Department of Pesticide Regulation

Mary-Ann Warmerdam
Director

M E M O R A N D U M

Arnold Schwarzenegger
Governor

TO: Linda O'Connell **HSM-09010**
Senior Environmental Scientist
Worker Health and Safety Branch

FROM: Maria Salomon *(original signed by M. Salomon)*
Environmental Scientist
Worker Health and Safety Branch
(916) 445-4322

DATE: August 25, 2009

SUBJECT: EXPOSURE SCOPING DOCUMENT FOR INDOXACARB

Attached is an exposure scoping document for registered pesticide products containing indoxacarb as an active ingredient. All actively registered labels (currently a total of 22) were reviewed, as well as pesticide use date, pesticide illness data, and other pertinent information. Based on this information, this document is intended to lay the groundwork for the risk assessment process. The information in this document may be used for the development of an exposure assessment document for indoxacarb.

If you have any comments or questions, please contact me at the number listed above.

Attachment

California Environmental Protection Agency
Department of Pesticide Regulation
Worker Health and Safety Branch

HSM-09010

EXPOSURE SCOPING DOCUMENT FOR PESTICIDE PRODUCTS THAT CONTAIN INDOXACARB

August 2009

Maria Salomon, Environmental Scientist
Human Health Mitigation Program
1001 I Street P.O. Box 4015, Sacramento, CA 95812-4012
(916) 445-4322; Fax (916)445-4280 **www.cdpr.ca.gov**

TABLE OF CONTENTS

SUMMARY……..3

PURPOSE…… 3

REGULATORY HISTORY/STATUS…… 4

PESTICIDE USE AND SALES…….. 4

FORMULATIONS AND USES…….. 7

LABEL REQUIREMENTS……. 7

POTENTIAL EXPOSURE SCENARIOS……... 8

PESTICIDE ILLNESS REPORTS…….11

REFERENCES……... 14

APPENDIX A…… 15

APPENDIX B…….16

APPENDIX C…… 17

SUMMARY

Indoxacarb is a non-systemic synthetic insecticide that is used to control lepidopterous pests such as beet codling moth, oriental fruit moth, lesser appleworm, redbanded leafroller, tufted apple bud worm, cabbage looper, diamondback moth, imported cabbageworm, fall armyworm, southern armyworm, tomato pinworm, and tomato fruitworm. It is also used to control ants and coackroaches. Indoxacarb is registered for use in residential, agricultural, commercial, institutional, and industrial settings. The mode of action is dermal absorption or ingestion which results in impaired nerve function, feeding cessation, paralysis, and death. Registered products of indoxacarb are developed from using a 3:1 (S:R) enantiomeric ratio. The name indoxacarb refers to the S-isomer. The R-stereoisomer does not display insecticidal activity. Indoxacarb is considered an organophosphate replacement insecticide. Indoxacarb trade names include Indoxacarb Technical™ Insecticide, Steward™ Insecticide, and Avaunt™ Insecticide. The basic producer of indoxacarb is E.I. Du Pont De Nemours & Company (Dupont)(Moncada, 2003).

Indoxacarb is used as an insecticide on vegetables, fruit crops, soybeans, alfalfa, peanuts, landscape and recreational turfgrass (including golf courses), and landscape ornamentals. The reported use of indoxacarb in California averaged about 58,688 pounds per year from 2003 through 2007. The major use crops were cotton, alfalfa, tomatoes, brassica (cole) crops, lettuce, peppers, potatoes, pome fruit, and corn (DPR, 2009 and 2009c).

There were a total of 28 reported illnesses that were associated with indoxacarb use from 2003 through 2007 in California. Illness incidents were associated with both agricultural and non-agricultural uses, involving mostly field workers and residents. The symptoms of illnesses included itchy skin, dizziness, nausea, vomiting, headache, difficulty breathing, stomach ache, and eye irritation (Mehler, 2009).

PURPOSE

The Department of Pesticide Regulation (DPR) identified indoxacarb as having potential adverse health effects in studies of sufficient quality to allow risk characterization (DPR, 2001). During the risk assessment process, DPR evaluates the significance of the adverse effects associated with use and determines if further action is needed to mitigate unacceptable adverse effects.

This scoping document establishes the groundwork for the exposure assessment process by assessing potential exposure scenarios and the protective measures identified on currently registered pesticide labels. Based on information on indoxacarb product labels, exposure scenarios are proposed in this document for occupational and non-occupational exposure to handlers. Exposure scenarios are also proposed for fieldworkers, residents, and others who may be exposed to post-application residues of indoxacarb.

The information in this document may be used for the development of an exposure assessment document for indoxacarb.

REGULATORY HISTORY/STATUS

Indoxacarb was first registered in California in January 2001 (Moncada, 2003). Currently, there are 22 indoxacarb products registered in California (DPR, 2009a), all of which have the signal word "Caution" on the label.

