

Risk Assessment Exercise

- Which products exceed EPA Levels of Concern?
- Which products pose less risk?
- What mitigation would you recommend?
- What additional information would you want if making the decision for use of this product?
- What are the uncertainties associated with the assessment?

EPA Risk Quotients (RQ)

- $RQ = \text{Exposure} / \text{Toxicity}$
- $RQ = \text{Estimated Environmental Concentration (EEC)} / \text{LC50 or EC50 or NOEC}$

How would an EPA screening assessment evaluate potential risk to an endangered sea turtle?

- What toxicity values are considered for reptiles?
- How is exposure calculated for reptiles?

Risk Quotient Calculations for Reptiles

- Acute RQ = Estimated Environmental Concentration (EEC) of the Pesticide on terrestrial vegetation / LC50 for Birds
- Chronic RA = EEC for terrestrial veg / NOEC for avian reproduction

How does EPA use RQ values?

Risk Presumption	RQ	LOC
Acute High Risk	EEC/LC50	0.5
Acute Restricted Use	EEC/LC50	0.2
Acute Endangered Species	EEC/LC50	0.1
Chronic RQ	EEC/NOEC	1

Which Pesticide Poses the Greatest Risk?

Pesticide	RQ
A	100
B	1
C	0.1

Terrestrial Acute RQ

Option 1: LC50-based method

- EEC (estimated residues on plants)/
LC50 (median lethal concentration)
 - Advantage – compares expected residues on food items to established toxicity values obtained from the dietary route of exposure.
 - Disadvantage – LC50 based on concentration of pesticide in feed rather than actual exposure. Can underestimate toxicity because food consumption by birds in lab may be less than birds in wild given issues of food avoidance, caloric content, and energetic needs.

Terrestrial Acute RQ

Option 2: LD50/ ft² method

- EEC (application rate in mg a.i./ft²)/ LD50 (median lethal dose)
 - Advantage – LD50 not likely to underestimate toxicity (dose is intubated into birds stomach). Assumes avian exposure is a function of contaminant availability.
 - Disadvantage – The LOC is based on a arbitrary unit (one ft²) and does not recognize differences in contaminant availability among different species. Additionally, the route of contaminant administration (oral intubation) may be less representative of typical exposure than the dietary route.

Terrestrial Acute RQ

Option 3: LD50/day method

- $\text{EEC (mg a.i. consumed/d)} / \text{LD50 (median lethal dose)}$
 - Advantage – Considers potential exposure based on estimated residues in environment and animal consumption. LD50 not likely to underestimate toxicity. Accounts for level of direct exposure.
 - Disadvantage – The route of contaminant administration (oral intubation) may be less representative of typical exposure than the dietary route.

Risk Assessment Exercise Groups

- Nimish: insecticide risk to birds
- Jim: insecticide risk to frogs
- Jay: herbicide risk to fish
- Tony: herbicide risk to terrestrial plant