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

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

Date: JANUARY 16, 2002

Subject: Occupational and Residential Risk Assessment to Support Request for New Uses of Clethodim on Dry Beans, Peanuts, Leafy Brassica and Turnip Greens

DP Barcode:	PC Code:	Trade Name:	EPA Reg#	MRID#	PRAT Case	Class	Caswell#	40 CFR
D278451, D274676	121011	Prism®	59639-2	N/A	294490, 280481	Herbicide	None	180.458

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This memorandum contains an occupational and residential exposure assessment based on the use of clethodim on dry beans, peanuts, Brassica and turnip greens in addition to currently registered use sites. Previously, an occupational and residential exposure assessment was performed for clethodim when uses were proposed on potatoes, sugar beets, sunflower, canola, cucumbers, bell peppers and non-bell peppers (04/10/2000, Attachment 1). Risk calculations in the previous exposure assessment are still valid and the attached memo should be used as a guide alongside this memo. This memo has been peer reviewed by Jack Arthur of RAB3, Tim Dole and Jeff Dawson (RRB1).

125

1.0 Executive Summary

Clethodim (Select®) is a cyclohexenone herbicide used for control of annual and perennial grass weeds in broad leaf crops. Other chemicals with similar molecular structure include sethoxydim, tralkoxydim and cycloxydim.

The established tolerances for clethodim are published in 40 CFR 180.458. The current petition (PP#1E6351) is for Prism®, an emulsifiable concentrate formulation containing 12.6% active ingredient (ai) per gallon (EPA Registration Number 59639-78). Select® is an alternative name for Prism® and all label language and, according to Registration Division, use direction are the same for these products.

Use Pattern

Clethodim products are currently registered for a variety of use sites including agricultural crops and non-crop areas. The labels for two clethodim products, Select® (12 % active ingredient or ai, EPA Reg. No. 59639-78) and Select 2 EC (26 % ai, EPA Reg. No. 59639-3) permit application to commercial and residential sites and on other non-crop or non-planted areas including rights of way such as railroads, highways, roads, dividers, medians, pipelines, public utility lines, pumping stations, transformer stations and substations, around airports, electric utilities, commercial buildings, manufacturing plants, storage yards, rail yards, fence lines, parkways, ornamental gardens, walkways, patios, greenhouse benches, along driveways and around golf courses.

Based on clethodim labels, Select® and Select® 2EC are both available for weed control use in residential and/or public areas. However, the registrant has indicated that the product is not intended for use by homeowners (personal communication with D. Kenny, Registration Division, 11/28/00), making application by pesticide control officers (PCOs) the only avenue by which residents may be exposed. However, application by homeowners is not prohibited on clethodim labels despite the recommendation for such language in HED's previous exposure assessment (04/10/2000). Therefore, a residential handler assessment was performed. In the residential handler assessment, risk estimates were below HED's level of concern for all individuals.

Exposure Scenarios

Following treatment by professional applicators, the public could possibly come into contact with clethodim residues in areas around shrubbery and flowers, and in areas such as patios, walkways, along driveways and around golf courses and fence lines. However, weed control with clethodim in these areas generally consists of a spot treatment, resulting in a very small treated area, and it is unlikely that adults and children would be exposed to these treated areas. Therefore, a non-occupational postapplication exposure assessment was not performed.

There is a potential for occupational exposure to clethodim during mixing, loading, application, and postapplication activities. Select® products are proposed for use by ground or

120

aerial equipment. For occupational handlers and those involved in postapplication activities such as scouting, irrigation and hand harvesting (possible but not likely), short-term or intermediate-term exposures may occur. Chronic exposures are not expected based on the use pattern.

Calculating Risk

No chemical-specific exposure data for handlers or postapplication activities were submitted to support the registration of clethodim on the proposed new uses or for previous uses. In accordance with HED policy, occupational handler exposures were estimated using the Pesticide Handlers Exposure Database (PHED) Surrogate Exposure Guide (revised August, 1998).

