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OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Avian and Aquatic Acute Hazard for Aldicarb and 24 Alternatives  
for Six Use Sites

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Attached please find the subject hazard comparison, in response to your request regarding the ongoing Special Review of aldicarb. The text accompanying the six tables (one for each use site) explains how the tabulated data were generated and some of the limitations of the assessment.

## Avian and Aquatic Acute Hazard for Aldicarb and 24 Alternatives for Six Use Sites

Listed in tabular form in this report are avian and aquatic acute hazard ratios calculated by the Ecological Effects Branch (EEB) for aldicarb and the 24 alternative active ingredients and six use sites provided by the Special Review Branch, Registration Division (RD). The values listed are the ratios of estimated exposure to the  $LC_{50}$  for birds and  $1/2 LC_{50}$  for aquatic organisms (Special Review criteria, 40 CFR 162.11).

Estimated exposure was developed using the maximum application rates provided by RD, and a single application. Where application rates (in lb ai/Acre) were not provided by RD, ratios were not calculated, except in one case (Telone II with sugarbeets) where information was located in a recent EEB Registration Standard review. One application is used since (1) this is the most common application frequency cited by RD, (2) there are a variety of cases where frequency of application was not provided by RD, and (3) the analysis examines acute toxicity only, without incorporation of environmental fate data. Some pesticides may accumulate between applications and others may not. The large number of chemicals and sites combined with a limited time-frame precluded any incorporation of environmental chemistry data in this analysis. For birds, estimated exposure is the product of application rate (lb ai/Acre) and the maximum expected residues on leaves and leafy crops for each lb ai/Acre (125 ppm -- EEB nomograph based on Kenaga, 1973). For aquatic organisms, estimated exposure is the application rate multiplied by the concentration expected for each lb ai if applied directly to 6 inches of water (see 40 CFR 162.11).

Acute toxicity data used in this analysis are generally the validated  $LC_{50}$  values indicating greatest toxicity (i.e., for the most sensitive species tested) available in EEB Registration files for the active ingredients. They were obtained from EEB Registration Standard reviews where available, EEB Chemical Profiles, or other EEB reviews. Chronic toxicity data (where available) could not be compared since this would require estimates of environmental exposure over time in terrestrial and aquatic environments. Formulated product data were not compared since these are not typically required by the Agency (40 CFR 158.145) and thus not available for most products, and since no information was provided by RD as to formulation types considered by RD to be potential aldicarb alternatives. In one case (acephate), toxicity data on the principal degradate were used since available information indicated this to be more toxic to birds and aquatic organisms.

Note that most avian and aquatic hazard ratios are  $> 1$ , and thus appear to meet Special Review criteria for non-endangered species. No information was provided by RD as to which chemicals may be alternatives for aldicarb only in combination with others, and thus the ratios are chemical-specific. If chemicals are used in combination, the hazard could be still greater--probably additive.

All values  $> 0.1$  exceed "no effect" cutoff points for endangered species (3-29-82 EEB memorandum). The U.S. Fish and Wildlife Service Office of Endangered Species (OES) 10-12-83 Biological Opinion cites the Slackwater darter, 12 freshwater mussels, Comanche Springs pupfish, and Pecos gambusia as being jeopardized by the use of pesticides used on cotton that exceed "trigger" levels. The other five sites have not yet had similar "cluster" reviews of all pesticides

used on them. Chemicals on the alternatives list that have Biological Opinions separate from "cluster" reviews include chlorpyrifos, phorate, carbofuran, and dicofol, as well as aldicarb itself. All of these covered multiple sites and indicated jeopardy to one or more species.

Please note that of aldicarb and the alternatives provided to EEB, at least 12 pesticides have had terrestrial and/or aquatic field kills reported to this Branch. In some cases, these have been seen in field studies submitted to the Agency. In other cases, they have been reported following non-experimental field use. They have been seen with chemicals such as disulfoton (e.g., bird and mammal mortality at 1 lb ai/Acre rate in field study with alfalfa) where the avian acute hazard ratio is  $< 1$ , as well as with those having higher ratios.

Avian acute hazard ratios were developed based on application rates and estimated foliar residues. In cases where the formulation to be used is a granular product, avian hazard would be largely via consumption of granules directly. To assess this hazard would require information on both the percent active ingredient and the granule weight of the granular product to be evaluated as an alternative. This information was not readily available for this review. A check of our files while searching for acute toxicity data indicates that at least 14 of the 25 chemicals examined have granular formulation(s) among the formulation types.

