



Department of Pesticide Regulation



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MEMORANDUM

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TO: John S. Sanders, Ph.D., Chief
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FROM: Frank Spurlock, Ph.D.
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DATE: November 8, 2002

SUBJECT: PESTICIDE VOLATILE ORGANIC COMPOUND EMISSIONS INVENTORY
2002 UPDATE: ESTIMATED EMISSIONS JANUARY – DECEMBER 2001

I. OVERVIEW

This memorandum summarizes the Department of Pesticide Regulation's (DPR's) 2001 estimated potential pesticide volatile organic compound (VOC) emission data. An electronic file containing detailed statewide 2001 data is available by download from DPR's internet webpage (<http://www.cdpr.ca.gov/docs/pur/vocproj/vocmenu.htm>) along with the VOC data file dictionary, VOC emissions data from previous years, and various VOC documentation.

The data processing and calculation procedures for the 2001 inventory were essentially identical to those developed for the recent revision of the 1990 – 2000 inventories (Spurlock, 2002a), and these calculation procedures are now available in a detailed report (Spurlock, 2002b). Briefly, VOC emission estimates were obtained by combining 2001 agricultural and commercial structural pesticide use data with product-specific emission potentials. The 2001 VOC emissions reported here are based on DPR's preliminary 2001 pesticide use data, released in October 2002 (DPR, 2002).

II. VOC INVENTORY RESULTS BY NON-ATTAINMENT AREA (NAA)

A. NAA 1, Sacramento Metropolitan Area

The 2001 VOC emissions in NAA 1 were lower than any previous year at approximately 1.26 million pounds of total organic gases (TOG) (Figure 1). As a result, 2001 emissions were below the 2005 goal of 1.54 million pounds TOG for the first time. The monthly distribution of NAA 1 VOC emissions is shown in Figure 2.

Approximately 90 percent of VOC emissions in NAA 1 were attributable to agricultural pesticide use as compared to 10 percent from commercial structural pesticide applications. Similar to most other areas of California the largest contributors to VOC emissions were fumigants; products containing the three top fumigants metam-sodium, methyl bromide, and 1,3-dichloropropene accounted for approximately 27 percent of 2001 NAA 1 VOC emissions



(Table 1). Another significant contributor to NAA 1 potential emissions was the rice herbicide molinate as in previous years.

TABLE 1. Top ten “primary active ingredients” contributing to 2001 VOC emissions in NAA 1, the Sacramento Metropolitan Area, listed in descending order of total emissions of products containing the primary active ingredient. Here the primary active ingredient is defined as the pesticidal active ingredient present at the highest percentage in a product. This approach prevents “double-counting” of emissions from products containing two active ingredients.

Primary AI	Total product emissions (lbs)	% of all 2001 pesticide emissions in NAA1
METAM-SODIUM	240284	19.1%
MOLINATE	188200	15.0%
METHYL BROMIDE	75970	6.1%
CHLORPYRIFOS	65618	5.2%
CYPERMETHRIN	55841	4.4%
TRIFLURALIN	53879	4.3%
THIOBENCARB	37495	3.0%
2,4-D, DIMETHYLAMINE SALT	33987	2.7%
OXYFLUORFEN	27395	2.2%
GLYPHOSATE, ISOPROPYLAMINE SALT	27141	2.2%

B. NAA 2, San Joaquin Valley

VOC emissions in NAA 2 continued to decline in 2001, following a trend that started in 1995 (Figure 1). The 2001 NAA 2 VOC emissions of 13.9 million lbs TOG were 26% lower than in 2000, and approximately 2.7 million lbs less than the NAA 2 2005 target of 16.6 million lbs. The monthly distribution of NAA 2 emissions is shown in Figure 2.

Approximately 98 percent of 2001 NAA 2 VOC emissions were attributable to agricultural pesticide uses with the remaining 2 percent resulting from commercial structural pesticide applications. Similar to previous years, the principal contributors to NAA 2 emissions were fumigants; more than 52 percent of VOC emissions were attributable to products in which metam-sodium, methyl bromide, or 1,3-dichloropropene were the primary active ingredient (Table 2).

