

		insecticide in the same season.  Imidacloprid is registered for suppression of the early fall larval stages of leatherjackets. Only one application per year is registered. If a previous application to turf was made with imidacloprid for control of Japanese beetle, European chafer or black turfgrass ateanius then imidacloprid may not be used to control leatherjackets in the same year. Imidacloprid may not be used on turf previously treated in the same year with a group 4 insecticide.  Chlorantraniliprole is applied between September and November
European chafer, Japanese beetle	4: clothianidin, imidacloprid  28: chlorantraniliprole	Clothianidin, imidacloprid and thiamethoxam are currently under re-evaluation.  Clothianidin is applied to turf as a preventative and curative treatment. Preventative treatments begin when first adults appear and continue through peak egg hatch. Curative treatments are applied after egg hatch or when damage is observed from the current generation.  Imidacloprid application is made prior to egg hatch (preventative treatment) and will provide suppression only.  Thiamethoxam is timed from peak adult flight to peak egg hatch.  Chlorantraniliprole is applied to turf as a preventative and early curative treatment from early April to late August.
Ants	1B: chlorpyrifos 3: deltamethrin, lambda cyhalothrin	Chlorpyrifos is registered for use on golf courses, industrial sites, highway medians and sod farms only.
Chinch bug	1B: chlorpyrifos 3: deltamethrin 4: clothianidin Other: <i>Metarhizium anisopliae</i>	Clothianidin, deltamethrin and lambda-cyhalothrin are currently under re-evaluation.  One application of chlorantraniliprole may be made per season.

Cutworms	1B: chlorpyrifos 3: deltamethrin 28: chlorantraniliprole	Deltamethrin is registered for use in Eastern Canada and British Columbia only.  <i>Metarhizium anisopliae</i> is registered for suppression of hairy chinch bug only.
Sod webworms	1B: chlorpyrifos 3: deltamethrin 5: spinosad	

<sup>1</sup> Insecticide and Acaricide Resistance Management Group Numbers based on DIR 99-06, *Voluntary Pesticide Resistance Management Labelling based on Target Site/Mode of Action*, with updates from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification Scheme v7.4 May 2015. Available at <http://www.irac-online.org/documents/moa-classification/>. 1B = acetylcholinesterase inhibitors; 3 = sodium channel modulators; 4 = nicotinic acetylcholine receptor competitive modulators; 5 = nicotinic acetylcholine receptor allosteric modulators; 28 = ryanodine receptor modulators.

<sup>2</sup> This is a list of registered alternatives, current as of August 2015. The registration status of active ingredients under re-evaluation may change pending the final regulatory decision. For additional information, consult the Pesticides and Pest Management portion of Health Canada's website: [http://www.hc-sc.gc.ca/cps-spc/pubs/pest/\\_decisions/index-eng.php](http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/index-eng.php) (English) and [http://www.hc-sc.gc.ca/cps-spc/pubs/pest/\\_decisions/index-fra.php](http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/index-fra.php) (French) for Re-evaluation Decisions (RVD and RRD documents) and Re-evaluation Notes (REV documents) or <http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/index-eng.php> (English) and <http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/index-fra.php> (French) for current and past consultation documents including Proposed Re-evaluation Decisions (PRVD and PACR documents) and certain Re-evaluation Notes (REV documents).

### 3.3 Use of Carbaryl in the Ornamental Landscape Industry and in Forestry for the Control of Mountain Pine Beetle

#### Comments:

Carbaryl is needed for the control of mountain pine beetle on high value ornamental trees and in forestry. In British Columbia, carbaryl has been critical to protecting pine trees in nurseries, golf courses, residential properties and other locations during the current outbreak of mountain pine beetle.

Carbaryl is critical to the ornamental industry for the control of Japanese beetle and gypsy moth which are identified by the Canadian Food Inspection Agency (CFIA) as quarantine pests.

Carbaryl is also needed for the control of ash plant bug, blister beetles, boxelder bug, elm leaf beetle, elm spanworm, flea beetles, leafhoppers, leafrollers, mountain pine beetle, black vine weevil, June beetle, psyllids, rose chafer, scale crawlers and willow leaf beetle on ornamental plants.

#### PMRA Response:

The PMRA acknowledges that there are limited registered alternative active ingredients to carbaryl for the control of mountain pine beetle in Western Canada including British Columbia. Currently, chlorpyrifos (limited to forestry use) and verbenone are the registered alternative active ingredients to carbaryl. In addition, it is noted that for some ornamental pests there are few registered alternatives (for example, for blister beetle, cankerworm, Eriophyid mites, flea beetle or leafrollers), or there are no registered alternative active ingredients to carbaryl (boxelder bug, June beetle and rose chafer).

Furthermore, the PMRA recognizes that several of the registered alternative active ingredients to carbaryl are currently under re-evaluation and may be registered for use only on a few of the ornamental crops listed on the carbaryl product labels or may have other use limitations.

### 3.4 Carbaryl Use on Tobacco

**Comment:**

Carbaryl is used for control of hornworm and flea beetle on flue-cured tobacco in the field. There are few registered alternative active ingredients to carbaryl.

**PMRA Response:**

Information received in response to PRVD2009-14 resulted in refinement of the risk assessment for tobacco. As a result, the restricted-entry intervals were reduced and deemed by the PMRA to be agronomically feasible. Therefore, tobacco will remain in the registered use pattern of carbaryl.

### 3.5 Carbaryl Use on Grape

**Comments:**

Carbaryl is critical for control of leafhoppers on grapes. The other registered alternative active ingredients are not as effective as carbaryl to control this pest and are more costly.

Neonicotinoids are persistent and negatively impact predaceous thrips and mites leading to secondary pest outbreaks of phytophagous mites. Some European countries have temporarily suspended the use of neonicotinoids (due to sudden bee colony collapse disorder) and this may impact export of Canadian wines due to concerns about neonicotinoid residues.

**PMRA Response:**

The registered alternative active ingredients to carbaryl for the control of leafhoppers on grapes are listed in Table 3.5. The PMRA acknowledges that the alternative active ingredients may be more costly and that repeated use of a single active ingredient or active ingredients within one resistance mode of action group may result in secondary pest outbreaks and promote the development of resistance.

**Table 3.5 Alternative Active Ingredients to Carbaryl for the Control of Leafhoppers on Grapes Registered in Canada as of August 2015**

Crop	Pest	Resistance Management Group MoA: <sup>1</sup> Registered alternatives <sup>2</sup>	Comments
Grape	Leafhoppers	1B: malathion  3: cypermethrin, permethrin, pyrethrins	Clothianidin, cypermethrin, imidacloprid, permethrin and pyrethrins are currently under re-evaluation.

Crop	Pest	Resistance Management Group MoA: <sup>1</sup> Registered alternatives <sup>2</sup>	Comments
		4: acetamiprid, clothianidin, imidacloprid, sulfoxaflor  Other: kaolin clay	

<sup>1</sup> Insecticide and Acaricide Resistance Management Group Numbers based on DIR 99-06, *Voluntary Pesticide Resistance Management Labelling based on Target Site/Mode of Action*, with updates from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification Scheme v7.4 May 2015. Available at <http://www.irac-online.org/documents/moa-classification/>. 1B = acetylcholinesterase inhibitors; 3 = sodium channel modulators; 4 = nicotinic acetylcholine receptor competitive modulator.

<sup>2</sup> This is a list of registered alternatives, current as of August 2015. The registration status of active ingredients under re-evaluation may change pending the final regulatory decision. For additional information, consult the Pesticides and Pest Management portion of Health Canada's website: [http://www.hc-sc.gc.ca/cps-spc/pubs/pest/\\_decisions/index-eng.php](http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/index-eng.php) (English) and [http://www.hc-sc.gc.ca/cps-spc/pubs/pest/\\_decisions/index-fra.php](http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/index-fra.php) (French) for Re-evaluation decisions (RVD and RRD documents) and Re-evaluation notes (REV documents) or <http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/index-eng.php> (English) and <http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/index-fra.php> (French) for current and past consultation documents including Proposed Re-evaluation Decisions (PRVD and PACR documents) and certain Re-evaluation notes (REV documents).

### 3.6 Carbaryl use for the control of (striped) cucumber beetle and climbing cutworms on cucumber, melon, pumpkin and squash

#### Comment:

Use of carbaryl for the control of cucumber beetle and climbing cutworm is critical until a suitable alternative active ingredient is available at a comparable price.

