

US EPA ARCHIVE DOCUMENT

6-14-88  
file

Shaughnessy No.: 103301

Date Out of EAP: JUN 14 1988  
JUN 14 1988

TO: M. Meutz  
Product Manager #3  
Registration Division (TS-767C)

FROM: Michael P. Firestone, Chief  
Special Review Section #2  
Exposure Assessment Branch/HED (TS-769C)

*Michael P. Firestone*

THRU: Paul F. Schuda, Chief  
Exposure Assessment Branch  
Hazard Evaluation Division (TS-769C)

*Paul F. Schuda*

Attached is the EAB review of:

Reg. File #: 239-2471

Chemical Name: Acephate

Product Name: ORTHENE Tobacco Insect Spray

Type of Product: Insecticide

Company Name: Chevron Chemical Company

Purpose: Worker Exposure Assessment

Date Received: 3/17/88

Action Code: 660

Date Completed:

EAB #(s): 80535

Monitoring Study Requested: X

Total Reviewing Time:

Monitoring Study Volunteered:     

- Deferrals to:
- Ecological Effects Branch
  - Residue Chemistry Branch
  - Toxicology Branch

## DATA EVALUATION RECORD

1. Study Type: Worker Exposure Study
2. Citation: ORTHENE: Groundboom Tobacco Exposure, Ford, J.E.,  
Chevron Chemical Company, November 6, 1986  
Assession No. 40504826
3. Reviewer: Henry Nelson, Chemist  
Special Review Section #2  
Exposure Assessment Branch/HED (TS-769C)
4. Approval: Michael P. Firestone, Chief  
Special Review Section #2  
Exposure Assessment Branch/HED (TS-769C)
5. Conclusion

Chevron Chemical Company has submitted a 1986 Research & Consulting Company study entitled "Exposure to Man During Mixing/Loading and Application of Captafol" as a surrogate study for estimating the dermal and inhalation exposure to acephate of mixer/loaders and applicators spraying by ground boom ORTHENE Tobacco Insect Spray formulation (75% acephate by wt.) diluted with water. Due to the inconsistencies and ambiguities in the reported amounts of captafol handled during the sampling periods and in the use of recovery data (discussed in the Methods section of this memorandum), EAB recommends that the report be rejected as a surrogate study for estimating dermal and inhalation exposure to acephate in ORTHENE unless further clarification can be provided by the registrant. If the registrant does supply satisfactory clarification, EAB recommends that captafol data from the report be added to the existing surrogate data base for acephate. However, even if the registrant does supply satisfactory clarification, the surrogate captafol data in the report cannot be used by itself to perform an actual exposure assessment for acephate because it only includes 3 replicate sets of data each for mixer/loaders and for applicators instead of the minimum of 15 recommended in Subdivision U of the Pesticide Assessment Guidelines.

Assuming that the reported amounts of captafol handled during sampling periods is correct, and that the exposure data was corrected for spike recovery efficiencies, EAB performed dermal and inhalation exposure computations on the surrogate data for purposes of discussion. Exposure computations were performed for both mixer/loaders and applicators under the following five (no glove) clothing scenarios: no clothing, no shirt/short pants, short sleeve shirt/short pants, short sleeve shirt/long pants, and long sleeve shirt/long pants. The results of the exposure computations are presented in Table 1. As can be seen, estimates of non-hand bodily dermal exposure under all five clothing scenarios and estimates of inhalation exposure are negligible compared to estimates of bare hand dermal exposure for both mixer/loaders and applicators.

Estimates of combined inhalation and dermal exposures (which are approximately equal to the bare hand exposure estimates) are 360 mg/kg AI handled (170 mg/lb AI) and approximately 75 mg/kg AI handled (34 mg/lb AI) for mixer/loaders and applicators, respectively, under all five clothing scenarios.

## 6. Methods

The captafol study was performed to estimate the dermal and inhalation exposure to captafol of mixer/loaders and applicators spraying water diluted Ortho-Difolathen SK formulation on wheat from an open cab using a ground boom sprayer. Three mixer/loaders and 3 applicators were monitored over 1 sampling period at 1 location. Therefore, only 3 replicates each were run which is far less than the minimum 15 recommended in Subdivision U of the Pesticide Assessment Guidelines.

Two of the three monitored mixer/loaders twice mixed approximately 22.7 L of liquid Ortho-Difolathen SK formulation (480 g captafol/L) with 2600 L of water which corresponds to mixing a total of 22 kg of captafol. The other mixer/loader twice mixed 3.5 L of the formulation with 400 L of water which corresponds to mixing 3.4 kg of captafol. The diluted Ortho-Difolathen SK formulation which had a captafol concentration of 4.2 g/L was sprayed on wheat at 400 L/ha which corresponds to an active ingredient application of 1.7 kg of captafol per ha (1.5 lb of captafol/acre).

