

EPA PESTICIDE CANCELLATIONS/SUSPENSIONS:
A SURVEY OF ECONOMIC IMPACTS

Office of Pesticide Programs
U.S. Environmental Protection Agency
Washington, D.C. 20460
March, 1980

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INTRODUCTION AND SUMMARY

Pesticides are important to farmers, homeowners, industry and government agencies. They are used to control harmful insects, diseases, rodents, weeds, bacteria and other pests that attack man's food and fiber supplies and threaten his health and welfare. About 1.1 billion pounds of pesticides are used annually in the U.S., at a user cost of about \$5 billion. More than 30 thousand pesticide products containing 1,400 different active ingredients are registered with EPA for use against 21,500 pest species.

The purpose of this paper is to briefly summarize the approximate economic impacts of major pesticide cancellation/suspension actions taken by the Administrator since EPA was formed in December, 1970. There have been nine such actions announced and implemented to date: DDT Cancellation-1972; Aldrin/Dieldrin Suspension-1974; Chlordane/Heptachlor Cancellation/Suspension-1974/75; Mercury Cancellation-1976; Chlorobenzilate Cancellation-1979; DBCP Suspension/Cancellation - 1977/79; Endrin Cancellation-1979; Kepone Cancellation-1978; and 2,4,5-T/Silvex, Suspension-1979. Economic impacts are estimated on the basis of data at the time each of these actions was taken and any other data available since that time. Generally, the estimates are in terms of price levels for the mid to late 1970's in line with price levels at the times the various actions were taken.

Estimates of economic impacts (e.g., cost and market production/price effects) are made for each regulatory action for a typical year immediately after the regulatory action becomes fully effective, i.e., no leftover stocks. Long term estimates are also made for the entire anticipated period of impact. The long term estimates are straight line projections and assume that impacts would decline from the midpoint of the projected range in the initial short term annual impacts to negligible levels after 4 to 10 years. This method was adopted to reflect trends in such factors as: declining use of the problem chemicals due to emergence of pest resistance, development of substitutes (which takes about seven years from discovery) and improved use of pest control technology due to integrated pest management projects and applicator training.

The nine major pesticide cancellation/suspension actions announced and implemented by EPA since December 1970 have involved 12 of the 1,400 EPA registered active ingredient pesticides and about 80-95

million pounds of active ingredient used per year (7-8% of U.S. total). The total projected direct economic impact of these actions is about \$363 million (\$1.65/capita) over the period during which impacts are expected to occur (through about 1990).

The breakdown of the projected impacts for the individual regulatory actions is as follows:

<u>Action</u>	<u>Typical yr immed. after action</u> (Millions)	<u>No yrs. of impact</u>	<u>Overall U.S. impact</u>	
			<u>Total</u> (\$ Mil.)	<u>Per Capita</u> (\$)
DDT cancellation	\$8.25 - 21.9	7	\$52.76	\$0.24
Aldrin/Dieldrin - Chlordane/Heptachlor suspension/canc.	9.5 - 19.0	7	49.88	0.23
Mercury cancellation	1.1 - 10.8	4	11.90	0.05
Chlorobenzilate canc.	0.2	10	1.0	0.005
DBCP suspension/canc.	42.69 - 43.48	7	150.8	0.69
Kepone cancellation	0	0	0.00	0.00
Endrin cancellation	2.2	7	7.7	0.04
2,4,5-T/Silvex susp.	13.3 - 75.9	2	89.2	0.40
		Total	363.24	1.65

These impacts, while significant, are nominal compared with the overall cost of pollution abatement programs in the U.S., which has been estimated to be about \$500 billion over the ten year period 1978-87 (CEQ. 1979, Draft). This overall cost approaches \$2,300 per capita, compared with about \$1.65 per capita for major pesticides actions.

The intent of the above estimates is to approximate general magnitudes of impact. A high degree of precision is not possible because of the highly variable nature of pest infestations, economic conditions and limitations in data available for analysis. This paper does not attempt to rigorously address the significance of economic impacts on identifiable individual economic sectors or groupings of economic units, nor possible secondary impacts. Neither does it consider other economic impacts or costs of the overall pesticides program--on industry, users and consumers. It is merely an attempt to provide impact estimates of major actions in order to place them into economic perspective with those of other environmental programs and national economic parameters.