#### PMRA Response:

Information received in response to PRVD2009-14, resulted in refinement of the risk assessment for cucumber, melon, pumpkin and squash. As a result, the restricted-entry intervals were reduced and deemed to be agronomically feasible by the PMRA. Therefore, these uses will remain in the registered use pattern of carbaryl.

### 3.7 Carbaryl use on cole crops (broccoli, Brussels sprouts, cabbage, cauliflower, and kohlrabi)

#### Comment:

Carbaryl is required for resistance management of crucifer pests.

#### PMRA Response:

Information received in response to PRVD2009-14, resulted in refinement of the risk assessment for kohlrabi. As a result, the restricted-entry intervals were reduced and deemed to be



agronomically feasible by the PMRA. Therefore, kohlrabi will remain in the registered use pattern of carbaryl. Registered alternative active ingredients are available from several resistance mode of action groups for the control of diamondback moth, imported cabbageworm and cabbage looper on broccoli, Brussels sprouts, cabbage, cauliflower and kale. However, there are few viable alternative active ingredients for the control of leafhoppers. Chlorantraniliprole is the only alternative active ingredient to carbaryl for control of armyworm and corn earworm. Management of the development of resistance to this active ingredient is a concern for growers. There are no registered alternative active ingredients to carbaryl for the control of meadow spittle bug, *Lygus* bug and stink bugs on cole crops. The PMRA also recognises that some of the registered alternative active ingredients to carbaryl have limitations, and that several of these active ingredients are currently under re-evaluation.

### **3.8 Carbaryl Use in Residential Areas and the Impact on Agriculture from the Rural and Urban Interface**

#### **Comments:**

Removal of the residential uses of carbaryl will negatively impact cherry growers where there is a rural and urban interface. Cherry growers adjacent to residential areas will be impacted by greater pest pressure from residential trees acting as a source of pests (particularly cherry fruit fly). There are no viable alternatives to carbaryl for the control of fruit tree pests on residential fruit trees. Residential yards acting as a source of pests may affect other crops as well.

#### **PMRA Response:**

The PMRA acknowledges that residential fruit trees may act as a source of insect pests that could infest orchards, particularly where residential yards are adjacent to production areas. Fruit tree hosts in residential areas which may harbour pests that could infest cherry orchards include:

- stone fruit: apricot, cherry, peach, plum; and
- pome fruit: apple and pear.

Use of pesticides to control fruit tree pests in residential areas may be subject to provincial or municipal regulations. These regulations may restrict or prohibit the use of pest control products in residential areas. Alternative pest control products to the Domestic Class carbaryl products include:

- Commercial Class products such as acephate, acetamiprid, malathion, permethrin, insecticidal soap and mineral oil that may be applied by a licensed applicator; and
- Domestic Class products that may be applied by the homeowner, including malathion, permethrin, pyrethrin, spinosad, *Bacillus thuringiensis* var *kurstaki*, insecticidal soap and mineral oil.

There are no other registered Domestic Class products for the control of cherry fruit fly or apple maggot on cherry, plum, and pears aside from the Domestic Class carbaryl products. However, Commercial Class products are available.

### 3.9 Carbaryl Use on Cherry

#### Comments:

Carbaryl is needed for control of cherry fruit flies on cherries. The options for cherry fruit fly control are limited based upon offshore market restrictions to the maximum residue limits, and the availability of alternative active ingredients from differing resistance mode of action (MoA) group for rotation to prevent development of resistance.

#### PMRA Response:

Alternative active ingredients to carbaryl are available from several insecticide resistance modes of action. The registered alternative active ingredients to carbaryl for the control of cherry fruit fly are listed in Table 3.9.

**Table 3.9 Alternative Active Ingredients to Carbaryl for the Control of Cherry Fruit Fly on Cherries in Canada as of August 2015**

Crop	Pest	Resistance Management Group MoA: <sup>1</sup> Registered alternatives <sup>2</sup>	Comments
Cherry	Cherry fruit fly	1B: diazinon, dimethoate, phosmet 3: lambda-cyhalothrin 4: acetamiprid, imidacloprid 5 spinosad 28: chlorantraniliprole (suppression), cyantraniliprole	As indicated in REV2013-01 <i>Diazinon Risk Management Plan</i> , foliar applications of diazinon on cherry crops will be phased out December 31, 2016.  Dimethoate is limited to two applications per season.  Phosmet is registered for use on sour cherries only.  Dimethoate, lambda-cyhalothrin and imidacloprid are currently under re-evaluation.  Acetamiprid and chlorantraniliprole are registered for suppression only.

<sup>1</sup> Insecticide and Acaricide Resistance Management Group Numbers based on DIR 99-06 *Voluntary Pesticide Resistance Management Labelling based on Target Site/Mode of Action*, with updates from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification Scheme v7.4 May 2015. Available at <http://www.irac-online.org/documents/moa-classification/>. 1B = acetylcholinesterase inhibitors (organophosphates); 3 = sodium channel modulators; 4 = nicotinic acetylcholine receptor competitive modulator; 5 = nicotinic acetylcholine receptor allosteric modulator; 28 = ryanodine receptor modulators.

<sup>2</sup> This is a list of registered alternatives, current as of August 2015. The registration status of active ingredients under re-evaluation may change pending the final regulatory decision. For additional information, consult the PMRA publications website: [http://www.hc-sc.gc.ca/cps-spc/pubs/pest/\\_decisions/index-eng.php](http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/index-eng.php) (English) and [http://www.hc-sc.gc.ca/cps-spc/pubs/pest/\\_decisions/index-fra.php](http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_decisions/index-fra.php) (French) for Re-evaluation Decisions (RVD and RRD documents) and Re-evaluation Notes (REV documents) or <http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/index-eng.php> (English) and <http://www.hc-sc.gc.ca/cps-spc/pest/part/consultations/index-fra.php> (French).

[spc/pest/part/consultations/index-fra.php](#) (French) for current and past consultation documents including Proposed Re-evaluation Decisions (PRVD and PACR documents) and certain Re-evaluation Notes (REV documents).

### **3.10 Carbaryl Use on Carrot**

#### **Comments:**

Sevin is the only product registered for the control of six spotted leafhopper (aster leafhoppers) which is a vector of aster yellows disease. There are no rotational products currently available to control this pest. Three applications of carbaryl may not be sufficient to provide season long control of this pest.

#### **PMRA Response:**

Information received in response to PRVD2009-14, resulted in refinement of the risk assessment for carrot. As a result, the restricted-entry intervals were reduced and deemed to be agronomically feasible by the PMRA. Therefore, carrots will remain in the registered use pattern of carbaryl.

## Appendix II Registered Carbaryl Products as of November 20151

Registrant Number	Registrant	Product Name	Guarantee (%) <sup>2</sup>	Formulation Type <sup>3</sup>	Marketing Class <sup>4</sup>
16653	Bayer CropScience Inc.	Sevin T&O Insecticide	CAB-43	SU	C+R
19351	Bayer CropScience Inc.	Sevin Brand 97.5% Manufacturing Concentrate	CAB-97.5	SO	M
22339	Bayer CropScience Inc.	Chipco Sevin RP2 Carbaryl Insecticide Liquid Suspension	CAB-22.5	SU	C
25870	Bayer CropScience Inc.	Sevin RP2 Domestic Carbaryl Insecticide Liquid Suspension	CAB-22.5	SU	D
26873	Bayer CropScience Inc.	Chipco Sevin T&O Carbaryl Insecticide	CAB-42.8	SU	C
30614	Bayer CropScience Inc.	Sevin Brand Carbaryl Technical	CAB-99.5	SO	T
9042	Dominion Veterinary Laboratories Limited	Sevin Dispersible Powder Insecticide (For Veterinary Use Only)	CAB-50	DU	C
9061	Dominion Veterinary Laboratories Limited	Dominion Dusting Powder For Veterinary Use Only	CAB-5	DU	C
9986	King Home & Garden Inc.	King Fruit Tree & Garden Spray	MAL-5; CAP-10; CAB-10	DU	D
14851	King Home & Garden Inc.	Gardal Rose, Flower, & Evergreen Dust	TPM-3; MAL-4; CAP-5; CAB-5	DU	D
29616	King Home & Garden Inc.	King Bug Killer Insecticide Dust	CAB-5.0	DU	D
29619	King Home & Garden Inc.	King PTV Potato, Tomato & Vegetable Dust For Bugs And Blights	CUB-7.0; CAB-5.0	DU	D
29623	King Home & Garden Inc.	King Ant & Earwig Killer Dust	CAB-5.0	DU	D

