To: H. Jacoby
            Product Manager #21
            Registration Division (TS-767)

From: Joseph C. Reinert, Ph.D., Chief
            Special Review Section
            Exposure Assessment Branch
            Hazard Evaluation Division (TS-769C)

Attached please find the EAB review of...

Reg./File No.: ___359-706___

Chemical: ___Fosetyl-Al___

Type Product: ___Fungicide___

Product Name: ___Aliette®___

Company Name: ___Rhone-Poulenc___

Submission Purpose: ___Worker Exposure Assessment for Use on Turf___

ZBB Code: _____

Date In: ___07/02/85___

Date Completed: ___9/04/85___

ACTION CODE: ___315___

EAB # ___5740___

TAIS (level II)   Days

                     4

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

_____ Benefits and Use Division

30

1.0 INTRODUCTION

Rhone-Poulenc has requested the registration of their fungicide Aliette® for use on turf. Aliette® is a wettable powder containing 80 percent aluminum tris-O-ethyl phosphonate as the active ingredient and is currently registered for use on pineapples and ornamentals. Aliette is to be applied to turf using ground boom or hydraulic handgun attached to a tractor drawn spray tank. Aliette is packaged in 2 pound boxes lined with a moisture proof barrier. Application rates are 4 ounces of formulation per acre (low rate) and 8 ounces per acre (high rate). The frequencies for application are 6 and 4 treatments per season (June through August) for low and high rates, respectively.

The label requires both mixer/loaders and applicators to wear long pants, long sleeve shirt, and water resistant gloves. The registrant estimates that a pair of workers would take 30 hours to spray an average sod farm of 150 acres and 6 hours to spray 9 acres of tees and greens on a golf course. BUD estimates that an average sod farm is 80 acres and that the fairway area of an average golf course is 30 acres. BUD further estimates that about 5 acres per hour can be treated (1). The acreage and time estimates provided by BUD will be used for this assessment.

EAB has recently conducted an exposure assessment for Aliette on turf in response to a request for an experimental use permit (2). Exposures for applicators were estimated to be 1.2×10^3 ug/kg/hr and 3.5 ug/kg/hr for dermal and respiratory routes, respectively. These estimates were based on an application rate of 4.8 oz ai/1000 ft^2. The dermal exposure of mixer/loaders was calculated to be 5.3 ug/kg/oz ai handled. The above exposure estimates take the use of protective clothing into account. In order to adjust these values for protective clothing the reviewer assumed that a long sleeve shirt and long trousers reduced the exposure of the areas covered by 50 percent and that impervious gloves provide 90 percent protection. One of the surrogate studies used in the previous review determined the hand exposure to account for 86 and 70 percent of the total dermal exposure for mixer/loaders and applicators, respectively.(3)

2.0 CALCULATION OF EXPOSURES

2.1 Adjustment of exposures for protective clothing

In order to adjust the dermal exposure values for protective clothing the degree of protection provided by each type of garment must be used. The general equation for this is:

$$\text{Adjusted exposure} = \text{exposure of body region} \times \text{degree of protection provided by clothing}$$

For example, the exposure of the hands of a mixer/loader would be:

$$\text{Adjusted exposure of hand (ug/kg/oz)} = [5.3 \text{ ug/kg/oz} \times 0.86] \times 0.1 = 0.46 \text{ ug/kg/oz.}$$

The exposure of the rest of the body would be:

$$\text{Adjusted exposure of body (ug/kg/oz)} = \text{Total unadjusted exposure (ug/kg/oz)} - \text{Unadjusted hand exposure} \times 0.50$$

$$= [5.3 - (5.3 \times 0.86)] \times 0.50$$

$$= 0.37 \text{ ug/kg/oz ai handled}$$

The total dermal exposure of a mixer/loader, adjusted for protective clothing is 0.83 ug/kg/oz ai handled. For applicators the exposures would be:

$$\text{Adjusted exposure of hand (ug/kg/hr)} = 1.2 \times 10^3 \text{ ug/kg/hr} \times 0.70 \times 0.1$$

$$= 84 \text{ ug/kg/hr}$$

$$\text{Adjusted exposure of body (ug/kg/hr)} = [1.2 \times 10^3 \text{ ug/kg/hr} - (1.2 \times 10^3 \times 0.70)] \times 0.50$$

$$= 1.8 \times 10^2 \text{ ug/kg/hr}$$

The total dermal exposure, adjusted for protective clothing, is 2.6×10^2 ug/kg/hr.

