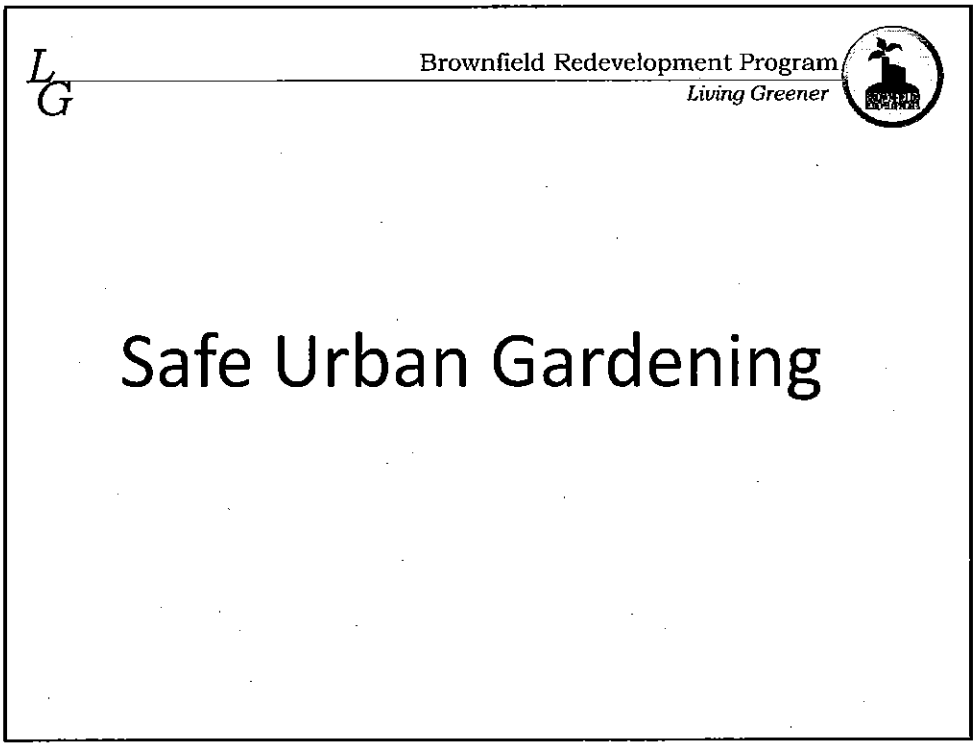


Welcome to our presentations on Safe Urban Gardening presented by the Kentucky Brownfield Redevelopment Program.

Vacant Urban Properties

- Large numbers in current economy
- Loss of tax revenue to the local government
- Cost to local governments to address
  - Crime, fires, weeds, vermin
- Depreciate surrounding property values

Across the United State there are large numbers of vacant properties in our cities.

These properties hurt local governments in two ways. They reduce the tax revenue the cities receive and they create additional costs for the cities as the communities must address the crime, fires, weeds and vermin associated with the abandoned lots.

Of course, the neighbors are also negatively affected in many ways, including seeing a decrease in their property values.

Community Gardens

- Address food deserts
  - Often in poor areas, where residents have limited food options and limited transportation
  - "The distance to a bag of potato chips is half the distance to a head of lettuce."
  - One 2.8 mile stretch of Broadway in Louisville has 24 fast food restaurants.

Another second trend cities are seeing is the growth of community gardens.

Many cities have food deserts. These are generally poor areas of town that have limited food options. There are few full-service grocery stores. The convenient store offer few fresh fruits and vegetables and what they offer is often expensive or of poor quality. Thus, one definition of a food desert is an area where "The distance to a bag of potato chips is half the distance to a head of lettuce." Since many of the residents don't own cars, it takes a significant effort to get fresh produce.

One food desert in Louisville has 24 fast food restaurants within a 2.8 mile stretch of highway – on this street one would seldom be more than three hundred feet from a fast food establishment.

Community gardens are one way of providing a healthy alternative.

Community Gardens

- Provide fresher, healthier, tastier, affordable food
- Recreational benefits
- Socializing
- Environmental education

Community gardens provide a number of benefits, beyond the benefits of providing fresh produce.

For many, the act of planting and nurturing plants is a enjoyable hobby.

Gardening groups often report that the gardens help create a true sense of community, creating connections between young and old, rich and poor, black and white. One half-way house for ex-offenders began a garden with the help of some local volunteers. Initially, the volunteers and the ex-offenders each tended to stay with their own groups, but talk of meals of homegrown vegetables at grandma's and other childhood memories enabled them to break down the barriers.

