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DATE: August 23, 2021

SUBJECT: ACEPHATE MITIGATION SCOPING DOCUMENT

Attached is a mitigation scoping document for registered pesticide products containing acephate as an active ingredient. Certain data were not yet available when Department of Pesticide Regulation (DPR) was preparing its 2008 Risk Characterization Document (RCD) and 2013 Addendum to the RCD. Thus, all actively registered labels were reviewed, as well as current pesticide use data, sales data, illness data, and other pertinent information. The attached scoping document serves to update the data within the 2008 RCD and the 2013 RCD Addendum and outlines current mitigation activities for acephate.

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-21004

ACEPHATE MITIGATION SCOPING DOCUMENT

August 23, 2021

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SUMMARY

Acephate is currently registered in California as a broad-spectrum systemic insecticide/miticide used in agricultural settings, primarily on cotton, head lettuce, celery, alfalfa, and beans, as well as non-agricultural settings, such as landscape maintenance and structural pest control. Acephate is an organophosphate pesticide and can cause cholinesterase inhibition in humans. The U.S. Environmental Protection Agency (U.S. EPA) classifies the acute oral toxicity as Category III and the acute dermal and inhalation toxicity as Category IV (U.S. EPA, 2001).

Based on the information on use patterns and restrictions, maximum rates and area treated, and other use requirements from the product labels, the Department of Pesticide Regulation's (DPR) Human Health Assessment (HHA) Branch evaluated exposure scenarios for handlers, fieldworkers, and residents. The Risk Characterization Document (RCD), published by HHA in 2008, identified multiple occupational handler, fieldworker, occupational golf course, and residential exposure scenarios of concern. These exposure scenarios were updated in 2018 and new uses were evaluated in 2019. The information contained in this scoping document is intended to aid in the mitigation process.

PURPOSE

During the risk assessment process, DPR evaluates current pesticide use practices, chemical toxicity, and the potential for adverse effects associated with a given active ingredient (AI), and determines if action is needed to further reduce the risk of exposure. DPR's Acephate RCD identified the AI as having potential health risks in studies of sufficient quality to allow risk assessment. Scenarios of concern consisted of occupational, agricultural post-application re-entry, golf course handler, residential handler, and residential post-application exposures. Since the 2008 publication of the RCD, DPR published a 2013 Addendum to the RCD, and then, in 2018, HHA published a memorandum that recalculated RCD margins of exposure (MOEs) for occupational exposure. Additionally, in 2019, HHA published a memorandum that updated MOEs for acephate products registered after the 2013 RCD Addendum was completed. The scenarios of concern discussed in this scoping document are representative of the recalculated MOEs in the 2018 Memorandum and 2019 Memorandum.

REGULATORY STATUS AND HISTORY

Acephate was first registered by U.S. EPA for ornamental use in 1973 and was registered for food use in 1974 (U.S. EPA 2001). A registration standard for acephate was published in 1987 that set several interim measures to reduce dietary, occupational, and domestic exposure from registered uses of acephate (U.S. EPA 2001). In 2000, U.S. EPA established no observable effects levels (NOELs) of 0.5 mg/kg/day for acute dietary exposure and 0.12 mg/kg/day for chronic dietary exposure (Gammon 2008). Also in 2001, U.S. EPA published a Reregistration Eligibility Decision (RED) that identified occupational, residential post-application, and ecological risk scenarios of concern (U.S. EPA 2001). In 2002, U.S. EPA requested cancellations and use deletions for certain acephate products sold for indoor residential use, and for all turfgrass uses, except golf courses, sod farms, and/or spot or mound treatment for harvester and fire ant control (U.S. EPA, 2002). In 2009, U.S. EPA initiated a registration review of acephate,

and in 2011, issued a cancellation order for acephate use on succulent green beans (U.S. EPA 2009, 2011).

DPR completed an RCD for acephate in 2008 and completed an RCD Addendum in 2013, which updated exposure scenarios covered by the RCD and addressed new uses, as well as new exposure and use data. In 2018, HHA prepared a memorandum as an update to the 2013 RCD Addendum that based MOE recalculations on updated transfer coefficients and pesticide use report (PUR) data. In 2019, DPR published a Risk Management Directive for acephate that directed DPR staff to mitigate acute occupational scenarios of concern associated with acephate, as identified in both the 2008 RCD and the 2013 RCD Addendum.

Table 1. Current California Regulatory Status.