Two of the three monitored applicators reportedly sprayed 22 kg of captafol over 10 hectares, and the other applicator reportedly sprayed 3.4 kg of captafol over 4 hectares. However, if 4.2 g of captafol/L was sprayed at 400 L/ha over 10 hectares, the applicator would have sprayed only 17 kg of captafol instead of the reported 22 kg. If 4.2 g of captafol/L was sprayed at 400 L/ha over 4 hectares, the applicator would have sprayed 6.8 kg of captafol instead of the reported 3.4 kg.

Personal air samplers drawing air at 2 L/min through Whatman glass microfibre filters (3-7 cm GF/A) were used to monitor inhalation exposure to captafol. Applicator #3 reportedly applied 3.4 kg of captafol over a 2 hour period. However, applicator #3 is also reported to have applied 3.4 kg of captafol over a 1 hour air sampling period which appears to be inconsistent with the previous statement.

Dermal exposure excluding the hands was monitored using dosimeters each constructed of a 3 cm x 3 cm sterile gauze pad stapled inside of a foil-lined cardboard holder. Dosimeters were attached both inside and outside of clothing at the following body locations: chest, upper arms (biceps), lower arms (forearms), upper legs (thighs), and lower legs (calves). In addition, outside dosimeters were attached to the front and back of the head, and an inside dosimeter was attached to the mid back. The locations of the dosimeters deviate slightly from Subdivision U guidelines which recommend shoulder instead of bicep patches, front of the

lower leg instead of calf patches, and a back of the neck patch. Hand exposure was monitored using cotton gloves.

Immediately after exposure, air filters, gauze pads, and cotton gloves were each transferred to separate screw top glass jars where they were shaken with 100 g-L sodium sulphate in acetone for 30 minutes to extract captafol. After filtration of each extract, residues were washed with acetone. The filtered extract and residue washings were then pooled, reduced in volume by rotary evaporation and frozen for shipment to the laboratory. In the laboratory, acetone samples were evaporated to dryness in a rotary evaporator at 40 °C. The residues were re-dissolved in n-hexane for injection into a capillary gas chromatograph and analysis for captafol.

A total of 3 mixer/loaders and 3 applicators were monitored over a single sampling period. One field blank was collected for each sampling media (gauze pad, glove, air filter) and each person monitored. Three gauze pad field spikes at 2, 10, and 100 ug were collected for each crew consisting of 1 mixer/loader and 1 applicator. In addition, glove and air filter field spikes were reportedly collected. The numbers and types of field blanks and field spikes reported to have been collected are within Subdivision U Guidelines. However, the results of the glove and air filter field spikes were not reported.

## 7. Results

Captafol was not detected above the detection limit of 1 ug in any of the gauze pad, glove, or air filter field blanks. The percent recoveries for the gauze pad field spikes were as follows: 2 ug (82.5%, 151.5%, 104.5%); 10 ug (120.6%, 99.3%, 115.4%); 100 ug (107.3%, 93.2%, 102.7%). The average spike recovery was 109%.

The results of the analyses of body patches, gloves, and air filters for captafol are presented for mixer/loaders and applicators in Tables 2 and 3, respectively, along with the values of other parameters used in exposure computations. The results of the dermal and inhalation exposure computations for mixer/loaders and applicators under the five no glove clothing scenarios listed in the Conclusion section are presented in Table 1. The computations were based upon the reported amounts of captafol handled during sampling periods, upon the assumption that the data presented in the report had been corrected for spike recovery efficiencies, and upon including non-detecteds in computations at 50% of the detection limit.

As can be seen from Table 1, the estimates of dermal non-hand bodily exposures for both mixer/loaders and applicators under the five clothing scenarios considered are all between 0.1% and 1.1% of the estimated dermal hand exposures. Estimates of inhalation exposures for mixer/loaders and applicators range from less than 0.1% to 2.8% of estimates of dermal non-hand exposures and are all less than 0.01% of dermal hand exposure estimates. Estimates

of combined inhalation, dermal non-hand, and dermal hand exposures for mixer/loaders and for applicators under the five no glove clothing scenarios considered are 360 mg/kg AI handled (170 mg lb AI) and 75-76 mg/kg AI handled (34mg/lb AI), respectively.

#### 8. Discussion

The results of the inhalation and dermal exposure computations based upon the limited data presented in the captafol report indicate that inhalation and dermal non-hand exposures to captafol (and by analogy, acephate) may be negligible compared to dermal hand exposures. Therefore, it appears that protective gloves would be much more effective in reducing worker exposure to captafol or acephate than other types of protective clothing and/or respirators face masks. Unfortunately, the submitted captafol study did not include data for cotton gloves worn beneath protective gloves or for rinses of hands protected by gloves. Therefore, it is not possible to estimate from the captafol report the potential reduction in worker exposure that could be obtained with the use of protective gloves.

