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To: Taylor
Product Manager 25
Registration Division TS-767

From: Samuel M. Creeger, Chief *SMC*
Environmental Chemistry Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division TS-769

Attach, please find the Eab Review of:

Reg./File No.: 324-316

Chemical: Alachlor

Type Product: H

Product Name: Lasso

Company Name: Monsanto

Submission Purpose: Exposure Assessment

ZBB Code: other

Action Code: 401

Date In: 3/1/84

EAB No.: 4199

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62

7

 Ecological Effects Branch

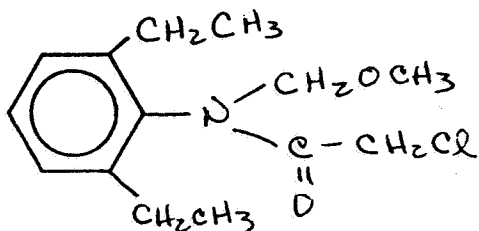
 Residue Chemistry Branch

 X Toxicology Branch

I. INTRODUCTION

Monsanto has resubmitted data previously generated as a result of a field study conducted using alachlor formulations. This submission contains recalculated exposure numbers taking into account recovery data and a 70 kg body weight (rather than 60 kg). The EPA Accession No. of the original submission is 070591 (EAB review dated 5/25/82) and of the current submission is 252498.

II. Alachlor: Lasso
2-chloro-2',6'-diethyl-N-(methoxymethyl)-acetanilide



III. DISCUSSION

Because of the controversy surrounding any previously submitted exposure assessments, EAB has returned to the original study and recalculated potential exposures to personnel involved in the use of alachlor.

A major item of controversy was the fact that the registrant failed to correct his raw data for recovery. Consequently EAB in its current review of the data did take into account these values. From the raw data submitted in the original study by the registrant, average recovery values from all field or lab studies conducted are as follows:

	<u>Field</u>	<u>Lab</u>
<u>Dermal</u>		
gauze pads	86%	92%
cotton gloves	74	74
rubber gloves		87
<u>Respiratory</u>		
foam plugs	96	95
silica gel	89	96
charcoal	77	76

For this current exposure assessment, EAB chose to use for gauze pads a recovery value of 89% and for cotton gloves, 74%. Exposure to hands as determined only from the residue values found on cotton gloves (worn under rubber gloves) was considered. Respiratory exposure values were used as submitted by the registrant in this submission since foam and silica gel were the trapping media and recovery values are excellent for both.

The assumptions and steps used to determine the exposure values are:

- o The average of the residue values from two reps is used.
- o All residue values are corrected for recovery as explained above.
- o Dermal and respiratory absorption is 100%.
- o Three different exposure scenarios are considered:
 - No Protection: This assumes the person is naked with the exception of wearing rubber gloves. Residue values from pads located in the following body regions were used: hands (cotton gloves), forehead, chest, back, thigh, forearm (outer), bicep (outer), and ankle (outer).
 - With Protection (80%): This assumes the person is wearing protective clothing such as coveralls. (Normal work clothes are not considered to be protective clothing.) Residue values from the same regions as with No Protection are used but now it is assumed that the protective clothing reduces exposure by 80%. It is still assumed that the worker is wearing rubber gloves so that his hand exposure (cotton gloves) is not further reduced by 80%.

It is believed this scenario best represents exposure to alachlor under normal working conditions.
 - With Protection (100%): This assumes the person is wearing the same protective clothing as above but that now the clothing reduces exposure by 100%. Only the face, back of the neck, front of neck and "V" of the chest, and the hands (cotton gloves) are exposed to the active ingredient.
- o From information presented by the registrant at various meetings and supported generally by BUD, the following assumptions were used in appropriate calculations:
 - A private farmer may treat a 100 acre plot/day and may have up to 600 acres to treat. Consequently he may be exposed to alachlor from 1 - 6 days/year.
 - A custom applicator may treat a 100 acre plot/day but may be exposed to alachlor from 5 - 30 days/year.
 - An aerial applicator, used only in emergency situations, may treat up to 1000 acres/day and may be exposed to alachlor from 5 - 10 days/year.
 - For Lifetime exposure calculations, a 40 year working lifetime is assumed during a 70 year lifespan.

All appropriate tables, abstracted from the registrant's study, and calculations used by EAB to determine the potential exposure to alachlor are attached to this review.

ALACHLOR (LASSO EC) EXPOSURE

<u>Operation</u>	<u>DERMAL EXPOSURE</u>		<u>RESPIRATORY EXPOSURE</u>
	<u>No Protection</u>	<u>With Protection (80%)</u>	
Ground Open Tank Fill	0.39 mg/kg	0.091 mg/kg	0.023 mg/kg
	110. mg/hr	26. mg/hr	6.9 mg/hr
	1.6 mg/kg/hr	0.38 mg/kg/hr	0.099 mg/kg/hr
	0.00096 mg/kg/lb	0.0002 mg/kg/lb	0.000059 mg/kg/lb
	0.38 mg/kg/day	0.09 mg/kg/day	0.024 mg/kg/day
	0.38 - 2.28 mg/kg/yr (Private)	0.09 - 0.54 mg/kg/yr (Private)	0.024 - 0.14 mg/kg/yr (Private)
	0.00061-0.0036 mg/kg/day (Lifetime-Private)	0.00014 - 0.00086 mg/kg/day (Lifetime-Private)	0.000038 - 0.00022 mg/kg/day (Lifetime-Private)
	1.9 - 11.4 mg/kg/yr (Custom)	0.45 - 2.7 mg/kg/yr (Custom)	0.12 - 0.72 mg/kg/yr (Custom)
	0.003 - 0.018 mg/kg/day (Lifetime-Custom)	0.00072 - 0.0043 mg/kg/day (Lifetime-Custom)	0.00019 - 0.0012 mg/kg/day (Lifetime-Custom)
			0.00027 mg/kg/hr
			0.000004 mg/kg/lb
			0.000065 mg/kg/day
			0.000065 - 0.0004 mg/kg/yr

ALACHLOR (LASSO EC) EXPOSURE

<u>Operation</u>	<u>DERMAL EXPOSURE</u>		<u>With Protection (100%)</u>	<u>RESPIRATORY EXPOSURE</u>
	<u>No Protection</u>	<u>With Protection (80%)</u>		
Ground Applicator	0.019 mg/kg	0.0074 mg/kg	0.0048 mg/kg	
	1.2 mg/hr	0.47 mg/hr	0.3 mg/hr	0.0022 mg/hr
	0.017 mg/kg/hr	0.0067 mg/kg/hr	0.0043 mg/kg/hr	0.000031 mg/kg/hr
	0.000046 mg/kg/lb	0.000018 mg/kg/lb	0.000012 mg/kg/lb	0.0000004 mg/kg/lb
	0.018 mg/kg/day	0.0073 mg/kg/day	0.0047 mg/kg/day	0.00003 mg/kg/day
	0.018 - 0.11 mg/kg/yr (Private)	0.0073 - 0.044 mg/kg/yr (Private)	0.0047 - 0.028 mg/kg/yr (Private)	0.00003 - 0.00018 mg/kg/yr
	(2.9-18.)x10 ⁻⁵ mg/kg/day (Lifet ime-Private)	(1.2 - 7.) x 10 ⁻⁵ mg/kg/day (Lifet ime-Private)	(0.75 - 4.5) x 10 ⁻⁵ mg/kg/day (Lifet ime-Private)	
	0.09 - 0.54 mg/kg/yr (Custom)	0.036 - 0.22 mg/kg/yr (Custom)	0.024 - 0.14 mg/kg/yr (Custom)	
	(14.-86.)x10 ⁻⁵ mg/kg/day (Lifet ime-Custom)	(5.8 - 35.) x 10 ⁻⁵ mg/kg/day (Lifet ime-Custom)	(3.8 - 22.) x 10 ⁻⁵ mg/kg/day (Lifet ime-Custom)	

ALACHLOR (LASSO EC) EXPOSURE

<u>Operation</u>	<u>DERMAL EXPOSURE</u>		<u>RESPIRATORY EXPOSURE</u>
	<u>No Protection</u>	<u>With Protection (80%)</u>	
Ground Probe Transfer 5 gal	0.02 mg/kg	0.0042 mg/kg	0.0056 mg/kg
	5.5 mg/hr	1.1 mg/hr	1.5 mg/hr
	0.079 mg/kg/hr	0.016 mg/kg/hr	0.021 mg/kg/hr
	0.000051 mg/kg/lb	0.00001 mg/kg/lb	0.000014 mg/kg/lb
	0.02 mg/kg/day	0.0042 mg/kg/day	0.0055 mg/kg/day
	0.02 - 0.12 mg/kg/yr (Private)	0.0042 - 0.025 mg/kg/yr (Private)	0.0055 - 0.033 mg/kg/yr (Private)
	(3.2-19.)x10 ⁻⁵ mg/kg/day (Lifetime-Private)	(0.67 - 4.) x 10 ⁻⁵ mg/kg/day (Lifetime-Private)	(0.88 - 5.3) x 10 ⁻⁵ mg/kg/day (Lifetime-Private)
	0.1 - 0.6 mg/kg/yr (Custom)	0.021 - 0.13 mg/kg/yr (Custom)	0.028 - 0.16 mg/kg/yr (Custom)
	(16.-96.)x10 ⁻⁵ mg/kg/day (Lifetime-Custom)	(3.4 - 21.) x 10 ⁻⁵ mg/kg/day (Lifetime-Custom)	(4.5 - 26.) x 10 ⁻⁵ mg/kg/day (Lifetime-Custom)

