



# IPM Guide to Reduced Toxicity Pesticide List

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## Introduction

The McKinleyville Community Services District's (MCSD) Integrated Pest Management Plan (IPM) Reduced Toxicity Pesticide List (RTP List, see Appendix A) is the result of a multi-step process that involves both environmental science and pest management. The first step is a hazard assessment of both the active ingredients and the formulated product. The second step is a consideration of the potential human and environmental exposure that may result from use of the product in the particular application proposed by MCSD staff. The third and final step combines the results of the hazard and exposure assessments into a decision by staff and the Board of Directors (Board) as to whether a product should be added to the RTP List, and label it an EPA Toxicity Category I, II, III, or IV.

## Step 1: Hazard Assessment

MCSD summarizes the hazards associated with pesticide products and places the products into EPA Toxicity Categories based on the toxicity of the active ingredient(s) and the other ingredients (if they are identified) in the product. The specific hazards assessed are described in Table 2 and the ingredients in the product are evaluated for each category and ranked as high, moderate or low hazard, according to the criteria in Table 3.

## Step 2: Exposure Assessment

The hazard review and category ranking process is only the first step toward placing a pesticide on the RTP List. A critical second step is review by the MCSD Interdepartmental IPM Review Group, which is composed of IPM Coordinator and District staff. This process will evaluate the MCSD IPM Control Alternatives & Cost Assumptions (Appendix B) and take into consideration the potential human and environmental exposure when selecting treatment method. The Committee discusses the selection criteria listed below when selecting a treatment method. Upon determining that treatment is necessary, the following criteria in descending order shall be used to help select the appropriate IPM treatment strategy:

1. Least hazardous to environment, non-target organisms and human health
2. Cost-effectiveness in the short and long-term
3. Least disruptive of natural controls
4. Most likely to produce a permanent reduction in the environment's ability to support target pests

MCSD Board approval is required for use of an EPA Toxicity Category I or II compound.

In the event of an emergency situation, the General Manager has the authority to function if not practical to go to the Board and then report to the Board when practical.

### Step 3: Placement on the MCSD IPM Reduced Toxicity Pesticide List

The MCSD Interdepartmental IPM Review Group makes recommendations for treatment methods. These recommendations are then reviewed by the MCSD General Manager (GM) or MCSD Board depending on the EPA Category. If the decision is made to list a product, it is categorized in one of three ways:

- **Category III and IV (Signal Word: Caution or None)** These products are generally the least hazardous pesticides on the list.
- **Category II (Signal Word: Warning)** These products include specific restrictions on allowable situations. Use of Category II products must be justified at an annual Board Meeting.
- **Category I (Signal Word: Danger)** These are pesticide products that pose the greatest health or environmental concerns, but which are nevertheless considered the least-hazardous chemical alternative for a particular purpose. Use of Category I products must be justified on a case by case basis by the Board at a Board Meeting.

The MCSD IPM Coordinator will compile data from all participating MCSD departments and submit an annual report at the January Board Meeting to the MCSD General Manager and Board of Directors. The report will detail the previous year's IPM efforts, including additions to the List. The report will include a review of new IPM strategies as well as trends in IPM techniques over time.

### Exemptions

The General Manager shall be granted a formal exemption and the authority to function in emergency situations, if it is not practical to go to the Board.

District Staff, shall be granted a formal exemption from the MCSD Board to use EPA Toxicity Category III or IV products not found on the Reduced Toxicity Pesticide List for pilot testing new, safer products.

### Hazard Tier Review Process

Pesticide products are assigned a hazard tier ranking after evaluating the hazard indices listed in the following section. The product is assigned a ranking as High, Moderate, or Low for each characteristic based on the ranges or values shown in Table 3 below. If any of the criteria are in the High category, the product is an EPA Toxicity Category I. If the chemical does not have any criteria in the High category, but does have at least one criterion in the Moderate category, the product is an EPA Toxicity Category II. Products with criteria only in the Low category are either EPA Toxicity Category III or IV. See Table 1 for a summary of rankings, and Table 2 for a summary of data sources. See Appendix C: *Code of Federal Regulations, Title 40: Chapter 1- Environmental Protection Agency, Part 156* and Appendix D: .

