-up level and wish to reduce their exposure to the lowest possible level. Activities such as playing, gardening, and working on your lawn can increase your opportunity for exposure even though they are healthful. The information in this pamphlet will help you understand how to reduce your chances of exposure so you do not feel you have to give up the outdoor activities that you and your family enjoy. Understand that each property is different. Some of the tips outlined may apply to your situation and some may not.

Arsenic

A major source of elevated arsenic in Spring Valley surface soils is from degradation of chemical warfare agents tested there during World War I (WWI).

The U.S. Environmental Protection Agency (EPA), Army Corps of Engineers (ACOE), and the D.C. Department of Health set an arsenic cleanup level of 20 ppm for yards in Spring Valley. ACOE has removed soil from some contaminated properties and is planning to continue soil removals over the next several years. Until the contaminated soil is replaced, residents may

reduce their chances of exposure by following the guidelines in this pamphlet. Additional information about arsenic can be found at the ATSDR Spring Valley Information Repository at Palisades Library (4901 V Street N.W. at 49th Street N.W.) or through the ATSDR Spring Valley Web site at www.atsdr.cdc.gov/sites/springvalley.

Arsenic and Gardening



Arsenic is a naturally occurring element. Two types of arsenic are found in the environment. The first is **inorganic arsenic**, which is usually found in the environment combined with other elements such as oxygen, iron, and sulfur. The second type of arsenic is **organic arsenic**. Organic arsenic is formed by arsenic combined with carbon and hydrogen. It is found in plants, fish, and shellfish and is considered less harmful than inorganic arsenic.

For most properties in Spring Valley the soil arsenic levels are not high enough to cause any health problems associated with eating homegrown vegetables. Indeed, even for those areas showing elevated levels of arsenic, the uptake into home grown vegetables or fruits, is not likely to be sufficient to cause any health effects to persons gardening in the soil or eating vegetables grown in the garden. This will be explained below.

Gardening in soil with elevated levels of arsenic has two main issues: cleaning soil from the edible portion of the plant and absorption of arsenic by the plant. It is always a good health practice to wash all fruits and vegetables thoroughly whether they are bought or homegrown. Washing the soil from your homegrown fruits and vegetables is one of the most effective ways of reducing your exposure to not only arsenic but to pesticides and germs as well.

Most edible plants absorb some small amounts of arsenic, but usually do not contain enough arsenic to be of health concern. The amount of arsenic absorbed by plants can depend on many factors. Some of the most important factors are soil acidity, nutrient content, iron, organic matter, and plant type. Plants can absorb more arsenic if you have acidic soil. Keeping your soil at a near-neutral range (pH 6–7) can help reduce the amount of arsenic absorbed in plants. Maintaining adequate levels of plant nutrients in your soil can help reduce arsenic absorption. Adding a balanced commercial fertilizer to soil can help maintain correct levels of key plant nutrients. Iron can prevent arsenic from being absorbed. The iron combines with arsenic to form iron arsenate, a form of arsenic that is not well absorbed by plants. Increased amounts of organic matter are also helpful; the organic matter binds to arsenic and reduces how much plants take up. Some lawn and garden products contain arsenic, so it is a good idea to check with your lawn and garden store for products that do not contain arsenic.

Another important thing to keep in mind is that arsenic deposited by the chemical weapons tests in Spring Valley has been in the soil for 80 years. The longer the arsenic stays in the soil, the more it becomes bound to the soil, making it less available to plants and humans.

Arsenic levels in garden areas tend to be lower than in other areas of the property because most gardeners add soil conditioners such as compost and topsoil. By adding these conditioners, the concentration of arsenic in the soil is diluted. Some gardeners might want to add additional compost or topsoil from an area of their yard that does not have elevated levels of arsenic. In some cases it may be best to remove the soil from the place you want to garden and replace it with topsoil from a commercial garden center.

