114402
Shaughnessy No.

Date out of EAB: 21 JUL 1983

To: Mountfort
Product Manager # 23
Registration Division (TS-767)

FILE COPY

From: Richard V. Moraski, Head (acting) R. Moraski
Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769c)

Attached please find the EAB review of...

Reg./File No.: 359 TNI

Chemical: Acifluorfen

Type Product: H

Product Name: Tackle

Company Name: Rhone Poulenc

Submission Purpose: exposure analysis

ZBB Code: 3(c)(5)

ACTION CODE: 166

Date In: 5/23/83

EFB # 3379

Date Completed: 7/19/83

TAIS (level II) Days

67 4

Deferrals To:

_____ Ecological Effects Branch

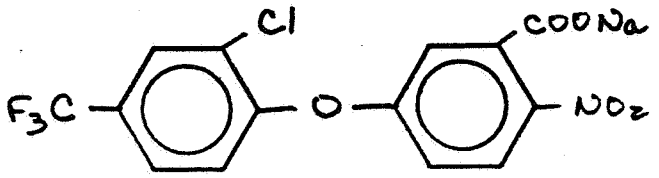
_____ Residue Chemistry Branch

X Toxicology Branch

1.0 INTRODUCTION

Rhone-Poulenc has submitted an exposure analysis for tackle, a herbicide. RD has requested that an exposure assessment be generated for this pesticide.

2.0 Tackle: acifluorfen, sodium salt
sodium 5-(2-chloro-4-(trifluoromethyl)phenoxy)-2-nitrobenzoate



3.0 EXPOSURE ASSESSMENT

From the exposure analyses presented by the registrant, the dermal deposition and inhalation exposure of the pesticide can be calculated. Since the registrant did not provide actual field monitoring data (studies not required) the exposure assessment will be calculated using existing data from comparable exposure situations.

The exposure estimates generated in this way will be referred to Toxicology Branch where risk analyses will be completed. This exposure assessment does not consider absorption of the pesticide through the skin. Assignment of dermal penetration values is left to Toxicology Branch.

3.1 Exposure Data

Tackle is the 21.1% sodium salt of acifluorfen formulated as a water soluble concentrate that contains 2 lb ai/gal. It is used for weed control in soybeans and is applied either by ground or aerial equipment at a rate of 0.38 to 0.75 lb ai/acre.

Tackle is applied between May and June and only one application is recommended. A worker using ground equipment could treat 40 acres in one hour according to the registrant. Aerially up to 200 acres/hr could be treated.

3.2 Ground Application

The registrant estimates that up to 1.5 hr could be spent mixing/loading, 1 hr calibrating and cleaning the equipment, and 4 hr applying the pesticide. If self-applied, only one worker is involved. If custom applied, two workers are needed,

one for mixing/loading and calibrating and the other for the actual application. The average size of a treated unit is 150 acres. The label recommends the use of goggles or a face shield when handling. No other additional protective clothing recommendations are made although it is assumed that long-sleeved shirts and long-legged pants are worn. The calculations are based on the assumption that the hands are the only body area exposed.

3.2.1 Assumption and Calculation

Dubelman, et al (1982) recently measured applicator exposure to diallate, a herbicide, which was applied using ground boom equipment. Diallate, a 4 lb ai/gal formulation, was applied at a rate of 1.25 lb ai/acre.

Table I gives the exposure values as determined for a 60 kg person treating a 20 acre plot with diallate.

In order to calculate the exposure of workers to tackle, some of the assumptions reported by the registrant in the exposure analysis are changed. The registrant's estimate of 40 acres/hr treated using ground equipment seems to be an over-estimation. A more realistic figure is 20 acres/hr using a 20 ft boom and a tractor speed of 5-10 mph. If the average size soybean farm is 150 acres, then it is possible to treat the total acreage in one day. However, a farmer applying tackle himself may need two days to spray the entire field. The time required to mix and load both the surrogate and tackle should be the same per load.

In addition, it is assumed that a custom applicator may apply tackle for up to 10 days on a number of farms in his locality. Two workers will now be exposed, the mixer/loader and the applicator.

For this assessment, the Dubelman exposure figures are multiplied by 60/70 to reflect the change in body weight and divided by two to reflect the difference in ai concentrations in formulated products and average application rates.

Table II gives the exposure values calculated for a 70 kg person treating a 20 acre plot with tackle (one tank fill). If eight tank fills are needed to treat 150 acres over the course of two days by an individual farmer, it is assumed half is treated each day. A custom applicator could treat 150 acres in one day. The daily exposures for both applicator types are given in Table III.

The farmer who applies tackle to his own field would need two days to spray the entire 150 acres. Since tackle is only applied once per season, his exposure for these two days is his annual exposure. The custom applicator may treat up to 150 acres per day for 10 days during May and June. His annual exposure is expected to be much greater than the individual farmers. The annual exposure figures are given in Table IV.

