Attachment 6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

MEMORANDUM

Date: June 23, 2003

Subject: Occupational and Residential Exposure/Risk Assessment for Use of BAS 510F on Potatoes, Bulb Vegetables, Lettuce, Dry/Succulent Beans, Fruiting Vegetables, Stone Fruits, Small Berries, Tree Nuts, Pistachio, Grapes, Strawberries, Peanuts, Canola, Brassica Leafy Vegetables, Cucurbits, Edible Peas, Mint, Root Vegetables, Sunflower, and Golf Course Turfgrass.
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The enclosed document is an assessment of potential occupational and residential exposures/ risk to support the proposed Section 3 registration for a new chemical, BAS 510F. The proposed registration includes fungicidal uses on the following crops: potatoes, bulb vegetables, lettuce, dry/succulent beans, fruiting vegetables, stone fruits, small berries, tree nuts, pistachio, grapes, strawberries, peanuts, canola, brassica leafy vegetables, cucurbits, edible peas, mint, root vegetables, sunflower, and golf course turfgrass.

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1.0 Executive Summary

This assessment addresses occupational/residential exposures and risk for the use of a new fungicidal chemical, BAS 510F, on the following crops: potatoes, bulb vegetables, lettuce, dry/succulent beans, fruiting vegetables, stone fruits, small berries, tree nuts, pistachio, grapes, strawberries, peanuts, canola, brassica leafy vegetables, cucurbits, edible peas, mint, root vegetables, sunflower, and golf course turfgrass.

The number of exposure days per year was not provided. Based on the frequency of applications and application interval, EPA assumes that both application handlers and post-application workers would be exposed for less than 6 months per year (short- and intermediate-term exposures). Long-term exposure is not expected.

Since no chemical-specific data for assessing human exposures during pesticide handling activities were submitted to the Agency in support of the registration of BAS 510F, HED used surrogate data from the PHED Version 1.1. Defaults established by the HED Science Advisory Council for Exposure were used for acres treated per day and body weight. Four chemical-specific dislodgeable foliar residue (DFR) and one turf transferable residue (TTR) studies were submitted for the evaluation of post-application exposures/risks.

Toxicological endpoints from the Hazard Identification Assessment Review Committee report (3/07/03) were used to assess dermal and inhalation risks. The oral NOAEL (21.8 mg/kg/day, all durations) is based on the liver/thyroid effects observed from the chronic toxicity rat, carcinogenicity rat and 1-year dog studies. The dermal and inhalation absorption rates used were 15 and 100%. Daily dermal and inhalation doses were combined and then compared to the NOAEL to determine the level of risks. The target margin of exposure (MOE) is 100. BAS 510F is classified as "suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential", and, therefore, the human cancer risk was not evaluated.

Occupational handler assessments were based primarily on surrogate unit exposures from the PHED, as presented in the PHED Surrogate Exposure Guide (8/98). All MOEs for the handlers performing agricultural crop uses were greater than the target of 100 at the baseline level (ranging from 460 to 31,000). All MOEs for the handlers performing golf course turfgrass uses were also greater than the target of 100 at the baseline level (ranging from 7,300 to 27,000).

The occupational post-application exposure/risk were calculated by coupling crop specific DFR values with activity specific transfer coefficient (Tc) values from the HED Science Advisory Council For Exposure Policy Number 3.1. Except for grapes with girdling, all post-application MOEs were greater than the target MOE of 100. The MOE for grapes with girdling was 95 on the day of application. Due to the statistical uncertainty in estimating the MOE, 95 is considered equivalent to the target of 100 for risk assessment in this case. Therefore, the WPS required 12 hour REI is appropriate for this chemical. However, HED does not concur with the proposed 4-hour REI because the determination as to whether BAS 510F is or is not a dermal sensitizer could not be made.

The short-term residential dermal post-application exposure/risk for golfing was calculated by coupling TTR values with activity specific Tc values from the HED Science Advisory Council For Exposure Policy Number 3.1. All MOEs for the residential dermal post-application exposure were greater than the target MOE of 100.

2.0 Hazard Information

On September 5, 2002 and January 23, 2003, the Health Effects Division (HED) Hazard Identification Assessment Review Committee (HIARC) selected endpoints for chronic dietary exposure (all populations), incidental oral short- and intermediate-term residential only, dermal (all durations) and inhalation (all durations). There was no appropriate endpoint identified for acute dietary. A dermal toxicity study was submitted and no endpoint was selected at the limit dose (1000 mg/kg/day). For all of the endpoints selected, liver and thyroid effects were chosen from the chronic toxicity study in rats, the carcinogenicity study in rats and the 1-year study in dogs. The NOAEL was 21.8 mg/kg/day. For the dermal route, the absorption rate was 15%. For the inhalation route, the absorption rate was assumed to be 100%.

The potential for increased susceptibility of infants and children from exposure to BAS 510F was also evaluated as required by the Food Quality Protection Act (FQPA) of 1996. The special FQPA safety factor is reduced to 1X because the existing data indicate that there are no/low concerns and no residual uncertainties with regard to pre- and/or postnatal toxicity. The Cancer Assessment Review Committee (CARC) classified BAS 510 F as, "suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential", and, therefore, the quantification of human cancer risk is not recommended.

The acute toxicity categories for the technical material are summarized in **Table 1**. The HIARC's conclusions, the doses and toxicological endpoints for various exposure scenarios are summarized and presented in **Table 2** (from the HIARC document on BAS 510F 03/07/03).

Table 1. Acute Toxicity Profile - BAS 510 F Technical.

Test Material	GDLN	Study Type	MRID	Results	Tox Category
Technical	870.1100	Acute Oral - rat	45404814	LD_{50} > 5000 mg/kg	IV
Technical	870.1200	Acute Dermal - rat	45404815	LD_{50} > 2000 mg/kg	III
Technical	870.1300	Acute Inhalation	45404816	LC_{50} (M & F): > 6.7 mg/L	IV
Technical	870.2400	Primary Eye Irritation	45404817	Not irritating to the eye	IV
Technical	870.2500	Primary Dermal Irritation	45404818	Not irritating to the skin	IV
Technical	870.2600	Dermal Sensitization	45404819	Study unacceptable as challenge dose was inadequate	N/A

Table 2. Summary of Toxicological Dose and Endpoints for BAS 510 F.

Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary	No appropriate endpoint identified	NA	NA
Chronic Dietary (All populations)	NOAEL= 21.8 UF = 100 **Chronic RfD** = 0.218 mg/kg/day	FQPA SF = 1 **cPAD** = chronic RfD / FQPA SF = 0.218 mg/kg/day	Chronic rat, carcinogenicity rat and 1-year dog studies LOAEL = 57-58 mg/kg/day based on liver and thyroid effects
Incidental Oral (Short and intermediate term residential only)	NOAEL= 21.8 mg/kg/day	**Residential** LOC for MOE = 100 **Occupational** LOC for MOE = 100	Chronic rat, carcinogenicity rat and 1-year dog studies LOAEL = 57-58 mg/kg/day based on liver and thyroid effects
Dermal (All Durations)	Oral study NOAEL=21.8 mg/kg/day (dermal absorption rate = 15%)	**Residential** LOC for MOE = 100 **Occupational** LOC for MOE = 100	Chronic rat, carcinogenicity rat and 1-year dog studies LOAEL = 57-58 mg/kg/day based on liver and thyroid effects
Inhalation (All Durations)	Oral study NOAEL= 21.8 mg/kg/day (inhalation absorption rate = 100%)	**Residential** LOC for MOE = 100 **Occupational** LOC for MOE = 100	Chronic rat, carcinogenicity rat and 1-year dog studies LOAEL = 57-58 mg/kg/day based on liver and thyroid effects
Cancer (oral, dermal, inhalation)	**Classification: "Suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential."**		

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose, MOE = margin of exposure, LOC = level of concern, NA = Not Applicable

For the purpose of conducting risk assessments for occupational workers, dermal and inhalation exposures may be combined because the same studies (with the same endpoints) were used for each route of exposure for each of the respective exposure scenarios.

3.0 Product Use information/Application Timing

Proposed use patterns for BAS 510F are summarized in **Table 3**.

Table 2. Proposed Use Patterns for BAS 510F.