The California regulatory status for indoxacarb is summarized below.

Table 1. California Regulatory Status for Indoxacarb

	Restricted Material	**Toxic Air Contaminant**	**Groundwater Protection List**	**Proposition 65 List**
Yes / No	No	No	No	No
Law	FAC Division 7, Chapter 3, Article 1, Section 14001	FAC Division 7, Chapter 3, Article 1.5, Section 14021(b)	FAC Division 7, Chapter 2, Article 15, Section 13141	Health & Safety Code, Section 25249.5
Regulation	3 CCR, Section 6400	3 CCR, Section 6860	3 CCR, Section 6800	27 CCR, Section 25000 to 27001

FAC: California Food and Agricultural Code
HSC: California Health and Safety Code
CCR: California Code of Regulations

Reregistration Eligibility Document (RED): As of March 13, 2009, a RED document for indoxacarb is not available from the United States Environmental Protection Agency (US EPA)(U.S. EPA, 2009).

Report of Food Quality Protection Act (FQPA) Tolerance Reassessment Progress: The initial tolerance decision for indoxacarb was made in 2002 (U.S. EPA, 2009a). Tolerances established for the combined residues of indoxacarb in or on certain raw agricultural commodities are identified in 40 Code of Federal Regulations, Chapter 1, Edition 7-1-07.

PESTICIDE USE AND SALES

California pesticide use reports show that indoxacarb had a range of uses in agricultural, residential, commercial, and industrial pest control. Available California pesticide use reports for the past five years (2003-2007) indicate an average annual use of 58,688 pounds (lbs) of indoxacarb. The average annual amount of indoxacarb sold in the same period was 187,163 lbs. Cotton, alfalfa, tomatoes, brassica (cole) crops, lettuce, peppers, potatoes, pome fruit, and corn were the major use crops constituting 35.6, 35.0, 10.7, 10.5, 6.7, 0.8, 0.6, 0.11 and 0.07 percent of the total reported uses, respectively (DPR, 2009 and 2009c)(Table 2).

Table 2. Pounds of Indoxacarb Applied to Major Use Crops in California for 2003-2007[a]

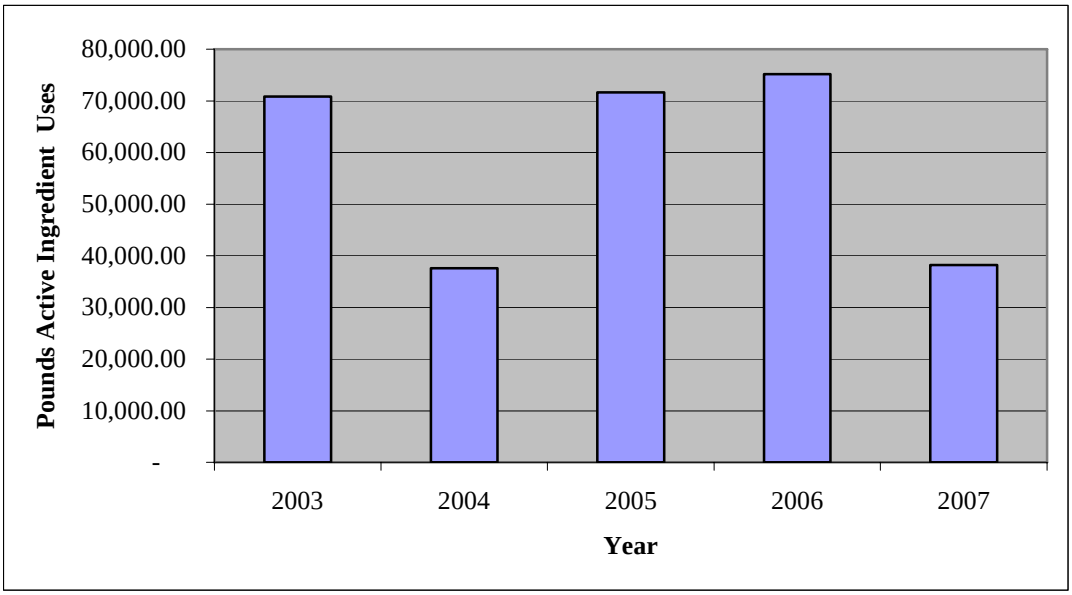
CROP	2003	2004	2005	2006	2007	Average	Percent of Total AI Applied
Cotton	31,466	12,900	29,876	24,048	6,021	20,862	35.6
Alfalfa	18,718	8,620	24,256	34,634	16,486	20,543	35.0
Tomatoes[b]	7,493	5,714	6,162	6,633	5,339	6,268	10.7
Brassica (Cole)[c]	6,172	5,788	6,481	6,315	6,105	6,172	10.5
Lettuce (head and leaf)	6,020	3,872	3,693	2,731	3,240	3,911	6.7
Peppers	645	477	388	385	406	460	0.8
Potatoes	301	198	526	362	483	374	0.6
Pome Fruit[d]	3	3	181	0	0	62	0.11
Corn (human consumption)	7	18	48	56	87	43	0.07
Total	70,825	37,590	71,611	75,164	38,167	58,671	~100%
Total AI Applied	70,853	37,593	71,619	75,177	38,200	58,688	-----
Total AI Sold	82,403	45,319	124,257	358,806	25,030	187,163	-----

