



**Asia-Pacific
Economic Cooperation**

2015/SOM3/CD/WKSP/023

Case Study - Using Pharmacokinetic Models in Human Health Risk Assessment for Lead

Submitted by: Australia



**Workshop on Metals Risk Assessment
Cebu, Philippines
28-29 August 2015**



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Background

Risk assessments for human exposures to lead generally are conducted using pharmacokinetic models. These models integrate intakes from multiple routes of exposure to lead in various environmental media, and predict resulting blood lead levels. The predicted levels are evaluated against risk management thresholds to evaluate the potential for adverse health effects, and/or to determine the need to reduce human exposure levels.

Several pharmacokinetic models can be used to evaluate human exposures to lead and have been evaluated by regulatory agencies. Some of the more widely known models are:

- EPA's Integrated Exposure and Uptake Biokinetic Model (IEUBK)
- Adult Lead Model (modified from Bowers et al. 1994)
- Leggett Model (Developed by Oak Ridge National Laboratories)
- O'Flaherty (1991, 1993, 1995)
- Carlisle and Wade (1992) (evaluated by EFSA and California EPA).

Among these, the IEUBK model is the most widely used by regulatory agencies in human health risk assessment. This model is unique, as it focuses on assessing exposures of children and resulting blood lead levels.

This breakout session will provide an overview of EPA's IEUBK model, including an assessment of the model structure, input parameters, interpretation of output, and opportunities for adjusting the model to reflect site- or project-specific

conditions. Session participants will work together to evaluate how adjustments to the model input parameters affect the output values.

Discussion Topics

1. How is the HHRA of lead different from other chemicals (carcinogens and non-carcinogens)?
2. How is the output interpreted in the context of HHRA?
3. What is the structure of the IEUBK model?
4. What are the specific input parameters to the model?
5. Which parameters can be adjusted with site-specific information?

Resources:

IEUBK Model

Overview <http://www.epa.gov/superfund/lead/products/factsht5.pdf>

EPA IEUBK Software and User

Manual: <http://www.epa.gov/superfund/lead/products.htm>

Downloadable IEUBK

software: <http://www.epa.gov/superfund/lead/products.htm#ieubk>

Review of pharmacokinetic models for assessing adult exposure to

lead: <http://www.epa.gov/superfund/lead/products/adultreview.pdf>