



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 12 1987

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Memorandum

Subject: Aldrin/Dieldrin Action Level Reevaluation.
RCB Nos. 1623, 1638.

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To: Emergency Response and Minor Use Section
Registration Division (TS-767C)

and

Toxicology Branch
Hazard Evaluation Division (TS-769C)

RCB has been asked to reevaluate the existing action levels for unavoidable residues of aldrin and dieldrin in agricultural and processed commodities. The most current list of action levels for aldrin/dieldrin prepared by FDA includes many commodities listed separately which could be incorporated into crop groupings as described in 40 CFR 180.34(f). In a recent letter from John R. Wessel (Director, Contaminant Policy Staff, Office of Enforcement, FDA, 2/18/87), FDA asked that EPA develop action level recommendations on a crop grouping basis whenever possible. RCB agrees with the suggestions made by Mr. Wessel. Therefore, action level recommendations made in this review will utilize crop groupings whenever possible.

The most recent FDA compilation of action levels for aldrin/dieldrin is shown below (submitted by FDA to EPA/OPP for review, 1/13/87).

Table 1: Current FDA Action Levels for Aldrin/Dieldrin

<u>Commodity^a</u>	<u>Current Action Level (ppm)</u>	<u>Recommended Action Level (ppm)</u>
Alfalfa	0.03	0.01 ^{17,20}
Animal feed, Processed	0.03	0.03
Artichokes	0.05	None ¹⁹
Asparagus	0.03	None
Bananas	0.02	None
Beets (garden and sugar)	0.1	0.01 ¹
Beet tops (garden and sugar)	0.05	None ²
Broccoli	0.03	None ⁵
Brussels sprouts	0.03	None ⁵
Bulb vegetables	0.1	0.01 ³
Cabbage	0.03	None ⁵
Cauliflower	0.03	None ⁵
Cereal grains (except buck- wheat, millet and teosinte)	0.02	0.01 ¹⁴
Celery	0.03	0.01 ⁴
Clover	0.03	0.01 ^{17,20}
Collards	0.05	None ⁵
Cowpea hay	0.03	0.01 ^{7,20}
Cucumbers	0.1	0.01 ⁹
Eggplant	0.05	None ⁸
Eggs	0.03	0.01
Endive (escarole)	0.05	0.01 ⁴
Fats and oils (animal feed)	0.3	0.3
Figs	0.05	None
Fish ^b	0.3 (edible portion)	- ^b
Forage, fodder and straw of cereal grains except those buckwheat, millet and teosinte)	0.03	0.01 ^{15,20}
Grapefruit	0.02	None ¹⁰
Hay	0.03	0.01 ^{16,20}
Horseradish	0.1	0.01 ¹
Kale	0.05	None ⁵
Kohlrabi	0.05	None ⁵
Lemons	0.02	None ¹⁰
Lespedeza	0.03	0.01 ^{17,20}
Lettuce	0.03	0.01 ⁴
Legume vegetables (except guar, jackbeans, lablab beans and lentils)	0.05	0.01 ⁶
Limes	0.02	None ¹⁰
Mangoes	0.03	None
Melons	0.1	0.01 ⁹
Milk	0.3 (fat basis)	0.3 (fat basis)
Mustard Greens	0.05	None ⁵
Oranges	0.02	None ¹⁰
Parsnips	0.1	0.01 ¹

<u>Commodity^a</u>	<u>Current Action Level (ppm)</u>	<u>Recommended Action Level (ppm)</u>
Pea hay	0.03	0.01 ^{7,20}
Peaches	0.02	None ¹²
Peanuts	0.05	0.03
Peanut hay	0.03	0.01 ²⁰
Peppers	0.05	None ⁸
Pimentos	0.05	None ⁸
Pineapples	0.03	None
Pome fruits (except crabapples and loquats)	0.03	0.01 ¹¹
Potatoes	0.1	0.01 ¹
Radishes	0.1	0.01 ¹
Radish tops	0.03	None ²
Rutabagas	0.1	0.01 ¹
Salsify roots	0.1	0.01 ¹
Salsify tops	0.05	None ²
Small fruits and berries	0.05	0.01 ¹³
Soybean hay	0.03	0.01 ^{7,20}
Spinach	0.05	0.01 ⁴
Squash	0.1	0.01 ⁹
Stone fruits (except Chicksaw, damson, japanese plums and peaches)	0.03	None ¹²
Sugarbeet pulp (animal feed)	0.1	None
Sweet potatoes	0.1	0.01 ¹
Swiss Chard	0.05	0.01 ⁴
Tangerines	0.02	None ¹⁰
Tomatoes	0.05	None ⁸
Turnips	0.1	0.01 ¹
Turnip tops	0.05	None ²

^aAction levels for crop groups cover all commodities specified in 40 CFR 180.34(f), except where an exception is noted.

