

COMPARISON OF FIELD MEASUREMENTS FROM CPPAES WITH PREDICTIONS FROM MENTOR/SHEDS - PESTICIDES FOR ESTIMATING CHILDREN'S RESIDENTIAL EXPOSURE AND DOSE TO CHLORPYRIFOS

Paromita Hore¹, Jianping Xue², Valerie Zartarian², Sheng-Wei Wang¹, Pay-ling Chu¹, Yu-ching Yang¹, Nicolle Tolve², Haluk Ozkaynak², Dana Barr³, Larry Needham³, P. Georgopoulos¹ and P. J. Lioy¹

¹Environmental and Occupational Health Sciences Institute (EOHSI), Rutgers University & the UMDNJ-Robert Wood Johnson Medical School, N.J.

²National Exposure Research Laboratory, U.S. EPA, RTP, N.C.

³Contemporary Pesticide Laboratory, CDC, Atlanta, G.A.

Funding Agencies:

Environmental Protection Agency (QT-RT-00-000185 & CR827033)

Dow Agro Sciences (Grant in Aid)

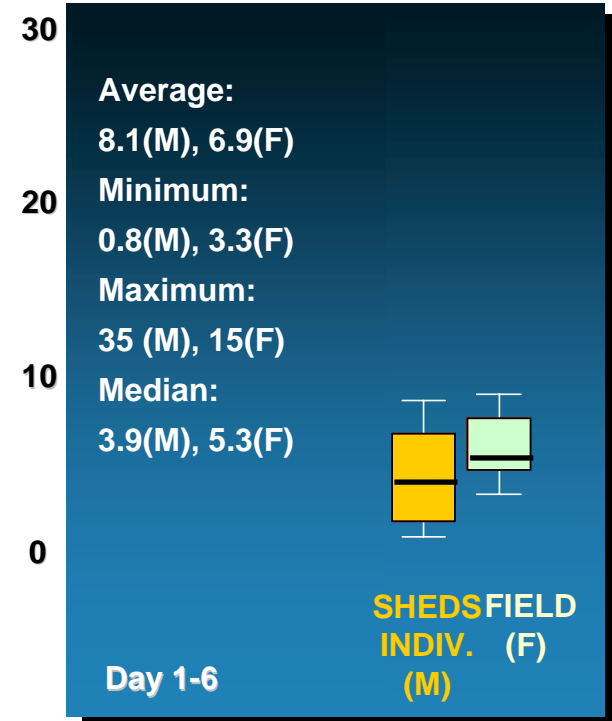
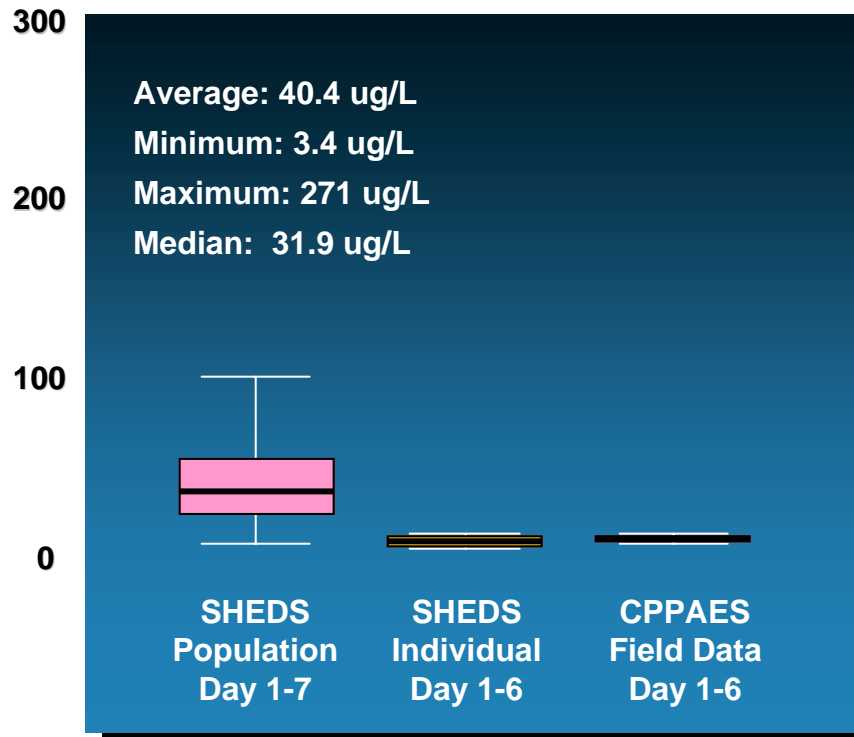
CHILDREN'S POST-PESTICIDE APPLICATION EXPOSURE STUDY (CPPAES)

- ◆ Field study conducted by EOHSI, N.J.
- ◆ Provide information on the distribution and accumulation patterns of chlorpyrifos within a residential environment for a two-week period following a crack and crevice application.
- ◆ Study was conducted in 10 residential homes (Criteria for selection: With child age 2-5 years and routinely apply pesticides).
- ◆ Samples collected (Indoor Air, Dust Wipes, Plush Toys, Gauze Pads, Handrinse, Clothing Dosimeters, Urine, Activity Diaries, Videotape).