Finally, the gardens are a way of introducing youngsters to the natural world.

Could we address problems of vacant properties and enjoy the benefits of community gardens by converting the lots into gardens?

Yes, but …

There is much to be said about addressing the problem of vacant properties and simultaneously enjoying the benefits of community gardens. However, a word of caution.

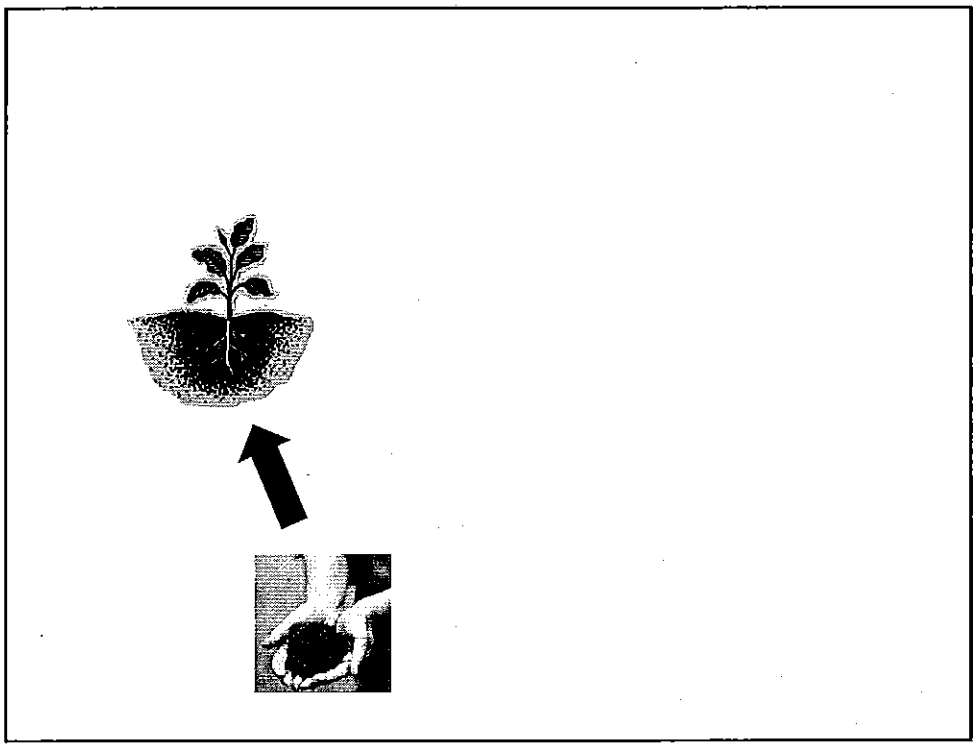
Potential Health Effects of Soil Contamination

- Science is still developing. It *may* not be a serious problem in most cases, especially given the health benefits.

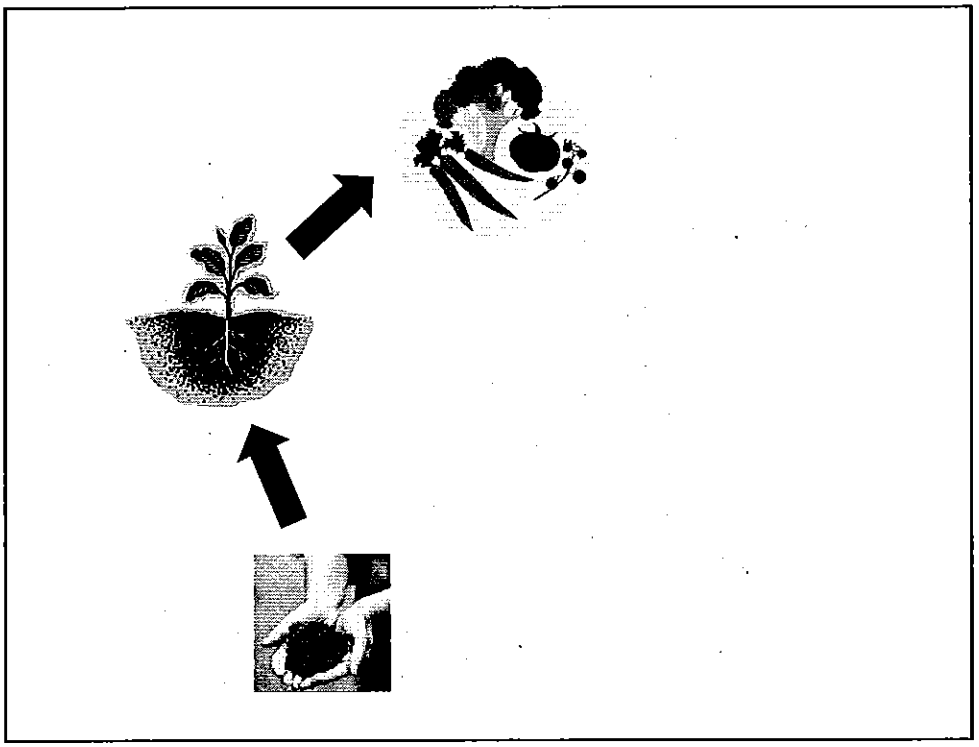
There are concerns about the potential health effects of soil contamination. It may not be a serious problem, especially given the health benefits of fresh produce. As we will see later, even though the science is still developing, there are some simple steps that can be taken to reduce or eliminate exposure.

