



# **Office of Environmental Health Hazard Assessment (OEHHA)**

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## **Proposed Methodology for Calculating Advisory Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil**

<http://www.oehha.ca.gov/risk/Sb32soils.html>



# **Legislative Background**

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**Methodology for Calculating Screening  
Numbers is Required by**

**SB 32**

**California Land Environmental  
Restoration and Reuse Act**

**(Escutia, Chapter 764, Statutes of 2001)**

# **SB 32 Requires:**

- **The California Environmental Protection Agency (Cal/EPA), “in cooperation with the Department of Toxic Substances Control, the State Water Resources Control Board, and the Office of Environmental Health Hazard Assessment,” to publish a list of screening numbers for specific contaminants.**



# **SB 32 Requires:**

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- **Before publishing the numbers the Agency shall hold workshops “to brief interested parties on the scientific and policy bases for the development of the proposed screening numbers and to receive public comments.”**

# **Purpose of this Section of SB 32**

- **To speed cleanup efforts at Brownfields and other sites by allowing property owners and local officials to more easily estimate the extent and cost of remediation needed to get sites into a condition for new development.**

# Definition of Screening Numbers

- **The concentration of a contaminant in soil, published by the agency as a protective reference value**
- **Solely an advisory number, and has no regulatory effect**
- **A number used by property owners, developers, citizen groups, etc. to estimate the degree of effort that may be necessary to remediate a contaminated property**

# Source of Chemicals on the List

- **39** hazardous waste constituents - Tables II and III of Title 22, California Code of Regulations Section 66261.24(a)(2)(A) and (B)
- **5** halogenated hydrocarbon industrial solvents
- **10** additional hazardous substances, identified by DTSC and SWRCB as the most common contaminants found at sites
- **Total = 54**

# Basis for Selecting Methodology

- **Risk assessment methodology that is consistent with the “most stringent” US EPA “Superfund” methodology.**
- **Risk assessment methodology that is recommended by DTSC or SWRCB for evaluations at sites recently or currently assessed under their authority.**





# Toxicity Criteria

- **Whenever available, chronic reference exposure levels and carcinogenic potency factors published by OEHHA are used.**
- **When an appropriate OEHHA toxicity criterion is not available, a US EPA toxicity criterion is used.**



# Exposure Algorithms

- **US EPA Risk Assessment Guidelines for Superfund algorithms were used for exposure to soil-bound chemicals (Appendix C)**
- **The most recent US EPA version of the J&E model for indoor air contamination from soil gas was used for volatile chemicals (Appendix B)**

# Exposure Scenarios

- **Residential: 350 days per year for 30 years; daily inhalation rate 20 m<sup>3</sup> (as recommended by US EPA)**
- **Commercial / Industrial: 250 days per year for 25 years; daily inhalation rate 20 m<sup>3</sup> (as recommended by US EPA)**

# **Non-Volatile Chemicals**

- **Soil levels calculated using the proposed methodology are similar to US EPA Region 9 Preliminary Remediation Goals (PRGs), except where U.S. EPA and OEHHA toxicity criteria differ.**



# **Non-Volatile Chemicals**

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- **Soil levels for carcinogenic chemicals calculated using the proposed methodology in several cases are similar or identical to San Francisco Bay RWQCB Environmental Screening Levels (ESLs).**

# **Non-Volatile Chemicals**

- **Soil levels for non-carcinogenic chemicals calculated using the proposed methodology in several cases are approximately fivefold higher than San Francisco Bay RWQCB ESLs due to the use of a safety factor in the ESLs to provide protection for exposure to more than one chemical.**



# **Non-Volatile Chemicals**

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- **OEHHA recommends a hazard index approach to provide protection against exposure to multiple chemicals.**
- **This hazard-index methodology is recommended by the US EPA Superfund program and by DTSC.**



# **Non-Volatile Chemicals**

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- **Large differences between a number calculated by OEHHA and an ESL for a chemical are due to protection of groundwater or ecological considerations in selecting the ESL.**
- **Example: endrin**





# **Volatile Chemicals**

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- **Soil levels calculated using the proposed methodology are lower than current PRGs.**
- **PRGs differ because indoor air contamination by soil gas was not considered in their calculation.**



# **Volatile Chemicals**

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- **Soil gas levels calculated using the proposed methodology and RWQCB ESLs, based on soil gas, are similar in most cases.**

# **Volatile Chemicals**


- **Soil levels calculated using the proposed methodology and RWQCB ESLs, based on soil, are different.**
- **This difference is due to use of different parameters in the US EPA model**
- **Some levels are below the level of detection.**



# Issues for Consideration

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- **These screening numbers are only for human health protection and are not meant for protection of environmental health or water quality.**
- **Does not include backyard garden scenario.**



# **Comments on Methodology**

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- **Methodology released in March 2004**
- **Comment period: March 12 – April 16, 2004.**



# Categories of Comments

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- **Document organization**
- **Target hazard index and cancer risk.**
- **Including a “backyard garden” exposure scenario.**
- **Soil gas intrusion modeling.**



# **Recommended Changes:**

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- **Johnson & Ettinger Model Parameters:**
  - **Increase air exchange rate to 1.0 for commercial/industrial.**
  - **Increase air exchange rate to 0.5 for residential exposure.**

# Recommended Changes:

- **Johnson & Ettinger Model Parameters**
  - **Develop screening numbers for buildings constructed without engineered fill below subslab gravel.**
  - **Modify the description of engineered fill to reflect compaction/moisture properties.**



# Recommended Changes:

- **Johnson & Ettinger Model Parameters**
  - For volatile chemicals, remove screening levels based on mg of chemical per kg of soil.
  - For volatile chemicals, retain screening levels based on concentrations in soil gas.



# Next Steps

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- **Publication of screening numbers (with Users Manual)**
- **Three public workshops to be held on the use of the screening numbers**