Crop	Product, Formulation	Treatment Type	Applications Per Season [1]	Maximum Application Rate[2] (lb ai/acre)		PHI[3] (days)
				Per Application	Per Season	
Carrots	BAS 510 02F, water-dispersible granule	ground, or aerial	5	0.20	1.00	0
Stone Fruits			5	0.23	1.15	0
Tree Nuts			4		0.92	14
Pistachio			4		0.92	14
Canola			2	0.26	0.52	21
Bulb Vegetables			6	0.30	1.80	7
Cucurbits		ground	4		1.20	0
Root Vegetables			3	0.34	1.02	0
Small Berries		ground, or aerial	4	0.35	1.40	0
Grapes			3		1.05	14
Strawberries			5		1.75	0
Brassica Leafy Vegetables		ground	2	0.40	0.80	14
Mint			4		1.60	15
Sunflower			2		0.80	21
Peanuts		ground, or aerial	3	0.44	1.32	14
Potatoes			2		0.88	30
Dry/Succulent Beans			2	0.48	0.96	21/7
Lettuce			2		0.96	14
Edible Peas		ground	2	0.50	1.00	21
Turfgrass			6		3.00	NA[4]
Fruiting Vegetables		ground, or aerial	2	0.55	1.10	0

[1] Maximum number of applications allowed on label.

[2] Rate = Maximum application rates specified on proposed labels.

[3] PHI = Pre-harvest Interval

[4] NA= Not Applicable

4.0 Non-Occupational Exposure

In the process of joint review with Health Canada, potential non-occupational exposure scenarios were identified for golfers and persons harvesting fruit at "U-pick" farms and orchards. Residues may be contacted from treated golf course turf or while picking strawberries, caneberries, and tree fruit. Based on low vapor pressure, outdoor uses and the weight of evidence from many residue

studies, no post-application inhalation exposures are anticipated for BAS-510F. Because "U-pick" is a "one-time" event (duration<1-day) and the HIARC found that the oral studies used to select endpoints were not appropriate to quantitate acute risk, "U-pick" exposure/risk was not evaluated. Therefore, only the golfing scenario is evaluated in this assessment with respect to non-occupational exposures.

4.1 Non-Occupational Handler

The **BAS 510 02F** label specifies that this product is intended for **golf course use only,** and not for use on residential turfgrass or turfgrass being grown for sale or other commercial use such as sod production. Although the label does not indicate that the product is applied by licensed or commercial applicators, it is acknowledged that the homeowner will not be applying the product to golf courses and therefore, a risk assessment for handler exposure is not required. BAS 510F is not packaged or marketed for home orchard use, and therefore that use is not assessed. **Specific label language could be added to exclude this use.**

4.2 Non-Occupational Post-application

The Agency uses the term "post-application" to describe exposures to individuals that occur as a result of being in an environment that has been previously treated with a pesticide. It has been determined that there is a potential for exposure from entering areas previously treated with BAS 510F. As indicated previously, there is only one potential non-occupational post-application scenario associated with BAS 510F: adults golfing (Table 4). Duration of such exposure is anticipated to be short-term.

Table 4: Non-Occupational Post-application Exposure Scenario for BAS 510F

Scenario, Product, Formulation	Method of Application	Use Sites	Application Rate
BAS 510 02F Turf Fungicide, EPA Reg No. 7969-Pending	ground equipment only	golf course use only	0.5 lb ai/A

4.2.1 Dermal Post-application Exposure

Turf Transferable Residue Data:

The Registrant, BASF Corporation submitted a turf transferable residue (TTR) study using BAS 510F in support of this registration action. The Health Canada Pest Management Regulatory Agency (PMRA) performed primary review on the study and HED performed secondary review. HED concurred with the TTR study review done by PMRA. A summary of the study is provided below.

BAS 510F UCF Turf Transferable Residue Study, D.W. Haughey and J. E. Jones III, March 21, 2001, MRID# 45405301

The TTR study was designed to collect data to calculate dislodgeable residue dissipation curves for BAS 510 F after application to turf at three sites in the United States: Pennsylvania, Georgia and California. At each site, BAS 510 F was applied 3 times at a rate of 0.35 lb ai/A, with a target spray interval of 14 days (± 1). The interval between the 2nd and 3rd applications at the Pennsylvania site was 24 days due to rain and adverse weather conditions. Dislodgeable residues were sampled from turf using the modified California Roller Technique. Cloth samples were collected in triplicate from the treated plot before and after each application, and at 1, 2, 3, 4, 7, 10, 14, 21, 28 and 35 (± 1) days after the last application (DALA). An additional sample was collected at 84, 92, and 78 DALA for Pennsylvania, Georgia and California, respectively, however, they were never analyzed. In addition, samples collected pre- and post-application 1 and 2 were not analyzed. A control plot at each site was used to sample untreated turf for field recovery. Except for minor limitations, the study design was considered acceptable for regulatory use.

After 3 applications of BAS 510F, residues reached a peak at day 0 in Georgia/California and at day 2 in Pennsylvania. For all three sites, Pennsylvania had the highest peak residue value of 0.1313 µg/cm^2 2 DALA. The residues in California and Georgia were considerably lower, with peak residue levels of 0.039 µg/cm^2 and 0.0172 µg/cm^2, respectively. Regression lines were plotted using the natural log (ln) of the residue values vs the days after the final application. R^2 values were 0.8763, 0.9261 and 0.8634 and the residue half lives were 2.2 days, 2.2 days and 0.64 days at the Pennsylvania, Georgia and California sites, respectively. Although samples were collected and analyzed up to 35 DALA (±1), dissipation occurred rapidly and values were below the LOQ at all three locations before the last sampling time point. Residues reached the LOQ by day-14 in Pennsylvania, day-10 in Georgia, and day-4 in California.

Assumptions:

- adult transfer coefficient is 500 cm2/hr (based on HED SOP 3.1)
- duration of exposure is estimated to be 4 hours (assuming chemical is used on all parts of a course [greens, tees and fairways] and an adult plays 18 holes of golf)

Equations and Calculations:

PDRo = TTRo x CF1 x Tc x ET x % DA

where

PDRo	=	potential dose rate on day 0 (mg/day)
TTRo	=	turf transferable residue on day 0 (ug/cm2); note highest TTR used, which may have occurred on day of application
CF1	=	unit conversion factor to convert ug units in the TTR to mg for daily exposure (0.001 mg/ug)
Tc	=	transfer coefficient (500 cm2/hr)
ET	=	exposure time (4 hr/day)
%DA	=	percent dermal absorption (15%)

4.2.2 Oral Post-application Exposure/Risk

There is the potential for oral exposure due to hand-to-mouth transfer of pesticide residues from picking your own fruit. However, HED does not have an applicable database for estimating consumption of U-Pick fruits in the field or hand-to-mouth activity during fruit picking. In addition, as noted previously, HIARC did not select an acute dietary endpoint that would be appropriate for this type of exposure.

4.2.3 Post-application Exposure/Risk and Characterization

The non-occupational dermal post-application exposure/risk were calculated by coupling turf specific TTR values with activity specific transfer coefficient (Tc) values from the HED Science Advisory Council For Exposure Policy Number 3.1: Agricultural Transfer Coefficients, Aug. 2000.

The TTR study provided two residue values, both from Pennsylvania, which were selected to estimate high end exposure from turf. The highest turf average daily residue value (0.1313 ug/cm2) was collected from a sampling site when the turf was wet, which is assumed to have resulted in higher than normal transferable residues. The other turf residue value (0.048 ug/cm2) was collected when the turf was dry and resulted in lower transferable residues. It should be noted that the Tc used to estimate dermal exposure to turf is based on samples collected on dry surfaces. However, golf courses are often automatically sprayed by built in sprinkler systems in the morning. Therefore, HED deemed it appropriate to assess dermal exposure in both dry and wet conditions. The TTR values were normalized (adjusted) to the maximum label application rate.

Table 5 provides a summary of short-term dermal post-application exposure and risk for golfing adults. All MOEs were above the target MOE of 100 and therefore did not exceed HED's level of concern. Although specific MOEs were not calculated for youth playing golf, the adult MOEs are considered representative since the body surface area to weight ratios do not vary significantly between adolescents and adults.