TABLE 1. Estimated exposures of Mixer/loaders and applicators to Captafol

MIXER/LOADER	#1(NC)	#2(NS,SP)	#3(SS,SP)	#4(SS,LP)	#5(LS,LP)
Hands(mg/kg)	3.6E-02	3.6E-02	3.6E+02	3.6E+02	3.6E+02
Body(mg/kg)	2.4E-00	2.5E-00	2.6E+00	2.6E+00	4.3E-01
Derm.(mg/kg)	3.6E+02	3.6E-02	3.6E+02	3.6E+02	3.6E+02
Inha.(mg/kg)	8.7E-04	8.7E-04	8.7E-04	8.7E-04	8.7E-04
Comb.(mg/kg)	3.6E+02	3.6E-02	3.6E+02	3.6E+02	3.6E+02
Hands(mg/lb)	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02
Body(mg/lb)	1.1E+00	1.1E+00	1.2E+00	1.2E+00	1.9E-01
Derm.(mg/lb)	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02
Inha.(mg/lb)	3.9E-04	3.9E-04	3.9E-04	3.9E-04	3.9E-04
Comb.(mg/lb)	1.7E+02	1.7E+02	1.7E+02	1.7E+02	1.7E+02

APPLICATOR	#1(NC)	#2(NS,SP)	#3(SS,SP)	#4(SS,LP)	#5(LS,LP)
Hands(mg/kg)	7.5E-01	7.5E+01	7.5E+01	7.5E+01	7.5E+01
Body(mg/kg)	8.2E-01	8.2E-01	3.0E-01	3.0E-01	3.7E-01
Derm.(mg/kg)	7.6E-01	7.6E+01	7.5E+01	7.5E+01	7.5E+01
Inha.(mg/kg)	5.4E-03	5.4E-03	5.4E-03	5.4E-03	5.4E-03
Comb.(mg/kg)	7.6E-01	7.6E+01	7.5E+01	7.5E+01	7.5E+01
Hands(mg/lb)	3.4E-01	3.4E+01	3.4E+01	3.4E+01	3.4E+01
Body(mg/lb)	3.7E-01	3.7E-01	1.4E-01	1.3E-01	1.7E-01
Derm.(mg/lb)	3.4E-01	3.4E+01	3.4E+01	3.4E+01	3.4E+01
Inha.(mg/lb)	2.4E-03	2.4E-03	2.4E-03	2.4E-03	2.4E-03
Comb.(mg/lb)	3.4E-01	3.4E+01	3.4E+01	3.4E+01	3.4E+01
Hands(mg/hr)	1.1E+02	1.1E+02	1.1E+02	1.1E+02	1.1E+02
Body(mg/hr)	1.2E+00	1.2E+00	7.4E-01	6.8E-01	9.0E-01
Derm.(mg/hr)	1.1E+02	1.1E+02	1.1E+02	1.1E+02	1.1E+02
Inha.(mg/hr)	3.3E-02	3.3E-02	3.3E-02	3.3E-02	3.3E-02
Comb.(mg/hr)	1.1E+02	1.1E+02	1.1E+02	1.1E+02	1.1E+02

(NC) = No clothing

(NS,SP) = No shirt, short pants

(SS,SP) = Short sleeve shirt, short pants

(SS,LP) = Short sleeve shirt, long pants

(LS,LP) = Long sleeve shirt, long pants

All scenarios assume no gloves

No neck patches

No outside back patches

TABLE 2. Mixer/loader exposure data

Outside	Loc.	L (ug)	R (ug)	Avg (ug)	AI (kg)
MX LD #1	Head(fr.)	-	-	5.0E-01	2.2E-01
MX LD #2	Head(fr.)	-	-	5.0E-01	2.2E-01
MX LD #3	Head(fr.)	-	-	4.5E-00	3.4E+00
Avg MX LD	Head(fr.)	-	-	-	-
MX LD #1	Head(bk.)	-	-	2.2E-00	2.2E-01
MX LD #2	Head(bk.)	-	-	5.0E-01	2.2E-01
MX LD #3	Head(bk.)	-	-	5.0E-01	3.4E-00
Avg MX LD	Head(bk.)	-	-	-	-
MX LD #1	Chest	-	-	5.0E-01	2.2E-01
MX LD #2	Chest	-	-	5.0E-01	2.2E-01
MX LD #3	Chest	-	-	5.0E-01	3.4E-00
Avg MX LD	Chest	-	-	-	-
MX LD #1	U. Arms	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #2	U. Arms	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #3	U. Arms	5.0E-01	5.0E-01	5.0E-01	3.4E+00
Avg MX LD	U. Arms	-	-	-	-
MX LD #1	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #2	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #3	Forearms	1.9E+00	3.4E+02	1.7E-02	3.4E+00
Avg MX LD	Forearms	-	-	-	-
MX LD #1	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #2	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #3	Thighs	4.4E+00	5.0E-01	2.5E+00	3.4E-00
Avg MX LD	Thighs	-	-	-	-
MX LD #1	Calves	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #2	Calves	5.0E-01	5.0E-01	5.0E-01	2.2E-01
MX LD #3	Calves	5.0E-01	5.0E-01	5.0E-01	3.4E-00
Avg MX LD	Calves	-	-	-	-
MX LD #1	Hands	9.7E+03	7.4E+03	8.6E+03	2.2E-01
MX LD #2	Hands	3.8E+03	3.2E+03	3.5E+03	2.2E-01
MX LD #3	Hands	5.4E+04	2.4E+04	3.9E+04	3.4E-00
Avg MX LD	Hands	-	-	-	-