Registrant Number	Registrant	Product Name	Guarantee (%) <sup>2</sup>	Formulation Type <sup>3</sup>	Marketing Class <sup>4</sup>
6839	Tessenderlo Kerley Inc.	Sevin Brand 50W Carbaryl Insecticide Wettable Powder	CAB-50	WP	C+R
18463	Tessenderlo Kerley Inc.	Sevin Brand Technical Carbaryl Insecticide	CAB-99.5	SO	T
19531	Tessenderlo Kerley Inc.	Sevin Brand XLR Plus Carbaryl Insecticide	CAB-42.8	SU	C+R
24973	Tessenderlo Kerley Inc.	Sevin Bran Bait Carbaryl Insecticide	CAB-5	PT	C
27876	Tessenderlo Kerley Inc.	Sevin Xlr Carbaryl Insecticide Liquid Suspension	CAB-42.8	SU	C+R
17534	Agrium Advanced Technologies RP Inc.	Farm & Ranch Brand Sevin 5-D Insecticide Dust	CAB-5	DU	C
25815	Peacock Industries	Eco Bran Grasshopper Insecticide Agricultural	CAB-2	GR	C
10565	Sure-Gro IP Inc.	Wilson Rose Doctor Insecticide-Fungicide	MAL-4; FOL-5; CAB-5	DU	D
12135	Sure-Gro IP Inc.	Wilson Sevin Garden Dust Insecticide	CAB-5.0	DU	D
14852	Sure-Gro IP Inc.	Wilson Bulb & Soil Dust	CAP-5; CAB-5	DU	D
17424	Sure-Gro IP Inc.	Wilson Garden Doctor Insecticide-Fungicide	CUB-7; CAB-5	DU	D
17971	Sure-Gro IP Inc.	Wilson Liquid Sevin Carbaryl Insecticide	CAB-22.5	SU	D
19228	Sure-Gro IP Inc.	Wilson Earwig & Cutworm Destroyer	CAB-5	GR	D

<b>Registrant Number</b>	<b>Registrant</b>	<b>Product Name</b>	<b>Guarantee (%) <sup>2</sup></b>	<b>Formulation Type<sup>3</sup></b>	<b>Marketing Class<sup>4</sup></b>
26698	Sure-Gro IP Inc.	Wilson Sevin Grubout Ant & Grub Killer Concentrate	CAB-22.5	EC	D
26699	Sure-Gro IP Inc.	Wilson Sevin Grubout Ant & Grub Killer	CAB-22.5	EC	D
26702	Sure-Gro IP Inc.	Wilson Antout Ant Killer Attach And Spray	CAB-22.5	EC	D
26923	Sure-Gro IP Inc.	Wilson Antout Ant Killer Dust	CAB-5.0	DU	D
27206	Scotts Canada Ltd.	Ortho Grub-B-Gon Max Grub Eliminator Ready-To-Spray	CAB-22.5	SU	D
27207	Scotts Canada Ltd.	Ortho Bug-B-Gon Max Ant & Chinch Bug Eliminator Ready-To-Spray	CAB-22.5	SN	D
27208	Scotts Canada Ltd.	Ortho Bug-B-Gon Max Ant And Chinch Bug Eliminator Concentrate	CAB-22.5	SN	D

<sup>1</sup> Excluding discontinued products and products with a submission for discontinuation.

<sup>2</sup> Formulation types based on PMRA database: DU = Dust or Powder, EC = Emulsifiable Concentrate or Emulsion, GR = Granular, SN = Solution, SO = Solid, SU= Suspension, WP = Wettable Powder.

<sup>3</sup> CAB = Carbaryl, CAP = Captan, CUB = Copper, present as basic copper sulfate, FOL = Folpet, MAL = Malathion, TPM = Thiophanate-Methyl.

<sup>4</sup> C = Commercial Class Products, D = Domestic Class Products, T = Technical Class, M = Manufacturing Concentrate, R = Restricted Class.





## Appendix III – Revised Mixer/Loader/Applicator Exposure Estimates

**Table III.1 Revised M/L/A Exposure Estimates and ARI Using Updated Application Rates for Uses to Be Cancelled**

Crop	Form <sup>a</sup>	Application Equipment <sup>b</sup>	Application Rates <sup>c</sup> (kg a.i./ha)	Area treated per day <sup>d</sup> (ha)	Daily Exposure (µg/kg/day)		Margins of Exposure		Aggregate Risk Indices <sup>i</sup>
					Dermal <sup>e</sup>	Inhalation <sup>f</sup>	Dermal <sup>g</sup>	Inhalation <sup>h</sup>	
Mixing and Loading: Closed system for suspensions, water soluble packaging for wettable powder. PPE regardless of formulation: chemical resistant coveralls over a single layer, chemical resistant gloves.									
Aerial Applications: Single layer, no gloves.									
Airblast applications: Open cab, chemical resistant coveralls over a single layer, chemical resistant gloves, chemical resistant headwear.									
pears	SU	aerial - M/L	1.728	200	38.21	0.54	929	2081	2.70
		aerial - Apply			47.69	0.35	744	3270	2.31
		airblast	2.910	16	45.72	3.93	776	287	1.36
	WP	airblast			44.02	3.98	806	284	1.38
apricot, peach	SU	airblast	2.910	16	45.72	3.93	776	287	1.36
	WP	airblast			44.02	3.98	806	284	1.38
corn (field, sweet)	SU	aerial – M/L	1.92	490	104.03	1.48	341	764	0.99
		aerial - Apply			129.83	0.94	273	1201	0.85
		groundboom		150	50.03	0.70	710	1616	2.06
	WP	groundboom			39.50	1.00	899	1135	2.37
cherries, plums	SU	aerial - M/L	2.910	200	64.35	0.91	552	1236	1.60
		aerial - Apply			80.32	0.58	442	1942	1.37
		airblast		16	45.72	3.93	776	287	1.36
cherries, plums, prunes	WP	airblast	2.910	16	44.02	3.98	806	284	1.38

<sup>a,b</sup> WP = Wettable Powder (For the purpose of exposure mitigation, assumed to be in Water Soluble Packaging); SU = Suspension. M/L = Mix and Load.

<sup>c</sup> Rate in kilograms of active ingredient per hectare (kg a.i./ha).

<sup>d</sup> Based on default assumptions, see PRVD 2009-14 for details.

<sup>e</sup> Where dermal exposure µg/kg/day = unit exposure × area treated × rate/70 kg bw.

<sup>f</sup> Where inhalation exposure µg/kg/day = (unit exposure × area treated × rate)/70 kg bw.

<sup>g</sup> Based on a dermal BMDL<sub>10</sub> of 35.5 mg/kg bw/day and a target dermal MOE of 300. Dermal Margin of Exposure (MOE<sub>D</sub>) = BMDL<sub>10</sub> (mg/kg/day) / Dermal Exposure (mg/kg/day).

<sup>h</sup> Based on an oral BMDL<sub>10</sub> of 1.13 mg/kg bw/day and a target MOE of 100. Inhalation Margin of Exposure (MOE<sub>I</sub>) = BMDL<sub>10</sub> (mg/kg/day) / Inhalation Exposure (mg/kg/day).

<sup>i</sup> Aggregate Risk Index = 1 / ((1/Dermal Risk Index)+(1/Inhalation Risk Index)). Shaded cells indicate an aggregate risk index (ARI) that failed to meet the target of 1.0. An ARI ≥ 1.0 does not represent a risk of concern

**Table III.2 Revised M/L/A Exposure Estimates and ARIs using Updated Application Rates for Uses to be Retained**

Crop	Form <sup>a</sup>	Application Equipment <sup>b</sup>	Application Rates <sup>c</sup> (kg a.i./ha)	Area treated per day <sup>d</sup> (ha)	Daily Exposure (µg/kg/day)		Margins of Exposure		Aggregate Risk Indices <sup>i</sup>
					Dermal <sup>e</sup>	Inhalation <sup>f</sup>	Dermal <sup>g</sup>	Inhalation <sup>h</sup>	
Mixing and Loading: Closed system for suspensions, water soluble packaging for wettable powder. PPE regardless of formulation: chemical resistant coveralls over a single layer, chemical resistant gloves.									
Aerial Applications: Single layer, no gloves.									
Airblast Applications: Open cab, chemical resistant coveralls over a single layer, chemical resistant headgear, chemical resistant gloves.									
Groundboom Applications: Closed cab, cotton coveralls over a single layer, no gloves.									
apple thinning (high density orchards)	SU	airblast	1.5	16	23.57	2.03	1506	558	2.64
rapeseed (canola)	SU	aerial - M/L	0.233	490	12.62	0.18	2812	6298	8.16
		aerial - Apply			15.76	0.11	2253	9898	6.98
		groundboom		300	12.14	0.17	2924	6657	8.50
tobacco	SU	aerial - M/L	1.2815	490	69.43	0.99	511	1145	1.48
		aerial - Apply			86.66	0.63	410	1800	1.27
		groundboom		300	66.78	0.93	532	1210	1.55
	W/P	groundboom	1.125	300	46.29	1.17	767	968	2.02

<sup>a,b</sup> WP = Wettable Powder (For the purpose of exposure mitigation, assumed to be in Water Soluble Packaging); SU = Suspension, M/L = Mix and Load.

