SUPPLEMENT TO ECONOMIC EVALUATION OF THE APPROPRIATENESS OF A SEVEN-YEAR COMPENSATION PERIOD FOR USE OF DATA TO REGISTER PESTICIDES

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INTRODUCTION AND SUMMARY

The purpose of this paper is to supplement the paper titled, "Economic Evaluation of the Appropriateness of a Seven Year Compensation Period for Use of Data to Register Pesticides", with information about pesticide industry health, the effects of regulatory actions, and the relationships between patent protection and compensation.

It is concluded that the pesticide industry is quite healthy with increasing production, sales and R&D expenditures, despite fears in some quarters that EPA regulatory actions would severely hamper the industry. It was found that EPA actions have affected no more than 5 percent of industry production. Economically, these actions are estimated to have a total impact of 54 cents per person, which compares quite favorably with the estimated cost of $1,000 per person for all pollution abatement programs in the U.S.

Not only have EPA actions not had major negative impacts on the pesticides industry, it is likely that they have had positive impacts. When a pesticide is cancelled or suspended, a void is created in the marketplace which increases the potential market for environmentally sound pesticides capable of filling the void.

For newly patented chemicals, the 17-year patent period overlaps the 7-year compensation period being proposed in S. 1678. Patent protection provides better opportunity to the firm to recover R&D costs, thereby making compensation somewhat superfluous for patented products.

However, compensation may be important for non-proprietary products. Firms may find it too risky to undertake expenditures to develop data support of registration if competing firms will have immediate, free access to the data for use in supporting their own registration.

HEALTH OF PESTICIDE INDUSTRY

While some people fear that EPA regulatory actions will damage the health of the pesticides industry, the evidence does not support this fear. Since 1972, when the first EPA regulatory action took effect, the industry has continued to increase production, sales (Table 1) and research and development (R&D) expenditures (Table 2).

With the possible exception of 1975, when preliminary estimates of sales volume were down slightly, both sales quantities and value increased each year since 1972. This is true even when the effects of inflation are accounted for and values are deflated to 1972 dollars.

Table 1

Synthetic Organic Pesticides: U.S. Production and Sales, 1972-1975[1/]

Year	Production			Sales (domestic and export)		
	Quantity (bil. lbs)	Nominal Value[2/] ($ bil.)	Value in 1972 Dollars[3/] ($ bil.)	Quantity (bil. lbs)	Nominal Value[2/] ($ bil.)	Value in 1972 Dollars[3/] ($ bil.)
1972	1.16	1.34	1.34	1.02	1.09	1.09
1973	1.29	1.50	1.33	1.20	1.34	1.18
1974[4/]	1.42	1.98	1.47	1.37	1.82	1.35
1975[4/]	1.61	2.92	1.99	1.32	2.36	1.61

1/ Includes a small quantity of soil conditioners
2/ Value of production: calculated (unit value x quantity); sales value: as reported by the U.S. International Trade Commission
3/ Calculated using Wholesale Price Index, all commodities
4/ Preliminary

Source: ASCS, USDA, The Pesticide Review, 1976
U.S. Bureau of the Census, Statistical Abstract of the United States: 1975
U.S. Bureau of Economic Analysis, Survey of Current Business, June 1977

R&D expenditures have also been increasing in recent years. The best information on pesticide R&D expenditures available are reported by the National Agricultural Chemicals Association (NACA) in its periodic industry profile studies. One must use care in comparing these expenditures through time since they are a non-random representation of industry R&D expenditures. However, it is believed that these expenditures represent a major portion of R&D expenditures and are reasonably representative of the total R&D expenditures each year.

An examination of the figures in Table 2 shows that average R&D expenditure per respondent firm remained relatively steady at $2.7 million from 1972 to 1974, but over the whole period from 1971 to 1976, trended upwards. These

figures are expressed in 1972 constant dollars. If they were expressed in nominal dollars, the rate of increase would appear to be much sharper. Thus, not only were firms increasing nominal R&D expenditures, they were also increasing the expenditures in real terms.

Table 2

Research and Development Expenditures
for Firms Reporting, 1971-1976

	Year					
	1971	1972	1973	1974	1975	1976
Total R&D expenditure ($ million)	87.7	98.5	110.7	134.8	160.5	195.2
Total R&D Expenditure[1/] ($ million)	91.7	98.5	97.9	100.3	109.3	127.1
Number of Companies Reporting	36	36	36	37	37	33
Average R&D Expenditure[1/] ($ million)	2.5	2.7	2.7	2.7	3.0	3.9

[1/] Expressed in constant 1972 dollars

Source: National Agricultural Chemicals Association, "1975 Industry Profile Study"
National Agricultural Chemcials Association, "1976 Industry Profile Study"

These findings support the following conclusion from a recent study, "the chemical pesticide industry has been healthy and profitable, and many major companies...are maintaining or increasing their investments in R&D and new plants, and are expected to continue their efforts to commercially develop new chemical pesticides...[SRI, 1977]". This despite not only EPA cancellation/ suspension actions, but also factors such as the energy crisis, new effluent guidelines, new EPA registration requirements, inflation, and lagging economic activity.

