4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

4.1 PRODUCTION

Chlorfenvinphos was introduced into the United States in 1963 (Hayes 1982), by the Shell International Chemical Company Ltd., Ciba AG (now Ciba-Geigy AG), and by Allied Chemical Corporation (Worthing 1983). The Burroughs Wellcome Company produced several chlorfenvinphos-containing formulated products including Dermaton® dust, Dermaton® dip, Dermaton® II, and Dermaton® flea and tick collars (EPA 1978a, 1978b, 1979, 1982a, 1982b, 1983). Information on current production of chlorfenvinphos is conflicting. One source lists current base producers of the compound as American Cyanamid Company (under the trade names Birlane® and Supona®) and Ciba Ltd. (under the trade names Sapecron® and Steladone®) (Farm Chemicals Handbook 1993). However, no producers of chlorfenvinphos were identified in a recent Directory of Chemical Producers for the United States of America (SRI 1993).

Chlorfenvinphos is produced by reaction of triethyl phosphite with 2,2,2',4'-tetrachloroacetophenone (Worthing 1983). The technical grade material contains greater than 92% chlorfenvinphos as both the Z (trans) and E (cis) isomers in a ratio (Z:E) of 8.5:1 (Spencer 1982; Worthing 1983).

No information on historic production volumes was found; however, there are currently no registered uses for chlorfenvinphos in the United States (REFS 1995).

No information is available in the Toxics Release Inventory (TRI) database on total environmental releases of chlorfenvinphos from production facilities because chlorfenvinphos is not included under SARA, Title III (40 CFR 372.65), and, therefore, is not one of the toxic chemicals that facilities are required to report to the Toxics Release Inventory database (EPA 1995).

4.2 IMPORT/EXPORT

Chlorfenvinphos is not likely to be imported as there are currently no registered uses for this compound as a pesticide in the United States (REFS 1995). No definitive information on recent or historic import volumes was found.

Current production of chlorfenvinphos in the United States could not be verified (SRI 1993), but production for domestic consumption is not permitted as all registered uses in the United States were canceled in 1991 (REFS 1995). Production of pesticides for export whose registered uses in the United States have been cancelled is legal under U.S. law. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) generally prohibits the EPA from releasing complete information on pesticide production, sales, and distribution. In a recent report by the Foundation for the Advancement of Science and Education, the authors report that no government agency maintains current records concerning what specific pesticides are exported (FASE 1996). No definitive information on recent or historic export volumes was found.

4.3 USE

In the United States, chlorfenvinphos was registered for a variety of uses from 1963 until 1991 when all products containing chlorfenvinphos as an active ingredient were canceled (REFS 1995). Chlorfenvinphos was first registered in 1963 under the trade name Dermaton® as an insecticide/ acaricide dip for veterinary use in controlling fleas and ticks on domestic pets and other animals. During the mid-1960s and early 1970s, chlorfenvinphos was registered for additional uses as a residual fly spray, surface spray, and larvicide. As part of these registrations, chlorfenvinphos was used to control adult flies in dairy barns, milk rooms, poultry houses and yards, other animal buildings, feedlots, and animal holding pens; and to control larval flies in manure storage pits and piles, and in other refuse accumulation areas around dairies and feedlots (REFS 1995). Beginning in the early 1980s, it was registered for additional uses under the trade name Dermaton®, in a dust formulation for use in dog kennels and in dog collars for the control of fleas and ticks (Farm Chemicals Handbook 1984, 1993; Hayes 1982; REFS 1995).

Available formulations of chlorfenvinphos included a 0.5% dust, 10% pelletized granules, 21% emulsifiable concentrate, 24.5% emulsifiable concentrate, 25% wettable powder(WP), and 40% seed dressing (with 2% mercury compounds); however, some of these formulations were not registered for use in the United States (Hayes 1982; REFS 1995; Spencer 1982). A summary of the registered uses of chlorfenvinphos in the United States prior to the cancellation of its registration is given in Table 4-1 (REFS 1995).