**Table 1: Rankings Derived from Hazard Screening**

<b>EPA Toxicity Category</b>	<b>Signal Word</b>	<b>Definition</b>
EPA Toxicity Category I	Danger	Highest concern. At least one criterion in Table 3 placed in highest hazard category.
EPA Toxicity Category II	Warning	Moderate concern. At least one criterion in Table 3 placed in the moderate hazard category.
EPA Toxicity Category III & IV	Caution or None	Lowest concern.

**Table 2: Hazards Evaluated and Data Sources Used**

Hazard	Source(s) of Information Used
Acute toxicity	Product label: Signal word (Caution, Warning or Danger)
Restricted use	Product label: Use restricted to professional applicators
Cancer	Cancer classification of ingredient by US EPA, State of California (Proposition 65 list) <sup>20</sup> , National Toxicology Program (Report on Carcinogens) <sup>21</sup> , or the International Agency for Research on Cancer (IARC Monographs) <sup>22</sup>
Reproductive or Developmental Toxicity	Designation of ingredient by the State of California (Proposition 65 list <sup>20</sup> ), US EPA on the Toxics Release Inventory list <sup>1</sup>
Endocrine disruption	Designation of ingredient by the European Commission <sup>2</sup> or included in the book
Water pollution potential	<i>Environmental Endocrine Disruptors</i> by Lawrence H. Keith <sup>3</sup> Ingredient listed under Clean Water Act Section 303(d). <sup>4</sup>
Hazard to birds	Product label or MSDS: Presence and wording of bird hazard statement or LD50 or LC50 of product (if available).
Hazard to aquatic life	Product label or MSDS: Presence and wording of fish hazard statement or LC50 of product (if available).
Hazard to bees	Product label or MSDS: Presence and wording of bee hazard statement or LD50 or LC50 of product (if available).
Hazard to wildlife	Product label or MSDS: Presence and wording of wildlife hazard statement or LD50 or LC50 of product (if available).
Soil mobility	Soil mobility score (Groundwater Ubiquity Score or GUS) calculated from physical properties or CA DPR's assessment of groundwater contamination potential using physical properties. Physical property data available in the OSU Pesticide Properties Database, <sup>5</sup> CA DPR Pesticide Contamination Prevention Act Status Reports, <sup>6</sup> or the EU Footprint Pesticide Properties database. <sup>7</sup>
Persistent, Bioaccumulative, Toxic substances (PBTs)	US EPA Waste Minimization priority chemical <sup>8</sup> or listed by the European Union as fulfilling PBT or Persistent Organic Pollutant (POP) criteria. <sup>9</sup>

**Table 3: Criteria for Hazard Signal Word Ranking**

<b>Hazard</b>	<b>High</b>	<b>Moderate</b>	<b>Low</b>
Signal word	Danger	Warning	Caution or none
Restricted use	Yes	---	No
Cancer (see Table 1)	Known or Probable	Possible	Unclassifiable, Not Likely, Not Listed
Reproductive or Developmental Toxicity	Listed	---	Not listed
Endocrine disruption	EC category I or II	---	EC category III or not listed
Water pollution	303(d) listed	---	Not listed
Hazard to birds	“Extremely toxic” or “Highly toxic” according to product label, or high product toxicity based on LC50 or LD50 (see above)	“Toxic” according to product label, or moderate product toxicity based on LC50 or LD50 (see above)	No warning on product label, or low product toxicity based on LC50 or LD50 (see above)
Hazard to aquatic life	“Extremely toxic” or “Highly toxic” according to product label, or high product toxicity based on LC50 (see above)	“Toxic” according to product label, or moderate product toxicity based on LC50 (see above)	No warning on product label, or low product toxicity based on LC50 (see above)
Hazard to bees	“Extremely toxic” or “Highly toxic” according to product label, or high product toxicity based on LD50 (see above)	“Toxic” according to product label, or moderate product toxicity based on LD50 (see above)	No warning on product label, or low product toxicity based on LD50 (see above)
Hazard to wildlife	“Extremely toxic” or “Highly toxic” according to product label, or high product toxicity based on LC50 or LD50 (see above)	“Toxic” according to product label, or moderate product toxicity based on LC50 or LD50 (see above)	No warning on product label, or low product toxicity based on LC50 or LD50 (see above)
Soil mobility	---	GUS $\geq 2$ or DPR classifies AI as exceeding SNVs	GUS $< 2$ and Not listed by DPR as exceeding SNVs.
PBT	Listed	---	Not listed

