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

4.1 PRODUCTION

1,2-Dichloroethene has been produced as a commercial end product by the direct chlorination of acetylene at about 40 °C or by a technique involving the dehydrochlorination of l,l,2trichloroethane at 500 °C (HSDB 1995). Such commercial preparations are mixtures of cis- and trans-l,2dichloroethene. The trans isomer is preferred in most industrial applications, which has tended to limit sales of the commercially available mixtures (HSDB 1995). 1,2-Dichloroethene is highly flammable and extremely corrosive, and yields the explosive compound chloroacetylene in the presence of copper or heated alkaline solutions (HSDB 1995).

Industrial quantities of 1,2-dichloroethene are produced for on-site use in the production of other chlorinated compounds, which are the final commercial product. Columbia Organics of South Carolina, and Aldrich Chemical of Milwaukee, Wisconsin, sell research quantities of 1,2-dichloroethene (cis, trans, and mixture); Columbia Organics also sells cis-1,2-dichloroethene in 55-gallon drums (Kuney 1988; Van 1988). Complete data about the volume and trends of 1,2-dichloroethene production in the United States are not available (HSDB 1995). As with many chemicals, especially those whose production or use involves proprietary information, quantitative estimates of production are virtually impossible to obtain (Bason and Colbom 1992). Table 4-l lists the facilities in each state that manufacture or process 1,2-dichloroethene, the intended use, and the range of maximum amount of 1,2-dichloroethene that is stored at the site. The data listed in Table 4-l are derived from the Toxics Release Inventory (TR193 1995). Only certain types of facilities were required to report and therefore this is not an exhaustive list. Twelve facilities were identified as producers or processors of 1,2-dichloroethene, with most of the producers located in Gulf Coast states (Louisiana and Texas).

4.2 IMPORT/EXPORT

No data were found on U.S. imports or exports of 1,2-dichloroethene (HSDB 1995).

Table 4-1. Facilities That Manufacture or Process 1,2-Dichloroethene

Facility	Location[a]	Range of maximum amounts on site in pounds	Activities and uses
VULCAN CHEMICALS	WICHITA, KS	10,000-99,999	Produce; As a by-product; As a reactant
WESTLAKE MONOMERS CORP.	CALVERT CITY, KY	100,000-999,999	Produce; For on-site use/processing; As a reactant
VULCAN MATERIALS CO.	GEISMAR, LA	1,000-9,999	Produce; For on-site use/processing; As a by-product; As an impurity; As a reactant
NA	LA	100,000-999,999	Produce; As a by-product
PPG IND. INC.	LAKE CHARLES, LA	100,000-999,999	Produce; For sale/distribution; As a by-product; As an impurity
NA	LA	100,000-999,999	Produce; As a by-product
DOW CHEMICAL CO.	LA	10,000-99,999	Produce; As a by-product; As an impurity
DOW CHEMICAL CO.	FREEPORT, TX	100,000-999,999	Produce; For on-site use/processing; As a by-product; As an impurity; As a chemical processing aid
UNION CARBIDE CORP.	TEXAS CITY, TX	No Data	Produce; As a by-product
OCCIDENTAL PETROLEUM CORP.	TX	10,000-99,999	Produce; As a by-product
GEON CO.	LA PORTE, TX	1,000-9,999	Produce
OCCIDENTAL PETROLEUM CORP.	TX	10,000-99,999	Produce; As a by-product

Source: TRI93 1995

[a] Post office state abbreviations used

NA = not available

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4.3 USE

1,2-Dichloroethene is used primarily as a chemical intermediate in the synthesis of chlorinated solvents and compounds. It has also been used as a solvent for waxes, resins, acetylcellulose, perfumes, dyes, lacquers, thermoplastics, fats, and phenols. It is used in the extraction of rubber, as a refrigerant, in the manufacture of pharmaceuticals and artificial pearls, and in the extraction of oils and fats from fish and meat (HSDB 1995). It has also been used as a low-temperature extraction solvent for organic materials such as decaffeinated coffee (HSDB 1995). No information is available about how much, if any, 1,2-dichloroethene is currently used for solvent purposes. The trans isomer is more widely used in industry than either the cis isomer or the commercial mixture (Gosselin et a1.1984).

4.4 DISPOSAL

1,2-Dichloroethene may be released from industries in waste water streams; however, these compounds can be removed from waste water by air stripping (Dilling 1977; Gossett 1987; Shen 1982a). Improved waste water treatment methods at publicly owned treatment works (POTWs) now use air stripping processes to remove most 1,2-dichloroethene and other volatile organic compounds (VOCs) from final effluents and deposit them in sludges or release them in air emissions (Bennett 1989). Product residues and sorbent media containing 1,2-dichloroethene may be packaged in epoxy-lined drums and disposed of at an EPA-approved landfill (OHM/TADS 1988). 1,2-Dichloroethene is a potential candidate for rotary kiln incineration at 820-1,600 °C with residence times of seconds for liquids and gases, and longer for solids; fluidized bed incineration at 450-980 °C with residence times of seconds for liquids and gases, and longer for solids; and liquid injection incineration at 650-1,600 °C with residence times of 0.1-2 seconds (HSDB 1995). Care must be exercised to assure complete combustion to prevent the formation of phosgene. Acid scrubbers are required to control air emissions. Information regarding the amount disposed of by each method is not available.

Experiments using a vacuum-ultraviolet excimer flow-through reactor to degrade chloro-organic compounds in water have had promising results (Baum and Oppenlander 1995). After 60 minutes of irradiation at 172 nm, the level of 1,2-dichloroethene in contaminated groundwater was reduced from 25 mg/L to below the detection limit of 0.1 mg/L. After 180 minutes of irradiation, more than 93% of the originally organic- bound chlorine atoms were converted to inorganic chloride ions.

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

The EPA has identified trans- 1,2dichloroethene as a hazardous waste; its disposal is regulated under the Resource Conservation and Recovery Act (RCRA). Cis-1,2-dichloroethene has not been identified as a hazardous waste by the EPA. Specific information on federal regulations concerning hazardous waste disposal by land treatment, landfilling, incineration, thermal treatment, chemical/physical/biological treatment, underground injection and deep sea injection appears in the Code of Federal Regulations (40 CFR 190 to 399). Release of trans-1,2-dichloroethene in waste water is regulated under the Clean Water Act by the National Pollutant Discharge Elimination System (NPDES). Information regarding effluent guidelines and standards for trans-1 ,2dichloroethene can be found in 40 CFR 122, 40 CFR 125, 40 CFR 413.02(i), 40 CFR 414, and 40 CFR 433.11(e).

Pursuant to RCRA Section 3004(g)(5), EPA has restricted the land disposal of trans-1,2-dichloroethene (EPA 1988b). It may be disposed on land only if prior treatment standards have been met, or if disposal occurs in units that satisfy the statutory no-migration standard (EPA 1988b). Proper guidelines and standards are outlined in the Code of Federal Regulations (EPA 1988b). Current criteria for land treatment or burial are subject to significant revision; prior to implementing land disposal of waste residue (including waste sludge) environmental regulatory agencies should be consulted for guidance on acceptable disposal practices (HSDB 1995; OHM/TADS 1988).

Rules and regulations regarding disposal practices are discussed in Chapter 7.