Chlorfenvinphos was subject to re-registration by the Office of Pesticide Programs of EPA in the mid-1980s. At that time, the sole manufacturer, Shell International Chemical Company decided not to support reregistration and allowed its registration of both the technical compound 4072 and of a variety of formulated

Table 4-1. Previously Registered Uses of Chlorfenvinphos

Site	Pest	Dosage	Tolerance, Use, and Limitations
Dairy barns and milk rooms; indoor surfaces	Housefly (adults)	3.5 fl. oz. of 21.1% conc./gal. water (EC)	0.1 ppm (milk fat). Apply to surfaces such as walls, ceilings, partitions and stalls where flies congregate or rest. Apply as a coarse spray to thoroughly wet the surfaces—approximately one gallon of spray per 500-1,000 sq. ft. Remove livestock from barns before spraying. Cover feed and water containers. Remove all milking utensils and milk containers. Do not apply directly to livestock.
Poultry houses and yards	Housefly (adults)	4.0 fl. oz. of 21.1% conc./gal. water (EC)	0.005 ppm (eggs and fat of poultry). Apply as a coarse spray to surfaces inside and outside poultry houses such as ceilings, partitions, walls, posts and yards. Thoroughly wet surfaces—apply about one gallon of spray per 1,000 sq. ft. Do not apply directly to birds. Do not treat litter or surfaces with which poultry may come in contact.
Droppings (beneath caged birds or birds on wire); effluents from houses; manure storage pits and piles	Flies (larvae)	3.0-10 fl oz. of 21.1% conc./gal water (EC)	Apply as a coarse spray with pressure or by sprinkling at the rate of one gallon of spray per 100 sq. ft. Thorough coverage and penetration is essential. Increase volume of water if penetration is in doubt. Use higher dosage for initial cleaning or severe infestations. Repeat as needed. Do not apply directly to birds. Do not treat litter or surfaces with which poultry may come in contact. Do not contaminate feed or water containers.
Animal buildings other than dairy and poultry; feed lots and holding pens; indoor surfaces	Housefly (adults)	3.5 fl. oz. of 21.1% conc./gal. water (EC)	0.005 ppm (fat of goats, hogs, horses). Apply to surfaces such as walls, ceilings, partitions and stalls where flies congregate or rest. Apply as a coarse spray to thoroughly wet the surfaces—approximately one gallon of spray per 500-1,000 sq. ft. Remove livestock from barns before spraying. Cover feed and water containers. Do not apply directly to livestock.
Outdoor areas; manure and refuse accumulations (including those around dairies and feed lots)	Flies (larvae)	0.75-1.5 fl. oz. of 21.1% conc./ gal. water (EC)	Apply as a coarse spray with low pressure at a rate of one gallon of spray per 25 sq. ft. Thorough coverage and penetration is essential. Increase volume if penetration is in doubt. Use higher dosage for severe infestations. Repeat as needed. Do not apply directly to livestock. Do not contaminate feed or water containers.
Exterior surfaces	Fleas; housefly (adults); ticks	3.5 fl. oz. of 21.1% conc/gal. water (EC)	Apply to surfaces such as fence posts, walls and yards where insects congregate or rest. Apply as a coarse spray to thoroughly wet the surfaces—approximately one gallon of spray per 1,000 sq. ft. Do not apply directly to livestock. Do not contaminate feed or water containers.

Table 4-1. Previously Registered Uses of Chlorfenvinphos (continued)

Site	Pest	Dosage	Tolerance, Use, and Limitations
Humans; pets and other animals	Fleas; ticks	0.5 fl. oz. of 24.5% conc./ gal. water (ED)	For use by or on the order of licensed veterinarians only. Bathe or dip dog, making sure it is thoroughly wet. Repeat as needed, but not more often than once a week. Do not use diluted emulsion stored more than 30 days.
Dog kennels; yards	Fleas; ticks	2.5 fl. oz. of 24.5% conc./gal. water (EC)	Spray or sprinkle at a rate of 1 gallon of spray per 1,000 sq. ft. Be sure to treat hiding places such as cracks, around dogs bedding, and debris.
Dog kennels; yards	Housefly (adults)	3.5 fl. oz. of 21.1% conc./gal. water (EC)	Apply to surfaces such as walls, ceilings, and partitions where flies congregate or rest. Apply as a coarse spray to thoroughly wet the surfaces—approximately one gallon of spray per 1,000 sq. ft.