Air Inh.	Mass(ug)	IR(L/hr)	F(L/hr)	AI(kg)
MX LD #1	1.4E+00	1.2E+03	1.2E+02	2.2E-01
MX LD #2	1.1E+00	1.2E+03	1.2E+02	2.2E-01
MX LD #3	5.0E-01	1.2E+03	1.2E+02	3.4E+00
Avg MX LD	-	-	-	-



TABLE 2. Mixer/loader exposure data continue

Outside	Loc.	ug kg*cm2	SA(cm2)	mg/kg AI	mg/lb AI
MX/LD #1	Head(fr.)	2.5E-03	6.5E-02	1.6E-03	7.5E-04
MX/LD #2	Head(fr.)	2.5E-03	6.5E+02	1.6E-03	7.5E-04
MX/LD #3	Head(fr.)	1.5E-01	6.5E-02	9.6E-02	4.3E-02
Avg MX/L	Head(fr.)	-	-	3.3E-02	1.5E-02
MX/LD #1	Head(bk.)	1.1E-02	6.5E+02	7.2E-03	3.3E-03
MX/LD #2	Head(bk.)	2.5E-03	6.5E+02	1.6E-03	7.5E-04
MX/LD #3	Head(bk.)	1.6E-02	6.5E+02	1.1E-02	4.8E-03
Avg MX L	Head(bk.)	-	-	6.5E-03	2.9E-03
MX/LD #1	Chest	2.5E-03	3.6E+03	9.0E-03	4.1E-03
MX/LD #2	Chest	2.5E-03	3.6E+03	9.0E-03	4.1E-03
MX/LD #3	Chest	1.6E-02	3.6E+03	5.8E-02	2.6E-02
Avg MX/LD	Chest	-	-	2.5E-02	1.1E-02
MX/LD #1	U. Arms	2.5E-03	2.9E+03	7.3E-03	3.3E-03
MX/LD #2	U. Arms	2.5E-03	2.9E+03	7.3E-03	3.3E-03
MX/LD #3	U. Arms	1.6E-02	2.9E+03	4.8E-02	2.2E-02
Avg MX/LD	U. Arms	-	-	2.1E-02	9.4E-03
MX/LD #1	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
MX/LD #2	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
MX/LD #3	Forearms	5.5E+00	1.2E+03	6.7E+00	3.0E+00
Avg MX/LD	Forearms	-	-	2.2E+00	1.0E+00
MX/LD #1	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
MX/LD #2	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
MX/LD #3	Thighs	8.0E-02	3.8E+03	3.1E-01	1.4E-01
Avg MX/LD	Thighs	-	-	1.1E-01	4.9E-02
MX/LD #1	Calves	2.5E-03	2.4E+03	6.0E-03	2.7E-03
MX/LD #2	Calves	2.5E-03	2.4E+03	6.0E-03	2.7E-03
MX/LD #3	Calves	1.6E-02	2.4E+03	3.9E-02	1.8E-02
Avg MX/LD	Calves	-	-	1.7E-02	7.7E-03
MX/LD #1	Hands	4.3E+01	8.2E+02	3.6E+01	1.6E+01
MX/LD #2	Hands	1.8E+01	8.2E+02	1.4E+01	6.6E+00
MX/LD #3	Hands	1.3E+03	8.2E+02	1.0E+03	4.7E+02
Avg MX/LD	Hands	-	-	3.6E+02	1.7E+02

Air Inh.