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

FAC: Food and Agricultural Code
CCR: California Code of Regulations

REPORTED USE AND SALES

Total agricultural and non-agricultural use and sales

Based on DPR's PUR database, between 2014 and 2018, approximately 838,000 pounds of acephate were applied with an average annual use of approximately 168,000 pounds (Figure 1). Acephate is used year-round, with the highest use occurring between May and September (peaking in July) and the lowest use occurring in December (Figure 2). The counties with the highest use between 2014 and 2018 were Fresno, Kings, Monterey, Ventura, and Santa Barbara (Table 2) (DPR 2021b). On average, 208,000 pounds of acephate were reported sold each year between 2014 and 2018 (Figure 2) (DPR 2021d).

Figure 1. Total pounds of acephate applied (agricultural and non-agricultural sites) and total pounds of acephate sold between 2014 and 2018.

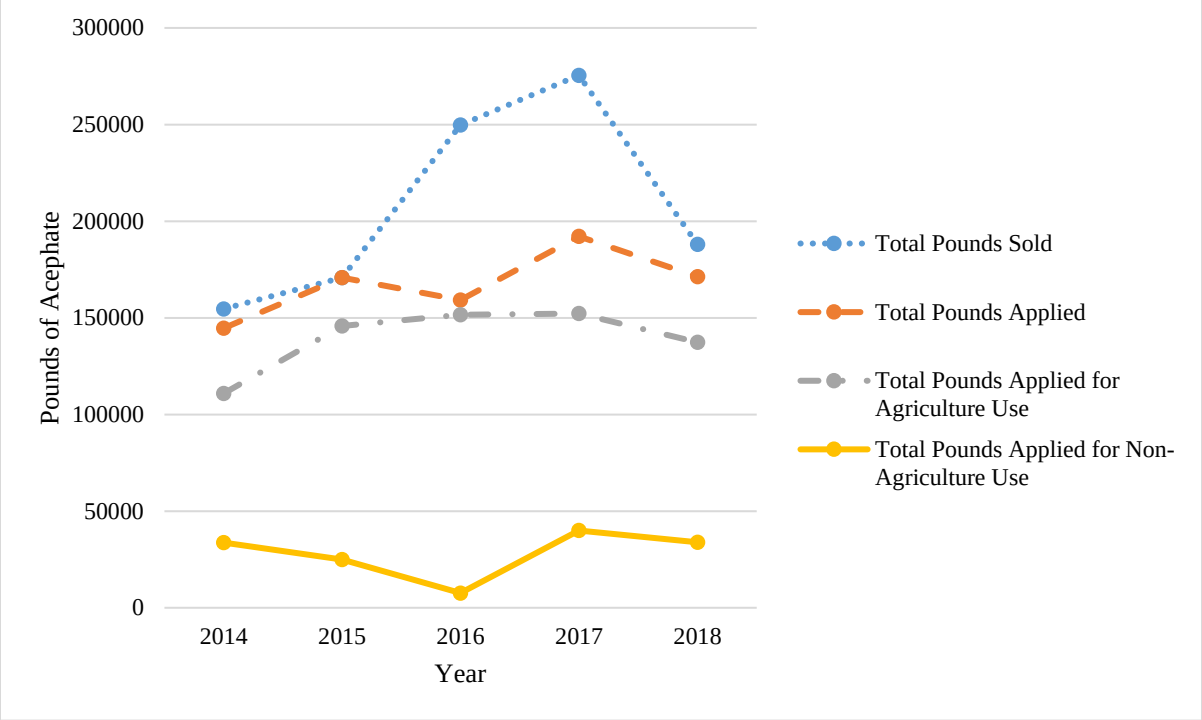

Figure 2. Average amount (pounds) of acephate applied each month from 2014–2018 for both agricultural and non-agricultural use.