<sup>c</sup> Rate in kilograms of active ingredient per hectare (kg a.i./ha).

<sup>d</sup> Based on default assumptions, see PRVD 2009-14 for details.

<sup>e</sup> Where dermal exposure µg/kg/day = unit exposure × area treated × rate/70 kg bw.

<sup>f</sup> Where inhalation exposure µg/kg/day = (unit exposure × area treated × rate)/70 kg bw.

<sup>g</sup> Based on a dermal BMDL<sub>10</sub> of 35.5 mg/kg bw/day and a target dermal MOE of 300. Dermal Margin of Exposure (MOE<sub>d</sub>) = BMDL<sub>10</sub> (mg/kg/day) / Dermal Exposure (mg/kg/day).

<sup>h</sup> Based on an oral BMDL<sub>10</sub> of 1.13 mg/kg bw/day and a target MOE of 100. Inhalation Margin of Exposure (MOE<sub>i</sub>) = BMDL<sub>10</sub> (mg/kg/day) / Inhalation Exposure (mg/kg/day).

<sup>i</sup> Aggregate Risk Index = 1 / ((1/Dermal Risk Index)+(1/Inhalation Risk Index)). An ARI ≥ 1.0 does not represent a risk of concern.

## Appendix IV Revised Postapplication Exposure Estimates

**Table IV.1** Revised Postapplication Exposure Estimates, MOEs and REIs based on Updated Use Information for Uses to be Cancelled

Crop	Applications per Year		Rates <sup>c</sup> (kg a.i./ha)	Activity	Transfer Coefficient (cm <sup>2</sup> /hr) <sup>d</sup>	DFR <sup>e</sup> (µg/cm <sup>2</sup> )	Dermal Exposure <sup>f</sup> (µg/kg bw/day)	MOE <sup>g</sup>	REI <sup>h</sup> (days)
	Number <sup>a</sup>	Interval <sup>b</sup> (days)							
alfalfa, clover	2	7	2.52	scouting	1100	0.93	116.84	304	8
apples (insecticide use), pears, apricot, peach, cherries, plums	2	11	2.91	thinning	3000	0.34	116.07	306	30
				hand harvesting	1500	0.70	120.21	295	23
				hand line irrigation	1100	0.96	120.45	295	20
				hand pruning, scouting, pinching, tying, training	500	1.98	113.40	313	13
				mechanical harvesting (cherries)	200	5.06	115.69	307	4
barley, oats, rye, wheat	2	7	2.52	scouting	1100	0.93	116.84	304	8
broccoli, Brussel sprouts, cabbage	2	7	2.52	hand harvest	5150	0.19	109.63	324	14
				hand weeding, thinning, topping	4400	0.23	113.29	313	13
				scouting, tying	4000	0.23	102.99	345	13
				irrigation	1100	0.85	107.24	331	6
		5	2.50	hand harvest	5150	0.18	108.76	326	14
				hand weeding, thinning, topping	4400	0.22	112.39	316	13
				scouting, tying irrigation	4000 1100	0.22 0.85	102.17 106.39	347 334	13 6
cauliflower	2	7	2.52	hand weeding, thinning, topping	4400	0.23	113.29	313	13
				hand harvest, scouting	1300	0.71	104.78	339	7
				irrigation	1100	0.85	107.24	331	6
		5	2.50	hand pruning, hand harvest	4400	0.22	112.39	316	13
				scouting	1300	0.70	103.95	342	7
				weeding, thinning, irrigation	1100	0.85	106.39	334	6

Table IV.1 Revised Postapplication Exposure Estimates, MOEs and REIs for Uses to be Cancelled (cont'd)

Crop	Applications per Year		Rates <sup>c</sup> (kg a.i./ha)	Activity	Transfer Coefficient (cm <sup>2</sup> /hr) <sup>d</sup>	DFR <sup>c</sup> (µg/cm <sup>2</sup> )	Dermal Exposure <sup>f</sup> (µg/kg bw/day)	MOE <sup>g</sup>	REI <sup>h</sup> (days)
	Number <sup>a</sup>	Interval <sup>b</sup> (days)							
corn (sweet & field)	2	2	1.92	hand harvesting (sweet corn only)	17000	0.06	117.68	302	20
				scouting	1100	0.87	109.27	325	7
				irrigation	1000	1.07	121.92	291	6
				hand weeding	100	3.65	41.69	852	0.5
peppers	r.a.n. (repeat as necessar y)	7	3.07	hand weeding, thinning	4400	0.23	114.18	311	14
				hand harvest, scouting	1300	0.71	105.61	336	8
strawberries	2	7	3.00	irrigation	1100	0.86	108.08	328	7
				hand harvest, pinching, pruning, training, irrigation	1000	0.90	103.03	345	9
				scouting	200	4.64	106.14	334	1
				hand weeding, thinning	100	5.70	65.14	545	0.5
sweet white lupin	2	7	1.86	scouting	1100	0.84	106.08	335	7
				harvesting, irrigation	1000	1.04	118.37	300	6
				weeding, thinning	100	3.54	40.47	877	0.5

<sup>a</sup> The number of applications for fruit trees was reduced from r.a.n. to 2 per year based on comment received from Bayer CropScience (BCS) (01/14/11). The number of applications for all other crops was limited to 2 per year based on the available DFR data.

<sup>b</sup> A minimum interval of seven days between applications was assumed in the risk assessment for those applications to trees where an interval was not specified. A seven or eight day interval was applied to all other crops based on the available DFR data.

<sup>c</sup> Maximum listed label rates expressed in kilograms a.i./hectare. The application rates for canola, tobacco and fruit trees were reduced in accordance to comments received from BCS (06/10/09 & 14/01/11).

<sup>d</sup> Transfer coefficients are from the Science Advisory Council for Exposure Agricultural Transfer Coefficient document (Revised – 7 August 2000) and any

amendments thereof (USEPA, 2000; PMRA document number 2115788).

<sup>e</sup> DFR is based on DFR data (see PRVD 2009-14), at  $\times$  days after application, where  $\times$  is the day when an  $\text{MOE} \geq 300$  is determined.

<sup>f</sup> Dermal exposure =  $\text{DFR} \times \text{TC} \times 8 \text{ hr} / 70 \text{ kg}$ .

<sup>g</sup> The resulting MOE on the recommended REI day. Based on the short and intermediate term dermal  $\text{BMDL}_{10}$  of 35.5 mg/kg/day and a dermal target MOE of 300.

<sup>h</sup> Day at which the dermal exposure results in an  $\text{MOE} \geq 300$ .