QUANTITIES OF ACTIVE INGREDIENT IMPACTED

EPA cancellation/suspensions have involved the annual use of about 80-95 million pounds of active pesticidal ingredients, or about 7 to 8 percent of the U.S. total (1.15 billion pounds). The approximate quantities of active ingredient use per year that have been cancelled/suspended in these actions, along with comparisons by type of pesticides, are as follows:

Table 1 Summary of Impact on Active Ingredients Resulting from Major EPA Cancellations/Suspensions

<u>Regulatory action</u>	<u>Cancelled/suspended use of active ingredient</u>	
	mill. lbs.	Percent ^{1/}
DDT cancellation	14 - 20	4 - 5
A/D cancellation	10 - 11	3
C/H cancellation	14 - 16	4
Chlorobenzilate cancellation	.1 - .2	.1
Endrin cancellation	.5 - .6	.1
Kepone cancellation	neg.	.1
DBCP susp/canc.	30 - 35	9
Total insecticide/nematicides	69 - 83	20 - 22
Mercury cancellation	0.35	.3
Total fungicides	0.35	.3
2,4,5-T/Silvex suspension	9 - 11	2
Total herbicides	9 - 11	2
Rodenticides (no major actions)	0	0
Total pesticides	80 - 95	7-8

More detailed data on the relative importance of cancelled uses are presented and discussed below.

^{1/} Percentages computed on basis of approximate total U.S. annual use in millions of pounds: insecticides/nematicides (350-400); fungicides (100-200); herbicides (500-600); and all pesticides (1,100-1,200).

ECONOMIC IMPACTS

DDT Cancellation

DDT, for many years one of the most widely used pesticides in the U.S., was cancelled for most of its remaining uses, effective January 1, 1973. DDT had been widely used since World War II, reaching a peak of nearly 80 million pounds per year in the late 1950's. By the early 1970's, its use had declined greatly—to 14-20 million pounds per year. Most U.S. production of DDT at that time was, and continues to be, for export. By 1972, DDT was the fourth ranking insecticide used in the U.S. in terms of pounds of active ingredient.

Detailed data on the use of DDT, and impacts of the regulatory action are presented in Figure 1. These data are summarized from a detailed retrospective review of the economic impacts of the Decision, as requested by the Congress (EPA, July 1975a).

Cotton, the major use of DDT prior to the cancellation, accounted for more than 80% of domestic DDT use. It was used on about one-sixth of U.S. cotton farms (one-fourth of cotton acreage) at the time of its cancellation. Its predominant use was in the Southeastern U.S., among the smaller-acreage cotton growers.

Costs of growing cotton were affected by the cancellation in two regions of the Southeastern U.S. In 1971/72, DDT was used on more than one-half (55 percent) of cotton acreage in the South Atlantic Region (Fla., Ga., S.C., N.C., Va., W.Va., and Md.) and on one-fifth of cotton acreage in the East South Central Region (Ark., La., Miss., Ala., Tenn., and Ky.).

Cost impacts of the cancellation were quite significant in the South Atlantic Region, the most affected area, as production costs increased by \$630 per farm on the average for 9,500 farms in 1973 and 1974. Cotton insecticide costs in this region were increased, due to the DDT cancellation, by \$6.22 per treated acre, over the 1971/72 average of \$15.54 per acre. Effects on insecticide costs in the East South Central Region were much less, only about \$.28 per treated acre (EPA, July 1975a). The cost impacts totalled \$7.75 million, nationally, equalling slightly more than \$1.00 per acre of cotton treated with insecticides (all types) or an increase in total cotton production costs of 0.5 percent (EPA, July 1975a).

Based on a linear programming analysis, (EPA, July 1975a) the impacts of the cancellation on cotton producers' costs are not projected to generate large regional or national effects in cropping patterns for cotton and other major agricultural crops. Thus, the major economic impact of the cancellation of DDT use on cotton was to increase production costs in the Southeastern U.S., causing cotton to

be somewhat less profitable for affected growers. Cotton production has been maintained adequately to meet market needs since the DDT cancellation, although yields may have been affected to some extent (EPA, July 1975b).

The cancellation of other crop uses of DDT has been of minor significance. DDT was used on less than 3 percent of the acreage of crops other than cotton which were contested in the DDT Hearings. The increased cost of shifting to alternative controls for these uses was estimated to be \$460,700 nationwide (EPA, July 1975a). Production and yields of these other crops have been maintained without the use of DDT.

Overall economic impacts of the DDT Decision are estimated to range from \$8.25 million to \$21.9 million, averaging \$15.07 million for a typical year immediately after cancellation and projected to decline linearly to negligible levels after about 7 years (Figure 1). Total impact over 7 years would be \$52.76 million ($\$15.07 \text{ million} \times 7/2$), equalling about 25 cents per capita.

