



Department of Pesticide Regulation



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MEMORANDUM

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DATE: March 20, 2018

SUBJECT: Recalculating Short-Term, Seasonal, and Annual Margin of Exposures (MOEs) of Acephate Based on Updated Policies, Updated Transfer Coefficients (TCs), and Updated Pesticide Use Report (PUR) Data.

Acephate exposure assessment document (EAD) and risk characterization document (RCD) were finalized in 2009 (DPR, 2009) and 2008 (DPR, 2008), respectively. An addendum to the RCD was published in July, 2013 (DPR, 2013). In the ensuing years, exposure assessment policies, the product application rates, the use amounts and seasons in California, and transfer coefficients for calculating post-application exposure were changed. Therefore, at the request of the DPR Worker Health and Safety Branch, all scenarios for handler, field workers, and golf course use were recalculated based on the latest Pesticide Use Reporting (PUR) data and policies of Human Health Assessment (HHA) Branch and the U.S. Environmental Protection Agency (U.S. EPA). Also, all short-term-, seasonal- and annual-margins of exposure (MOEs) of acephate exposure scenarios were updated.

Table 1 summarizes the short-term-, seasonal, and annual-MOE of occupational handlers, Table 2 summarizes the short-term-, seasonal-, and annual-MOE of agricultural field workers, and Table 3 summarizes the short-term MOEs of golf course (representative of recreational areas) handlers and reenters. The MOE estimates in this memo that are different from the 2008 Acephate Risk Characterization Document (Gammon, 2008) include:



- 1) Replacing the use seasons of aerial and ground applications from 2004-2008 in the EAD (DPR, 2009) with data from the most recent five years (2011-2015) based on the Pesticide Use Report (DPR 2018).
- 2) Replacing the multipliers employed in short-term and seasonal exposure calculations in the EAD (DPR, 2009) with a methodology as specified in the latest guidance document (Beauvais, 2007).
- 3) Updating the application rates specified on the product labels to June 2013; some application rates are different from those used in the EAD (DPR, 2009).
- 4) Updating the transfer coefficients from 2000 U.S. EPA values (U.S. EPA, 2000) in the EAD (DPR, 2009) to 2017 values (U.S. EPA, 2017).

Table 1. MOE estimates for occupational exposure to acephate in agriculture handlers^a

Job category/ Formulation ^b	Crop/ Use rate ^c (lb AI/A or gallon as noted)	Daily Treat ^d (A or gallon)	Acute MOE ^e	Seasonal MOE ^f	Annual MOE ^g	Scenario Number ^h
AERIAL						
M/L (WP) ⁱ	Cotton 1.0	1200	19	12	22	-
M/L (SP)	Ag. 1.0	1200	0.2	0.1	0.1	1
	Turf 4.0 ^j	350	0.1	-	-	1
	Pasture 0.125	350	5	2	3	1
	Forest 0.75	1200	0.2	0.1	0.1	1
A (L)	Ag. 1.0	1200	1	0.4	1	17
	Turf 4.0 ^j	350	1	-	-	17
	Pasture 0.125	350	35	12	21	17
	Forest 0.75	1200	2	0.4	0.8	17
F (L)	Ag. 1.0	1200	5	2	3	7
	Turf 4.0 ^j	350	5	-	-	7
	Pasture 0.125	350	148	49	89	7
	Forest 0.75	1200	7	2	4	7
GROUND M/L						
Groundboom (SP)	Ag. 1.0	200	1	0.3	0.4	1
	Sod 4.0 ^j	80	0.6	-	-	1
	Pasture 0.125	80	20	7	9	1
Airblast (SP)	Citrus, non-bear 0.5	40	10	3	4	1
	Trees/shrubs 1.0/100 gal	1000 gal	20	7	9	1
	Outdoor floral 0.5/100 gal	1000 gal	41	14	18	1
Handgun (SP)	Trees, Shrubs, Outdoor	1000 gal	20	7	9	1
	Floral Crops 1.0 lb/100 gal	1000 gal	20	7	9	1
	Turf 4.0 ^j	5	10	-	-	1
Slurry seed treatment (SP)	Cotton seed 0.04 lb/100 lb seed	200,000 lb seed	3	1	1	1
Slurry seed treatment (DF)	Cotton seed 0.04 lb/100 lb seed	200,000 lb seed	16	5	7	2
Chemigation (SP)	Cranberry 1.0	30	7	2	4	1
Hopper box seed (SP) ⁱ	Cotton seed 0.225	80	0.1	0.1	0.1	-
Tractor-Drawn Spreader (G)	Cotton 1.0	200	25	8	11	4
	Sod 4.0 ^j	80	16	-	-	4
GROUND A						
Groundboom appl	Ag 1.0	200	17	6	7	11
	Sod 4.0 ^j	80	10	-	-	11
	Pasture 0.125	80	330	110	142	11
Airblast (SP)	Non-bearing citrus 0.5	40	8	3	3	9A
	Trees/shrubs 1.0 lb/100 gal	2400 gal	7	2	3	9A
	Outdoor floral 0.5/100 gal	2400 gal	13	4	6	9A
Handgun (SP) ^l	Trees, Shrubs, Outdoor	1000 gal	0.2	0.1	0.1	13
	Floral Crops 1.0 lb/100 gal	1000 gal	0.2	0.1	0.1	13
	Turf 4.0 ^{jm}	5	0.1	-	-	13