Table IV.2 Revised Postapplication Exposure Estimates, MOEs and REIs for Uses to be Retained

Crop	Applications per Year		Rates <sup>c</sup> (kg a.i./ha)	Activity	Transfer Coefficient (cm <sup>2</sup> /hr) <sup>d</sup>	DFR <sup>e</sup> (µg/cm <sup>2</sup> )	Dermal Exposure <sup>f</sup> (µg/kg bw/day)	MOE <sup>g</sup>	REI <sup>h</sup> (days)
	Number <sup>a</sup>	Interval <sup>b</sup> (days)							
apples (for thinning in orchards that have transitioned to high density trellis production)	1	1	1.50	hand thinning	3000	0.34	115.74	307	21
				hand thinning	3000	0.70	239.73	148	14
				hand harvest	1500	0.70	119.87	296	14
				hand line irrigation	1100	0.96	120.10	296	11
apples ( for thinning in orchards that have not transitioned to high density trellis production)	1	1	1.00	hand pruning, scouting, pinching, tying, training	500	1.98	113.08	314	4
				hand thinning	3000	0.34	116.98	303	17
				hand harvest	1500	0.71	121.15	293	10
				hand line irrigation	1100	0.87	109.39	325	8
asparagus and asparagus ferns	2	3	3.07	hand pruning, scouting, pinching, tying, training	500	2.00	114.29	311	0.5
				irrigation	1000	1.04	118.84	299	6
				hand weeding	100	2.69	30.76	1154	0.5
				scouting	1100	0.86	108.08	328	7
beans	2	7	3.07	hand harvest, irrigation	1000	1.04	118.84	299	6
				hand weeding	100	0.23	2.60	13680	0.5
				hand harvest, irrigation	1000	1.03	117.91	301	5
				scouting	200	2.67	61.04	582	0.5
beet (root), horseradish, radish, rutabaga (root), salsify (root), turnip (root)	2	5	2.25	hand weeding, thinning	100	2.21	25.23	1407	0.5
				hand harvest, irrigation	1000	0.92	105.28	337	5
				scouting	200	2.38	54.50	651	0.5
				hand weeding,	100	2.38	27.25	1303	0.5

				thinning					
berries	2	7	2.52	hand harvest, pinching, pruning, training	1500	0.62	105.76	336	10
				irrigate, weed, scout, thin	700	1.40	112.02	317	6

Table IV.2: Revised Postapplication Exposure Estimates, MOEs and REIs for Uses to be Retained (cont'd)

Crop	Applications per Year		Rates <sup>c</sup> (kg a.i./ha)	Activity	Transfer Coefficient (cm <sup>2</sup> /hr) <sup>d</sup>	DFR <sup>e</sup> (µg/cm <sup>2</sup> )	Dermal Exposure <sup>f</sup> (µg/kg bw/day)	MOE <sup>g</sup>	REI <sup>h</sup> (days)
	Number <sup>a</sup>	Interval <sup>b</sup> (days)							
blueberries	2	10	1.99	hand harvest, pinching, pruning, training	1500	0.60	102.51	346	9
				irrigate, weed, scout, thin	700	1.36	108.57	327	5
carrots	2	7	2.52	hand harvest, irrigation	1000	1.03	117.91	301	5
				scouting	200	2.67	61.04	582	0.5
				weeding, thinning	100	2.21	25.23	1407	0.5
		5	2.25	hand harvest, irrigation	1000	0.92	105.28	337	5
				scouting	200	2.38	54.50	651	0.5
				weeding, thinning	100	1.97	22.53	1576	0.5
celery, lettuce, kohlrabi	2	7	2.52	hand harvest, hand pruning, irrigation	1000	1.03	117.91	301	5
				scouting	200	2.67	61.04	582	0.5
				hand weeding, thinning	100	2.67	30.52	1163	0.5
		5	2.50	hand harvest, hand pruning, irrigation	1000	1.02	116.97	303	5
				scouting	200	2.65	60.55	586	0.5
				hand weeding,	100	2.65	30.28	1173	0.5



					thinning					
cranberries	2	7	3.65		irrigation, pruning, harvesting	1000	0.89	102.07	348	10
					scouting	200	4.60	105.15	338	2
					weeding, thinning	100	6.93	79.21	448	0.5
cucumbers, melons, squash, pumpkins	2	7	1.25		hand-line irrigation	1100	0.91	113.83	312	2
					hand harvest	800	1.32	121.11	293	0.5
					turning, tying, staking	550	1.32	83.26	426	0.5
					scouting, weeding	100	1.32	15.14	2345	0.5
eggplants	r.a.n.	7	3.07		hand-line irrigation	1100	0.86	108.08	328	7
					hand harvest	800	1.26	114.99	309	5
					turning, tying, staking	550	1.84	115.65	307	3
					scouting, weeding	100	3.26	37.20	954	0.5

Table IV.2: Revised Postapplication Exposure Estimates, MOEs and REIs for Uses to be Retained (cont'd)

Crop	Applications per Year		Rates <sup>c</sup> (kg a.i./ha)	Activity	Transfer Coefficient (cm <sup>2</sup> /hr) <sup>d</sup>	DFR <sup>e</sup> (µg/ cm <sup>2</sup> )	Dermal Exposure <sup>f</sup> (µg/kg bw/day)	MOE <sup>g</sup>	REI <sup>h</sup> (days)
	Number <sup>a</sup>	Interval <sup>b</sup> (days)							
leafy vegetables	2	7	2.52	hand harvest, hand pruning, irrigation	1000	1.03	117.91	301	5
				scouting	200	2.67	61.04	582	0.5
				hand weeding, thinning	100	2.67	30.52	1163	0.5
	2.25	5	2.25	hand harvest, hand pruning, irrigation	1000	0.92	105.28	337	5
				scouting	200	2.38	54.50	651	0.5
parsnips	2	7	2.45	hand weeding, thinning	100	2.38	27.25	1303	0.5
				hand harvest, hand pruning, irrigation	1000	1.00	114.47	310	5
				scouting	200	2.59	59.26	599	0.5
				hand weeding, thinning	100	2.59	29.63	1198	0.5
peas	2	7	2.25	hand harvest, irrigation	1000	0.92	105.28	337	5

					scouting	200	2.38	54.50	651	0.5
					thinning, hand weeding	100	2.38	27.25	1303	0.5
potato	2	7	3.07		irrigation	1000	1.04	118.84	299	6
					scouting	200	3.26	74.41	477	0.5
					hand weeding	100	2.69	30.76	1154	0.5
					scouting	1100	0.44	55.65	638	0.5
rapeseed (canola)	2	7	0.23		irrigation	1000	0.44	50.59	702	0.5
snapbeans (*used beans TCs)	2	7	2.45		scouting	1100	0.83	104.11	341	6
					hand harvest, irrigation	1000	1.00	114.47	310	5
					hand weeding	100	2.59	29.63	1198	0.5

**Table IV.2: Revised Postapplication Exposure Estimates, MOEs and REIs for Uses to be Retained (cont'd)**

Crop	Applications per Year		Rates <sup>c</sup> (kg a.i./ha)	Activity	Transfer Coefficient (cm <sup>2</sup> /hr) <sup>d</sup>	DFR <sup>e</sup> (µg/cm <sup>2</sup> )	Dermal Exposure <sup>f</sup> (µg/kg bw/day)	MOE <sup>g</sup>	REI <sup>h</sup> (days)
	Number <sup>a</sup>	Interval <sup>b</sup> (days)							
strawberries	2	7	3.00	hand harvest, pinching, pruning, training, irrigation	1000	0.90	103.03	345	9
				scouting	200	4.64	106.14	334	1
				hand weeding, thinning	100	5.70	65.14	545	0.5
tobacco	2	7	1.28	harvesting, irrigation	800	1.32	120.38	295	3
				scouting, weeding, pruning	100	2.43	27.82	1276	0.5
			1.13	harvesting, irrigation	800	1.16	105.68	336	3
				scouting, weeding, pruning	100	2.14	24.43	1453	0.5
tomato	2	7	3.07	hand harvest, tying, pruning, irrigation	1000	1.04	118.84	299	6
				scouting	200	3.26	74.41	477	0.5
				thinning, hand weeding, staking	100	3.26	37.20	954	0.5

<sup>a</sup> The number of applications for fruit trees was reduced from r.a.n. to 2 per year based on comment received from BCS (01/14/11). The number of applications for all other crops was limited to 2 per year based on the available DFR data.

<sup>b</sup> A minimum interval of seven days between applications was assumed in the risk assessment for those applications to trees where an interval was not specified. A seven or eight day interval was applied to all other crops based on the available DFR data.

<sup>c</sup> Maximum listed label rates expressed in kilograms a.i./hectare. The application rates for canola, tobacco and fruit trees were reduced in accordance to comments received from BCS (06/10/09 & 14/01/11).

<sup>d</sup> Transfer coefficients are from the Science Advisory Council for Exposure Agricultural Transfer Coefficient document (Revised – 7 August 2000) and any amendments thereof (USEPA, 2000; PMRA document number 2115788).

<sup>e</sup> DFR is based on DFR data (see PRVD 2009-14), at  $\times$  days after application, where  $\times$  is the day when an  $\text{MOE} \geq 300$  is determined.

<sup>f</sup> Dermal exposure =  $\text{DFR} \times \text{TC} \times 8 \text{ hr} / 70 \text{ kg}$ .