MODEL CRACK & CREVICE INPUT PARAMETERS

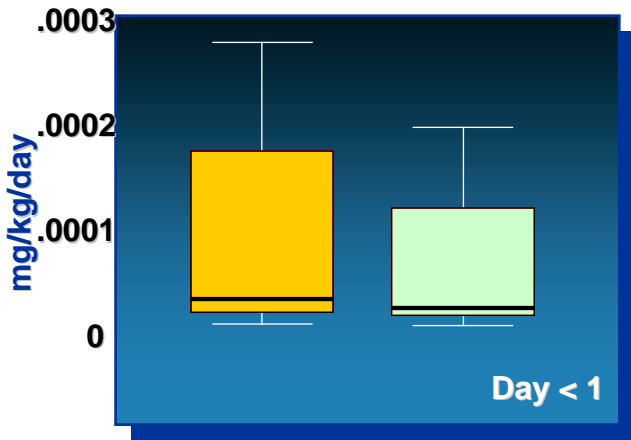
- ◆ Instead of sampling from default distributions, child specific & activity specific daily input parameters were extracted/estimated for each macroactivity from the CPPAES activity diaries & environmental measurements.
- ◆ Sampled actual children's diaries rather than CHAD diaries.
- ◆ Time spent by the child at home (in treated/un-treated rooms) or away from home were specified for each macroactivity.
- ◆ Daily air and residue concentrations for chlorpyrifos in the treated rooms were specified (as measured in the field).
- ◆ Child-specific dermal body and hand transfer coefficients were estimated for each macroactivity (given activity level, clothing information, most-likely surface in contact with information - as specified in the activity diaries).
- ◆ Daily handwashing & shower events were specified for each child.
- ◆ Child specific frequency of hand-mouth & object-mouth information were extracted from the individual videotapes.

TCP in Urine (ug/L) (MENTOR/PESTICIDE – SHEDS, POPULATION – SHEDS & CPPAES)



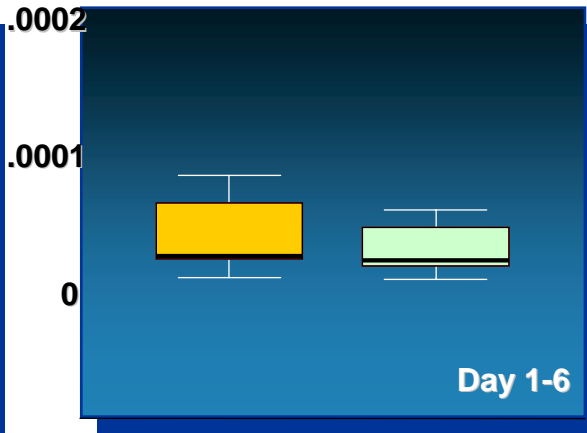
INHALATION EXPOSURE (mg/kg/day)

MENTOR/PESTICIDE - SHEDS vs. CPPAES



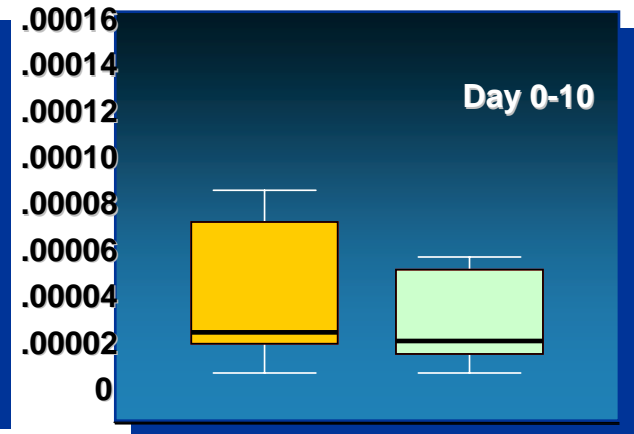
MODEL (M) FIELD (F)

