Department of Pesticide Regulation

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Exposure Assessment Program
Worker Health and Safety Branch
Types and Number of Products Registered in California

- ~11,000 products
- ~800 active ingredients
  - Agricultural
  - Industrial
  - Institutional
  - Residential
Why Conduct Risk Assessments?

• Ensure the Safe use of Pesticides in State

  – As mandated by:
    • California Food and Agriculture Code
    • Sections 11501, 12824, 12825, 12826, 13121-13135, 14102, and 14103
**Stages of Risk Assessment**

- **Hazard Identification**
  - Identify potential adverse effects
- **Dose-Response Assessment**
  - How are effects related to Dose
- **Exposure Assessment**
  - How much are people exposed to?
- **Risk Characterization**
  - What is risk to exposed populations
Risk Assessment Stages

Hazard Identification and Dose-Response Assessment

Based on Toxicity Studies
Typically Laboratory Animal
May be Human
Exposure Assessment is Based on:

- Animal Studies
- Human Monitoring Studies
- Cultural Practices
- Labels
- Regulations
- Use Patterns
Risk Characterization is:

- Combining:
  - Hazard Identification
  - Dose Response
  - Exposure Assessment
- Reported as Margins of Safety

\[
\text{MOS} = \frac{\text{NOAEL}}{\text{Estimated Exposure}}
\]
Utility of Pesticide Use Data in Risk Assessment

• Priority Setting
  – All uses considered in RA
  – High use considered in Priority Setting

• Developing Exposure Assessments
Primary Routes of Exposure

- Dermal
- Inhalation
- Oral
Individuals Assessed

- Estimate Exposure
  - Handlers
  - Reentry
  - Bystanders (including offsite)

(All potentially exposed)
Exposure Duration

- Acute Exposures
  - Single Exposures

- Chronic Exposures
  - Repeated Exposures
Exposure Must Consider Toxicity

- Dose Makes the Poison

Paracelsus

Auroleus Phillipus Theostratus Bombastus von Hohenheim 1493-1541
Exposure Must Consider Toxicity

- **Acute Effects**
  - Shows up within 1 – 7 days

- **Chronic Effects**
  - Shows up after 1 year
Appearance of Acute Toxicity

- Quick
- Delayed
Acute Toxicity Magnitude

- Magnitude can vary over Time
Acute Toxicity Issues

• To Address Some of these Issues
  – DPR Considers Exposure Durations
    • 1 hour (workers, bystanders)
    • 8 hour (workers, bystanders)
    • 24 hour (bystanders)

• Estimate Upper-Bound Exposure
Chronic Exposure
Based on Use Patterns

• May be Relatively Constant
Chronic Exposure Use Patterns

• Exposure May be Seasonal
Chronic Exposure Use Patterns

- May Include Multiple Peak Pattern
Chronic Exposure Issues

- Seasonal Exposure is a Concern
Chronic Exposure Questions

• Continuous Chronic Exposure
  – Occurs for More than 7 Days?
  – Significantly Less than 1 Year?

• If yes:
  – Intermediate-Term Exposure Occurs

  • Compare Mean Daily Exposure to Sub-Chronic Toxicology Studies
Exposure Assessment
Step 1

- Scoping Process
  - Review All Labels
  - Identify Potential Exposure Scenarios
  - Identify Use Patterns
    - By crop
    - By activity
    - By location
Use Data Patterns

San Joaquin Valley Grape Harvest

Day of Year

09-Apr 29-May 18-Jul 06-Sep 26-Oct

Application Table Wine Raisin
Cultural Activities and Carbaryl Applications in Table Grapes
Use Data Patterns

Harvest/Application Timing in Oranges
San Joaquin Valley

- 30-Nov
- 22-Aug
- 14-May
- 03-Feb
- 26-Oct
- 18-Jul
- 09-Apr
- 30-Dec

Applica. Valencia Navel Applica.
Use Data Patterns

Tomato Harvest: San Joaquin Valley
Process and Fresh Market Tomatoes-1994
In Summary

Knowledge of Pesticide Use Patterns:

- Provides the exposure assessor with essential insight into the potential impact of pesticide use.
- Provides opportunities for mitigation of potential harmful effects.
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Questions/Comments

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