## Appendix A

### MCSD Reduced Toxicity Pesticide List

Product Name	Type	EPA #	Active Ingredient(s)	EPA Toxicity Category / Signal Word	Use Limitations	Changes	Usage 2017 (lbs)
Bayer Advanced Grub Control Plus Turf Revitalizer	FERTILIZER, INSECTICIDE	72155-36	IMIDACLOPRID 0.25%	Category II / Caution	No use in pesticide free parks and sports site. Do not apply directly to water.		
RoundUp Weed & Grass Killer Concentrate Plus	HERBICIDE	71995-29	GLYPHOSATE, ISOPROPYLAMINE SALT 18%, DIQUAT DIBROMIDE 0.73%	Category II / Caution	No use in pesticide free parks and sports site.		
Ace Wasp & Hornet Killer4	INSECTICIDE	9688- 325	CYPERMETHRIN 0.04%, PRALLETHRIN 0.02%	Category III / Caution	Do not apply directly to water.		
Amdro Kills Ants Ant Killing Bait	INSECTICIDE	1663-33	HYDRAMETHYLNON 1%	Category III / Caution			
Ortho Bug B Gon Insect Killer For Lawns & Gardens Concentrate	INSECTICIDE	239- 2718	BIFENTHRIN 0.3%, (S)-CYPERMETHRIN 0.075%	Category III / Caution			
Raid Multi Insect Killer 7	INSECTICIDE	4822- 569	PRALLETHRIN 0.1%, PHENOTHIRIN 0.125%	Category III / Caution	Do not apply directly to water.		
Terro Liquid Ant Bait	INSECTICIDE	149-8	BORAX 5.4%	Category III / Caution			
VectoLex FG	INSECTICIDE	73049- 20	BACILLUS SPHAEERICUS, SEROTYPE H-5A5B, STRAIN 2362 7.5%	Category III / Caution	To be used only at the Wastewater Management Facility.		
ZEP Hitman	INSECTICIDE	1270- 256	DELTAMETHRIN 0.02%	Category III / Caution			
Hot Shot Fogger 6 With Odor Neutralizer	MITICIDE, FUNGICIDE, INSECTICIDE	9688-309	CYPERMETHRIN 0.75%, TETRAMETHRIN 0.05 %	Category III / Caution	Do not apply directly to water.		
Espoma Organic Weed Preventer 9-0-0	PRE-EMERGENT	N/A	0	Category IV / No Signal Word			
Gopher Getter Type 2 Ag Bait by Wilco	RODENTICIDE	36029-23	DIPHACINONE 0.005%	Category III / Caution	No use in pesticide free parks and sports site.		
D-Con Bait Station XI Kills Mice	VERTEBRATE CONTROL	3282-102	DIPHACINONE 0.005%	Category III / Caution			
The Giant Destroyer	VERTEBRATE CONTROL	10551-1	SODIUM NITRATE 46.2%, SULFUR 34.8%, CARBON 8.7%	Category II / Warning	No use in pesticide free parks and sports site.		