	IE(mg/kg)	IE(mg/lb)
MX/LD #1	6.4E-04	2.9E-04
MX/LD #2	5.0E-04	2.3E-04
MX/LD #3	1.5E-03	6.7E-04
Avg MX/LD	8.7E-04	3.9E-04

TABLE 2. Mixer/loader exposure data continue

0	Inside	Loc.	L(ug)	R(ug)	Avg(ug)	AI(kg)
	MX/LD #1	Chest	-	-	5.0E-01	2.2E+01
	MX/LD #2	Chest	-	-	1.8E+00	2.2E+01
	MX/LD #3	Chest	-	-	2.7E+00	3.4E+00
	Avg MX/LD	Chest	-	-	-	-
	MX/LD #1	U. Arms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #2	U. Arms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #3	U. Arms	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg MX/LD	U. Arms	-	-	-	-
	MX/LD #1	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #2	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #3	Forearms	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg MX/LD	Forearms	-	-	-	-
	MX/LD #1	Thighs	2.5E+01	1.8E+01	2.2E+01	2.2E+01
	MX/LD #2	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #3	Thighs	2.3E+00	5.0E-01	1.4E+00	3.4E+00
	Avg MX/LD	Thighs	-	-	-	-
	MX/LD #1	Calves	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #2	Calves	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	MX/LD #3	Calves	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg MX/LD	Calves	-	-	-	-
	MX/LD #1	Back	-	-	5.0E-01	2.2E+01
	MX/LD #2	Back	-	-	5.0E-01	2.2E+01
	MX/LD #3	Back	-	-	5.0E-01	3.4E+00
	Avg MX/LD	Back	-	-	-	-
0	Inside	Loc.	ug/kg*cm2	SA(cm2)	mg/kg AI	mg/lb AI
	MX/LD #1	Chest	2.5E-03	3.4E+03	8.5E-03	3.8E-03
	MX/LD #2	Chest	9.0E-03	3.4E+03	3.0E-02	1.4E-02
	MX/LD #3	Chest	8.8E-02	3.4E+03	3.0E-01	1.3E-01
	Avg MX/LD	Chest	-	-	1.1E-01	5.1E-02
	MX/LD #1	U. Arms	2.5E-03	2.9E+03	7.3E-03	3.3E-03
	MX/LD #2	U. Arms	2.5E-03	2.9E+03	7.3E-03	3.3E-03
	MX/LD #3	U. Arms	1.6E-02	2.9E+03	4.8E-02	2.2E-02
	Avg MX/LD	U. Arms	-	-	2.1E-02	9.4E-03
	MX/LD #1	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
	MX/LD #2	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
	MX/LD #3	Forearms	1.6E-02	1.2E+03	2.0E-02	9.0E-03
	Avg MX/LD	Forearms	-	-	8.6E-03	3.9E-03
	MX/LD #1	Thighs	1.1E-01	3.8E+03	4.2E-01	1.9E-01
	MX/LD #2	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
	MX/LD #3	Thighs	4.6E-02	3.8E+03	1.7E-01	7.9E-02
	Avg MX/LD	Thighs	-	-	2.0E-01	9.2E-02
	MX/LD #1	Calves	2.5E-03	2.4E+03	6.0E-03	2.7E-03
	MX/LD #2	Calves	2.5E-03	2.4E+03	6.0E-03	2.7E-03
	MX/LD #3	Calves	1.6E-02	2.4E+03	3.9E-02	1.8E-02
	Avg MX/LD	Calves	-	-	1.7E-02	7.7E-03
	MX/LD #1	Back	2.5E-03	3.6E+03	9.0E-03	4.1E-03
	MX/LD #2	Back	2.5E-03	3.6E+03	9.0E-03	4.1E-03
	MX/LD #3	Back	1.6E-02	3.6E+03	5.8E-02	2.6E-02
	Avg MX/LD	Back	-	-	2.5E-02	1.1E-02

9

TABLE 3. Applicator exposure data

0	Outside	Loc.	L(ug)	R(ug)	Avg(ug)	AI(kg)
	Appl #1	Head(fr.)	-	-	5.0E-01	2.2E+01
	Appl #2	Head(fr.)	-	-	2.0E-00	2.2E+01
	Appl #3	Head(fr.)	-	-	5.0E-01	3.4E+00
	Avg Appl	Head(fr.)	-	-	-	-
	Appl #1	Head(bk.)	-	-	5.0E-01	2.2E+01
	Appl #2	Head(bk.)	-	-	5.0E-01	2.2E+01
	Appl #3	Head(bk.)	-	-	5.0E-01	3.4E+00
	Avg Appl	Head(bk.)	-	-	-	-
	Appl #1	Chest	-	-	5.0E-01	2.2E+01
	Appl #2	Chest	-	-	5.0E-01	2.2E+01
	Appl #3	Chest	-	-	1.8E+01	3.4E+00
	Avg Appl	Chest	-	-	-	-
	Appl #1	U. Arms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #2	U. Arms	5.0E-01	3.0E+00	1.8E+00	2.2E+01
	Appl #3	U. Arms	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg Appl	U. Arms	-	-	-	-
	Appl #1	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #2	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #3	Forearms	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg Appl	Forearms	-	-	-	-
	Appl #1	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #2	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #3	Thighs	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg Appl	Thighs	-	-	-	-
	Appl #1	Calves	5.0E-01	4.3E+00	2.4E-00	2.2E+01
	Appl #2	Calves	1.1E+00	5.0E-01	8.0E-01	2.2E+01
	Appl #3	Calves	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg Appl	Calves	-	-	-	-
	Appl #1	Hands	4.3E+03	3.6E+02	2.3E+03	2.2E+01
	Appl #2	Hands	6.5E+02	7.2E+02	6.8E+02	2.2E+01
	Appl #3	Hands	8.7E+03	7.2E+03	7.9E+03	3.4E+00
	Avg Appl	Hands	-	-	-	-