[a] Source: (DPR, 2009b) and (DPR, 2009c)
[b] Includes all types
[c] Includes bok choy, broccoli, Brussels sprouts, cabbage, cauliflower, Chinese cabbage, kale, and kohlrabi
[d] Includes apples and pears; Average calculated for 2003-2005

It is important to note that reported uses are those reported by licensed applicators and agricultural applicators. Indoxacarb has numerous products registered in California that may be used by homeowners and people other than licensed and agricultural applicators. In addition to use report data, sales report data is collected by DPR for all pesticides sold in the state of California. Pesticide sales data is primarily utilized to collect a mill assessment fee. While quantities of reported pesticide use and sales are often not equivalent each year (sold does not necessarily means applied), the averages of each over several years indicates approximate amounts of pesticides used by those other than licensed and agricultural applicators.

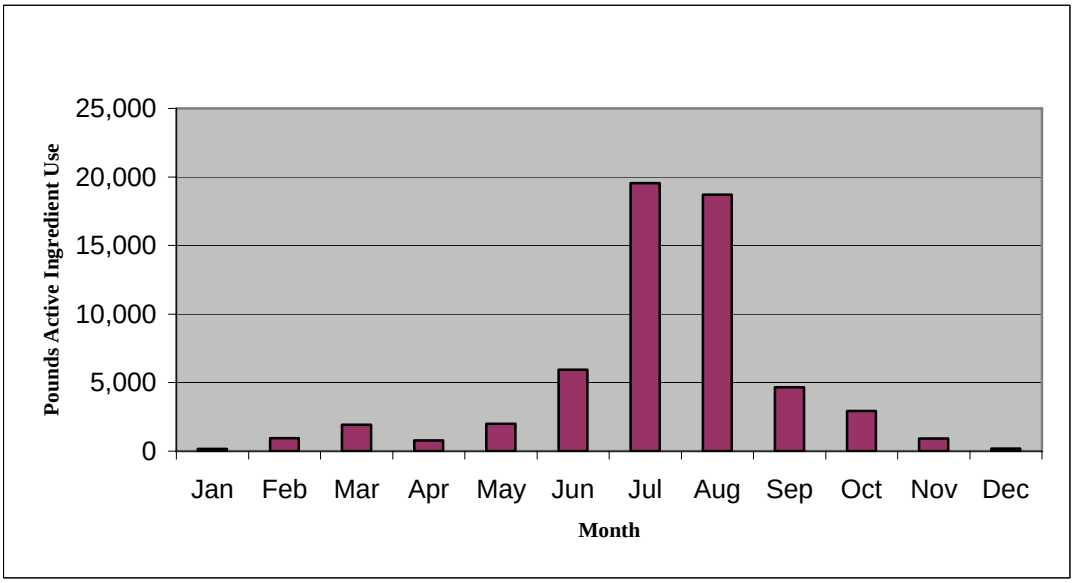
The total use of indoxacarb per year in California for 2003-2007 is shown in Figure 1. Monthly uses of indoxacarb were obtained from the California Pesticide Information Portal (DPR, 2009c). Average monthly uses of indoxacarb from 2003 through 2007 are shown in Figure 2. The highest monthly use was in July and August, totaling about 33.3% and 31.8% of the total annual use, respectively. The top five counties with the highest use of indoxacarb for 2003 through 2007 are shown in Table 3. The average annual use in these five counties totaled 43,168 lbs of indoxacarb, which accounted for 73.7% of the average total annual use in California during the same period.

Figure1. Total Pounds of Indoxacarb Use per Year in California for 2003-2007[a]



[a] Source: (DPR,2009)

Figure 2. Average Monthly Pounds of Indoxacarb Use in California for 2003-2007[a]



[a] Source: (DPR,2009)

Table 3. Top Five Counties with the Highest Use of Indoxacarb in California for 2003-2007[a]

COUNTY	AVERAGE POUNDS OF INDOXACARB	PERCENT AVERAGE TOTAL ANNUAL USE
Fresno	17,901	30.5
King	12,598	21.5
Imperial	6,142	10.5
Monterey	3,493	6.0
Merced	3,034	5.2
TOTAL	43,168	73.7

[a] Source: (DPR, 2009c)

FORMULATIONS AND USES

Indoxacarb has agricultural and non-agricultural uses, and is used both indoors and outdoors. The bulk of the products registered in California are bait formulations for indoor/outdoor residential, commercial, institutional and industrial pest control. Indoxacarb products are manufactured in a wide range of formulations (Table 4).