Short- and intermediate-term risks were calculated. Long-term exposure is not expected based on the use pattern. Standard values established by the HED Science Advisory Council for Exposure were used for acres treated per day by occupational applicators. Endpoints were selected for risk assessment as recommended in the HIARC Report. MOE's were calculated for both dermal and inhalation short-term and intermediate-term exposure. Exposures for dermal and inhalation were summed and compared to the NOAEL of 100 since the same NOAEL was chosen for dermal and inhalation risk assessment. The oral NOAEL of 100 mg/kg/day from the developmental rat study was used to estimate short-term dermal and inhalation risks. For short-term exposure assessment, a body weight of 60 kg was used to represent females because the short-term endpoint is based on maternal effects. The oral NOAEL of 25 mg/kg/day from the subchronic toxicity in dogs was used to estimate intermediate-term dermal and inhalation risks.

A body weight of 70 kg, representing males and females, was used for the intermediate-term assessment. The level of personal protective equipment worn by handlers is based on the minimal level needed to achieve the targeted MOE of 100 for the endpoint of the active ingredient. A dermal absorption rate of 30% was used to estimate the absorbed dermal dose. The dermal absorption rate is based on a dermal absorption study conducted in rats.

MOE's were calculated for both dermal and inhalation short-term and intermediate-term exposure.

Results and Recommendations

Short-and intermediate-term dermal MOEs for occupational handlers were greater than the target of 100. Short- and intermediate-term postapplication MOEs were greater than 100 on the day of treatment, and do not exceed HED's level of concern. Based on the use pattern, long-term or chronic exposure is not expected.

Draft copies of Prism®, Select® and Select® 2EC labels have a 24-hour restricted entry interval (REI). The 24-hour REI does not comply with the Worker Protection Standard (WPS): as shown in Table 1, clethodim is categorized in Category I for primary dermal irritation. Based on WPS, the appropriate REI that should be stated on the labels is **48 hours**. Registration

127

Division must ensure that the correct REI appears on the label.

2.0 Hazard Profile

Table 1. Acute Toxicity of Clethodim Technical

Study Type	MRID	Dose	Results	Tox Catagory
Acute Oral (Rat)	409745-07	0.25 g/kg tech. 83.3% ai	LD50: ♂: 1.63 g/kg ♀: 1.36 g/kg	III
Acute Oral (Mice)	409745-08	0.35 g/kg tech 83.3% ai	LD50: ♂: 2.57 g/kg ♀; 2.43 g/kg	III
Acute Dermal (Rabbit)	409745-10	2 & 5 g/kg tech 83.3% ai	LD50 > 5.0 g/kg for ♂ and ♀	IV
Acute Inhalation (Rat)	409745-12	3.9 mg/l, MMAD= 2.8 um	LC50: . 3.9 mg/L	III
Primary Eye Irritation (Rabbit)	409745-14	0.1 ml tech 83.3% ai	mild ocular irritation	III
Primary Dermal Irritation (Rabbit)	409745-16	0.5 ml tech 83.2% ai	severe erythema observed at 72 hours	I*
Dermal Sensitization (Guinea Pig)	409745-18	0.5 & 5% induction; 0.5% challenge	not a sensitizer	

* In the rat 21-day dermal toxicity study (conducted at doses of 0, 10, 100 or 1,000 mg/kg/day), the LOAEL for skin irritation was 10 mg/kg/day and no NOAEL for dermal irritation was established. Thus, the TESC recommended that for occupational or residential exposure concerns, the chemical should be placed in Tox Catagory 1 (Toxicology Endpoint Selection Document, February 6, 1996).

Clethodim falls into acute toxicity Category I for primary dermal irritation and categories III and IV for all other types of acute toxicity.

The Hazard Identification Assessment Review Committee (HIARC) met to evaluate the toxicology data base for clethodim on October 16, 1997 (Attachment 1). The HIARC identified endpoints for short-, intermediate- and long-term risk assessment for dermal and inhalation routes of exposure. The short-term dermal and inhalation endpoint was chosen based on the results of an oral developmental rat study in which reductions in fetal body weight and an increase in the incidence of skeletal anomalies were observed. The intermediate-term dermal and inhalation endpoint was based on the results of an oral subchronic toxicity study in dogs in which increased absolute and relative liver weights were observed. The long-term dermal and inhalation endpoint was based on the results of a chronic toxicity study in dogs in which alterations in hematology and chemistry parameters were observed. Based on proposed and existing use patterns, long-term dermal or inhalation exposure is not expected and a long-term

128

risk assessment was not conducted. The doses and toxicological endpoints selected for various scenarios are summarized below.