The science is still developing because only recently have people started looking into this topic. Also, it is rather complex.

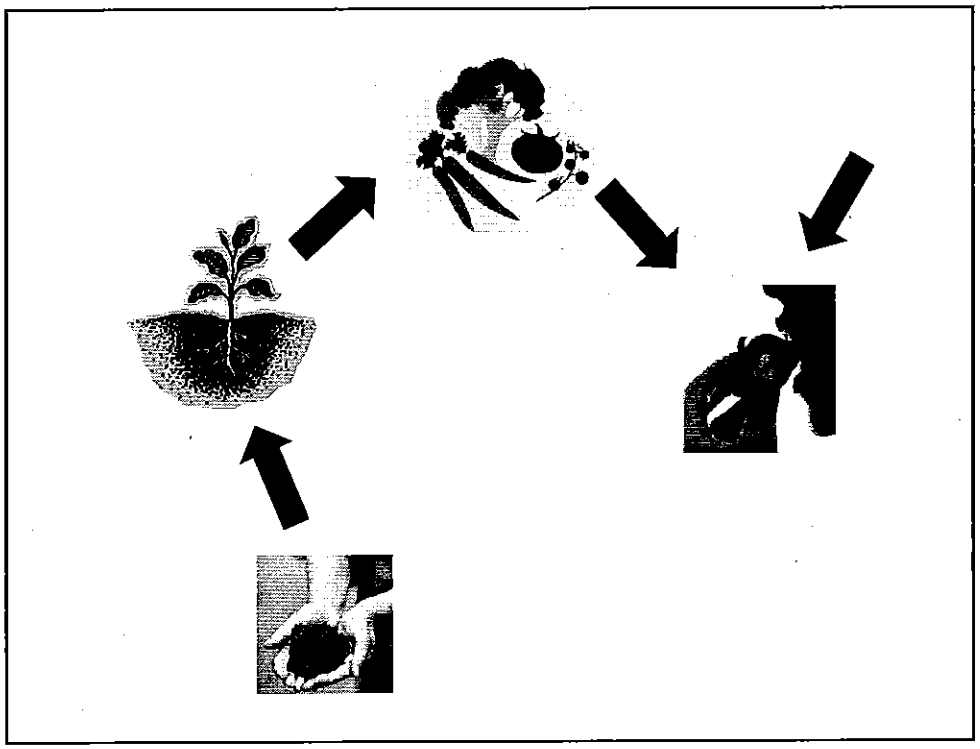
Consider soil with a certain level of contamination.



