

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

5.1 PRODUCTION

Carbon tetrachloride is produced by exhaustive chlorination of a variety of low molecular weight hydrocarbons such as carbon disulfide, methane, ethane, propane, and ethylene dichloride (HSDB 2004). It is also produced by thermal chlorination of methyl chloride (HSDB 2004). Carbon tetrachloride is a feedstock for chlorofluorocarbon gases, such as dichlorodifluoromethane (F-12) and trichlorofluoromethane (F-11), which were used as aerosol propellants in the 1950s and 1960s (Holbrook 1991). Following this, the growth rate for the production of carbon tetrachloride averaged 10.7% per year from 1960 to 1970 (Holbrook 1991). This rate slowed to 7.2% per year from 1970 to 1974, when the production of this chemical was at its peak, as other forms of propellants became commercially available (Anonymous 1981; Holbrook 1991). The FDA banned the sale of carbon tetrachloride in any product used in the home and the EPA regulated the use of chlorofluorocarbon gases as aerosols or propellants. Since then, production of carbon tetrachloride has declined at approximately 8% a year from 1974 to 1994 (Anonymous 1995; Holbrook 1991). Carbon tetrachloride is currently manufactured in the United States by Vulcan Materials Company at two plants: Geismar, Louisiana and Wichita, Kansas, with a combined 130 million pound capacity (HSDB 2004; SRI 2004). It should be noted, however, that these capacities are flexible, since other chlorinated solvents are made using the same equipment (SRI 2004).

This recent decline in production is due to the adoption of an international agreement (the Montreal Protocol) to reduce environmental concentrations of ozone-depleting chemicals (including carbon tetrachloride), and to the provisions of Title VI of the Clean Air Act Amendments of 1990 addressing these chemicals. The regulation called for reduction to 15% of 1989 production levels by 1995 and a complete phase-out of carbon tetrachloride production for nonfeedstock uses by 2000. The EPA allocated a baseline production allowance of about 138 million pounds (63,000 metric tons) of carbon tetrachloride, apportioned among the eight U.S. companies producing the chemical in 1989 (EPA 1991a).

5.2 IMPORT/EXPORT

The trend in recent years has shown a drop off in both imports and exports for carbon tetrachloride. (Anonymous 1983, 1995). Current import or export quantities show that for the year 2002, the United

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States exported 11,880,074 kg (1,880 metric tons), and for 2003 through April, the United States exported 3,714,817 kg (3,715 metric tons) (USITC 2003). Imports for both years were reported at <50 kg.

Table 5-1 summarizes information on U.S. companies that reported the production, import, or use of carbon tetrachloride for the Toxics Release Inventory (TRI) in 2002 (TRI02 2004). The TRI data should be used with caution since only certain types of facilities are required to report. This is not an exhaustive list.

5.3 USE

The major use of carbon tetrachloride has historically been for the production of chlorofluorocarbons, such as dichlorodifluoromethane (F-12) and trichlorofluoromethane (F-11), which are used primarily as refrigerants as mentioned in section 5.1 (Holbrook 1991; HSDB 2004). Carbon tetrachloride found a variety of other uses in the past in industry, in medicine, and in the home. In the early part of this century, carbon tetrachloride was taken by mouth as a treatment for intestinal worms (Hall 1921), and it was also used briefly as an anesthetic (Hardin 1954). Because carbon tetrachloride is a solvent, it has been widely used as a cleaning fluid in the home and as a degreaser in industry. Because it is nonflammable, it was also used in fire extinguishers. Until recently, it was used as solvent in some household products and as a fumigant to kill insects in grain. It has been estimated that 28 million pounds of carbon tetrachloride were used as a fumigant in 1978 (Daft 1991). Because of the toxicity of carbon tetrachloride, consumer and fumigant uses have been discontinued, and only industrial uses remain (HSDB 2004).

Since production of carbon tetrachloride for most remaining uses has been phased-out due to Clean Air Act legislation (see Section 5.1), the chemical is only available for those uses for which no effective substitute has been found.