Average: 9.5E-05(M), 6.6E-05(F)
 Minimum: 2.8E-06(M), 2.1E-06(F)
 Maximum: 2.7E-04(M), 1.9E-04(F)
 Median: 2.6E-05(M), 1.9E-05(F)



MODEL (M) FIELD (F)

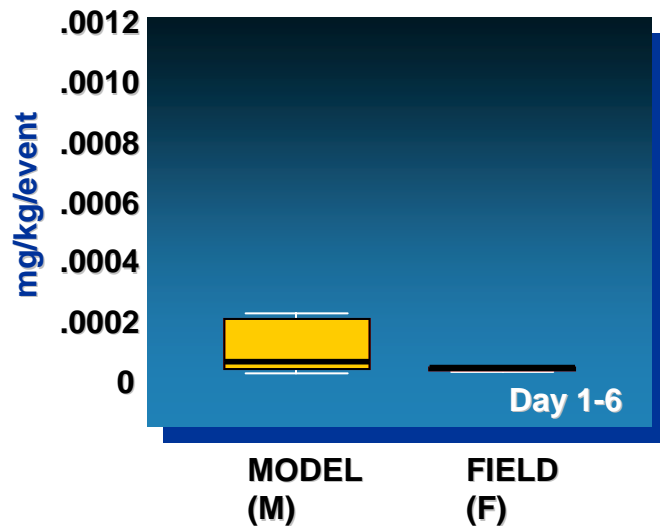
Average: 4.8E-05(M), 3.4E-05(F)
 Minimum: 2.3E-06(M), 1.7E-06(F)
 Maximum: 1.7E-04(M), 1.2E-04(F)
 Median: 1.8E-05(M), 1.5E-05(F)



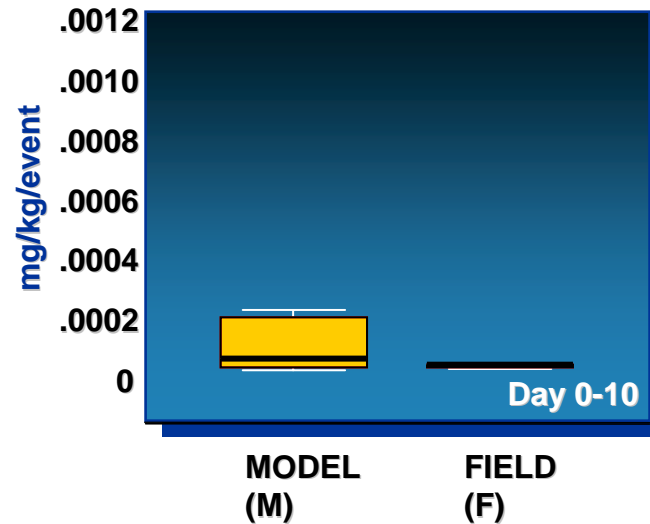
MODEL (M) FIELD (F)

Average: 4.8E-05(M), 3.4E-05(F)
 Minimum: 2.2E-06(M), 1.7E-06(F)
 Maximum: 1.5E-04(M), 1.1E-04(F)
 Median: 1.96E-05(M), 1.6E-05(F)

DERMAL EXPOSURE (mg/kg/event) MENTOR/PESTICIDE - SHEDS vs. CPPAES



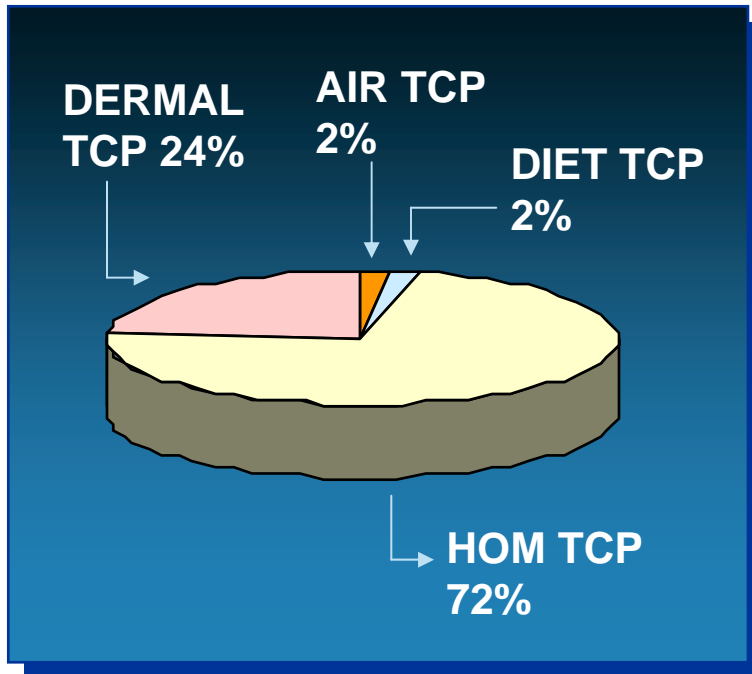
Average: 1.96E-04(M), 1.5E-05(F)
Minimum: 1.2E-06(M), 2.8E-06(F)
Maximum: 9.4E-04(M), 2.1E-05(F)
Median: 4.1E-05(M), 1.9E-05(F)



