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REVIEW NO.

EEB REVIEW

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TYPE PRODUCT(S) : I, D, H, F, N, R, S Insecticide

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. D. Stubbs (41)

PRODUCT NAME(S) Sevin (Carbaryl)

COMPANY NAME California Dept. of Food and Agriculture

SUBMISSION PURPOSE Proposed Sec. 18 for use on home garden crops to control gypsy moth and japanese beetle

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
	Carbaryl 80S	80%
	Carbaryl 50W	50%

EEB REVIEW

Carbaryl

100.0 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

The California Department of Food and Agriculture is requesting the reissuance of a Section 18 Quarantine Exemption under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), to allow the use of carbaryl (Sevin Brand 80S Carbaryl Insecticide and Sevin Brand 50W Carbaryl Insecticide) for the control of Japanese Beetle and Gypsy Moth on home garden crops. Examples of these crops are: avocados, figs, loquats, artichokes, crabapples, guavas, quince, persimmons, kiwifruit, rhubarb, spices and herbs.

100.2 Formulation Information

Sevin Brand 80S Carbaryl Insecticide
Active Ingredient: 1-napthyl N-methylcarbamate...80%
Inert Ingredients: 20%

Sevin Brand 50W Carbaryl Insecticide
Active Ingredient: 1-napthyl N-methylcarbamate...50%
Inert Ingredients: 50%

100.3 Application Methods, Directions, Rates

The application of either product must be done by ground sprayer. Dosage for Sevin 80S is 1.25 lbs of product per acre. For Sevin 50W the dosage is 2 lbs of product per acre. Both products can be applied at seven day intervals or as necessary.

100.4 Target Organisms

Gypsy Moth	Lymantria dispar
Japanese Beetle	Popillia japonica

100.5 Precautionary Labeling

Label information was not submitted with the Section 18 Proposal.

101.0 Hazard Assessment

101.1 Discussions

The active ingredient for 80S will be applied at 1.00 lb ai/acre and for 50W at 1 lb ai/acre. Immediately following application the following maximum residue are anticipated for both products.

Surface	Residue
Short rangegrass	240 ppm
Long grass	100 ppm
Leaves and leafy crops	125 ppm
Forage	58 ppm
Pod containing seeds	12 ppm
Fruits, cherries, peaches	7 ppm
Soil surface	22 ppm
Top 6 inches of water	.73 ppm
Aquatic EEC	12.2 ppb

The aquatic EEC was calculated by multiplying the active ingredient rate by a 2 percent runoff (based on water solubility of 40 ppm at 30 C) and by 10 acres (which represents the drainage basin). This value is then multiplied by 61 ppb (the constant for total pesticide loading to a one acre farm pond with a six foot depth).

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Terrestrial

In avian acute dietary studies carbaryl (technical) has been found to be practically nontoxic to bobwhite quail (LC50 > 5000 ppm) and mallards (LC50 > 5000 ppm).

Avian acute oral studies show carbaryl to be practically nontoxic to ringnecked pheasants (LD50 > 2000 mg/kg) and mallards (LD50 > 2179 mg/kg).

In reproduction studies no adverse effects occurred to bobwhite quail up to 3000 ppm but mallards exhibited reduced reproduction at 1000 and 3000 ppm.

Carbaryl is highly toxic to honeybees. The contact LD50 is 1.1 - 1.3 mg/bee and the LD50 is .11 - .14 mg/bee.

Mammalian acute oral toxicity studies show carbaryl to be slightly toxic to rats (LD50 510 mg/kg).

Aquatic

Carbaryl is moderately toxic to freshwater fish as determined by available acute aquatic toxicity bioassays. For warmwater fishes the LC50 values ranged from 2.6 to 20 ppm and .69 to 7.1 ppm for coldwater fishes. An MATC value for fathead minnows was reported between .21 and .68 ppm.

Carbaryl is very highly toxic to freshwater invertebrates as determined by available acute aquatic toxicity bioassays. The LC50 for Pteronarcys is 4.8 ppb and 22 ppb for Gammarus lactustris. Carbaryl may cause reductions in growth and reproduction of Daphnia magna with an MATC of >3.3 > 6.0 mg/L.

Available estuarine/marine toxicity studies indicate carbaryl is very highly toxic to crustaceans (LC50 for mysid shrimp is 6.7 ppb),moderately toxic to marine invertebrates (48 EC50=2.7 ppm for eastern oyster embryo-larvae) and moderately toxic to marine fish (long nose killfish 48 hour TLM = 1.75 ppm). Also, after 96 hours exposure to 2 ppm carbaryl, oysters experienced reduced shell growth.

1-Naphtol, the degradate of carbaryl produced highly toxic LC50 values of .21 ppm for mysids and .73 ppm for Daphnids and .76 ppm for bluegill sunfish. 1-Naphtol is moderately toxic to rainbow trout(LC50=1.4 ppm), sheephead minnows (LC50=1.2 ppm) and eastern oysters (EC50=2.1ppm).

According to the Exposure Assessment Branch Carbaryl Addendum of February 26, 1985, "[14C] carbaryl, at 10 ppm, was relatively stable to hydrolysis in buffered solutions at pH 3 and 6 and hydrolyzed with a half-life of 3 to 5 hours at pH 9 when incubated at 25 C. At 35 C, [14C] carbaryl was stable at pH 3, and hydrolyzed with half-lives of > 28 days and 30 to 60 minutes at pH 6 and 9, respectively. 1-Napthol was the major degradate formed."