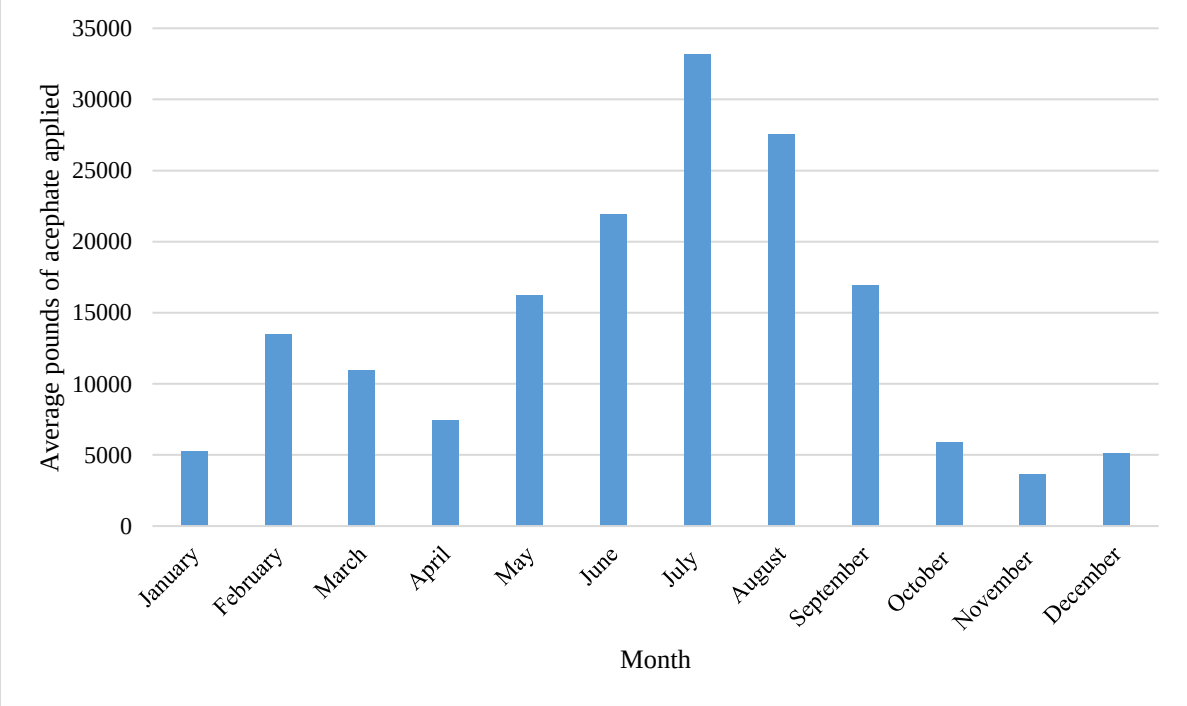

Table 2. Top 5 counties with highest use from 2014–2018, based on total pounds of acephate applied and percentage of total pounds of acephate applied in each county.

County	2014	2015	2016	2017	2018	Average	Percentage
Fresno	29,469	32,868	31,597	38,943	27,779	32,131	19%
Kings	26,018	38,305	15,133	44,606	35,321	31,877	19%
Monterey	21,581	25,487	29,723	26,235	29,512	26,508	16%
Ventura	12,360	13,570	14,561	13,022	10,956	12,894	8%
Santa Barbara	10,207	11,443	12,210	13,196	11,459	11,703	7%
All other Counties	45,004	49,089	55,980	56,147	56,273	52,499	31%
Total	***144,639***	***170,762***	***159,204***	***192,149***	***171,300***	***167,611***	

Acephate Use on Agricultural Sites

Based on 2014-2018 PUR data, approximately 83% of the total pounds of acephate applied were to agricultural use sites and account for 87% of the total applications (Table 3 and Table 4). The sites with highest use based on total pounds of acephate applied were head lettuce, cotton, celery, alfalfa, and dried-type beans (DPR 2021b).

Table 3. Pounds of acephate applied to agricultural sites between 2014 and 2018 and percentage of total use on each site.

Site	2014	2015	2016	2017	2018	Average	Percentage
Head Lettuce	26,741	28,753	33,600	30,671	30,009	29,955	21%
Cotton	20,411	46,759	26,089	30,591	24,873	29,745	21%
Celery	14,663	17,463	18,558	16,807	16,568	16,812	12%
Alfalfa	15,298	11,409	16,144	12,255	8,120	12,645	9%
Beans (dried-type)	6,587	8,370	12,857	11,456	11,740	10,202	7%
All other Ag	27,179	33,019	44,326	50,420	46,042	40,197	29%
Total	***110,879***	***145,767***	***151,574***	***152,200***	***137,352***	***139,554***	

Table 4. Number of applications to agricultural sites and percentage of total applications to each agricultural site.

Site	2014	2015	2016	2017	2018	Average	Percentage
Head Lettuce	2,087	2,480	2,827	2,536	2,552	2,496	21%
Outdoor Grown Cut Flowers or Greens	1,665	1,887	1,504	1,573	1,560	1,638	14%
Celery	1,364	1,642	1,771	1,640	1,767	1,637	14%
Outdoor Container/Field Grown Plants	1,541	1,651	1,782	1,547	1,319	1,568	13%
Greenhouse Grown Plants in Containers	986	823	675	759	716	792	7%
All other Ag	2,747	3,203	3,729	4,011	4,109	3,560	30%
Total	***10,390***	***11,686***	***12,288***	***12,066***	***12,023***	***11,691***	

Acephate Use on Non-Agricultural Sites

Seventeen percent of the total pounds of acephate applied in California were to non-agricultural sites, according to 2014-2018 PUR data (Table 5). Non-agricultural sites also accounted for 13% of the total applications (Table 6). The highest uses to non-agricultural sites were cotton (seed treatment), structural pest control, and landscape maintenance (DPR 2021b).