FIGURE 1

ECONOMIC IMPACTS OF

DDT CANCELLATION

- A. REGULATORY ACTION: cancellation of remaining major uses of DDT (primarily cotton) and most minor uses, effective January 1, 1973.
- B. EXEMPTIONS: certain minor crop uses without substitutes (temporary, pending determination on availability of substitutes) and public health/quarantine uses by official government agencies. Forest use was not addressed in the DDT hearings—use phased out earlier by USDA.
- C. EXTENT OF DDT USE:
- Cotton: S.E. U.S., only; 17% of U.S. cotton farms; 25% of U.S. cotton acres; 20 and 60 percent of cotton farms in two S.E. U.S. regions, respectively (18,700 farms); 12-16 million lbs active ingredient/yr.
- Other agric. uses: primarily peanuts, soybeans, potatoes and other vegetables; 1-2 million lbs active ingredient/yr; less than 3% of U.S. acreage.
- Other uses: industrial, governmental, home and garden; 1-2 million lbs active ingredient/yr.
- Total cancelled uses: 14-20 million lbs/yr. (equalling 4 to 5 percent of total U.S. insecticide use).
- D. SUBSTITUTES generally available for all uses but often more expensive and may require more applications; yield effects are possible against some pests but not well documented; improved cultural practices, applicator training and integrated pest management programs minimize the need for chemical controls.

E. ECONOMIC IMPACTS:

Cotton:

cotton production costs increased \$7.75 million/yr. in 1973 and 1974 (an average of about \$400/farm in S.E. U.S.); also yield losses, although not clearly proven, are possible in the range of 0 to 4 percent on land where alternatives do not provide satisfactory performance (up to 31 million pounds, valued at \$12.4 million at 1973 prices). Probable range in annual economic impacts - \$7.75 million to \$20.15 million (initial years of impact).

Other agric. uses:

\$250,000 to \$1.0 million/yr.
(largely cost effects).

Non agric. uses:

\$250,000 to \$750,000/yr.

All cancelled uses:

total impact of \$8.25 to \$21.9 million per year during initial years, declining to negligible impacts after about seven years.

Aldrin/Dieldrin Suspension

and

Chlordane/Heptachlor Cancellation/Suspension

The Administrator of EPA suspended food and feed uses of aldrin and dieldrin in October 1974, after extended cancellation and suspension hearings. In November 1974, the Administrator of EPA announced his intent to cancel chlordane and heptachlor uses with the exception of ground insertion for termite control and the dipping of roots and tops of non-food plants. In July 1975, the Administrator announced his intent to suspend rather than cancel the same chlordane/heptachlor uses. In December 1975, the Administrator suspended most uses of the compounds, pending the outcome of the cancellation hearings (EPA, August 1976). In March, 1978 suspended uses of chlordane/heptachlor were cancelled, with a phase-out period in some instances. For example, seed treatment uses are to be phased out by July 1, 1983.

The full economic significance and impacts of the suspension of aldrin and dieldrin uses depends on whether chlordane/heptachlor is available as a replacement. For this reason, economic impacts of actions involving aldrin/dieldrin and chlordane/heptachlor are estimated jointly in this paper. Detailed data on the use of these compounds and the estimated impacts of regulatory actions have been prepared by EPA economists and others testifying in public hearings (Aspelin, September 1975 and EPA, August 1976). Figure 2 is a summary of the best available data and includes impact estimates for the years immediately following a fully effective regulatory actions as well as the entire projected impact period of 7 years. These estimates are solely those of the authors, based on all available data and analyses including those of others who may believe that alternative estimations are more appropriate.

Corn was the largest agricultural use of these four insecticides. Approximately 9.5 million pounds of active ingredient of aldrin and dieldrin were annually applied to 7 million corn acres (about 9.5% of the 1973/74 U.S. corn acreage). Chlordane and heptachlor were applied to 2 million corn acres in 1973/74 (about 1.5% of the domestic corn acreage).

Costs of meeting the domestic demand for corn and other major food/feed grains were estimated to increase by .06% or about \$6.4 million annually after the regulatory actions are fully implemented. In addition to the above costs, an increased inter-regional transportation cost of \$0.74 million was estimated for a typical year. The total cost impact to the corn sector for a typical year was estimated to be \$7.14 million immediately following the full implementation of the regulatory actions. In a typical year, the total cost impact could vary from \$5.0 to \$10.0 million.

All other agricultural uses of aldrin, dieldrin, chlordane, and heptachlor accounted for 3 to 4 million pounds of active ingredient. These uses were estimated to have annual production cost increases or yield losses ranging from \$1.5 to \$3.0 million.