There has been a shift from an R&D emphasis on insecticides to an emphasis on herbicides in the pesticides industry coinciding with the sales growth in herbicides. This is especially true for firms which were only marginally effective in developing insecticides. "Companies have had less success in developing insecticides [recently] because new functional groups possessing insecticidal activity have been generally exhausted in the search for new compounds. Additionally, the market for insecticides has been around a longer time and is saturated with inexpensive, non-proprietary compounds which make the cost of producing insecticides a very important factor and one which tends to eliminate compounds early in the development process [EPA-540/9-75-018, 1975]."

While insecticide R&D was facing these difficulties, herbicide production was growing rapidly and attracting R&D effort. U.S. herbicide production grew rapidly during the 1960's, dropped sharply in 1969 to 393 million pounds, then grew slowly until 1973, and spurted to 788 million pounds in 1975 (Table 3). From 1960 to 1968 the average annual rate of growth was 21 percent. This slowed to an average annual rate of growth of 2 percent from 1968-1973, reflecting the almost 80 million pound decline in production from 1968 to 1969, and then grew at an average rate of 26 percent from 1973 to 1975. For comparison, insecticides have grown at a maximum average annual rate of 6 percent, from 1960 to 1968, and fungicides have grown at a maximum 2 percent rate, from 1968 to 1973.

Since herbicide markets tend to be larger and longer lived than insecticide markets, the effect of this shift has been to make small changes in R&D expenditures of less consequence than ever.

Table 3

U.S. Pesticide Production
by Classes, 1960-1975

Year	Class		
	Herbicide (million pounds)	Insecticide (million pounds)	Fungicide (million pounds)
1960	103	366	180
1961	121	411	168
1962	151	461	118
1963	175	478	111
1964	226	444	113
1965	263	490	124
1966	324	552	137
1967	409	496	144
1968	469	569	154
1969	393	571	141
1970	404	490	140
1971	429	558	149
1972	451	564	143
1973	496	639	154
1974	604	650	163
1975[1/]	788	666	155
Annual growth (percent)			
1960 - 1968	21	6	-1
1968 - 1973	2	3	2
1973 - 1975	26	2	<1

[1/] Preliminary

Source: A.D. Little, Inc., Economic Analysis of Interim Final Effluent Guidelines for the Pesticides and Agricultural Chemicals Industry--Group II, EPA-230/1-76-065f, September 1976.

A.S.C.S., USDA, The Pesticide Review, 1976

EPA Calculations

EFFECTS OF PESTICIDE CANCELLATIONS/SUSPENSIONS

Since EPA's inception in December of 1970, four major pesticide cancellation/suspension actions have been taken by EPA. The four actions are: DDT cancellation - 1972, aldrin/dieldrin suspension - 1974, chlordane/heptachlor suspension - 1975, mercury cancellation - 1976. "These actions have involved 6 of the 1,400 registered active ingredients in pesticides, about 70 million pounds of active ingredient used per year...and have generated projected total economic impacts of about $114 million...[Aspelin, Gaede, and Luttner, 1977]." These impacts do not include certain minor/voluntary actions to take pesticides off the market.

Annually in the U.S., approximately 1 billion pounds of pesticides are used. Active ingredients involved in EPA cancellations/suspensions represent use of 38-47 million pounds annually or 3.8 to 4.7 percent of the total use. The impact on use by individual chemical and type of pesticide is presented in Table 4. These figures show that the largest impact on use to date has been on the insecticides sector of the pesticide industry.

Table 4

Annual Quantities of Active Ingredient
Use Which Were Cancelled/Suspended by EPA Regulatory Actions

Regulatory Action	Cancelled/Suspended Use of Active Ingredient	
	(million lbs)	(% of U.S.)[1/]
DDT cancellation	14 - 20	4.7 - 6.7
A/D cancellation/suspension	10 - 11	3.3 - 3.7
C/H suspension	14 - 16	4.7 - 5.3
Total insecticides	38 - 47	12.7 -15.7
Mercury cancellation	0.23	0.12
Herbicides (No major actions)[2/]	0	0
Rodenticides (No major actions)[2/]	0	0
Total pesticides	38.23-47.23	3.8 - 4.7

1/ Percentages are based on the approximate total U.S. annual use in millions of pounds: insecticides (300); fungicides (190); herbicides (500); rodenticides (10); all pesticides (1,000).