Table 5. Total pounds of acephate applied to non-agricultural sites between 2014 and 2018 and percentage of total non-agricultural use on each site.

Site	2014	2015	2016	2017	2018	Average	Percentage
Cotton*	15,080	13,082	2,245	34,454	27,090	18,390	66%
Structural Pest Control	15,585	10,294	3,745	3,851	4,686	7,632	27%
Landscape Maintenance	2,158	1,535	1,600	1,364	2,117	1,755	6%
All other Non-Ag	936	79	40	278	54	277	1%
Total	***33,759***	***24,990***	***7,630***	***39,947***	***33,947***	***28,055***	

*Treated seed

Table 6. Number of applications to non-agricultural sites and percentage of total applications to each non-agricultural site.

Site	2014	2015	2016	2017	2018	Average	Percentage
Structural Pest Control	1,112	1,146	966	930	953	1,021	59%
Landscape Maintenance	799	657	627	525	582	638	37%
Research Commodity	47	26	29	23	20	29	2%
All other Non-Ag	55	28	21	23	48	35	2%
Total	***2,013***	***1,857***	***1,643***	***1,501***	***1,603***	***1,723***	

PRODUCTS AND FORMULATIONS

There are currently 23 actively registered products in California that contain acephate (Table 7) and 1 product with an active Section 24(c) Special Local Need (SLN) registration (Table 8) (DPR 2021c).

Table 7. Acephate products actively registered in California.

Name	Registration Number	Percent AI	Formulation	Company
1300 Orthene TR Total Release Insecticide	499- 421-ZA	12	Pressurized Liquid/Sprays/ Foggers	BASF Corporation
Ace-Jet	74578- 2-AA	97.4	Granular/Flake	Arborjet, Inc.
Acecap Systemic Insecticide Tree Implants	37979- 1-ZB	98.9	Soluble Powder	Creative Sales, Inc.
Acephate 90 SP Soluble Powder	70506- 2-ZB	90	Soluble Powder	United Phosphorus, Inc.
Acephate 90 WDG	34704- 1051-AA	90	Granular/Flake	Loveland Products, Inc.
Acephate 90 WSP Insecticide	34704- 862-AA	90	Soluble Powder	Loveland Products, Inc.
Acephate 97 WDG	66222-266-AA	97	Granular/Flake	Makhteshim Agan of North America, Inc.
Acephate 97UP Insecticide	70506- 8-AA	97	Soluble Powder	United Phosphorus, Inc.
Bioadvanced Science-Based Solutions 2-in-1 Systemic Rose & Flower Care Ready-To-Use Granules	192-211-AA-92564	1.5	Granular/Flake	SBM Life Science Corp.

Name	Registration Number	Percent AI	Formulation	Company
Bioadvanced Science-Based Solutions 2-in-1 Systemic Rose & Flower Care Ready-To-Use Granules 1	192-223-AA-92564	1.5	Granular/Flake	SBM Life Science Corp.
Eliminator Fire Ant Killer with Acephate	53883- 203-AA- 59144	50	Dust/Powder	Gro Tec, Inc.
Lepitect	74779- 6-AA	97.4	Granular/Flake	Rainbow Treecare Scientific Advancements
Lepitect Infusible	74779- 5-AA	97.4	Granular/Flake	Rainbow Treecare Scientific Advancements
Lilly Miller Ready-to-Use Systemic Rose, Shrub, & Flower Care	71376- 1-AA- 33116	98.5	Granular/Flake	Lilly Miller Brands
Orthene 97	5481- 8978-ZA	97.4	Wettable Powder	AMVAC Chemical Corporation
Orthene 97 ST	5481- 8978-AA	97.4	Pellet/Tablet/Cake / Briquet	AMVAC Chemical Corporation
Orthene PCO Pellets	5481- 8973-AA	97.4	Pellet/Tablet/Cake / Briquet	AMVAC Chemical Corporation
Orthene Turf, Tree, & Ornamental 97 Spray	5481- 8978-ZB	97.4	Pellet/Tablet/Cake / Briquet	AMVAC Chemical Corporation
Orthene Turf, Tree, & Ornamental WSP	5481- 8971-AA	75	Wettable Powder	AMVAC Chemical Corporation
Ortho Orthene Fire Ant Killer 1	239- 2632-ZA	50	Dust/Powder	Scotts Company
Pennington Ultra Green Systemic Rose & Flowercare 8-12-4	71376- 1-AA- 90098	1.5	Granular/Flake	Central Garden & Pet Garden Division
StartUp ACE97 Seed Treatment	70506- 8-ZA	97	Dry Flowable	United Phosphorous, Inc.
Tide Acephate 90 WDG	8422- 7-AA	90	Granular/Flake	Tide International USA, Inc.

