Environmental Assessment

Ted Kuchnicki

Environmental Assessment Division

Pest Management Regulatory Agency

Environmental Assessment Division

- Diverse team of staff
  - Microbiologists
  - Entomologists
  - Soil scientists
  - Aquatic toxicologists
  - Plant physiologists
  - Chemist

Environmental Assessment Division

- Data evaluated
  - Environmental Fate - Part 8
  - Environmental Toxicology - Part 9

Preliminary Review

- Verification of waivers
- Review of methodology
  - Deviations from accepted protocols
  - Appropriateness
  - Scientific correctness

Evaluation

- Detailed study review
  - Researchers' notes
  - Chromatograms
  - Statistical analysis
- Verification of researchers' results
- Validation of researchers' conclusions

Evaluation

- Draw conclusions regrading fate and effects
- Assess risk of use to environment
  - Estimation of the likelihood of occurrence of adverse effects

Risk Assessment

- Exposure estimation
- Hazard identification

Exposure Estimation

- Concentration of pesticide in environment
- Concentration to which non-targets exposed
- Duration of exposure

Estimating Environmental Exposure

- Summaries of physicochemical properties (Part 2)
  - Solubility
  - Vapour pressure
  - Octanol/water coefficient
  - Dissociation constant
  - UV-visible adsorption spectrum

Estimating Environmental Exposure

- Use Part 8 - Environmental Fate data
- Analytical methodology for detection in soil, water, and biota
  - To understand limitations of techniques
- Hydrolysis

Estimating Environmental Exposure

- Phototransformation
  - Soil
  - Water
- Biotransformation
  - Aerobic soil - 20-30 °C
  - Aerobic water - 20-30 °C
  - Anaerobic sediment/water - 20-30 °C

Estimating Environmental Exposure

- Studies of Mobility
  - Adsorption/Desorption or
  - Soil column leaching or
  - Soil thin layer chromatography

Estimating Environmental Exposure

- Field dissipation studies
  - Demonstrate fate in canadian environment
  - Four regions
    - B.C. - 2
    - Prairies - 4
    - Central Canada - 4
    - Maritimes - 2

Hazard Identification

- Determination of toxic endpoints and dose response
- Based on use of surrogate test species
- Data used to predict affect on non-targets

Hazard Identification

- Use Part 9 - Environmental Toxicity data
- Earthworm acute toxicity
- *Daphnia* sp. acute toxicity

