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PESTICIDE INDUSTRY SALES AND USAGE:

1988 MARKET ESTIMATES

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INTRODUCTION

This report provides an overview of the pesticide industry for 1988. It contains a series of tables with estimates of U.S. and world pesticide markets for 1988. The following page presents a number of highlights of this year's report.

Economists with the Economic Analysis Branch (EAB) have prepared similar studies in previous years. With the exception of Tables 10 and 11, the figures presented are only approximate values, since available data do not support precise projections. In addition to 1988 estimates, this report includes two new tables which review the pesticide market from 1979 to 1988. Drawn from previous EAB reports, Tables 12 and 13 offer a look at the U.S. pesticide market, in terms of total annual pesticide volume and user expenditures. Two accompanying graphs complement these new tables.

OVERVIEW

Overall pesticide industry sales have been relatively stable during recent years. The agricultural share of pesticide usage (see Table 8) appears to have stabilized and may even decline in the coming years after increasing steadily throughout the 1960's and 1970's. A number of factors contribute to this trend: lower application rates due to the introduction of more potent pesticides, more efficient use of pesticides, and lower farm commodity prices. It is not unusual to see maximum application rates for new agricultural pesticides equal to one to two ounces per acre, whereas application rates for older pesticides often reach several pounds per acre. This trend is particularly pronounced in the insecticide market and to a lesser degree in the market for herbicides. Also, the efficiency of pesticide use has improved as a result of more and better certification programs, more widespread use of integrated pest management programs, and the pesticide producers' provision of better information to farmers. Increased interest in Low Input Sustainable Agriculture (LISA) will probably tend to further reduce the quantity of pesticides used in future. Finally, low commodity prices over the past few years have lessened farmers' willingness to apply pesticides.

If you have questions regarding this report or need further information, please contact this office. Feel free to contact Jeff Doidge, Economist, at (703) 557-0837 or Arnold Aspelin, Chief of the Economic Analysis Branch, at (703) 557-7600.

HIGHLIGHTS OF REPORT
(table no. in parenthesis)

- U.S. pesticide sales represent about one quarter of the world market (1).
- Annual U.S. pesticide user expenditures totalled approximately \$7.4 billion in 1988 (2).
- Agriculture accounts for over two-thirds of pesticide user expenditures and roughly three-fourths of the quantity used annually (2 & 3).
- Herbicides are the leading type of pesticides, in terms of both user expenditures and volumes used (2 & 3).
- About 1.1 billion pounds active ingredient of conventional pesticides are used in the U.S. (4).
- Total U.S. pesticide usage in 1988 approached 2.7 billion pounds of active ingredient. (This figure includes wood preservatives, disinfectants, and sulfur.) (4)
- Farmers' expenditures on pesticides represent slightly less than 4% of total farm production expenditures (5).
- Total pesticide R & I expenditures represent in the neighborhood of 10% of pesticide expenditures by user community (6).
- The two most widely used pesticides by volume are alachlor and atrazine (9).
- There were 11 new active ingredients registered under FIFRA in calendar 1988 (10).
- There are about 1.2 million certified pesticide applicators in the U.S. (11).

TABLE 1: U.S. and World Market Conventional Pesticide Sales at Basic Producer Level, 1988 Estimates.

	<u>U.S. Market</u>		<u>World Market</u>		U.S. % of World Mkt
	(\$ Million)	(%)	(\$ Million)	(%)	
Herbicides	2,770	56%	7,700	42%	36%
Insecticides	1,200	24%	6,100	33%	20%
Fungicides	580	12%	3,500	19%	17%
Other	420	8%	1,200	6%	35%
Total	4,970	100%	18,500	100%	27%

Note: U.S. market is sales for domestic use only, net of imports and exports.

Source: EPA estimates based on NACA annual surveys and other sources.

TABLE 2: User Expenditures for Conventional Pesticides in the U.S. by Class and Sector.
1988 Estimates

	Herbicides(1)		Insecticides(2)		Fungicides(3)		Other(4)		Total	
	(mil \$)	(%)	(mil \$)	(%)	(mil \$)	(%)	(mil \$)	(%)	(mil \$)	(%)
Agriculture	3,080	78%	1,110	53%	550	64%	370	77%	5,110	69%
Ind/Com/Govt	500	13%	440	21%	200	23%	50	10%	1,190	16%
Home & Garden	350	9%	560	26%	110	13%	60	13%	1,080	15%
Total	3,930	100%	2,110	100%	860	100%	480	100%	7,380	100%

Source: EPA staff estimates based on NACA annual surveys and other sources.