Appendix B

MCSD IPM Control Alternatives & Cost Assumptions																									
Maintenance Task	Approach	Recommended Frequency (# of Times Annually)	Labor Hours (per 100 sq. ft.)	Equipment Codes				Total Equip Hours Cost (per 100 sq. ft.)	Materials Codes							Total Materials Cost (per 100 sq. ft.)	Actual Annual Cost (per 100 sq. ft.)	Effectiveness of Alternative							
Planter Bed																									
Weed Control (pre existing)	Cultivating	3	0.5	I	G			45								0	\$ 91.65			Labor	Cost/Hour	Code	Materials	Cost/100 Sq. Ft.	
	Chemical Application	2	0.1	I				35	13							1.62	\$ 42.84	Very effective; politically sensitive		Maint. Worker,	\$ 31.10	0	None	\$	
	Mulch	1	0.33	I	G			45	12							35	\$ 90.26	Somewhat effective				1	Ace Wasp & Hornet Killer4	\$ 5.49	
	Fabric Application	0.2	0.75	I				35	19							15.33	\$ 55.00	Somewhat effective; damaged by digging				2	Amdro Kills Ants Ant Killing Bait	\$ 1.24	
Weed Control (existing)	Hand Weeding	3	0.5	I	G			45								0	\$ 91.65	Very effective; costly on annual basis	A	Backhoe	\$ 70.00	3	Bayer Advanced Grub Control Plus Turf Revitalizer	\$ 0.16	
	Chemical Application (Spot)	2	0.1	I				35	13							1.62	\$ 42.84	Very effective; least costly; politically sensitive	B	Boom Truck	\$ 81.00	4	D-Con Bait Station XI Kills Mice	\$ 4.00	
Pruning	Hand Pruning	1	1	I	G			45								0	\$ 76.10		C	BushHog	\$ 35.00	5	Espoma Organic Weed Preventer 9-0-0	\$ 5.67	
	Reduce Pruning (damage only)	0.5	0.5	I	G			45								0	\$ 52.78	Unattractive; weak plant material	D	Chipper	\$ 60.00	6	Fertilizer 12 12 12	\$ 0.45	
Debris Collection	Raking/Collecting	2	0.5	I	G			45								0	\$ 76.10		E	Dump Truck	\$ 50.00	7	Gopher Getter Type 2 Ag Bait by Wilco	\$ 0.05	
Turf Management																			F	John Deere	\$ 40.00	8	Grass Seed	\$ 0.50	
Mowing	7 Day cycle	32	0.0083	I	H			65								0	\$ 73.26		G	Landscape	\$ 10.00	9	Hot Shot Fogger 6 With Odor Neutralizer	\$ 0.26	
	10 Day cycle; Limit Watering	20	0.0083	I	H			65								0	\$ 70.16	Unattractive turf in summer	H	Riding Mower	\$ 30.00	10	Ortho Bug B Gon Insect Killer For Lawns & Gardens Concentrate	\$ 0.36	
Weed Control	Increase mowing height (2" to 3")	20	0.0083	I	H			65								0	\$ 70.16	Cost remains the same; less attractive	I	Utility Truck	\$ 35.00	11	Raid Multi Insect Killer 7	\$ 5.60	
	Chemical Application (Spot)	2	0.1	I				35	6							0.45	\$ 41.67	Very effective; politically sensitive	J	Vac Con	\$ 100.00	12	Redwood Mulch	\$ 35.00	
	Chemical Application (Saturation)	1	0.1	I				35	6							0.45	\$ 38.56	Most effective; more politically sensitive	Z	None	\$ -	13	RoundUp Weed & Grass Killer Concentrate Plus	\$ 1.62	
	Fertilization	3	0.0083	I				35	6							0.45	\$ 36.22	Somewhat effective; costly; improves appearance				14	Super Sweet Lime	\$ 0.40	
Hard Surface Care																						15	Terro Liquid Ant Bait	\$ 1.50	
Weed Removal (Spot)	Hand Removal	8	1	I	G			45								0	\$ 293.80					16	The Giant Destroyer	\$ 2.00	
	Chemical Application	3	0.0083	I				35	13							1.62	\$ 37.39	Very effective; reduces labor; politically sensitive				17	VectoLex FG	\$ 0.30	
	Burning	6	0.25	I				35								0	\$ 81.65	Potential burying of surface				18	ZEP Hitman	\$ 2.78	
Tree Care																									
Pruning	Safety & shaping	0.5	2	I	G	D	B	186								0	\$ 217.10								
	For safety only	1	1	I	G			45								0	\$ 76.10	Safety only							
Pest Control	Chemical Application	1						0								0	\$ -	Very effective; high labor cost; poltically sensitive							
	General Wash	1						0								0	\$ -	Somewhat effective; low labor cost; poltically acceptable							
	Biological	1						0								0	\$ -	Somewhat effective; low labor cost; poltically acceptable							

# Appendix C



## § 156.62

## 40 CFR Ch. I (7–1–10 Edition)

direct or inform the user of actions to take to avoid the hazard or mitigate its effects.