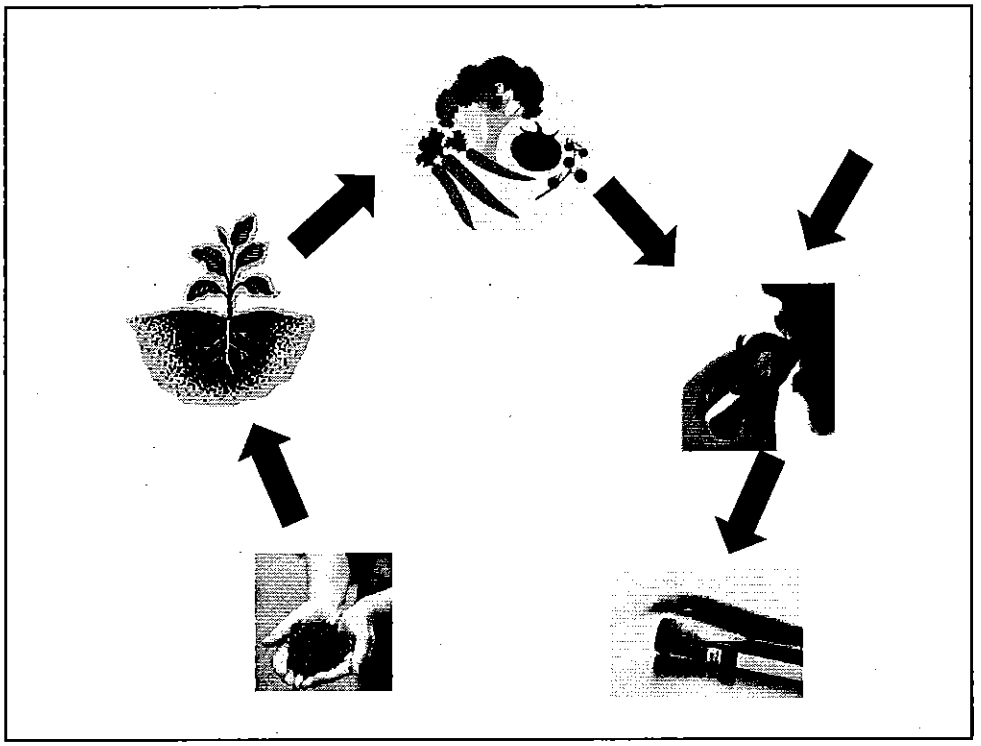
The plant will only absorb some of the contaminant. That will depend on the plant, the nature of the contaminant, the make up of the soil, the soil acidity, etc.



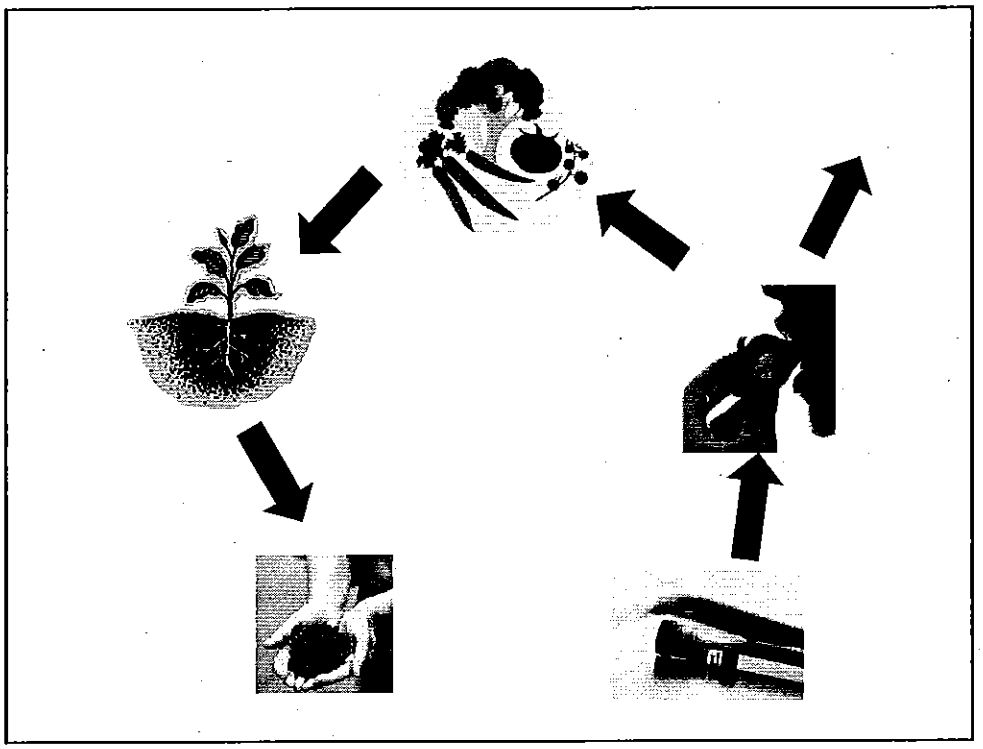
The plant then distributes the contaminant among its various parts. The distribution isn't always even. How much ends up in the part that is consumed?