Some 2001 Kern County pesticide use data was not submitted to DPR due to data processing problems at the county (Department of Pesticide Regulation, 2002). Based on pesticide use in surrounding San Joaquin Valley Counties in 2000 and 2001, an estimate of Kern County's actual 2001 reported pesticide use is about 1 – 2 million pounds greater than the reported use. The net effect on 2001 NAA 2 VOC emission estimates reported here is that they may be low approximately 120,000 – 250,000 pounds too low.

TABLE 2. Top ten “primary active ingredients” contributing to 2000 VOC emissions in NAA 2, the San Joaquin Valley, listed in descending order of total emissions of products containing the primary active ingredient. Here the primary active ingredient is defined as the pesticidal active ingredient present at the highest percentage in a product. This approach prevents “double-counting” of emissions from products containing two active ingredients.

Primary AI	Total product emissions (lbs)	% of all 2001 pesticide emissions in NAA2
METAM-SODIUM	3317115	23.8%
1, 3-DICHLOROPROPENE	2762938	19.8%
METHYL BROMIDE	1171962	8.4%
CHLORPYRIFOS	1089846	7.8%
OXYFLUORFEN	451556	3.2%
GLYPHOSATE, ISOPROPYLAMINE SALT	396863	2.8%
TRIFLURALIN	362615	2.6%
PENDIMETHALIN	324062	2.3%
ACROLEIN	194668	1.4%
SULFUR	162336	1.2%

C. NAA 3, Southeast Desert

While VOC emissions in NAA 3 increased significantly between the early 1990s through 2000, 2001 emissions were less than those in either 1999 or 2000 (Figure 1). However, the estimated 2001 NAA 3 emissions of 1.43 million pounds remained approximately 85% (0.66 million lbs) greater than the 2005 NAA 3 target of 0.77 million lbs. The monthly distribution of NAA 3 emissions is shown in Figure 2.

Approximately 96 percent of 2001 NAA 3 VOC emissions were attributable to agricultural uses, with the remaining 4 percent a result of commercial structural pesticide applications. Emissions in NAA 3 are driven almost entirely by fumigants; almost 83 percent of 2001

NAA 3 emissions were attributable to products in which metam-sodium, methyl bromide, or 1,3-dichloropropene was the primary active ingredient (Table 3).

TABLE 3. Top ten “primary active ingredients” contributing to 2000 VOC emissions in NAA 3, the Southeast Desert, listed in descending order of total emissions of products containing the primary active ingredient. Here the primary active ingredient is defined as the pesticidal active ingredient present at the highest percentage in a product. This approach prevents “double-counting” of emissions from products containing two active ingredients.

Primary AI	Total product emissions (lbs)	% of all 2001 pesticide emissions in NAA3
METAM-SODIUM	858256	60.2%
METHYL BROMIDE	238242	16.7%
1,3-DICHLOROPROPENE	82623	5.8%
GIBBERELLINS	27166	1.9%
HYDROGEN CYANAMIDE	16835	1.2%
CHLOROPICRIN	16341	1.1%
CHLORPYRIFOS	16282	1.1%
GLYPHOSATE, ISOPROPYLAMINE SALT	15364	1.1%
TRIFLURALIN	12847	0.9%
DIAZINON	12082	0.8%

D. NAA 4, Ventura

In 2001, VOC emissions in NAA 4, Ventura, showed a decrease for the second consecutive year. However, the 2001 emissions of 2.90 million lbs were still much higher than estimated emissions in the early 1990's, and were approximately 70% greater than the 2005 target of 1.71 million lbs (Figure 1). Nearly 100% of potential 2001 NAA 4 emissions resulted from agricultural pesticide uses, with commercial structural pesticide applications accounting for only 0.3 percent of emissions. The monthly distribution of NAA 4 emissions is shown in Figure 2.

Similar to 2000, 2001 NAA 4 VOC emissions were dominated by fumigants; 88 percent of total emissions were attributable to products in which metam-sodium, methyl bromide, or 1,3-dichloropropene were the primary active ingredient (Table 4).

TABLE 4. Top ten “primary active ingredients” contributing to 2000 VOC emissions in NAA 4, Ventura, listed in descending order of total emissions of products containing the primary active ingredient. Here the primary active ingredient is defined as the pesticidal active ingredient present at the highest percentage in a product. This approach prevents “double-counting” of emissions from products containing two active ingredients.

