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EEB REVIEW

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FILE OR REG. NO. 89-CA-26

PETITION OR EXP. NO. \_\_\_\_\_

DATE OF SUBMISSION 11-29-89

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TYPE PRODUCTS(S): I, D, H, F, N, R, S \_\_\_\_\_

DATA ACCESSION NO(S). \_\_\_\_\_

PRODUCT MANAGER NO. Stanton/Cool (41)

PRODUCT NAME(S) Various Malathion Products

COMPANY NAME California Department of Food and Agriculture

SUBMISSION PURPOSE Review of request to amend malathion  
quarantine exemption

SHAUGHNESSEY NO.	CHEMICAL AND FORMULATION	% A.I.
_____	<u>Malathion</u>	_____
_____	_____	_____
_____	_____	_____

ECOLOGICAL EFFECTS BRANCH REVIEW

100.1 SUBMISSION PURPOSE AND PESTICIDE USE

The Department of Food and Agriculture of the State of California has requested an amendment to the Section 18 (89-CA-26) permitting use of malathion for eradication of exotic fruit flies. Currently the exemption permits use of malathion on 23 crops. California proposes to amend the exemption to allow spraying of any commercial or residential planting of any food or feed crop.

100.2 FORMULATION INFORMATION (excerpted from label)

Clean Crop Malathion ULV Concentrate Insecticide  
(EPA No: 34704-18-AA)

Active Ingredient:  
Malathion.....95.0%  
Inert Ingredients..... 5.0%

Prokil Malathion 25-WP (EPA No: 10163-61-AA)

Active Ingredient:  
Malathion.....25.0%  
Inert Ingredients.....75.0%

Malathion 25 Spray (EPA No: 279-739-ZA)

Active Ingredient:  
Malathion.....25.0%  
Inert Ingredients.....75.0%

Cythion Insecticide "The Premium Grade Malathion"

(EPA No: 241-208-ZA)  
Active Ingredient:  
Malathion.....95.0%  
Inert Ingredients..... 5.0%

Malathion ULV Concentrate Insecticide (EPA No. 241-110-ZA)

Active Ingredient:  
Malathion.....95.0%  
Inert Ingredients..... 5.0%

100.3 APPLICATION METHODS, DIRECTIONS, RATES (excerpted from submission request)

Use a maximum of 2.8 oz. active ingredient malathion mixed with a maximum of 9.6 fluid ounces per acre of Staley's Protein Bait, Nulure or other similar bait material cleared for use on food crops. Apply with up to 39.9 gallons of water per acre by ground or apply with a maximum of 2.9 gallons of water per acre by aircraft. No dilution with water shall be used over urban areas. Repeat applications will be made at a minimum of 7 day intervals. Only ground applications shall be made in environmentally sensitive areas, such as water.

The use of malathion is prohibited in areas that may result in exposure of the following endangered species: valley elderberry longhorn beetle, Kern primrose sphinx moth, and the delta green ground beetle. Only ground applications should be made when treating areas adjacent to endangered species habitats. (Note: the U.S. Fish and Wildlife Service has made the above determinations).

#### 100.4 TARGET ORGANISMS

All exotic (non-established, quarantined) fruit fly members of the family Tephritidae, including, but not restricted to, the Mediterranean Fruit Fly (Ceratitis capitata), the Oriental Fruit Fly (Dacus dorsalis), the Mexican Fruit Fly (Anastrepha ludens), the Caribbean Fruit Fly (Anastrepha suspensa), the Melon Fly (Dacus cucurbitae), the Peach Fruit Fly (Dacus zonatus), the Guava Fruit Fly (Dacus correctus), and the Queensland Fruit Fly (Dacus tryoni).

#### 101.0 HAZARD ASSESSMENT

The active ingredient will be applied at a rate of 2.8 fluid ounces per acre or 0.175 lb a.i./acre. Following a single application, the maximum expected residues are expected to be:

<u>Surface</u>	<u>Concentration</u>
Short range grass	38 ppm
Long grass	17 ppm
Leaves and leafy crops	20 ppm
Forage, small insects	9 ppm
Pods containing seeds	1.7 ppm
Fruits	1.2 ppm
6" of water (direct application)	128 ppb
Aquatic EEC (see attached)	3.7 ppb
Aquatic EEC (EXAMS model, C. Brassard, 1986)	0.42 ppb

#### 101.1 TERRESTRIAL SPECIES

The available toxicity data show that, on an acute basis, malathion is moderately toxic to upland game birds (pheasant LD<sub>50</sub> = 167 mg/kg) and slightly toxic to waterfowl (mallard LD<sub>50</sub> = 1485 mg/kg). The active ingredient is slightly toxic to upland game birds (bobwhite LC<sub>50</sub> = 3497 ppm) and practically non-toxic to waterfowl (mallard LC<sub>50</sub> > 5000 ppm) when fed in the diet.

Based on the maximum residue level on short range grass (38 ppm), this proposal is not expected to adversely affect terrestrial vertebrates. This residue level is well below 1/10th the level of concern for the most sensitive species tested.

The acute LD<sub>50</sub> for the honeybee is 0.27 ug/bee. Spray deposition studies conducted by the California State Water Resources board

have shown that the California spray program results in deposition levels significantly greater than the above LD<sub>50</sub>. In addition, there is evidence in the entomological literature that honey bee populations may be adversely affected by the spraying of malathion.

#### 101.2 AQUATIC SPECIES

Based on data in EEB's files, malathion is highly toxic to both warmwater and coldwater fish (rainbow trout LC<sub>50</sub> = 4 ppb, bluegill sunfish LC<sub>50</sub> = 20 ppb). Malathion is very highly toxic to the water flea (Daphnia magna) with a 96-hour EC<sub>50</sub> of 1 ppb.