(a) *Location of statements*—(1) *Front panel statements*. The signal word, child hazard warning, and, in certain cases, the first aid statement are required to appear on the front panel of the label, and also in any supplemental labeling intended to accompany the product in distribution or sale.

(2) *Statements elsewhere on label*. Hazard and precautionary statements not required on the front panel may appear on other panels of the label, and may be required also in supplemental labeling. These include, but are not limited to, the human hazard and precautionary statements, domestic animal statements if applicable, a Note to Physician, and physical or chemical hazard statements.

(b) *Placement and prominence*—(1) *Front panel statements*. All required front panel warning statements shall be grouped together on the label, and shall appear with sufficient prominence relative to other front panel text and graphic material to make them unlikely to be overlooked under customary conditions of purchase and use. The table below shows the minimum type size requirements for the front panel warning statements for various front panel sizes.

TYPE SIZES FOR FRONT PANEL WARNING STATEMENTS

Size of Label Front Panel (Square Inches)	Point Size	
	Signal Word (All Capital Letters)	Child Hazard Warning
5 and under	6	6
Over 5 to 10	10	6
Over 10 to 15	12	8
Over 15 to 30	14	10
Over 30	18	12

(2) *Other required statements*. All other hazard and precautionary statements must be at least 6 point type.

### § 156.62 Toxicity Category.

This section establishes four Toxicity Categories for acute hazards of pesticide products, Category I being the highest toxicity category. Most human hazard, precautionary statements, and human personal protective equipment statements are based upon the Toxicity Category of the pesticide product as sold or distributed. In addition, toxicity categories may be used for regulatory purposes other than labeling, such as classification for restricted use and requirements for child-resistant packaging. In certain cases, statements based upon the Toxicity Category of the product as diluted for use are also permitted. A Toxicity Category is assigned for each of five types of acute exposure, as specified in the table in this paragraph.

ACUTE TOXICITY CATEGORIES FOR PESTICIDE PRODUCTS

Hazard Indicators	I	II	III	IV
Oral LD <sub>50</sub>	Up to and including 50 mg/kg	>50 thru 500 mg/kg	>500 thru 5,000 mg/kg	>5,000 mg/kg
Dermal LD <sub>50</sub>	Up to and including 200 mg/kg	>200 thru 2000 mg/kg	>2000 thru 20,000 mg/kg	>20,000 mg/kg
Inhalation LC <sub>50</sub>	Up to and including 0.2 mg/liter	>0.2 thru 2 mg/liter	>2 thru 20 mg/liter	>20 mg/liter
Eye irritation	Corrosive; corneal opacity not reversible within 7 days	Corneal opacity reversible within 7 days; irritation persisting for 7 days	No corneal opacity; irritation reversible within 7 days	No irritation
Skin irritation	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

### § 156.64 Signal word.

(a) *Requirement*. Except as provided in paragraph (a)(4), each pesticide product must bear on the front panel a signal

word, reflecting the highest Toxicity Category (Category I is the highest toxicity category) to which the product is assigned by any of the five routes of exposure in § 156.62. The signal word

must also appear together with the heading for the human precautionary statement section of the labeling (see § 156.70).

(1) *Toxicity Category I.* Any pesticide product meeting the criteria of Toxicity Category I for any route of exposure must bear on the front panel the signal word “DANGER.” In addition, if the product is assigned to Toxicity Category I on the basis of its oral, inhalation or dermal toxicity (as distinct from skin and eye irritation), the word “Poison” must appear in red on a background of distinctly contrasting color, and the skull and crossbones symbol must appear in immediate proximity to the word “Poison.”

(2) *Toxicity Category II.* Any pesticide product meeting the criteria of Toxicity Category II as the highest category by any route of exposure must bear on the front panel the signal word “WARNING.”

(3) *Toxicity Category III.* Any pesticide product meeting the criteria of Toxicity Category III as the highest category by any route of exposure must bear on the front panel the signal word “CAUTION.”

(4) *Toxicity Category IV.* A pesticide product meeting the criteria of Toxicity Category IV by all routes of exposure is not required to bear a signal word. If a signal word is used, it must be “CAUTION.”

