Ecological Risk Assessment Forum (ERAF)

Viewpoints on Bioavailability for Wildlife

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Introduction

< **ERAF**: a *Superfund / RCRA ecological risk assessment group* with 10 BTAG (biological technical assistance group) members from each EPA Region plus 4 HQ ecologists from OSWER, NCEA, ORD and OSW.

< **Guidances**: the 1997 *ERAGS* (Ecological Risk Assessment Guidelines for Superfund) and 1998 EcoGuidelines are the principle followed.

< **Mission**: to *improve the quality and consistency* of EPA's ecological risk assessments for sites under CERCLA and RCRA evaluations.

< **Meetings**: monthly via teleconference (ERATS) and biannually at risk assessment meetings to conduct business related to the ERAF mission.
< **Committees**: currently for wildlife: 1) background reference exposures, 2) monte carlo analyses of ecological data, 3) toxicity reference values.

Bioavailability Points for Wildlife

1) Concepts, definitions and terminology:

- simply performing unvalidated *solubility tests* (termed **bio*access*ibility**) is NOT equivalent to measuring biological absorption and/or transport to internal molecular receptors (conventional known as **bioavailability**)

- focus is more often on terrestrial wildlife and **bioaccumulation** from ingestion pathways, vs more straight-forward aquatic **bioconcentration** or the bioconcentration factors (BCFs) estimated for vegetation uptake

[double-sided – see reverse]

2) Ecological risk assessment needs for bioavailability data

- like for human health, bioavailability studies can evaluate and determine the *transfer* or **assimilation** of environmental contaminants from abiotic and biotic media to the wildlife receptors of concern

- needs go beyond simple exposure assessments, to determination of how much contaminant actually gets **absorbed** internally by the wildlife

- site conceptual models are often more *complex*, than for human health, since multi-media exposure pathways can include **food chains** or **webs**

3) Ecological sampling for and modeling of bioavailability

  - model estimates are generally **unvalidated** for uptake of chemicals from abiotic media (soil, water) or from lower biotic media to higher trophic levels of wildlife; thus, they are highly uncertain and should *only be used cautiously, sparingly, and for initial screening* uses

  - using **co-located** sampling within wildlife exposure units (i.e., home ranges) of both the contaminated abiotic media and proximate biotic media (forage or prey) is arguably the best approach for relating the *biotransfer* of chemicals with the most accuracy and least uncertainty

  - deriving **BCFs** (bio-concentration factors) requires proper analyses of *edible parts* of contaminated prey or forage, whose concentrations are compared to *whole-body* levels in consumers and/or their *tissues* (i.e., liver, kidney, blood, egg) that bioaccumulate chemicals -- this latter bio-indicator tissue approach is most useful for *biomarker* work

  - **background** uptake, determined from receptors in good *reference* or control areas, is often critically needed to help discern whether the measured tissue concentration is attributable to a specific site source

4) Wildlife bioavailability data

  - are **limited, but direly needed**, in ecological risk assessments to improve the accuracy for estimates of exposures to contaminants

[double-sided – see reverse]