Hazard Identification

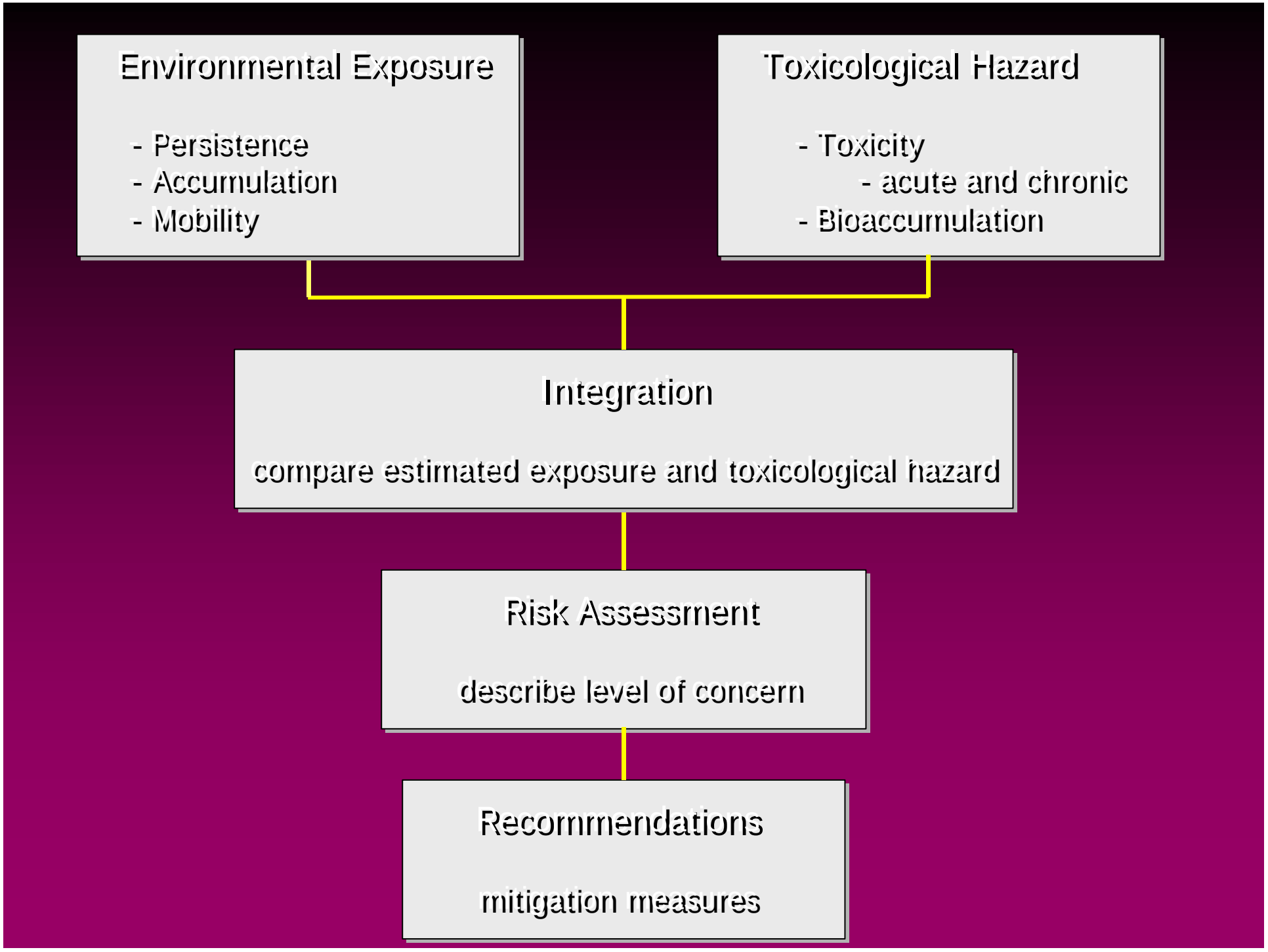
- Fish acute toxicity
  - cold water
    - rainbow trout
  - warm water
    - bluegill sunfish

Hazard Identification

- Birds
  - dietary acute toxicity (LC_{50})
    - Bobwhite Quail and Mallard Duck
  - oral acute toxicity (LD_{50})
    - Bobwhite Quail or Mallard Duck

Hazard Identification

- Terrestrial vascular plants
  - 10 crop species
- Algae
  - Fresh water - 3
  - Salt water - 1
- Aquatic vascular plants
  - *Lemna* sp.


Environmental Exposure
- Persistence
- Accumulation
- Mobility
Toxicological Hazard
- Toxicity
- acute and chronic
- Bioaccumulation
Integration
compare estimated exposure and toxicological hazard
Risk Assessment
describe level of concern
Recommendations
mitigation measures

RISK ASSESSMENT

- Integration of assessments on:
  - Environmental Exposure (Fate)
  - Environmental Hazard (Toxicology)
- Exposure:
  - Expected Environmental Concentration (EEC)

RISK ASSESSMENT

- Hazard:
  - No Observable Effect Concentration (NOEC)
  - No Observable Effect Level (NOEL)
  - Most sensitive test specied

Risk Assessment

- Ratio of NOEC to EEC is determined
- NOEC/EEC less than 1 indicates
  - margin of safety
- NOEC/EEC greater than 1 indicates
  - environmental impact is expected

Risk Mitigation

- Reduce number of applications per season
- Restrict to ground application (no aerial use)
- Buffer zones
- Any other measures that would reduce the exposure