Table 4. Indoxacarb Formulations[a]

FORMULATION TYPE	NUMBER OF PRODUCTS	CONCENTRATION RANGE (PERCENT)	SIGNAL WORD
Granular/Flake	8	0.008 - 30.0	Caution
Suspension	1	14.5	Caution
Emulsifiable Concentrate	1	15.84	Caution
Other, Dry (Baits)	2	0.1 - 0.5	Caution
Gel, Paste, Cream	2	0.05 - 0.6	Caution
Pellet/Tablet/Cake/Briquette (Baits)	8	0.04 – 0.10	Caution
TOTAL	22	----------	----------

[a] As identified on DPR's label database (DPR, 2009a)

LABEL REQUIREMENTS

Currently there are 22 indoxacarb-containing products registered in California (DPR, 2009a). There are three registered labels for use in crop production in California. Dupont™ Avaunt® Insecticide is dispersible granule formulation with 30% indoxacarb [active ingredient (AI)]. Dupont™ Steward® Insecticide, a suspension concentrate and Dupont™ Steward® EC Insecticide, an emulsifiable concentrate both contain 1.25 pounds (lbs) AI per gallon (gal). All three products may be mixed with water and applied as foliar spray to control various insects. Application via any irrigation system is not allowed for all three products except as allowed by Federal Supplemental and Special Local Need (SLN) labeling. Dupont™ Avaunt® Insecticide and Dupont™ Steward® EC Insecticide product labels specify application via ground, aerial or overhead sprinkler chemigation equipment. The product label for Dupont™ Steward® Insecticide specifies only ground and aerial applications. Aerial applications must be made using a minimum of five gallons per acre (gpa), except in tree and vine crops a minimum of 10 gpa per must be used. Ground applications must be made using a minimum of five to10 gpa, except in tree and vine crops 50 to 200 gpa of water is required. There are a number of label restrictions to avoid spray drift to non-target areas when indoxacarb products are applied. These include droplet size, boom length and size, and wind speed restrictions.

All three products require applicators and other handlers to wear the following work clothing and personal protective equipment (PPE):

- Long-sleeved shirt and long pants
- Shoes plus socks
- Chemical-resistant gloves category A such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber

Dupont™ Avaunt® Insecticide is a toxicity category III pesticide with the signal word "Caution" on the label. It is a water-dispersible granule (30 percent AI/18 ounces) that may be applied as a

foliar spray. The restricted entry interval (REI) for treated crops is 12 hours except for hand harvesting of sweet corn which has an REI of 14 days. The maximum application rate is 0.26 lbs AI for brassica leafy vegetables, sweet corn, fruiting vegetables and okra, leafy petioles, mint, southern peas, and spinach; 0.44 lbs AI for cranberries, leafy vegetables (except spinach), cucurbit vegetables, pome fruit, stone fruit, and tuberous and corm vegetables; and 0.22 lbs AI for grapes. The preharvest interval (PHI) is 3 days for brassica leafy vegetables, sweet corn, cucurbit vegetables, fruiting vegetables and okra, leafy vegetables, leafy petioles, and spinach; 7 days for grapes, mint, and tuberous and corm vegetables; 14 days for pome and stone fruits; 28 days for pears; and 30 days for cranberries.

Dupont™ Steward® Insecticide and Dupont™ Steward® EC Insecticide each contain 1.25 lbs AI/gal and both are toxicity category III pesticides with the signal word "Caution" on the label. Both labels specify that the restricted entry interval (REI) for treated crops is 12 hours. The maximum application rate for alfalfa, cotton, and peanuts is 0.44 lbs AI. The PHI is 7 days for alfalfa and 14 days for cotton and peanuts.

Dupont™ Provaunt™ Insecticide is a toxicity category III pesticide with the signal word "Caution" on the label. It is a water-dispersible granular (30 percent AI/10 ounces) that may be applied as a full coverage foliar spray on landscape and recreational turfgrass, and landscape ornamentals. Repeat applications must be limited to no more than once per seven days.

Chemsico Ant Control 4I, Chemsico Roach Control I, Chemsico Ant Control 1, and Chemsico Insect Bait 161 are all identified as Master Labels with the signal word "Caution". All four are identified as baits stations except for Chemsico Insect Bait 161 which is a granular formulation (0.016 percent AI). The percent of AI in the three bait station formulations is 0.04, 0.05, and 0.10. All specify placement of the product in areas inaccessible to children, pets, and other non-target animals. All are for household use only.

