STATE OF CALIFORNIA HEALTH AND WELFARE AGENCY

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October 16, 1987

To: Distribution List

From: Toxic Substances Control Division
714/744 P Street

Subject: EMPTIED AEROSOL PESTICIDE CONTAINERS

Per your request a copy of "The Public Health Concerns Regarding Emptied Aerosol Pesticide Containers" is attached. If you have any questions about this document, please call Carol Masson of my staff at (916) 324-1807.

Sincerely,

David J. Leu, Ph.D., Chief
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THE PUBLIC HEALTH CONCERNS REGARDING EMPTIED AEROSOL PESTICIDE CONTAINERS

INTRODUCTION

The Department of Health Services (DHS) was requested in a letter dated April 11, 1986 by the Pest Control Operators of California (PCOC) to determine the classification of emptied aerosol pesticide containers. This request was made on behalf of pest control operators and aerosol pesticide products manufacturers.

Federal regulations prohibit the puncture of aerosol pesticide containers. As a result, emptied aerosol pesticide containers cannot be rinsed and would be considered hazardous in California under California Administrative Code (CAC), Title 22. Emptied household pesticide containers of one gallon or less in capacity, which are drained until there is no continuous flow of liquid, are exempt from regulation as hazardous waste in California (22 CAC 66300 (g)).

Pest control operators use aerosol pesticide products in houses, apartments, food establishments, hotels, and hospitals. Many of the aerosol pesticide products are botanical pesticides (pyrethrins); botanical pesticides degrade quickly. The remaining products include carbamates, organophosphates, and synthetic pyrethroids. The ingredients found in the aerosol pesticide products used by pest control operators in California are listed in Table 1.

About 630,000 units of aerosol pesticide products were sold for commercial use in California in 1985. Data from Selling Areas Marketing, Inc. (SAMI) indicate 20,832,383 cans of aerosol insecticide are sold annually in California. The approximate ratio of commercial to consumer aerosol pesticide products is 1:30. Residual data submitted by manufacturers indicate that 1 to 5 grams of residue per unit are left in emptied containers. Based on the residue studies and 1985 sales, the annual estimate of active ingredients remaining in emptied containers is 360 pounds.

In making the decision to exempt the emptied containers from regulation as hazardous waste, DHS reviewed several areas of public health concern: public health benefits of aerosol pesticides, pest control operator health and safety, landfill operator health and safety, storage and disposal issues, and environmental release of the pesticides.

PUBLIC HEALTH BENEFITS OF AEROSOL PESTICIDES

Aerosol pesticides are used against flying pests (e.g. wasps, flies, mosquitoes) and crawling pests (e.g. cockroaches, spiders, ants). Some of these pests are public nuisances; some are carriers of diseases. Pest control operators use aerosol pesticide products in various places, including residences, food establishments, and

hospitals. These products are used to kill or repel pests. Some aerosols (pyrethrins) are used in conjunction with other pesticides as flushing agents-- the pyrethrins excite the pests and cause them to leave their hiding places, while a more toxic pesticide (applied in the open spaces) kills them.

Aerosol pesticides replaced some of the functions of pesticide dusts and compressed air sprayers. Because of the finer spray and more even particle distribution, aerosols are more effective in crack and crevice application; the previous methods could result in overapplication (Wright and Jackson, 1975; Bennett and Yonker, 1986; Rambo, 1987).

Rather than contend with managing emptied aerosol containers as hazardous waste, pest control operators may choose to use liquid pesticides with compressed air sprayers because those containers can be effectively rinsed and rendered nonhazardous. As mentioned above, the compressed air sprayer application is not as effective as aerosols; pest control operators will need to increase applications (either by concentration of pesticides or frequency of application or both) to achieve killing results similar to aerosol application. At least one aerosol pesticide manufacturer has already experienced a decrease in sales in California (Crowder, 1987).

*The beneficial use of aerosol pesticides for killing disease-carrying pests may outweigh the drawbacks in classifying the emptied containers as hazardous waste.

PEST CONTROL OPERATOR HEALTH AND SAFETY

The California Department of Food and Agriculture states that aerosol pesticides appear to be safer for a pest control operator to use than liquid pesticides: (1) aerosol products contain active ingredients in lower concentrations than liquid products requiring mixing, (2) pest control operators have a lower risk of pesticide exposure with aerosols because the operators do not have to do any mixing, and (3) pest control operators have a lower risk of pesticide exposure with aerosols because aerosols are primarily used for spot work rather than wide area application.