Table 5: Short-term Dermal Post-application Exposure for Adults

Scenario & Product	DFR/TTR [1] (ug/cm2)	CF1 (mg/ug)	Tc (cm2/hr)	ET (hr/day)	% DA	BW (kg)	Daily Dose [2] (mg/kg/day)	Dermal MOE [3]
Golfing								
BAS 510 02F Turf Fungicide TTR Study MRID# 45405301	0.069[a]	0.001	500	4	15	70	0.000295	74000
	0.188[b]						0.0008	27000

1a. The highest daily average Transferable Turf Residue for **dry** turf resulting from Pennsylvania TTR study data (Adjusted for difference in application rate from 0.35 to 0.5 lb ai/A max rate)

1b. The highest daily average Transferable Turf Residue for wet turf resulting from Pennsylvania TTR study data (Adjusted for difference in application rate from 0.35 to 0.5 lb ai/A max rate)

2. DD (mg/kg/day) = DFR x CF1 x Tc x ET x %DA/BW

3. Dermal MOE = NOAEL (21.8 mg/kg/day)/ Daily Dose (mg/kg/day)

4.3 Spray Drift

Spray drift is always a potential source of exposure to residents nearby to spraying operations. This is particularly the case with aerial application, but, to a lesser extent, could also be a potential source of exposure from the ground application method employed for BAS 510F. The Agency has been working with the Spray Drift Task Force, EPA Regional Offices and State Lead Agencies for pesticide regulation and other parties to develop the best spray drift management practices. The Agency is now requiring interim mitigation measures for aerial applications that must be placed on product labels/labeling. The Agency has completed its evaluation of the new data base submitted by the Spray Drift Task Force, a membership of U.S. pesticide registrants, and is developing a policy on how to appropriately apply the data and the AgDRIFT computer model to its risk assessments for pesticides applied by air, orchard airblast and ground hydraulic methods. After the policy is in place, the Agency may impose further refinements in spray drift management practices to reduce off-target drift and risks associated with aerial as well as other application types where appropriate.

5.0 Occupational Exposure

5.1 Handlers

Equations/Calculations

The following equations were used to calculate handler exposure and risk:

Dermal Dose (mg/kg/day) = $\frac{\text{Rate (lb ai/A) x UE (mg/lb ai) x DA x Acres Treated (A/day)}}{\text{BW (kg)}}$

Inhalation Dose (mg/kg/day) = $\frac{\text{Rate (lb ai/acre) x UE (mg/lb ai) x Acres Treated (A/day)}}{\text{BW (kg)}}$

Where:

Rate (Application Rate)	=	Maximum application rate on product label (lb ai/acre)
UE (Unit Exposure)	=	Exposure value derived from August 1998 PHED Surrogate Exposure Table (mg/lb ai handled)
DA (dermal absorption factor)	=	Factor to account for dermal absorption (15%) when endpoint is selected from an oral study.
Acres Treated	=	Maximum number of acres treated per day (acres/day)
BW	=	Body weight (kg)

Combined Daily Dose (mg/kg/day) = Dermal Dose (mg/kg/day)+Inhalation Dose (mg/kg/day)

MOE = $\frac{\text{NOAEL (21.8 mg/kg/day)}}{\text{Combined Daily Dose (mg/kg/day)}}$

Exposure Scenarios

There are 7 handler scenarios that are expected to result in the highest exposure for the proposed uses:

- Mixing/Loading Dry Flowable for Ground-boom Applications (Scenario 1)
- Mixing/Loading Dry Flowable for Air Blast Applications (Scenario 2)
- Mixing/Loading Dry Flowable for Aerial Applications (Scenario 3)
- Applying Sprays with Ground-boom Equipment (Scenario 4)
- Applying Sprays with Air Blast Equipment (Scenario 5)
- Applying Sprays with a Fixed Wing Aircraft (Scenario 6)
- Flagging during Aerial Applications (Scenario 7)

Application Rate

The maximum application rates listed on the proposed labels provided by the Registration Division were used for all exposure assessments. The maximum rates are 0.20 lb ai/A for carrots, 0.23 lb ai/A for stone fruits/tree nuts/pistachio, 0.26 lb ai/A for canola, 0.30 lb ai/A for bulb

vegetables/cucurbits, 0.34 lb ai/A for root vegetables, 0.35 lb ai/A for small berries/grapes/ strawberries, 0.40 lb ai/A for brassica leafy vegetables/mint/sunflower, 0.44 lb ai/A for peanuts/potatoes, 0.48 lb ai/A for dry & succulent beans/lettuce, 0.50 lb ai/A for edible peas/turfgrass, and 0.55 lb ai/A for fruiting vegetables.

Area or the Amount Treated

Based on HED's Exposure Science Advisory Council Policy Number 9.1, the following acres per day treated, or gallons of spray solution per day treated were assumed:

- 1200 acres/day for applications on canola/sunflower using aerial equipment & flagging;
- 350 acres/day for applications on other ag. crops using aerial equipment & flagging;
- 200 acres/day for applications on canola/sunflower using ground-boom equipment;
- 80 acres/day for applications on other ag. crops using ground-boom equipment;
- 40 acres/day for applications on tree crops using air blast equipment;
- 40 acres/day for application on turfgrass using ground-boom equipment.

Body Weight

The average body weight for general population (70 kg) was used for all assessments.

Exposure Frequency

No data on the number of exposure days per year was provided For this risk assessment, it was assumed that handlers would be exposed for less than 6 months per year. Long-term exposure is not expected.

Unit Exposures

The unit exposures used for assessments to plant protection uses are based on the PHED Version 1.1 as presented in the August 1998 PHED Surrogate Exposure Guide. PHED was designed by a task force of representatives from the U.S. EPA, Health Canada, the California Department of Pesticide Regulation, and member companies of the American Crop Protection Association. PHED is a software system consisting of two parts–a database of measured exposure values for workers involved in the handling of pesticides under actual field conditions and a set of computer algorithms used to subset and statistically summarize the selected data. Currently, the database contains values for over 1,700 monitored individuals (i.e., replicates).

Users select criteria to subset the PHED database to reflect the exposure scenario being evaluated. The subsetting algorithms in PHED are based on the central assumption that the magnitude of handler exposures to pesticides is primarily a function of activity (e.g., mixing/loading, applying), formulation type (e.g., wettable powders, granulars), application method (e.g., aerial, groundboom), and clothing scenarios (e.g., gloves, double layer clothing).

Once the data for a given exposure scenario have been selected, the data are normalized (i.e., divided by) by the amount of pesticide handled resulting in standard unit exposures (milligrams of

exposure per pound of active ingredient handled). Following normalization, the data are statistically summarized. The distribution of exposure values for each body part (e.g., chest, upper arm) is categorized as normal, lognormal, or "other" (i.e., neither normal nor lognormal). A central tendency value is then selected from the distribution of the exposure values for each body part. These values are the arithmetic mean for normal distributions, the geometric mean for lognormal distributions, and the median for all "other" distributions. Once selected, the central tendency values for each body part are composited into a "best fit" exposure" value representing the entire body.

There are three basic risk mitigation approaches considered appropriate for controlling occupational exposures. These include administrative controls, the use of personal protective equipment or PPE, and the use of engineering controls. Occupational handler exposure assessments were completed by HED using baseline, PPE, and engineering controls. [Note: Administrative controls available generally involve altering application rates for handler exposure scenarios. These are typically not utilized for completing handler exposure assessments.] The baseline clothing level scenario for occupational exposure scenarios is generally an individual wearing long pants, a long-sleeved shirt, no chemical resistant gloves, and no respirator. The first level of mitigation generally applied is PPE. As reflected in the calculations included herein, PPE may involve the use of an additional layer of clothing, chemical-resistant gloves, and a respirator. The next level of mitigation considered in the risk assessment process is the use of appropriate engineering controls which, by design, attempt to eliminate the possibility of human exposure. Examples of commonly used engineering controls include enclosed tractor cabs and cockpits, closed mixing/loading/transfer systems, and water-soluble packets.

Handlers' Exposure and Risk

All MOEs for the handlers performing agricultural crop uses were greater than the target of 100 at the baseline level (ranging from 460 to 31,000). All MOEs for the handlers performing golf course turfgrass uses were also greater than the target of 100 at the baseline level (ranging from 7,300 to 27,000). Summaries of the risks for handlers are presented in **Table 6.**

The handler exposure estimates in this assessment are based on a central tendency estimate of unit exposure and an upper-percentile assumptions for the application rate and acres treated, and are assumed to be representative of high-end exposures. The uncertainties associated with this assessment stem from the use of surrogate exposure data (e.g., differences in use scenario and data confidence), and assumptions regarding that amount of chemical handled. The estimated exposures are believed to be reasonable high-end estimates based on observations from field studies and professional judgement.

Table 6. Non-Cancer Short- and Intermediate-Term Risk for BAS 510 F Handlers.