Job category/ Formulation ^b	Crop/ Use rate ^c (lb AI/A or gallon as noted)	Daily Treat ^d (A or gallon)	Acute MOE ^e	Seasonal MOE ^f	Annual MOE ^g	Scenario Number ^h
Tractor-Drawn Spreader (G)	Cotton 1.0	200	257	86	110	14A
	Sod 4.0 ^j	80	161	-	-	14A
Paintbrush	window frame 0.083 lb/gal	2 gal	36	12	16	28
GROUND M/L/A						
Hopper box (SP) ⁿ	Cotton seed 0.225	80	2	1	1	-
Low pressure handwand (SP)	Trees/shrubs/floral 1.0 lb/100 gal	40 gal	22	7	9	23
	Wasps 0.075 lb/gal	5 gal	24	8	10	23
Backpack sprayer (SP)	Trees/shrubs/floral 1.0 lb/100 gal	40 gal	27	9	11	20
	Wasps 0.075 lb/gal	5 gal	28	9	12	20
High pressure sprayer (SP)	Trees/shrubs/floral 1.0 lb/100 gal	1000 gal	3	1	1	21
Shaker Can (G) ^k	Fire Ant (non-crop) 0.007 lb/5 gal/mound ^l	10 mounds	148	-	-	27
	Trees/shrubs/ornamentals 0.1125 lb/1000 sqft	10000 sqft	9	3	4	27
Belly grinder (G)	Trees/shrubs/ornamentals 0.1125 lb/1000 sqft	87000 sqft	1	0.4	0.5	27
By hand (G)	0.00099 lb/pot	1000 pots	7	1	1	15
	Fire ants 0.008 lb/mound ^l	10 mounds	87	-	-	15
	Trees/shrubs/ornamentals 0.1125 lb/1000 sqft	1000sqft	22	7	10	15