The nonagricultural uses of these four insecticides accounted for 6 to 8 million pounds of active ingredient, which was mostly chlordane and heptachlor for termite control. The annual increase in pest control costs were estimated to range from \$3.0 to \$6.0 million.^{1/}

The overall economic impact associated with regulatory actions taken against aldrin, dieldrin, chlordane, and heptachlor were estimated to initially range from \$9.5 to \$19.0 million annually with a decline to negligible levels expected over a 7 year time period. The total economic impact over the 7 year period was estimated at \$49.88 million or about 24 cents per capita.

^{1/} Estimates of impact for other agricultural and nonagricultural uses were based on a sample of uses analyzed in detail plus extrapolations (for other uses evaluated in less detail) in proportion to the pounds of active ingredient involved in these uses.

FIGURE 2

ECONOMIC IMPACTS OF CANCELLATION/SUSPENSION
OF ALDRIN/DIELDRIN AND CHLORDANE/HEPTACHLOR

- A. REGULATORY ACTION: food and feed uses of aldrin/dieldrin (A/D) were suspended effective August 1974, as were similiar uses of chlordane/heptachlor (C/H), effective July 1975.
- B. EXEMPTIONS: structural termite uses were exempted from both actions; phase-out periods of use were authorized for several uses of C/H. The final phase-out dates range through July 1, 1983.
- C. EXTENT OF USE:
- Corn: A/D - 7 mil acres/yr (9.5% of U.S. corn acres); 9.5 mil lbs; C/H - 2 mil acres/yr (1.5% of U.S. corn acres); 3 to 6 mil lbs; 1973/74 data.
- Other agric. uses: 3 to 4 mil lbs/yr.
- Industrial/home garden & turf: 6 to 8 mil lbs/yr.
- All suspended uses: A/D - 10 to 11 mil lbs/yr (about 3% of U.S. insecticide use).
C/H - 14 to 16 mil lbs/yr (about 5% of U.S. insecticide use).
- Non-suspended uses: 6 to 8 mil lbs/yr - mostly C/H for termite use.
- D. SUBSTITUTES: there are registered substitutes for all major suspended/cancelled uses of A/D and C/H but usually are somewhat more expensive (up to 50 percent in many cases) and may need to be repeated more often due to lack of persistence

E. ECONOMIC IMPACTS:

the A/D and C/H suspension actions are evaluated in combination because the two sets of active ingredients have overlapping uses and are ready substitutes in many cases.

Corn:

costs of meeting domestic demand for corn and other major food/feed grain increased by 0.06% or \$6.4 mil/yr after action would be fully in effect (early 1980's); to these costs are added \$0.74 million per year in inter-regional transport costs giving total increase of \$7.14 mil/yr for a typical year; costs could be greater or less in an individual atypical year during the initial years of suspension/cancellation, e.g., from \$5.0 to \$10.0 million.

Other agric. uses:

increased costs and yield losses ranging from \$1.5 to \$3.0 mil/yr.

Non-agric uses:

increased costs of pest control ranging from \$3.0 to \$6.0 mil/yr.

All suspended uses:

total overall economic impact of \$9.5 to \$19.0 mil/yr, declining to negligible levels after a period of about 7 years. Total impact for 7 years is projected at \$49.88 million.

Mercury Cancellation

The Administrator of EPA cancelled several major uses (paint, turf, and seed treatments) and most minor uses of mercurial fungicides and bactericides in early 1976. Certain of these cancelled uses were reinstated later in the year after further review pursuant to requests by industry and user groups. Detailed data on the use and the estimated impacts of regulatory action taken against the mercurial fungicides and bactericides are presented in Figure 3.

In 1973, the largest cancelled use of mercurial pesticides was oil-base paint with 180,000 pounds of active ingredient. The cost impact associated with paint manufacturing ranged from 5.9 to 11.0 cents per gallon, which aggregated to a total annual impact ranging from \$2.65 to \$4.96 million for as many as 45.05 million gallons of oil-based paint affected by the cancellation. The wide range of the annual impact is related to mercurials used either at relatively low concentrations as in-can preservatives or at higher concentrations as mildewcides, as well as the cost of alternative pesticides used.

The annual use of mercurial fungicides on turf for control of summer diseases was about 43,600 pounds of active ingredient applied on approximately 8,125 golf courses. The annual cost increase associated with the maintenance of greens was estimated to range from \$650,000 to \$3,055,000. If this cost increase was totally passed on to 15.6 million golfers, the annual cost per golfer would increase within a range of 4.2 to 19.6 cents.