(1) Includes plant growth regulators.

(2) Includes miticides and contact nematocides.

(3) Does not include wood preservatives.

(4) Includes rodenticides, fumigants, and molluscicides, but does not include wood preservatives, disinfectants, and sulfur.

TABLE 3: Volume of Conventional Pesticide Active Ingredient Used in U.S. by Class and Sector, 1988 Estimates.

	Herbicides(1) (mil lbs)	(%)	Insecticides(2) (mil lbs)	(%)	Fungicides(3) (mil lbs)	(%)	Other(4) (mil lbs)	(%)	Total (mil lbs)	(%)
Agriculture	510	77%	185	64%	80	61%	70	100%	845	75%
Ind/Com/Govt	120	18%	45	17%	40	30%	0	0%	205	18%
Home & Garden	30	5%	38	14%	12	9%	0	0%	80	7%
Total	660	100%	268	100%	132	100%	70	100%	1,130	100%

Source: EPA staff estimates based on NACA annual surveys and other sources.

(1) Includes plant growth regulators.

(2) Includes miticides and contact nematocides.

(3) Does not include wood preservatives.

(4) Includes rodenticides, fumigants, and molluscicides, but does not include wood preservatives, disinfectants, and sulfur.

Volume of Pesticide Active Ingredient Used in U.S., by Class and Sector, 1988.