This perception of operator health and safety is not supported nor disputed by any data. The Department of Food and Agriculture has 2 sources of pesticide exposure data: (1) physician reports of illnesses caused or believed to be caused by pesticide exposure and (2) Department of Industrial Relations reports of worker exposure. Neither one of these data sources is of sufficient detail to make a health and safety evaluation of aerosol pesticides (Gibbons, 1987).

*The nature of aerosol pesticides imply a greater level of safeness for pest control operators than non-aerosol products, but there are no data to support this premise.

LANDFILL OPERATOR HEALTH AND SAFETY

The refuse collection and disposal industry is a dangerous occupation, even without considering the problems with disposal of hazardous waste with municipal waste (Cimino, 1975). In its June 1985 report, the Association of Bay Area Governments (ABAG) stated that the specific records on hazardous waste-related injuries to solid waste workers are limited:

> "From 1977-1982, an average of 3.2% of the injuries and illnesses in publicly operated services was reportedly due to hazardous materials. For private companies, reports of illness and injury in this category more than doubled for the six year period, with an average rate of 1.8%. Matching data on types of injuries and illnesses are not available." (ABAG, 1985)

Injuries due to aerosol pesticide containers may or may not be included in this hazardous material category. Rather than chemical burns, skin irritations, fume inhalation, or eye irritations, injuries due to aerosol pesticide containers may be of a projectile nature (e.g. abrasions, cuts, physical impact). The approximate ratio of commercial to consumer aerosol pesticide products is 1:30. Considering the amount of everyday products in aerosol form (e.g. hair spray, deodorant, air freshener), the number of aerosol pesticide containers is probably insignificant. The above-mentioned ABAG report briefly discusses a San Francisco study on sanitation workers in which initial data indicate about 3 injuries per month from exploding aerosol cans. The number of exploding aerosol can incidences may vary seasonally: pressure in a can may increase during warmer weather.

Another factor to consider with aerosol pesticide containers is the degree of emptiness. It is accepted as fact that consumers will dispose of partially full aerosol containers for a variety of reasons (e.g. product dissatisfaction, no longer a need for product, no desire to pack product during a move). It is unlikely that a pest control operator will dispose of a partially full aerosol pesticide container: a 32-ounce aerosol pesticide container costs $15-20. In addition, the aerosol pesticide products manufacturers have replacement policies for defective cans (e.g. leaking cans, cans with incomplete content dispensal). Pest control operators send the defective cans back to the manufacturers and are given customer credit. The manufacturers release the propellants, open the containers, and reuse the ingredients (active ingredients and solvents).

A San Diego County solid waste inspector has observed bulk loads of aerosol containers deposited at landfills. When a bulldozer covers these loads, some of the containers explode. Explosions of aerosol containers probably occur in mixed loads of trash, but pose less of a hazard to landfill workers because the aerosol containers are a small proportion of mixed loads (Frank, 1987). The City of Fresno Solid Waste Management Division has had no punctured aerosol container problems at the landfill; however, a refuse-collecting

truck has occasionally had a can lodged in the crushing mechanism, causing it to break open. The Solid Management Division Manager said there are far more problems with waste oil being put in the trash than with aerosol containers (Sallee, 1987). The statement of reason for 22 CAC 66300 (c)- currently listed as 66300 (g) - includes two pertinent comments:

1) "When disposed with garbage, empty household containers, with no flowing hazardous liquid, pose little safety hazard to garbage handlers and persons at landfills."

2) "No public health, safety, or environmental hazards have been reported as a result of empty householder containers being handled as nonhazardous wastes."

*The disposal of aerosol pesticide containers as nonhazardous waste may pose a hazard to municipal landfill workers (and refuse collectors). Compared to the quantity of other aerosol containers disposed, the level of significance for this hazard is probably minimal. Mixing the aerosol pesticide containers with other trash, rather than dumping as a bulk load, may further reduce any risk.

STORAGE AND DISPOSAL ISSUES

DHS Community Toxicology Unit (COMTU) assesses public health risks from toxic substances in the environment. COMTU has discussed its public health concerns over the issue of emptied aerosol pesticide containers as nonhazardous waste. COMTU reviewed three areas of this issue:

1) Potential problems with discard of emptied containers at the site of pesticide application.