Exposure Scenario (Scenario #)	Mitigation Level[a]	Dermal Unit Exposure[b] (mg/lb ai)	Inhalation Unit Exposure[c] (ug/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated[d] (A/day)	Daily Dermal Dose[e] (mg/kg/day)	Daily Inhalation Dose[f] (mg/kg/day)	Combined Daily Dose[g] (mg/kg/day)	MOE[h]
Mixer/Loader										
Dry Flowables for Ground-boom application (1)	Baseline	0.066	0.77	Carrots	0.20	80	0.0023	0.0002	0.0025	8,700
				Bulb Vegs, Cucurbits	0.30		0.0034	0.0003	0.0037	5,900
				Root Vegs	0.34		0.0039	0.0003	0.0042	5,200
				Sm. Berries, Grapes, Strawberries	0.35		0.0040	0.0003	0.0043	5,100
				Brassica Leafy Vegs., Mint	0.40		0.0045	0.0004	0.0049	4,500
				Peanuts, Potatoes	0.44		0.0050	0.0004	0.0054	4,000
				Dry/Succul. Beans, Lettuce	0.48		0.0054	0.0004	0.0058	3,800
				Edible Peas	0.50		0.0057	0.0004	0.0061	3,600
				Turfgrass		40	0.0028	0.0002	0.0030	7,300
				Fruit. Vegs	0.55	80	0.0062	0.0005	0.0067	3,300
				Canola	0.26	200	0.0074	0.0006	0.0080	2,700
				Sunflower	0.40		0.0113	0.0009	0.0122	1,800
Dry Flowables for Air Blast application (2)	Baseline	0.066	0.77	Stone Fruits, Tree Nuts, Pistachio	0.23	40	0.0013	0.0001	0.0014	15,600
Dry Flowables for Aerial application (3)	Baseline	0.066	0.77	Carrots	0.20	350	0.0099	0.0008	0.0107	2,000

Exposure Scenario (Scenario #)	Mitigation Level[a]	Dermal Unit Exposure[b] (mg/lb ai)	Inhalation Unit Exposure[c] (ug/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated[d] (A/day)	Daily Dermal Dose[e] (mg/kg/day)	Daily Inhalation Dose[f] (mg/kg/day)	Combined Daily Dose[g] (mg/kg/day)	MOE[h]
				Stone Fruits, Tree Nuts, Pistachio	0.23		0.0114	0.0009	0.0123	1,800
				Bulb Veg.	0.30		0.0149	0.0012	0.0161	1,400
				Sm. Berries, Grapes, Strawberries	0.35		0.0173	0.0014	0.0187	1,200
				Peanuts, Potatoes	0.44		0.0218	0.0017	0.0235	930
				Dry/Succul. Beans, Lettuce	0.48		0.0238	0.0019	0.0257	850
				Fruit. Vegs	0.55		0.0272	0.0021	0.0293	740
				Canola	0.26	1,200	0.0441	0.0034	0.0475	460
Applicator										
Sprays with Ground-boom (4)	Baseline	0.014	0.74	Carrots	0.20	80	0.0005	0.0002	0.0007	31,000
				Bulb Vegs, Cucurbits	0.30		0.0007	0.0003	0.0010	22,000
				Root Vegs	0.34		0.0008	0.0003	0.0011	20,000
				Sm. Berries, Grapes, Strawberries	0.35		0.0008	0.0003	0.0011	20,000
				Brassica Leafy Vegs., Mint	0.40		0.0010	0.0003	0.0013	17,000
				Peanuts, Potatoes	0.44		0.0011	0.0004	0.0015	15,000
				Dry/Succul. Beans, Lettuce	0.48		0.0012	0.0004	0.0016	14,000

Exposure Scenario (Scenario #)	Mitigation Level[a]	Dermal Unit Exposure[b] (mg/lb ai)	Inhalation Unit Exposure[c] (ug/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated[d] (A/day)	Daily Dermal Dose[e] (mg/kg/day)	Daily Inhalation Dose[f] (mg/kg/day)	Combined Daily Dose[g] (mg/kg/day)	MOE[h]
				Edible Peas	0.50		0.0012	0.0004	0.0016	14,000
				Turfgrass		40	0.0006	0.0002	0.0008	27,000
				Fruit. Vegs	0.55	80	0.0013	0.0005	0.0018	12,000
				Canala	0.26	200	0.0016	0.0006	0.0022	9,900
				Sunflower	0.40		0.0024	0.0008	0.0032	6,800
Sprays with Air Blast (5)	Baseline	0.36	4.5	Stone Fruits, Tree Nuts, Pistachio	0.23	40	0.0071	0.0006	0.0077	2,800
Sprays with fixed wing Aircraft (6)	Engineer. Control	0.0050	0.068	Carrots	0.20	350	0.0008	0.0001	0.0009	24,000
				Stone Fruits, Tree Nuts, Pistachio	0.23		0.0009	0.0001	0.0010	21,800
				Bulb Veg.	0.30		0.0011	0.0001	0.0012	18,000
				Sm. Berries, Grapes, Strawberries	0.35		0.0013	0.0001	0.0014	16,000
				Peanuts, Potatoes	0.44		0.0017	0.0002	0.0019	12,000
				Dry/Succul. Beans, Lettuce	0.48		0.0018	0.0002	0.0020	11,000
				Fruit. Vegs	0.55		0.0021	0.0002	0.0023	9,500
				Canola	0.26	1,200	0.0033	0.0003	0.0036	6,100
Flagger										
Flagging for Aerial Application (7)	Baseline	0.011	0.35	Carrots	0.20	350	0.0017	0.0004	0.0021	10,000
				Stone Fruits, Tree Nuts, Pistachio	0.23		0.0019	0.0004	0.0023	9,500
				Bulb Veg.	0.30		0.0025	0.0005	0.0030	7,300
				Sm. Berries, Grapes, Strawberries	0.35		0.0029	0.0006	0.0035	6,200

Exposure Scenario (Scenario #)	Mitigation Level[a]	Dermal Unit Exposure[b] (mg/lb ai)	Inhalation Unit Exposure[c] (ug/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated[d] (A/day)	Daily Dermal Dose[e] (mg/kg/day)	Daily Inhalation Dose[f] (mg/kg/day)	Combined Daily Dose[g] (mg/kg/day)	MOE[h]
				Peanuts, Potatoes	0.44		0.0036	0.0008	0.0044	5,000
				Dry/Succul. Beans, Lettuce	0.48		0.0040	0.0008	0.0048	4,500
				Fruit. Vegs	0.55		0.0045	0.0010	0.0055	4,000
				Canola	0.26	1,200	0.0074	0.0016	0.0090	2,400

a Baseline consists of long-sleeve shirt, long pants, shoes, and socks and no respirator. PPE consists of long-sleeve shirt, long pants, shoes, socks, chemical-resistant gloves, and no respirator.
b Baseline Dermal Unit Exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractors, as appropriate.
c Baseline Inhalation Exposure represents no respiratory protection, open mixing/loading, and open cab tractors, as appropriate.
d Daily acres treated values are from EPA estimates of acreage that could be treated or volume handled in a single day for each exposure scenario of concern, based on the application method and formulation/packaging type.
e Daily dermal dose (mg/kg/d) = [unit dermal exposure (mg/lb ai) * dermal absorption (0.15) * application rate (lb ai/acre) * daily acres treated / body weight (70 kg).
f Daily inhalation dose (mg/kg/d) = (unit exposure (µg/lb ai) * (1mg/1000 µg) conversion * appl. rate (lb ai/acre) * daily acres treated / body weight (70 kg).
g Combined daily dose = daily dermal dose + daily inhalation dose.
h MOE = NOAEL (21.8 mg/kg/d) / combined daily dose. UF = 100.

5.2 Post-application

It has been determined that there is a potential for occupational exposure from entering areas previously treated with BAS 510 F. Table 7 summarizes the post-application exposure scenarios associated with BAS 510F. The residue transfer coefficients (TCs) used in this assessment are from an interim TC policy developed by HED Science Advisory Council (SAC) for Exposure using proprietary data from the Agricultural Re-entry Task Force (ARTF) database (Exposure SAC Policy No. 3.1). It is the intention of HED Exposure SAC that this policy will be periodically updated to incorporate additional information about agricultural practices in crops and new data on transfer coefficients. Much of this information will originate from exposure studies currently being conducted by the ARTF, from further analysis of studies already submitted to the Agency, and from studies in the published scientific literature. Occupational post-application exposure is expected to be short- and intermediate-term in duration.