ALACHLOR (LASSO EC) EXPOSURE

<u>Operation</u>	<u>DERMAL EXPOSURE</u>		<u>RESPIRATORY EXPOSURE</u>
	<u>No Protection</u>	<u>With Protection (80%)</u>	
Ground Probe Transfer	0.18 mg/kg	0.038 mg/kg	0.017 mg/kg
	65 mg/hr	13 mg/hr	5.9 mg/hr
55 gal	0.92 mg/kg/hr	0.19 mg/kg/hr	0.084 mg/kg/hr
	0.00046 mg/kg/lb	0.000095 mg/kg/lb	0.000042 mg/kg/lb
	0.18 mg/kg/day	0.038 mg/kg/day	0.017 mg/kg/day
	0.18 - 1.1 mg/kg/yr (Private)	0.038 - 0.23 mg/kg/yr (Private)	0.017 - 0.1 mg/kg/yr (Private)
	(29.-176.)x10 ⁻⁵ mg/kg/day (Lifetime-Private)	(6.1 - 37.) x 10 ⁻⁵ mg/kg/day (Lifetime-Private)	(2.7 - 16.) x 10 ⁻⁵ mg/kg/day (Lifetime-Private)
	0.9 - 5.4 mg/kg/yr (Custom)	0.19 - 1.1 mg/kg/yr (Custom)	0.085 - 0.51 mg/kg/yr (Custom)
	(144.-864.)x10 ⁻⁵ mg/kg/day (Lifetime-Custom)	(30. - 176.) x 10 ⁻⁵ mg/kg/day (Lifetime-Custom)	(14. - 82.) x 10 ⁻⁵ mg/kg/day (Lifetime-Custom)

ALACHLOR (LASSO EC) EXPOSURE

<u>Operation</u>	<u>DERMAL EXPOSURE</u>		<u>RESPIRATORY EXPOSURE</u>
	<u>No Protection</u>	<u>With Protection (80%)</u>	
Aerial Tank-fill	1.8 mg/kg	0.37 mg/kg	0.024 mg/kg
	640. mg/hr	130. mg/hr	8.2 mg/hr
	9.1 mg/kg/hr	1.9 mg/kg/hr	0.12 mg/kg/hr
	0.0061 mg/kg/lb	0.00126 mg/kg/lb	0.00008 mg/kg/lb
	18.3 mg/kg/day	3.8 mg/kg/day	0.24 mg/kg/day
	92. - 183. mg/kg/yr	19. - 38. mg/kg/yr	1.2 - 2.4 mg/kg/yr
	0.14 - 0.29 mg/kg/day (Lifetime)	0.03 - 0.061 mg/kg/day (Lifetime)	0.0019 - 0.0038 mg/kg/day (Lifetime)
Aerial Pilot	0.082 mg/kg	0.019 mg/kg	0.0053 mg/kg
	8.2 mg/hr	1.9 mg/hr	0.53 mg/hr
	0.12 mg/kg/hr	0.027 mg/kg/hr	0.0076 mg/kg/hr
	0.00028 mg/kg/lb	0.000063 mg/kg/lb	0.000018 mg/kg/lb
	0.84 mg/kg/day	0.19 mg/kg/day	0.053 mg/kg/day
	4.2 - 8.4 mg/kg/yr	0.95 - 1.9 mg/kg/yr	0.26 - 0.53 mg/kg/yr
	0.0067 - 0.013 mg/kg/day (Lifetime)	0.0015 - 0.003 mg/kg/day (Lifetime)	0.00042 - 0.00085 mg/kg/day (Lifetime)

ALACHLOR (LASSO EC) EXPOSURE

<u>Operation</u>	<u>DERMAL EXPOSURE</u>		<u>RESPIRATORY EXPOSURE</u>
	<u>No Protection</u>	<u>With Protection (80%)</u>	
Aerial Flagman	2.5 mg/kg	0.56 mg/kg	0.22 mg/kg
	440. mg/hr	97. mg/hr	38 mg/hr
	6.3 mg/kg/hr	1.4 mg/kg/hr	0.55 mg/kg/hr
	0.0084 mg/kg/lb	0.00186 mg/kg/lb	0.00073 mg/kg/lb
	25.2 mg/kg/day	5.6 mg/kg/day	2.2 mg/kg/day
	126. - 252. mg/kg/yr	28. - 56. mg/kg/yr	11. - 22. mg/kg/yr
	0.2 - 0.4 mg/kg/day (Lifetime)	0.045 - 0.09 mg/kg/day (Lifetime)	0.018 - 0.035 mg/kg/day (Lifetime)

IV. CONCLUSIONS and RECOMMENDATION

With the recalculation of potential exposure to alachlor under various scenarios, EAB makes the following conclusions:

- o Respiratory exposure is insignificant when compared to dermal exposure.
- o In terms of mg/kg/lb, the following comparison can be made for potential dermal exposure, ground open tank fill and ground application:

Mixer/Loader + Applicator:

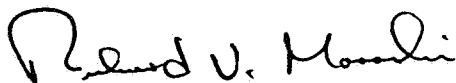
$$2 \times 10^{-4} \text{ mg/kg/lb} + 0.2 \times 10^{-4} \text{ mg/kg/lb} = 2.2 \times 10^{-4} \text{ mg/kg/lb (EPA-80\% Protection)}$$

$$3 \times 10^{-4} \text{ mg/kg/lb} + 0.6 \times 10^{-4} \text{ mg/kg/lb} = 3.6 \times 10^{-4} \text{ mg/kg/lb (Monsanto)}$$

$$4 \times 10^{-4} \text{ mg/kg/lb} + 1.2 \times 10^{-4} \text{ mg/kg/lb} = 5.2 \times 10^{-4} \text{ mg/kg/lb (Canada)}$$

- o It is believed that the exposure scenarios developed represent reasonable exposure ranges to a vast majority of alachlor users.
- o The exposure studies conducted by Monsanto were well planned and executed and continue to provide valuable data on exposure to applicators.

EAB defers to Toxicology Branch for the conclusion of the risk assessment. If further number generation or explanation is needed, please call me.



Richard V. Moraski, Ph.D.
Chemist

Environmental Chemistry Review Section No. 1

CALCULATIONS

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Ground Application
Open Tank Fill

A. No Protection

Residue values average of two reps:

Hands (cotton gloves)	0.99 ug/cm ²	x	820 cm ²	=	811.8 ug
Forehead	0.02	x	650	=	13.0
Chest	3.2	x	3700	=	11840.
Back	0.04	x	3610	=	144.
Thigh	3.94	x	2250	=	8865.
Forearm (outer)	0.06	x	1210	=	72.6
Bicep (outer)	1.23	x	1320	=	1623.6
Ankle (outer)	0.33	x	2380	=	785.4

Total Hands + Body = 24155.4 ug
Total Body only = 23343.6 ug

Corrected for recovery:

Hands 811.8 ug/0.74 = 1097. ug
Body 23343.6 ug/0.89 = 26228.7 ug

Total Hands + Body = 27325.7 ug

Assume 70 kg body weight:

27325.7 ug/70 kg = 390 ug/kg = 0.39 mg/kg

Assume 0.24 hr (from study):

27325.7 ug/0.24 hr = 113857 ug/hr = 110 mg/hr

mg/kg/hr:

27325.7 ug/70 kg/0.24 hr = 1625 ug/kg/hr = 1.6 mg/kg/hr

mg/kg/lb:

assumptions: 0.24 hr/100 acre; 400 lb ai/100 acre; 4 lb ai/acre (from study)

1.6 mg/kg/hr x 0.24 hr/100 acre x 100 acre/400 lb = 96 x 10⁻⁵ mg/kg/lb

Daily exposure: mg/kg/day

assumptions: 0.24 hr/100 acre; 400 lb ai/100 acre; 100 acre/day

1.6 mg/kg/hr x 0.24 hr/day = 0.38 mg/kg/day

96 x 10⁻⁵ mg/kg/lb x 400 lb/day = 0.38 mg/kg/day

Annual exposure: mg/kg/yr:

-Private: assumptions: 1 - 6 day/yr; 100 - 600 acre/yr; 400 - 2400 lb/yr; 4 lb/acre

$$0.38 \text{ mg/kg/day} \times 1 \text{ day/yr} = 0.38 \text{ mg/kg/yr}$$

$$0.38 \text{ mg/kg/day} \times 6 \text{ day/yr} = 2.28 \text{ mg/kg/yr}$$

-Custom: assumptions: 5 - 30 day/yr; 500 - 3000 acre/yr; 2000 - 12000 lb/yr; 4 lb/acre

$$0.38 \text{ mg/kg/day} \times 5 \text{ day/yr} = 1.9 \text{ mg/kg/yr}$$

$$0.38 \text{ mg/kg/day} \times 30 \text{ day/yr} = 11.4 \text{ mg/kg/yr}$$

Lifetime daily exposure: mg/kg/day:

-Private: assumptions: 40 yr working lifetime; 70 yr lifespan [40/70x365 = 0.0016]

$$0.38 \text{ mg/kg/yr} \times \frac{40 \text{ yr}}{70 \text{ yr} \times 365 \text{ day/yr}} = 0.00061 \text{ mg/kg/day}$$

$$2.28 \text{ mg/kg/yr} \times 0.0016 = 0.0036 \text{ mg/kg/day}$$

-Custom: assumptions: 40 yr working lifetime; 70 yr lifespan

$$1.9 \text{ mg/kg/yr} \times 0.0016 = 0.003 \text{ mg/kg/day}$$

$$11.4 \text{ mg/kg/yr} \times 0.0016 = 0.018 \text{ mg/kg/day}$$

B. With Protection (80%)

Assume 80% reduction in exposure to body only. (20% of exposure with no protection.)