In addition, "[14C] carbaryl, at 5 ppm, photodegraded slowly in 0.1 M phosphate buffer solutions, with 4.39 to 4.49 ppm remaining as parent after 18 days of irradiation. In a 2 percent acetone solution, [14C] carbaryl accounted for 3.63 to 3.65 ppm after 18 days. 1-Napthol and several unidentified compounds were found at < 0.07 ppm."

Exposure

Mammals

The residue concentrations for 80S and 50W will be taken from short rangegrass because it possesses the highest residual concentrations and because it typifies the surroundings associated with domestic use. This maximum residue of 240 ppm exceeds the endangered species concern level of 163 ppm (1/10 LC50). The LC50 value was calculated from the rat LD50 of 510 mg/kg.

Avian Species

The maximum exposure level of 240 ppm is below the endangered species concern level of 500 ppm and below the ecological concern level of 1000 ppm.

Aquatic Species

The estimated aquatic EEC of 12.2 ppb does not exceed the ecological concern level (1/10 LC50) for freshwater fish (69 ppb), marine fish (175 ppb) or marine invertebrates (270 ppb). The aquatic EEC is also within the endangered species concern level (1/20 LC50) for freshwater fish (35 ppb), marine fish (87.5 ppb) and marine invertebrates (135 ppb).

The LC50 data for 1-Naphtol, does not exceed any of the concern levels when it is calculated as a degradate of carbaryl.

Sevin Brand 80S and 50W pose an unacceptable risk to freshwater invertebrates and estuarine/marine crustaceans. The aquatic EEC of 12.2 ppb exceeds the ecological concern level (1/10 LC50) of .48 ppb and the endangered species concern level (1/20 LC50) of .24 ppb for freshwater invertebrates. The EEC also exceeds the same concern levels for estuarine/marine crustaceans at .67 ppb and .34 ppb respectively.

It is noted that the EEC value created under a freshwater scenario is loosely applied to estuarine/marine systems. Nevertheless carbaryl's toxicity to marine invertebrates is demonstrated by Sevin 80S's use in oyster beds to control pest crustaceans. Also, non target areas associated with home garden crops such as surfaced areas can expedite runoff of pesticides. The storm sewer systems servicing residential areas directly discharges pesticides into waterways thereby circumventing natural filtering systems.

Evaluation of Use on Home Garden Crops

The proposed use of Carbaryl 80S and 50W on home garden crops will facilitate quarantine efforts to eradicate gypsy moths and japanese beetles as infestations arise. At present, isolated adult populations of gypsy moths have been found in Sonoma, San Diego and Placer counties. Japanese beetles have presented a control problem in the past. The projected losses due to a statewide infestation warrant the request of a Section 18 Quarantine Exemption.

101.3 Endangered Species Considerations

The following federally listed crustaceans and insect species in California may be affected by exposure to the home garden crop application of Carbaryl 80S or 50W.

Crustacean

- Shasta Crayfish (Pacifastacus fortis) - E
  Range - Shasta county: Pit River drainage system including tributaries of the Hat Creek and Fall River subdrainages.

  "increased residential development on Fall River, including the headwater spring areas at Lava Creek, is resulting in increased human use of the area and associated pollution that may adversely affect the crayfish." (California Department of Fish and Game 1987)

- California Freshwater Shrimp (Syncaris pacifica) - E
  Range - Napa, Marin, Sonoma counties: 11 streams.

  The California Department of Fish and Game (1980) attributes "the decline in shrimp populations primarily to degradation and loss of their habitat resulting from increased urbanization,... and water pollution."

Insect

- Mission Blue Butterfly [Plebejus (Icaricis) icariodes missionensis] - E
  Range - San Francisco county: Twin Peaks area.

  "Continued loss of habitat from residential development threatens this colony" (U.S. Fish and Wildlife Service).

  Range - San Mateo county: San Bruno Mountain.

  There is a loss of habitat do to urbanization (U.S.F&WS). The life history of I. missionensis is associated with the host plant Lupinus which has several ornamental species found in domestic areas.

101.4 Adequacy of Toxicity Data

No studies were included with the submission. Toxicity test data was obtained from 14 types of studies using the technical grade. Six additional studies used the degradate

of carbaryl, 1-Naphtol. Two avian reproduction studies were mentioned.

101.5 Adequacy of Labeling

Label requirements as stated in 40 CFR 156.55:

Environmental Hazards

"Do not apply directly to water or wetlands(swamps, bogs, marshes and potholes."

This pesticide (or product) is toxic to fish and extremely toxic to freshwater and estuarine invertebrates.

"Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas."

"Do not contaminate water when disposing of equipment washwater."

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

102.0 Classification

According to regulatory risk criteria Carbaryl 80S and 50W should be classified according to a presumption of unacceptable risk for endangered mammalian species and all freshwater invertebrates and estuarine/marine invertebrates.

103.0 Conclusion

The EEB has completed the review of the Section 18 Quarantine Exemption of two Carbaryl products for use on home garden crops. Based on available information both carbaryl products are toxic to fish and extremely toxic to freshwater and estuarine invertebrates and honey bees.

Use of Carbaryl 80S or 50W is prohibited within a half mile of the ranges for Shasta Crayfish anbd California Freshwater Shrimp. Before these products are applied in San Fransisco or San Mateo counties, applicators must contact an Endangered Species Specialist of the U.S. Fish & Wildlife Service in Sacramento to ensure that the Mission Blue Butterfly will not be exposed.

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