Table 8. Active SLN registrations for acephate.

Name	SLN Number	Crop/Site/Commodity	Target Pest/Species
Orthene 97	CA-100010	Alfafa grown for seed	Lygus Bug

LABEL AND REGULATORY REQUIREMENTS

Acephate is approved for both agricultural and non-agricultural use. All 23 acephate products registered in California are labeled with the signal word "Caution." Acephate is applied using both ground and aerial application equipment. Application via chemigation is prohibited except on cranberries. Acephate toxicity category designations are Category III for acute oral and dermal, and Category II/III for acute inhalation (Zhao 2013). Acephate is categorized as Group C, possible human carcinogen by U.S. EPA (Zhao 2013).

Personal Protective Equipment (PPE) for Agricultural Use Products with Toxicity Category III/IV:

- Chemical-resistant headgear
- Long-sleeved shirt and long pants
- Shoes plus socks
- Water-proof gloves (mixers and loaders, applicators, and other handlers when product contains 80% or greater acephate)
- Coveralls (early-entry fieldworkers only)

PPE for Industrial/Commercial Use Products with Toxicity Category III/IV:

- Chemical-resistant gloves
- Long-sleeved shirt and long pants
- Shoes plus socks

For all the actively registered pesticide labels for products containing acephate in California, the restricted entry interval (REI) is listed as 24 hours.

POTENTIAL EXPOSURE SCENARIOS

The potential exposure scenarios identified in the 2018 Memorandum include:

- Occupational exposures in agricultural settings
- Post-application exposures in agricultural settings
- Golf course handler and post-application reentry exposures

The 2008 RCD identified residential exposure scenarios of concern, taking into account U.S. EPA's acephate product cancellations and use deletions for residential indoor and turfgrass sites (except golf courses, sod farms, and spot or mound treatment for harvest and fire ant control) in 2000 (Tables 15-17) (U.S. EPA 2002). The 2013 RCD Addendum and 2018 Memorandum did not recalculate the remaining residential exposure scenarios identified in the 2008 RCD based on the current use data and transfer coefficients. Therefore, the residential exposure scenarios in this document are representative of the 2008 RCD, rather than the 2013 RCD Addendum and 2018 Memorandum. However, all acephate-containing products, including residential use products, were considered during mitigation development. In the future, recalculation of the remaining residential exposure scenarios from the 2008 RCD should be considered to ensure that all potential residential exposure scenarios of concern are addressed.

For all exposure scenarios, an MOE is used to identify a scenario that has acute, seasonal, or chronic non-oncogenic risks of significant concern. The MOE is a ratio of the NOEL to the anticipated exposure; the lower the MOE, the greater the risk of exposure. For acephate, acute MOEs were calculated using a NOEL of 1.0 mg/kg/day, based on the inhibition of plasma and red blood cell cholinesterase in a human oral capsule study; therefore, an acute MOE of 10 or greater is considered protective of human health. Seasonal and annual MOEs were calculated with NOELs from animal studies; therefore, seasonal and annual MOEs of 100 or greater are considered protective of human health. With the exception of outdoor residential sites and turfgrass on golf courses, sod farms, and spot or mound treatment for harvest and fire ant control, the 2013 RCD Addendum updated the MOEs for exposure scenarios found in the 2008 RCD. Since the completion of the 2013 RCD Addendum, transfer coefficients, policies, and use data have been revised. In March 2018, HHA recalculated acute, seasonal, and annual MOEs for handler, fieldworker, and golf course scenarios based on those changes (Zhao, Kwok 2018). The recalculated MOEs are listed in Tables 9 through 14.

Table 9. Occupational exposure MOEs for agricultural mixer/loaders.