Mercurial seed treatments for fungal diseases were estimated to use 7,000 pounds of active ingredient annually. Annual regulatory cost increases were estimated to range from 7.1 to 38.8 cents per treated acre for 300,700 acres. The total annual impact was estimated to range from \$21,000 to \$117,000 or \$38.80 for a farm that treated 100 acres.

The use of mercurial pesticides for plastics and medical disinfectants was minor and regulatory cost increases would be negligible.

The overall annual economic impact associated with the cancelled uses of mercurial fungicides and bactericides was estimated to range from \$2.65 to \$4.96 million in the first two years following the regulatory action. The cost impact would increase to a range of \$3.30 to \$8.13 million following the imposition of the cancellation order on the use of mercurials for summer diseases of turf and seed treatments. The annual economic impact is expected to decline to negligible levels in about four years (totalling \$11.4 million, or about 5 cents per capita).

FIGURE 3

ECONOMIC IMPACTS OF
MERCURY CANCELLATION

- A. REGULATORY ACTION: cancellation of the following pesticide uses of mercury; as an in-can preservative and/or mildewcide for oil-based paints (effective February 17, 1976); for seed treatments and summer diseases of turf after August 31, 1978, or following the production of two years supply of these products (based on recent production data) whichever occurs first; all uses of mercury in plastics and as medical disinfectants.
- B. EXEMPTIONS: water-based paints, winter diseases of turf, textiles and fabrics for outdoor use, control of brown mold on freshly sawn lumber and Dutch elm disease.
- C. EXTENT OF USE:
- | | |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <u>Oil-based paint:</u> | 180,000 pounds active ingredient mercurials were used in as many as 45.05 million gallons of paint/year (1973). |
| <u>Turf, esp. golf courses for summer diseases:</u> | 43,600 pounds active ingredient mercurial fungicides were used on about 8,125 golf courses/year 1973. |
| <u>Seed treatment:</u> | 7,000 pounds active ingredient used to protect various seeds from fungi. |
- D. SUBSTITUTES: data presented in the mercury hearings, indicated that a number of effective alternatives were available for most applications in which mercury pesticides have been used. For oil-based paint, mercury alternatives provide an adequate level of control at an increased cost ranging from 5.9¢ to 11.0¢

per gallon, depending upon the mercury substitute used. For turf the efficacy of nonmercurials (equal or superior to mercury compounds) has been indicated in the control of summer turf diseases, but are generally more expensive to use (\$400 for the season per course). For seed treatments, the cost differential of nonmercurial over the mercurial compounds is slight, ranging from 7.1¢ to 38.8¢ per acre.

E. ECONOMIC IMPACTS:

Oil-based paint:

cost increases of 5.9¢ to 11.0¢ per gallon in as many as 45.05 million gallons; equivalent to an aggregate increase ranging from \$2.65 to \$4.96 million/year, depending upon the number of gallons treated and the alternative pesticide used.

Summer turf:

cost increase for control of summer disease of turf - 8,125 golf courses ranging from \$650,000 to \$3,055,000/year (4.2¢ to 19.6¢ more/year for 15.6 million golfers), after August 31, 1978, or after the production of two years supply of mercurial turf fungicides.

Seed treatment:

cost increase of 7.1¢ to 38.8¢ per acre on 300,700 acres, totalling \$21,000 to \$117,000 (\$7.10 to \$38.80 per farm on a farm with 100 acres treated).

Other uses:

the use of mercury compounds in other pesticidal applications (plastics and medical disinfectants) is minor. Substitutes are available which have been used for years. Cancellation of other uses would have no measureable impact either on firms or on medical practice.

All cancelled uses:

total impact of \$2.65 to \$4.96 million/year during the first two years of cancellation, increasing to \$3.30 to \$8.1 million/year following the imposition of cancellation upon summer turf disease uses (after August 31, 1978, or after two years' volume of production of mercurial turf fungicides). Impacts are expected to be negligible four years after effective cancellation.

Kepone Cancellation

The Administrator of EPA cancelled all registrations of products containing Kepone, effective May 1, 1978. Kepone use at the time of notice of cancellation was limited to the stock on hand of certain formulated products. The manufacturer of Kepone had previously ceased production and requested a voluntary cancellation of all Kepone registrations with the use of remaining stocks to be allowed. A review of the impacts of the cancellation action found that numerous substitute products were available at comparable costs to Kepone products. No economic impacts were thus expected as a result of this cancellation action. Figure 4 summarizes the regulatory action taken on products containing Kepone.