5.2.1 Post-application Data, Assumptions and Calculations

Dislodgeable Residue Data:

Four dislodgeable foliar residue (DFR) studies were submitted in support of this registration action. The Health Canada Pest Management Regulatory Agency (PMRA) performed primary reviews on the studies and HED performed secondary reviews. HED concurred with the DFR study reviews done by PMRA. A summary of each study and the assumptions used to estimate post-application exposure for these crops are provided below. The DFR values selected and dissipation rate calculations are detailed in the appended REI estimation summaries.

BAS 510F UCF Dislodgeable Foliar Residue Study in Tomatoes, D.W. Haughey and J. E. Jones III, March 9, 2001, MRID# 45405302

This study shows a dissipation curve for BAS 510F after application to tomatoes at Pennsylvania/Georgia/California. At each site, BAS 510F was applied 2 times at 0.55 lba.i./A using ground boom with a 7-day interval between applications. Dislodgeable residues were sampled from the leaves using a Birkestrand leaf puncher. Each sample consisted of 40 leaf punches, and was taken in triplicate. Samples were taken before and after each application, and at 1, 3, 4, 7, 10, 14, 21, 28, and 35 days after the last application (DALA) at the Georgia/California sites. At the Pennsylvania site, samples were taken before and after each application and at 1, 2, 3, 6, 9, 13, 20, 27 and 34 DALA. Analyses were not performed for the samples taken before and after the first application at the Georgia and California sites. A control plot at each site was used to sample untreated leaves for field recovery. Except for minor limitations, the study design was considered acceptable.

After 2 BAS 510F applications, the peak residue value was observed on day 0, immediately after the final application at Pennsylvania/California, and on day 3 post-application at Georgia. Residues did not reach the LOQ by 35 days post-application at Pennsylvania or Georgia. At the California site, values of two replicates were below the LOQ on days 14, 28 and 35. Peak values were 1.06 $\mu g/cm^2$ in Pennsylvania, 0.71 $\mu g/cm^2$ in Georgia, and 0.66 $\mu g/cm^2$ in California. California had the most rapid decline with rep. values below the LOQ by day 14 followed by Pennsylvania/Georgia. Precipitation records showed that dry weather prevailed at California during the monitoring period and the irrigation systems did not result in any foliar contact. No rationale or explanation was given in the study report for these results. Regression lines were plotted using the natural log (ln) of the residue values vs the days after the final application. R^2 values were 0.9149, 0.6585 and 0.7647 and the half life ($t_{½}$) was 9.4 days at the Pennsylvania site. As R^2 were low at the Georgia and California sites, half lives could not be determined.

BAS 510F UCF Dislodge able Foliar Residue Study in Grapes, D.W. Haughey and J. E. Jones III, March 16, 2001, MRID# 45405303

This study shows a dissipation curve for BAS 510F after application to grape at Pennsylvania/California/Washington. At each site, BAS 510F was applied 3 times at 0.37 lba.i./A, with a 14-day interval between applications. Dislodgeable residues were sampled from the grape leaves using a Birkestrand leaf puncher. Each sample consisted of 40 leaf punches, and was taken in triplicate. Samples were taken before and after each application, and as follows: at 1, 3, 4, 7, 11, 14, 21, 28, 35 and 89 days after the last application (DALA) in Pennsylvania; at 1, 3, 4, 7, 10, 14, 21, 28, 35 and 88 DALA in California; and at 1, 3, 4, 7, 10, 14, 21 and 28 DALA in Washington. In Washington, an early season killing frost prohibited sampling after the 28 DALA time point. Analyses were performed only for the samples taken prior to the last application, and at the time intervals after the last application. A control plot at each site was used to sample untreated leaves for field recovery. Except for minor limitations, the study design was considered acceptable.

After 3 applications of BAS 510 F, residues reached a peak on day 1 in Pennsylvania and Washington. Residues in California reached a peak 10 DALA. Peak values were 0.72 $\mu g/cm^2$ in Pennsylvania, 1.17 $\mu g/cm^2$ in California and 1.42 $\mu g/cm^2$ in Washington. Residues did not reach the LOQ by 89, 88 and 28 days post-application at Pennsylvania, California and Washington. Residues declined to 0.26 $\mu g/cm^2$ in Pennsylvania, 0.23 $\mu g/cm^2$ in California, and 1.13 $\mu g/cm^2$ in Washington. Regression lines were plotted using the natural log (ln) of the residue values vs the days after the final application. R^2 values were all below 0.53, thus residue half lives could not be determined.

BAS 510F UCF Dislodge able Foliar Residue Study in Peaches, D.W. Haughey and J. E. Jones III, January 5, 2001, MRID# 45405304

This study shows a dissipation curve for BAS 510F after application to peach at California/Georgia/Pennsylvania. At each site, BAS 510F was applied 5 times at 0.23 lba.i./A using airblast with a 7-day interval between applications. Dislodgeable residues were sampled from the peach tree leaves using a Birkestrand leaf puncher. Each sample consisted of 40 leaf punches, and was taken in triplicate. Samples were taken before and after each application, and at 1, 2, 3, 4, 5, 7, 10, 14, 21, 28, and 35 days after the last application; however, analyses were not performed for the samples taken before and after the first 4 applications. A control plot at each site was used to sample untreated leaves for field recovery. Except for minor limitations, the study design was considered acceptable.

Peak residues were measured 2, 3 or 14 days after the last application. The highest peak residue was 1.3 $\mu g/cm^2$ in Pennsylvania (day 3), followed by 1.19 $\mu g/cm^2$ in California (day 14), and 0.58 $\mu g/cm^2$ in Georgia (day 2). A gradual decline in dislodgeable residues was observed in California/Georgia/Pennsylvania after the peak value, with residue values of 0.66, 0.21, and 0.26 $\mu g/cm^2$ after 35 days, respectively. Regression lines were plotted using the natural log (ln) of the residue values vs the days after the final application. R^2 values were 0.1417, 0.8312, and 0.8684 for California/Georgia/Pennsylvania sites. The half life ($t_{½}$) was 14.5 days for Pennsylvania but could not be determined for California or Georgia due to low R^2 values. The limitations of the study were not significant enough to affect the overall outcome.

BAS 510F UCF Dislodge able Foliar Residue Study in Strawberries, D.W. Haughey and J. E. Jones III, January 5, 2001, MRID# 45405305.

This study shows a dissipation curve for BAS510F after application to strawberries at N. Carolina/California/Oregon. At each site, BAS 510F was applied 5 times at 0.37 lba.i./A using ground boom with a 7-day interval between applications. Dislodgeable residues were sampled from the leaves using a Birkestrand leaf puncher. Each sample consisted of 40 leaf punches, and was taken in triplicate. Samples were taken before and after each application, and at 1, 2, 3, 4, 5, 6, 7, 10, 14, 21, 28, and 35 days after the last application; however, analyses were not performed for the samples taken before and after the first 4 applications. A control plot at each site was used to sample untreated leaves for field recovery. Except for minor limitations, the study design was considered acceptable.

After 5 applications of BAS 510F, the peak residue value was observed on day 0, immediately after the final application at N. Carolina/Oregon, and on days 2 and 3 post-application at California. Peak values were 1.63 $\mu g/cm^2$ in N. Carolina, 1.83 $\mu g/cm^2$ in California, and only 0.76 $\mu g/cm^2$ in Oregon. In N. Carolina, the peak value was followed by a rapid decrease (from 1.63 $\mu g/cm^2$ to 0.86 $\mu g/cm^2$) on day 1. Residues did not reach the LOQ by 35 days post-application at any of the three sites. Regression lines were plotted using the natural log (ln) of the residue values vs the days after the final application. R^2 values were 0.8958, 0.8434, and 0.8665 and half lives ($t_{½}$) were 5.7 days, 21.9 days,

and 8.7 days at N. Carolina/California/Oregon sites, respectively.