All other labels are for non-agricultural use in commercial, institutional, industrial, and residential settings, including homes, apartments, warehouses, golf courses, recreational areas, supermarkets, restaurants, motels, hotels, hospitals, zoos, food handling/storage establishments, aircraft, trains, ships, boats and buses. The majority of non-agricultural use labels are bait stations. Dupont™ Advion® Ant Gel, Dupont™ Advion® Fire Ant Bait, and Dupont™ Advion® Cockroach Gel Bait may only be used by commercial applicators.

POTENTIAL EXPOSURE SCENARIOS

Indoxacarb products are categorized into the following 3 major use sites:

1. Indoor and outdoor residential
2. Indoor and outdoor institutional, commercial, and industrial
3. Agricultural

These use sites do not have clear boundaries, but rather overlap each other. However, these site categories provide some understanding regarding the type of handlers, their activities, and the type of equipment that may be used. The use site also provides some information on the non-handlers that may potentially be exposed during or after an application. Given this information, indoxacarb exposure scenarios are grouped as follows:

1. Occupational handlers such as agricultural and commercial pesticide applicators
2. Non-occupational handlers such as residential applicators
3. Occupational non-handlers such as fieldworkers and
4. Non-occupational non-handlers such as residents in a treated home or people in or around treated areas.

Occupational Handler Exposure Scenarios

For the purpose of this document, agricultural handlers include those workers who are involved in the application of indoxacarb to agricultural sites. Commercial pesticide applicators include those who are involved in the application of indoxacarb to residential, institutional, commercial and industrial sites, including lawns and ornamentals. Occupational handler (both agricultural and commercial applicators) activities associated with the use of indoxacarb formulations are shown in Table 5. Non-crop occupational reentry scenarios for indoxacarb, including all use sites, application rates, and reentry activities are listed in Appendix B.

Occupational Non-Handlers (Fieldworkers) Exposure Scenarios

Non-handlers are those workers who may be exposed to pesticides after an application, and who may be exposed to pesticide residues or pesticide drift. Agricultural fieldworkers (reentry workers) who enter treated fields after an application are included in this group. The exposure scenarios during the reentry to treated fields depend mainly on the time of reentry following an application, the crop, and the type of activities the worker performs. The restricted entry interval (REI) on the label specifies the earliest time of entry to treated agricultural fields by workers after an application. The crop and the type of work activity help determine the level of contact with treated surfaces. These work activities include harvesting, pruning, thinning, scouting, weeding, irrigating, staking/tying, and transplanting. Crop reentry scenarios for indoxacarb, including each use site, and the corresponding maximum application rate, seasonal application rates, REI, preharvest interval (PHI), and reentry activities are listed in Appendix A.

Reentry exposures occur when a worker enters treated fields or use sites to perform work activities. A person may come into contact with pesticide residues on treated surfaces of plants or other objects. Typically, allowable reentry time is at the expiration of the REI or the PHI (for harvesters only). A person may enter a treated site before harvesting to perform work activities such as scouting, pruning, or thinning if the REI is shorter than the PHI. In this case, the exposure of a worker reentering a treated field would likely be greater than that for a harvester.

Non-Occupational Handler (Residential) Exposure Scenarios

Residential applicators may handle bait stations and granular formulations. Granular formulations may be applied via broadcast spreader and shaker/sprinkler containers. Non-occupational (residential) handler activities associated with the use of indoxacarb formulations are shown in Table 6.

Non-Occupational Non-Handlers Exposure Scenarios

The product labels for indoxacarb allow uses in and around residential, institutional, commercial, and industrial areas. Men, women, and children may be exposed to treated environments following an application of indoxacarb to areas such as homes, apartments, lawns, schools, office buildings, warehouses, theaters, industrial buildings, hotels, kennels, livestock housing, food processing plants, food service establishments, restaurants, grocery stores, and transportation equipment. Residential and public reentry scenarios for indoxacarb, including all use sites, application rates, and reentry activities are listed in Appendix C.

Table 5. Occupational Handler Activities Associated with the Use of Indoxacarb Formulations

Handler Activity[a]	PRODUCT FORMULATIONS[b]					
	Water Dispersible Granular	**Granular**	**Other (Dry)**	**Suspension Concentrate**	**Emulsifiable Concentrate**	**Gel**
Aerial (mixer/loader)	x			x	x	
Aerial Applicator	x			x	x	
Flagger	x			x	x	
Airblast (mixer/loader)	x			x	x	
Airblast Applicator	x			x	x	
Airblast (mixer/loader/applicator)	x			x	x	
Groundboom (mixer/loader)	x			x	x	
Groundboom Applicator	x			x	x	
Groundboom (mixer/loader/applicator)	x			x	x	
Overhead Sprinkler Chemigation (mixer/loader)	x				x	
Ground Applicator	x			x	x	
Low-Pressure Sprayer (mixer/loader/applicator)	x			x	x	
High-Pressure Sprayer (mixer/loader/applicator)	x			x	x	
Broadcast Spreader (loader/applicator)		x				
Belly Grinder (loader/applicator)		x				
Backpack Sprayer (mixer/loader/applicator)	x					
Mound Treatment		x			x	
Crack & Crevice or Spot Treatment						x
Bait Station/Arena			x			