$$26228.7 \text{ ug} \times 20\% = 5245.7 \text{ ug}$$

$$\text{Total: Hand + Body} = 1097 \text{ ug} + 5245.7 \text{ ug} = 6342.7 \text{ ug}$$

$$\text{mg/kg: } 6342.7 \text{ ug}/70 \text{ kg} = 0.091 \text{ mg/kg}$$

$$\text{mg/hr: } 6342.7 \text{ ug}/0.24 \text{ hr} = 26 \text{ mg/hr}$$

$$\text{mg/kg/hr: } 0.091 \text{ mg/kg}/0.24 \text{ hr} = 0.38 \text{ mg/kg/hr}$$

$$\text{mg/kg/lb: } 0.38 \text{ mg/kg/hr} \times 0.24 \text{ hr}/100 \text{ acre} \times 100 \text{ acre}/400 \text{ lb} = 2 \times 10^{-4} \text{ mg/kg/lb}$$

$$\text{Daily exposure: mg/kg/day: } 0.38 \text{ mg/kg/hr} \times 0.24 \text{ hr/day} = 0.09 \text{ mg/kg/day}$$

Annual exposure: mg/kg/yr:

Private

0.09 mg/kg/day x 1 day/yr = 0.09 mg/kg/yr

0.09 mg/kg/day x 6 day/yr = 0.54 mg/kg/yr

Custom

0.09 mg/kg/day x 5 day/yr = 0.45 mg/kg/yr

0.09 mg/kg/day x 30 day/yr = 2.7 mg/kg/yr

Lifetime daily exposure: mg/kg/day

Private

0.09 mg/kg/yr x 0.0016 = 0.00014 mg/kg/day

0.54 mg/kg/yr x 0.0016 = 0.00086 mg/kg/day

Custom

0.45 mg/kg/yr x 0.0016 = 0.00072 mg/kg/day

2.7 mg/kg/yr x 0.0016 = 0.0043 mg/kg/day

C. With Protection (100%)

Assume 100% protection to covered body parts. (Hand exposure determined by cotton gloves.) The following body areas are the only exposed parts to alachlor: face, front of neck ("V" of chest), back of neck and hands as determined by residues in cotton gloves.

Residue values average of two reps:

Hands (cotton gloves)	0.99 ug/cm ²	x	820 cm ²	=	812. ug
Chest	3.2	x	150	=	480.
Back	0.04	x	110	=	4.4
Forehead	0.02	x	650	=	13.

Total Hands + Body = 1309.4 ug
 Total Body only = 497. ug

Corrected for recovery:

Hands: 812 ug/0.74 = 1097.3 ug
 Body: 497.4 ug/0.89 = 558.8 ug

Total Hands + Body = 1656.2 ug

mg/kg: 1656.2 ug/70 kg = 0.023 mg/kg

mg/hr: 1656.2 ug/0.24 hr = 6.9 mg/hr

mg/kg/hr: 1656.2 ug/70 kg/0.24 hr = 0.099 mg/kg/hr

mg/kg/lb: 0.099 mg/kg/hr x 0.24 hr/100 acre x 100 acre/400 lb = 0.000059 mg/kg/lb

Daily exposure: mg/kg/day:

$$0.099 \text{ mg/kg/hr} \times 0.24 \text{ hr/day} = 0.024 \text{ mg/kg/day}$$

mg/kg/yr:

Private

$$0.024 \text{ mg/kg/day} \times 1 \text{ day/yr} = 0.024 \text{ mg/kg/yr}$$

$$0.024 \text{ mg/kg/day} \times 6 \text{ day/yr} = 0.14 \text{ mg/kg/yr}$$

Custom

$$0.024 \text{ mg/kg/day} \times 5 \text{ day/yr} = 0.12 \text{ mg/kg/yr}$$

$$0.024 \text{ mg/kg/day} \times 30 \text{ day/yr} = 0.72 \text{ mg/kg/yr}$$

Lifetime daily exposure: mg/kg/day

Private

$$0.024 \text{ mg/kg/yr} \times 0.0016 = 0.000038 \text{ mg/kg/day}$$

$$0.14 \text{ mg/kg/yr} \times 0.0016 = 0.00022 \text{ mg/kg/day}$$

Custom

$$0.12 \text{ mg/kg/yr} \times 0.0016 = 0.00019 \text{ mg/kg/day}$$

$$0.72 \text{ mg/kg/yr} \times 0.0016 = 0.0012 \text{ mg/kg/day}$$

D. Respiratory Exposure

Respiratory exposure was abstracted from the current submission without change and multiplied by appropriate factors to obtain specified units. The highest residue value was chosen to determine the exposure (12.7 ug/m^3).

$$\text{mg/hr: } 12.7 \text{ ug/m}^3 \times 1.5 \text{ m}^3/\text{hr} = 19 \text{ ug/hr}$$

$$\text{mg/kg/hr: } 19 \text{ ug/hr}/70 \text{ kg} = 0.27 \text{ ug/kg/hr}$$

Daily exposure: mg/kg/day:

$$12.7 \text{ ug/m}^3 \times 1.5 \text{ m}^3/\text{hr} \times 0.24 \text{ hr/day} = 4.6 \text{ ug/day}/70 \text{ kg} = 0.065 \text{ ug/kg/day}$$

$$\text{mg/kg/lb: } 0.0000004 \text{ mg/kg/lb (from current submission)}$$

Ground Application
Applicator

A. No Protection

Residue values average of two reps:

Hands (cotton gloves)	0.27 ug/cm ²	x	820 cm ²	=	221.4 ug
Forehead	0.011	x	650	=	7.15
Chest	0.146	x	3700	=	540.2
Back	0.007	x	3610	=	25.3
Thigh	0.128	x	2250	=	288.0
Forearm (outer)	0.11	x	1210	=	13.3
Bicep (outer)	0.32	x	1320	=	42.2
Ankle (outer)	0.027	x	2380	=	64.3

Total Hands + Body	1201.85 ug
Total Body only	980.45 ug

Corrected for recovery:

Hands	221.4 ug/0.74	=	299.2 ug
Body	980.45 ug/0.89	=	1101.6 ug

Total Hands + Body 1330.8 ug

Assume 70 kg body weight:

1330.8 ug/70 kg = 19.0 ug/kg

Assume 1.1 hr (from study):

1330.8 ug/1.1 hr = 1209.8 ug/hr

mg/kg/hr:

1330.8 ug/70 kg/1.1 hr = 17.2 ug/kg/hr

mg/kg/lb:

assumptions: 1.1 hr/100 acre; 400 lb ai/100 acre; 4 lb ai/acre (from study)

0.017 mg/kg/hr x 1.1 hr/100 acre x 100 acre/400 lb = 0.046 ug/kg/lb

Daily exposure: mg/kg/day:

assumptions: 1.1 hr/100 acre; 400 lb ai/100 acre; 100 acre/day

0.017 mg/kg/hr x 1.1 hr/day = 0.018 mg/kg/day

Annual exposure: mg/kg/yr:

-Private: assumptions: 1 - 6 day/yr; 100 - 600 acre/yr; 400 - 2400 lb/yr; 4 lb/acre

$$0.018 \text{ mg/kg/day} \times 1 \text{ day/yr} = 0.018 \text{ mg/kg/yr}$$

$$0.018 \text{ mg/kg/day} \times 6 \text{ day/yr} = 0.11 \text{ mg/kg/yr}$$

-Custom: assumptions: 5 - 30 day/yr; 500 - 3000 acre/yr; 2000 - 12000 lb/yr; 4lb/acre

$$0.018 \text{ mg/kg/day} \times 5 \text{ day/yr} = 0.09 \text{ mg/kg/yr}$$

$$0.018 \text{ mg/kg/day} \times 30 \text{ day/yr} = 0.54 \text{ mg/kg/yr}$$

Lifetime daily exposure: mg/kg/day

-Private: assumptions: 40 yr working lifetime; 70 yr lifespan [40/70x365 = 0.0016]

$$0.018 \text{ mg/kg/yr} \times \frac{40 \text{ yr}}{70 \text{ yr} \times 365 \text{ day/yr}} = 2.9 \times 10^{-5} \text{ mg/kg/day}$$

$$0.11 \text{ mg/kg/yr} \times 0.0016 = 18 \times 10^{-5} \text{ mg/kg/day}$$

-Custom: assumptions: 40 yr working lifetime; 70 yr lifespan

$$0.09 \text{ mg/kg/yr} \times 0.0016 = 14 \times 10^{-5} \text{ mg/kg/day}$$

$$0.54 \text{ mg/kg/yr} \times 0.0016 = 86 \times 10^{-5} \text{ mg/kg/day}$$

B. With Protection (80%)

Assume 80% reduction in exposure to body only. (20% of exposure with no protection.)

$$1101.6 \text{ ug} \times 20\% = 220.3 \text{ ug}$$

$$\text{Total Hands + Body} = 299.2 \text{ ug} + 220.3 \text{ ug} = 519.5 \text{ ug}$$

$$\text{mg/kg: } 519.5 \text{ ug}/70 \text{ kg} = 7.4 \text{ ug/kg}$$

$$\text{mg/hr: } 519.5 \text{ ug}/1.1 \text{ hr} = 472.3 \text{ ug/hr}$$

$$\text{mg/kg/hr: } 519.5 \text{ ug}/70 \text{ kg}/1.1 \text{ hr} = 6.7 \text{ ug/kg/hr}$$

$$\text{mg/kg/lb: } 0.0067 \text{ mg/kr/hr} \times 1.1 \text{ hr}/100 \text{ acre} \times 100 \text{ acre}/400 \text{ lb} = 0.000018 \text{ mg/kg/lb}$$

$$\text{Daily exposure: mg/kg/day: } 6.7 \text{ ug/kg/hr} \times 1.1 \text{ hr/day} = 0.0073 \text{ mg/kg/day}$$

Annual exposure: mg/kg/yr

Private

$$0.0073 \text{ mg/kg/day} \times 1 \text{ day/yr} = 0.0073 \text{ mg/kg/yr}$$

$$0.0073 \text{ mg/kg/day} \times 6 \text{ day/yr} = 0.044 \text{ mg/kg/yr}$$

Custom

$$0.0073 \text{ mg/kg/day} \times 5 \text{ day/yr} = 0.036 \text{ mg/kg/yr}$$

$$0.0073 \text{ mg/kg/day} \times 30 \text{ day/yr} = 0.22 \text{ mg/kg/yr}$$

Lifetime daily exposure: mg/kg/day

Private

$$0.0073 \text{ mg/kg/yr} \times 0.0016 = 1.2 \times 10^{-5} \text{ mg/kg/day}$$

$$0.044 \text{ mg/kg/yr} \times 0.0016 = 7. \times 10^{-5} \text{ mg/kg/day}$$

Custom

$$0.036 \text{ mg/kg/yr} \times 0.0016 = 5.8 \times 10^{-5} \text{ mg/kg/day}$$

$$0.22 \text{ mg/kg/yr} \times 0.0016 = 35. \times 10^{-5} \text{ mg/kg/day}$$

C. With Protection (100%)

Assume 100% protection to covered body parts. (Hand exposure determined by cotton gloves.) The following body areas are the only exposure parts to alachlor: face, front of neck ("V" of chest), back of neck, and hands as determined by residues in cotton gloves.