Table 2. Summary of Dermal and Inhalation Toxicological Endpoints

Exposure Scenario	Dose Used in Risk Assessment, UF	FQPA SF* and Level of Concern (LOC) for Risk Assessment	Study and Toxicological Effects
Short-Term Dermal (1 to 7 days) (Residential)	Oral study Maternal NOAEL= 100 mg/kg/day (dermal absorption rate = 30%)	LOC for MOE = 100 (Residential)	Developmental Toxicity-Rat. LOAEL = 350 mg/kg/day based on reductions in fetal body weight and an increase the incidence of skeletal anomalies.
Intermediate-Term Dermal (1 week to several months) (Residential)	Oral study NOAEL= 25 mg/kg/day (dermal absorption rate = 30%)	LOC for MOE = 100 (Residential)	Subchronic Toxicity-Dog (90 days). LOAEL = 75 mg/kg/day based on increased absolute and relative liver weights.
Long-Term Dermal (several months to lifetime) (Residential)	Oral study NOAEL= 1.0 mg/kg/day (dermal absorption rate = 30%)	LOC for MOE =100 (Residential)	Chronic Toxicity-Dog (1 year). LOAEL = 75 mg/kg/day based on alterations in hematology and clinical chemistry parameters as well as increases in absolute and relative liver weights.
Short-Term Inhalation (1 to 7 days) (Residential)	Oral study Maternal NOAEL= 100 mg/kg/day (inhalation absorption rate = 100%)	LOC for MOE =100 (Residential)	Developmental-Rat LOAEL = 350 mg/kg/day based on reductions in fetal body weight and an increase the incidence of skeletal anomalies.
Intermediate-Term Inhalation (1 week to several months) (Residential)	Oral study NOAEL = 25 mg/kg/day (inhalation absorption rate = 100%)	LOC for MOE = 100 (Residential)	Subchronic Toxicity-Dog (90 days). LOAEL = 75 mg/kg/day based on increased absolute and relative liver weights.
Long-Term Inhalation (several months to lifetime) (Residential)	Oral study NOAEL= 1.0 mg/kg/day (dermal absorption rate = 30%)	LOC for MOE =100 (Residential)	Chronic Toxicity-Dog (1 year). LOAEL = 75 mg/kg/day based on alterations in hematology and clinical chemistry parameters as well as increases in absolute and relative liver weights.
Cancer (oral, dermal, inhalation)	N/A	N/A	Clethodim is classified as a "Not Likely" carcinogen

[1]A dermal absorption factor of 30% is used for these risk assessments, based on the results of a dermal absorption study (MRID 41030202).

The Food Quality Protection Act (FQPA) Safety Factor Committee evaluated the hazard and exposure data for clethodim on July 31, 2000. The Committee concluded that the FQPA safety factor could be removed (1x) for the purposes of risk assessment (Attachment 2). The rationale for removing the FQPA safety factor include:

- There is no indication of quantitative or qualitative increased susceptibility of rats or rabbits to *in utero* and/or postnatal exposures;
- A developmental neurotoxcity study is not required; and
- The dietary (food and drinking water) and non-dietary (residential) exposure assessments will not underestimate the potential exposures for infants and children.

3.0 Use Profile

The established tolerances for clethodim are published in 40 CFR 180.458. The current petition (PP#1E6351) is for Prism®, an emulsifiable concentrate formulation containing 12.6% active ingredient (ai) per gallon (EPA Registration Number 59639-78). Select® is an alternative name for Prism® and all label language and use direction are the same. Use patterns for all currently registered and proposed uses are presented in Table 3.

Table 3. Proposed and Existing Use Patterns for Clethodim

Formulation Type (Name, Reg. #)	Crops	Weeds controlled (Maximum Rate for Single Application)	Max. Rate per Season (lb ai/ acre/season)	Interval Between Applications (days)	Pre-Harvest Interval (days)
Emulsifiable Concentrate (Select® or Prism®, 59639-78 and Select® 2EC, 59639-3)	Cotton	Annual and perennial grasses (0.25 lb ai/acre except cucumbers and peppers; cucumbers and peppers: 0.12 lb ai/acre)	0.5 (except canola); Canola: 0.08	14	60
	Soybeans				
	Sugar beets, onions (dry bulbs), garlic, shallots (dry bulbs), tomatoes, alfalfa, peanuts, dry beans, potatoes, sweet potatoes, yams[1], sunflower, canola, cucumbers, peppers				Sugar beets and peanuts: 40; Onions and shallots: 45; Tomatoes and peppers: 20; Alfalfa: 15; Dry beans and potatoes and yams: 30; Sunflower: 70; Canola: 60; Cucumbers: 14
	Brassica and Leafy Greens (Includes Broccoli raab, Chinese cabbage (bok choy), collards, mizuna kale, mustard greens, mustard spinach, rape greens and turnip greens)				14
	Ornamentals				Maple Syrup: 365
	Conifer trees, non-bearing food crops, fallow land, non-crop or non-planted areas				N/A