Primary AI	Total product emissions (lbs)	% of all 2001 pesticide emissions in NAA4
METHYL BROMIDE	2376024	82.0%
1,3-DICHLOROPROPENE	101339	3.5%
METAM-SODIUM	73718	2.5%
CHLORPYRIFOS	65516	2.3%
CHLOROPICRIN	45975	1.6%
PETROLEUM OIL, UNCLASSIFIED	26099	0.9%
METALDEHYDE	20143	0.7%
OXAMYL	16539	0.6%
GLYPHOSATE, ISOPROPYLAMINE SALT	15473	0.5%
POTASSIUM N-METHYLDITHIO CARBAMATE	11936	0.4%

E. NAA 5, South Coast

VOC emissions in NAA 5 decreased dramatically early in the 1990s, and have remained at a constant relatively low level since 1993 (Figure 1). In 2001, NAA 5 emissions of 1.65 million lbs were approximately one-third of the 2005 NAA 5 goal of 4.86 million pounds. Approximately 57 percent of potential 2001 emissions in NAA 5 were attributable to agricultural uses, with commercial structural pesticide applications accounting for the remaining 43 percent of emissions. The monthly distribution of NAA 5 emissions is shown in Figure 2.

Although the fumigant contribution to 2001 NAA 5 emissions was less than in other NAAs, the fumigant products containing methyl bromide and metam-sodium as primary active ingredients still comprised 35 percent of the total emissions. The organophosphate and pyrethroid insecticides - chlorpyrifos, diazinon, permethrin, cyfluthrin, bifenthrin and cypermethrin - contributed 38 percent of total 2001 NAA 5 emissions (Table 5).

TABLE 5. Top ten “primary active ingredients” contributing to 2000 VOC emissions in NAA 5, the South Coast, listed in descending order of total emissions of products containing the primary active ingredient. Here the primary active ingredient is defined as the pesticidal active ingredient present at the highest percentage in a product. This approach prevents “double-counting” of emissions from products containing two active ingredients.

Primary AI	Total product emissions (lbs)	% of all 2001 pesticide emissions in NAA5
METHYL BROMIDE	490767	29.7%
DIAZINON	194101	11.8%
CHLORPYRIFOS	129445	7.8%
PERMETHRIN	102573	6.2%
METAM-SODIUM	84584	5.1%
CYFLUTHRIN	75737	4.6%
CYPERMETHRIN	72203	4.4%
BIFENTHRIN	58163	3.5%
GLYPHOSATE, ISOPROPYLAMINE SALT	42294	2.6%
CHLOROPICRIN	31838	1.9%

III. SUMMARY

Similar to last year, the 2001 inventory indicates that the Southeast Desert (NAA 3) and Ventura (NAA 4) will experience the greatest difficulty in meeting the 2005 VOC emission goal of 80 percent of estimated 1990 emission levels. While emissions decreased in both NAAs in 2001, both still currently exceed their 2005 targets by very large percentages; 185% in NAA 3 and 170% in NAA 4. More than 80% of estimated VOC emissions in both NAAs were attributable to fumigants, so that achievement of the 2005 goal will be impossible without a marked change in fumigant use.

In contrast to the Southeast Desert and Ventura, the Sacramento Metropolitan Area (NAA 2) and San Joaquin Valley (NAA 3) 2001 emissions were both less than the 2005 attainment goal of 80% of 1990 emissions. This is the first time that the goal has been met in the last decade in either NAA. Finally, estimated emissions in the South Coast (NAA 5) are already well below the 2005 reduction goal as they have been for several years.

Overall, 2001 pesticide VOC emissions decreased almost 20% statewide from the previous year, with total statewide 2001 estimated emissions of 35.6 million pounds as compared to 43.6 million lbs in 2000. These reductions are a direct result of decreased use in 2001 of pesticides generally and methyl bromide in particular (Figures 3 & 4).

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VI. REFERENCES

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Attachments

cc: Randy Segawa, Senior Environmental Research Scientist (w/Attachments)
Mark Pepple, Senior Environmental Research Scientist (w/Attachments)