^bFish action levels will not be reevaluated in this review but will be reevaluated at a later date together with other chlorinated pesticides.

Reevaluation of these action levels was performed utilizing FDA monitoring data (surveillance only) for FY'85 and FY'86. For crop groupings, all available residue monitoring data for each crop in the crop groupings were combined to obtain the total data set used for statistical analysis for the crop grouping. Averages and 95% confidence limits were determined for each crop grouping for FY'85 (domestic and import separately) and for FY'86 (domestic and import separately). The same calculations were made for commodities which could not be included in crop groupings. A summary of the results of these calculations is shown in Table 2 together with action level recommendations.

Table 2: Summary of FDA Surveillance Data (FY'85 and FY'86) / Recommended Replacement Action Levels for Aldrin/Dieldrin Residues (ppm)

Commodity/ Crop Group	FY '85						FY '86						Recom. Action Level
	Domestic			Import			Domestic			Import			
	Avg.	95% Conf. Limit	Number Smples.	Avg.	95% Conf. Limit	Number Smples.	Avg.	95% Conf. Limit	Number Smples.	Avg.	95% Conf. Limit	Number Smples.	
Group 11	0.006	0.006	637	0.003	0.005	107	0.003	0.005	492	0.002	0.002	87	0.01
Group 22	ND ¹⁸	ND	26	ND	ND	4	ND	ND	28	ND	ND	4	None ¹⁹
Group 33	0.002	0.003	83	ND	ND	55	0.003	0.004	94	ND	ND	55	0.01
Group 44	ND	ND	872	ND	ND	115	ND	ND	715	0.002	0.003	84	0.01
Group 55	ND	ND	499	ND	ND	162	ND	ND	519	ND	ND	93	None
Group 66	ND	ND	177	ND	ND	299	0.002	0.003	164	ND	ND	166	0.01
Group 77	ND	ND	0	ND	ND	0	ND	ND	0	ND	ND	0	0.0120
Group 88	ND	ND	253	ND	ND	1263	ND	ND	231	ND	ND	104	None
Group 99	0.006	0.01	274	0.003	0.006	860	0.003	0.005	355	0.003	0.004	948	0.01
Group 1010	ND	ND	197	ND	ND	42	ND	ND	112	ND	ND	143	None
Group 1111	0.002	0.002	365	ND	ND	79	0.002	0.002	348	ND	ND	43	0.01
Group 1212	ND	ND	203	ND	ND	59	ND	ND	242	ND	ND	73	None
Group 1313	ND	ND	240	ND	ND	257	0.002	0.003	377	ND	ND	759	0.01
Group 1514	0.004	0.004	428	0.004	0.005	38	0.004	0.004	416	ND	ND	34	0.01
Group 1615	0.002	0.004	4	ND	ND	0	ND	ND	1	ND	ND	0	0.0120
Group 1716	ND	ND	3	ND	ND	0	ND	ND	1	ND	ND	0	0.0120
Group 1817	0.002	0.003	37	ND	ND	1	ND	ND	19	ND	ND	0	0.0120
Animal Feed, Processed	0.009	0.013	269	0.008	0.009	89	0.015	0.023	307	ND	ND	1	0.03
Artichokes	ND	ND	14	ND	ND	0	ND	ND	15	ND	ND	1	None
Asparagus	ND	ND	19	ND	ND	30	ND	ND	48	ND	ND	15	None
Bananas	ND	ND	5	ND	ND	17	ND	ND	1	ND	ND	23	None
Eggs	0.008	0.008	416	ND	ND	50	0.008	0.009	292	ND	ND	5	0.01
Fats and Oils (animal feed)	0.037	0.203	6	ND	ND	0	ND	ND	3	ND	ND	0	0.3
Figs	ND	ND	0	ND	ND	1	ND	ND	0	ND	ND	1	None
Mangoes	ND	ND	3	ND	ND	7	ND	ND	3	ND	ND	1	None
Milk	0.01	0.017	364	ND	ND	0	0.01	0.015	413	ND	ND	2	0.3 (fat basis)
Peanuts	0.01	0.015	32	ND	ND	0	0.018	0.028	30	ND	ND	0	0.03
peanut hay	ND	ND	0	ND	ND	0	ND	ND	0	ND	ND	0	0.0120
pineapples	ND	ND	4	ND	ND	9	ND	ND	6	ND	ND	87	None
Sugar Beet	ND	ND	21	ND	ND	1	ND	ND	4	ND	ND	0	None
Pulp (animal feed)	ND	ND	21	ND	ND	1	ND	ND	4	ND	ND	0	None