Application	Formulation	Crop	Use Rate (lb. AI/acre)	Acute MOE	Seasonal MOE	Annual MOE
Aerial	WP	Cotton	1	19	**12**	**22**
Aerial	SP	Ag	1	**0.2**	**0.1**	**0.1**
Aerial	SP	Turf	4	**0.1**	NA	NA
Aerial	SP	Pasture	0.125	**5**	**2**	**3**
Aerial	SP	Forest	0.75	**0.2**	**0.1**	**0.1**
Groundboom	SP	Ag	1	**1**	**0.3**	**0.4**
Groundboom	SP	Pasture	0.125	20	**7**	**9**
Groundboom	SP	Sod	4	**0.6**	NA	NA
Airblast	SP	Citrus non-bear	0.5	10	**3**	**4**
Airblast	SP	Trees/shrubs	1/100 gallons	20	**7**	**9**
Airblast	SP	Outdoor floral	0.5/100 gallons	41	**14**	**18**
Handgun	SP	Trees/shrubs/floral	1.0/100 gallons	20	**7**	**9**
Handgun	SP	Turf	4	10	NA	NA
Slurry seed treatment	SP	Cotton	0.04/100 lb. of seed	**3**	**1**	**1**
Slurry seed treatment	DF	Cotton	0.04/100 lb. of seed	16	**5**	**7**
Chemigation	SP	Cranberry	1	**7**	**2**	**4**
Hopper box seed	SP	Cotton	0.225	**0.1**	**0.1**	**0.1**

Application	Formulation	Crop	Use Rate (lb. AI/acre)	Acute MOE	Seasonal MOE	Annual MOE
Tractor-drawn spreader	G	Cotton	1	25	**8**	**11**
Tractor-drawn spreader	G	Sod	4	16	NA	NA

DF: Dry Flowable
G: Granule
SP: Soluble Powder
WP: Wettable Powder
NA: Not Applicable

Table 10. Occupational exposure MOEs for agricultural applicators.

Application	Formulation	Crop	Use Rate (lb. AI/acre)	Acute MOE	Seasonal MOE	Annual MOE
Aerial	L	Ag	1	**1**	**0.4**	**1**
Aerial	L	Turf	4	**1**	NA	NA
Aerial	L	Pasture	0.125	35	**12**	**21**
Aerial	L	Forest	0.75	**2**	**0.4**	**0.8**
Groundboom	SP	Ag	1	17	**6**	**7**
Groundboom	SP	Sod	4	10	NA	NA
Groundboom	SP	Pasture	0.125	330	110	142
Airblast	SP	Non-bearing Citrus	0.5	**8**	**3**	**3**
Airblast	SP	Trees/shrubs	1.0/100 gallons	**7**	**2**	**3**
Airblast	SP	Outdoor floral	0.5/100 gallons	13	**4**	**6**
Handgun	SP	Trees/shrubs/floral	1.0/100 gallons	**0.2**	**0.1**	**0.1**
Airblast	SP	Turf	4	**0.1**	NA	NA
Tractor-drawn spreader	G	Cotton	1.0	257	**86**	110
Tractor-drawn spreader	G	Sod	4.0	161	NA	NA
Paintbrush	NA	Window frame	0.083 lb./gal	36	**12**	**16**

G: Granule
L: Liquid
SP: Soluble Powder
NA: Not Applicable

Table 11. Occupational exposure MOEs for agricultural mixer/loader/applicators.

Application	Formulation	Crop	Use Rate (lb. AI/acre)	Acute MOE	Seasonal MOE	Annual MOE
Hopper box	SP	Cotton seed	0.225	**2**	**1**	**1**
Low pressure handwand	SP	Trees/shrubs/floral	1.0/100 gallons	22	**7**	**9**
Low pressure handwand	SP	Wasps	0.075 lb./gallon	24	**8**	**10**
Backpack sprayer	SP	Trees/shrubs/floral	1.0/100 gallons	27	**9**	**11**
Backpack sprayer	SP	Wasps	0.075 lb./gallon	28	**9**	**12**
High pressure sprayer	SP	Trees/shrubs/floral	1.0/100 gallons	**3**	**1**	**1**
Belly grinder	G	Trees/shrubs/ ornamental	0.1125 lb./1000 ft^2	**1**	**0.4**	**0.5**
Shaker can	G	Trees/shrubs/ ornamental	0.1125 lb./1000 ft^2	**9**	**3**	**4**
Shaker can	G	Fire ants	0.007 lb./5 gal/ mound	148	NA	NA
By hand	G	Trees/shrubs/ ornamental	0.1125 lb./1000 ft^2	22	**7**	**10**
By hand	G		0.00099 lb./pot	**7**	**1**	**1**
By hand	G	Fire ants	0.008 lb./ mound	87	NA	NA

G: Granule
SP: Soluble Powder
NA: Not Applicable

Table 12. Occupational exposure MOEs for flaggers.

