

Air Toxics Hot Spots Program Guidance Manual

Daryn Dodge, Ph.D., Staff Toxicologist

**Air Toxicology and Risk Assessment
Section**

**Office of Environmental Health Hazard
Assessment**



Purpose of the Hot Spots Guidance Manual

To provide a User's Manual to risk assessors on how to conduct a Hot Spots Risk Assessment

It is a consolidation of methodologies from three Hot Spots documents previously reviewed by the SRP

The Guidance Manual contains:

- ♦ **Air dispersion modeling procedures to estimate emissions migrating offsite into neighborhoods and businesses**
- ♦ **Equations and default values used to estimate noncancer hazard and cancer risk from these facility emissions**
- ♦ **Distributions of some variates (e.g., breathing rates) to provide stochastic analysis**



Approved Hot Spots Documents Incorporated into the Guidance Manual

- ◆ **OEHHA revised the Hot Spots Program to include consideration of sensitive subpopulations (i.e., infants and children) to comply with Children's Health Protection Act.**
- ◆ **OEHHA created the Technical Support Documents (TSDs) to lay out underlying science and methods to meet this requirement**
 - ◆ **Noncancer and cancer exposure level guidance reviewed by Scientific Review Panel (SRP) in 2008 and 2009.**
 - ◆ **Exposure Assessment and Stochastic guidelines reviewed by SRP in 2012**



SRP Charge for Guidance Manual

- ◆ Review new material not presented in the three TSDs already approved
 - ◆ Is the Guidance Manual clear?
 - ◆ Are there any problems or errors with the material we clarified or added?
- ◆ Highlighted additions in draft document to help avoid need to review entire Manual



Air Dispersion Chapter

- ◆ **Text added to clarify examples of “release types” for point, area or volume sources and modeling selection related to screening or refined air dispersion modeling**
- ◆ **Text clarified spatial averaging method – how to place the grid when dealing with a fence line receptor**



Estimation of Concentration Soil Contaminant Accumulation

Clarification:

- ◆ **For simplicity and health protection, the Tier 1 default assumes 70-year soil deposition for the accumulation period at end of a 70-year facility lifetime. In order to estimate exposure via soli contact and ingestion.**
- ◆ **Under a Tier 2 scenario, subject to District approval, the risk assessor may use soil accumulation at the time of the assessment to estimate exposure or expected accumulation at the end of facility operation.**



Estimation of Concentration Mother's Milk Pathway

- ◆ **Guidance added for use of mother's milk biotransfer coefficients**

Chemical/chem. group	Tco _m (day/kg-milk)
PCDDs - oral ^a	3.7
PCDFs - oral ^a	1.8
Dioxin-like PCBs - oral ^a	1.7
PAHs – inhalation	1.55
PAHs – oral	0.401
Lead - inhalation ^b	0.064

^a **Use Oral Tco_m also for the inhalation and dermal pathways for dioxins and PCBs**

^b **Use inhalation Tco_m also for the ingestion and dermal pathways for lead**



Estimation of Concentration Home Produced Food Pathway

Clarification:

- ◆ **Footnotes added to Table 5.4 – conditions for using various intake point estimates for food animals (cows, chickens and pigs) in the food animal pathway.**

Estimation of Dose

Use of 8-Hour Noncancer RELs

Clarification on when 8-hour RELs can be used

- ◆ **Primarily for exposure to off-site worker, and can be used for school site exposures. But few 8-hour RELs currently available, so we recommend that the assessor also estimate the chronic Hazard Index (HI) at these locations.**
- ◆ **An 8-hour HI based on the daily average 8-hour exposure is not required for the MEIR, but can be performed at the discretion of the District.**



Estimation of Dose

Noncancer, Non-inhalation Pathway

No equations in 2012 Exposure Assessment TSD for calculating average dose for chronic non-inhalation pathways

- ◆ **For hazard assessment, a time-weighted average approach is used to combine food ingestion rates for the age groups (i.e., 0<2, 2<16 and 16-70 yrs) to estimate the chronic dose for residential exposure.**

Estimation of Dose

Noncancer, Non-inhalation Pathway

Example:

Soil Ingestion Rate (SIR):

$$\begin{aligned} & (\text{SIR for age } 0 < 2 \text{ yrs} \times C_{\text{soil}} \times \text{GRAF} \times 10^{-9} \times 2 / 70) + \\ & (\text{SIR for age } 2 < 16 \text{ yrs} \times C_{\text{soil}} \times \text{GRAF} \times 10^{-9} \times 14 / 70) + \\ & (\text{SIR for age } 16\text{-}70 \text{ yrs} \times C_{\text{soil}} \times \text{GRAF} \times 10^{-9} \times 54 / 70) = \\ & \text{soil Chronic Dose} \end{aligned}$$

GRAF = gastrointestinal relative absorption factor



Noncancer RELs

OEHHA considers developmental toxicity as a subset of reproductive toxicity; thus for the Hazard Index, we combine them as impacting one target organ system.

