



# Urban Gardens & State Voluntary Programs – A Good Fit?

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# Voluntary Cleanup Programs

## Commonalities

- Though each states' voluntary cleanup program has unique features suited to the specific industrial/commercial history, economic climate, citizen concerns and laws of the state, there are commonalities.
  - **Cleanup standards that clearly address the age-old question “how clean is clean?” These standards are risk-based and take into account the intended future use of the property**
  - **Liability release or confirmation that cleanup has been performed to the satisfaction of the state issued at the end of the cleanup**

# Voluntary Cleanup Programs

## Commonalities

- Focus is on brownfields that will be redeveloped into industrial, commercial and residential properties
- Greenspace is considered and recognized as a potential end use; however, the focus is normally on neighborhood parks, bike trails and other recreational areas

So.....where do urban gardens fit in?

# Urban Gardens



Urban garden in Cleveland Ohio which practices both container and in-ground gardening

Traditional state voluntary cleanup programs have not developed cleanup standards that take into account what levels of soil contaminants are safe for eating the fruits and vegetables grown on an urban brownfield.

Given the relatively recent development of these urban gardens , most states are even less familiar with the human activity patterns, and hence human exposure potential , at these sites.

# Urban Gardens- Recent Practices

- Sample the soils and compare them to direct- contact soil standards for residential properties which take into account incidental ingestion, dermal contact, and inhalation of particulates and volatiles.
- Most residential standards assume children and adults are on the property up to 24 hours a day, 350 days a year for 30 years.
- **Upside** - residential cleanup standards are generally very protective for urban gardening. **Downside** – can rule out many good urban sites that might also be protective.

# Common Human Health

## Direct Contact Soil Exposure Scenarios

### U.S. EPA Regional Screening Levels & State Programs

- Residential Land Use
  - Children and adults living at residence
  - 350 days per year
  - 30 years
- Commercial and Industrial Land Use
  - Adult workers
  - 250 days per year
  - 25 years
- Excavation and Construction Workers
  - 1 year or less, property-specific risk assessment
- Recreational Land Use/Greenspace
  - Property-specific risk assessment

# We have some recreational risk assessment examples:

- Neighborhood parks, playgrounds have high potential for frequent exposures to children and adults, therefore exposure assumptions very similar to residential
- Nature preserves and wildlife areas generally have less frequent exposures to children and adults, therefore exposure assumptions often include reduced number of days per year (e.g. 90 or 120 days per year)
- So what exposure assumptions could potentially be modified for urban ag exposure scenarios?



# What are some potential exposure assumption considerations for urban agriculture?



- Urban agriculture may include:
  - Community gardens
  - Market gardens
- Exposure factors to consider:
  - Days per year: May – Sept, + lower frequency other months of year?
  - Number of years?
- Point of compliance?
  - Depth of soil to assess?
- Bioavailability?

# Common chemicals of concern and potential risk assessment results



- If reduce number of days per year (e.g. 120 days per year), some chemicals still exceed risk goals (1 in 100,000 cancer risk goal, hazard index 1)
- Arsenic – background concentrations need to be considered
- Lead – biokinetic update model, consider soil amendments to reduce bioavailability
- Carcinogenic PAHs

# Combination of Risk Assessment and Risk Management Considerations

- Applying current human health risk assessment practices, limited number of exposure assumptions that can be defensibly modified
  - Will generally increase standards by less than an order of magnitude, usually only 2-4 times
- If likely that risk-based levels will be exceeded, consider risk management options that may include:
  - Remove localized “hot spots”
  - Raised beds with “clean soil”
  - Mulched garden paths

