

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

5.1 PRODUCTION

1,2-Dichloroethane does not occur naturally (IARC 1979). It is produced commercially either by direct chlorination or by oxychlorination. Direct chlorination is carried out in the liquid or vapor phase over iron, aluminum, copper, or antimony chloride catalysts at 60 EC. Oxychlorination is carried out in a fixed or fluidized bed reactor at 220 EC with a suitable solid chloride catalyst (Sundaram et al. 1994).

Currently, there are 12 domestic manufacturers of 1,2-dichloroethane; production occurs at 16 sites located predominantly in Texas, Kentucky, and Louisiana (Anonymous 1998; SRI 1998). Domestic producers and their annual capacities as of February 16, 1998 are listed in Table 5-1 (Anonymous 1998). U.S. production totals for 1,2-dichloroethane in 1984, 1985, 1986, 1990, 1992, 1993, and 1994 were 7.3, 12.1, 12.9, 13.8, 15.2, 17.9, and 16.8 billion pounds, respectively (USITC 1985, 1986, 1987, 1991, 1993, 1994, 1995). In 1986, sales were nearly 800 million pounds and were valued at . 66 million dollars (USITC 1987). By 1994, sales had reached 2.8 billion pounds and were valued at . 317 million dollars (USITC 1995). Sales of 1,2-dichloroethane on the open market in 1986 were . 6% of the total 1,2-dichloroethane produced (USITC 1987), indicating that the producers captively consumed >90% of production (EPA 1985a). Currently, . 85% of total production is used captively (USITC 1995).

According to the Toxics Release Inventory (TRI), 41 facilities manufactured or processed 1,2-dichloroethane in 1999 (TRI99 2001). All of these facilities reported the range of the maximum amounts of 1,2-dichloroethane that they have on site. A summary of these data are presented in Table 5-2. The data listed in the TRI should be used with caution since only certain types of facilities are required to report. This is not an exhaustive list.

5.2 IMPORT/EXPORT

In 1996, 2.5 billion pounds of 1,2-dichloroethane were exported while 316 million pounds were imported to the United States (Anonymous 1998). This trend in import/export volume was also observed from 1992 to 1996 when the average amount of 1,2-dichloroethane exported was 2.1 billion pounds annually and the average amount imported was 267 million pounds annually (Anonymous 1998).

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Table 5-1. United States Production of 1,2-Dichloroethane^{a,b}

Manufacturer	Location	Annual capacity (millions of pounds)
Borden Chemicals and Plastics	Geismar, Louisiana	745
CONDEA Vista Company	Lake Charles, Louisiana	1,400
Dow Chemical U.S.A.	Freeport, Texas Plaquemine, Louisiana	4,500 2,300
Formosa Plastics Corporation U.S.A.	Baton Rouge, Louisiana Point Comfort, Texas	525 1,900
Geon Company	LaPorte, Texas	4,000
Georgia Gulf Corporation	Plaquemine, Louisiana	1,760
Occidental Chemical Corporation Electrochemicals and Proprietary Products Division	Convent, Louisiana Deer Park, Texas	1,500 1,950
Electrochemicals	Ingleside, Texas	1500
Oxymar	Ingleside, Texas	3,000
PHH Monomers	Lake Charles, Louisiana	1,400
PPG Industries, Inc. Chemicals Group	Lake Charles, Louisiana	1,600
Vulcan Materials Company Vulcan Chemicals Division	Geismar, Louisiana	500
Westlake Monomers Corporation	Calvert City, Kentucky	1,950
Total		30,530

^aDerived from Anonymous 1998^bEstimates as of February 16, 1998

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Table 5-2. Facilities that Produce, Process, or Use 1,2-Dichloroethane

State ^a	Number of facilities	Range of maximum amounts on site in pounds ^b	Activities and uses ^c
CA	2	100–99,999	10
IA	1	1,000–9,999	1
KY	3	1,000–49,999,999	1, 2, 3
LA	11	1,000–999,999,999	1, 3, 4, 10
MI	3	1,000–99,999	1, 8
MO	3	100–9,999,999	1, 3, 8
PA	2	10,000–999,999	1
PR	2	10,000–99,999	2, 3
SC	1	100,000–999,999	1
TX	13	0–999,999,999	1, 2, 3, 4, 8, 10

Source: TRI99 2001

^aPost office state abbreviations used

^bRange represents maximum amounts on site reported by facilities in each state

^cActivities/Uses:

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

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5.3 USE

1,2-Dichloroethane is currently used as a chemical intermediate and as a solvent in closed systems (Dow Chemical Company 1989b). It is also added to leaded gasoline as a lead scavenger; however, this use has declined significantly as leaded gasoline use has attenuated (Vulcan Materials Company 1989). In the United States, about 98% of the 1,2-dichloroethane produced is used to manufacture vinyl chloride (Anonymous 1998). Smaller amounts of 1,2-dichloroethane are used in the synthesis of vinylidene chloride, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, aziridines, and ethylene diamines and in chlorinated solvents (Anonymous 1998; EPA 1985a).

Formerly, 1,2-dichloroethane was used in varnish and finish removers, in soaps and scouring compounds, in organic synthesis for extraction and cleaning purposes, in metal degreasers, in ore flotation, and in paints, coatings, and adhesives (Archer 1979; Budavari et al. 1996; Dow Chemical Company 1989b; EPA 1985a). It was also formerly used as a grain, household, and soil fumigant (Archer 1979; CMA 1989; Dow Chemical Company 1989b; EPA 1985a; Vulcan Materials Company 1989).

5.4 DISPOSAL

1,2-Dichloroethane can be removed from water by treatment with granulated activated carbon, by aeration (air stripping), and by boiling. One of the main drawbacks of granulated activated carbon removal is that the spent carbon must be further processed by desorbing the chemical with steam or thermal carbon regeneration and concomitant incineration of the desorbed chemicals. Recently, granulated active carbon treatment has been combined with bioremediation technologies to increase the removal capacity of 1,2-dichloroethane from groundwater (Stucki and Thuer 1994). Boiling is an effective treatment on a short-term emergency basis when low concentrations are spilled in water. Air stripping removes 1,2-dichloroethane simply and inexpensively from water. However, these processes should be used with caution, as they result in the transfer of the contaminant directly to air (EPA 1985a, 1987d).