[a] Handler activities identified on product labels

[b] Product formulations as identified on DPR's label database (DPR, 2009a)

x Handler activities associated with the identified formulation on product labels

Table 6. Non-Occupational Handler (Residential) Activities Associated with the Use of Indoxacarb Formulations

Handler Activity[a]	PRODUCT FORMULATIONS[b]		
	Water Dispersible Granular	**Granular**	**Pellet/Tablet/Cake/Briquette And Other (Dry)**
Broadcast Spreader (loader/applicator)		x	
Belly Grinder (loader/applicator)		x	
Backpack Sprayer (mixer/loader/applicator)	x		
Low-Pressure Sprayer (mixer/loader/applicator)	x		
High-Pressure Sprayer (mixer/loader/applicator)	x		
Bait Stations/Arenas			x
Mound Treatment		x	
Shaker/Sprinkler		x	

[a] Handler activities identified on product labels

[b] Product formulations as identified on DPR's label database (DPR, 2009a)

x Handler activities associated with the identified formulation on product labels

PESTICIDE ILLNESS REPORTS

Reports of illnesses and injuries associated with exposure to pesticides products are maintained in the Pesticide Illness Surveillance Program database of DPR. Reported illnesses that were associated with indoxacarb indicated a total of 28 incidents from 2003 through 2007 in California (Mehler, 2009). These cases were classified as definitely, probably, or possibly associated with indoxacarb alone or indoxacarb in combination with other pesticides. These cases stemmed from 10 episodes in which one or more people developed symptoms following indoxacarb exposure (Table 7).

The affected people included 19 field workers, one applicator, and eight people engaged in routine activities with no particular expectation of pesticide exposure (Table 8). Twelve of the thirteen violations identified as "Other Misuse" were drift-related and the other was associated with a child playing with a sprayer on a spray rig. The symptoms of exposure included itchy skin, dizziness, nausea, vomiting, headache, difficulty breathing, stomach ache, and eye irritation.

Table 7. Individual Illnesses and Number of Episodes Associated With Indoxacarb Exposure in California for 2003-2007[a]

YEAR	NUMBER OF EPISODES[b]	NUMBER OF ILLNESSES[c]
2003	2	2
2004	2	11
2005	3	12
2006	1	1
2007	2	2
TOTAL	10	28

[a] Source: (Mehler, 2009)

[b] An episode refers to any single pesticide-related event (application, accidental spill, mix/load) that resulted in 1 or more illnesses.

[c] An illness refers to a single person reporting symptoms.

Table 8. Violations Associated With Indoxacarb Exposure in California for 2003-2007[a]

YEAR	NUMBER OF VIOLATIONS	VIOLATION TYPE [b]	ACTIVITY[c]
2003	1	None	Applicator
	1	None	Field Worker
2004	10	Early Entry	Field Worker
	1	Non-Contributory	Field Worker
2005	5	Other Misuse	Field Worker
	7	Other Misuse	Routine Outdoor
2006	1	Other Misuse	Routine Outdoor
2007	2	None	Field Worker
TOTAL	28	-----	-----

[a] Source: (Mehler, 2009)

[b] Violation types as identified in investigation report.

[c] Activity of the individual at the time of the exposure.

None: Indicates that information provided in the investigation report shows that no violation occurred.

Early Entry: Indicates that the affected person reentered a pesticide treated area prior to the expiration of the restricted entry interval set by regulation or listed on the product label. This excludes early reentry that meets the requirements specified by the California Code of Regulations (Title 3, California Code of Regulations Sections 6770 and 6771).

Non-Contributory: Indicates that violation(s) occurred, but did not contribute to exposure.

Other Misuse: Indicates any violation of pesticide safety requirements other than unknown, early reentry, or failure to use required equipment that contributed to the exposure. Twelve were related to drift from the target site and one involved a child playing with a sprayer on a spray rig.

In 1999 there was one incident in Texas that resulted in exposure to 45 people (De Vries, 2009). The incident reportedly affected residents living near fields used for experimental pesticide development. No violations were noted. Symptoms reported included skin, eye, and respiratory irritation.

Review of published literature provided no additional information regarding poisonings and human exposure related to the use of indoxacarb.

REFERENCES

De Vries, G. 2009. Sent electronic table containing indoxacarb related exposures outside of California for 1999-2006 to Maria Salomon of the California Human Health Mitigation Program, Worker Health and Safety Branch, Department of Pesticide Regulation, California Environmental Protection Agency.