1. Includes other tuberous and corm vegetables.

130

4.0 Occupational Exposure

Reference: *Summary of HED's Reviews of Outdoor Residential Task Force (ORETF) Chemical Handler Studies; MRID 449722-01. ORETF Study Numbers OMA001, OMA002, OMA003, OMA004.* G. Bangs. 04/30/01.

Workers may be exposed to clethodim during mixing, loading, application, and postapplication activities. Based on the proposed application frequency, short-term (1-30 days) and intermediate-term (1-6 months) exposures may occur. Chronic exposures (≥6 months of continuous exposure) are not expected.

The highest rate for a single application among the crops included in this assessment is 0.25 lb ai/acre. This application rate was used for estimating exposure and risk for workers. The previous assessment evaluated exposure and risk from potatoes, sugar beets, sunflower, canola, cucumbers, bell peppers and non-bell peppers (October, 2000; Attachment 1). In the previous assessment, all handler and postapplication risk estimates were above HED's level of concern (i.e., MOEs were above 100). For details on those uses and others that are already on clethodim labels, please see Attachment 1.

For occupational exposure assessment, values for acres treated per day are upper bound, representing estimates for large acreage crops such as soybeans.

4.1 Occupational Handler Exposure and Risk

No chemical-specific handler exposure data were submitted in support of this action. It is the policy of the HED to use surrogate data, such as data from the Pesticide Handlers Exposure Database (PHED) Version 1.1 as presented in PHED Surrogate Exposure Guide (8/98) to assess handler exposures for regulatory actions when chemical-specific monitoring data are not available (HED Science Advisory Council for Exposure Draft Policy # 7, dated 1/28/99).

Potential handler exposure scenarios for the proposed uses on dry beans, peanuts, leafy Brassica and turnip greens include mixing/loading liquids for groundboom and aerial applications, groundboom and aerial applications of liquid formulations and mixing/loading and application for spot treatment (PCO applicators). Exposure for aerial flaggers was also assessed.

A summary of the exposure and risk estimates for occupational handlers are presented in Tables 4 and 5. All MOEs are above 100. The lowest MOE, 720, was calculated for intermediate-term risk for mixer loaders for aerial application. For workers, MOEs of 100 or greater do not exceed HED's level of concern.

13

Table 4. Short-term Exposure and Risk for Occupational Handlers

Exposure Scenario	Personal Protective Equipment	Acres Treated per day	PHED Unit Dermal Exposure (mg/lb ai)	Daily Dermal Exposure (mg/kg/day)[1] and Short-term Dermal MOE[3]	PHED Unit Inhalation Exposure (mg/lb ai)	Daily Inhalation Exposure[2] (mg/kg/day) and Short-term Inhal. MOE[3]	PHED Data Confidence	Combined Dermal and Inhalation Daily Exposure[4] (mg/kg/day)	Total Short-Term MOE
Mixer/loader: Liquid, Open Mix (for groundboom)	Long Sleeves, Long Pants, Gloves	200	0.023	0.0058 / 17,000	0.0012	0.001 / 100,000	Dermal: High; Inhal: High	0.0068	15,000
Mixer/loader: Liquid, Open Mix (for aerial)	Long pants, long sleeves, gloves	1,200	0.023	0.035 / 2,900	0.0012	0.006 / 17,000	Dermal: High; Inhal: High	0.0405	2,500
Application: Groundboom, Open Cab	Long pants, long sleeves, NO gloves	200	0.014	0.0035 / 29,000	0.00074	0.00062 160,000/	Dermal: High; Inhal: High	0.0041	24,000
Application: Aerial, Fixed Wing, Closed Cab	Long pants, long sleeves, NO gloves	1,200	0.0050	0.0075 / 13,000	0.000068	0.00034 / 290,000	Dermal: Medium; Inhal: Medium	0.0078	13,000
Flaggers for Aerial Application	Long pants, long sleeves, NO gloves	1,200	0.011	0.017 / 6,000	0.00035	0.0018 / 57,000	Dermal: High; Inhalation: High	0.018	5,500

[1] Dermal Daily Exposure = {Application Rate (0.25 lb ai/A) x Acres Treated (A/day) x Dermal Unit Exposure (mg/lb ai handled) x Dermal Absorption Factor (0.30)}/Body Weight (60 kg).