2) Potential problems with discard of emptied containers at the pest control operator's establishment.

3) Potential problems at landfills.

If the emptied aerosol containers are discarded at the site of pesticide application, there is a possible risk to children playing with these discarded items in the trash. There are known incidences of pesticide exposure occurring in the home with children spraying pesticide products on themselves and other children, but the COMTU staff could not recall incidences occurring with emptied aerosol containers already in the trash can or dumpster. While in compliance with EPA's disposal instructions ("Wrap container and discard in trash."), discard at the application site was not considered to be a significant risk of exposure.

If the emptied aerosol containers are discarded at the pest control operator's establishment, there are some possible risks with the waste consolidation (especially if the aerosol containers are the major waste component): (1) increase risk of exposure from leaks or

explosions and (2) increase risk to children if waste is stored in an open, unsecured area. Compared to the previously mentioned disposal approach, COMTU would prefer that the emptied aerosol containers be discarded at the site of pesticide application rather than be collected at the operator's establishment for subsequent disposal.

If the emptied aerosol containers are discarded at municipal landfills, COMTU foresaw the following problems: (1) injury to landfill operators, (2) injury to landfill scavengers, and (3) environmental release of the pesticides. Landfill operator health and safety issues were addressed earlier. COMTU was aware that landfills allow people to come and salvage items; COMTU was concerned about the health and safety of these scavengers with respect to aerosol pesticides. DHS did some further investigation of this issue. The California Waste Management Board (CWMB) regulates the municipal landfills (approximately 400 Class II and Class III facilities). Scavenging by the public can be written into the landfill permit, under specified conditions. Because of all the other potential hazards inherent with this practice, DHS decided that the CWMB has considered all health and safety issues sufficiently to include any hazards from aerosol pesticides when permitting this activity. COMTU also considered the release of solvent and active ingredient residues from the landfills and into the water and air. Environmental release issues are discussed in the next section. Even though this release may be an environmental health problem, COMTU is far more concerned about the potential problems associated with household hazardous waste disposed at municipal landfills. When compared to the amount of aerosol pesticide containers and aerosol non-pesticide containers (often containing the same solvents as those found in aerosol pesticide products) and other hazardous material containers disposed in municipal landfills by household consumers, the number of aerosol pesticide containers from the pest control operators is the infamous drop in the bucket. The environmental impact of household hazardous waste disposed in municipal landfills is an issue that needs to be addressed, but not in this assessment.

*The disposal of commercial aerosol pesticide containers as nonhazardous waste in comparison to consumer aerosol pesticide containers is not of significant public health concern (COMTU, 1987).

ENVIRONMENTAL RELEASE

Even though the propellants will be removed from the aerosol pesticide containers during product use, there will be some remaining residue (1 to 5 grams of residue per unit, based on data from manufacturers) of solvents and active ingredients. The aerosol containers will eventually deteriorate in a landfill and release the residues. The residues may break down, possibly while in the aerosol container. The residues may leach out and contaminate water. They may be released in a gaseous state, combine with the methane gas commonly produced in landfills, and pollute the air or water. All these factors are recognized, but

difficult to assess. Inquiries were made of the aerosol pesticide manufacturers, reference materials were reviewed, and some calculations were made for specific situations in order to evaluate the environmental release of aerosol pesticides.

The deterioration rate of aerosol containers is unknown. The aerosol pesticide manufacturers said the containers could last on the shelf or in storage indefinitely, but what happens (and how quickly) to the containers in a landfill situation is unknown. It is assumed that the aerosol containers break open and/or deteriorate (rust) in landfills.

Review of reference books indicated that some of the pesticides degrade rather quickly (i.e. have short residual times). Pyrethrin is very unstable when exposed to light, moisture, and air; resmethrin and rotenone both decompose by light and air (Sittig, 1980). An aquatic reaction study found that 50% of the original amount of propoxur was found in the test water after 1 week and 5% after 8 weeks; a similar study on carbaryl found 90% remaining after 1 hour and 5% after 8 weeks; a similar study on carbaryl found 90% remaining after 1 hour and 5% remaining after 1 week (Verschueren, 1983). One diazinon study indicated 75-100 % disappearance from soils in 12 weeks (Verschueren, 1983). Another study indicated diazinon degradation (via hydrolysis) in soil at 11% per day (Guenzi, 1974). A degradation study on chlorpyrifos indicated 5% remaining in an organic soil medium after 8 weeks and 5% remaining in a sandy loam medium after 1 week. Except for the facts that fenvalerate is a photostable pyrethroid (Verschueren, 1983) and that resmethrin decomposes rather quickly when exposed to air and light (Sittig, 1980), no degradation information was found concerning the synthetic pyrethrins in products used by the PCOC. Organophosphates (e.g. chlorpyrifos, diazinon, dichlorvos) and carbamates (e.g. carbaryl, propoxur) both degrade fairly rapidly in soil (Guenzi, 1974). According to one pesticide manufacturer, the half-life of pyrethrin is 7 hours (Dimacopoulos, 1987).