Average: 1.96E-04(M), 1.4E-05(F)
Minimum: 9.8E-07(M), 2.7E-06(F)
Maximum: 9.6E-04(M), 2.1E-05(F)
Median: 4.1E-05(M), 1.7E-05(F)

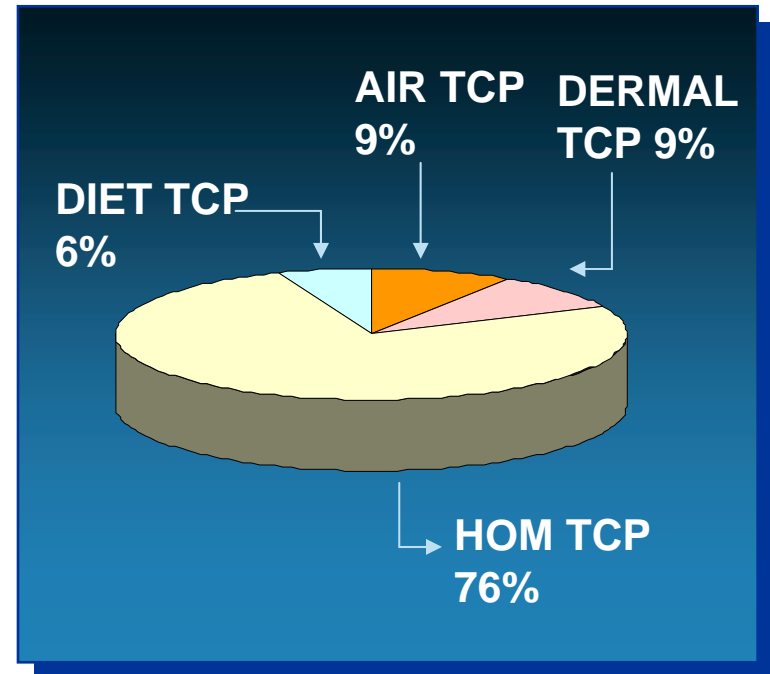
PERCENT TCP FROM EACH EXPOSURE ROUTE (MENTOR/PESTICIDE - SHEDS VS. POPULATION-SHEDS)