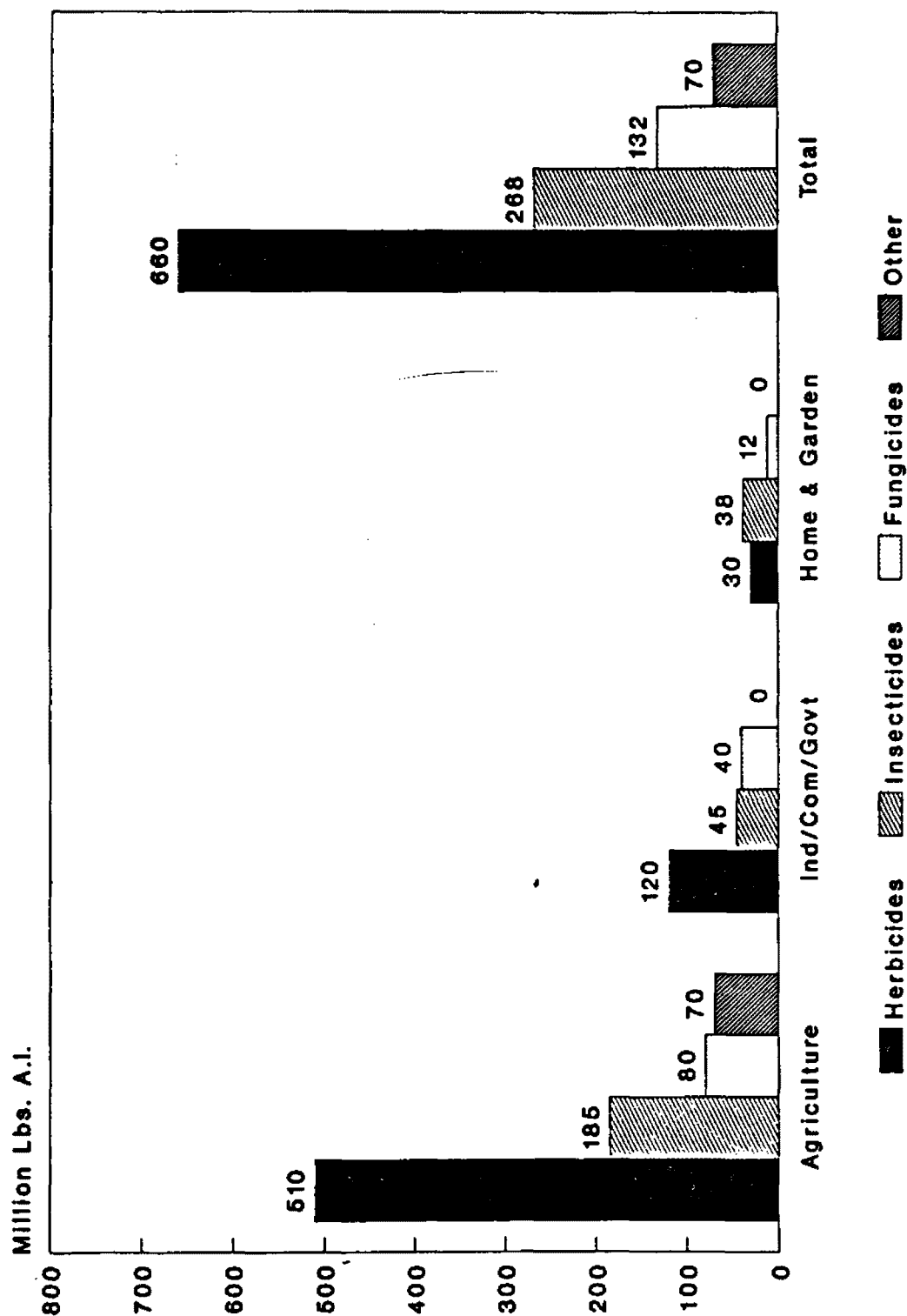


TABLE 4: Extended U.S. Annual Pesticide Consumption, 1988 Estimates.

Type	Billion Pounds A.I.
Conventional Pesticides	1.1
Wood Preservatives	1.0
Disinfectants	0.4
Sulfur	0.2
Total	2.7

Source: EPA staff estimates.

TABLE 5: Importance of Conventional Pesticide Expenditures to U.S. Farmers,
1988 Estimates.

	(\$ bil)	(%)
Farm Pesticide Expenditures(1)	5.1	3.9
Total Farm Production Expenditures(2)	132.0	100.0

(1) Excludes wood preservatives, disinfectants, and sulfur.

(2) USDA, 1989.

Source: USDA and EPA staff estimates.

TABLE 6: Comparison of the Cost of EPA Data Requirements Relative to
Conventional Pesticide User Expenditures in U.S.
1987 Estimates(1)

	\$ Million	Percent
Pesticide User Expenditures	6,850	100.0
Total Pesticide R&D Expenditures	682	10.0
EPA Registration-Related R&D Expenditures	173	2.5

Source: EPA staff estimates, based on Agricultural Statistics, 1986
(USDA), the NACA survey (1987), and other sources.

(1) Re-estimated for 1987 based on data from NACA member firms only.
R&D figures for 1988 are not available.

TABLE 7: U.S. Pesticide Production and User Sectors--Key Profile Parameters, 1988. (1)
(Approximate Values)

Basic Production Level	Marketing Level	User Level
30 Major Basic Producers	3,300 Formulators	0.8-1.0 M. Farms
100 Other Producers	29,000 Distributors & Establishments	90,000,000 Households
		40,000 Commercial Pest Control Firms
1,200 Active Ingredients Registered	37,000 Formulated Products Registered at Federal Level	(Several million) Other Industry/ Government Users
850 Active Ingredients in Production		
200 Leading Active Ingredients in Production	200 Firms Registering Pesticides per Year	
11 New Active Ingredients/Calendar Year		
11,000 Employment		
-----1988 Market Estimates-----		
U.S. Production	(bil lbs) 1.43	Domestic Usage (bil lbs) 1.13
U.S. Exports	0.45	Value of U.S. Purchases (bil \$) 7.38
U.S. Imports	0.15	
U.S. Supply	1.13	(%)
	Agricultural Share 75%	Agricultural Share 69%
	Ind/Com/Govt Share 18%	Ind/Com/Govt Share 16%
Value of Sales	(bil \$) 4.97	Home/Garden Share 7%
		Home/Garden Share 15%

Source: EPA staff estimates.

(1) Estimates for registered active ingredients and products varied little from 1987 to 1988. However, due to FIFRA '88, some of the above figures will change significantly in 1989.