The potential average daily exposure to tackle over the course of a 40 year working lifetime in a 70 year lifespan is presented in Table V for both the individual farmer and custom applicator.

3.3 Aerial Applicator - Assumptions

The following assumptions are made for individuals engaged in the aerial application of tackle.

a) the pilot is not involved in mixing/loading or maintenance operation.

b) the mixer/loader wears goggles or a face shield, long sleeved shirt, and long legged pants.

c) up to 200 acres per hour can be treated for about 4 hours/day.

d) a pilot may spend up to 30 hours (7.5 days) per year spraying tackle.

e) for pilots the exposure is related to pesticide application rate.

3.3.1 Calculations

For mixer/loaders, the potential exposure when filling a hopper on an aircraft will be essentially the same as for ground operations for each tank fill. It is also assumed that mixer/loaders will be handling tackle for about an hour each day as was the situation with ground applicators.

For pilots, the study of Peoples et al (1981) provides exposure data for DEF during aerial application. Table VI summarizes the exposure data presented. Using this data, the potential exposure of individuals to tackle during aerial application is given in table VII. These values were obtained by multiplying the surrogate value by the ratio 0.6 lb tackle/A (average)/1.32 lb DEF/acre to account for application rate differences and by 60/70 to reflect body weight differences.

If the pilot spends 4 hr/day spraying tackle and up to 30 hours/year, the annual exposure may be obtained by multiplying the daily exposure by 7.5 days. For the Lifetime Daily Exposure, it is again assumed that a worker spends 40 years during a 70 year lifespan applying tackle.

4.0 RECOMMENDATIONS

1. EAB defers to Tox Branch, the results of the exposure assessment so that the risk assessment can be completed. Dermal absorption values are left to Tox Branch to determine as well.

2. EAB notes that the use of impermeable gloves could reduce the dermal exposure by 80-90%.

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Table I. Diallate Exposure Values in ug/kg (Dubelman et al, 1982)

field operation	average exposure time (min)	inhalation exposure	dermal exposure
tank fill and mix	2.8	0.006	973
boom spray application	42.6	0.106	1.5

Table II. Calculated Exposure Values to Tackle for One Tank Fill in ug/kg

field operation	inhalation exposure	dermal exposure	total
tank fill and mix (5 min)	0.003	417	417
boom spray application (1 hr)	0.045	0.643	0.69
combined	0.048	417	418

Table III. Daily Exposure in ug/kg/day

field operation	inhalation exposure	dermal exposure	total
	self-application		
tank fill and mix	0.012	1668	1668
boom spray application	0.18	2.57	2.75
combined	0.192	1671	1671
	custom application		
tank fill and mix	0.024	3336	3336
boom spray application	0.36	5.14	5.5

Table IV. Annual Exposure in ug/kg/yr

field operation	inhalation exposure	dermal exposure	total
	self-application		
tank fill and mix	0.024	3336	3336
boom spray operation	0.36	5.14	5.5
combined	0.38	3341	3341
	custom applicator		
tank field and mix	0.24	33360	33360
boom spray application	3.6	51.4	55

Table V. Lifetime Daily Average Exposure in ug/kg/day

field operation	inhalation exposure	dermal exposure	total
	self-application		
tank fill and mix	0.00004	5.2	5.2
boom spray application	0.0006	0.008	0.0086
combined	0.00064	5.2	5.2
	custom applicator		
tank fill and mix	0.0004	52	52
boom spray application	0.006	0.08	0.086

Table VI. Pilot Exposure to DEF from Peoples et al (1981) in mg/kg/hr

surrogate study	application rate (lb ai/A)	inhalation exposure	dermal exposure
DEF	1.32	7×10^{-4}	2×10^{-2}

Table VII. Exposure to Tackle during Aerial Application

field operation	inhalation exposure	dermal exposure	total
	Daily Exposure (ug/kg/day)		
mixer/loader	0.012	1668	1668
pilot	1.1	31	33
	Annual Exposure (ug/kg/yr)		
mixer/loader	0.09	12510	12510
pilot	8.3	232	240.3
	Lifetime Daily Exposure (ug/kg/day)		
mixer/loader	0.00014	20	20
pilot	0.013	0.36	0.38

References

1. Dubelman, S., et. al. 1982. "Operator Exposure Measurements During Application of the Herbicide Diallate." J. Agric. Food Chem. 30:528-532.

2. Peoples, S.A., et. al., 1979. "Monitoring of Potential Exposure of Mixer-Loaders, Pilots, and Flaggers During Application of Tributyl Phosphorotrithioate (DEF) and Tributyl Phosphorotrithioate (Folex) to Cotton Fields in the San Joaquin Valley of California in 1979" (unpublished).