FIGURE 4

ECONOMIC IMPACTS OF
KEPONE CANCELLATION

- A. REGULATORY ACTION: cancellation of all registered products containing Kepone, effective May 1, 1978.
- B. EXEMPTIONS: use of existing stocks of all inaccessible products was permitted until such stocks are exhausted.
- C. EXTENT OF USE:
- Domestic Dwellings: approximately 1,000 lbs active ingredient remained when Allied Chemical Corp. ceased production with a request for voluntary cancellation provided use of existing stocks was permitted. A portion of the quantity in accessible devices was not allowed to be sold.
- D. SUBSTITUTES: numerous substitutes are available to replace Kepone. Substitutes are comparable or better in control and many have lower costs.
- E. ECONOMIC IMPACTS: None

Chlorobenzilate Cancellation

In February 1979, the Administrator of EPA announced the intent to cancel all non-citrus uses of the miticide, chlorobenzilate. Figure 5 summarizes the regulatory action on products containing chlorobenzilate. The sites to be cancelled included primarily cotton, fruits, nuts, melons, and turf grass. The cancelled uses accounted for about 120,000 pounds active ingredient out of the approximate total of 1.1 million pounds active ingredient of chlorobenzilate used annually. The remaining 1.0 million pounds active ingredient on non-cancelled uses are applied to citrus crops in Florida, California, Texas, and Arizona.

All cancelled uses of chlorobenzilate have registered available alternative chemical controls. The use of these alternative chemicals is anticipated to maintain yield or mite control at the current levels. Production costs of some commodities may increase somewhat where alternatives are more costly to use. The total cost increase is expected to be less than \$200,000 per year for all sites on which chlorobenzilate was cancelled. The cost increase effect is expected to decline to negligible levels over a 10 year span as new chemicals are developed for those uses. Economic impacts are not expected to be evident beyond the producer level because of the relatively minor extent of chlorobenzilate usage on the cancelled sites.

FIGURE 5

ECONOMIC IMPACT OF

CHLOROBENZILATE CANCELLATION

A. REGULATORY ACTION: cancellation of registrations of chlorobenzilate for all uses other than citrus.

B. EXEMPTIONS: registrations for citrus with modifications of terms or conditions of registration.

C. EXTENT OF CHLOROBENZILATE USE:

Other uses: primarily cotton, fruits, nuts, melons, and turf grasses; about 120,000 lbs active ingredient applied over 24,000 acres.

Total cancelled uses: 120,000 lbs active ingredient

Total non-cancelled uses: about 1.0 million lbs active ingredient used on citrus.

D. SUBSTITUTES: all cancelled uses have available alternatives with no yield changes anticipated. Changing to alternatives may increase production costs of individual commodities slightly.

E. ECONOMIC IMPACTS:

Other uses: less than \$200,000/yr in increased cost of production.

All cancelled uses: less than \$200,000/yr.

Endrin Cancellation

In July 1979, the Administrator of EPA announced the intent to cancel registrations for use of the insecticide endrin on several sites. Figure 6 summarizes the regulatory actions announced and their expected impacts. These sites included cotton east of Interstate Highway #35; use on small grain except for control of army cutworm, pale western cutworm, and grasshoppers; use in apple orchards in Eastern states to control meadow voles; use on sugarcane to control the sugarcane borer; and use on ornamentals. All other uses of endrin were continued with modifications to application instructions designed to minimize human and environmental exposure.

The cancelled uses of endrin totaled about 600,000 pounds of active ingredient on an annual basis. The non-cancelled uses account for about 300,000 pounds active ingredient annually. The cancelled uses comprise about 0.2% of current insecticide use in the United States.

The cancelled uses of endrin generally have alternative chemicals available for use. Some increases in production costs for cotton and small grains are expected since some alternatives to endrin are higher in cost. The increases in production costs are \$1.0 million and \$1.2 million annually for cotton and small grains respectively. The development of new chemicals and the possibility of resistance to endrin on the part of some pests leads to the assumption that the effect of the cancellation on production costs would decline to negligible levels over a seven year period from the effective date of cancellation. The total impact would thus be about \$7.7 million. Economic impacts are not expected to be evident beyond the user level.