TABLE 8: United States Conventional Pesticide Usage, Total and Estimated Agricultural Sector Share for 1964-1988

Year	Total U.S.	Agricultural Sector	Agricultural Sector Share
	—Million Lbs. AI—		—Percent—
1964	540	320	59
1965	610	335	55
1966	680	350	51
1967	735	380	52
1968	835	470	56
1969	775	430	55
1970	740	430	58
1971	835	495	59
1972	875	525	60
1973	910	560	62
1974	950	590	62
1975	990	625	63
1976	1,030	660	64
1977	1,075	720	67
1978	1,110	780	70
1979	1,150	840	73
1980	1,175	846	72
1981	1,205	860	71
1982	1,100	880	80
1983	953	733	77
1984	1,080	850	79
1985	1,112	861	77
1986	1,096	820	75
1987	1,085	815	75
1988	1,130	845	75

Note: Excludes wood preservatives, disinfectants, and sulfur.

Source: EPA staff estimates.

U.S. Pesticide Usage, Total and Agricultural Share, 1964-1988.

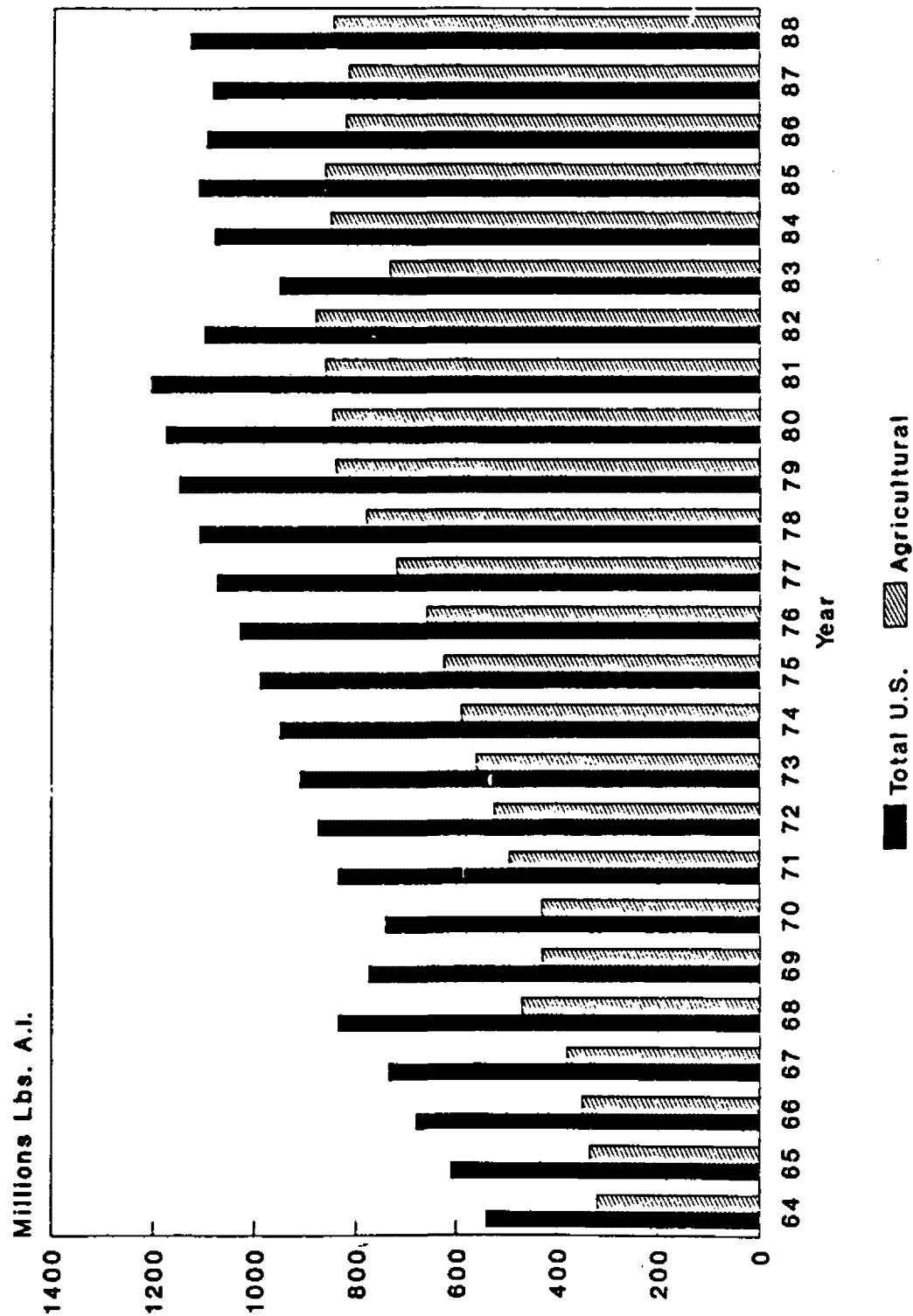


TABLE 9: Annual Usage Estimates of the Largest Agricultural Pesticides in U.S. ¹
(approximate values, 1987)

Pesticide	Usage in Million Pounds Active Ingredient
Alachlor	75 - 100
Atrazine	75 - 100
2,4-D	52 - 67
Butylate	44 - 58
Metolachlor	45 - 55
Trifluralin	30 - 35
Cyanazine	20 - 25
Carbaryl	12 - 25
Malathion	15 - 20
Metribuzin	13 - 17
Maneb/Mancozeb (4 - 6 / 8 - 12)	12 - 18