Air Inh.	Mass(ug)	IR(L/hr)	F(L/hr)	AI(kg)
Appl #1	2.9E+01	1.2E+03	1.2E+02	2.2E+01
Appl #2	3.4E+00	1.2E+03	1.2E+02	2.2E+01
Appl #3	5.0E-01	1.2E+03	1.2E+02	3.4E+00
Avg Appl	-	-	-	-

TABLE 3. Applicator exposure data continue

0	Outside	Loc.	ug·kg*cm2	SA(cm2)	mg/kg AI	mg/lb AI
	Appl #1	Head(fr.)	2.5E-03	6.5E+02	1.6E-03	7.5E-04
	Appl #2	Head(fr.)	1.0E-02	6.5E+02	6.6E-03	3.0E-03
	Appl #3	Head(fr.)	1.6E-02	6.5E+02	1.1E-02	4.8E-03
	Avg Appl	Head(fr.)	-	-	6.3E-03	2.8E-03
	Appl #1	Head(bk.)	2.5E-03	6.5E+02	1.6E-03	7.5E-04
	Appl #2	Head(bk.)	2.5E-03	6.5E+02	1.6E-03	7.5E-04
	Appl #3	Head(bk.)	1.6E-02	6.5E+02	1.1E-02	4.8E-03
	Avg Appl	Head(bk.)	-	-	4.6E-03	2.1E-03
	Appl #1	Chest	2.5E-03	3.6E+03	9.0E-03	4.1E-03
	Appl #2	Chest	2.5E-03	3.6E+03	9.0E-03	4.1E-03
	Appl #3	Chest	6.0E-01	3.6E-03	2.1E+00	9.7E-01
	Avg Appl	Chest	-	-	7.2E-01	3.3E-01
	Appl #1	U. Arms	2.5E-03	2.9E+03	7.3E-03	3.3E-03
	Appl #2	U. Arms	8.8E-03	2.9E+03	2.6E-02	1.2E-02
	Appl #3	U. Arms	1.6E-02	2.9E+03	4.8E-02	2.2E-02
	Avg Appl	U. Arms	-	-	2.7E-02	1.2E-02
	Appl #1	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
	Appl #2	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
	Appl #3	Forearms	1.6E-02	1.2E+03	2.0E-02	9.0E-03
	Avg Appl	Forearms	-	-	8.6E-03	3.9E-03
	Appl #1	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
	Appl #2	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
	Appl #3	Thighs	1.6E-02	3.8E+03	6.2E-02	2.8E-02
	Avg Appl	Thighs	-	-	2.7E-02	1.2E-02
	Appl #1	Calves	1.2E-02	2.4E+03	2.9E-02	1.3E-02
	Appl #2	Calves	4.0E-03	2.4E+03	9.6E-03	4.4E-03
	Appl #3	Calves	1.6E-02	2.4E+03	3.9E-02	1.8E-02
	Avg Appl	Calves	-	-	2.6E-02	1.2E-02
	Appl #1	Hands	1.2E+01	8.2E+02	9.7E+00	4.4E+00
	Appl #2	Hands	3.4E+00	8.2E+02	2.8E+00	1.3E+00
	Appl #3	Hands	2.6E+02	8.2E+02	2.1E+02	9.7E+01
	Avg Appl	Hands	-	-	7.5E+01	3.4E+01

Air Inh.	IE(mg/kg)	IE(mg/lb)
Appl #1	1.3E-02	6.0E-03
Appl #2	1.5E-03	7.0E-04
Appl #3	1.5E-03	6.7E-04
Avg Appl	5.4E-03	2.4E-03