bcc: Spurlock Surname File

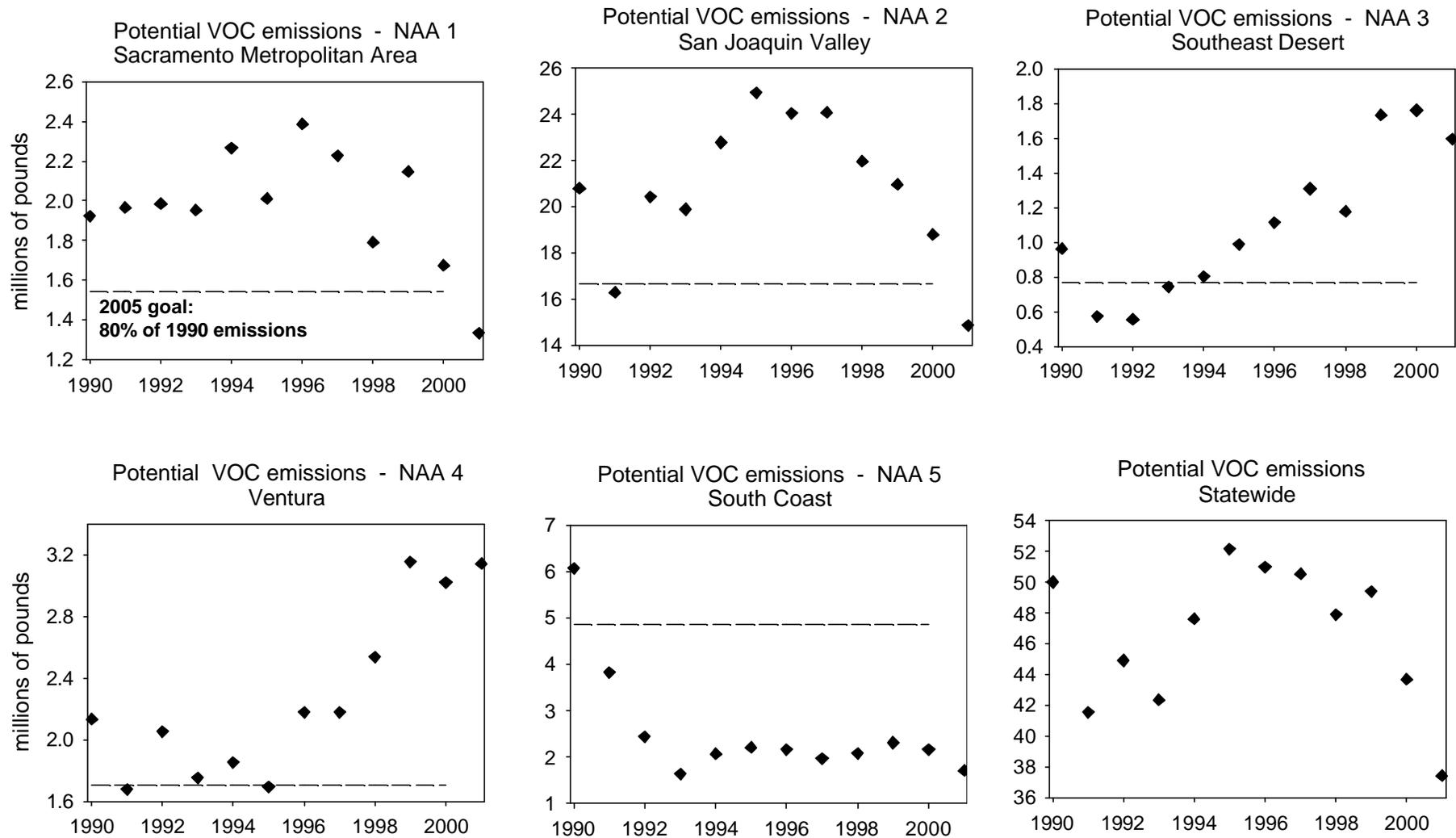


Figure 1. 1990 - 2001 estimated potential VOC emissions from agricultural and commercial structural pesticide use by non-attainment area (NAA)