Glyphosate	10 - 15
Captan	9 - 11
Chlorpyrifos	7 - 11
Methyl Parathion ²	5 - 10

Source: EPA staff estimates based on a variety of sources.

¹ The estimates represent all usage of the active ingredient including noncrop usage.

² The estimate does not include the estimated 4 -7 mil. pounds of ethal parathion usage.

TABLE 10: Number of Chemicals Registered for First Time as Pesticides Under FIFRA, by Type,
Calendar Years 1967-1988

Year	Type							Total Uses Registered	Total Chemicals Registered
	Insecticide	Herbicide	Fungicide	Bactericide/ Slimicide	Nematicide	Rodenticide	Other		
1967	4	2	2	5	0	2	1	16	16
1968	6	2	5	4	0	0	1	18	18
1969	7	4	0	2	0	0	1	14	14
1970	1	2	2	3	0	0	2	10	10
1971	0	1	1	1	0	1	1	5	4
1972	4	5	6	5	0	0	1	21	17
1973	5	3	4	2	1	0	0	15	13
1974	6	8	6	0	1	1	0	22	22
1975	8	11	5	11	0	0	1	36	35
1976	2	3	2	4	0	0	1	12	12
1977	1	1	0	1	0	0	0	3	3
1978	2	2	0	0	0	0	1	5	5
1979	8	2	4	0	0	1	2	17	17
1980	4	3	1	0	0	2	1	11	11
1981	4	3	2	1	0	0	6	16	16
1982	5	5	1	1	0	2	3	17	17
1983	5	5	3	1	0	0	0	14	14
1984	6	1	2	2	0	1	2	14	13
1985	8	1	1	1	0	0	2	13	10
1986	2	7	0	0	1	0	2	12	11
1987	3	5	0	1	1	0	2	12	11
1988	2	5	1	0	1	0	2	11	11

Source: EPA registration files.

Number of Chemicals Registered Annually, 1967-1988.