Footnotes (Table 2):

- 1 Root and Tubor Vegetables Group; Commodities in which detectable residues were found include beets, carrots, parsley, potatoes, radishes, rutabagas and turnips.
- 2 Leaves of Root and Tubor Vegetables Group
- 3 Bulb Vegetables Group; Commodities in which detectable residues were found include onions
- 4 Leafy vegetables Group; Commodities in which detectable residues were found include spinach
- 5 Brassica (Cole) Leafy Vegetables Group
- 6 Legume Vegetables (Succulent and Dry) Group; Commodities in which detectable residues were found include kidney beans and soybeans
- 7 Forage of Legume Vegetables Group
- 8 Fruiting Vegetables (except Curcurbits) Group
- 9 Curcurbits Vegetable Group; Commodities in which detectable residues were found include canteloupe, pumpkins, squash and cucumbers
- 10 Citrus Fruits Group
- 11 Pome Fruits Group; Commodities in which detectable residues were found include apples
- 12 Stone Fruits Group
- 13 Small Fruits and Berries Group; Commodities in which detectable residues were found include strawberries
- 14 Cereal Grains Group; Commodities in which detectable residues were found include corn and oats
- 15 Forage, Fodder and Straw of Cereal Grains Group
- 16 Grass Forage, Fodder and Hay Group
- 17 Non-grass Animal Feeds (Forage, Fodder, Straw and Hay) Group; commodities in which detectable residues were found include alfalfa
- 18 ND = No detectable residues found
- 19 None = No replacement action level recommended
- 20 Replacement action levels for these commodities are recommended at approximatey the limit of detection because insufficient data are available to recommend elimination of the action levels.

In performing these calculations, residue values given by the FDA as "trace" were assigned values at the limit of detection, 0.003 - 0.015 ppm (higher limit of detection values are for fatty foods). Non-detectable residues were calculated as one-half the limit of detection.

In determining the recommended action levels from the statistical information, the presence of detectable residues as well as the 95% confidence limits were considered. Commodities for which there were a sufficient number of

analyses all showing no detectable residues, were not assigned recommended levels. In these cases, the absence of detectable residues makes replacement action levels unnecessary, and RCB will, therefore, recommend that replacement action levels not be established for these commodities. In cases where no detectable residues were found but where an insufficient number of residue values were available, action levels, approximately corresponding to the limit of detection are suggested. Finally, in cases where detectable residues were found, action levels were recommended at values near the 95% confidence limits.

USDA Data

Residue monitoring data were submitted by USDA for residues of aldrin and dieldrin in the fat of animals. These data were statistically analyzed in a manner similar to the FDA data, and the results are summarized in Table 3. Monitoring data were submitted for 1984 and 1985. The percentage of samples showing detectable residues decreased from 5.4% to 0.52% from 1984 to 1985. Considering this as well as the 95% confidence limits shown in Table 3, we recommend an action level of 0.02 ppm to replace the current action level of 0.3 ppm for combined residues of aldrin and dieldrin in the fat of calves, cattle, chickens, ducks, geese, goats, horses, rabbits, sheep, swine and turkeys.

Codex Considerations

The action levels for aldrin/dieldrin recommended in this review are not compatible with Codex maximum residue limits or extraneous residue limits for any commodity listed. Domestic and import surveillance show a significant decline in residue levels from previous years in most cases. Codex limits for aldrin/dieldrin were established during or prior to 1977. Therefore, Codex limits do not likely reflect current residue levels in many commodities because the decline in residues which has occurred over the past 10 years has lowered actual residues to levels below those found when the Codex limits were established. The action levels recommended in this review are more representative of current residues of aldrin/dieldrin. A comparison of Codex limits to recommended action levels is shown in Table 4.

A single Canadian limit of 0.1 mg/kg for milk, fat basis (recommended action level 0.3 ppm, fat basis) is established. No Mexican limits have been established for residues of aldrin/dieldrin.