Residue values average of two reps:

Hands (cotton gloves)	0.27 ug/cm ²	x	820 cm ²	=	221.4 ug
Chest	0.146	x	150	=	21.9
Back	0.007	x	110	=	0.77
Forehead	0.011	x	650	=	7.15

Total Hands + Body	251.22 ug
Total Body only	29.82 ug

Corrected for recovery:

Hands	221.4 ug/0.74	=	299.2 ug
Body	29.82 ug/0.89	=	33.5 ug

Total Hands + Body 332.7 ug

mg/kg: 332.7 ug/70 kg = 4.75 ug/kg

mg/hr: 332.7 ug/1.1 hr = 302.4 ug/hr

mg/kg/hr: 332.7 ug/70 kg/1.1 hr = 4.3 ug/kg/hr

$$\text{mg/kg/lb: } 4.3 \text{ ug/kg/hr} \times 1.1 \text{ hr/100 acre} \times 100 \text{ acre/400 lb} = 0.012 \text{ ug/kg/lb}$$

$$\text{Daily exposure: mg/kg/day: } 4.3 \text{ ug/kg/day} \times 1.1 \text{ hr/day} = 0.0047 \text{ mg/kg/day}$$

Annual exposure: mg/kg/yr:

Private

$$0.0047 \text{ mg/kg/yr} \times 1 \text{ day/yr} = 0.0047 \text{ mg/kg/yr}$$

$$0.0047 \text{ mg/kg/yr} \times 6 \text{ day/yr} = 0.028 \text{ mg/kg/yr}$$

Custom

$$0.0047 \text{ mg/kg/yr} \times 5 \text{ day/yr} = 0.024 \text{ mg/kg/yr}$$

$$0.0047 \text{ mg/kg/yr} \times 30 \text{ day/yr} = 0.14 \text{ mg/kg/yr}$$

Lifetime daily exposure: mg/kg/day:

Private

$$0.0047 \text{ mg/kg/yr} \times 0.0016 = 0.75 \times 10^{-5} \text{ mg/kg/day}$$

$$0.028 \text{ mg/kg/yr} \times 0.0016 = 4.5 \times 10^{-5} \text{ mg/kg/day}$$

Custom

$$0.024 \text{ mg/kg/yr} \times 0.0016 = 3.8 \times 10^{-5} \text{ mg/kg/day}$$

$$0.14 \text{ mg/kg/yr} \times 0.0016 = 22. \times 10^{-5} \text{ mg/kg/day}$$

D. Respiratory Exposure

Respiratory exposure was abstracted from the current submission without change and multiplied by appropriate factors to obtain specified units. The highest residue value was chosen to determine exposure (1.45 ug/m^3).

$$\text{mg/hr: } 1.45 \text{ ug/m}^3 \times 1.5 \text{ m}^3/\text{hr} = 2.2 \text{ ug/hr}$$

$$\text{mg/kg/hr: } 2.2 \text{ ug/hr}/70 \text{ kg} = 0.031 \text{ ug/kg/hr}$$

Daily exposure: mg/kg/day:

$$1.45 \text{ ug/m}^3 \times 1.5 \text{ m}^3/\text{hr} \times 1.1 \text{ hr/day} = 2.4 \text{ ug/day}$$

$$2.4 \text{ ug/day}/70 \text{ kg} = 0.034 \text{ ug/kg/day}$$

$$\text{mg/kg/lb: } 0.0000004 \text{ mg/kg/lb (from current submission)}$$

Canadian Calculation

Open Tank Fill: 28.3 ug/lb/70 kg = 0.0004 mg/kg/lb

Application: 8.78 ug/lb/70 kg = 0.00012 mg/kg/lb

Other Scenarios

Similar calculations were performed for the remaining exposure scenarios (aerial, probe transfer). Original study provides information concerning hours applied, lb/acre used, etc.

TABLES

Abstracted from original study
and current submission and from
Canadian response.

Tables from original study.

EPA Accession No.: 070591

Table VII
AERIAL APPLICATOR EXPOSURE
RECOVERIES OF ALACHLOR
FROM
FIELD FORTIFIED POT PLINGS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.62	--
check	0.24	--
200.0 ug	180.04	90
200.0 ug	198.01	99
		95 % average

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OR
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INFORMATION OF MONSANTO
COMPANY

Table VIII

LASSO EC
GROUND APPLICATOR EXPOSURE
RECOVERIES OF ALACHLOR
FROM
FIELD FORTIFIED PUF PLUGS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.78	--
check	0.63	--
check	0.06	--
check	0.70	--
5.0 ug	5.73	98
5.0 ug	5.64	97
10.0 ug	10.87	101
10.0 ug	10.65	98
15.0 ug	16.23	103
15.0 ug	15.77	100
20.0 ug	22.67	103
20.0 ug	20.70	99
check	63.63	--
check	29.19	--
check	47.56	--
check	54.64	--
25.0 ug	64.47	61
25.0 ug	63.29	76
50.0 ug	88.48	78
50.0 ug	65.45	72
100.0 ug	123.26	71
100.0 ug	116.92	68
200.0 ug	230.54	91
200.0 ug	214.88	83
		<u>85 % average</u>

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OF
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COMPANY

Table IX
LASSO II GRANULES
 GROUND APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED PTF PLUGS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	1.32	--
check	1.45	--
check	1.57	--
check	1.57	--
10.0 ug	12.32	107
10.0 ug	11.63	100
20.0 ug	22.06	102
20.0 ug	21.94	102
50.0 ug	55.63	108
50.0 ug	53.10	103
200.0 ug	186.66	93
200.0 ug	192.24	95
		101 % average

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OF
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 INFORMATION OF MONSANTO
 COMPANY

Table X
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALAMICOR
 FROM
 LAB FORTIFIED PUF PLUGS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.58	--
check	0.22	--
10.0 ug	9.06	91
10.0 ug	8.74	87
20.0 ug	17.77	89
20.0 ug	17.51	88
50.0 ug	44.04	88
50.0 ug	44.20	88
200.0 ug	175.32	88
200.0 ug	176.86	88
		88 % average

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OF
 OTHERWISE CONFIDENTIAL
 INFORMATION OF MONSANTO
 COMPANY

Table XI

20.

LASSO EC

GROUND APPLICATOR EXPOSURE

RECOVERIES OF ALACHLOR

FROM

LAB FORTIFIED PTF PLUGS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.25	--
check	0.19	--
5.0 ug	5.27	104
5.0 ug	5.43	104
10.0 ug	10.47	104
10.0 ug	10.23	100
check	0.23	--
check	0.20	--
15.0 ug	16.45	108
15.0 ug	15.73	105
20.0 ug	21.92	108
20.0 ug	21.80	108
check	0.21	--
check	0.20	--
25.0 ug	28.65	114
25.0 ug	29.15	116
50.0 ug	54.82	109
50.0 ug	56.83	113
check	0.26	--
check	0.26	--
100.0 ug	87.37	87
100.0 ug	89.75	89
200.0 ug	195.72	98
200.0 ug	192.69	96
check	0.64	--
check	0.55	--
500.0 ug	498.06	100
500.0 ug	511.53	102
1000.0 ug	721.70	72
1000.0 ug	782.67	98
		103 % average

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OTHERWISE CONFIDENTIAL
INFORMATION OF AGROBIO
CORPORATION

Recoveries are corrected for their respective backgrounds.

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Table XII
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED SILICA GEL TUBES

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.01	--
check	0.01	--
0.1 ug	0.12	111
0.1 ug	0.11	100
check	0.01	--
check	0.02	--
2.5 ug	2.56	94
2.5 ug	2.63	105
check	0.02	--
check	0.02	--
20.0 ug	19.06	95
20.0 ug	18.95	95
		100 % average

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OR
 OTHERWISE CONFIDENTIAL
 INFORMATION OF MONSANTO
 COMPANY

Table XIII

LASSO EC
GROUND APPLICATOR EXPOSURE
RECOVERIES OF ALACHLOR
FROM
FIELD FORTIFIED SILICA GEL

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.03	--
check	0.04	--
check	0.03	--
check	0.03	--
0.1 ug	0.12	93
0.1 ug	0.12	93
0.5 ug	0.55	104
0.5 ug	0.56	106
1.0 ug	1.09	106
1.0 ug	1.04	101
2.5 ug	2.72	108
2.5 ug	2.43	96
check	0.02	--
check	0.02	--
check	0.14	--
check	0.22	--
5.0 ug	4.74	93
5.0 ug	4.64	--
7.5 ug	6.62	87
7.5 ug	6.35	83
10.0 ug	9.47	94
10.0 ug	10.06	100
20.0 ug	16.39	81
20.0 ug	16.07	80
		94 % average

Recoveries are corrected for their respective backgrounds.

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INFORMATION OF MONSANTO
COMPANY.