- a All data from the Pesticide Handlers Exposure Database (PHED) were calculated based on the latest agricultural handler exposure assessment policy (Beauvais S., et al., 2007), except for the monitoring studies noted.
- b M/L/F/A = Mixer/Loader/Flagger/Applicator. WP= water-soluble pellet; SP= soluble powder; DF= dry flowable; L= liquid; G= granular.
- c Maximum application rates are values found on currently registered labels. AI = active ingredient; A = Acre.
- d Maximum daily acres and volumes to be treated in each scenario based on default (U.S. EPA, 2001).
- e Acute MOE = ratio of critical acute (human) NOEL of 1 mg/kg/day to ADD (DPR, 2008).
- f Seasonal MOE = ratio of critical subchronic (rat) NOEL of 0.12 mg/kg/day to SADD.
- g Chronic MOE = ratio of critical chronic (dog) NOEL of 0.09 mg/kg/day to AADD.
- h Scenario numbers are from Beauvais *et al.*, 2007.
- i Data calculated from a field monitoring study (Bruce *et al.*, 2002).
- j Based on use history information (DPR, 2018), there was no record of acephate use on turf in California from 2011 to 2015. Therefore, seasonal and annual MOE values were not estimated.
- k No PHED data were available for this scenario; therefore, Belly Grinder scenario was used as a surrogate.
- l Since acephate is not a recommended chemical in the California Department of Food and Agriculture (CDFA) eradication program, it is minimally used to control the fire ants in California. Therefore, only acute MOE was estimated in this document.
- m The data calculated from a field monitoring study (Merricks, 1987).
- n The data calculated from a field monitoring study (Klonne, 2005).

Table 2. MOE estimates agricultural post-application reenters of acephate^a

Job category^b REI/PHI (days)^c	Crop/Use sites^d	Acute MOE^e	Seasonal MOE^f	Annual MOE^g
Scouting (1)	Cotton	220	459	1032
Harvesting (14)	Cauliflower	748	303	303
Harvesting (14)	Succulent bean	2847	2552	11485
Pruning (1)	Citrus tree	32	9	16
Pruning/harvesting (1)	Greenhouse rose	198	30	22
Turf mowing (0)	Turfgrass ^h	159	-	-
Harvesting sod (0)	Sod ^h	78	-	-

a Calculations based on exposure estimates from DPR 2009.

b Job categories were based on product label and with highest transfer coefficients (U.S. EPA, 2017).

c REI = restricted entry interval, PHI = preharvest interval; the minimum REI and PHI from the product labels are listed.

d Crop and use sites were from product labels.

e Acute MOE = ratio of critical acute (human) NOEL of 1 mg/kg/day to acute average absorbed daily dosage.

f Seasonal MOE = ratio of critical subchronic (rat) NOEL of 0.12 mg/kg/day to seasonal average daily dosage.

g Chronic MOE = ratio of critical chronic (dog) NOEL of 0.09 mg/kg/day to annual average daily dosage.

h Based on use history information (DPR, 2018), there was no record of acephate use on turf in California from 2011 to 2015. Therefore, only acute MOEs were estimated.

Table 3: MOE estimates for golf courses' handler and post-application reenters exposure ^a

Job category ^b REI (days) ^c	Crop/Use sites ^d	Acute MOE ^e	Seasonal MOE ^f	Annual MOE ^g
M/L(SP)	Golf course turf ^{h,i}	5	-	-
M/L (G)	Golf course turf ^h	32	-	-
A(SP)	Golf course turf ^{h,i}	18	-	-
A (G)	Golf course turf ^h	322	-	-
Mowing (0)	Golf course turf ^h	159	-	-
Golfing (0)	Golf course turf ^h	7968	-	-
Maintaining (0)	Golf course turf ^h	108	-	-

a Calculations based on exposure estimates from DPR 2009.

b M/L/A = Mixer/Loader/Applicator; SP= soluble powder, G= granular.

c REI = restricted entry interval; the minimum REIs from the product labels are listed.

d Crop and use sites were from product labels.

e Acute MOE = ratio of critical acute (human) NOEL of 1 mg/kg/day to acute average absorbed daily dosage.

f Seasonal MOE = ratio of critical subchronic (rat) NOEL of 0.12 mg/kg/day to seasonal average daily dosage.

g Chronic MOE = ratio of critical chronic (dog) NOEL of 0.09 mg/kg/day to annual average daily dosage.

h Based on use history information (DPR, 2018), there was no record of acephate use on turf in California from 2011 to 2015. Therefore, only acute MOEs were estimated.

i The data from monitoring studies (Merricks, 1987).

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