# Lead-Contaminated Soils

## Status of SAB Review

**"...its déjà vu all over again..."**

**Yogi Berra**

**Prepared for**
**MTCA Science Advisory Board**
**November 9, 2004**

**Outline**

- Confirm Board's Conclusions on the Six Questions Discussed at June 2004 SAB meeting
    - Upper End of the Moderate Range
    - Lower End of the Moderate Range
    - Soil Concentrations Below 250 mg/kg
    - Protection of Adults and Older Children
    - Protection of Ground Water
    - Future Information Collection and Evaluation

# Overview

- **Ecology asked that the SAB to review the scientific bases for Ecology's definition for moderate levels of lead in soils.**
  - **High – potential to cause PbB > 15 ug/dL**
  - **Moderate – potential to cause PbB = 10 to 15 ug/dL**
  - **Low – soils unlikely to cause PbB > 10 ug/dL**
- **The Board discussed a variety of issues and questions related to Ecology's working definition at meetings held in January, March, May and June.**
- **Ecology distributed a paper summarizing the status and conclusions that emerged from those discussions.**



# Task Force Recommendation Tiered Response

**High**

- **Traditional Cleanup Processes and Measures (e.g. removal & containment)**
- **Institutional Controls & Periodic Review**

**Moderate**

- **Broad-Based Education and Awareness**
- **Encourage and Support Early Implementation of Simple Containment Measures (Focus on Child Play Areas)**
- **Integrate More Permanent Containment Measures with New Construction/ Renovations**
- **Periodic Program Review**

**Low**

- **No Further Actions**

## Moderate Levels of Lead Ecology Working Definition

| | Lower End of Range | Upper End of Range |
|---|---|---|
| Residential Areas | 250 mg/kg | 500 mg/kg |
| Schools & Child Care Facilities | 250 mg/kg | 700 mg/kg |
| Commercial Facilities & Parks | 250 mg/kg | 1000 mg/kg |



## Discussion Questions

- **Upper End of "Moderate" Range**
- **Lower End of "Moderate" Range**
- **Soil Concentrations Below 250 mg/kg**
- **Protection of Adults and Older Children**
- **Protection of Ground Water**
- **Future Information Collection and Evaluation**

## Upper End of "Moderate" Range

- **Ecology Question:**
  - Does the Science Advisory Board agree that the methods and assumptions used by Ecology to define the upper end of the moderate range are scientifically defensible?
- **Ecology Rationale:**
  - CDC Guidelines
  - Use of IEUBK Model
  - Reasonable parameters and assumptions given variability and uncertainty in exposure and health effects
- **SAB Conclusion:**
  - Methods and assumptions are scientifically defensible
  - Periodically review given rapidly emerging scientific information



## Lower End of "Moderate" Range

- **Ecology Question:**
  - Does the Science Advisory Board agree that the methods and assumptions used by Ecology to define the lower end of the moderate range are scientifically defensible?
- **Ecology Rationale:**
  - CDC Guidelines/MTCA Method A Soil Cleanup Level
  - Use of IEUBK Model
  - Reasonable parameters and assumptions
- **SAB Conclusion:**
  - Methods and assumptions are scientifically defensible.
  - Review lead cleanup level to determine if it remains consistent with MTCA goals and approaches for other chemicals

## Reviewing the Lead Cleanup Level

- **Issues:**
  - **Incremental vs Total Exposure**
  - **Target Blood Lead Levels**
  - **Probability of Exceeding Target Blood Lead Concentration**
  - **Age Intervals & the IEUBK Model (or EPA All-Ages Model)**
  - **Soil Size Fraction (250 um vs 2 mm)**
- **Examples:**
  - **@100 mg/kg = Soil level predicted by the IEUBK model to result in 5% probability of exceeding 5 ug/dL for children 12-36 months of age**
  - **@200 mg/kg = Soil level predicted by the IEUBK model to result in 10% probability of exceeding 5 ug/dL for children 0-84 months of age**
  - **@100 mg/kg = Soil level associated with a 1 ug/dL increase in blood lead levels (children 12-36 months of age)**



## Soil Concentrations Below 250 mg/kg

- **Question:**
  - **Does the Science Advisory Board believe there is a sound scientific justification for providing information on ways to reduce lead exposure in situations where soil concentrations are below the MTCA cleanup level (i.e. < 250 mg/kg)?**
- **Factors:**
  - **Scientific evidence of adverse effects at PbB < 10 ug/dL;**
  - **Importance of primary prevention;**
  - **Information as a prerequisite to primary prevention.**
- **SAB Conclusion:**
  - **Sound scientific justification for providing information on ways to reduce exposure in areas where soil levels are likely to be below 250 mg/kg**
  - **Consider a lower limit where extra precautions are no longer recommended**

## Protection of Adults and Older Children

- **Ecology Question:**
  - **Does the Science Advisory Board agree that it is scientifically defensible to conclude that levels protective of young children also protect older children and adults?**
- **Ecology Rationale:**
  - **Relative Sensitivities of Young Children and Adults/Older Children**
  - **Health Endpoints in Adults**
  - **Modeling Results**
- **SAB Conclusions:**
  - **The assumption appears reasonable.**



## Protection of Ground Water

- **Ecology Question:**
  - **Does the Science Advisory Board agree that it is scientifically defensible to conclude that surface soil lead concentrations below 1000 mg/kg are unlikely to significantly impact ground water?**
- **Ecology Rationale:**
  - **Soil profiles of lead concentrations at different depths in former orchards**
  - **Soil profiles of lead concentrations at different depths in areas surrounding former smelters**
  - **Results of fate and transport modeling and assumptions underlying MTCA Method A Soil Cleanup Levels**
- **Status of Review:**
  - **Ecology compiling additional information on arsenic and lead in soils and groundwater.**

## Future Information Collection and Evaluation

- **Ecology Question:**
  - **Given available information, where does the SAB recommend that Ecology focus future information collection and review?**
- **Board Suggestions Provided at Previous Meetings:**
- **SAB Conclusion:**
  - **The list appears reasonable.**
  - **Additional information collection and evaluation needs may be identified when the Board discusses ecological impacts of lead- and arsenic-contaminated soils.**



## Next Steps

- **Actions on SAB Conclusions:**
  - **Review/Modify Education Materials**
  - **Review of Cleanup Level During Rulemaking**
- **Consolidated Lead Document**
- **Ongoing Board Discussions**
  - **Soil-to-Ground Water Issues (Lead and Arsenic)**
  - **Ecological Impacts (Lead and Arsenic)**