[2] Inhalation Daily Exposure = {Application Rate (0.25 lb ai/A) x Acres Treated (A/day) x Inhalation Unit Exposure (mg/lb ai handled)}/Body Weight.

[3] Short-Term MOE = NOAEL (100 mg/kg/day) / Daily Dose.

[4] Combined Dermal and Inhalation Daily Exposure = Dermal Daily Exposure = Inhalation Daily Exposure

[5] Total Short-Term MOE = Short-Term NOAEL (100 mg/kg/day) / Combined Dermal and Inhalation Exposure

Note: Error may occur due to rounding.

132

Table 5. Intermediate-term Exposure and Risk for Occupational Handlers

Exposure Scenario	Personal Protective Equipment	Acres Treated per day	PHED Unit Dermal Exposure (mg/lb ai)	Daily Dermal Exposure (mg/kg/day)[1] and Int. Dermal MOE[3]	PHED unit Inhalation Exposure (mg/lb ai)	Daily Inhalation Exposure[2] (mg/kg/day) and Int. Inhalation MOE[3]	PHED Data Confidence	Combined Dermal and Inhalation Daily Exposure[4] (mg/kg/day)	Total Intermediate-Term MOE[5]
Mixer/loader: Liquid, Open Mix (for groundboom)	Long Sleeves, Long Pants, Gloves	200	0.023	0.0049 / 5,100	0.0012	0.00086/ 29,000	Dermal: High; Inhal: High	0.0058	4,300
Mixer/loader: Liquid, Open Mix (for aerial)	Long pants, long sleeves, gloves	1,200	0.023	0.030 / 830	0.0012	0.0051/ 4,900	Dermal: High; Inhal: High	0.035	720
Application: Groundboom, Open Cab	Long pants, long sleeves, NO gloves	200	0.014	0.003 / 8,300	0.00074	0.00053/ 47,000	Dermal: High; Inhal: High	0.0035	7,100
Application: Aerial, Fixed Wing, Closed Cab	Long pants, long sleeves, NO gloves	1,200	0.0050	0.006 / 4,200	0.000068	0.00029/ 86,000	Dermal: Medium; Inhal: Medium	0.0063	4,000
Flaggers for Aerial Application	Long pants, long sleeves, NO gloves	1,200	0.011	0.014 / 1,800	0.00035	0.0015 / 17,000	Dermal: High; Inhalation: High	0.016	1,600

[1] Dermal Daily Exposure = {Application Rate (0.25 lb ai/A) x Acres Treated (A/day) x Dermal Unit Exposure (mg/lb ai handled) x Dermal Absorption Factor (0.30)}/Body Weight (70 kg).

[2] Inhalation Daily Exposure = {Application Rate (0.25 lb ai/A) x Acres Treated (A/day) x Inhalation Unit Exposure (mg/lb ai handled)}/Body Weight.

[3] Intermediate-Term MOE = NOAEL (25 mg/kg/day) / Daily Dose

[4] Combined Dermal and Inhalation Daily Exposure = Dermal Daily Exposure + Inhalation Daily Exposure

[5] Total Intermediate-Term MOE = Intermediate-Term NOAEL (25 mg/kg/day) / Combined Dermal and Inhalation Exposure

Note: Error may occur due to rounding.

4.2 Occupational Postapplication Exposure and Risk

Postapplication exposure is possible for workers entering treated fields to tend or harvest crops. Based on the timing of application (throughout all stages of plant growth), workers are expected to have some dermal contact with clethodim residues. Since clethodim is used primarily as an early and mid-season herbicide, it is possible but not likely that workers harvesting crops could have some exposure to residues.