(b) *Use of signal words.* In no case may a product:

(1) Bear a signal word reflecting a higher Toxicity Category than indicated by the route of exposure of highest toxicity, unless the Agency determines that such labeling is necessary to prevent unreasonable adverse effects on man or the environment;

(2) Bear a signal word reflecting a lesser Toxicity Category associated with a diluted product. Although precautionary statements for use dilutions may be included on label, the signal word must reflect the toxicity of the product as distributed or sold; or

(3) Bear different signal words on different parts of the label.

#### § 156.66 Child hazard warning.

(a) Each pesticide product must bear on the front panel of the label the statement “Keep Out of Reach of Chil-

dren.” That statement, or any alternative statement approved by EPA, must appear on a separate line in close proximity to the signal word, if required. The statement is required on Toxicity Category IV products that do not otherwise require a signal word.

(b) In its discretion, EPA may waive the requirement, or require or permit an alternative child hazard warning, if:

(1) The applicant can demonstrate that the likelihood of exposure of children to the pesticide during distribution, marketing, storage or use is remote (for example, an industrial use product); or

(2) The pesticide is approved for use on children (for example, an insect repellent).

(c) EPA may approve an alternative child hazard warning that more appropriately reflects the nature of the pesticide product to which children may be exposed (for example, an impregnated pet collar). In this case, EPA may also approve placement on other than the front panel.

#### § 156.68 First aid statement.

(a) *Product as sold and distributed.* Each product must bear a first aid statement if the product has systemic effects in Category I, II, or III, or skin or eye irritation effects in Category I or II.

(b) *Product as diluted for use.* If the product labeling bears directions for dilution with water prior to use, the label may also include a statement describing how the first aid measures may be modified for the diluted product. Such a statement must reflect the Toxicity Category(ies) of the diluted product, based upon data for the route of exposure (or calculations if appropriate). If the labeling provides for a range of use dilutions, only that use dilution representing the highest concentration allowed by labeling may be used as the basis for a statement pertaining to the diluted product. The statement for a diluted product may not substitute for the statement for the concentrate, but augments the information provided for the concentrate.

(c) *Heading.* The heading of the statement may be “First Aid” or “Statement of Practical Treatment.”

## Appendix D

**Below are details on the hazard indices used in the evaluation:**

### **- Acute Toxicity**

EPA assigns every pesticide product to a hazard category based on the results of acute toxicity testing of the full product including inert ingredients. The testing includes the single dose required to cause death in test animals via ingestion, inhalation, and skin absorption. The testing also considers the degree of skin and eye irritation or damage. Based on the results of these tests, EPA assigns the product to a hazard category and requires a signal word such as Caution, Warning, or Danger to be placed on the label. Danger indicates the highest hazard, Warning indicates moderate hazard, and Caution indicates a lower hazard.

### **- Restricted Use**

Some pesticides are restricted to use only by certified pesticide applicators and are not available to the general public because of high toxicity, particularly hazardous ingredients, or environmental hazards. Pesticides designed as restricted use are so indicated on the product label.

### **- Cancer (known ingredients only)**

Various state, federal, and international organizations evaluate or list chemicals for carcinogenicity, their potential to cause cancer <sup>19, 20, 21, 22</sup> Due to the expense and difficulty of such evaluations, not all agencies have reviewed the same chemicals and not all reach the same conclusions on a given chemical. For this reason, we use the ratings of several agencies whenever possible. These ratings indicate the strength of the scientific evidence that a particular chemical can cause cancer in humans, but they do not consider the potency of the chemical, i.e. the number of cancers that will result from a standard level of exposure to a population. The various agencies use different words to describe the strength of evidence, such as possible, probable, likely, known, etc. In order to simplify the rating, we have assigned the various phrases used by the different agencies to a standard phrase used in the Hazard Tier assessment (see Table 4). The tier rating is based on the highest likelihood assigned by any agency that has evaluated the chemical.