Malathion is highly toxic to estuarine fish and invertebrates. The hermit crab and grass shrimp have LC<sub>50</sub>s of 100 ppb and 131 ppb, respectively. The sheepshead minnow LC<sub>50</sub> is 40 ppb. Larval amphibians are also susceptible to malathion toxicity. The LC<sub>50</sub> of the western chorus frog tadpole is 200 ppb.

The California Department of Fish and Game conducted intensive monitoring of the 1981-82 California fruit fly eradication program. Direct application of malathion to inland streams resulted in mean concentrations of 10.3 ppb. The highest measured concentration was 157 ppb. Interestingly, the empirical mean concentration was less than 25% of the theoretical mean based on water depth and application rate. Rainstorm runoff from aerially applied malathion sprayed one or two days previously resulted in concentrations of up to 1000 ppb in inland streams. The diversity of aquatic invertebrates was reduced but overall population density was not. At least seven fish kills were documented.

Residue levels observed in the monitoring program exceeded the special review trigger to fish and invertebrates. To mitigate the potential impact to aquatic species, the Department of Fish and Game recommends no aerial application of malathion in large [environmentally sensitive] areas during the rainy season (late September through mid-December).

#### 101.3 ENDANGERED SPECIES CONSIDERATION

As noted above, the U.S. Fish and Wildlife Service determined that the only endangered or threatened species at risk from the original Section 18 exemption are the valley elderberry longhorn beetle, Kern primrose sphinx moth, and delta green ground beetle. Measures to protect these species were specified on the label. It is not anticipated that the proposed amendment will increase the risk to threatened or endangered species.

#### 101.4 ADEQUACY OF THE TOXICITY DATA

The existing toxicity data base was sufficient to evaluate this proposal.

101.5 ADEQUACY OF LABELING

EEB is providing the following statements for use in supplementary labeling:

"This pesticide is toxic to fish, aquatic invertebrates, and aquatic life stages of amphibians, Do not apply directly to water or to swamps, bogs, marshes, or potholes. Drift and runoff may be hazardous to aquatic organisms in areas near the application site. Do not contaminate water when disposing of equipment washwaters".

"This product is highly toxic to bees exposed to direct treatment of blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area".

102 CONCLUSIONS

California Department of Agriculture estimates that a maximum of 431,117 lbs. of active ingredient will be used in the 1990-91 spray program. The proposed rate of application is lower than registered rates for adult mosquito control and much lower than registered rates for use on numerous crops and noncrop sites. The Department of Food and Agriculture expects to make fewer applications in 1990-91 than in 1989-90. In addition, current practice results in the accidental application of malathion to many of the crops that would fall under the proposed amendment. If the recommendation of the California Department of Fish and Game regarding no aerial spraying during the wet season is accepted, this proposal is not expected to markedly increase risk to non-target species.

Clyde R. Houseknecht, Biologist  
Ecological Effects Branch  
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*Clyde Houseknecht 7/11/90*

Henry T. Craven, Head, Section 4  
Ecological Effects Branch  
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*for James W. Akerman 7/11/90*

James W. Akerman, Chief  
Ecological Effects Branch  
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*James W. Akerman 7/11/90*

MALATHION

Attachment A

EEC CALCULATION SHEET

I. For un-incorporated ground application

A. Runoff

$$\underline{\hspace{1cm}} \text{ lb(s)} \times \frac{0.0\_\_}{(\_\% \text{ runoff})} \times \frac{10 \text{ (A)}}{\text{(from 10 A. drainage basin)}} = \underline{\hspace{1cm}} \text{ lb(s)} \text{ (tot. runoff)}$$

EEC of 1 lb a.i. direct application to 1 A. pond 6-foot deep = 61 ppb

$$\text{Therefore, EEC} = 61 \text{ ppb} \times \underline{\hspace{1cm}} \text{ (lb)} = \underline{\hspace{1cm}} \text{ ppb}$$

II. For incorporated ground application

A. Runoff

$$\underline{\hspace{1cm}} \text{ lb(s)} \div \frac{\underline{\hspace{1cm}} \text{ (cm)}}{\text{(depth of incorporation)}} \times \frac{0.0\_\_}{(\_\% \text{ runoff})} \times \frac{10 \text{ (A)}}{\text{(10 A d.basin)}} = \underline{\hspace{1cm}} \text{ lb(s)} \text{ (tot. runoff)}$$

$$\text{Therefore, EEC} = 61 \text{ ppb} \times \underline{\hspace{1cm}} \text{ (lbs)} = \underline{\hspace{1cm}} \text{ ppb}$$

III. For aerial application (or mist blower)

A. Runoff

$$\underline{0.175} \text{ lb(s)} \times \frac{0.6}{\text{(appl. efficiency)}} \times \frac{0.05}{(\underline{5\%} \text{ runoff})} \times \frac{10 \text{ (A)}}{\text{(10 A. d.basin)}} = \underline{0.0525} \text{ lb(s)} \text{ (tot. runoff)}$$

B. Drift

$$\underline{0.175} \text{ lb(s)} \times \frac{0.05}{(5\% \text{ drift})} = \underline{0.00875} \text{ lb(s)} \text{ (tot. drift)}$$

$$\text{Tot. loading} = \underline{0.0525} \text{ lb(s)} \text{ (tot. runoff)} + \underline{0.00875} \text{ lb(s)} \text{ (tot. drift)} = \underline{\hspace{1cm}} \text{ lb(s)}$$

$$\text{Therefore, EEC} = 61 \text{ ppb} \times \underline{0.06125} \text{ (lbs)} = \underline{3.74} \text{ ppb}$$