DPR. 2001. Notice to Pesticide Registrants Regarding Initiation of Risk Assessment Process for the Active Ingredient Indoxacarb. California Notice 2001-13. Sacramento, CA: Pesticide Registration Branch, Department of Pesticide Regulation, California Environmental Protection Agency.

DPR. 2009. Pesticide Use Reporting (PUR), Pesticide Use Annual Summaries (2002-2006). Department of Pesticide Regulation, California Environmental Protection Agency. http://www.cdpr.ca.gov/docs/pur/purmain.htm

DPR. 2009a. California Product/Label Database Queries & Lists (search for active indoxacarb products). Department of Pesticide Regulation, California Environmental Protection Agency. http://www.cdpr.ca.gov/docs/label/labelque.htm

DPR. 2009b. Reports of pesticides sold in California (2002-2006). Department of Pesticide Regulation, California Environmental Protection Agency. http://www.cdpr.ca.gov/docs/mill/nopdsold.htm

DPR. 2009c. California Pesticide Information Portal (CalPIP), Pesticide Use Report. Website accessed for database queries on several dates. Department of Pesticide Regulation, California Environmental Protection Agency. http://calpip.cdpr.ca.gov/main.cfm

Mehler, L. 2009. Case reports received by the California Pesticide Illness Surveillance Program, 2003 - 2007 in which health effects were definitely, probably, or possibly attributed to exposure to indoxacarb, alone or in combination. Sacramento, CA: Worker Health and Safety Branch, Department of Pesticide Regulation, California Environmental Protection Agency.

Moncada, A. 2003. Environmental Fate of Indoxacarb. Sacramento, CA: Environmental Monitoring Branch, Department of Pesticide Regulation, California Environmental Protection Agency.

U.S. EPA. 2009. Pesticide Reregistration Status: Indoxacarb Reregistration Eligibility Decision Document. Washington, DC. http://www.epa.gov/pesticides/reregistration/status.htm

U.S. EPA. 2009a. Status of Actual/Anticipated Residue Tolerance Review Process. Washington, DC. http://www.epa.gov/pesticides/regulating/anticipated_residue/process_status.htm

Appendix A
CROP REENTRY SCENARIOS FOR INDOXACARB

The following table was prepared by reviewing indoxacarb product labels. Maximum single application rates is in pounds active ingredient per acre (lbs AI/A) unless specified otherwise and minimum preharvest intervals (PHI) were chosen when they differed between labels; however, most application rates and PHI were generally the same on all labels.

Rows are sorted by site category (FC = Field Crops; FN = Fruits and Nuts; V = Vegetables; S = Specialty Uses), then by use sites.

Site Cat.	Use Site	Rate[a] (Single)	Seasonal[b] Applications	REI[c]	PHI[d]	Reentry Activities
FC	Corn, Sweet (through tassel push only)	0.26	4	12 (14 days for hand harvesting)	3 (35 fodder and stover)	Irrigating, Scouting, Weeding, Roguing, Detasseling, Hand Harvesting, Mechanical Harvesting
FC	Alfalfa	0.44	NS[e]	12	7	Irrigating, Weeding, Roguing, Scouting, Mechanical Harvesting
FC	Cotton	0.44	NS	12	14	Irrigating, Weeding, Roguing, Scouting, Mechanical Harvesting
FN	Cranberries	0.44	NS	12	30	Irrigating, Weeding, Roguing, Scouting, Mechanical Harvesting
FN	Grapes	0.22	2	12	7	Thinning, Hand Harvesting, Pruning, Propping, Irrigating, Scouting, Weeding, Transplanting
FN	Pears	0.44	4	12	28	Thinning, Hand Harvesting, Pruning, Propping, Irrigating, Scouting, Weeding, Transplanting
FN	Pome Fruits (except pears)	0.44	4	12	14	Thinning, Hand Harvesting, Pruning, Propping, Irrigating, Scouting, Weeding, Mechanical Harvesting, Transplanting
FN	Stone Fruits	0.44	4	12	14	Thinning, Hand Harvesting, Pruning, Propping, Irrigating, Scouting, Weeding, Mechanical Harvesting, Transplanting
V	Cucurbit Vegetables	0.44	NS	12	3	Staking/tying, Hand Harvesting, Scouting, Irrigating, Weeding, Transplanting, Mechanical Harvesting
V	Leafy Vegetables (except spinach and spinach varieties)	0.44	NS	12	3	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Spinach	0.26	NS	12	3	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Brassica (cole) Leafy Vegetables	0.26	6 (per calendar year)	12	3	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Leafy Petioles	0.26	NS	12	3	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Fruiting Vegetables	0.26	NS	12	3	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Mint (peppermint and spearmint)	0.26	NS	12	7	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Peanuts	0.44	NS	12	14	Irrigating, Scouting, Weeding, Mechanical Harvesting
V	Southern Peas (dry varieties only)	0.26	NS	12	7	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting
V	Tuberous and Corm Vegetables	0.44	NS	12	7	Hand Harvesting, Irrigating, Scouting, Weeding, Thinning, Transplanting, Mechanical Harvesting

a Rate, maximum single application rate in pounds active ingredient per acre (lbs AI/acre) , unless otherwise noted.