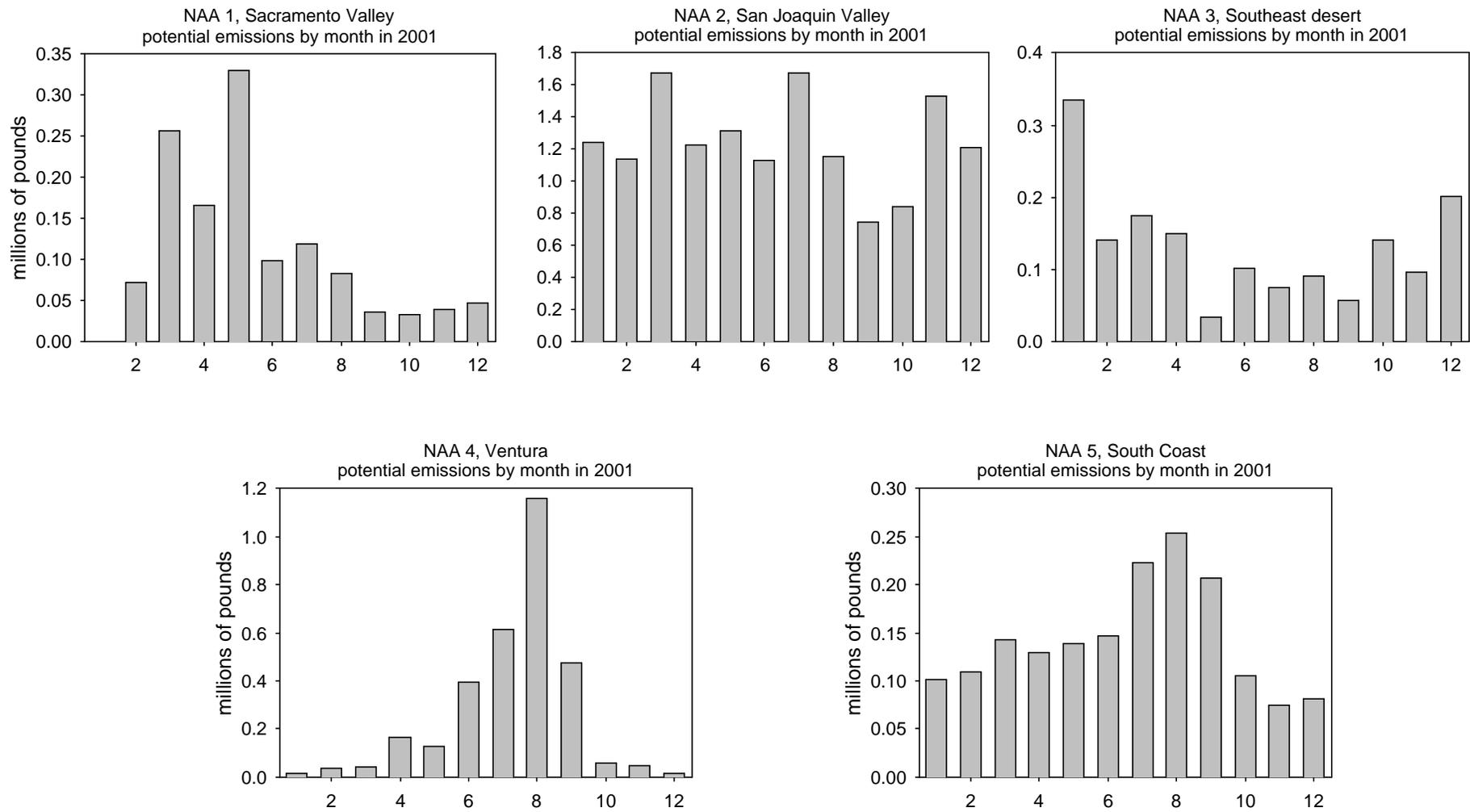


Figure 2. 2001 estimated VOC emissions by month in individual NAAs.
note y-axis scale differences among graphs

