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

4.1 PRODUCTION

1,1-dichloroethene does not occur naturally (EPA 1985a), but it is found as the result of the breakdown of polyvinylidene chloride products in landfills. It is produced commercially by the dehydrochlorination of 1,1,2-trichloroethane with excess lime or caustic. As an inhibitor of the polymerization reaction, 200 ppm γ-hydroxyanisole is added, then later removed by distillation or washing (Grayson 1985). Typically, a commercial grade contains 99.8% 1,1-dichloroethene (EPA 1985a).

1,1-dichloroethene polymerizes after the addition of an initiator by either an ionic or a free radial reaction. 1,1-dichloroethene can polymerize spontaneously at room temperature following addition of peroxides (Grayson 1985).

1,1-dichloroethene is manufactured in chemical plants located in Texas and Louisiana. Currently, there are two major producers, Dow Chemical and Pittsburgh Paint and Glass (PPG) Industries (Burke 1987; EPA 1977; SRI 1991). Production capacity in 1985 was 178 million pounds/year (EPA 1985a). This has decreased from 1977, when production capacity was estimated at 270 million pounds (EPA 1977). In 1988, plant capacity at PPG Industries was estimated at 64 million pounds/year (PPG Industries 1988). Estimated 1989 production is 230 million pounds (CMA 1989).

According to the 1991 Toxic Chemical Release Inventory (TRI), 23 facilities manufactured or processed 1,1-dichloroethene in 1991 (TRI91 1993). All 23 of these facilities reported the maximum amount of 1,1-dichloroethene that they would have on site. These data are listed in Table 4-l. The TRI data should be used with caution since only certain types of facilities are required to report.. This is not an exhaustive list.

TABLE 4-1. Facilities That Manufacture or Process 1,1-Dichloroethene[a]

Facility	Location[b]	Range of maximum amounts on site in pounds	Activities and uses
3M	DECATUR, AL	1,000-9,999	As a reactant
MONSANTO CO. CHEMICAL GROUP	DECATUR, AL	100,000-999,999	As a reactant
EASTMAN KODAK CO. KODAK COLORADO DIV.	WINDSOR, CO	1,000-9,999	As a reactant
DOW CHEMICAL DALTON SITE	DALTON, GA	0-99	As a reactant
MORTON INTERNATIONAL INC. (RIN)	RINGWOOD, IL	1,000,000-9,999,999	As a reactant
BF GOODRICH CO. LOUISVILLE PLANT	LOUISVILLE, KY	10,000-99,999	As a reactant
W. R. GRACE & CO.	OWENSBORO, KY	100,000-999,999	As a reactant
MARINE SHALE PROCESSORS INC.	AMELIA, LA	10,000-99,999	As a reactant
VULCAN MATERIALS CO. CHEMICAL DIV.	GEISMAR, LA	10,000-99,999	Produce; as a byproduct; as an impurity; as a reactant
DOW CHEMICAL CO. LOUISIANA DIV.	PLAQUEMINE, LA	1,000-9,999	Produce; as a byproduct; as a reactant; in ancillary or other uses
PPG INDUSTRIES INC.	WESTLAKE, LA	10,000,000-49,999,999	Produce; for sale/distribution; as a byproduct; as an impurity
DOW CHEMICAL USA MIDLAND SITE	MIDLAND, MI	10,000,000-49,999,999	As a reactant; in ancillary or other uses
RHONE-POULENC INC. WALSH DIV.	GASTONIA, NC	10,000-99,999	As a reactant
ALLIED-SIGNAL INC. ELIZABETH	ELIZABETH, NJ	10,000-99,999	As a reactant
DU PONT PARLIN PLANT IMAGING SYSTEMS DEPT.	PARLIN, NJ	1,000-9,999	As a reactant
ALLIED-SIGNAL INC.	BUFFALO, NY	10,000,000-49,999,999	As a reactant
EASTMAN KODAK CO. KODAK PARK	ROCHESTER, NY	1,000-9,999	As a reactant
GENCORP POLYMER PRODUCTS LATEX	MOGADORE, OH	100,000-999,999	As a reactant
OCCIDENTAL CHEMICAL CORP. VCM PLANT	DEER PARK, TX	10,000-99,999	Produce; as a byproduct
DOW CHEMICAL CO. TEXAS OPERATIONS	FREEPORT, TX	1,000,000-9,999,999	Produce; for sale/distribution; as a byproduct; as an impurity; in repackaging; as a processing aid; in ancillary or other uses
OCCIDENTAL CHEMICAL CORP. CORPUS CHRISTI PLANT	GREGORY, TX	100-999	Produce; as a byproduct
HERCULES INC.	COVINGTON, VA	100,000-999,999	As a reactant
ARCO CHEMICAL CO.	SOUTH CHARLESTON, WV	100,000-999,999	As a reactant

[a]Derived from TRI91 (1993)
[b]Post Office state abbreviations used

4.2 IMPORT/EXPORT

In 1986, 217,000,000 pounds of 1,1-dichloroethene were imported into the United States (SRI 1987). No data are available on the export levels.

4.3 USE

Monomeric 1,1-dichloroethene is used as an intermediate for captive organic chemical synthesis and in the production of polyvinylidene chloride copolymers. These polymers, which have been commercially important since their introduction in the early 1940s are used extensively in many types of flexible packing materials (including barrier, multilayer, and monolayer), as flame retardant coatings for fiber and carpet backing, and in piping, coating for steel pipes, and adhesive applications (EPA 1977). The major application of polyvinylidene chloride copolymers is the production of flexible films for food packaging (SARAN and VELON wraps). 1,1-dichloroethene is found in many food and other packaging materials. At one time, SARAN wrap was found to contain up to 30 ppm 1,1-dichloroethene (Birkel et al. 1977). The plastic packaging films can contain no more than 10 ppm 1,1-dichloroethene (FDA 1988). The coating applicable to fresh citrus fruit (minimum amount required for intended use) is <25% aqueous solution (FDA 1982). Because of the instability of the polymer, 1,1-dichloroethene is usually used as a copolymer with acrylonitrile, vinyl chloride, methacrylonitrile, and methacrylate (Grayson 1985; Rossberg et al. 1986).

4.4 DISPOSAL

1,1-dichloroethene is classified as a llammable liquid (Weiss 1986). As such, the EPA (1987a) requires compliance with the regulations of the Resource Conservation and Recovery Act (RCRA) when producing, treating, transporting, storing, or disposing of this substance. Current disposal regulations of 1,1-dichloroethene require dissolving it in combustible solvents and scatter spraying the solvent into a furnace with an afterburner and alkaline scrubber. However, the criteria for land treatment and burial is undergoing significant revision (HSDB 1992). The waste mother liquor probably contains higher concentrations (>200 ppm) of the inhibitor, MEHQ.