<sup>g</sup> The resulting MOE on the recommended REI day. Based on the short and intermediate term dermal  $\text{BMDL}_{10}$  of 35.5 mg/kg/day and a dermal target MOE of

300. Shaded cells indicate those MOEs that failed to reach the target MOE of 300. Apple thinning exposure based on the unmodified orchard thinning transfer coefficient (TC) of 3000 cm<sup>2</sup>/h. This TC over-estimates dermal postapplication exposure for orchards that have transitioned to high density trellis production. However, the degree of over-estimation cannot be quantified.

<sup>b</sup> Day at which the dermal exposure results in an MOE  $\geq$ 300.

**Table IV.3 Worker Postapplication Exposure and MOEs on Sod Farm and Golf Course Turfs**

Activities <sup>a</sup>	Label REI	REI	Transfer Coefficient (cm <sup>2</sup> /hr)	TTR Data <sup>b</sup>		Dermal Exposure <sup>c</sup> Absorbed (µg/kg/d)	Dermal MOE <sup>d</sup>
				% TTR			
Sod Farms (Short-term exposure):							
Harvesting treated turf	0		6800	1.65	1782.37	20	
		26		0.11	115.16	308	
Mowing, watering, irrigation	0		3500	1.65	917.40	39	
		20		0.20	111.53	318	
Aerating, fertilizing, hand pruning, mechanical weeding, scouting, seeding	0		500	1.65	131.06	271	
		1		1.49	117.95	301	
Golf Courses (Short-term exposure):							
Harvesting and transplanting treated turf	0		6800	1.65	1782.37	20	
		26		0.11	115.16	308	
Mowing, watering, cup changing, irrigation repair, miscellaneous grooming	0		3500	1.65	917.40	39	
		20		0.20	111.53	318	
Aerating, fertilizing, hand pruning, mechanical weeding, scouting, seeding	0		500	1.65	131.06	271	
		1		1.49	117.95	301	

<sup>a</sup> Postapplication activities and subsequent Transfer Coefficients are based on the December 2008 PMRA memo: Interim Transfer Coefficients (TCs) for Golf Courses and Sod Farm Postapplication Activities.

<sup>b</sup> Chemical specific data from 'Turf' Transferable Residue study assuming a 10% dissipation rate.

<sup>c</sup> Dermal exposure = % TTR  $\times$  rate of 139 µg/cm<sup>2</sup>  $\times$  TC  $\times$  8 hr duration / 70 kg BW.

<sup>d</sup> Based on a dermal BMDL<sub>10</sub> of 35.5 mg/kg/day; target MOE for acute and short-term estimates is 300. Shaded cells indicate those MOEs that failed to meet the target of 300.

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## Appendix V    Label Amendments for Commercial Class Products Containing Carbaryl

Note: The label amendments presented below do not include all label requirements for individual end-use products, such as first aid statements, disposal statements, precautionary statements and supplementary protective equipment. Additional information on labels of currently registered products should not be removed unless it contradicts the label statements below.

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Based on the toxicological assessments, the label text of the carbaryl-containing products should be expanded and/or standardized, as follows:

### TOXICOLOGICAL INFORMATION

Carbaryl is a carbamate which is a cholinesterase inhibitor. Typical symptoms of overexposure to cholinesterase inhibitors include malaise, muscle weakness, dizziness and sweating. Headache, salivation, nausea, vomiting, abdominal pain and diarrhea are often prominent. A life-threatening poisoning is signified by loss of consciousness, incontinence, convulsions and respiratory depression with a secondary cardiovascular component. Treat symptomatically. If exposed, plasma and red blood cell cholinesterase tests may indicate degree of exposure (baseline data are useful). However, if a blood sample is taken several hours after exposure, it is unlikely that blood cholinesterase activities will be depressed, due to rapid reactivation of cholinesterase. Atropine, only by injection, is the preferable antidote. Do not use pralidoxime. In cases of severe acute poisoning, use antidotes immediately after establishing an open airway and respiration. With oral exposure, the decision of whether to induce vomiting or not should be made by an attending physician.

### Add to ENVIRONMENTAL PRECAUTIONS:

**TOXIC** to birds, mammals and aquatic organisms. Observe buffer zones specified under DIRECTIONS FOR USE.

To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to: heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g. soils that are compacted or fine textured such as clay).

Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Avoid application of this product when heavy rain is forecast.

**Pollinators:**

TOXIC to bees. Bees may be exposed through direct spray, spray drift, and residues on leaves, pollen and nectar in flowering crops and weeds. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site. Avoid applications when bees are foraging in the treatment area in ground cover containing blooming weeds. To further minimize exposure to pollinators, refer to the complete guidance “Protecting Pollinators during Pesticide Spraying – Best Management Practices” on the Health Canada website ([www.healthcanada.gc.ca/pollinators](http://www.healthcanada.gc.ca/pollinators)). Follow crop specific directions for application timing.

For applications on crops that are highly attractive to pollinators (asparagus, rapeseed, apple, blackberries, boysenberries, dewberries, loganberries, chokecherries, raspberries, blueberries, cranberries, melons, pumpkin, squash, cucumber, broad beans and outdoor ornamentals and trees (excluding coniferous evergreens), or when using managed bees for pollination services, add the following statements:

- DO NOT apply during the crop blooming period.

For beans (except broad beans as listed above), peas, potato, eggplant, tomato, tobacco, and the following crops when grown for seed: Chinese cabbage, collards, mustard greens, kohlrabi, dandelion, watercress, celery, endive, lettuce, parsley, spinach, Swiss chard, turnip, rutabaga, carrots, beets, parsnip, horseradish, radish, salsify, add the following statements:

- Avoid application during the crop blooming period. If applications must be made during the crop blooming period, restrict applications to evening when most bees are not foraging.

**Add to USE PRECAUTIONS**

The following statements must be added to all current commercial class products labels:

- Not for indoor use.
- This product is not to be used in and around homes or other residential areas such as parks, schools, public buildings, playing fields or any other areas where the general public including children could be exposed.
- Not for use in greenhouses (vegetable or ornamental).
- Not for use on turf, golf courses, sod farms, residential ornamentals or residential vegetable gardens.
- Keep the following personal protective equipment immediately available for use in case of emergency (i.e., a broken package, spill, or equipment breakdown): chemical-resistant coveralls, chemical-resistant gloves, chemical-resistant head gear and a respirator.

For apple thinning, add the following:

- For good hygiene practices, chemical-resistant gloves are recommended when hand thinning apples following an application of carbaryl.

To protect bystander exposure to carbaryl, the following statement must be added to all labels, with the exception of those for bran bait:

- Apply only when the potential for drift to areas of human habitation or areas of human activity (houses, cottages, schools and recreational areas) is minimal. Take into consideration wind speed, wind direction, temperature inversion, application equipment and sprayer settings.

### **Engineering Controls and Personal Protective Equipment**

Statements must be amended (or added) to include the following directions to the appropriate labels in order to mitigate the risk of exposure to carbaryl:

#### **Mixing/Loading**

**A. Mixing and Loading Bran Bait:**

Wear cotton coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.

Do not mix and load by hand or with hand held equipment.

**B. Mixing and Loading liquids:**

- Use a closed mixing system.
- Wear chemical resistant coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.

**C. Mixing and Loading Wettable Powders in Water Soluble Packaging:**

Wear chemical resistant coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.

#### **Applying**

**A. Applying Bran Bait:**

- Do not apply by hand or handheld equipment. Use an open or closed cab broadcast spreader.
- Wear cotton coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.

**B. Applying by air:**

Wear cotton coveralls over long pants and a long-sleeved shirt, shoes plus socks.



**C. Applying by groundboom:**

- During groundboom application use a closed cab that provides both a physical barrier and respiratory protection (i.e., dust/mist filtering and/or vapour/gas purification system). The closed cab must have a chemical resistant barrier that totally surrounds the occupant and prevents contact with pesticides outside the cab.
- Wear cotton coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.
- Keep the following personal protective equipment immediately available for use in case of emergency or when exiting the cab with treated areas (i.e., a broken package, spill, or equipment breakdown): chemical-resistant coveralls, chemical-resistant gloves, chemical-resistant head gear and a respirator. Once PPE is worn in a treated area, it must be removed before re-entering the cab.