When someone eats the plant, how much of the contaminant is absorbed? That is effected by factors such as if the person eating the plant on an empty stomach or as part of a meal. What fraction of the person's diet comes from the contaminated soils? What other sources of the contaminant is the person exposed to?



All these factors lead to a level of contamination in the blood stream. How big an effect does that level have on the person? That depends on the mass of the person, genetic disposition, age, etc.



Based on studies, we know that children should have less than 10 micrograms/deciliter of lead in their blood to avoid serious health effects.

You can imagine the difficulty of working backwards through the chain to come up with a level of lead contamination in the soil that would be protective. So, toxicologists can't yet provide firm number on what are safe levels in soil. However, they have developed some tentative levels that should be protective. And, there are some simple steps one can take to reduce the exposure.

How to safely garden in an urban setting

1. Be aware of the potential issue of soil contamination.
2. Avoid the most contaminated areas or take extra steps to address.
3. Follow some basic practices to reduce exposure.

The solution to safely garden in an urban setting is three-fold:

First - Be aware of the potential issue of soil contamination.

Second - Avoid the most contaminated areas or take extra steps to address.

Finally - Follow some basic practices to reduce exposure.

Common Sources of Contamination	
General Source	**Specific Contaminant**
Paint (<1978)	lead
High-Traffic Areas	lead, zinc, polycyclic aromatic hydrocarbons (PAHs)
Treated Lumber	arsenic, chromium, copper
Burning Wastes	PAHs, dioxins
Coal Ash	molybdenum, sulfur
Petroleum Spills	PAHs, benzene, toluene, xylene
Commercial/Industrial Site Use	PAHs, petroleum products, solvents, lead, other heavy metals
Pesticides	lead, arsenic, mercury (historical use), chlordane and other chlorinated pesticides

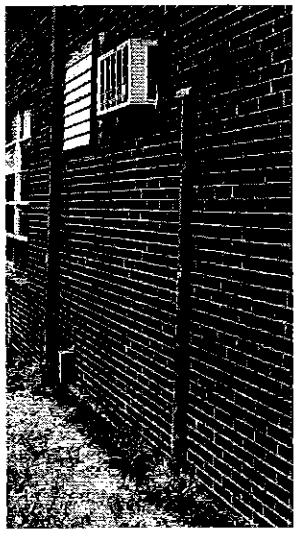
Here is a list of common contaminants and their sources. Note the variety of sources that can leave residual contamination.

Also, note that pesticides are included in the list. Though this talk is primarily about urban gardens, even a farm or orchard may leave an environmental legacy.

So, the place to start is looking at the history of your property and nearby properties.

Identify Current and Previous Uses of Property and Nearby Properties

- Interview neighbors and former occupants
- Sanborn Insurance Maps and other historical documents
- Federal and state environmental databases
- Visual site inspection



What are some ways to lean about the history of a property and nearby properties:

Talk with neighbors and former occupants.

Review historical documents. Sanborn Insurance Maps are fascinating sources for learning the history of a neighborhood.

Review state and federal environmental databases. Many of these are now on-line.

Finally conduct a visual inspection. Look for soil where nothing is growing or the plants are discolored or seem stunted. Look for anything that seems unusual. For example, the green pipe that is nearest to us in the photo. It looks like it may be a vent pipe for an underground tank. This should lead to other questions: What was in the tank? Did it leak? Is the tank still in place or has it been removed? Was any contaminated soil removed with the tank?

Formal Environmental Site Assessment

- A Phase I Environmental Site Assessment, done by an environmental professional prior to acquisition, is crucial if you want environmental liability protection.
- Also, this is wise if you want to be extra cautious or if site history raises concerns.
- The Kentucky Brownfield Redevelopment Program provides a limited number of free assessments (including testing) for nonprofits and local governments.

If you want to be extra cautious, or if the history of the property raises concerns, it may be wise to hire an environmental professional to conduct a formal environmental site assessment.

A Phase I Environmental Assessment consists of records review, interviews and a site visit by an environmental professional. Not only will it identify if there are any environmental concerns on the property, it will also provide a degree of liability protection if it is conducted BEFORE you acquire the property.

A Phase I will also recommend whether or not a Phase II Environmental Assessment should be conducted. In a Phase II, samples are collected and sent to the laboratory for analysis.