Within the limitations of the present analysis, pesticides appearing to be less acutely hazardous than aldicarb at the given application rates, to both birds and aquatic organisms, are as follows:

cotton — acephate; terrazole

potatoes — dimethoate; methamidophos; methomyl; oxamyl

sweet potatoes — oxamyl

citrus — dimethoate; oxamyl

peanuts — ethoprop

sugarbeets — none

However, as can be seen in the tables, all of the above except terrazole on cotton appear to exceed avian and/or aquatic acute hazard criteria for non-endangered species while all seven chemicals would exceed one or both of the stricter endangered species criteria.

Site #1—Cotton

<u>Chemical</u>	<u>Max. Applic. Rate of ai (lb ai/A)</u>	<u>Avian Acute Hazard Ratio</u>	<u>Aquatic Acute Hazard Ratio</u>
Aldicarb	0.60	1.1	73.4
Acephate	0.16	0.14*	2.7*
Dicrotophos	0.20	1.9	0.68
Disulfoton	1.05	0.26	395.2
Fenamiphos	1.20	4.2	1101
Methamidophos	0.80	2.4	45.2
Phorate	1.05	5.5	5708.9
Terrazole	1.25	0.09	0.56

\* based on 30% principal degradate, which is more toxic than parent material

Site #2---Potatoes

<u>Chemical</u>	<u>Max. Applic. Rate of ai (lb ai/A)</u>	<u>Avian Acute Hazard Ratio</u>	<u>Aquatic Acute Hazard Ratio</u>
Aldicarb	3.00	5.3	367
Carbofuran ✓	3.00	17.9	114.1
Dimethoate	0.50	0.19	17.1
Disulfoton ✓	4.00	0.98	1,505.6
Endosulfan	1.00	0.16	36,700
Ethoprop	9.00	34.1	1,860.8
Fenvalerate	0.20	0.005	38,631.6*
Methamidophos	1.00	3.0	56.5
Methomyl	0.90	c. 0.1	150.1
Oxamyl	1.00	2.3	3.0
Phorate ✓	3.50	18.2	19,029.6
Telone II**	NP	?**	?**
Vapan	NP	?***	?***
Vorlex	NP	?	?

NP = application rate (lb ai/A) not provided by RD

\* preliminary USEPA/Gulf Breeze data used

\*\* information available to EEB indicates this chemical is only registered as an herbicide for this site (8-30-85 EEB review)

\*\*\* In addition to the missing application rate (lb ai/A) from RD, no avian or aquatic data are available in EEB file

Site #3---Sweet Potatoes

<u>Chemical</u>	<u>Max. Applic. Rate of ai (lb ai/A)</u>	<u>Avian Acute Hazard Ratio</u>	<u>Aquatic Acute Hazard Ratio</u>
Aldicarb	4.50	7.9	550.5
Ethoprop ✓	12.00	45.5	2,481.1
Fensulfothion ✓	7.00	39.8	1,027.6
Oxamyl	3.00	6.9	9.0
Telone II	NP	?	?

NP = application rate (lb ai/A) not provided by RD

Site #4—Citrus

<u>Chemical</u>	<u>Max. Applic. Rate of ai (lb ai/A)</u>	<u>Avian Acute Hazard Ratio</u>	<u>Aquatic Acute Hazard Ratio</u>
Aldicarb	10.00	17.6	1,223.3
Carbophenothion	3.75	1.5	11,712.8
Dicofol	3.00	*	*
Dimethoate	2.50	0.97	85.3
Fenamiphos	20.00	69.4	18,350
Fenbutatin Oxide	1.00	**	863.5
Oxamyl	2.00	4.6	6.0
Phosalone	8.00	< 0.60	9,786.7

\* per M. Rostker (1-10-86), regulatory status currently under review by Assistant Administrator

\*\* designated Core or Supplemental data not available



Site #5—Peanuts

<u>Chemical</u>	<u>Max. Applic. Rate of ai (lb ai/A)</u>	<u>Avian Acute Hazard Ratio</u>	<u>Aquatic Acute Hazard Ratio</u>
Aldicarb	3.00	5.3	367
Carbofuran	4.95	29.5	188.3
Disulfoton	2.10	0.51	790.5
Ethoprop	0.40	1.5	82.7
Fenamiphos	4.95	17.2	4,541.6
Phorate	1.00	5.2	5,347.0
Telone II	NP	?	?

NP = application rate (lb ai/A) not provided by RD

Site #6---Sugarbeets

<u>Chemical</u>	<u>Max. Applic. Rate of ai (lb ai/A)</u>	<u>Avian Acute Hazard Ratio</u>	<u>Aquatic Acute Hazard Ratio</u>
Aldicarb	4.00	7.0	489.3
Carbofuran	2.00	11.9	76.1
Chlorpyrifos	2.00	1.8	5,150.9
Phorate	1.50	7.8	8,155.6
Telone II	138*	< 8.63	34.3
Terbufos	2.00	1.75	9,471.0

\* from 8-30-85 EEB Registration Standard review