Table XIV
LASSO - GRANULES
 GROUND APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED SILICA GEL

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.05	--
check	0.05	--
check	0.03	--
check	0.02	--
0.5 ug	0.41	74
0.5 ug	0.41	74
2.5 ug	1.76	69
2.5 ug	1.72	67
7.5 ug	6.79	90
7.5 ug	5.39	71
20.0 ug	15.92	79
20.0 ug	13.65	69
		<u>74 % average</u>

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OR
 OTHERWISE CONFIDENTIAL
 INFORMATION OF MONSANTO
 COMPANY

Table XV
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 LAB FORTIFIED SILICA GEL TUBES

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.03	--
check	0.04	--
0.1 ug	0.13	92
0.1 ug	0.15	114
1.0 ug	0.96	92
1.0 ug	0.99	95
check	0.12	--
check	0.17	--
5.0 ug	5.69	111
5.0 ug	5.16	100
10.0 ug	10.17	100
10.0 ug	9.34	92
		100 % average

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OF
 OTHERWISE CONFIDENTIAL
 INFORMATION OF MONSANTO
 COMPANY

Table XVI

LASSO EC

GROUND APPLICATOR EXPOSURE

RECOVERIES OF ALACHLOR

FROM

LAB FORTIFIED SILICA GEL

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.01	--
check	0.01	--
0.1 ug	0.11	100
0.1 ug	0.10	90
0.5 ug	0.61	120
0.5 ug	0.57	112
check	0.02	--
check	0.01	--
1.0 ug	0.94	92
1.0 ug	1.19	117
2.5 ug	2.29	91
2.5 ug	2.50	99
check	0.01	--
check	0.01	--
5.0 ug	4.55	91
5.0 ug	4.19	84
7.5 ug	6.50	87
7.5 ug	6.43	85
check	0.01	--
check	0.01	--
10.0 ug	9.27	83
10.0 ug	8.46	85
20.0 ug	17.42	87
20.0 ug	16.34	82
check	0.00	--
check	0.01	--
25.0 ug	23.87	95
25.0 ug	23.30	93
50.0 ug	45.58	91
50.0 ug	45.46	91

CONTAINS TRADE SECRET
OTHERWISE CONFIDENTIAL
INFORMATION OF MONSANTO
COMPANY

(continued)

Table XVI (continued)

LASSO EC

LAB FORTIFIED SILICA GEL

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.01	--
check	0.00	--
100.0 ug	74.67	75
100.0 ug	63.24	63
250.0 ug	217.07	87
250.0 ug	224.79	90
check	0.01	--
check	0.01	--
500.0 ug	403.06	81
500.0 ug	407.86	82
		<u>91 % average</u>

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OF
OTHERWISE CONFIDENTIAL
INFORMATION OF MONSANTO
COMPANY

Table XXI
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED GAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.01	--
check	----	--
check	0.01	--
check	0.01	--
0.5 ug	0.49	96
0.5 ug	0.43	85
0.5 ug	0.42	82
0.5 ug	0.48	94
check	----	--
check	----	--
check	----	--
check	----	--
10.0 ug	8.15	82
10.0 ug	7.67	76
10.0 ug	8.25	83
10.0 ug	7.95	80
check	----	--
check	----	--
check	----	--
check	----	--
200.0 ug	144.31	72
200.0 ug	141.67	71
200.0 ug	153.68	77
200.0 ug	166.66	83
		82 % average

σ_r = 7.20

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OR
 OTHERWISE CONFIDENTIAL
 INFORMATION OF MONSANTO
 COMPANY

Table XXII

LASSO EC

GROUND APPLICATOR EXPOSURE
RECOVERIES OF ALACHLOR
FROM
FIELD FORTIFIED GAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.06	--
check	0.05	--
check	0.04	--
check	0.03	--
0.5 ug	0.35	60
0.5 ug	0.34	58
1.0 ug	0.77	72
1.0 ug	0.72	67
5.0 ug	3.96	78
5.0 ug	4.33	86
10.0 ug	8.91	89
10.0 ug	8.97	89
check	0.34	--
check	0.24	--
check	0.30	--
check	0.29	--
25.0 ug	23.53	93
25.0 ug	23.37	92
50.0 ug	44.20	88
50.0 ug	44.80	89
100.0 ug	82.80	83
100.0 ug	84.03	84
200.0 ug	180.03	90
200.0 ug	168.63	84
		<u>81</u> % average

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OR
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CORPORATION

$\sigma = 10.86$

Table XXIII
ASSO III GRATULES
 GROUND APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED GAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	17.51	--
check	0.05	--
check	0.05	--
check	0.05	--
1.0 ug	0.99	94
1.0 ug	0.89	84
10.0 ug	9.59	93
10.0 ug	9.66	96
50.0 ug	46.87	94
50.0 ug	47.66	95
200.0 ug	199.07	100
200.0 ug	195.76	98
		95 % average

Recoveries are corrected for their respective backgrounds.

Not used for background correction.

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 INFORMATION OF MONSANTO
 COMPANY

Table XXIV
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 LAB FORTIFIED GAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.08	--
check	0.05	--
0.5 ug	0.58	102
0.5 ug	0.74	134
check	0.07	--
check	0.12	--
1.0 ug	0.90	81
1.0 ug	1.08	99
check	0.07	--
check	0.05	--
5.0 ug	4.75	94
5.0 ug	4.65	92
check	0.10	--
check	0.06	--
10.0 ug	8.94	89
10.0 ug	8.89	88
check	0.13	--
check	0.04	--
25.0 ug	20.96	84
25.0 ug	21.85	87
check	0.04	--
check	0.03	--
50.0 ug	37.46	75
50.0 ug	39.95	80
check	0.04	--
check	0.04	--
100.0 ug	84.73	85
100.0 ug	95.91	95
200.0 ug	209.43	105
200.0 ug	201.83	101
		93% average

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 INFORMATION OF MUNSUNG
 COMPANY

$\sigma = 13.4$

93%

Recoveries are corrected for their respective backgrounds.

Table XXV

LASSO EC

GROUND APPLICATOR EXPOSURE

RECOVERIES OF ALACHLOR

FROM

LAB FORTIFIED GAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.05	--
check	0.04	--
0.5 ug	0.35	60
0.5 ug	0.35	50
check	0.07	--
check	0.08	--
1.0 ug	0.79	71
1.0 ug	0.91	73
check	0.07	--
check	0.07	--
5.0 ug	4.32	85
5.0 ug	4.06	80
check	0.07	--
check	0.06	--
10.0 ug	9.19	91
10.0 ug	9.05	90
check	0.06	--
check	0.06	--
25.0 ug	19.92	79
25.0 ug	19.10	76
check	0.08	--
check	0.10	--
50.0 ug	41.25	82
50.0 ug	43.55	87
check	0.06	--
check	0.03	--
100.0 ug	81.50	81
100.0 ug	84.14	84

CONTAINS THE
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DE 51

DE 51

LASSO EC

37.

LAB FORTIFIED LAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.02	--
check	0.02	--
3000.0 ug	2670.32	89
3000.0 ug	2725.64	91
check	0.15	--
check	0.11	--
4000.0 ug	4122.03	103
4000.0 ug	3933.79	96
check	0.25	--
check	0.16	--
5000.0 ug	4938.33	100
5000.0 ug	4999.73	100
check	0.30	--
check	0.18	--
0.5 ug	0.60	72
0.5 ug	0.58	68
check	0.15	--
check	0.13	--
1.0 ug	0.98	84
1.0 ug	1.01	87
check	0.02	--
check	0.02	--
5.0 ug	3.97	79
5.0 ug	3.76	75
check	0.04	--
check	0.18	--
10.0 ug	10.60	105
10.0 ug	10.53	104
check	0.11	--
check	0.09	--
25.0 ug	24.48	98
25.0 ug	25.52	102
check	0.04	--
check	0.05	--
50.0 ug	47.75	95
50.0 ug	48.53	97

CONTAINS TRADE SECRET &
OTHERWISE CONFIDENTIAL
INFORMATION OF MONSANTO
COMPANY

(continued)

(continued)

LASSO EC

LAB FORTIFIED GAUZE PADS

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.25	--
check	0.17	--
100.0 ug	106.54	106
100.0 ug	116.52	116
200.0 ug	222.09	121
200.0 ug	257.54	<u>134</u>
		91 % average

Recoveries are corrected for their respective background.

CONTAINS TRADE SECRET OF
OTHERWISE CONFIDENTIAL
INFORMATION OF MONSANTO
COMPANY

Table XXVI
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED COTTON GLOVES

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.87	--
check	1.14	--
10.0 ug	9.04	81
10.0 ug	8.89	79
check	1.03	--
check	1.14	--
100.0 ug	68.50	67
100.0 ug	76.02	75
check	0.93	--
check	0.65	--
1000.0 ug	954.91	95
1000.0 ug	997.62	100
		<u>83 % average</u>

Recoveries are corrected for their respective backgrounds.

CONTAINS TRADE SECRET OR
 OTHERWISE CONFIDENTIAL
 INFORMATION OF MONSANTO
 COMPANY

Table XXVII

LASSO EC

GROUND APPLICATOR EXPOSURE

RECOVERIES OF ALACHLOR

FROM

FIELD FORTIFIED COTTON GLOVES

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	1.23	--
check	0.80	--
10.0 ug	7.01	69
10.0 ug	6.72	57
25.0 ug	17.15	65
25.0 ug	14.26	53
50.0 ug	39.91	78
50.0 ug	32.37	63
100.0 ug	65.16	64
100.0 ug	62.08	61
check	3.43	--
check	2.07	--
250.0 ug	191.21	75
250.0 ug	198.64	78
500.0 ug	356.53	71
500.0 ug	373.95	74
750.0 ug	510.83	69
750.0 ug	555.93	74
1000.0 ug	764.39	76
1000.0 ug	783.42	78
		<u>68</u> % average

Recoveries are corrected for their respective backgrounds.