**D. Applying by airblast:**

- During airblast application use a closed cab that provides both a physical barrier and respiratory protection (i.e., dust/mist filtering and/or vapour/gas purification system). The closed cab must have a chemical resistant barrier that totally surrounds the occupant and prevents contact with pesticides outside the cab. Wear cotton coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.
- If a closed cab is not feasible, wear chemical resistant coveralls over long pants and a long-sleeved shirt, shoes plus socks, chemical resistant gloves and chemical-resistant headgear. Chemical resistant headgear includes So'Westers, or large brimmed, water-proof hats, and hoods with sufficient neck protection. Avoid touching face or other unprotected parts of the body during application.
- Keep the following personal protective equipment immediately available for use in case of emergency or when exiting the cab with treated areas (i.e., a broken package, spill, or equipment breakdown): chemical-resistant coveralls, chemical-resistant gloves, chemical-resistant head gear and a respirator. Once PPE is worn in a treated area, it must be removed before re-entering the cab.

**E. Applying by right-of-way sprayer:**

Wear chemical resistant coveralls over long pants and a long-sleeved shirt, shoes plus socks and chemical resistant gloves.

**F. Applying by handheld equipment:**

Wear chemical resistant coveralls over long pants and a long-sleeved shirt, shoes plus socks, chemical resistant gloves and NIOSH approved respiratory protection.

**DIRECTION FOR USE**

The following uses should be removed from all current labels:

- Indoor pest control uses including greenhouses, residences, food and feed handling establishments and barns and livestock production areas;
- Aerosol products;
- Agricultural dust uses;
- Bran bait application to residential gardens;
- Livestock for food;
- Livestock for non-food;
- Companion animals (including pet collars);
- Granular bait products for ornamental gardens;
- Applications by hand, spoon and bellygrinder;
- All commercial applications to residential areas (turf, ornamentals, fruit trees, and vegetable gardens);
- alfalfa, apples (insect control only), apricot, balsam fir, barley, broccoli, Brussels sprouts, cabbage, cauliflower, cherries, clover, corn (sweet & field), farm woodlots, grapes, kale, municipal parks, oats, peach, pears, peppers, plums, rights-of-way for control of spruce budworm, residential ornamentals and residential vegetable gardens, rye, snapbeans (hand harvest only), spruce, strawberries, sweet white lupin, turf (lawns, golf courses & sod farms) and wheat.

The following amendments must be made to the appropriate labels:

- For canola, the new maximum label rate is 0.233 kg a.i./ha.
- For tobacco, the new maximum label rate is 1.28 kg a.i./ha (solutions) and 1.13 kg a.i./ha for (wetable powders), two applications, 7 days apart.

## Revised Restricted-Entry Intervals (REIs)

The restricted-entry intervals listed below must be added to the appropriate labels.

Crop	Activity	REI <sup>1</sup> (days)
apples (orchards that have transitioned to high density trellis production) Max. application rate: 1.5 kg a.i./ha (chemical thinning application)	Hand harvest	14
	Hand thinning, hand-line irrigation	14
	Hand pruning, scouting, pinching, tying, training	4
apples (orchards that have not transitioned to high density trellis production) Max. application rate: 1.0 kg a.i./ha (chemical thinning application)	Hand harvest	17
	Hand thinning, hand-line irrigation	10
	Hand pruning, scouting, pinching, tying, training	0.5
asparagus and asparagus ferns	High contact activities (irrigation)	6
	Low contact activities (hand weeding)	0.5
beans	High contact activities (scouting, hand harvest, irrigation)	7
	Low contact activities (hand weeding)	0.5
beet (root/top), horseradish, radish, rutabaga (root), salsify (root/top), turnip (root/top)	High contact activities (hand harvest, irrigation)	5
	Low contact activities (scouting, hand weeding, thinning)	0.5
blackberry, boysenberry, dewberry, loganberry, raspberry	High contact activities (hand harvest, pinching, pruning, training)	10
	Low contact activities (irrigation, weeding, scouting, thinning)	6
blueberries	High contact activities (hand harvest, pinching, pruning, training)	9
	Low contact activities (irrigation, weeding, scouting, thinning)	5
bran bait applications	All activities	0.5
carrots	Low contact activities (scouting, weeding, thinning)	0.5
cranberries	High contact activities (irrigation, pruning, harvesting)	10
	Low contact activities (scouting, weeding, thinning)	2
cucumbers, melons, squash, pumpkins	High contact activities (hand-line irrigation)	2
	Low contact activities (hand harvest, turning, tying, staking, scouting, weeding)	0.5
choke cherries	All activities	21
ditch banks, forage grasses, pastures	All activities	2
eggplants	High contact activities (hand harvest, hand-line irrigation)	7
	Low contact activities (scouting turning, weeding, tying, staking)	3

forests	All activities	13
green ash	All activities	24
high value trees	All activities	7
Chinesc cabbage, dandelion, endive, lettuce, collards, mustard greens, parsley, spinach, Swiss chard, and watercress celery, kohlrabi	High contact activities (hand harvest, hand pruning, irrigation)	5
	Low contact activities (scouting, hand weeding, thinning)	0.5
ornamental trees	All activities	28
ornamental shrubs and flowers	All activities	13
parsnips	High contact activities (hand harvest, hand pruning, irrigation)	5
	Low contact activities (scouting, hand weeding, thinning)	0.5
peas	High contact activities (hand harvest, irrigation)	5
	Low contact activities (scouting, thinning, hand weeding)	0.5
potatoes	High contact activities (irrigation)	6
	Low contact activities (scouting, hand weeding)	0.5
rapeseed (canola)	All activities (scouting, irrigation)	0.5
root crops	All activities	10
snapbeans	High contact activities (scouting, irrigation)	6
	Low contact activities (hand weeding, mechanical harvest)	0.5
tobacco	High contact activities (harvesting, irrigation)	3
	Low contact activities (scouting, weeding, pruning)	0.5
tomatoes	High contact activities (tying, hand harvest, pruning, irrigation)	6
	Low contact activities (scouting thinning, hand weeding, staking)	0.5
trap trees	All activities	7

<sup>1</sup> Day at which the dermal exposure results in an MOE  $\geq 300$ .

### Number of Applications:

Consult the table below for the number of applications per year and application intervals per crop:

### Applications per Year and Application Intervals

Crops	Applications per Year	
	Number	Interval (days)
apples (chemical thinning application)	1	N/A
trap trees; choke cherries; high value trees	1	N/A
ditch banks, forage grasses and pastures, rapeseed (canola); blackberries, boysenberries, dewberries, loganberries, raspberries, blueberries, cranberries;	2	8

tobacco		
beet (root/top), Chinese cabbage, dandelion, collards, endive, mustard greens, parsley, salsify (root/top), spinach, Swiss chard, turnip (root/top), watercress, parsnips; asparagus; celery, lettuce, kohlrabi, beans, horseradish, radish, rutabaga (root), carrots, peas, potatoes, snapbeans (mechanical harvesting only), tomato, eggplants, cucumbers, melons, pumpkin, squash; azalea, carnation, chrysanthemums, gladiolus, holly, hydrangea, lilac, rose, zinnia; green ash	2	7
forests, arborvitae, birch, boxwood, dogwood, elm, juniper, maple, oak, pines, ornamental trees, bran bait application (non-residential)	3	7

### Add to DIRECTIONS FOR USE (Pollinator statements):

Appropriate restrictions should be repeated under the specific crop use directions, as follows.

To protect pollinators, follow the instructions regarding bees in the Environmental Precautions section.

For asparagus, rapeseed (canola), apple, blackberries, boysenberries, dewberries, loganberries, chokecherries, raspberries, blueberries, cranberries, melons, pumpkin, squash, cucumber, broad beans and outdoor ornamentals and trees (excluding coniferous evergreens), add the following statements:

- TOXIC to bees. DO NOT apply during the crop blooming period.

For beans (except broad beans as listed above), peas, potato, eggplant, tomato, tobacco, and the following crops when grown for seed: Chinese cabbage, collards, mustard greens, kohlrabi, dandelion, watercress, celery, endive, lettuce, parsley, spinach, Swiss chard, turnip, rutabaga, carrots, beets, parsnip, horseradish, radish, salsify, add the following statements:

- TOXIC to bees. Avoid application during the crop blooming period. If applications must be made during the crop blooming period, restrict applications to evening when most bees are not foraging. When using managed bees for pollination services, DO NOT apply during the crop blooming period.

### Add to DIRECTIONS FOR USE:

Field sprayer application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE) fine classification. Boom height must be 60 cm or less above the crop or ground.

Airblast application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** direct spray above plants to be treated. Turn off outward pointing nozzles at row ends and outer rows. **DO NOT** apply when wind speed is greater than 16 km/h at the application site as measured outside of the treatment area on the upwind side.