Postapplication exposure and risk from existing registered uses of clethodim have been assessed in the previous occupational and residential exposure assessment (Attachment 1). In that assessment, short- and intermediate-term postapplication MOEs were greater than 100 on the day of treatment, and do not exceed HED's level of concern. Based on the use pattern, long-term or chronic exposure is not expected. Exposure from the uses proposed in this action are addressed below.

Workers performing postapplication activities such as scouting, irrigating and harvesting may receive dermal exposure to clethodim residues. When calculating the dermal doses for workers, the maximum label application rates from proposed labels was used (0.25 lb ai/acre). Clethodim is registered or proposed for use on many different agricultural crops which can be categorized based upon the characteristics of the crop and postapplication activities of workers. Transfer coefficients ranged from 1000 to 5,000 cm^2/hour, depending on the task performed and the crop. Transfer coefficient values were taken from those appearing in Exposure SAC Policy number 3.1, "Agriculture Transfer Coefficients" (August, 2000). Transfer coefficients are based on studies conducted by the Agriculture Reentry Task Force (ARTF).

Daily dermal absorbed doses (mg/kg/day) were calculated for postapplication activities using the following equation:

$$\textbf{Daily dermal absorbed dose}_t = \frac{DFR_t\ (\mu g/cm^2) \times 1E\text{-}3\ mg/\mu g \times Tc\ (cm^2/hr) \times DA \times ET\ (hrs)}{BW\ (kg)}$$

Where,

DFR	=	dislodgeable foliar residue on day "0" (ug/cm^2)
Tc	=	transfer coefficient (cm^2/hr)
DA	=	dermal absorption factor (unitless)
ET	=	exposure time (hr/day)
BW	=	body weight (kg)

Dislodgeable foliar residue values on the day of application were calculated using the following equation:

$$DFR_t\ (ug/cm^2) = \text{Application Rate (lb ai/acre)} \times F \times 4.54E8\ \mu g/lb \times 2.47E\text{-}8\ acre/cm^2$$

Where:

13

DFR_t = dislodgeable foliar residue on day "0" (ug/cm^2)
Rate = application rate (lb ai/acre)
F = fraction of ai retained on foliage (unitless)

The non-cancer risk or margin of exposure (MOE) for all time durations was calculated as follows:

$$\textbf{MOE} = \frac{\text{NOAEL (mg/kg/day)}}{\text{Daily Absorbed Dose (mg/kg/day)}}$$

Table 6. Occupational Postapplication Exposure and Risk

Postapplication Activities (highest exposure crop)	Transfer Coefficient (cm^2/hr)	Short-Term Daily Dermal Absorbed Dose (mg/kg/day)	Intermediate-Term Dermal Absorbed Dose (mg/kg/day)	Short-Term Day '0' MOE (day of treatment)	Intermediate-Term Day '0' MOE
Hand harvesting, irrigating, topping, pruning, thinning, tying (Brassica crops)	5,000[1]	0.10	0.087	1,000	290
Irrigation, scouting (peanuts)	1500[2]	0.030	0.026	3,300	960
Hand harvesting (turnips or dry beans/peas)	2500[2]	0.050	0.043	2,000	580

1. Transfer Coefficient is the high-end value taken from Agriculture reentry Task Force study ARF012.
2. Transfer Coefficient is the high-end value taken from Agriculture reentry Task Force study ARF021.

Table 6 shows the dermal MOEs calculated on the day of application which represent the highest day of exposure. MOE's are above the target of 100 for all occupational activities on day zero.

Draft copies of Prism®, Select® and Select® 2EC labels have a 24-hour restricted entry interval (REI). The 24-hour REI does not comply with the Worker Protection Standard: as shown in Table 1, clethodim is categorized in Category I for primary dermal irritation. The appropriate REI that should be stated on the labels is **48 hours**.

5.0 Non-Occupational/Residential Exposure

Based on clethodim labels, Select® and Select® 2EC are both available for weed control use in residential and/or public areas. A residential handler exposure assessment was performed but a postapplication residential exposure assessment was not performed.

13

5.1 Non-Occupational Handler Exposure

Based on clethodim labels, Select® and Select® 2EC, are both available for weed control use in residential and/or public areas. However, the registrant has indicated that the product is not intended for use by homeowners (personal communication with D. Kenny, Registration Division, 11/28/00), making application by pesticide control officers the only avenue by which residents may be exposed. In the previous exposure assessment (Attachment 1), HED recommended for a statement to appear on clethodim labels that would prohibit or discourage direct use by homeowners. However, application by homeowners is not prohibited on clethodim labels despite HED's recommendation. Therefore, a residential handler assessment was performed. In the assessment, risk estimates were below HED's level of concern for all individuals.