2.2 Adjustment of applicator exposures for application rate.

The applicator exposure values must also be adjusted for the actual application rates used. The above estimates were based on an application rate of 4.8 oz ai/1000 ft^2. The proposed application rates are 4 oz and 8 oz of formulation per 1000 ft^2. These are equal to 3.2 and 6.4 oz ai per 1000 ft^2, respectively. To adjust for the differences in application rate, the following equation is used:

$$\text{Adjusted exposure (ug/kg/hr)} = \text{estimated exposure (ug/kg/hr)} \times \frac{\text{actual applic. rate (oz ai/1000 ft}^2)}{4.8 \text{ oz ai/1000 ft}^2}$$

32

The applicator exposures, after adjustment for both protective clothing and application rate, are presented in Table 1.

Table 1. Exposure of applicators to Aliette.

| Application rates (oz/1000 ft^2) | | Exposure (ug/kg/hr) | |
Formulation	Active ingredient	Dermal	Respiratory
4	3.2	8.0×10^2	2.3
8	6.4	1.6×10^3	4.7

2.3 Calculation of annual exposures

The annual exposure of mixer/loaders can be calculated from the total amount of material handled per year:

$$\text{Annual exposure (ug/kg/yr)} = \text{exposure (ug/kg/oz)} \times \frac{\text{oz ai}}{1000 \text{ ft}^2} \times \frac{43560 \text{ ft}^2}{\text{acre}} \times \frac{\text{acres}}{\text{treatment}} \times \frac{\text{treatments}}{\text{year}}$$

The annual exposure estimates of mixer/loaders and applicators to Aliette are summarized in Table 2.

Table 2. Annual exposure of mixer/loaders to Aliette.

Type of turf	Application rate of formulation (oz/1000 ft^2)	Acres per treatment	Treatments per year	Dermal Exposure (ug/kg/yr)
Sod farm	4	80	6	5.6×10^4
Sod farm	8	80	4	7.4×10^4
Golf course	4	30	6	2.1×10^4
Golf course	8	30	4	2.8×10^4

The annual exposures of applicators were calculated on the basis of time spent applying Aliette:

$$\text{Annual exposure (ug/kg/hr)} = \text{exposure (ug/kg/hr)} \times \frac{0.2 \text{ hr}}{\text{acre}} \times \frac{\text{acres}}{\text{treatment}} \times \frac{\text{treatments}}{\text{year}}$$

33

Table 3. Annual exposure of workers applying Aliette to turf.

Type of turf	Application rate of formulation (oz/1000 ft^2)	Acres per treatment	Treatments per year	Exposure (ug/kg/yr)	
				Dermal	Respiratory
Sod farm	4	80	6	5.1×10^4	2.2×10^2
Sod farm	8	80	4	1.0×10^5	3.0×10^2
Golf course	4	30	6	2.9×10^4	8.3×10^1
Golf course	8	30	4	3.8×10^4	1.1×10^2

David Jaquith
Special Review Section
Exposure Assessment Branch
Hazard Evaluation Division

B4

REFERENCES

(1) Memo from E. Pelletier (BUD) to J. Reinert (EAB) titled "Use Exposure Report for Proposed Applications of Aliette to Turf Grasses", dated 6/3/85.

(2) Memo from J. Reinert (EAB) to H. Jacoby (RD) titled "Worker Exposure Assessment to Support EUP", dated 6/20/85.

(3) British Agrochemicals Association Limited (1984) Spray Operator Safety Study. British Agrochemicals Association Limited, London.

35