Appendix C
Speaker Presentations

Overview presentation entitled “Workshop on the Analysis of Children’s Measurement Data” by Dr. Linda Sheldon

Workshop on the Analysis of Children’s Measurement Data

Linda Sheldon, Ph.D
National Exposure Research Laboratory, U.S. EPA
September 27-28, 2005

RESEARCH & DEVELOPMENT
Building a scientific foundation for sound environmental decisions

Goals for NERL’s Children’s Research

- Develop and evaluate approaches and methods for assessing children’s aggregate and cumulative exposures
- Identify and characterize key determinants of exposure
- Quantify and understand the importance of each route and pathway of exposure
- Collect population data on exposure concentrations and exposure factors

RESEARCH & DEVELOPMENT
Building a scientific foundation for sound environmental decisions

What do we need to know?

- Has exposure occurred?
- How many people have been exposed?
- Will the exposure cause a health effect?
  - Intensity, Duration, Frequency, Route, Timing
- What can we do to reduce the exposure?
  - Source
  - Route and Pathway

RESEARCH & DEVELOPMENT
Building a scientific foundation for sound environmental decisions

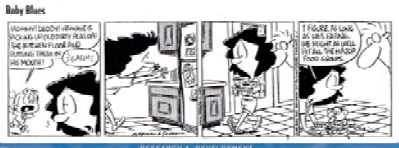
FQPA Basis for Research

- The Food Quality Protection Act of 1996 (FQPA) requires
  - Children’s risks to pesticide exposures be considered
  - Exposure assessments to be conducted for all exposure pathways
  - Assessments use high quality and high quantity exposure data or models based on exposure factors generated from existing, reliable data

RESEARCH & DEVELOPMENT
Building a scientific foundation for sound environmental decisions

Why Couldn't We Do This ?

- No protocols for collecting children's exposure data
- Limited data on exposures, activities, and exposure factors
- Models to characterize children's exposure for multiple pollutants across multiple pathways not developed



Program Approach

- Develop model
- Define data requirements
- Use screening assessment to evaluate magnitude and significance of exposure
- Identify most important data gaps
- Conduct research to fill critical gaps

Critical Gaps

- Age/developmental benchmarks for categorizing children's exposure
- Contaminant use patterns in locations where children spend time
- Activity pattern data, especially for young kids
- Distribution of contaminants in locations
- Population exposure data on children
- Approaches and factors for estimating dermal and non-dietary exposure

Many Studies

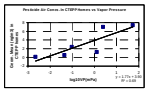
- CTEPP
- Feasibility of Macroactivity Approach – Day Care Jazzercise
- Characterize Important Factors for Transfer Activities
- Post Application Exposure Studies
- Transport of Pesticides in Test House
- Survey of Environmental Hazards in Child Care Centers
- CDC Duval County Pesticide Exposure Study
- Pet Study
- Kid's in Agricultural Communities
- Kid's Dietary Ingestion Study
- Survey of Environmental Hazards in Homes

Observations

Two categories of pesticides

- Based on volatility
  - Semi volatile – chlorpyrifos
  - Non volatile – permethrins
- This will influence
  - fate and transport in the environment
  - Exposure routes and pathways

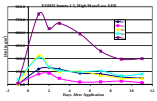
Air concentrations increase with volatility;



- Dust/air concentration decrease with volatility

Air/Dust concentration ratios		
	OH	NC
Chlorpyrifos	30	21
cis-Permethrin	2500	2000

- Fate and transport will be different
  - Permethrins – more persistent indoor
  - Longer exposure duration



Pesticide Concentrations

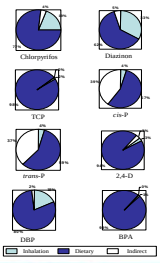
- Air concentrations are predictable based on applications
- Concentrations on textured surfaces (gauze, texture toys) are predictable based on applications
- Concentrations on hard surfaces are highly variable

Impact on Exposure Routes

- Nondietary ingestion
  - Transfer of particles on and off hands is more efficient than transport of residue
    - Fluorescent tracer data
    - Hand rinse vs. hand wipe data - ~ 8 to 1
    - Surface loadings may be used as a realistic upper bound for hand loadings
- Dermal
  - Particle bound pesticides are likely to stay on particles or transfer to skin more slowly

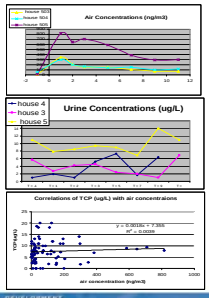
Exposure Routes --

- Need to understand most important routes
  - Provides focus for future data collection activities
  - Model sensitivity analysis must be framed based on route
- CTEPP results
  - Apportioned from environmental data
- What else can we learn about routes



Inhalation

- Pesticides may be poorly absorbed
  - CPPAES data
  - CTEPP data
    - Air (GM, 75th, 95th)
      - OH (2.2, 4.8, 23)
      - NC (7.0, 18, 71)
    - Urine
      - OH (4.6, 7.3, 12)
      - NC (5.2, 8.2, 16)



Dermal Absorption

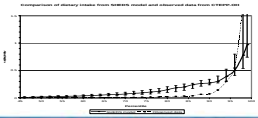
- Not likely to be a major route for kid's residential pesticide exposure
- Back of the envelop calculation –
  - Hand loading x 60%body surface area x 3% absorption / body weight
  - CTEPP results – median (ng/kg/day) – Ohio
    - Inhalation – 0.38
    - Dietary – 2.1
    - Indirect – 0.083
    - Dermal – 0.005
    - Urine – 117 (dose reconstruction
  - CPPAES results using body suits – 0.20

Nondietary Ingestion

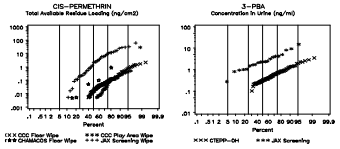
- Important for nonvolatile pesticides
  - Transfer as particles – high efficiency
  - Higher dust concentrations
    - Median *cis*-permethrin/chlorpyrifos –
      – 13 for OH, 6.2 for NC (still in residential use)
  - Uncertainties in how to estimate exposure/dose
  - Should consider lead models
- Less important for semivolatiles in residue form

Dietary Ingestion

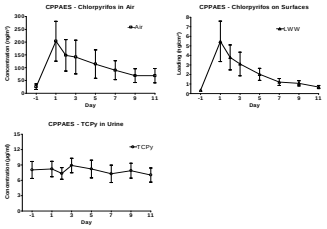
- This is the big deal for the general population
- Do we know how to estimate?
  - Need better analytical methods
  - Uncertainty in duplicate diet collections
  - What is the impact of preparation and handling.
- How well do we model?



Impact of Residential Applications



Impact of Residential Application



The End