TABLE 3. Applicator exposure data continue

0	Outside	Loc.	0.67*E(ug)	T(hr)	ug/hr*cm2	mg/hr
App1 #1	Head(fr.)		3.3E-01	2.0E+00	1.8E-02	1.2E-02
App1 #2	Head(fr.)		1.3E+00	2.0E+00	7.3E-02	4.8E-02
App1 #3	Head(fr.)		3.3E-01	2.0E+00	1.8E-02	1.2E-02
Avg App1	Head(fr.)		-	-	-	2.4E-02
App1 #1	Head(bk.)		3.3E-01	2.0E+00	1.8E-02	1.2E-02
App1 #2	Head(bk.)		3.3E-01	2.0E+00	1.8E-02	1.2E-02
App1 #3	Head(bk.)		3.3E-01	2.0E+00	1.8E-02	1.2E-02
Avg App1	Head(bk.)		-	-	-	1.2E-02
App1 #1	Chest		3.3E-01	2.0E+00	1.8E-02	6.5E-02
App1 #2	Chest		3.3E-01	2.0E+00	1.8E-02	6.5E-02
App1 #3	Chest		1.2E+01	2.0E+00	6.8E-01	2.4E+00
Avg App1	Chest		-	-	-	8.5E-01
App1 #1	U. Arms		3.3E-01	2.0E+00	1.8E-02	5.3E-02
App1 #2	U. Arms		1.2E+00	2.0E+00	6.4E-02	1.9E-01
App1 #3	U. Arms		3.3E-01	2.0E+00	1.8E-02	5.3E-02
Avg App1	U. Arms		-	-	-	9.8E-02
App1 #1	Forearms		3.3E-01	2.0E+00	1.8E-02	2.2E-02
App1 #2	Forearms		3.3E-01	2.0E+00	1.8E-02	2.2E-02
App1 #3	Forearms		3.3E-01	2.0E+00	1.8E-02	2.2E-02
Avg App1	Forearms		-	-	-	2.2E-02
App1 #1	Thighs		3.3E-01	2.0E+00	1.8E-02	7.0E-02
App1 #2	Thighs		3.3E-01	2.0E+00	1.8E-02	7.0E-02
App1 #3	Thighs		3.3E-01	2.0E+00	1.8E-02	7.0E-02
Avg App1	Thighs		-	-	-	7.0E-02
App1 #1	Calves		1.6E+00	2.0E+00	8.8E-02	2.1E-01
App1 #2	Calves		5.3E-01	2.0E+00	2.9E-02	7.0E-02
App1 #3	Calves		3.3E-01	2.0E+00	1.8E-02	4.4E-02
Avg App1	Calves		-	-	-	1.1E-01
App1 #1	Hands		1.5E+03	2.0E+00	8.6E+01	7.0E-01
App1 #2	Hands		4.5E+02	2.0E+00	2.5E+01	2.1E+01
App1 #3	Hands		5.2E+03	2.0E+00	2.9E+02	2.4E+02
Avg App1	Hands		-	-	-	1.1E+02
=====						
	Air Inh.		0.67*B(ug)	T(hr)		mg/hr
App1 #1			1.9E+01	2.2E+00		8.5E-02
App1 #2			2.2E+00	2.1E+00		1.1E-02
App1 #3			3.3E-01	1.0E+00		3.3E-03
Avg App1			-	-		3.3E-02