Table 3: USDA Monitoring Data for Aldrin/Dieldrin Residues in Fat (1984 and 1985)

Commodity (Fat of..)	Residues (ppm)					
	1984			1985		
	Avg.	95% Conf. Limit	Total # Smpls.	Avg.	95% Conf. Limit	Total # Smpls.
Horse	0.01	0.019	343	0.006	0.008	313
Bull	0.02	0.04	95	ND	ND	27
Steer	0.007	0.011	355	0.008	0.009	213
Cow	0.011	0.023	455	0.006	0.009	286
Heifer	0.007	0.011	223	0.005	0.007	102
Calf	0.008	0.014	616	0.007	0.008	330
Sheep	0.009	0.019	96	ND	ND	59
Lamb	0.006	0.009	246	0.006	0.007	260
Goat	0.005	0.007	133	0.007	0.01	82
Market Hog	0.006	0.008	584	0.005	0.007	316
Boar or Stag	0.007	0.011	143	ND	ND	52
Sow	0.009	0.012	432	0.005	0.01	172
Young Chicken	0.007	0.014	470	ND	ND	303
Mature Chicken	0.006	0.01	602	ND	ND	292
Young Turkey	0.011	0.025	290	ND	ND	299
Mature Turkey	0.009	0.019	195	ND	ND	160
Fry-Roast Turkey	0.021	0.07	85	-	-	-
Duck	0.005	0.007	323	0.005	0.007	353
Goose	0.009	0.018	25	ND	ND	16
Rabbit	ND	ND	95	0.006	0.008	75

Table 4: Comparison of Recommended Action Levels to Codex Limits

Recommended Action Levels		Codex Limits	
Commodity	Residue (ppm)	Commodity	Residue (mg/kg)
Root and Tubor Veggies. Group	0.01	Carrots	0.1 ¹
		Horseradish, parsnips, potatoes and radishes	0.1
Leaves of Root and Tubor Veggies. Group	None ²	Radish tops	0.1
Bulb Veggies. Group	0.01	Onions	0.1
Leafy Veggies. Group	0.01	Lettuce	0.1 ¹
Brassica (Cole) Leafy Veggies. Group (Continued)	None	Broccoli, Brussels sprouts, cabbage and cauliflower	0.1

Table 4: (Continued)

Recommended Action Level		Codex Limit	
Commodity	Residue (ppm)	Commodity	Residue (mg/kg)
Legume Veggies. Group	0.01	No Codex Limits	
Foliage of Legume Veggies. Group	0.01	No Codex Limits	
Fruiting Veggies. Group	None	Eggplant, peppers and pimentos	0.1
Curcubits Veggies. Grp.	0.01	Cucumbers	0.1
Citrus Fruits Group	None	Fruit	0.05
Pome Fruits Group	0.01	Fruit	0.05
Stone Fruits Group	None	Fruit	0.05
Small Fruits and Berries Group	0.01	Fruit	0.05
Cereal Grains Group	0.01	Cereal grains (except rice in husk) Rice in husk	0.02 ¹ 0.02
Forage, Fodder and Straw of Cereal Grains Group	0.01	No Codex Limits	
Grass Forage, Fodder and Hay Group	0.01	No Codex Limits	
Non-Grass Animal Feed Group	0.01 ¹	No Codex Limits	
Animal feeds, processed	0.03	No Codex Limit	
Artichokes	None	No Codex Limit	
Asparagus	None	Asparagus	0.1
Bananas	None	Fruit	0.05
Eggs	0.01	Eggs	0.1 ¹
Fats and Oils (animal feeds)	0.3	No Codex Limit	
Figs	None	Fruit	0.05
Mangoes	None	Fruit	0.05
Milk	0.3 (fat basis)	Milk	0.006 ¹
Peanuts	0.03	No Codex Limit	
Peanut hay	0.01	No Codex Limit	
Pineapples	None	Fruit	0.05
Sugarbeet pulp (animal feed)	None	No Codex Limit	

- 1 Limit is an Extraneous Residue Limit which approximates an action level in definition.
2 None = No replacement action level recommended

Conclusions and Recommendations

RCB concludes that the action level recommendations shown in Table 2 (and 0.02 ppm for the fat of various animals) are appropriate to cover unavoidable residues of aldrin and dieldrin in the environment. We recommend that these levels be provided to and established by FDA and USDA.

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