Table 7. Anticipated Post-application Activities and Dermal Transfer Coefficients for BAS 510 F						
Proposed Crops	**Policy Crop Group Category**	**Application Rate (lb ai/A)**	**Exposure Potential**	**Transfer Coefficients (cm^2/hr)**	**Activities**	**Reference**
strawberry	low berries	0.35	low	400	hand weeding, harvesting and pruning, scouting, irrigation, mulching, thinning	DFR Strawberry Study MRID# 45405305
			high	1500	hand harvesting, and pruning, pinching, and training	
peas and beans (dry & succulent), canola, mint, peanuts	field row low/medium	0.48	low	100	irrigation, scouting, thinning, hand weeding	Central value from MRID 426891 - hoeing in cotton and beans
			medium	1500	irrigation, scouting, hand weeding,	Central value from ARF021 - scouting dry peas
			high	2500	hand harvesting	high end value from ARF021 - scouting dry peas
Tall field row (sunflower seeds) crop	field row crop, tall	0.40	low	400	scouting	low value from ARF009- scouting sweet corn
			high	1000	scouting	central value from ARF009- scouting sweet corn
stone fruits (apricot, cherry, nectarine, peach, plum & prune)	trees, fruit, deciduous	0.23	very low	100	propping	Peach DFR Study (MRID#4540304)
			low	1000	scouting, irrigation, hand weeding	
			high	1500	hand harvesting &pruning, propping, training, tying	
			very high	3000	thinning	
Tree Nuts (almond, pecan, walnut, pistachio	tree, nuts	0.23	low	500	scouting, thinning, irrigation, hand weeding	Peach DFR Study (MRID#4540304)
			high	2500	hand pruning, harvesting, netting, and thinning	

cucurbit vegetables	cucurbit vegetables	0.31	low	500	irrigation, scouting, thinning, hand weeding	1. DFR Tomato Study MRID# 45405302 2. HED default DFR and dissipation rates
			medium	1500	irrigation, scouting, hand weeding	
			high	2500	hand harvesting and pruning, thinning, turning, leaf pulling	
tomato, bell pepper, chilli pepper, eggplant	fruiting vegetables	0.55	low	500	hand weeding, scouting, thinning, irrigation	DFR Tomato Study MRID# 45405302
			medium	700	irrigating, scouting, hand pruning, staking, tying	
			high	1000	hand harvest & pruning, staking, tying, thinning, training	
cole crops	head and stem brassica	0.42	low	2000	irrigation, scouting, thinning, weeding immature plants	1. DFR Tomato Study MRID# 45405302 2. HED default DFR and dissipation rates
			medium	4000	scouting mature plants	
			high	5000	hand harvesting, irrigation, pruning, topping, tying mature plants	
Lettuce	leafy vegetables	0.48	low	500	hand weeding, irrigation, scouting, thinning	1. DFR Tomato Study MRID# 45405302 2. HED default DFR and dissipation rates
			medium	1500	irrigation, scouting	
			high	2500	hand harvesting & pruning, thinning	
carrots, potatoes, onions, garlic and leeks	vegetable, root	0.44	low	300	irrigation, scouting, thinning, hand weeding and pruning	1. DFR Tomato Study MRID# 45405302 2. HED default DFR and dissipation rates
			medium	1500	irrigation and scouting	
			high	2500	hand harvest, thinning	

grapes blueberry, caneberry, raspberry	vine/trellis (w/ and w/o girdling)	0.35	low	500	irrigation, hand weeding, scouting, hedging	DFR Grape Study MRID#5405303
			medium	1000	training, scouting, tying	
			high	5000	hand harvesting & pruning, training, tying, thinning, leaf pulling	
	(w/girdling)		very high	10,000	cane turning & tying, and girdling	
Turf	mowing	0.5	low	500	mowing, irrigation	Turf TTR Study MRID# 45405301
	jazzercise		high	16,500	hand weeding, transplanting	

The information in the table is based on proprietary and non-proprietary data.

Equations/Calculations:

The following equations were used to calculate risks for workers performing post-application activities:

DFR_t (ug/cm^2) = Application Rate (lb ai/acre) x F x $(1-D)^t$ x 4.54E8 µg/lb x 24.7E-9 $acre/cm^2$

Where:

DFR_t	=	dislodgeable foliage residue on day "t" (ug/cm^2)
Rate	=	application rate (lb ai/acre)
F	=	fraction of ai retained on foliage (unitless)
D	=	fraction of residue that dissipates daily (unitless)

Note that DFR and TTR (transferable turf residue) may be used interchangeably in this equation to determine exposure to residues on crop foliage or turf leaves, respectively.

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

Where,

t	=	number of days after application day (days)
DFR_t	=	dislodgeable foliage residue on day "t" (ug/cm^2)
Tc	=	transfer coefficient (cm^2/hr)
DA	=	dermal absorption factor (0.15)
ET	=	exposure time (8 hr/day)
BW	=	body weight (70 kg)

$$\textbf{MOE} = \frac{\text{NOAEL (21.8 mg/kg/day)}}{\textbf{Dermal Daily Dose (mg/kg/day)}}$$

5.2.2 Post-application Exposure, Risk and Characterization

The occupational dermal post-application exposure and risk were calculated by coupling crop specific DFR values or turf TTR values with activity specific transfer coefficient (Tc) values from the HED Science Advisory Council For Exposure Policy Number 3.1: Agricultural Transfer Coefficients, August 2000.

For each DFR/TTR study, the site with the highest residue was selected for use in the risk assessment. The DFR studies were used to assess both crop specific as well as chemical specific surrogate data for determining post-application exposure for various other crops (i.e. leafy and root vegetables, cole crops and cucurbits). Table 8 summarizes the post-application exposure estimates for all crops. Post-application exposure estimates except for one, grapes with girdling, were all greater than the target MOE of 100 and therefore did not exceed HED's level of concern. The MOE for grapes with girdling was 95 on the day of application. The MOE did not reach the target MOE of 100 till day 9.

TABLE 8: Post-application Exposure and Risk for BAS 510 F Using DFR Study Data							
Crops	DAT	DFR [1] (ug/cm2)	Daily Dose [2] (mg/kg/day)		MOE [3]		Pre-harvest Interval
			low	high	low	high	
strawberry, blueberry, caneberry, rasberry	0	1.731 *	0.012	0.045	1800	490	0-days
Low/medium field row crops (peas, beans, canola, mint, and peanuts)	0	0.925 *	0.0016	0.040	14000	550	6-8 days - succulent peas 7-days - succulent beans 14 days - peanuts, mint 21 days - dry beans & peas, and canola,
Tall row crop (sunflower seeds)	0	0.920	0.0016	0.016	14000	1400	20-21 days
Deciduous fruit trees (stone fruits)	0	1.3	0.0022	0.067	9800	330	0-days
tree nuts	0	1.3	0.011	0.056	2000	390	14-days
cucurbits	0	0.597 *	0.0051	0.026	4300	850	0-days
fruiting vegetables	0	1.06	0.0091	0.018	2400	1200	0-days
cole crops	0	0.809 *	0.028	0.069	790	310	0-days 14-days
leafy vegetables	0	0.925 *	0.0079	0.04	2700	550	14-days
root vegetables	0	0.848 *	0.0044	0.036	5000	600	0-days - carrots and immature plants
							7-days - onions, garlic, leeks 30-days - potatoes
grapes w/girdling	0	1.343 *	0.012	0.23	1900	95	14-days
	2	1.327 *	0.011			96	
	4	1.31 *		0.22		97	
	5	1.3 *			2000	98	
	7	1.286 *				99	
	9	1.27 *				100	
blueberry, caneberry, rasberry; grapes w/o girdling	0	1.343 *	0.012	0.12	1900	190	
golf course turf	0	0.188	0.0016	0.053	14,000	410	N/A

1. * The highest daily average Dislodgeable Foliar Residues were adjusted for differences in application rates between the DFR studies and the proposed label rates

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

3. MOE = $\frac{\text{NOAEL (21.8 mg/kg/day)}}{\text{Dermal Daily Dose (mg/kg/day)}}$

Re-Entry Interval (REI)

Due to the statistical uncertainty in estimating the MOE, 95 is considered equivalent to the target of 100 for risk assessment in this case. Therefore, the Restricted Entry Interval (REI) may be based on acute toxicity of the active ingredient.

A 4-hour REI is proposed on the BAS 510 02F label. In accordance with the Federal Register Notice: Worker Protection Standard (WPS), Reduced REIs for Certain Pesticides (May 3, 1995), 4-hour REI active ingredients cannot be dermal sensitizers. The submitted dermal sensitization study on guinea pigs (MRID# 45404819) was considered unacceptable and therefore the determination as to whether BAS 510F is or is not a dermal sensitizer could not be made. In addition, the data demonstrate that residues are highly persistent, dissipate slowly, and, for grape girdling, result in a MOE close to the level of concern. The technical material has a Toxicity Category III or IV. Per the WPS, a 12-hr REI is required. Therefore, **HED recommends use of the WPS required 12 hour REI based on acute toxicity categories and does not concur with the proposed 4-hour REI.** Should an acceptable dermal sensitizer study be submitted in the future, HED will revisit the REI issue.