Plants vary in the amount of arsenic they absorb from the soil and where they store arsenic. Some plants move arsenic from the roots to the leaves, while others absorb and store it in the roots only. Fruit-type vegetables such as tomatoes concentrate arsenic in the roots and very little arsenic is taken up in the edible portion of the plant. Leafy vegetables also store arsenic in their roots, but some is also stored in the stems and leaves. Lettuce and some members of the Brassica plant family such as collards, kale, mustard, and turnip greens store more arsenic in the leaves than do other crops, but not at concentrations high enough to cause concern. Root crops such as beets, turnips, carrots, and potatoes absorb most of the arsenic in the surface skin of the vegetable. By peeling the skins of root crops, you can eliminate the portion of the plant that contains arsenic. Again, garden vegetables grown in Spring Valley should not contain enough arsenic to be of health concern. Recommendations for conditioning your soil, washing vegetables, and peeling root crops are intended to provide you the property owner with additional options for reducing exposure to arsenic.

For some properties with limited space for gardens, a raised garden bed might be an option. Instructions for building a raised garden bed can be found in most gardening books. The raised beds can be filled with soil from commercial gardening centers or from an area of your yard that does not contain elevated levels of arsenic. Your local agricultural extension office is an excellent source of for all types of gardening information.



Can I Eat Fruits and Vegetables Grown in My Garden?

Yes. Homegrown fruits and vegetables are highly unlikely to contain arsenic levels that would affect your health. Vegetables grown in soils with arsenic will take up some small amounts of arsenic. However, we believe the benefits from the eating your homegrown fruits and vegetables outweigh the risk presented by their arsenic content. By following the recommendations in the Tips for Safe Gardening, Safe Play, and a Safe Home section, you can greatly reduce your exposure to arsenic from the soil.

Unknown Buried Material

As the result of activities performed at the American University Experimental Station during WWI, dangerous materials used in the war effort were often buried as a means of disposal. ACOE, using historical records, has identified several areas of concern and continues to investigate. Buried items already discovered include buried munitions (both conventional and those containing chemical warfare agents), chemical weapon agents in ceramic jugs, laboratory waste, and other related items. These items have been buried since WWI and many have rusted and deteriorated to a point that they pose little health risk but it is possible for some to contain chemical agents. There have been very few reports of these items being uncovered through normal yard work, but the possibility does exist. Existing gardens and flowerbeds that have already been tilled or dug in are considered very low risk, but you should follow precautions. If you dig up any suspicious glass or metal object, do not attempt to remove the item yourself. Call ACOE at 1-800-434-0988, 410-962-7522, or 202-686-3359 for assistance.

Tips for Safe Gardening, Safe Play, and a Safe Home

Preparing Your Garden Soil

We are all exposed to a little arsenic every day. The recommendations below are for people who want to keep their exposure to the minimum possible. These recommendations are intended to be on the safe side. Under normal circumstances, a lapse in following these recommendations will not, by itself, lead to health problems.

- Increase the organic matter in your soil by adding compost or manure from outside sources such as commercial garden centers.
- Keep soil pH in the near-neutral range (pH 6–7). For a soils test, check with your local agricultural extension office or purchase a soils test kits at a garden center.
- Maintain adequate levels of plant nutrients by using a balanced commercial fertilizer.
- Maintain adequate levels of iron in your soil.
- Consider building a raised-bed garden. Fill it with topsoil and compost from outside sources or areas of your yard that do not have elevated levels of arsenic.



Note: Do not use chromated copper arsenate (CCA)-treated wood to build your raised garden beds. CCA contains arsenic that can leach into your soil. Use a safer nonarsenic pressure-treated wood such as ammoniacal copper quaternary (ACQ). Bricks, stone, or other wood products such as cedar or redwood can be used to build a raised garden bed.

Working in the Garden and Yard

- Avoid eating or drinking while working in the yard or garden because contaminated soil and dust might get on your food and you could accidentally swallow it.
- Dampen soils with water before you garden to limit the amount of dust you inhale.