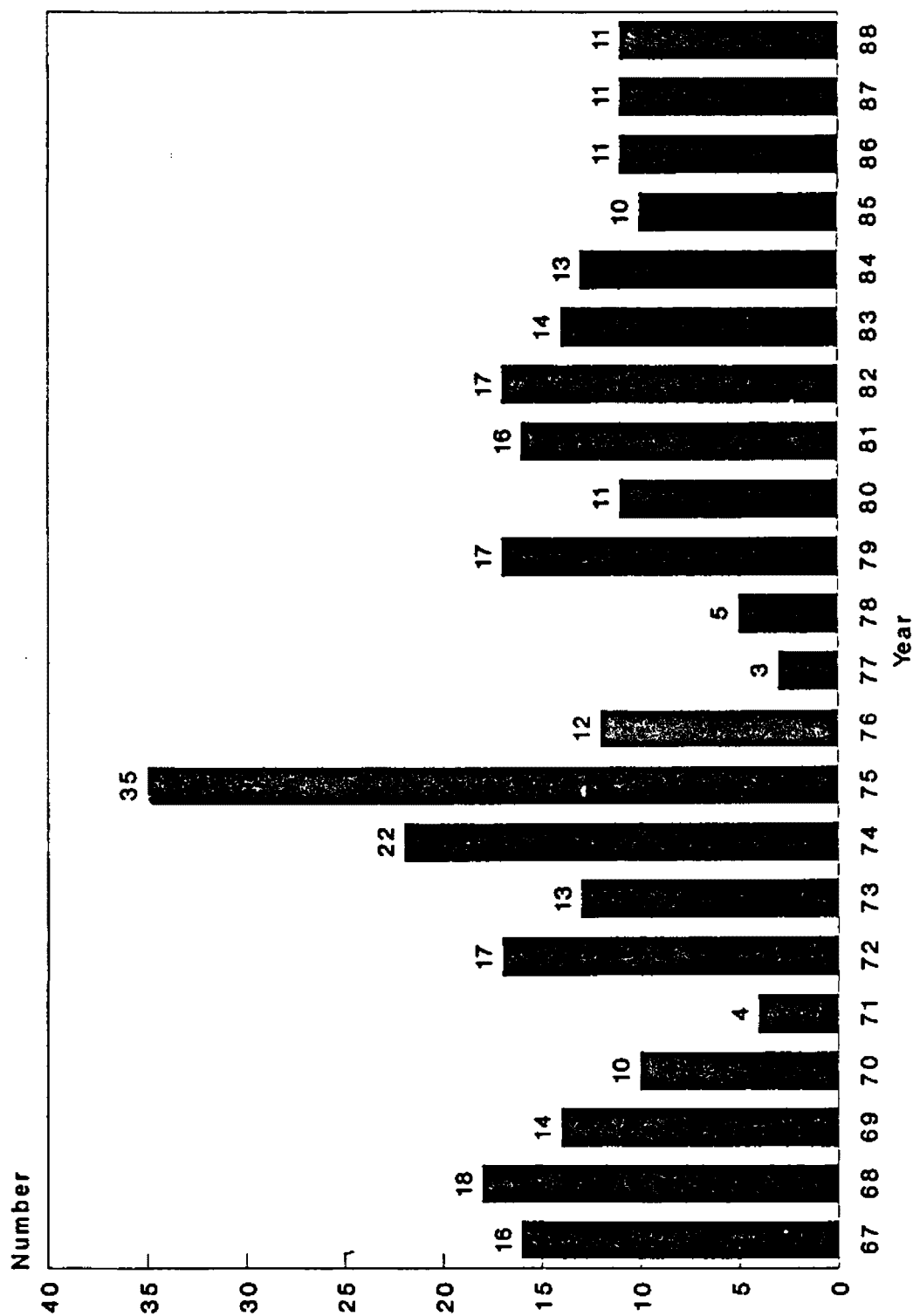


TABLE 11: Number of Certified Applicators in the United States,
1988 Estimates(1).