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Table XXVIII
LASSO II GRANULES
 GROUND APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 FIELD FORTIFIED COTTON GLOVES

<u>fort. level</u>	<u>uz found</u>	<u>% rec.</u>
check	0.49	--
check	0.46	--
25.0 ug	19.07	74
25.0 ug	20.84	80
100.0 ug	64.50	64
100.0 ug	61.12	61
500.0 ug	356.12	71
500.0 ug	376.77	75
1000.0 ug	664.36	66
1000.0 ug	752.33	75
		<u>72 % average</u>

Recoveries are corrected for their respective backgrounds.

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Table XXIX
 AERIAL APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 LAB FORTIFIED COTTON GLOVES

<u>fort level</u>	<u>ug found</u>	<u>% rec.</u>
check	2.53	--
check	1.27	--
10.0 ug	9.13	77
10.0 ug	9.05	76
25.0 ug	22.22	83
25.0 ug	22.87	86
check	0.74	--
check	0.65	--
50.0 ug	39.34	77
50.0 ug	40.84	80
100.0 ug	82.64	82
100.0 ug	82.52	82
500.0 ug	509.98	102
500.0 ug	466.60	93
		84 % average

Recoveries are corrected for their respective backgrounds.

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Table AAX

43.

LASSO ECGROUND APPLICATOR EXPOSURE
RECOVERIES OF ALACHLOR
FROM
LAB FORTIFIED COTTON GLOVES

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	2.78	--
check	1.38	--
10.0 ug	6.87	48
10.0 ug	7.04	50
check	0.93	--
check	0.35	--
10.0 ug	8.36	77
10.0 ug	6.43	58
check	0.56	--
check	0.00	--
25.0 ug	14.56	57
25.0 ug	17.57	69
check	0.37	--
check	0.21	--
50.0 ug	33.70	67
50.0 ug	34.50	68
check	0.48	--
check	0.33	--
100.0 ug	63.93	64
100.0 ug	56.60	56
500.0 ug	356.18	71
500.0 ug	378.15	76
1000.0 ug	682.16	68
1000.0 ug	661.75	66
2500.0 ug	1706.0	68
2500.0 ug	1614.97	65
5000.0 ug	2965.78	59
5000.0 ug	2572.82	57
10000.0 ug	6260.37	63
10000.0 ug	6312.35	63
		64 % average

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Recoveries are corrected for their respective backgrounds.

Table XXXI

LASSO EC

GROUND APPLICATOR EXPOSURE

RECOVERIES OF ALACHLOR

FROM

LAB FORTIFIED SOIL

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.40	--
check	0.66	--
5.0 ug	5.18	93
5.0 ug	5.03	90
check	3.28	--
50.0 ug	47.56	89
50.0 ug	45.32	84
check	1.77	--
check	0.86	--
100.0 ug	79.53	78
100.0 ug	97.15	96
check	11.22	--
check	4.27	--
200.0 ug	158.13	75
200.0 ug	159.22	76
check	3.08	--
check	3.22	--
300.0 ug	330.55	109
300.0 ug	352.29	116
400.0 ug	326.13	81
400.0 ug	329.03	81
500.0 ug	452.72	90
500.0 ug	541.90	108
600.0 ug	623.42	103
600.0 ug	620.66	101
		<u>92 % average</u>

Recoveries are corrected for their respective backgrounds.

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Table XXXII
 GROUND APPLICATOR EXPOSURE
 RECOVERIES OF ALACHLOR
 FROM
 LAB FORTIFIED RUBBER GLOVES

<u>fort. level</u>	<u>ug found</u>	<u>% rec.</u>
check	0.13	--
check	0.07	--
10,000.0 ug	8,775.54	88
10,000.0 ug	8,606.37	86
		<u>87</u> % average

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5.1

Table XXXIII
 LASSO EC AERIAL APPLICATOR EXPOSURE

TANK FILL

		REP NO. 1	REP NO. 2
<u>SAMPLING CONDITIONS</u>	Wind (mph-direction):	9 W	11 W
	Humidity:	74%	57%
	Air Temperature (°C):	7	20
	Sampling Time (min):	15	15
Measured Concentration of Alachlor in Air (ug/m ³)	(polyurethane foam)	6.04 7.03	19.52 4.69
	(silica gel)	14.22 14.72	39.08 35.69
Measured Concentration of [redacted] (ug/m ³)	(charcoal)	9,154.5 12,424.2	8,033.3 9,151.5
	Dermal Deposition of Alachlor (ug/cm ²)		
	Hands:	0.051	1.409
	Head:	0.036	0.065
	Forehead:	0.026	0.777
	Shoulder:	0.040	0.075
	Chest:	7.040	2.315
	Back:	0.031	0.070
	Thigh:	16.050	50.676
	Forearm (under):	0.075	0.181
	Forearm (outer):	0.423	0.286
	Bicep (under):	0.007	0.051
	Bicep (outer):	0.151	0.234
	Ankle (under):	0.075	270.90
	Ankle (outer):	15.955	0.166

82% < 37%
 93% < 78%
 99% < 270.90
 0.166 - outlier

average reduction around clothes

78%

49

Table XX.:V

LASSO EC AERIAL APPLICATOR EXPOSURE

APPLICATION (PILOT)

SAMPLING CONDITIONS		REP NO. 1	REP NO. 2
Wind (mph-direction):		7 SW	3 NE
Humidity:		62%	62%
Air Temperature (°C):		15	10
Sampling Time (min):		35	47
Measured Concentration of Alachlor in Air ($\mu\text{g}/\text{m}^3$)	(polyurethane foam)		
	(silica gel)	15.20 17.79	7.53 12.72
Measured Concentration of XXXXXXXXXX ($\mu\text{g}/\text{m}^3$)	(charcoal)	<2,272.1 ¹ <2,272.7 ¹	<1,694.9 ¹ <1,694.9 ¹
Dermal Deposition of Alachlor ($\mu\text{g}/\text{cm}^2$)	Hands:	0.177	0.270
	Head:	0.057	0.057
	Forehead:	0.045	0.045
	Shoulder:	0.060	0.049
	Chest:	0.521	0.034
	Back:	0.640	0.276
	Thigh:	0.155	0.105
	Forearm (under):	0.058	0.052
	Forearm (outer):	1.844	0.036
	Bicep (under):	0.065	0.032
	Bicep (outer):	0.043	0.029
	Ankle (under):	0.067	0.079
	Ankle (outer):	0.645	0.061

95%
+ 33%
79%
0.045
.94
.048
.036
.073
.353

¹ Based on 200 ug sensitivity and volume of air sampled.

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47% protection factor
 ↑
 mixed average of 1 and 2
 for under + out

Table XXXV
LASSO EC AERIAL APPLICATOR EXPOSURE

		REP NO. 1	REP NO. 2
<u>SAMPLING CONDITIONS</u>			
Wind (mph-direction):		7 SW	3 NE
Humidity:		62 ²	62 ²
Air Temperature (°C):		15	10
Sampling Time (min):		25	24
Measured Concentration of Alachlor in Air (ug/m ³)	(polyurethane foams)		
	(silica gel)	168.88	152.75
		96.48	103.67
Measured Concentration of [REDACTED] (ug/m ³)	(charcoal)	<3,174.6 ¹	<3,333.3 ¹
		<3,174.6 ¹	<3,333.3 ¹
Dermal Deposition of Alachlor (ug/cm ²)	Hands:	6.603	2.273
	Head:	9.904	7.232
	Forehead:	18.637	2.228
	Shoulder:	4.266	12.948
	Chest:	9.039	2.351
	Back:	3.110	29.561
	Thigh:	13.258	2.462
	Forearm (under):	0.045	1.006
	Forearm (outer):	21.377	3.723
	Bicep (under):	0.038	0.048
	Bicep (outer):	12.650	3.185
	Ankle (under):	0.194	0.133
	Ankle (outer):	16.789	1.623

9970 }
 99 }
 99 }
 73%
 9870
 9270

¹ Based on 200 ug sensitivity and volume of air sampled.

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Table XXXVI
LASEO EC GROUND APPLICATOR EXPOSURE

OPEN-POUR TANK FILL

<u>SAMPLING CONDITIONS</u>		<u>REP NO. 1</u>	<u>REP NO. 2</u>
Wind (mph-direction):		9 S	7 NE
Humidity:		64%	62%
Air Temperature (°C):		20	15
Sampling Time (min):		12	17
Measured Concentration of Alachlor in Air (ug/m ³)	(polyurethane foam)	1.87 20.39	2.33 2.57
	(silica gel)	6.67 7.50	2.94 10.12
Measured Concentration of [redacted] (ug/m ³)	(charcoal)	9,177.0 7,153.0	<4,651.0 ¹ <4,551.0 ¹
	Dermal Deposition of Alachlor (ug/cm ²)		
	Hands:	1.545	0.427
	Head:	0.012	0.011
	Forehead:	0.026	0.006
	Shoulder:	0.037	0.030
	Chest:	4.958	1.415
	Back:	0.004	0.079
	Thigh:	7.794	0.089
	Forearm (under):	0.007	0.014
	Forearm (outer):	0.003	0.027
	Bicep (under):	0.002	0.008
	Bicep (outer):	2.267	0.187
	Ankle (under):	0.008	0.009
	Ankle (outer):	0.111	0.540

90% < 0.007 52%
 99% < 0.002 95%
 92% < 0.008 98%

¹ Based on 200 ug sensitivity and volume of air sampled.