**Table 4: Standardized Cancer Rankings Used in Hazard Tier Assessment**

Organization	Organization Rating	Standardized Rating for MCSD Hazard Tier
US EPA <sup>19</sup>	<p>Group A: Known Human Carcinogen Known/Likely Likely to be Carcinogenic to Humans</p> <p>Group B: Probable Human Carcinogen B1: Sufficient evidence of carcinogenicity from animal studies with limited evidence of carcinogenicity from epidemiologic studies in humans B2: Sufficient evidence of carcinogenicity from animal studies with inadequate or no data from epidemiologic studies in humans</p> <p>Group C: Possible Human Carcinogen Likely to be Carcinogenic to Humans at High Doses, but Not Likely at Low Doses Suggestive Evidence of Carcinogenicity to Humans</p> <p>Group D: Not classifiable as to human carcinogenicity Data are inadequate for an assessment of human carcinogenic potential</p> <p>Group E: Not Likely to be Carcinogenic to Humans</p>	<p>Known or Probable Known or Probable Known or Probable Known or Probable</p> <p>Possible Possible</p> <p>Possible Unclassifiable Unclassifiable Not Likely</p>
IARC <sup>22</sup>	<p>Group 1: Carcinogenic to Humans</p> <p>Group 2A: Probably Carcinogenic to Humans</p> <p>Group 2B: Possibly Carcinogenic to Humans</p> <p>Group 3: Unclassifiable as to Carcinogenicity to Humans</p> <p>Group 4: Probably not Carcinogenic to Humans</p>	<p>Known or Probable Known or Probable Possible Unclassifiable</p> <p>Not Likely</p>
NIH/NTP <sup>21</sup>	<p>Known to be a Human Carcinogen</p> <p>Reasonably Anticipated to be a Human Carcinogen</p> <p>Reviewed but not listed</p>	<p>Known or Probable Known or Probable Not Listed</p>
Proposition 65 <sup>20</sup>	Known to the State of California to Cause Cancer	Known or Probable

- Reproductive/Developmental Toxicants (known ingredients only)

Known ingredients in the products are screened against the State of California lists of known reproductive and developmental toxicants,<sup>20</sup> the US EPA Toxics Release Inventory (TRI) chemical hazard list,<sup>32</sup> or the list from the National Toxicology Program's Health Assessment and Translation (formerly the Center for Evaluation of Risks to Human Reproduction).<sup>33</sup>

### - Endocrine Disruptors (known ingredients only)

Under the Food Quality Protection Act, the EPA is required to screen pesticide ingredients for endocrine system effects. Until that screening is done, a comprehensive list of endocrine disruptors will not be available. For purposes of this screening, we used the list of endocrine disruptors compiled by the European Commission<sup>24</sup> and in the book *Environmental Endocrine Disruptors* by Lawrence Keith.<sup>25</sup> Chemicals on the EU list are classified for both humans and wildlife as Category I: evidence for endocrine disruption in living organisms, Category II: evidence of potential to cause endocrine disruption, or Category III: low exposure concern, no scientific basis for inclusion, or insufficient information. The list of endocrine disruptors will likely be expanded at a later date, when US EPA publicizes the results of the Endocrine Disruptor Screening Program.

### - Water Pollution (known ingredients only)

Section 303(d) of the federal Clean Water Act requires states to compile a list of water bodies with excessive contamination. The list of impaired water bodies in the area where the product will be used (available from the US EPA 303(d) web site<sup>34</sup>) is searched for pesticide active ingredients. Based on a site-specific analysis of the water bodies, products are assessed as to whether they contain priority 303(d) pollutants for that area.

### - Hazards to Birds, Aquatic Life, Bees, and Other Wildlife

The US EPA requires particular hazard warning statements on pesticide product labels depending on the toxicity of the active ingredients and the formulated product to particular off-target species, evidence that adverse effects have occurred, and the use for which the product is intended. The hazard assessment is based on whether such warnings appear on the specific product label or the acute toxicity of the product as described in the MSDS. This toxicity is expressed as an LC<sub>50</sub> (or LD<sub>50</sub>) that is the lethal concentration (or dose) to 50% of the test organisms in a laboratory test. The criteria for defining toxicity for different species are shown in Table 5 below.