Two modes of calculation were done to evaluate the environmental release of aerosol pesticides. First of all, calculated oral LD_{50}s were done for those products in which all ingredients and their respective weight percentages were known; the calculations were done pursuant to Section 66696 (c), Title 22, CAC. An attempt was made to group the products by principal active ingredient(s) and to compare the calculated oral LD_{50}s with the acute oral LD_{50} values obtained from toxicity tests done by EPA and manufacturers (see Table 2). Quite a few of the calculated oral LD_{50}s and acute oral LD_{50} values were greater than 5,000 mg/kg. Based solely on these values greater than 5,000 mg/kg and Section 66696 (a)(1), Title 22, CAC, these particular substances (primarily pyrethrin and pyrethroid products) would not be considered hazardous. Since some of the calculated oral LD_{50} values are not strongly supported by the actual toxicity tests done on the same products, this consideration is not valid. Table 2 does seem to indicate that the pyrethrin and pyrethroid products are of a lesser public health concern than the organophosphate and carbamate products. The

second mode of calculated evaluation is a "worst case scenario": assume all the residue is the pesticide with the lowest drinking water standard and it all goes into the groundwater, then determine what volume of water would be needed to keep the pesticide concentration below the drinking water standard and compare this amount with the annual rainfall in California. The calculations for this evaluation are shown in Tables 3A and 3B. The amount of water needed to keep the annual estimate of active ingredient residue below the drinking water standard was 0.005% of the annual rainfall in California. With this low percentage and the fact that the majority of the aerosol pesticide products are pyrethrins and pyrethroids, DHS considers groundwater contamination from these aerosol pesticide containers to be of minimal concern.

*After considering the chemical and biological degradation information, toxicity data, and "worst case scenario", DHS does not consider the environmental release of residue from the emptied aerosol pesticide containers to be of significant public health concern.

COMPARISON OF CONSUMER AND COMMERCIAL AEROSOL PESTICIDE PRODUCTS

All of the aerosol pesticide manufacturers state their products could be sold for home use, but they choose to sell to the commercial market (pest control operators and distributors) only. The manufacturers contend that the distributors could sell the aerosol pesticide products to the household consumer, without any restriction. According to the California Department of Food and Agriculture, the aerosol pesticide products used by PCOC are all registered for general use by the U.S. Environmental Protection Agency (EPA) and could be sold to consumers (Campbell, 1987). Investigations were carried out to compare the aerosol pesticide products used by PCOC with the aerosol pesticide products sold to consumers.

Five pest control supply stores in Sacramento were called to see what products could be sold for home use. Two businesses did not sell products to consumers, but would provide service. The other three stores sold ready-for-use and concentrate pesticides for liquid sprayers; only one sold a fogger and it was not one used by PCOC. One of the concentrate pesticides was the same product name that the manufacturer sells commercially in aerosol form; the concentrate pesticide was 23% diazinon whereas the aerosol formula is 1% diazinon.

A survey of 24 consumer aerosol pesticide products was done. Some of the active ingredients in these consumer products were not found in products used by PCOC and vice versa. All of the active ingredients in consumer and commercial aerosol pesticide products, plus their lowest and highest percentages, are listed in Table 4. The concentration of active ingredients in commercial products was often greater than the amounts of the same ingredients in consumer products. The Product Safety Department of Johnson & Son (manufacturer of Raid products) said the major inert ingredient is

water, but some of its pesticide products do contain 1,1,1-trichloroethane (Meyers, 1987). One of the aerosol pesticide manufacturers submitted formula data for a consumer fogger product: this product contains both methylene chloride and 1,1,1-trichloroethane.