Aerial application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply when wind speed is greater than 16 km/h at flying height at the site of application. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE) fine classification. To reduce drift caused by turbulent wingtip vortices, the nozzle distribution along the spray boom length **MUST NOT** exceed 65% of the wing- or rotorspan.

### **Buffer zones:**

Use of the following spray methods or equipment **DO NOT** require a buffer zone: hand-held or backpack sprayer and spot treatment.

The buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands) and estuarine/marine habitats.

Method of application	Crop		Buffer Zones (metres) Required for the Protection of:			
			Freshwater Habitat of Depths:		Estuarine/Marine Habitats of Depths:	
			Less than 1 metre	Greater than 1 metre	Less than 1 metre	Greater than 1 metre
Field sprayer	Asparagus (seedling), beans, beet, blackberry, blueberry, boysenberry, canola, carrot, Chinese cabbage, celery, chokecherry, collards, cucumber, dandelion, eggplant, endive, kohlrabi, lettuce, loganberry, melon, mustard greens, parsley, parsnip, peas, potato, pumpkin, radish, raspberry, rutabaga, salsify, snapbeans, spinach, squash, Swiss chard, turnip, tomato and watercress.		10	3	15	10
	Ditch banks, field borders, wastelands, headlands, forage grass, pasture, rangeland, asparagus (ferns), cranberry, ornamentals		15	4	25	10
	Tobacco		25	5	35	15
Airblast	Apple (apple thinning only)	Early growth stage	25	10	30	20
	Ornamentals	Early growth stage	45	30	50	40
		Late growth stage	35	20	40	30
Aerial	Blueberries	Fixed wing	700	100	800	575
		Rotary wing	675	75	800	525
	Forage, field crops, and vegetable crops	Fixed wing	750	225	800	600
		Rotary wing	675	125	800	550
	Cranberries	Fixed wing	775	350	800	600
		Rotary wing	650	300	800	550
	Forest, woodlands	Fixed wing	800	350	800	725
		Rotary wing	375	125	450	275

For tank mixes, consult the labels of the tank-mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture and apply using the coarsest spray (ASAE) category indicated on the labels for those tank mix partners.

The buffer zones for this product can be modified based on weather conditions and spray equipment configuration by accessing the Buffer Zone Calculator on the Pest Management Regulatory Agency web site.

### **Apple Thinning:**

**The use directions for apple thinning on Sevin Brand 50W (Reg. No. 6839) label must be removed.**

**For apple thinning use on the current labels (Sevin Brand XLR Plus (Reg. No. 19531) and Sevin XLR (Reg. No. 27876)): Add the following to DIRECTIONS FOR USE:**

“TO REDUCE FRUIT SET — APPLE TREES (FRUIT):

#### **APPLICATION RATE AND TIMING**

For orchards that have transitioned to high density trellis production architecture (e.g., spindle or super spindle trees) apply 0.5 to 3.22 L/ha as a full coverage spray timed between late petal fall and 25 days after full bloom. The use rate will depend on the apple variety, tree size, row spacing, and the weather conditions at the time of and following application. For easily thinned varieties apply 0.5-1 L of product/1000 L of spray (233–466 g a.i./1000 L). For hard to thin varieties apply 1-2 L of product/1000 L of spray (466–932 g a.i./1000 L). The maximum application rate per growing season is not to exceed 1.5 kg a.i./ha.

For orchards that have not transitioned to high density trellis production architecture (e.g., dwarf, semi-dwarf and full sized trees) apply 0.5 to 2.15 L/ha as a full coverage spray timed between late petal fall and 25 days after full bloom. The use rate will depend on the apple variety, tree size, row spacing, and the weather conditions at the time of and following application. For easily thinned varieties apply 0.5-1 L of product/1000 L of spray (233–466 g a.i./1000 L). For hard to thin varieties apply 1-2 L of product/1000 L of spray (466–932 g a.i./1000 L). The maximum application rate per growing season is not to exceed 1.0 kg a.i./ha.

Apple tree varieties differ in their sensitivity to chemical thinners. Varieties considered easy-to thin, including Ginger Gold, Cortland, and Granny Smith may be adequately thinned with one application. Varieties considered more difficult-to-thin such as Golden Delicious, Red Delicious, Gala, etc. may require an additional application or be combined with another compatible thinner containing benzyladenine or naphthaleneacetic acid.

Pre-harvest interval is 75 days for apple thinning applications.



## SPRAY APPLICATION AND VOLUME

Sevin should be applied from the ground using a high volume handgun or airblast sprayer. The sprayer should be properly calibrated to ensure complete coverage of foliage and developing fruit without runoff. It is suggested that nozzles be adjusted to deliver 2/3 of the spray volume in the upper portion of a tree. Reduce spray coverage to the lower portion of the tree since over thinning may occur here. Adjust spray volume to accommodate tree size. The most effective spray volume will depend on the tree size, planting density (row and tree spacing) and amount of foliage. Use sufficient spray volume to ensure adequate coverage; typical spray volume is dependent on tree size (e.g., 1000 to 2000 L/ha). Avoid spray to the point of runoff.

## COMPATABILITY WITH OTHER THINNERS

Sevin may be tank mixed with other fruit thinners, such as products containing 6-benzyladenine or naphthaleneacetic acid (NAA) for use on some varieties. However, use caution to avoid over-thinning and other adverse effects. The combination with NAA may result in pygmy or small fruit production on some varieties such as Delicious and Fuji. Consult with local fruit thinning experts for recommendations before using either of these combinations. Refer to and follow the tank mix partner's label for specific use directions and precautions.

## PRECAUTIONS FOR APPLE THINNING USE OF SEVIN XLR CARBARYL INSECTICIDE

### LIQUID SUSPENSION

- Do not apply during bloom prior to 80% petal fall.
- Weather Influences Thinner Response:
  - Climatic temperature, high humidity, frost, and other weather factors may influence fruit thinning results. When fruit reach a size range of 7 to 14 mm they are most sensitive to thinner application and weather conditions, particularly at 3 to 4 days after application, will influence thinner response. Application made when temperatures are expected to be below 17°C may result in reduced and insufficient thinning. When temperatures are expected to exceed 27°C or when moderate temperatures are accompanied by an extended period (3 to 4 days) of cloudy weather, heavy or excessive thinning may be observed. A good rule-of thumb is once fruit reach 6 to 7 mm in size the most satisfactory thinning is often achieved by making the application right before a period forecasted of at least 3 days of moderate (21°C to 25°C) temperatures.
- Other Factors that Influence Thinner Response:
  - Exercise caution to avoid possible over thinning and possible yield reduction. Tree age, variety, nutrition, previous crop pruning and bloom, and degree of set may influence fruit thinning results.
- Fruit Deformity Precaution:

- The use of Sevin may result in fruit deformity under certain environmental conditions. Before using on any variety of apples, the user must weigh the risk versus benefits when using this product, particularly when using it between 80% petal fall and 6 mm fruit size. Red Delicious is more sensitive to this phenomenon and in particular, the varieties Bisbee, Red Chief and Vallee Spur are very susceptible to conditions causing fruit deformity. Precipitation and temperatures below 18°C increases the possibility of fruit deformity. The use of this product with any spray additive not specifically recommended on the label may increase the risk of fruit deformity and injury.  
Consult with fruit thinning experts in your area for advice on using this product on specific apple varieties under local growing conditions or other questions. Observe all restrictions on the use of this product for apple thinning.

#### DRIFT MANAGEMENT

For airblast application, observe the following drift management practices:

- Adjust deflectors and aiming devices so that spray is only directed into the canopy;
- Block off upward pointed nozzles when there is no overhanging canopy;
- Do not allow the spray to go beyond the edge of the cultivated area (i.e., turn off sprayer when turning at end rows);
- For applications to the outside rows, only spray inward, toward the orchard.”

## **Appendix VI Additional Mitigation Measures for Certain Products Containing Carbaryl**

### **Domestic Class Products**

All domestic class products containing carbaryl are to be cancelled.

The cancellation schedule for all domestic class products is as follows:

Last sale by registrants: 12 months following the publication date of this document

Last sale by retail: 24 months following the publication date of this document

Expiry date of registration: 36 months following the publication date of this document

### **Wettable Powder in Water Soluble Packaging (WSP)**

Registrants of end-use product must take measures to package wettable powder products in water soluble packaging and discontinue the wettable powder formulation.

An application to register a new product in water soluble packaging is required within 24 months following the publication date of this document. Label directions for these products must be revised to provide use directions for products in water soluble packaging.

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<b>PMRA Number</b>	<b>Reference</b>
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