**Table 5: Toxicity Reference Values for Terrestrial and Aquatic Wildlife**

Category	Mammal and Bird LD <sub>50</sub> (mg/kg) <sup>35</sup>	Mammal and Bird LC <sub>50</sub> (mg/kg of food) <sup>36</sup>	Aquatic LC <sub>50</sub> (mg/L) <sup>36</sup>	Bee LD <sub>50</sub> (g/bee) <sup>37</sup>
High Toxicity	< 50	< 500	< 1	< 2
Moderate Toxicity	50–500	500–1,000	1–10	2–11
Low Toxicity	> 500	> 1,000	> 10	> 11

### - Mobility in Soil (known ingredients only)

The potential for ground-water or surface-water pollution by pesticides is dependent on many factors, including persistence of the ingredients, water solubility, soil binding, amount of rainfall or irrigation, soil properties, amount and frequency of applications, soil slope, vegetation present, proximity to ground- or surface-water, etc. The hazard assessment only considers the properties that relate strictly to the pesticide itself. The potential for a pesticide moving to surface water or groundwater is thus assessed in one of three ways:



- 1) The Ground-water Ubiquity Score (GUS) is an empirically derived index that relates pesticide persistence and soil binding to mobility. The GUS index is defined mathematically as:

$$\text{GUS} = \log_{10}(\text{half-life}) \times [4 - \log_{10}(\text{K}_{\text{oc}})]$$

where  $K_{\text{oc}}$  is the soil sorption coefficient and half-life is the soil half-life in days. Information on pesticide  $K_{\text{oc}}$  values can be found in the OSU Pesticide Properties database,<sup>27</sup> the California Department of Pesticide Regulation groundwater Status Reports,<sup>28</sup> or in the EU Footprint Pesticide Properties database.<sup>29</sup>

A pesticide movement rating ranging from “extremely low” to “very high” has been assigned to the numerical values by the researchers in the OSU Extension Pesticide Properties Database.<sup>27</sup> The values are shown in Table 6.

**Table 6: Pesticide Mobility in Soil as a Function of Groundwater Ubiquity Score**

GUS Value	Pesticide Movement Rating
<2	Low
>2.0–3.0	Moderate
>3.0	High

- 2) The California Department of Pesticide Regulation (DPR) lists pesticide active ingredients as potential groundwater contaminants when physical properties exceed Specific Numeric Values (SNVs). In order for a chemical to be listed, one of the following must be true:

Water solubility: > 3 ppm (mg/L), or

Soil adsorption coefficient ( $K_{\text{oc}}$ ): < 1,900

cm<sup>3</sup>/g AND one of the following must be

true

Hydrolysis half-life: > 14 days, or

Aerobic soil metabolism half-life: > 610 days, or

Anaerobic soil metabolism half-life: > 9 days

The list of pesticides that exceed SNVs is available from DPR’s annual Groundwater Status Reports.<sup>28</sup>

- 3) In addition to the GUS index and DPR's assessment, information on pesticide water contamination potential is noted from product label warnings. EPA requires two levels of warnings for products with characteristics that have been determined to result in likely contamination of groundwater from use as labeled. A lower level of warning is required if no actual detections have occurred or no field studies have been done. A higher level of warning is required if detections have occurred or field studies have shown that the chemical leaches. For purposes of the initial screening, the presence of either warning is considered an indication that the chemical has high mobility. In rare cases where a label ground-water advisory occurs but the GUS index or DPR assessment did not indicate high mobility, the label advisory is given priority.

Pesticides that have high soil mobility according to the criteria above, but are not otherwise toxic or bioaccumulative are classified as Tier 2.

#### **• Persistent, Bioaccumulative, Toxic Chemicals (PBTs)**

In recent years much attention has been paid to toxic chemicals that persist in the environment and bioaccumulate. PBTs pose a serious threat because they can build up in ecosystems, wildlife, and humans even when deposited slowly. Many organizations including the United Nations, International Joint Commission on the Great Lakes, U.S. EPA, and Washington State Department of Ecology have proposed strategies to reduce or eliminate them. The list used for this evaluation is EPA's Waste Minimization Priority Chemicals list or listed by the European Union as fulfilling PBT or Persistent Organic Pollutant (POP) criteria. New lists will be added as more information becomes available.



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