Ave 88%

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Table XA .1
LASSO EC GROUND APPLICATOR EXPOSURE
APPLICATION/INCORPORATION (INSIDE)

<u>SAMPLING CONDITIONS</u>		<u>REP NO. 1</u>	<u>REP NO. 2</u>
Wind (apt-direction):		9 S	7 NE
Humidity:		64%	62%
Air Temperature (°C):		20	15
Sampling Time (min):		69	63
Measured Concentration of Alachlor in Air (ug/m ³)	(polyurethane foam)		
	(silica gel)	1.19	1.33
		1.15	1.40
Measured Concentration of [redacted] (ug/m ³)	(charcoal)	1,255.0	1,525.0
		1,259.0	1,479.0
Dermal Deposition of Alachlor (ug/cm ²)	Hands:	0.499	0.041
	Head:	0.008	0.009
	Forehead:	0.011	0.011
	Shoulder:	0.058	0.019
	Chest:	0.273	0.019
	Back:	0.095	0.010
	Thigh:	0.258	0.018
	Forearm (under):	0.069	0.007
	Forearm (outer):	0.015	0.008
	Bicep (under):	0.018	0.010
	Bicep (outer):	0.050	0.013
	Ankle (under):	0.115	0.065
	Ankle (outer):	0.017	0.036

64% }
1240 }
2340 }

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Table A.VI
 LASSO EC GROUND APPLICATOR EXPOSURE
 PROBE TRANSFER TANK FILL (5 GALLON CAN)

SAMPLING CONDITIONS		REP NO. 1	REP NO. 2
Wind (mph-direction):		12 NE	10 NE
Humidity:		50%	47%
Air Temperature (°C):		17	18
Sampling Time (min):		15	18
Measured Concentration of Alachlor in Air (ug/m ³)	(polyurethane foam)	3.86 2.46	1.23 3.54
	(silica gel)	9.08 5.69	2.67 2.11
Measured Concentration of [REDACTED] (ug/m ³)	(charcoal)	<6,061.0 ¹ <6,061.0 ¹	<4,444.0 ¹ <4,444.0 ¹
	Dermal Deposition of Alachlor (ug/cm ²)		
	Hands:	0.010	0.012
	Head:	0.156	0.005
	Forehead:	0.992	0.034
	Shoulder:	0.014	0.005
	Chest:	0.014	0.005
	Back:	0.025	0.007
	Thigh:	0.031	0.055
	Forearm (under):	0.010	0.036
	Forearm (outer):	0.015	0.042
	Bicep (under):	0.005	0.005
	Bicep (outer):	0.016	0.005
	Ankle (under):	0.011	0.019
	Ankle (outer):	0.028	0.532

¹ Based on 200 ug sensitivity and volume of air sampled.

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Table XLVII

IASIO EC GROUND APPLICATION EXPOSURE

PROBE TRANSFER TANK FILL (55 GALLON DRUM)

<u>SAMPLING CONDITIONS</u>		<u>REP NO. 1</u>	<u>REP NO. 2</u>
Wind (mph-direction):		12 SSE	13 SSE
Humidity:		77%	74%
Air Temperature (°C):		21	21
Sampling Time (min):		11	13
Measured Concentration of Alachlor in Air (ug/m ³)	(polyurethane foam)	5.99 3.01	7.64 5.66
	(silica gel)	9.82 5.82	8.31 28.46
Measured Concentration of [REDACTED] (ug/m ³)	(charcoal)	(7,142.0) ¹ (1,142.0) ¹	13,474.0 16,650.0
Dermal Deposition of Alachlor (ug/cm ²)	Hands:	0.717	0.452
	Head:	0.374	0.023
	Forehead:	0.069	0.016
	Shoulder:	0.073	0.024
	Chest:	1.462	0.111
	Back:	1.575	0.015
	Thigh:	4.504	0.222
	Forearm (under):	0.005	0.034
	Forearm (outer):	0.610	0.233
	Bicep (under):	0.046	0.022
	Bicep (outer):	0.366	0.045
	Ankle (under):	0.043	0.013
	Ankle (outer):	0.013	0.012

¹ Based on 200 ug sensitivity and volume of air sampled.

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Table XLVIIII

Total Body Dose Estimates

Combined Inhalation & Dermal Exposure

	1	2	3	4	5	6	7	8
Location	Unit Inhalation Exposure (ug)	Total Inhalation Exposure (ug)	Total Daily Inhalation Exposure (ug) 100% Absorption Assumed	Unit Dermal Exposure (ug)	Total Dermal Exposure (ug)	Total Daily Dermal Exposure (ug) 10% Absorption Assumed	Total Body Dose Dermal & Inhalation (ug/kg bw/100 acres)	Total Body Dose Dermal & Inhalation (ug/kg bw/round applied)
Field (corn)	0.08			20.71				
Field (soy)	0.23	0.31	0.31	5.38	26.09	2.61	2.92	0.010
Field (wheat)	1.31	1.31	1.31	211.47	211.47	21.15	22.46	0.075
Field (barley)	0.19			111.61				
Field (oats)	0.19	0.38	0.38	21.00	132.61	13.26	13.64	0.036
Field (rye)	2.11			21.41				
Field (sorghum)	0.20	2.31	2.31	n.b.	21.41	2.14	4.45	0.011

lb/acre treated (refer to footnotes in tables 49 and 50 for explanation of assumptions used).

All inhalation values are from table 49, column 5.

Additive total of tankfill values and application values.

Column 2 multiplied by absorption rate.

All dermal exposure values are from table 50, column 5.

Column 5 multiplied by absorption rate.

Additive total of columns 3 and 6.

Critical application calculated at 970 lbs/100 acres; ground application calculated at 400 lbs/100 acres.

Table XLIX

Applicator Exposure to Alachlor Through Inhalation

1	2	3	4	5	
Operation	Average Exposure Level (ug/M ³)	Range (ug/M ³)	Number of Samples	Time (in hours) for 100 acre application	Unit Inhalation Exposure (ug/kg bw/100 acres treated)
Tank Fill (airplane)	16.53	4.7-39.1	8	0.2	0.08
Application (pilot)	13.14	7.5-17.1	4	0.7	0.23
Application (flag-man)	130.50	96.5-160.9	4	0.4	1.31
Tank Fill (tractor)	6.00	1.9-20.4	8	1.1	0.19
Application/Ine. (inside cab)	1.30	1.1-1.40	4	5.7	0.19
Hopper Fill (planter)	64.85	1.4-193.0	8	1.3	2.11
Application (inside cab)	0.00	0.6-1.0	4	10.0	0.20

1 Inside tractor cab air concentration values were used for application/incorporation operations.
 2 A 60 kg female body weight is assumed; a 1.5 M³/hr breathing rate is assumed.
 3 Multiply the value in column 1 by column 4, then multiply by 1.5 M³/hr, and then divide by 60 kg.

Table L1

Applicator Exposure Through Inhalation

1	2	3	4	5	
Operation	Average Exposure Level (ug/M ³) ¹	Range (ug/M ³)	Number of Samples	Time (in hours) for 100 acre application	Unit Inhalation Exposure (ug/kg bw/100 acres treated) ^{2,3}
Tank Fill (airplane)	9,691	0,033-12,424	4	0.2	40.46
Application (pilot)	N.D.	N.D.	4	0.7	N.D.
Application (flag-man)	N.D.	N.D.	4	0.4	N.D.
Tank Fill (open pour)	6,408	4,651-9,177	4	1.1	117.48
Tank Fill (5 gal. probe)	N.D.	N.D.	4	1.1	N.D.
Tank Fill (55 gal. probe)	11,102	7,142-16,650	4	0.9	166.53
Application/Ine. (inside cab)	1,375	1,239-1,525	4	5.7	195.87

1 Inside tractor cab air concentration values were used for application/incorporation operations.
 2 A 60 kg female body weight is assumed; a 1.5 M³/hr breathing rate is assumed.
 3 Multiply the value in column 1 by column 4, then multiply by 1.5 M³/hr, and then divide by 60 kg.

Table III
Total Body Dose Estimates
Combined Inhalation & Dermal Exposure

Operation	1 Unit Inhalation Exposure ^{1,2}	2 Total Inhalation Exposure ^{1,3}	3 Total Daily Inhalation Exposure ^{1,4} 10% Absorption Assumed	4 Unit Dermal Exposure ^{1,5}	5 Total Dermal Exposure ^{1,5}	6 Total Daily Dermal Exposure ^{1,6} 10% Absorption Assumed	7 Total Body Dose Dermal & Inhalation (ug/kg bw/100 acres)	8 Total Body Dose Dermal & Inhalation (ug/kg bw/pound applied)
Tank Fill (5 gal. probe)	0.11			26.93				
Application/Inc. (inside cab)	0.19	0.30	0.30	21.00	49.93	4.99	5.29	0.013
Tank Fill (55 gal. probe)	0.21			55.83				
Application/Inc. (inside cab)	0.19	0.40	0.40	21.00	76.83	7.48	8.08	0.020

1. ug/kg bw/area treated (refer to footnotes in Tables 53 and 54 for explanation of assumptions used).
2. Unit inhalation values are from table 53, column 5.
3. Additive total of tankfill values and application values.
4. Column 2 multiplied by absorption rate.
5. Unit dermal exposure values are from table 54, column 5.
6. Column 5 multiplied by absorption rate.
7. Additive total of columns 3 and 6.
8. Application calculated at 477 lbs/100 acres.

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Table LIII

Applicator Exposure to Alachlor Through Inhalation

Operation	1 Average Exposure Level ($\mu\text{g}/\text{M}^3$)	2 Range ($\mu\text{g}/\text{M}^3$)	3 Number of Samples	4 Time (in hours) for 100 acre application	5 Unit Inhalation Exposure ($\mu\text{g}/\text{kg bw}/100$ acres treated) ^{1,2}
Tank Fill (5 gal. probe)	3.83	1.2-9.1	8	1.1	0.11
Tank Fill (55 gal. probe)	9.34	3.0-28.5	8	0.9	0.21

¹ A 60 kg female body weight is assumed; a 1.5 M³/hr breathing rate is assumed.
² Multiply the value in column 1 by column 4, then multiply by 1.5 M³/hr, and then divide by 60 kg.

