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MEMORANDUM

TO: Karen Morrison, PhD, Assistant Director
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FROM: Teresa Marks
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DATE: May 23, 2019

SUBJECT: RISK MANAGEMENT DIRECTIVE (RMD) FOR ACEPHATE – ACUTE OCCUPATIONAL EXPOSURES

A. BACKGROUND:

Acephate is an organophosphate insecticide/miticide currently registered in California for use in agricultural and home and garden settings. The major uses of acephate in California are for lettuce, cotton, beans, celery, landscape, nurseries, and structural pests.

In 2008, the Department of Pesticide Regulation (DPR) completed a Risk Characterization Document (RCD) for acephate. The RCD evaluated dietary, occupational, and residential exposures. DPR updated the RCD in 2013 based on label changes. Both of these documents are available at <https://www.cdpr.ca.gov/docs/whs/active_ingredient/acephate.htm>. In March 2018, staff recalculated the acute, seasonal, and annual Margins of Exposures (MOEs) for acephate, based on updated policies, transfer coefficients, and pesticide-use report data <https://www.cdpr.ca.gov/docs/whs/active_ingredient/acephate.htm>.

B. RISK:

The acute toxicity of acephate results from its ability to inhibit acetylcholinesterase (AChE) at synapses and neuromuscular junctions. Consequent local accumulations of acetylcholine generate cholinergic effects. The RCD identified a critical No-Observed-Effect-Level (NOEL) of 1 mg/kg/d for acute effects based on red-blood cell AChE inhibition from a controlled human oral toxicity study. The potential health risk for non-oncogenic effects resulting from acephate exposure is characterized by an MOE in the RCD. An MOE is the ratio of the critical NOEL derived from the toxicity studies divided by the estimated exposure. For DPR's risk assessment of acephate, an MOE of 10 or more is considered protective of human health for occupational exposures when the adverse effects are observed in human studies. The MOE of 10 reflects the assumption that there is a ten-fold range of sensitivity existing in the human population. Therefore, the acceptable MOE for acute effects is 10 or greater.

Table 1. Acute Occupational Exposure Scenarios that Require Mitigation Measures.

Application Method	Formulation	Site	Acute MOE
<i>Mixer/Loader</i>			
Aerial	Soluble Powder	Ag	0.2
Aerial	Soluble Powder	Turf	0.1
Aerial	Soluble Powder	Pasture	5
Aerial	Soluble Powder	Forest	0.2
Groundboom	Soluble Powder	Ag	1
Groundboom	Soluble Powder	Sod	0.6
Slurry Seed Treatment	Soluble Powder	Cotton Seed	3
Chemigation	Soluble Powder	Cranberry	7
Hopper Box	Soluble Powder	Cotton Seed	0.1
Not Applicable	Soluble Powder	Golf Course Turf	5
<i>Applicator</i>			
Aerial	Liquid	Ag	1
Aerial	Liquid	Turf	1
Aerial	Liquid	Forest	2
Handgun	Soluble Powder	Trees, Shrubs, Outdoor Floral Crops	0.2
Handgun	Soluble Powder	Turf	0.1
<i>Mixer/Loader/Applicator</i>			
Hopper Box	Soluble Powder	Cotton Seed	2
High Pressure Sprayer	Soluble Powder	Trees, Shrubs, Floral	3
Shaker Can	Granular	Trees, Shrubs, Ornamentals	9
Belly Grinder	Granular	Trees, Shrubs, Ornamentals	1
By Hand	Granular	Pots	7
<i>Flagger</i>			
Aerial	Liquid	Ag	5
Aerial	Liquid	Turf	5
Aerial	Liquid	Forest	7

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C. CONCLUSION:

This RMD addresses acute occupational exposures from the use of acephate. Based on the 2018 recalculated MOEs, DPR staff are directed to develop mitigation measures to address the unacceptable acute occupational exposure scenarios identified in Table 1. Since licensed applicators can also apply products intended for use by homeowners, the need for mitigation measures applies to “homeowner” products as well as products intended for use by licensed applicators.