Shaughnessy #: 109301

EAB Log-Out Date: 5 June 1987

To: George LaRocca
Product Manager #15
Registration Division (TS-767C)

From: Michael P. Firestone, PhD, Acting Chief
Special Review Section
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C)

Attached, please find the EAB review of...

Reg./File No.: 20954-11

Chemical: Fenvalerate

Type Product: Termiticide

Product Name:

Company Name: Velsicol Chemical Corporation

Submission Purpose: Conditional Registration of Fenvalerate as a Termiticide

ACTION CODE: 350

Date In: EAB #: 70016

Date Completed: 5 June 87 TAIS Code:

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

XX Toxicology Branch

_____ Benefits and Use Division

Monitoring study requested by EAB: /___/

Monitoring study voluntarily conducted by registrant: /___/

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Inhalation Exposure for Fenvalerate

THRU: Michael P. Firestone, PhD, Acting Chief
Special Review Section
Exposure Assessment Branch
Hazard Evaluation Division (TS-769C)

M. P. Firestone

TO: George LaRocca, PM #15
Registration Division (TS-767C)

Velsicol Chemical Corporation has submitted a proposal for a conditional registration of fenvalerate as a termiticide. Included in this proposal package is a protocol for an exposure assessment study for inhabitants of treated homes as well as for applicators of fenvalerate. In order to expedite the process of exposure assessment and perhaps eliminate the need for such a long and expensive study, EAB has calculated a theoretical maximum exposure based on the vapor pressure for fenvalerate found in the Farm Chemicals Handbook (1987). EAB will retain the Velsicol proposal for future review of the protocol pending Toxicology Branch's conclusions on the risks involved for homeowners via the respiratory route.

EAB has calculated a worst-case exposure scenario for fenvalerate via the inhalation route. This theoretical calculation is based on the following assumptions: 100% saturation of the fenvalerate in the air; a total of 15 hours spent in the home, 5 hours at light work and 10 hours at rest; and a 60 kg individual which accounts for the presence of women and children in the home. The respiratory rates used are those given in Subdivision U of the Pesticide Assessment Guidelines. The calculations are listed below.

GIVEN:

Vapor Pressure	1.1×10^{-8} mm Hg @ $25^{\circ}C$
Absolute Temperature	$25^{\circ}C + 273.15 = 298.15$ K
Universal Gas Constant	0.08206 L·atm/mol·K
Formula Weight of Fenvalerate	419.9 g/mol

IDEAL GAS LAW: $pV = nRT$ where p = pressure
V = volume
n = number of moles
R = universal gas constant
T = absolute temperature

Assuming a volume of 1 L:

$$pV = nRT$$

$$n = \frac{pV}{RT}$$

$$n = \frac{[(1.1 \times 10^{-8} \text{ mm Hg}) \times (1 \text{ atm}/760 \text{ mm Hg})] \times (1 \text{ L})}{(0.08206 \text{ L·atm/mol·K}) \times (298.15 \text{ K})}$$

$$n = \frac{1.45 \times 10^{-11} \text{ atm·L}}{24.5 \text{ L·atm/mol}}$$

$$n = 5.9 \times 10^{-13} \text{ mol fenvalerate/L}$$

Assuming a 15 hr day, 5 hr at light work (29 L/min) and 10 hr at rest (7.4 L/min):

$$29 \text{ L/min} \times 60 \text{ min/hr} \times 5 \text{ hr/day} = 8700 \text{ L}$$
$$7.4 \text{ L/min} \times 60 \text{ min/hr} \times 10 \text{ hr/day} = 4440 \text{ L}$$
$$13140 \text{ L inhaled/day}$$

moles inhaled/day:

$$5.9 \times 10^{-13} \text{ mol/L} \times 13140 \text{ L/day} = 7.8 \times 10^{-9} \text{ mol/day}$$

ug/day:

$$(419.9 \text{ g/mol}) \times (1 \times 10^{6} \text{ ug/g}) = 4.199 \times 10^{8} \text{ ug/mol}$$

$$(4.199 \times 10^{8} \text{ ug/mol}) \times (7.8 \times 10^{-9} \text{ mol/day}) = 3.3 \text{ ug/day}$$

ug/kg/day:

$$\frac{3.3 \text{ ug/day}}{60 \text{ kg individual}} = 5.5 \times 10^{-2} \text{ ug/kg/day}$$

mg/kg/day:

$$(5.5 \times 10^{-2} \text{ ug/kg/day}) \times (1 \times 10^{-3} \text{ mg/ug}) = 5.5 \times 10^{-5} \text{ mg/kg/day}$$

The ADI for fenvalerate of 2.5×10^{-2} mg/kg is based on a 13-week rat study in which a NOEL of 2.5 mg/kg was determined. The estimated exposure, based on ideal gas considerations, is only about 0.2% of the ADI ($[5.5 \times 10^{-5}$ mg/kg/day$]/[2.5 \times 10^{-2}$ mg/kg$] \times 100$). Thus, EAB questions the need for an ambient air monitoring study and defers to Toxicology Branch the actual need.

It should be noted that the utility of this theoretical approach will vary from compound to compound. The more toxic chemicals, such as organophosphates, will likely yield unacceptable risks when saturation of the indoor air is assumed.

It must be emphasized that this is a worst-possible-case scenario and that indoor air is not likely to approach saturation with the material. This theoretical exposure assessment should allow Toxicology Branch to estimate risks from this compound. If the risks are acceptable, EAB sees no reason to request an exposure monitoring study for fenvalerate applied as a termiticide.

Karen E. Warkentien
Special Review Section
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