TABLE 3. Applicator exposure data continue

0	Inside	Loc.	L(ug)	R(ug)	Avg(ug)	AI(kg)
	Appl #1	Chest	-	-	5.0E-01	2.2E-01
	Appl #2	Chest	-	-	5.0E-01	2.2E-01
	Appl #3	Chest	-	-	3.7E+00	3.4E+00
	Avg Appl	Chest	-	-	-	-
	Appl #1	U. Arms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #2	U. Arms	1.0E+01	5.0E-01	5.2E-00	2.2E-01
	Appl #3	U. Arms	5.0E-01	1.9E+00	1.2E+00	3.4E-00
	Avg Appl	U. Arms	-	-	-	-
	Appl #1	Forearms	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #2	Forearms	5.0E-01	2.4E+01	1.2E+01	2.2E+01
	Appl #3	Forearms	5.0E-01	7.7E+00	4.1E-00	3.4E-00
	Avg Appl	Forearms	-	-	-	-
	Appl #1	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E-01
	Appl #2	Thighs	5.0E-01	5.0E-01	5.0E-01	2.2E-01
	Appl #3	Thighs	5.0E-01	5.0E-01	5.0E-01	3.4E-00
	Avg Appl	Thighs	-	-	-	-
	Appl #1	Calves	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #2	Calves	5.0E-01	5.0E-01	5.0E-01	2.2E+01
	Appl #3	Calves	5.0E-01	5.0E-01	5.0E-01	3.4E+00
	Avg Appl	Calves	-	-	-	-
	Appl #1	Back	-	-	5.0E-01	2.2E+01
	Appl #2	Back	-	-	5.0E-01	2.2E+01
	Appl #3	Back	-	-	5.0E-01	3.4E+00
	Avg Appl	Back	-	-	-	-
0	Inside	Loc.	ug/kg*cm2	SA(cm2)	mg/kg AI	mg/lb AI
	Appl #1	Chest	2.5E-03	3.4E+03	8.5E-03	3.8E-03
	Appl #2	Chest	2.5E-03	3.4E+03	8.5E-03	3.8E-03
	Appl #3	Chest	1.2E-01	3.4E+03	4.1E-01	1.8E-01
	Avg Appl	Chest	-	-	1.4E-01	6.4E-02
	Appl #1	U. Arms	2.5E-03	2.9E+03	7.3E-03	3.3E-03
	Appl #2	U. Arms	2.7E-02	2.9E+03	7.7E-02	3.5E-02
	Appl #3	U. Arms	3.9E-02	2.9E+03	1.1E-01	5.2E-02
	Avg Appl	U. Arms	-	-	6.6E-02	3.0E-02
	Appl #1	Forearms	2.5E-03	1.2E+03	3.1E-03	1.4E-03
	Appl #2	Forearms	6.1E-02	1.2E+03	7.4E-02	3.4E-02
	Appl #3	Forearms	1.3E-01	1.2E+03	1.6E-01	7.4E-02
	Avg Appl	Forearms	-	-	8.0E-02	3.6E-02
	Appl #1	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
	Appl #2	Thighs	2.5E-03	3.8E+03	9.6E-03	4.4E-03
	Appl #3	Thighs	1.6E-02	3.8E+03	6.2E-02	2.8E-02
	Avg Appl	Thighs	-	-	2.7E-02	1.2E-02
	Appl #1	Calves	2.5E-03	2.4E+03	6.0E-03	2.7E-03
	Appl #2	Calves	2.5E-03	2.4E+03	6.0E-03	2.7E-03
	Appl #3	Calves	1.6E-02	2.4E+03	3.9E-02	1.8E-02
	Avg Appl	Calves	-	-	1.7E-02	7.7E-03
	Appl #1	Back	2.5E-03	3.6E+03	9.0E-03	4.1E-03
	Appl #2	Back	2.5E-03	3.6E+03	9.0E-03	4.1E-03
	Appl #3	Back	1.6E-02	3.6E+03	5.8E-02	2.6E-02
	Avg Appl	Back	-	-	2.5E-02	1.1E-02

(15)

TABLE 3. Applicator exposure data continue

Inside	Loc.	0.67*E(ug)	T(hr)	ug/hr*cm <sup>2</sup>	mg hr
-----	-----	-----	-----	-----	-----
Appl #1	Chest	3.3E-01	2.0E+00	1.8E-02	6.1E-02
Appl #2	Chest	3.3E-01	2.0E+00	1.8E-02	6.1E-02
Appl #3	Chest	2.4E+00	2.0E-00	1.4E-01	4.5E-01
Avg Appl	Chest	-	-	-	1.9E-01
Appl #1	U. Arms	3.3E-01	2.0E+00	1.8E-02	5.3E-02
Appl #2	U. Arms	3.5E+00	2.0E+00	1.9E-01	5.6E-01
Appl #3	U. Arms	7.9E-01	2.0E+00	4.4E-02	1.3E-01
Avg Appl	U. Arms	-	-	-	2.5E-01
Appl #1	Forearms	3.3E-01	2.0E+00	1.8E-02	2.2E-02
Appl #2	Forearms	8.0E+00	2.0E+00	4.4E-01	5.4E-01
Appl #3	Forearms	2.7E+00	2.0E+00	1.5E-01	1.8E-01
Avg Appl	Forearms	-	-	-	2.5E-01
Appl #1	Thighs	3.3E-01	2.0E+00	1.8E-02	7.0E-02
Appl #2	Thighs	3.3E-01	2.0E+00	1.8E-02	7.0E-02
Appl #3	Thighs	3.3E-01	2.0E+00	1.8E-02	7.0E-02
Avg Appl	Thighs	-	-	-	7.0E-02
Appl #1	Calves	3.3E-01	2.0E+00	1.8E-02	4.4E-02
Appl #2	Calves	3.3E-01	2.0E+00	1.8E-02	4.4E-02
Appl #3	Calves	3.3E-01	2.0E+00	1.8E-02	4.4E-02
Avg Appl	Calves	-	-	-	4.4E-02
Appl #1	Back	3.3E-01	2.0E+00	1.8E-02	6.5E-02
Appl #2	Back	3.3E-01	2.0E+00	1.8E-02	6.5E-02
Appl #3	Back	3.3E-01	2.0E+00	1.8E-02	6.5E-02
Avg Appl	Back	-	-	-	6.5E-02
-----	-----	-----	-----	-----	-----