Because homeowner use of clethodim is not prohibited on the label, HED assumes that clethodim products are available for use by untrained applicators. A homeowner exposure assessment was performed to determine the risk potential to homeowners. The following assumptions were made in conducting the assessment:

- Clethodim would be applied by low pressure handwand (spot treatment)
- The highest label rate of 1.3 ounces per gallon was used (for ornamentals from the Select® label)
- Five gallons of spray are used
- Applicators mix, load and apply
- Short sleeved shirt and short pants are worn by homeowners

Exposure data for handgun sprayer application (low pressure handwand) were obtained from the Outdoor Residential Exposure Task Force (ORETF) Chemical Handler Studies (04/30/01).

Estimated risks for residential handler exposure are above HED's level of concern and result in MOEs above 100. Exposure and risk calculations are presented below in Table 7.

136

Table 7. Short-Term Non-Occupational Handler Exposure

Exposure Scenario	Personal Protective Equipment	Amount Formulation Handled per day	ORETF Unit Dermal Exposure (mg/lb ai)	Daily Dermal Exposure (mg/kg/day)[1] and Short-Term Dermal MOE[3]	PHED unit Inhalation Exposure (mg/lb ai)	Daily Inhalation Exposure[2] (mg/kg/day) and Short-term Inhalation MOE[3]	Combined Dermal and Inhalation Daily Exposure[4] (mg/kg/day)	Total Short-term MOE[5]
Liquid / Open Pour Low Pressure Handwand (Mix, Load and Apply)	Long Sleeves and Long Pants, Gloves	5 gallons (0.05 lb ai)	0.73	0.0001825 / 550,000	0.001	0.0000008 / 125,000,000	0.0001833	550,000

[1] Dermal Daily Exposure = {Amount Handled x Dermal Unit Exposure (mg/lb ai handled) x Dermal Absorption Factor (0.30)}/Body Weight (60 kg).
[2] Inhalation Daily Exposure = {Application Rate (0.25 lb ai/A) x Acres Treated (A/day) x Inhalation Unit Exposure (mg/lb ai handled)}/Body Weight.
[3] Short-Term MOE = NOAEL (100 mg/kg/day) / Daily Dose.
[4] Combined Dermal and Inhalation Daily Exposure = Dermal Daily Exposure = Inhalation Daily Exposure
[5] Total Short-Term MOE = Short-Term NOAEL (100 mg/kg/day) / Combined Dermal and Inhalation Exposure
Note: Error may occur due to rounding.

5.2 Non-Occupational Postapplication Exposure

The clethodim labels permit application to commercial and residential sites and on other non-crop or non-planted areas including rights of way such as railroads, highways, roads, dividers, medians, pipelines, public utility lines, pumping stations, transformer stations and substations, around airports, electric utilities, commercial buildings, manufacturing plants, storage yards, rail yards, fence lines, parkways, ornamental gardens, walkways, patios, greenhouse benches, along driveways and around golf courses (not on golf courses). It is possible that the public could be exposed to clethodim residues in areas such as patios, along drive ways and around golf courses and fence lines. However, in these areas, clethodim is typically used to control unwanted weeds of all types (grass and broadleaf) through spot treatment, usually resulting in a small treated area. Broadcast treatment is not expected. It is unlikely that adults and children would be exposed to treated areas which would most likely consist of a single spot. Therefore, a non-occupational postapplication exposure assessment was not performed. This is consistent with a recommendation made by the Science Advisory Council for Exposure on 04/26/01 regarding postapplication exposure from treatment of ornamentals.

Attachments:

1. *Occupational and Residential Risk Assessment to Support Request for New Uses of Clethodim on Potatoes, Sugar Beets, Sunflower, Canola, Cucumbers, Bell Peppers and Non-Bell Peppers*. M. Rust. D 268761. 04/10/2000.
2. Clethodim: Report of the Hazard Identification Assessment Review Committee. HED document #121011. October 24, 1997.
3. Clethodim: Report of the FQPA Safety Factor Committee. HED document #014309. August 31, 2000.