5.4 DISPOSAL

EPA classifies carbon tetrachloride and waste containing carbon tetrachloride as hazardous wastes. Generators of waste containing this contaminant must conform to EPA regulations for treatment, storage, and disposal (see Chapter 8). Rotary kiln or fluidized bed incineration methods are acceptable disposal methods for these wastes (HSDB 2004). According to the TRI, 2,893 pounds of carbon tetrachloride were transferred to landfills and/or other treatment/disposal facilities and 617,050 pounds were sent to publicly owned treatment works in 2002 (TRI02 2004) (see Section 6.2).

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Table 5-1. Facilities that Produce, Process, or Use Carbon Tetrachloride

State ^a	Number of facilities	Minimum amount on site in pounds ^b	Maximum amount on site in pounds ^b	Activities and uses ^c
AL	10	0	49,999,999	1, 3, 4, 5, 10, 11, 12, 13
AR	10	100	999,999	6, 7, 10, 11, 12
CA	25	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12
CO	8	1,000	999,999	1, 2, 5, 6, 10, 11, 12, 13
CT	2	10,000	999,999	6, 10
DE	2	100,000	999,999	6, 10
FL	1	10,000	99,999	12
GA	4	0	9,999,999	7, 8, 10, 11
ID	1	0	99	2, 3, 10, 11
IL	14	0	9,999,999	1, 3, 4, 5, 6, 7, 9, 10, 12
IN	13	0	9,999,999	1, 2, 3, 5, 10, 11, 12, 13, 14
KS	14	0	9,999,999	1, 3, 4, 6, 7, 10, 11, 12, 13
KY	12	1,000	49,999,999	1, 3, 5, 6, 9, 10, 12
LA	60	0	49,999,999	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13
MD	5	10,000	999,999	2, 3, 6, 7
MI	10	0	9,999,999	5, 6, 7, 10, 12
MN	4	100	99,999	7, 10, 11, 12
MO	5	100	99,999	7, 12
MS	6	0	999,999	8, 9, 10, 12
MT	2	100	99,999	10
NC	2	0	9,999	1, 7, 13
ND	2	1,000	99,999	10
NE	2	10,000	999,999	12
NH	1	0	99	12
NJ	16	0	9,999,999	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12
NY	6	1,000	999,999	9, 10, 12, 13
OH	18	1,000	999,999	1, 4, 5, 9, 10, 11, 12, 13
OK	2	10,000	999,999	10
PA	10	1,000	9,999,999	6, 7, 10, 11, 12
PR	1	10,000	99,999	12
SC	7	1,000	9,999,999	6, 7, 8, 12
TN	14	0	999,999	1, 2, 3, 6, 7, 9, 10, 11, 12, 13, 14
TX	52	0	99,999,999	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
UT	1	10,000	99,999	12
VA	4	0	99,999	12
VI	3	10,000	9,999,999	10
WA	3	1,000	99,999	10, 11, 12
WI	2	1,000	9,999	9, 10

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Table 5-1. Facilities that Produce, Process, or Use Carbon Tetrachloride

State ^a	Number of facilities	Minimum amount on site in pounds ^b	Maximum amount on site in pounds ^b	Activities and uses ^c
WV	11	0	9,999,999	1, 4, 5, 9, 11, 12, 13
WY	4	0	99,999	2, 3, 10

Source: TRI02 2004 (Data are from 2002)

^aPost office state abbreviations used

^bAmounts on site reported by facilities in each state

^cActivities/Uses:

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|--------------------------|--------------------------|-----------------------------|
| 1. Produce | 6. Impurity | 11. Chemical Processing Aid |
| 2. Import | 7. Reactant | 12. Manufacturing Aid |
| 3. Onsite use/processing | 8. Formulation Component | 13. Ancillary/Other Uses |
| 4. Sale/Distribution | 9. Article Component | 14. Process Impurity |
| 5. Byproduct | 10. Repackaging | |