EC = effective concentration; ED = effective dose

products to lapse and be canceled (EPA 1994). A summary of chlorfenvinphos product registrations and their effective dates of cancellation are given in Table 4-2.

Outside the United States, chlorfenvinphos is registered for use under the trade names Birlane®, C8949, CGA 26351, Sapecron®, Steladone® and Supona® (Farm Chemicals Handbook 1993). Chlorfenvinphos (under the trade name Birlane®) is used as a soil insecticide for controlling root maggots, root worms, and cutworms (Farm Chemicals Handbook 1984; Spencer 1982; Worthing 1983). As a foliar insecticide, it controls Colorado beetles, *Leptinotarsa decemlineata* on potatoes, and scale insects on citrus, where it also exhibits ovicidal activity against mite eggs. It also controls stem borers on maize, rice, and sugarcane, and whiteflies (*Benusia* sp.) on cotton (Farm Chemicals Handbook 1984; Worthing 1983). Birlane® 24 controls root flies, phorid and sciarid fly larvae, fruit flies on maize and sweet corn, and wheat bulb flies in winter wheat. Birlane® 10% granules are used to control root flies and Birlane® Liquid Seed Treatment is used to control wheat bulb flies in winter wheat. Supona® is used to control ticks, flies, lice and mites on cattle; blowflies, lice ked, and itchmites on sheep; and fleas and ticks on dogs. Steladone® and Sapecron® are used as cattle dips or sprays to control ectoparasites on cattle (Farm Chemicals Handbook 1984; REFS 1995; Spencer 1982). Chlorfenvinphos is also used in public health applications for control of mosquito larvae (The Agrochemicals Handbook 1991).

No quantitative information on the volume of chlorfenvinphos use in the United States or on historic trends in use was found. It is known, however, that chlorfenvinphos was first introduced for use in the United States on October 3, 1963, and that the last EPA approved label date for a chlorfenvinphos-containing product was September 1986. Use is likely to have declined from 1986 until January 22, 1991, when all uses of the chemical were canceled in the United States (REFS 1995).

4.4 DISPOSAL

Chlorfenvinphos is considered to be an extremely hazardous substance (EPA 1988). The recommended disposal method for chlorfenvinphos consists of hydrolysis and subsequent transport to a landfill (IRPTC 1985). Chlorfenvinphos and chlorfenvinphos-containing wastes should be treated by alkali and then mixed with a portion of soil which is rich in organic matter before burial (at least to a depth of 0.5 meters) in a pit or in clay soil. For disposal of large quantities of chlorfenvinphos, incineration at high temperatures in a unit equipped with an effluent gas scrubbing device is recommended (IRPTC 1985). See Chapter 7 for further information on regulations and advisories.

Table 4-2. Chlorfenvinphos Product Registrations and Dates of Cancellation in the United States

Percent chlorfenvinfos	ID number	Product name	Initial registration date	Effective cancellation date
21.10	218-608	Arcadian Residual Fly Spray	09-29-66	02-21-86
21.10	59-144	Residual Surface Spray and Larvicide	03-25-66	02-21-86
21.10	59-173	Coopona Poultry Premise Larvicide	03-07-73	02-21-86
24.50	59-136	Dermaton® Dip	10-03-63	07 -01-87
92.00	201-209	Shell Technical Compound 4072, Insecticide for Manufacturing Purposes Only	12-13-66	10-10-89
92.00	31629-1	Technical Compound 4072 Insecticide (for Manufacturing Purposes Only)	06-07-74	10-10-89
00.50	59-189	Dermaton Dust	07-14-80	01-22-91
15.00	59-197	Dermaton Dog Collar	08-10-82	01-22-91
12.25	59-203	Dermaton III	05-15-84	01-22-91

Source: EPA 1994