b Maximum seasonal applications, unless otherwise noted.

c REI, given in hours, restricted entry interval for the specified crop.

d PHI, given in days, preharvest interval for the specified crop.

e NS means not specified on the label

Appendix B
NON-CROP OCCUPATIONAL REENTRY SCENARIOS FOR INDOXACARB

The following table was prepared by reviewing indoxacarb product labels. Maximum single application rates (units are specified) were chosen when they differed between labels.

Rows are sorted by site category (M = Miscellaneous), then by use sites.

Site Category	Use Site	Rate[a]	Units[b]	Reentry Activities
M	Crack and Crevice or Spot Treatment (In and Around Residential, and Non-food/Non-feed Institutional, Commercial and Industrial Areas)	0.1 to 1.0 Net Contents = 30 g of 0.05% AI	g/spot	Work or Recreational Related Activities in Treated Areas (such as weeding, watering, and playing)
M	Broadcast Treatments Mound Treatments	1.5 (up to 4 applications/year)= 6 lbs/A/year total 0.50	lbs/A of 0.045% AI oz/mound of 0.045% AI	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
M	Ant Bait Arena (In and Around Residential, Institutional, Commercial and Industrial Areas)	Net= 0.07/arena (AI=0.10%)	-------	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
M	Ant Bait Arena (In and Around Residential, Institutional, Commercial and Industrial Areas)	3 – 10 bait arenas/100 ft (AI=0.50%)	-------	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
M	Landscape and Recreational Turfgrass (including golf courses) and Landscape Ornamentals	0.45 (turfgrass) 0.092 (ornamentals) Net= 10 oz (AI=30.0%)	Lb AI/A/season lb AI/100 gal	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and golfing)
M	Crack and Crevice or Spot Treatment (In and Around Residential, and Non-food/Non-feed Institutional, Commercial and Industrial Areas)	3 to 5 (about 0.5 g/spot) Net Contents = 30 g of 0.60% AI	Spots/10 ft	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)

a Rate, maximum single application rate given for the active ingredient unless otherwise noted.

b Units are specified for each rate (gram=g; %= percent; AI= active ingredient; A= acre; pounds= lbs; feet= ft. ; ounce= oz; gallon= gal).

Appendix C
RESIDENTIAL AND PUBLIC REENTRY SCENARIOS FOR INDOXACARB

The following table was prepared by reviewing indoxacarb product labels. Maximum single application rates (units are specified) were chosen when they differed between labels.

Rows are sorted by site category (R = Residential; B = Both Residential and Public Areas), then by use sites.

Site Category	Use Site	Rate[a]	Units[b]	Reentry Activities
R	Broadcast Treatments Mound Treatments	0.5 4	lbs/1000 ft^2 of 0.016% AI Tbsp/mound of 0.016% AI	Residential Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
B	Landscape and Recreational Turfgrass (including golf courses) and Landscape Ornamentals	0.45 (turfgrass) 0.092 (ornamentals) Net= 10 oz (AI=30.0%)	Lb AI/A/season lb AI/100 gal	Work or Recreational Activities in Treated Area (such as weeding, watering, and golfing)
R	Mound Treatments	Treats 36 mounds (AI=0.008%)	-------	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
R	Broadcast Treatments Mound Treatments	1.0 1	lb/1000 ft^2 of 0.008% AI Tbsp/ ft^2 of mound of 0.008% AI	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
B	Ant Bait Arena (In and Around Residential, Institutional, Commercial and Industrial Areas)	Net= 0.07 (AI=0.10%)	oz/arena	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
R	Ant Bait Station (Indoor Residential)	Net= 0.07 (AI=0.04%)	oz /station	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
R	Ant Bait Station (Indoor Residential)	Net= 0.07 (AI=0.10%)	oz /station	Work or Recreational Related Activities in Treated Area (such as weeding, watering and playing)
R	Ant Bait Station (Indoor/Outdoor Residential)	Use all 12 bait stations Net= 0.07 (AI=0.05%)	oz /station	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)
B	Ant Bait Arena (In and Around Residential, Institutional, Commercial and Industrial Areas)	3 – 10 bait arenas/100 ft (AI=0.50%)	-------	Work or Recreational Related Activities in Treated Area (such as weeding, watering, and playing)

a Rate, maximum single application rate given for the active ingredient unless otherwise noted.

b Units are specified for each rate (Tbsp= tablespoon; %= percent; AI= active ingredient; A= acre; lb= pound; ft= feet; ft2= feet squared; oz= ounce).