SHEDS-POPULATION



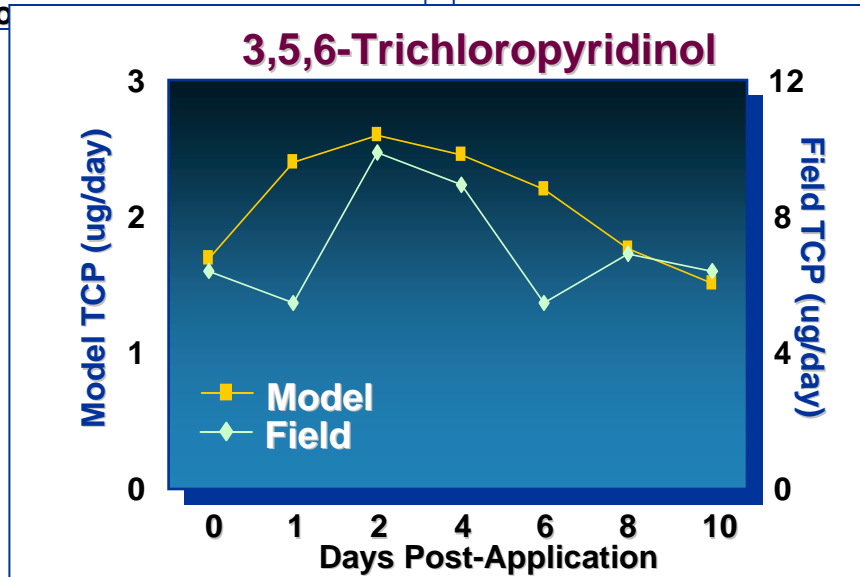
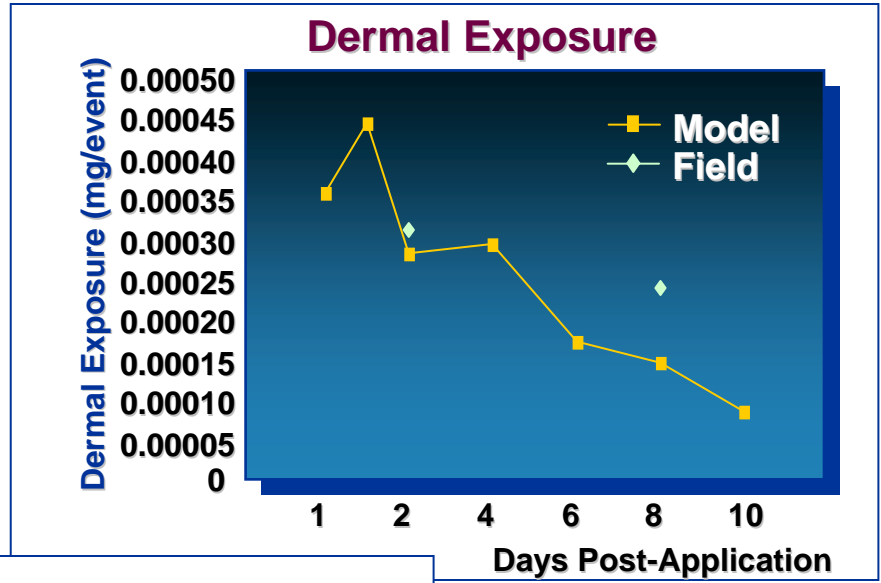
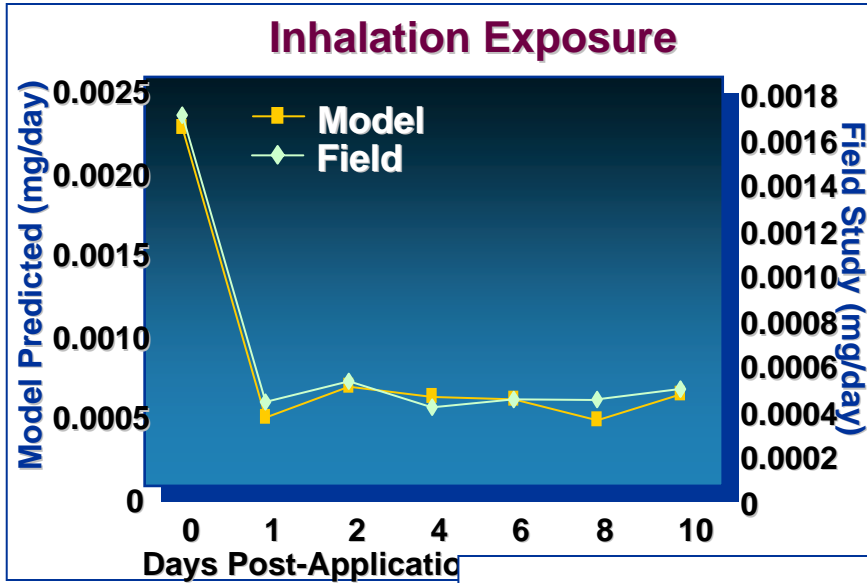
DAY 0-7 MEDIAN VALUES

SHEDS-INDIVIDUAL



DAY 1-6 MEDIAN VALUES

INHALATION/DERMAL EXPOSURE & TCPy TRENDS (MENTOR/PESTICIDE - SHEDS vs. CPPAES) – Child B



POSSIBLE REASONS FOR DISCREPANCIES BETWEEN MENTOR/PESTICIDE - SHEDS AND CPPAES RESULTS

- ◆ **For a given macroactivity, variability in questionnaire activity information reported could have resulted in possibly underestimating or overestimating the transfer coefficient.**
- ◆ **For input parameters for which macroactivity specific field data was not available, average point estimates were used instead of distributions.**
- ◆ **Issues regarding timing and dilution of urinary samples may have contributed to some of the variability in the CPPAES field samples.**

SUMMARY

- ◆ Estimates of **TCP** metabolite levels in the urine by MENTOR/SHEDS-Pesticides were within the same order of magnitude as the results from CPPAES for each child (Based on mean & median values model **Total TCP** estimates for days 0-10 were within a factor of 2 for all homes).
- ◆ Daily trends for TCP elimination & inhalation exposure were comparable between the field measurements and model simulation results.
- ◆ Major route of exposure for “users” was determined to be non-dietary ingestion.