FIGURE 6
ECONOMIC IMPACT OF
ENDRIN CANCELLATION

- A. REGULATORY ACTION: cancellation of the use on cotton in all areas east of Interstate Highway #35; use on small grains to control all pests other than army cutworm, the pale western cutworm, and grasshoppers; use on apple orchards in Eastern states to control meadow voles; use on sugarcane to control sugarcane borer, and use on ornamentals.
- B. EXEMPTIONS: remaining uses with modifications to terms and conditions of registrations including: use on cotton west of Interstate Highway #35; use on small grains to control army cutworms and pale western cutworms; use on apple orchards in Eastern state to control pine vole and in Western states to control meadow vole; use on sugarcane to control sugarcane beetle; use for conifer seed treatment, and use in enclosed bird perch treatments.
- C. EXTENT OF ENDRIN USE:
- Cotton: about 600,000 lbs. active ingredient, primarily in combination with methyl parathion, largely east of Interstate #35
- Small grain: cancelled uses on small grains, total about 1,500 lbs. active ingredient.
- Apple orchards: cancelled uses will have no appreciable impact on endrin use on this site.
- Other uses: all other cancelled uses would total less than 1,000 lbs. active ingredient.
- Total cancelled uses: slightly more than 600,000 pounds active ingredient.
- Total non-cancelled uses: about 300,000 lbs. active ingredient on small grains and about 1,500 lbs. active ingredient for other uses including forest seed treatment and bird control.

D. SUBSTITUTES:

alternatives are generally available for significant cancelled uses of endrin.

E. ECONOMIC IMPACTS:

Cotton:

the cancelled uses on cotton will have small impacts on growers with an expected impact of \$2.0 million increase in production costs.

Small grains:

cancelled uses on wheat will cause negligible increase in production costs as a result of switching to higher cost alternatives.

Apple orchard use

the cancelled uses on apple orchards will result in no expected losses and negligible cost increases.

Other uses:

no expected impacts for other cancelled uses.

All cancelled uses:

total impact of up to \$2.2 million during initial years, declining to negligible levels after about seven years.

DBCP Suspension and Cancellation

From September 1977 through October 1979, several notices of intent and orders of cancellation and suspension were issued concerning the nematocide DBCP. The culmination of this series of notices and orders is that all uses of DBCP except for pineapples in Hawaii have been suspended and all uses are subject to pending cancellation. Figure 7 summarizes these regulatory actions and their anticipated economic impacts.

Prior to EPA actions, approximately 32.7 million pounds active ingredient of DBCP were applied annually to several crops including soybeans, almonds, vegetables, vineyards, peanuts, cotton, peaches, pineapple and citrus. DBCP uses accounted for about 9% of all insecticide/nematocide pesticides used annually in the United States.

Pending final outcome of cancellation proceedings, EPA has estimated the economic impact of EPA suspension and cancellation actions to be about \$43 million. This figure does not include impacts in California (other than certain vegetable uses), which suspended all uses of DBCP in 1977. This estimate reflects revisions of certain impact estimates presented in the suspension hearing during 1979 (soybeans estimates were revised to reflect a realistic pattern of usage similar to that which occurred in cotton from 1977 to 1979; soybean and certain vegetable treatment cost data were revised to improve consistency with analyses of the other uses).

FIGURE 7

ECONOMIC IMPACT OF

DBCP SUSPENSION/CANCELLATION

- A. REGULATORY ACTIONS: began Sept. 1977 with notice to suspend and conditionally cancel some uses of DBCP. Actions continued through July 1979, when notice of intent to suspend all uses was issued.
 Oct. 1979 : Suspension of all uses not suspended in Nov '77: cotton; soybeans; citrus; grapes; pineapples (except Hawaii); peaches; nectarines; plums; almonds; commercial okra; lima beans, snap beans, and southern peas; berries (black, blue, logan, dew, boysen, raspberry); strawberry nursery stock; apricots; cherries, figs; walnuts; bananas; turf; ornamentals. also: Notice of intent to unconditionally cancel DBCP.
- B. EXEMPTIONS: all uses except pineapple (HI) now suspended; all uses subject to cancellation notice.
- C. EXTENT OF USE: Prior to EPA actions:
lbs. a.i. applied/yr (1,000)
- | | |
|---------------------------------------------|---------------|
| <u>field crops:</u> | 18,272 |
| <u>fruit/nuts</u> | 9,732 |
| <u>vegetables:</u> | 3,392 |
| <u>other:</u> | <u>1,079</u> |
| <u>total suspended/
cancelled uses:</u> | 32,475 |
| <u>pineapple:</u> | <u>225</u> |
| <u>all uses:</u> | <u>32,700</u> |
- D. SUBSTITUTES:
- | | |
|---------------------|----------------------------------------------------------------------------------------------|
| <u>field crops:</u> | D-D, EDB, dichloropropene, carbofuran
fensulfothion, ethoprop, fenamiphos |
| <u>fruits/nuts:</u> | preplant: D-D, EDB, dichloropropene
postplant: none for bearing trees,
bushes or vines |
| <u>vegetables</u> | D-D, EDB, dichloropropene, Vorlex |

turf ornamentals: diazinon, fensulfothion, EDB, methyl
bromide, dichloropropene

home garden: none postplant

pineapple: EDB

E. ECONOMIC IMPACTS: Effects due to EPA suspensions/
cancellations (millions):

<u>field crops:</u>	\$23.09-23.48
<u>fruits/nuts:</u>	3.81- 4.21
<u>vegetables:</u>	14.09
<u>other:</u>	1.7
<u>total suspended uses:</u>	\$42.69-43.48