Application	Formulation	Crop	Use Rate (lb. AI/acre)	Acute MOE	Seasonal MOE	Annual MOE
Aerial	L	Ag	1	**5**	**2**	**3**
Aerial	L	Turf	4	**5**	NA	NA
Aerial	L	Pasture	0.125	148	**49**	**89**
Aerial	L	Forest	0.75	**7**	**2**	**4**

L: Liquid
NA: Not Applicable

Table 13. Agricultural post-application exposure MOEs for fieldworkers.

Job	Crop	REI/PHI (days)	Acute MOE	Seasonal MOE	Annual MOE
Scout	Cotton	1	220	459	1032
Harvesting	Cauliflower	14	748	303	303
Harvesting	Succulent bean	14	2847	2552	11485
Pruning	Citrus tree	1	32	**9**	**16**
Pruning/harvest	Greenhouse Rose	1	198	**30**	**22**
Harvesting	Sod	0	78	NA	NA
Turf mowing	Turfgrass	0	159	NA	NA

NA: Not Applicable

Table 14. Golf course exposure MOEs for handlers and post-application reenters.

Job	Formulation	Acute MOE
Mixer/Loader	SP	**5**
Mixer/Loader	G	32
Applicator	SP	18
Applicator	G	322
Mowing	NA	159
Golfing	NA	7,968
Maintaining	NA	108

G: Granule
SP: Soluble Powder
NA: Not Applicable

Table 15. MOE estimates for Residential*/Institute Mixer/Loader/Applicators (from the 2008 RCD).

Application Category	Crop/Pest	Use Rate (lb. AI/acre)	Acute MOE
Low pressure wand	Ornamentals, flowers, shrubs, trees, fire ants	0.023 lb./gallon	**6.6**
Backpack sprayer	Turf	0.035 lb./gallon	10.3
Backpack sprayer	Fire ants (non-crop)	0.47 lb./5 gallons	68.9
Backpack sprayer	Pest Control Operator	0.088 lb./gallon	516
Hose-end sprayer	Fire ants	0.023 lb./gallon	56.8

Application Category	Crop/Pest	Use Rate (lb. AI/acre)	Acute MOE
Hose-end sprayer	Turf	0.035 lb./gallon	86.5
Hose-end sprayer	Roses, flowers, shrubs, trees	0.0076 lb./gallon	18.8
Hose-end sprayer	Ornamentals, turf	0.058 lb./1000 ft^2	57.3
Hose-end sprayer	Ornamentals, shade trees, hedges	0.01175 lb./gallon	171
Sprinkling can	Ornamentals, flowers, shrubs, trees, fire ants	0.023 lb./gallon	NA
Sprinkling can	Turf	0.035 lb./gallon	NA
Sprinkling can	Roses, flowers, shrubs, trees	0.0076 lb./gallon	NA
Handtool/shaker can	Fire ants	0.0069 lb./mound	**5.6**
Shaker cup	Ornamentals	0.5 lb./1000 ft^2	**5.8**
Shaker cup	Roses	0.1125 lb./1000 ft^2	**1.3**
Aerosol can	Crack & crevice	0.01 lb./can	27.7
Aerosol can	Ornamentals	0.03 lb./can	83
Low pressure hand wand	Wasps	0.075 lb./gallon	53.6
Low pressure hand wand	Fire ants (non-crop)	0.47 lb./gallon	67.2
Low pressure hand wand	Pest Control Operator (residential)	0.088 lb./gallon	57.8
Low pressure hand wand	Pest Control Operator (commercial)	0.088 lb./gallon	62.6
Paintbrush	Window frame	0.083 lb./gallon	65.6

*Indoor residential uses are cancelled
NA: Not Applicable

Table 16. MOE estimates for Residential Post-application on lawns (from the 2008 RCD).

Application Category	Crop/Pest	Use Rate (lb. AI/acre)	Acute MOE
Adult dermal	Turf	5.0	**9.1**
Child dermal	Turf	5.0	15.1
Child hand-to-mouth	Turf	5.0	**3.8**
Child grass ingestion	Turf	5.0	**0.5**

Table 17. MOE estimates for Residential Indoor Exposures* (from the 2008 RCD).