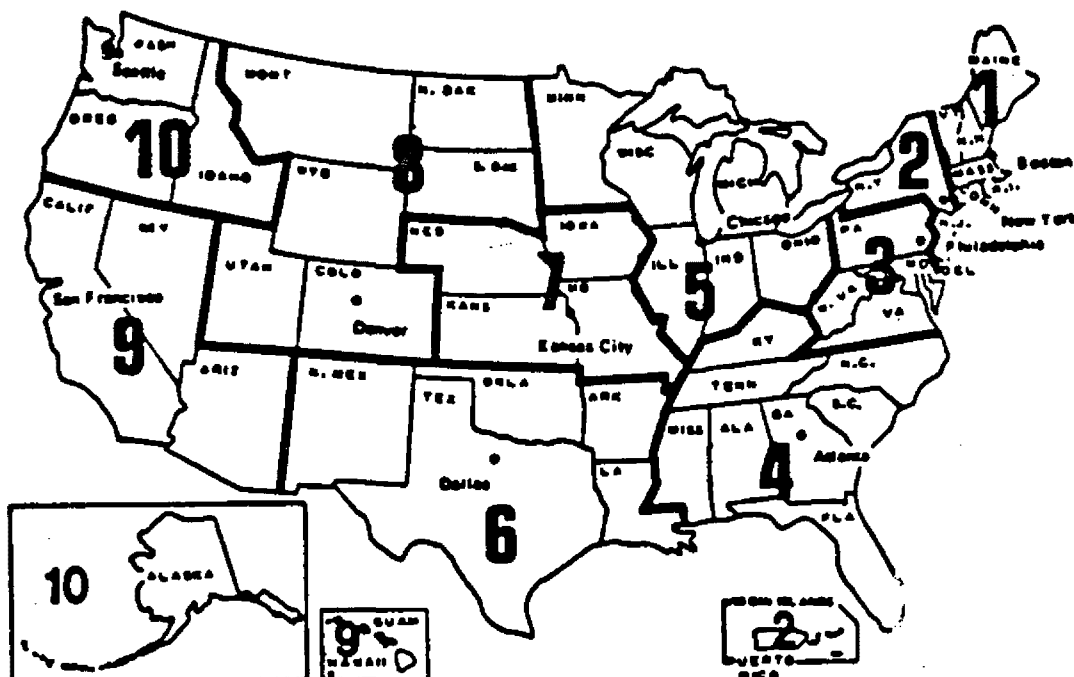
EPA Region	Private(2)	Commercial(3)
I	7,797	7,529
II	19,377	31,995
III	52,344	18,268
IV	248,582	40,724
V	147,784	41,739
VI	227,187	28,895
VII	144,707	23,053
VIII	63,367	14,073
IX	31,483	21,011
X	50,292	26,787
U. S. (4)	992,920	254,074

Source: EPA staff estimates.

- (1) The following page presents a map of EPA regions.
- (2) Private refers primarily to individual farmers.
- (3) Commercial refers to professional pesticide applicators.
- (4) These estimates reflect some double counting, as some applicators are certified in more than one state.

EPA

Regional Offices



Regions	Regions	Regions
4 — Alabama	1 — Maine	3 — Pennsylvania
10 — Alaska	3 — Maryland	1 — Rhode Island
9 — Arizona	1 — Massachusetts	4 — South Carolina
6 — Arkansas	5 — Michigan	8 — South Dakota
9 — California	6 — Minnesota	4 — Tennessee
8 — Colorado	4 — Mississippi	6 — Texas
1 — Connecticut	7 — Missouri	8 — Utah
3 — Delaware	8 — Montana	1 — Vermont
3 — D.C.	7 — Nebraska	3 — Virginia
4 — Florida	9 — Nevada	10 — Washington
4 — Georgia	1 — New Hampshire	3 — West Virginia
9 — Hawaii	2 — New Jersey	5 — Wisconsin
10 — Idaho	6 — New Mexico	8 — Wyoming
5 — Illinois	2 — New York	9 — American Samoa
5 — Indiana	4 — North Carolina	9 — Guam
7 — Iowa	8 — North Dakota	2 — Puerto Rico
7 — Kansas	5 — Ohio	2 — Virgin Islands
4 — Kentucky	6 — Oklahoma	
6 — Louisiana	10 — Oregon	

TABLE 12: U.S. Annual Volume of Pesticide Usage, by Type, 1979-1988.

Pesticide Type	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
-----Millions of Lbs. A.I.-----										
Herbicides	560	555	570	544	575	675	670	655	645	660
Insecticides	378	395	405	391	255	270	300	295	260	268
Fungicides	106	120	123	119	68	80	82	86	122	132
Other	106	105	107	106	55	55	60	60	60	70
Total	1,150	1,175	1,205	1,160	953	1,080	1,112	1,096	1,087	1,130

Source: EPA reports for years indicated.

U.S. Annual Volume Usage, by Pesticide Type, 1979-1988.