There are federal labelling requirements for products, depending on toxicity and flammability characteristics. The labellings are "Caution", "Warning", and "Danger"; "Caution" is on the scale of lowest concern while "Danger" is of highest concern. "Caution" is the most common labelling. 3 out of the 24 surveyed consumer products have "Warning" labelling; none had "Danger" labelling. Labels from 25 commercial products were submitted: 9 with "Warning" and 3 with "Danger" labelling. The active ingredients of products with "Danger" labelling were acephate, sumithrin, and dichlorvos with propoxur. None of the surveyed consumer products contained acephate or sumithrin, but some did contain dichlorvos with propoxur. No clear distinction was found between the consumer and commercial products with respect to the "Caution", "Warning", and "Danger" labelling.

Since the aerosol pesticide products used by PCOC are all registered for general use and could be sold to consumers, it is puzzling to find such things as the fact that the concentration of active ingredients is often greater in commercial products. One aerosol pesticide manufacturer representative said consumer products are made less concentrated for 2 reasons: to ensure no overuse at time of application (reduced risk of exposure injury to consumer) and to support sales (consumer must buy more of the product to achieve desired kill results) (Crowder, 1987).

CONCLUSION

In making the decision to exempt the emptied aerosol pesticide containers from regulation as hazardous waste, DHS reviewed areas of public health concern and compared the commercial products with consumer products. There were areas of concern without any hard facts to use in the decision process; in these areas, DHS relied on professional judgement and hypothetical scenarios. Primarily because of 3 facts and 66300 (g) CAC 22, DHS decided to exempt the aerosol pesticide products used by pest control operators. The 3 facts are: (1) these products are registered for general use and could be sold to consumers, (2) these products are used in residences, and (3) these products represent a small portion of aerosol pesticide containers disposed in California.

TABLE 1

INGREDIENTS OF AEROSOL PESTICIDE PRODUCTS
USED BY PEST CONTROL OPERATORS
IN CALIFORNIA

ACTIVE INGREDIENTS:	chlorpyrifos (Dursban) butoxy polypropylene glycol carbaryl propoxur (Baygon) rotenone pyrethrum resmethrin dichlorvos (DDVP) N-octyl bicycloheptene dicarboximide (MGK 264) piperonyl butoxide diazinon fenvalerate acephate hyamine compounds pine oil boric acid
SOLVENTS:	methylene chloride 1,1,1-trichloroethane terpene alcohol (Terpineol 318) isopropyl alcohol tetrachloroethylene d-limonene oil
PROPELLANTS:	propane monochlorodifluoromethane dimethyl ether dichlorodifluoromethane trichloromonofluoromethane carbon dioxide

TABLE 2

A COMPARISON OF ORAL LD_{50} VALUES FOR
AEROSOL PESTICIDE PRODUCTS
USED BY PEST CONTROL OPERATORS IN CALIFORNIA

PESTICIDE GROUP[1]	ACTIVE INGREDIENTS	SOLVENTS/PROPELLANTS	DHS-CALCULATED[2] ORAL LD_{50} (mg/kg)	EPA TEST[4] ACUTE ORAL LD_{50} (mg/kg)	MANUFACTURER TEST ACUTE ORAL LD_{50} (mg/kg)
PYRETHRINS, SYNERGIZED	pyrethrins piperonyl butoxide MGK 264 Sumithrin butoxypolypropylene glycol Nyamine 1622 petroleum distillates rotenone	α-terpineol 1,1,1-trichloroethane methylene chloride isopropyl alcohol propane d-limonene oil	5,556		>5,000[6] 3,330[6]
PYRETHRINS WITH ROTENONE OR RESMETHRIN	pyrethrins rotenone/cube resins pine oil petroleum distillates	tetrachloroethylene trichloromonofluoromethane trichlorodifluoromethane methylene chloride	8,554[5a]	1,660[5a]	910[6]
FENVALERATE	fenvalerate piperonyl butoxide MGK 264	monochlorodifluoromethane dimethyl ether 1,1,1-trichloroethane methylene chloride propane	13,441 11,111 5,208[3] 5,181[5b]		>5,000[5b]
BORIC ACID	boric acid	Freon 22 1,1,1-trichloroethane	8,111[5c]		>5,000[5c,6]
CARBARYL	carbaryl rotenone/cube resins pyrethrins piperonyl butoxide butoxypolypropylene glycol	methylene chloride isopropyl alcohol propane petroleum distillates	6,211		
ACEPHATE	acephate	1,1,1-trichloroethane carbon dioxide methylene chloride	4,310 4,048[5d]		3,960[5d,6]
DIAZINON	diazinon	1,1,1-trichloroethane carbon dioxide methylene chloride propane water	30,030[5e] 3,937[5f]	>5,000[5f]	17,750[5e,6]
CHLORPYRIFOS	chlorpyrifos	1,1,1-trichloroethane carbon dioxide methylene chloride	3,650		3,980
DICHLORVOS AND DICHLORVOS/ PROPOXUR	dichlorvos propoxur	methylene chloride 1,1,1-trichloroethane propane	704 658[5g]		>50[5g]
PROPOXUR	propoxur	1,1,1-trichloroethane methylene chloride carbon dioxide	3,074		1,840