The Kentucky Brownfield Redevelopment Program provides a limited number of free assessments (Phase I and Phase II) for nonprofits and local governments.

Testing

- Usual soil testing is for nutrients, not contaminants.
- Needs to be tailored to site and planned uses.
- See guidance documents in handout to assist with sampling plan and the analysis of the results.

If you conduct your own testing, see the guidance documents in the accompanying reference sheet for assistance. Note that there are two types of soil testing for gardening. The most common is focussed on the plant nutrients in the soil. A test for soil contamination must be specifically requested and sent to a laboratory that is equipped for that type of analysis.

Interpreting Results

- "Residential levels" are generally used as interim standard. (Science still developing.)
- When developing gardening plan, consider not only exposure through plant consumption, but also contact with soil, ingestion of soil and breathing dust.

There are tables that list the level of contamination that is generally regarded as safe. The "residential levels" on these tables provide a good interim standard by which to judge the level of contamination.

Remember, when developing a gardening plan, don't just consider the exposure through plant consumption. Also be aware of contact with soil, ingestion of soil and breathing dust.

For example, I hope that you will involve your children in gardening. However, it would be best not to have them playing in bare soil. Covering the pathways with mulch, brick or stone can reduce this.

Best Management Practices (BMPs)

- Cover pathways with mulch or stones or bricks.
- Plant away from footprint of older buildings (lead-based paint) and away from heavily travelled roads.
- Amend soils – neutral pH, organic material
- Might add topsoil or clean fill. (Just make sure that you are not adding more contaminants.)

Besides covering the walkways, you can reduce exposure by keeping your garden away from the footprints of older buildings and away from heavily travelled roads. These are areas that tend to have higher levels of lead.

Keeping the pH near neutral and adding organic material, such as compost, will reduce the amount of contamination taken up by the plants.

If you want to bring in additional topsoil, be careful of the source so as not to bring in additional contaminants.

Produce Selection

Most Suitable	Vegetable Fruits and Seeds	Trees	
	tomatoes, eggplant, peppers, okra (seed pods only), squash, corn, cucumber, melons, peas, beans (shelled), onions (bulbs only)	apples, pears	
Least Suitable	**Green Leafy Vegetables**	**Other Vegetables**	**Root Crops**
	lettuce, spinach, Swiss chard, beet leaves, cabbage, kale, collards	broccoli, cauliflower, green beans, snow peas	carrots, potatoes, turnips

Often contaminants will concentrate in the leaves of a plant.

This table shows which produce are likely to have more contamination in their edible parts. You may wish to grow less of the bottom row of plants and more of the top row.

BMPs for More Serious Contamination

- Raised-bed or container gardening
  - Put down water permeable fabric.
  - Use clean soil and walls of safe material (or just mound soil without walls).
  - Can also use containers.
  - See reference on Safe Container Gardening regarding materials (e.g. may not wish to use treated lumber)
- Remediation

Another possible solution is to grow these less suitable plants in raised beds or containers. On more contaminated properties, you may want to use entirely raised beds or containers. Raised beds have an additional advantage in that they are more accessible for the elderly or disabled.

See the reference on "Safe Container Gardening" for discussion of materials to use for raised-bed walls. You may wish to avoid treated lumber. Some gardeners have just used mounds of dirt on water permeable fabric without walls.

You may also be able to remediate the soil. The cost depends on many factors. Our office would be glad to discuss cleanup options and discuss possible funding sources.

Good Habits

- Wear gloves and wash hands after gardening.
- Don't track dirt into the house.
- Clean all produce.
- Peel root crops.
- Remove outer leaves of leafy vegetables.

Finally, you can further reduce the exposure through some simple tips, many of which your parents probably taught you while your were growing up. Wash your hands, don't track dirt into the house, clean the produce, etc.

In Summary

1. Be aware of the potential issue of soil contamination.
2. Avoid the most contaminated areas or take extra steps to address.
3. Follow some basic practices to reduce the exposure.

Enjoy the bounty of the land!

In summary, it all boils down to the three basic steps.

First - Be aware of the potential issue.

Second - Avoid the most contaminated areas or, if contamination is present, take extra steps to address.

Finally - Follow some basic practices to reduce the exposure.

Enjoy the bounty of the land!

Questions

Kentucky Brownfield Redevelopment Program

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If you have any questions, or would like to see if your organization would qualify for a free environmental assessment, contact us at via the email addresses or phone numbers show on the screen.