2/ Regulatory actions initiated on 2,4,5-T; certain rodenticides; have not been concluded.

Source: Aspelin, A.A., Gaede, H.W., Jr., and Luttner, M.A. "EPA Pesticide Cancellation/Suspensions: An Estimate of Overall Ecomomic Impacts", February 1977

The impacts of cancellations and suspensions are expected to occur over a period of years after the action is taken. During this time period, the total direct economic impact for all four EPA actions was estimated to be $114 million, equivalent to 54¢ per capita. A summary of the individual actions is presented in Table 5.

Table 5

Economic Impacts of Four EPA
Regulatory Actions

Regulatory Action	Typical Year Immediately After Action ($ millions)	Number of Years of Impact	Overall U.S. Impact 1/	
			Total ($ mil)	Per Capita ($)
DDT cancellation	8.25-21.9	7	52.76	0.25
Aldrin/dieldrin - chlordane/heptachlor suspension	9.5 -19.0	7	49.88	0.24
Mercury cancellation	3.3 - 8.01	4	11.31	0.05
		TOTAL	113.95	0.54

1/ 1973/75 prices

Source: Aspelin, A.A., Gaede, H.W., Jr., and Luttner, M.A., "EPA Pesticide Cancellation/Suspensions: An Estimate of Overall Economic Impacts", February 1977

While these impacts are significant, they appear nominal when compared with the cost of pollution abatement programs in the U.S. These programs are estimated by the Council on Environmental Quality to cost $200 billion from 1974 to 1983, [CEQ, 1974]. On a per capita basis, this total pollution abatement cost approaches $1,000, as compared with the 54¢ per capita for EPA regulatory actions.

Oftentimes, voids left in the marketplace by EPA regulatory actions are viewed solely as a loss. Actually, a cancellation or suspension can have a strong positive impact, as the void will need to be filled by some other pesticide,

one which is more environmentally sound. Consequently, a cancellation or suspension action both removes environmentally damaging pesticides from the market and at the same time encourages introduction and/or market growth of more desirable pesticides.

PATENTS AND COMPENSATION

The significance of a compensation period varies, depending on whether or not the pesticide is patented and, if patented, whether the compensation period ends within the patent period. A patent, with its exclusive production and marketing rights, is a more powerful means for a firm to recover R&D costs than is mandatory compensation for use of registration data. Therefore, if the compensation period falls within the patent period, as it does for newly patented products, there is little value in discussing the reasonableness of a compensation period.

Firms developing new chemicals usually apply for patents early in the R&D process to protect themselves against loss of commercial rights to the chemical through independent development and patent acquisition by another firm. The patent "provides that during the 17-year period commencing with the issuance of the patents, no one other than the patent's owner can 'practice' the invention without the owner's permission. The owner may license others to practice the invention", but has no motive to do so unless he receives compensation sufficient to improve profitability over what could be obtained by retaining exclusive production and distribution rights [Senate Report No. 95-334, 1977].

During the patent period, the patent-holding firm will have better protection and opportunity to recover R&D costs than during the 7-year compensation period. With patent protection, the firm has the option of refusing permission to a competitor to produce and market the chemical or setting a high price on such permission, high enough to more than recover R&D costs.

Since application for a patent is made early in the R&D process, part of the 17-year patent period may be lost by the beginning of the sales period. The extent of this loss will depend on the relative lengths of the R&D/registration period and the patent pending period. Generally, at least 12 years of patent protection remain when a pesticide registration is issued. Therefore, by the time a patent expires on a newly patented chemical, the proposed 7-year compensation period will have already expired.

Consequently, a FIFRA imposed compensation period appears to be unimportant for patented pesticides with greater than 7 years of patent protection remaining. The matter of compensation for data submitted during the last 7 years of patent protection and for unpatented products is discussed in the next section of this report. The FIFRA purpose of insuring that firms have a reasonable opportunity to recover registration-related R&D expenditures is accomplished by patent protection without assistance from a compensation provision.

UNPATENTED PESTICIDES AND COMPENSATION

For firms marketing unpatented pesticides, pesticides for which the patent has expired or pesticides with less than 7 years of patent protection remaining, a compensation period does have some importance. Without a compensation period protecting the use of data under these circumstances, a firm would probably be faced with producing a pesticide in competition with other producers who have not incurred the costs of developing data.

The reasonableness of the 7-year time period for compensation proposed in Senate Bill 1678 was the subject of the September 2, 1977, report which this report supplements. In that report, it was concluded that a 7-year compensation period was reasonable for recovering these expenditures.

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