



### Areas Where Additional ORD Input Is Needed

- Non-dietary ingestion:
  - Correlation between surface area and frequency of hand to mouth events
  - Quiet versus active play
  - Wet hand transfer efficiency
    - Clothier
  - Saliva extraction of residues from hands during the mouthing event

### Areas Where ORD Input Is Needed

- Post application dermal exposure
  - Indoor broadcast and crack and crevice treatments
  - Treated pet
- Interpreting the data appears to be complicated by:
  - Small sample sizes
  - a wide variety of surface residue collection methods

### Other ORD Research

- House dust and track-in
- Compared to our dermal and non-dietary assessments, they don't have a big impact.
- Difficult to model or develop guidelines for

### Analysis of Workshop Studies Can Help

- Dermal contact values for post application assessments (broadcast and C+C)
  - Daycare, CPPAES, JAX, Hore.
- Hand loadings for H-t-M pathway
  - CTEPP, CPPAES, DIYC, SHEDS.
- Characterization of dust, track-in, object to mouth
  - CTEPP

### Example of Challenges with Assessing Children's Oral Nondietary Exposure

- N-Methyl Carbamate Cumulative Assessment

### Hand-to-Mouth Algorithm

- Non-dietary ingestion via hand-to-mouth behavior has been discussed at several SAPs
- Most recently N-methyl Carbamate
  - Case study (February)
  - Preliminary (August)
    - Consult the experts

## Hand-to-Mouth Contact Factors- Previous Assumptions

- Based on discussions at August 1999 SAP
  - 20 cm<sup>2</sup> surface area of hand mouthed
    - Palmer surface area of 3 fingers (4 year old)
  - 20 hand-to-mouth events per hour
    - 90<sup>th</sup> percentile from videography data collected and analyzed by Reed *et. al.*, 1999
- Considered removal by saliva (e.g., Geno)
- Assumed complete replenishment of hands between events

## What We Used in the Case Study

- Hand-to-mouth Frequency
  - Triangular Distribution (Reed, 1999)
    - Range from 0 to 26 events per hour
      - Mean 9.5
- Surface area of the hand (fingers)
  - Uniform Distribution
    - 0 – 20 cm<sup>2</sup> per event

## We Considered Additional Data

- Available Micro-Activity Data and their Applicability to Aggregate Exposure Modeling
  - Valerie Zartarian's SRA Presentation, Dec. 2003
    - Analyzed hand-to-mouth data based on six studies
      - Including Reed
    - Relied on observational data using video tape analysis, trained observers, or parental observers
  - All hand contacts were recorded as hand-to-mouth events, regardless of the fraction of hand mouthed
  - One study (Letkie) was used to estimate the percent area of hand mouthed

## Available Micro-Activity Data and their Applicability to Aggregate Exposure Modeling (Zartarian et al., December 2003)

Author	No. Subjects	Description	Videotape time	Median Frequency/Other Information
Black et al., 2003	52 children in Laredo, TX	13 infants, 12 one-year olds, 18 two-year olds, 9 preschool living in the vicinity of the Brown Toxic	Four hour videotaped observations	Infants: 13.5/hour and 4.7/hour toddlers
Falvo et al., 2002	71 urban Washington State children	ages 11 to 60 months	No video-tape (parental and trained observers). Observations for more than one day were available for 70% of the children.	Mean = 76 hand to mouth contacts per hour
Frisman et al., 2001	19 children	ages 3 to 6 years living in Minnesota	Four hour videotaped observations	Median: 3.5 hand to mouth contacts/hour, 3-6 years. Median: 2.5 contacts/hour, 5-6
Reed et al., 1999	30 urban children living in Newark, NJ	A total of 20 day care (3-4 yrs) and 10 at home (2-3 years)		Mean hand to mouth frequency 9.5 contacts per hour
Zartarian et al., 1998	4 Latino children in agricultural area in California		Single day videos (6, 7, 8, 10 waking hours)	Mean = 9.5 events/hr
Letkie et al., 2000	Video observations of suburban children ages 1 to 6 years of age		23.34 hours of children "in view"	These data were used to estimate area of hand mouthed. Median: 2.3 hand to mouth contacts/hour, mean: 7.3 contacts/hour

## What We Used in the Preliminary Assessment

- Increased the potential area of the hand that can be mouthed (Letkie)
  - Begin with surface area of 200 cm<sup>2</sup>
  - Multiply times percent area mouthed
    - Beta distribution
      - Mean: 0.13 (std 0.06)
      - 99<sup>th</sup> %-ile: 0.3
- Increased hand to mouth frequency
  - Weibull:
    - Mean: 12.5 events/hr (std 16.4)
    - 90<sup>th</sup> %-ile: 27.8
    - 99<sup>th</sup> %-ile: 84.8

## Uncertainties In Modeling Hand-to-Mouth Exposure

- Assumes residue replenishment between each hand to mouth event
- Fixed values for exposure duration
  - Surface area
  - Frequency
- Fixed upper percentiles for long durations has the potential to create unrealistic exposure estimates
- Age differences

## Summary

- To better assess children's exposures to pesticides, OPP had identified the following areas of importance:
  - Dermal contact values for post application assessments (broadcast and C+C)
  - Hand loadings for H-I-M pathway
  - Interpretation of biomonitoring data
  - Characterization of dust, track-in, object to mouth (relative source contribution)

## Final Thoughts

- Continued efforts to improve assessment of children's exposure to pesticides
  - Increased OPP collaboration with ORD
    - ORD research
    - STAR grants