Figure 3. Statewide pesticide use trends 1990 - 2001

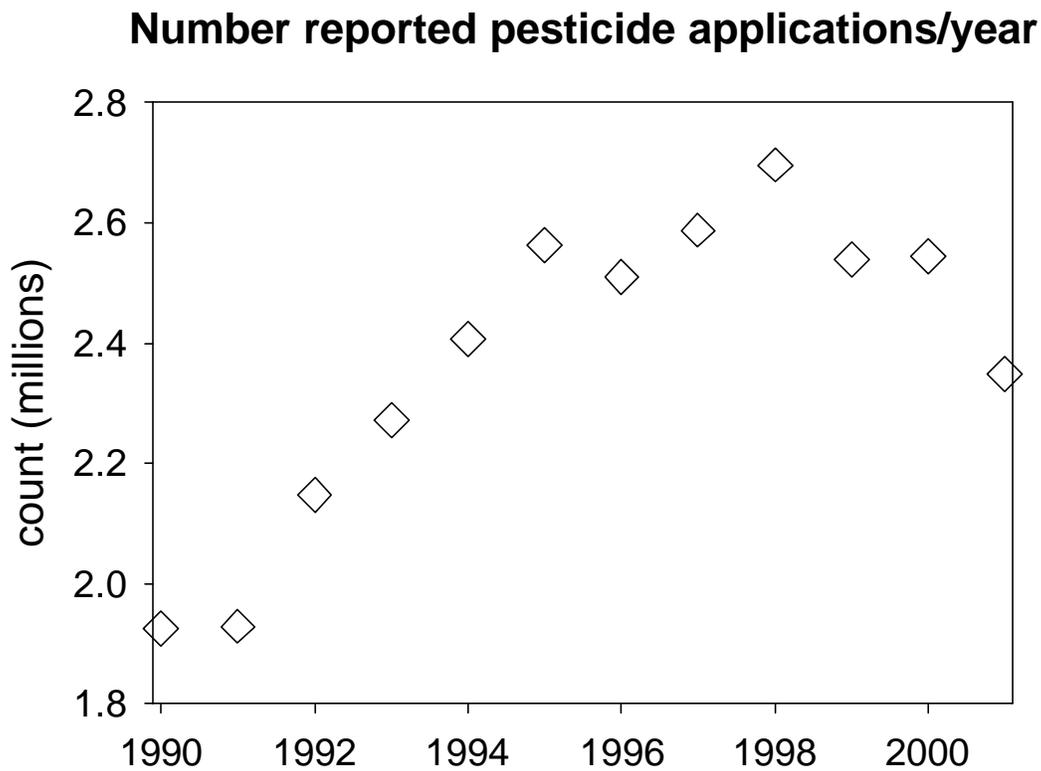
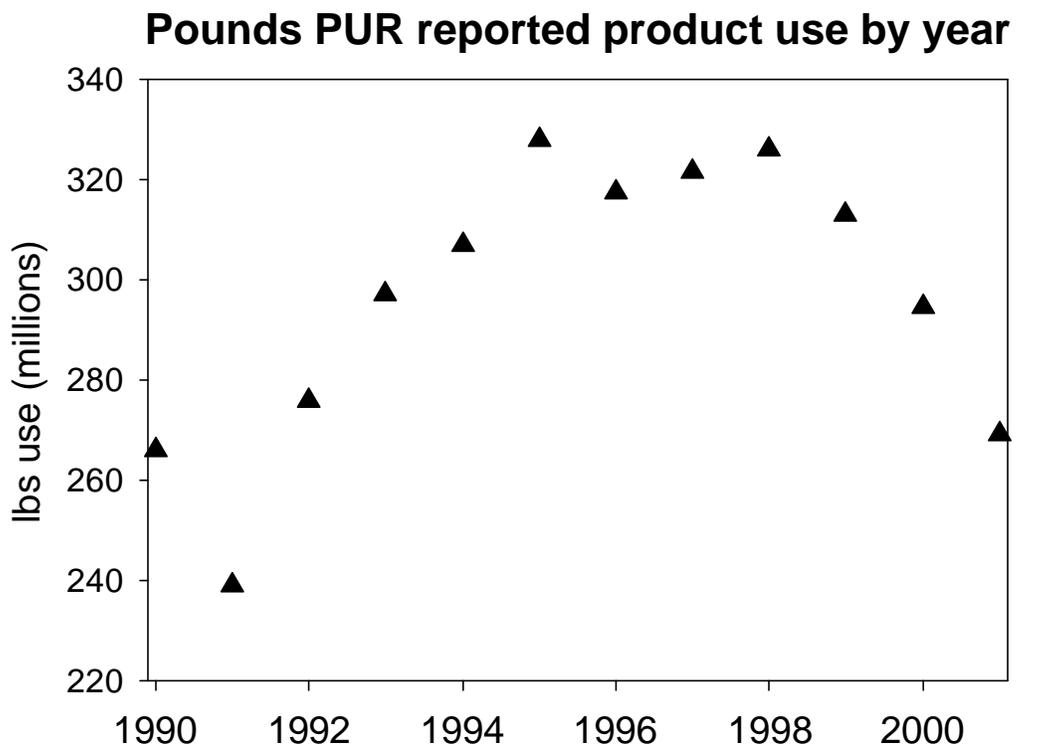


Figure 4. California fumigant use 1992 - 2001