Application Category	Crop/Pest	Use Rate (lb. AI/acre)	Acute MOE
Adult dermal (hard surface)	Crack/crevice spot spray	0.088 lb./gallon	**0.60**
Child dermal (hard surface)	Crack/crevice spot spray	0.088 lb./gallon	**1**
Adult dermal (carpet)	Spot spray	0.088 lb./gallon	**0.60**
Child dermal (carpet)	Spot spray	0.088 lb./gallon	**1**
Child hand-to-mouth	Spot spray	0.088 lb./gallon	**0.22**

*Indoor residential uses are cancelled

PESTICIDE ILLNESS REPORTS

Between 2013 and 2017 (the most recent available data), 27 human health exposure cases associated with acephate were reported in DPR's Pesticide Illness Surveillance Program (PISP) database (Table 18). Of those cases, 13 were agriculture-related and 14 were non-agriculture-related. Eleven cases were due to residue exposures (8 ag, 3 non-ag), 8 were due to drift, odor, fumes, pesticide transfer (e.g., from contaminated hand/glove to eye) (4 ag, 4 non-ag), 5 were due to ingestion (non-ag), 1 was due to spill or other direct contact (non-ag), 1 was due to multiple exposures (non-ag), and 1 was classified as other (ag) (DPR 2021a). Of the 27 exposure cases, 1 was considered definite, 11 probable, and 15 possible (DPR 2021a).

Table 18. Number of agricultural and non-agricultural illness cases.

Year	Ag	Non-Ag	Total
2013	8	2	10
2014	2	2	4
2015	1	2	3
2016	0	3	3
2017	2	5	7
Total	**13**	**14**	**27**

Table 19. Exposure scenarios in which an acephate case occurred.

Exposure Scenario	Number of Cases	Number of Episodes
Occupational handler, agriculture	2	2
Occupational re-entry/bystander, agriculture	9	3

Exposure Scenario	Number of Cases	Number of Episodes
Occupational bystander, non-agriculture	2	1
Residential handler, non-agriculture	1	1
Residential bystander, non-agriculture	2	2
Other (intentional/unintentional ingestion)	4	4
Grand Total	**20**	**13**

Acephate Illness Cases

Occupational handler, agriculture

- An applicator that was not wearing PPE opened a tank to see how much acephate was left and if there was debris in the tank from an application a day earlier, and was overcome by fumes.
- A worker wearing a disposable respirator that had been previously used, smelled pesticide odor while mixing and loading a pesticide mixture that included acephate, and later felt sick.

Occupational re-entry/bystander, agriculture

- A tractor driver reported symptoms after smelling a pesticide odor in the lettuce field in which he was working. The field had been treated 3 days earlier with a pesticide mixture that included acephate and had a 24-hour REI.
- Several workers reported symptoms after a crew of 29 fieldworkers entered a field that had been treated with a pesticide mixture that included acephate the evening before. Seven cases resulted from the incident.
- A nursery worker was drifted on by an adjacent application of a pesticide mixture that included acephate.
- Two cases resulted from an incident where an almond orchard was being sprayed next to a group of ninety fieldworkers, two of which reported being sprayed.

Occupational bystander, non-agriculture

- Two cases resulted from an incident where 6 nursery workers were exposed to a pesticide mixture that included acephate from an adjacent property was being sprayed.

Residential handler, non-agriculture

- A man removed a stuck hose nozzle while applying a pesticide mixture that included acephate and a drop of the product splashed into his eye.
- A woman and her family felt ill after she applied an illegal acephate product in her house.

- A women developed symptoms after treating her kitchen for cockroaches using an insecticide.

Residential bystander, non-agriculture

- A woman reported symptoms after mist from an acephate application entered her car as she drove by with the windows down.
- An apartment occupant developed symptoms after the occupant's roommate spread acephate powder around the kitchen and living room.
- A child developed symptoms after the parents applied acephate powder in their backyard and found the product on the child's clothes.

Other, non-agriculture (intentional/unintentional ingestion)

- A woman attempted suicide by drinking a mixture of alcohol and acephate.
- A woman intentionally ingested an unknown amount of acephate.
- A man unintentionally ingested acephate when he made coffee with an ant poison stored in a coffee ground container.
- A girl unintentionally ingested acephate when it was left inside a cupcake liner in the kitchen cabinet.
- A girl unintentionally ingested acephate when her candy fell into a pile of acephate powder, which she picked up and then ingested.
- A woman unintentionally ingested acephate after eating food out of a pantry that had been sprayed with acephate.

MITIGATION ACTIVITIES

DPR's Worker Health and Safety Branch (WHS) developed mitigation options for acephate-containing products with acute occupational exposure scenarios of concern, including products intended for residential use, as licensed applicators can also apply such products. WHS and DPR's Registration Branch are currently working with acephate registrants to implement mitigation options through product label amendments.

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