APPENDIX

Post-application Worker Exposure & Risk Estimates

Using BAS 510F DFR/TTR Study Data

Appendix 1. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results--1

Chemical: BAS510 **wet turf**
Date: 5/16/03
Assessor: M Collantes
Transfer Coefficient Group: Turf / sod
Specific Crop Considered: Golf courses
Application Rate of Crop (lb ai/A): 0.5

DFR Data Summary
Source: TTR Study
Slope of Semilog Regression: -0.3188
Day 0 Concentration (ug/cm): 0.048
Study Application Rate (lb ai/A): 0.35
Limit of Quantification (ug/cm2): 0.00179

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	N/A	Mowing
Medium	N/A	N/A	N/A
High	16500	N/A	Transplanting, Weeding (hand), Harvest (hand), Harvest (mechanical)
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	0.048	0.069	N/A	0.00059	N/A	0.019	N/A	N/A	37000	N/A	1100	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', 8/17/00.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).
5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 2. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—2

Chemical: BAS510 **dry turf**
Date:
Assessor:
Transfer Coefficient Group: Turf / sod
Specific Crop Considered: Golf courses
Application Rate of Crop (lb ai/A): 0.5

DFR Data Summary
Source: TTR study
Slope of Semilog Regression: -0.3188
Day 0 Concentration (ug/cm): 0.1313
Study Application Rate (lb ai/A): 0.35
Limit of Quantification (ug/cm2): 0.00179

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	N/A	Mowing
Medium	N/A	N/A	N/A
High	16500	N/A	Transplanting, Weeding (hand), Harvest (hand), Harvest (mechanical)
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	0.131	0.188	N/A	0.0016	N/A	0.053	N/A	N/A	14000	N/A	410	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 3. BAS 510 Agricultural Crop Reentry Crop Groupings, Selected Transfer Coefficients, Treated Crops, and Rates

Transfer Coefficient Group (1)	Specific Transfer Coefficient (cm2/hr) (1)		BAS510 Specific Crops (2)	Max Foliar Rate (lb ai/acre)
	High end activities	Low end activities		
Berry, low	1500 400 - 1,800	400 400 - 1,800	Berry, low	0.35
Field / row crops, low / medium	2500 486 - 2,760	100 TBD	Field / row crops, low / medium	0.48
Field / row crops, tall	1000 418 - 1,980	100 TBD	Field / row crops, tall	0.41
Trees, fruit, deciduous	1500 1,421 - 4,393	1000 197 - 2,302	Trees, fruit, deciduous	0.23
Trees, nut	2500 1,121 - 4,929	500 197 - 2,302	Trees, nut	0.23
Vegetable, cucurbit	2500 486 - 2,760	500 486 - 2,760	Vegetable, cucurbit	0.31
Vegetable, fruiting	1000 364 - 1,908	500 486 - 2,760	Vegetable, fruiting	0.55
Vegetable, head and stem Brassica	5000 2,862 - 7,584	2000 1,672 - 8,147	Vegetable, head and stem Brassica	0.42
Vegetable, leafy	2500 486 - 2,760	500 486 - 2,760	Vegetable, leafy	0.48
Vegetable, root	2500 486 - 2,760	300 140 - 290	Vegetable, root	0.44
Vine / trellis (w/ girdling)	5000 TBD	500 197 - 2,302	Vine / trellis (w/ girdling)	0.35
Vine / trellis (w/o girdling)	5000 TBD	500 197 - 2,302	Vine / trellis (w/o girdling)	0.35

Footnote:

1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.

Appendix 4. Summary of 'Days After Treatment' to Reach the Target MOE for Short-term Exposure

Crop Grouping (1)	BAS510 Specific Crops (2)	Max Foliar Rate (lb ai/acre) (2)	Days After Treatment Target MOE Achieved (Target MOE = 100)				
			Exposure Activity Levels (3,4)				
			Very Low	Low	Medium	High	Very High
Berry, low	Berry, low	0.35	N/A	0	N/A	0	N/A
Field / row crops, low / medium	Field / row crops, low / medium	0.48	N/A	0	0	0	N/A
Field / row crops, tall	Field / row crops, tall	0.41	N/A	0	0	0	2
Trees, fruit, deciduous	Trees, fruit, deciduous	0.23	0	0	N/A	0	0
Trees, nut	Trees, nut	0.23	N/A	0	N/A	0	N/A
Vegetable, cucurbit	Vegetable, cucurbit	0.31	N/A	0	0	0	N/A
Vegetable, fruiting	Vegetable, fruiting	0.55	N/A	0	0	0	N/A
Vegetable, head and stem Brassica	Vegetable, head and stem Brassica	0.42	N/A	0	0	0	N/A
Vegetable, leafy	Vegetable, leafy	0.48	N/A	0	0	0	N/A
Vegetable, root	Vegetable, root	0.44	N/A	0	0	0	N/A
Vine / trellis (w/ girdling)	Vine / trellis (w/ girdling)	0.35	N/A	0	0	0	9
Vine / trellis (w/o girdling)	Vine / trellis (w/o girdling)	0.35	N/A	0	0	0	N/A

Footnote:

1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d) where the absorbed dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

Appendix 5. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—3

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Berry, low
Specific Crop Considered: Berry, low
Application Rate of Crop (lb ai/A): 0.35

DFR Data Summary
Source: strawberry study
Slope of Semilog Regression: -0.0317
Day 0 Concentration (ug/cm): 1.83
Study Application Rate (lb ai/A): 0.37
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	400	400 - 1,800	Scouting, Weeding (hand), Irrigation, Pruning (hand), Thinning, Harvest (hand) (raking), Pruning (hand) (shears), Mulching
Medium	N/A	N/A	N/A
High	1500	400 - 1,800	Harvest (hand), Pruning (hand), Pinching, Training
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.830	1.731	N/A	0.012	N/A	0.045	N/A	N/A	1800	N/A	490	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', 8/17/00.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).
5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 6. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results-4

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Field / row crops, low / medium
Specific Crop Considered: Field / row crops, low / medium
Application Rate of Crop (lb ai/A): 0.48

DFR Data Summary
Source: tomato study
Slope of Semilog Regression: -0.0739
Day 0 Concentration (ug/cm): 1.06
Study Application Rate (lb ai/A): 0.55
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	100	TBD	Irrigation, Scouting, Weeding (hand), Thinning
Medium	1500	486 - 2,760	Irrigation, Scouting, Weeding (hand)
High	2500	486 - 2,760	Harvest (hand)
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	0.925	N/A	0.0016	0.024	0.040	N/A	N/A	14000	920	550	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).
5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 7. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results-5

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Field / row crops, tall
Specific Crop Considered: Field / row crops, tall
Application Rate of Crop (lb ai/A): 0.41

DFR Data Summary
Source: tomato study
Slope of Semilog Regression: -0.0739
Day 0 Concentration (ug/cm): 1.06
Study Application Rate (lb ai/A): 0.55
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	100	TBD	Scouting, Weeding (hand)
Medium	400	418 - 1,980	Scouting
High	1000	418 - 1,980	Irrigation, Scouting, Weeding (hand)
Very High	17000	6,748 - 25,254	Detasseling, Harvest (hand)

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	0.790	N/A	0.0014	0.0054	0.014	0.23	N/A	16000	4000	1600	95
1	0.984	0.734	N/A	0.0013	0.0050	0.013	0.21	N/A	17000	4300	1700	100

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 8. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—6

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Trees, fruit, deciduous
Specific Crop Considered: Trees, fruit, deciduous
Application Rate of Crop (lb ai/A): 0.23

DFR Data Summary
Source: strawberry study
Slope of Semilog Regression: -0.0317
Day 0 Concentration (ug/cm): 1.83
Study Application Rate (lb ai/A): 0.37
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	100	TBD	Propping
Low	1000	197 - 2,302	Scouting, Weeding (hand), Irrigation
Medium	N/A	N/A	N/A
High	1500	1,421 - 4,393	Harvest (hand), Propping, Pruning (hand), Training, Tying
Very High	3000	2,177 - 3,688	Thinning

DAT (4)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.830	1.138	0.0020	0.020	N/A	0.029	0.059	11000	1100	N/A	750	370

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.