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Table LIV

Applicator Exposure to Alachlor Via Dermal Deposition

Operation	1 Average Exposure Level ^{1,2,3,4}	2 Range ^{1,5}	3 Number of Samples	4 Time (in hours) for 100 acre application	5 Unit Dermal Exposure ($\mu\text{g}/\text{kg bw}/100$ acres treated) ^{6,7}
Tank Fill (5 gal. probe)	1,578	114-3,042	2	1.1	28.93
Tank Fill (55 gal. probe)	3,722	1,843-5,595	2	0.9	55.83

1. $\mu\text{g}/\text{exposed area}$.
2. The pads located on the forehead and back of neck and the gloves were considered representative of the exposed skin on the face, back of neck and "V" of the chest and hands.
3. It is assumed that a long-sleeved shirt is worn.
4. Exposed areas: face = 650 cm^2 ; back of neck = 110 cm^2 ; front of neck and "V" of chest = 150 cm^2 ; hands = 820 cm^2 . Based on W. J. Hayse, Toxicology of Pesticides and Durham and Wolfe, Bull. WHO 26, 75-91 (1962).
5. Range: lowest and highest values from forehead, back, chest pads and hand gloves, divided by exposure time (minutes), multiplied by 60 min/hr, multiplied by the appropriate surface areas listed in footnote 4.
6. A 60 kg body weight is assumed.
7. Multiply column 1 by column 4, then divide by 60 kg body weight.

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Tables from current submission.

EPA Accession No.: 252498

Table V

LASSO EC - GROUND - OPEN POUR

Reps are calculated separately then are averaged,
Lbs alachlor: Rep 1 = 80, Rep 2 = 108

I. DERMAL	Operation	Body Site	Deposition		Ala-chlor lbs ³	Deposition		Site Area cm ²	Deposition Total $\mu\text{g}/\text{lb AL}$	Body (70 kg) "Exposure" $\mu\text{g}/\text{kg bw}/\text{lb AL}$	Body Load 10% Absor $\mu\text{g}/\text{kg bw}/\text{lb}$	
			Rec %	$\mu\text{g}/\text{cm}^2$		$\mu\text{g}/\text{cm}^2/\text{lb AL}$	Avg					
	Mix/Load	Hands	68	1.545 0.427	2.27 0.628	80 108	0.0284 0.0058	0.0171	820	14.0	0.2000	0.0200
		Forehead	81	0.026 0.006	0.032 0.007	80 108	0.0004 0.0001	0.0003	650	0.19	0.0030	0.0003
		Back (Neck)	81	0.008 0.079	0.010 0.098	80 108	0.0001 0.0009	0.0005	110	0.06	0.0008	0.0001
		Chest (Vee)	81	4.958 1.415	6.127 1.747	80 108	0.0765 0.0162	0.0463	150	6.95	0.0993	0.0099
							DERMAL TOTALS			21.2	0.3031	0.0303
	Applic/Incorp	Hands	68	0.499 0.041	0.734 0.060	80 108	0.0092 0.0006	0.0049	820	4.02	0.0574	0.0057
		Forehead	81	0.011 0.011	0.014 0.014	80 108	0.0002 0.0001	0.0002	650	0.13	0.0014 0.0002	0.0002 0.0000
		Back (Neck)	81	<0.005 0.010	0.006 0.012	80 108	0.0000 0.0001	0.0001	110	0.013	0.0002	0.0000
		Chest (Vee)	81	0.273 0.019	0.337 0.023	80 108	0.0042 0.0002	0.0022	150	0.33	0.0047 0.0042 0.0062	0.0005 0.0064 0.0062
							DERMAL TOTALS			4.49		
												0.0365 ug/kg bw/lb AL
												DERMAL OVERALL TOTAL

03/20/64

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Table VI

LASSO EC - GROUND - OPEN POUR

Reps are calculated separately then averaged,
Lbs alachlor Rep 1 = 80; Rep 2 = 108

AD Slurry 2-28-84

Operation	Type Sample	Rep	Raw Data $\mu\text{g}/\text{m}^3$ per Rep	Rec'n %	Corr Conc'n $\mu\text{g}/\text{m}^3$	Avg $\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$ Avg/Rep	Exposure $\mu\text{g}/\text{m}^3/\text{Hr}$		Exposure, Total @ 100%	
								x Hr	x 1.5 m^3/Hr	Per 80 lb Ala	Per 108 lb Ala
Mix/Load	PUF	1	1.89	88	2.15	12.7	10.1	0.20	3.03	0.038	0.0005
			20.39		23.2						
	SiO ₂		6.67	94	7.09	7.53					
			7.50		7.98						
	PUF	2	2.33	88	2.65	2.79	4.87	0.28	2.05	0.019	0.0003
			2.57		2.92						
	SiO ₂		2.94	94	3.13	6.95					
			10.12		10.8						
Applic/ Incor	SiO ₂	1	1.19	94	1.27	1.24	1.24	1.15	2.14	0.027	0.0004
			1.13		1.20						
	SiO ₂	2	1.33	94	1.41	1.45	1.45	1.05	2.28	0.021	0.0003
			1.40		1.49						
										App'l Avg	0.0004
										Mix Load + Appl	0.0008

$\mu\text{g}/\text{kg bw}/\text{lb}$
alachlor

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Table VI Footnotes: References: R.D. No. 396, Special Report MSL-1983, Vol. 7, EPA Accession No. 70591.

¹ Raw data, for Mix/Load: Polyurethane Foam, PUF, Table XXXVI, p. 52

Silica Gel, SiO₂, Table XXXVI, p. 52

For Applic/Incorp, Silica Gel, SiO₂, Table XXXVII, p. 53 (PUF not used).

² Recovery %: PUF, Table VIII, p. 17; 88%

SiO₂, Table XIII, p. 22; 94%

³ Replicate descriptions, Rep. 1, p. 79-80 (20 gals Lasso EC, 80 lbs)

Rep 2, p. 80 (27 gals Lasso EC, 108 lbs).

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Table VII

LASSO EC - GROUND APPLICATION - COMBINED OPERATIONS

Operation	Body Load (70 kg)		Total
	µg/kg bw/lb Alachlor		
	Dermal ¹	Inhal. ²	
Mix/Load	0.0303	0.0004	0.0307
Applic/Incorp	0.0062	0.0004	0.0066
Combined Totals	0.0365	0.0008	0.0373

¹ Dermal absorption at 10%

² Lung absorption at 100%

From Table VII, the total body load exposure through the mix/load and application/incorporation operations is 0.0373⁵ µg/kg bw/lb alachlor applied. It is to be noted that of this total body load exposure only 2% or 0.0008 µg/kg bw/lb alachlor is by inhalation, attesting to the very low volatility of alachlor.

Using this body load exposure value a typical grower-applicator lifetime exposure can be calculated. The parameters for the calculation for this typical farmer using Lasso are listed below. It is to be noted that a farmer uses Lasso, a pre-emergent herbicide, only once each year. From Monsanto marketing information for 1981, the average or typical grower-applicator grows 130 acres of corn and 120 acres of soybeans, both treated with Lasso at an average rate of about 2 lbs/acre.

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Lasso usage, number of years	40 years
Lifetime	70 years
Area treated per year	250 acres
Average application rate	2.0 lbs alachlor/acre
Total body load dose per pound alachlor applied	0.037 $\mu\text{g}/\text{kg}$ bw/lb alachlor

$$\frac{0.037 \mu\text{g}/\text{kg bw}/\text{lb} \times 2.0 \text{ lb}/\text{acre} \times 250 \text{ acres} \times 40 \text{ years}}{70 \text{ years} \times 365 \text{ days}/\text{year}}$$

$$0.029 \mu\text{g}/\text{kg bw}/\text{day} =$$

$$2.9 \times 10^{-5} \text{ mg}/\text{kg bw}/\text{day}$$

The result at $2.9 \times 10^{-5} \text{ mg}/\text{kg bw}/\text{day}$ is incrementally higher than the $2.0 \times 10^{-5} \text{ mg}/\text{kg bw}/\text{day}$ value for a grower-applicator reported in 1982 (R.D. No. 396, Special Report MSL-1983, Vol. 1 (of 9), Section I, Part 3, pp. 15-16). Factors contributing to the difference in value are (1) the aforementioned correction for recoveries from field-spiked sampling devices; (2) the shift to a 70 kg body weight from a 60 kg body weight; and (3) an increase of years for using alachlor to 40 from 30. As mentioned, the last two factors represent values used by the Agency in recent risk assessment notices for several other pesticides. The $2.9 \times 10^{-5} \text{ mg}/\text{kg bw}/\text{day}$ value is used for exposure risk assessment calculations.

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Canadian Calculation.

CANADIAN CALCULATION

TABLE 3 Total Dermal Exposure Field Application (EC)

patch represent- ing area	body area (cm ²)	corrected (1) patch values (ug/cm ² /lb handled) (2)	regional exposure (3) (ug/body area/lb handled) (2 applicators 1 trial)
cotton gloves rubber gloves	820	1.7×10^{-2} 4.64×10^{-1}	13.9 (380.6)*
forehead	650	2.33×10^{-4}	0.15
back (over)	110	5.2×10^{-4}	0.057
chest (over)	150	6.7×10^{-2}	7.05
lower arm (over)	1286	8.6×10^{-4}	1.1
upper arm (under)	5240	6.68×10^{-5}	0.42
upper leg (under)	6028	1.11×10^{-4}	0.67
			23.3
			4.0
			0.094
			0.01
			0.331
			0.20
			1.24
			2.9
			8.78

The total body exposure for each pound of pesticide mixed and sprayed is 32.1 ug

32.1 ug/lb used x 60 lb/day mixed = 1926 ug/day

or

= 274 ug/kg b.w./day for applicator wearing rubber gloves during mixing

(32.1 ug/lb used + 380.6 ug/lb used x 600 lb/day) = 2751.33 ug/kg b.w./day for an applicator not wearing rubber gloves during mixing

- 1) Original analytical results corrected for field recovery
- 2) Patch values for each applicator normalized with respect to the number of pounds sprayed, then results of two trials averaged.
- 3) Corrected patch values x body area = regional contact exposure
- 4) Total dermal contact exposure during mixing and spraying
- 5) Residue on rubber gloves presenting "unprotected hands"