2,4,5-T and Silvex Suspension

On February 28, 1979, the forestry, rights-of-way and pasture uses of both 2,4,5-T and silvex were suspended. At the same time several other uses of silvex were also suspended, viz., home and garden, commercial/ornamental turf, and aquatic weed control/ditch bank. The suspension will remain in effect until a final decision regarding cancellation is reached, approximately two years after the suspension. Some uses were not suspended but the risks and benefits associated with these uses will also be evaluated during the cancellation hearings. Figure 8 summarizes the regulatory action and its estimated impacts.

The economic impacts of suspending 2,4,5-T and silvex are generally limited to increased control costs, although some yield reductions may occur in the forestry industry. The projected impact for all uses is approximately \$90 million for the two-year suspension period. Forestry will realize estimated impacts of \$46-\$56 million during this two-year period. Rights-of-way impacts are estimated to range from \$2.6-\$67.8 million for two years and average about \$35 million, while pasture impacts are estimated at \$5 million for two years. Minor increases in control costs may occur for other uses of silvex, but these costs have not been estimated.

FIGURE 8

ECONOMIC IMPACTS OF

2,4,5-T AND SILVEX SUSPENSION

- A. REGULATORY ACTION: suspension of forestry, rights-of-way and pasture uses of both 2,4,5-T and silvex; additionally, suspension of home and garden, commercial/ornamental turf, and aquatic weed control/ditch bank uses of silvex, effective February 28, 1979 until a final decision regarding cancellation is reached.
- B. EXEMPTIONS: rice, range, and non-crop uses of 2,4,5-T and silvex; additionally, sugarcane and orchard uses of silvex; to be included in FIFRA section 6(b)(2) cancellation hearings.
- C. EXTENT OF USE:
- Forestry: used in conifer production primarily in South and Pacific Coast regions; 0.23% commercial forest acres treated annually with 2,4,5-T; 2.6 million lbs. active ingredient 2,4,5-T/yr.; less than 1,000 lbs. active ingredient silvex/year since 1977.
- Rights-of-way: Eastern and Northwestern U.S. primarily; percent acres treated with 2,4,5-T: electric - 9.4%, railroad - 6.6% pipeline - 4%, highway - 0.8%; minimal silvex usage - less than 2% of R-O-W firms; 3.8 million lbs. active ingredient 2,4,5-T/yr.; negligible quantity of silvex.
- Pasture: primarily South Central U.S.; 1% of total U.S. pasture acreage treated with 2,4,5-T; less treated with silvex; 500,000 lbs. active ingredient 2,4,5-T/yr.
- Other silvex uses: home and garden, commercial/ornamental turf, aquatic weed control/ditch bank; 2-3 million lbs. active ingredient silvex/yr.
- Total suspended uses: seven million lbs. active ingredient 2,4,5-T/yr.; 3 million lbs. active ingredient silvex/yr.

D. SUBSTITUTES:

generally available for rights-of-way, pasture, home and garden, commercial/ornamental turf, forestry site preparation and some aquatic uses at comparable or slightly higher cost; few available for forestry release and other aquatic uses.

E. ECONOMIC IMPACTS:

Forestry:

control cost and yield impacts from 2,4,5-T suspension — \$10-\$17 million in first year, \$36-\$39 million in second year; negligible impacts from silvex suspension.

Rights-of-way:

increased treatment cost of \$1.3 million annually or, if treatment cycle is shortened from four to three years, increased cost of \$33.9 million/yr. (less than 0.1% of total operating expenditures); negligible impact from silvex suspension.

Pasture:

\$2-\$3 million annually from 2,4,5-T suspension (increased costs); unmeasured but small from silvex suspension.

Other silvex uses:

no quantitative estimates; probably minor increase in control costs.

All suspended uses:

impact of \$13.3-\$75.9 million/yr. from 2,4,5-T suspension; negligible impacts from silvex suspension.

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