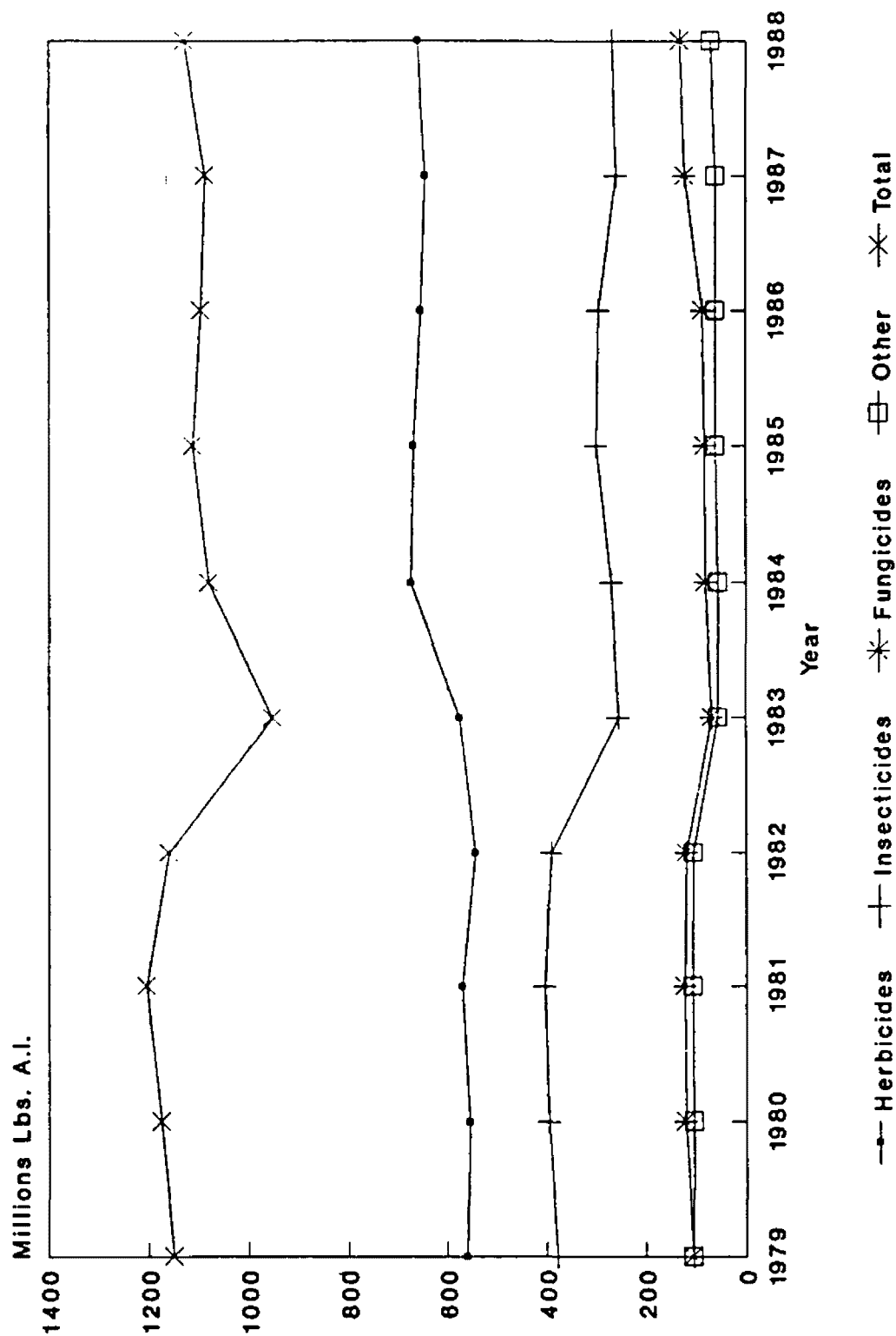


TABLE 13: U.S. Annual User Expenditures on Pesticides, by Type, 1979-1988.

Pesticide Type	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
	Millions of \$									
Herbicides	2,830	3,100	3,500	3,500	3,600	4,260	3,700	3,625	3,745	3,930
Insecticides	1,370	1,600	1,700	1,700	1,800	1,880	1,975	1,980	1,990	2,110
Fungicides	425	520	620	620	450	428	515	515	730	860
Other	425	580	650	650	200	215	370	370	385	480
Total	5,050	5,800	6,470	6,470	6,050	6,783	6,560	6,490	6,850	7,380

Source: EPA reports for years indicated.

U.S. Annual User Expenditures, by Pesticide Type, 1979-1988.