Previously :

Acute HI was a combined Hazard Index for reproductive/developmental

Chronic was not combined – it was reproductive or developmental

- ◆ **We recommend that in a risk assessment , Hazard Quotients for either developmental or reproductive toxicity are combined into one Hazard Index.**



Cancer Risk Assessment

For mother's milk pathway, we modified risk equation for $0 < 2$ yr from this:

$$\text{RISKmm} = \text{Dose-Im} \times \text{CPForal} \times \text{ASF} \times \text{ED} \times 0.5$$

To this:

$$\text{RISKmm} = \text{Dose-Im} \times \text{CPForal} \times \text{ASF} \times \text{ED/AT}$$

- ◆ Puts AT back into equation
- ◆ Emphasize mother's milk pathway risk exposure duration is only for the first year in the $0 < 2$ yr age group.



Cancer Risk from Short-Term Projects

Hot Spots guidelines used for permitting short-term projects

Guidance included more details around offsite worker short-term exposures

- ◆ **For offsite worker, although workers are presumed to be older than 16 yrs, risk managers need to consider presence of women of child-bearing age and daycares at the site, and apply ASFs to the risk estimate**



Cancer Risk from Short Term projects

- ◆ **Suggested that risk managers consider lowering the allowable risk level when evaluating short-term projects (to avoid compacting “lifetime” risk into short time period)**
 - ◆ **Reflects concern over impacts of higher exposure to carcinogens during short-term projects**



Polychlorinated Biphenyls

- ◆ Previously, no noncancer health values for unspeciated PCBs
- ◆ Added language in Appendix E for estimating noncancer hazard impacts from unspeciated PCB mixtures:

“Consult with OEHHA and the local Air Pollution Control or Air Quality Management District if an assessment of the noncancer hazard for unspeciated PCB mixtures is needed.”



Summary

- ◆ **The updated draft Guidance Manual incorporates approved methods from the Cancer, Noncancer, and Exposure Assessment TSDs**
- ◆ **We are looking for comments on:**
 - ◆ **Clarity**
 - ◆ **New material added that was not in previous TSDs**



Comments



Comments

Many comments had to do with issues already addressed at previous public reviews on early-in-life cancer risks, i.e., Age Sensitivity Factors (ASFs):

- ◆ **Cancer risk for exposures from third trimester to <2 years weighted 10x (OEHHA, 2009)**
- ◆ **Cancer risk for exposures from age 2 to <16 years weighted 3x (OEHHA, 2009)**
- ◆ **Cancer risk for exposures from age 16-70 years weighted 1x (OEHHA, 2009)**



Comments

- ◆ **Comment:** OEHHA should incorporate into the final guidelines a procedure for developing ASFs based on chemical-specific data that can be used in Tier I HRAs.
- ◆ **Response:** In Section 8.2.1 we already say, “The risk assessments generated under the Air Toxics Hot Spots Act are reviewed by OEHHA. If a risk assessor had data indicating there are no windows of susceptibility early in life or that a different ASF should be used for a specific carcinogen and wanted to use these data, OEHHA would review the material as part of the review of the risk assessment.”



Comments

- ◆ **Comment:** the proposed changes in the guidance overstate risk from exposure without recognizing the large range in risk variables or the degree of uncertainty built into the process.
- ◆ **Response:** this is also a subject covered in previous TSDs. Nevertheless we made an addition to Chapter 1 that provides a detailed definition of cancer risk and the noncancer hazard index, noting that uncertainty factors are built into the REL values.



Comments

- ◆ **Comment:** The process and criteria by which a project could seek and obtain approval to utilize Tier 2 or Tier 4 approaches is not well defined, nor is it clear why a Tier 1 approach is needed if other approaches provide better and more scientifically sound site-specific data.
- ◆ **Response:** We clarify further in Section 2.5.3. Tier 1 is a standard point estimate approach using the recommended point-estimates presented in Hot Spots Guidance Manual. If site-specific information is available to modify some point estimates and is more appropriate to use than the recommended point-estimates in this document, then Tier 2 allows use of that site-specific information.



Comments

- ◆ We have also added language in Section 8.1.1 regarding use of Tier 2 and 4 for small footprint facilities (e.g., gas stations). For example, alternative breathing rates (point estimates or distributions) may be used as part of Tier 2 or Tier 4 risk assessments with appropriate supporting justification in the case of a very small zone of impact. OEHHA would work with risk managers at ARB and the Districts to review the alternative estimates in such an assessment.



Comments

- ◆ A number of comments from the LA Sanitation District asked for additional clarity for specific items in the air dispersion chapter...primarily regarding the air dispersion modeling program (HARP).
- ◆ All these comments were addressed and clarifying language was included in the air dispersion chapter of the manual.



End slide