1. Grouping done by principal active ingredient(s)
2. References used include (Berg, 1984), (NIOSH, 1983), (Sax, 1984), and (Verschueren, 1983)
3. Consumer product
4. Emulsion concentrate
5. Same product as one with DHS-calculation (letter differentiates each product)

TABLE 3 A

ANNUAL ESTIMATE OF ACTIVE INGREDIENTS REMAINING IN EMPTIED CONTAINERS

	1985 sales (units)	Annual estimate of active ingredient residue (lbs)	Ratio of active ingredient residue to units sold in 1985
Manufacturer A	216,338	23	1×10^{-4}
Manufacturer B	9,444	8	8×10^{-4}
Manufacturer C	2,484	3	4×10^{-4}
Manufacturer D	400,000	320*	
	628,266 units	354 lbs	

* Calculation based on highest ratio of active ingredient residue to units sold by other manufacturers.

TABLE 3 B

COMPARISON OF ACTIVE INGREDIENT RESIDUE AND DRINKING WATER STANDARD WITH ANNUAL RAINFALL IN CALIFORNIA

	Drinking water standard for diazinon (ppb)*	Converted drinking water standard (lbs/gal)	Amount of water needed to dilute residue and meet drinking water standard (gal)	Converted dilution (acre-feet)	Per cent of annual rainfall+
Assuming half of residue (180 lbs) is diazinon	14	1.2×10^{-7}	1.5 Billion	4,600	0.002
Assuming all of residue (360 lbs) is diazinon	14	1.2×10^{-7}	3.0 Billion	9,200	0.005

* 1) Diazinon chosen as the pesticide with the lowest drinking water standard (Souther, 1987)

\+ 2) Annual rainfall, 193 million acre-feet, obtained from Department of Water Resources Bulletin 160-83 (Erlewine, 1987)

TABLE 4

COMPARISON OF CONSUMER AND COMMERCIAL AEROSOL PESTICIDE PRODUCTS

AMOUNT IN CONSUMER PRODUCTS		ACTIVE INGREDIENT*	AMOUNT IN COMMERCIAL PRODUCTS	
Lowest%	Highest%		Lowest %	Highest%
	18	N,N-Diethyl-m-toluamide (Deet)		
	12	dimethyl phthalate		
	1	Di-n-propyl isocinchomeronate		
	1	2-hydroxyethyl-n-octyl sulfide		
	0.03	methoprene (Precor)		
	0.24	2,3:4,5-Bis (2-butylene) tetrahydro-2-furaldehyde		
0.063	0.2	tetramethrin		
0.15	0.32	d-trans allethrin		
	12.6	permethrin		
0.17	1.67	N-octyl bicycloheptene dicarboximide (MGK264)	0.34	5.0
0.1	1	piperonyl butoxide	0.25	4.0
0.05	0.5	pyrethrum	0.05	1
0.09	0.5	resmethrin	0.53	1.07
0.5	1	propoxur (Baygon)	1	2
0.2	0.5	dichlorvos (DDVP)	6	7
	0.5	chlorpyrifos	0.5	1
	0.5	carbaryl		0.5
	4.5	silica gel		4
	0.48	fenvalerate	0.24	0.5
0.48	95.5	petroleum distillates	1.2	12.9
		butoxy polypropylene glycol	2.5	3.8
		diazinon		1
		rotenone	0.1	0.4
		acephate	1.0	3.0
		boric acid		20
		pine oil		2.8
		sumithrin		0.5
		hyamine compounds		0.1

* includes isomers

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