3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).
5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 9. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—7

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Trees, nut
Specific Crop Considered: Trees, nut
Application Rate of Crop (lb ai/A): 0.23

DFR Data Summary
Source: peach data
Slope of Semilog Regression: -0.0477
Day 0 Concentration (ug/cm): 1.3
Study Application Rate (lb ai/A): 0.23
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	197 - 2,302	Scouting, Thinning, Irrigation, Weeding (hand)
Medium	N/A	N/A	N/A
High	2500	1,121 - 4,929	Harvest (hand), Pruning (hand), Thinning, Harvest (hand) (net)
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.300	1.300	N/A	0.011	N/A	0.056	N/A	N/A	2000	N/A	390	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 10. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—8

Chemical:	BAS510
Date:	050803
Assessor:	Margarita Collantes
Transfer Coefficient Group:	Vegetable, cucurbit
Specific Crop Considered:	Vegetable, cucurbit
Application Rate of Crop (lb ai/A):	0.31

DFR Data Summary

Source:	tomato study
Slope of Semilog Regression:	-0.0739
Day 0 Concentration (ug/cm):	1.06
Study Application Rate (lb ai/A):	0.55
Limit of Quantification (ug/cm2):	0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	486 - 2,760	Irrigation, Scouting, Thinning, Weeding (hand)
Medium	1500	486 - 2,760	Irrigation, Scouting, Weeding (hand)
High	2500	486 - 2,760	Harvest (hand), Leaf Pulling, Pruning (hand), Thinning, Turning
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	0.597	N/A	0.0051	0.015	0.026	N/A	N/A	4300	1400	850	N/A

Footnote:

1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 11. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—9

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Vegetable, fruiting
Specific Crop Considered: Vegetable, fruiting
Application Rate of Crop (lb ai/A): 0.55

DFR Data Summary
Source: tomato study
Slope of Semilog Regression: -0.0739
Day 0 Concentration (ug/cm): 1.06
Study Application Rate (lb ai/A): 0.55
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	486 - 2,760	Weeding (hand), Irrigation, Scouting, Thinning
Medium	700	TBD	Irrigation, Scouting, Pruning (hand), Staking, Tying
High	1000	364 - 1,908	Harvest (hand), Pruning (hand), Staking, Thinning, Training, Tying
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	1.060	N/A	0.0091	0.013	0.018	N/A	N/A	2400	1700	1200	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 12. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—10

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Vegetable, head and stem Brassica
Specific Crop Considered: Vegetable, head and stem Brassica
Application Rate of Crop (lb ai/A): 0.42

DFR Data Summary
Source: tomato study
Slope of Semilog Regression: -0.0739
Day 0 Concentration (ug/cm): 1.06
Study Application Rate (lb ai/A): 0.55
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	2000	1,672 - 8,147	Weeding (hand), Scouting, Thinning, Irrigation, Pruning (hand)
Medium	4000	1,672 - 8,147	Scouting
High	5000	2,862 - 7,584	Harvest (hand), Irrigation, Pruning (hand), Thinning, Topping, Tying
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	0.809	N/A	0.028	0.056	0.069	N/A	N/A	790	390	310	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', 8/17/00.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 13. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—11

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Vegetable, leafy
Specific Crop Considered: Vegetable, leafy
Application Rate of Crop (lb ai/A): 0.48

DFR Data Summary
Source: tomato study
Slope of Semilog Regression: -0.0739
Day 0 Concentration (ug/cm): 1.06
Study Application Rate (lb ai/A): 0.55
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	486 - 2,760	Weeding (hand), Irrigation, Scouting, Thinning
Medium	1500	486 - 2,760	Irrigation, Scouting
High	2500	486 - 2,760	Harvest (hand), Pruning (hand), Thinning
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	0.925	N/A	0.0079	0.024	0.040	N/A	N/A	2700	920	550	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).
5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 14. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—12

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Vegetable, root
Specific Crop Considered: Vegetable, root
Application Rate of Crop (lb ai/A): 0.44

DFR Data Summary
Source: tomato study
Slope of Semilog Regression: -0.0739
Day 0 Concentration (ug/cm): 1.06
Study Application Rate (lb ai/A): 0.55
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	300	140 - 290	Irrigation, Scouting, Thinning, Weeding (hand), Pruning (hand)
Medium	1500	486 - 2,760	Irrigation, Scouting
High	2500	486 - 2,760	Harvest (hand), Thinning
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.060	0.848	N/A	0.0044	0.022	0.036	N/A	N/A	5000	1000	600	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 15. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—13

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Vine / trellis (w/ girdling)
Specific Crop Considered: Vine / trellis (w/ girdling)
Application Rate of Crop (lb ai/A): 0.35

DFR Data Summary
Source: grape study
Slope of Semilog Regression: -0.0062
Day 0 Concentration (ug/cm): 1.42
Study Application Rate (lb ai/A): 0.37
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	197 - 2,302	Irrigation, Weeding (hand), Scouting, Hedging
Medium	1000	197 - 2,302	Scouting, Training, Tying
High	5000	TBD	Harvest (hand), Pruning (hand), Training, Tying, Thinning, Leaf Pulling
Very High	10000	TBD	Girdling, Turning (Cane turning), Tying (Cane turning)

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.420	1.343	N/A	0.012	0.023	0.12	0.23	N/A	1900	950	190	95
1	1.411	1.335	N/A	0.011	0.023	0.11	0.23	N/A	1900	950	190	95
2	1.403	1.327	N/A	0.011	0.023	0.11	0.23	N/A	1900	960	190	96
3	1.394	1.318	N/A	0.011	0.023	0.11	0.23	N/A	1900	960	190	96
4	1.385	1.310	N/A	0.011	0.022	0.11	0.22	N/A	1900	970	190	97

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
5	1.377	1.302	N/A	0.011	0.022	0.11	0.22	N/A	2000	980	200	98
6	1.368	1.294	N/A	0.011	0.022	0.11	0.22	N/A	2000	980	200	98
7	1.360	1.286	N/A	0.011	0.022	0.11	0.22	N/A	2000	990	200	99
8	1.351	1.278	N/A	0.011	0.022	0.11	0.22	N/A	2000	990	200	99
9	1.343	1.270	N/A	0.011	0.022	0.11	0.22	N/A	2000	1000	200	100

Footnote:

1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).
5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

Appendix 16. Occupational Post-Application Risk Assessment Calculator (12/7/01) Short-term Results—14

Chemical: BAS510
Date: 050803
Assessor: Margarita Collantes
Transfer Coefficient Group: Vine / trellis (w/o girdling)
Specific Crop Considered: Vine / trellis (w/o girdling)
Application Rate of Crop (lb ai/A): 0.35

DFR Data Summary
Source: grape study
Slope of Semilog Regression: -0.0062
Day 0 Concentration (ug/cm): 1.42
Study Application Rate (lb ai/A): 0.37
Limit of Quantification (ug/cm2): 0.0125

Exposure Inputs Summary

Exposure Potential	Transfer Coefficients (cm2/hr) (1)		Activities (1)
	Used for RA	Range	
Very Low	N/A	N/A	N/A
Low	500	197 - 2,302	Irrigation, Weeding (hand), Scouting, Hedging
Medium	1000	197 - 2,302	Scouting, Training, Tying
High	5000	TBD	Harvest (hand), Pruning (hand), Training, Tying, Thinning, Leaf Pulling
Very High	N/A	N/A	N/A

DAT (3)	DFR LEVELS (ug/cm2)		DOSE (mg/kg/day) (4)					MOEs (5)				
	Not Adjusted	Adjusted for Rate	Very Low	Low	Medium	High	Very High	Very Low	Low	Medium	High	Very High
0	1.420	1.343	N/A	0.012	0.023	0.12	N/A	N/A	1900	950	190	N/A

Footnote:
1. Crop groupings and transfer coefficients from Science Advisory Council for Exposure: Policy Memo #003.1 'Agricultural Transfer Coefficients', August 17, 2000.
2. Maximum label rates from end use product labels.
3. DAT = Days after treatment; DAT0 = On the day of treatment, after sprays have dried; assumed approximately 12 hours.
4. The absorbed dermal dose = DFR (ug/cm2) x TC (cm2/hr) x conversion factor (1 mg/1,000 ug) x exposure time (hrs) x dermal absorption / body weight (kg).

5. MOE = Dermal toxicity endpoint (mg/kg-day)/absorbed dermal dose (mg/kg-d).

CC: RAB2 RF, M. Collantes, G. Bangs, S. Wang