

5. POTENTIAL FOR HUMAN EXPOSURE

5.1 OVERVIEW

1,2-Dibromoethane has historically been released to the environment mainly as a result of its use as a gasoline additive and fumigant. 1,2-Dibromoethane partitions to the atmosphere and groundwater. The compound can be transported over long distances in the atmosphere, and is very mobile in soils. 1,2-Dibromoethane is transformed in the atmosphere by reaction with hydroxyl radicals and in soils by biodegradation. As a result of its high water solubility, the compound is not expected to bioconcentrate or biomagnify in food chains. Residual 1,2-dibromoethane bound to soil micropores is relatively immobile and resistant to degradation. This material is present in ppb concentrations and may be slowly leached from soil micropores over years to contaminate groundwater. If the micropores are disturbed and crushed, there is a greater likelihood of releasing the bound 1,2-dibromoethane. The compound persists in soils and groundwater.

The most important route of exposure to 1,2-dibromoethane for most members of the general population is ingestion of contaminated drinking water. Individuals living in the vicinity of hazardous waste sites contaminated with 1,2-dibromoethane may be exposed to higher concentrations of the compound.

EPA has identified 1,177 NPL sites. 1,2-Dibromoethane has been found at 9 of the total number of sites evaluated for that compound. We do not know how many of the 1,177 sites have been evaluated for 1,2-dibromoethane. As more sites are evaluated by EPA; this number may change (View 1989). The frequency of these sites within the United States can be seen in Figure 5-1.

5.2 RELEASES TO THE ENVIRONMENT

1,2-Dibromoethane has been widely released to the environment mainly as a result of the historical use of the compound as a gasoline additive and a fumigant (Fishbein 1979). The compound has also been released from industrial processing facilities. For example, 1,2-dibromoethane was found in air, water, soil, and sediment samples taken near industrial bromine facilities in El Dorado and Magnolia, Arkansas, in 1977 (Pellizzari et al. 1978).

According to the SARA Section 313 Toxics Release Inventory (TRI), an estimated total of at least 152,634 pounds of 1,2-dibromoethane were released to the environment from manufacturing and processing facilities in the United States in 1987 (see Table 5-1). This total includes an estimated 44 pounds that were released through underground injection. The TRI data should be used with caution since the 1987 data represent first-time reporting by these facilities. Only certain types of facilities were required to report. This is not an exhaustive list.

TABLE 5-1. Releases to the Environment from Facilities
That Manufacture or Process 1,2-Dibromoethane*

Facility	Location	Total (lbs)						
		Air	Underground injection	Water	Land	Environment	POTW ^b transfer	Off-site transfer
Great Lakes Chemical Co. El Dorado-Main Plant	El Dorado, AR	9,700	0	0	0	9,700	0	14,000
Great Lakes Chemical Corp. South Plant	El Dorado, AR	3,700	44	0	0	3,744	0	0
Ethyl Corporation	Magnolia, AR	18,100	0	0	0	18,100	0	23,300
Texaco Ref. 7 Mktg., Inc.	Bakersfield, CA	150	0	0	0	150	0	0
Exxon Co. USA. Benicia Refinery	Benicia, CA	0	0	0	0	0	0	0
Arco Products Company Los Angeles Refinery	Carson, CA	60	0	0	0	60	0	0
Shell Oil Company	Carson, CA	145	0	0	0	145	0	0
Shell Oil Company	Carson, CA	71	0	0	0	71	0	0
Chevron U.S.A. Inc.	El Segundo, CA	13	0	90	250	353	1	1
Tosco Corporation	Martinez, CA	500	No Data	250	250	1,000	No Data	0
Chevron Research Company Richmond Research Center	Richmond, CA	0	0	0	0	0	0	0
Chevron U.S.A. Inc. Richmond Refinery	Richmond, CA	500	0	0	0	500	No Data	0
Mobil Oil Corporation Torrance Refinery	Torrance, CA	500	0	0	0	500	250	0
Texaco Ref. & Mktg., Inc.	Wilmington, CA	50	0	2	0	52	2	0
Chevron U.S.A. Inc. Hawaiian Refinery	Ewa Beach, HI	500	No Data	250	0	750	0	0
Shell Oil Company	Roxana, IL	0	0	0	0	0	0	0
Rock Island Refining Corporation	Indianapolis, IN	250	0	0	250	500	0	250
Ethyl Process Development Center	Baton Rouge, LA	5,500	0	250	0	5,750	0	0
Exxon Baton Rouge Refinery	Baton Rouge, LA	18	0	0	0	18	0	0

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TABLE 5-1 (Continued)

Facility	Location	Total (lbs)						
		Air	Underground injection	Water	Land	Environment	POTW ^b transfer	Off-site transfer
Alliance Refinery - Bp America	Belle Chasse, LA	750	0	0	0	750	0	0
Tenneco Oil Company	Chalmette, LA	4	0	0	0	4	No Data	0
Marathon Petroleum Company	Garyville, LA	750	0	0	0	750	0	0
Placid Refining Company	Port Allen, LA	4	No Data	0	0	4	0	0
Marathon Petroleum Company	Detroit, MI	0	0	0	0	0	0	0
Koch Refining Company	Saint Paul, MN	12	0	0	0	12	0	0
Chevron U.S.A. Inc. Pascagoula Refinery	Pascagoula, MS	500	0	92	250	842	0	0
Du Pont Chambers Works	Deepwater, NJ	6,060	0	0	700	6,760	No Data	No Data
Diaz Chemical Corporation	Holley, NY	500	0	0	0	500	250	1,700
Shell Chemical Company	Belpre, OH	13,000	0	0	0	13,000	0	360
Sun Refinery And Marketing Co.	Oregon, OH	250	0	0	0	250	0	0
Sun Refining And Marketing Co.	Tulsa, OK	0	0	0	0	0	0	0
Kerr-Mcgee Refining Corp.	Wynnewood, OK	250	0	0	0	250	0	0
Chevron U.S.A. Inc.	Philadelphia, PA	500	0	0	0	500	0	0
Exxon Baytown Refinery	Baytown, TX	0	0	0	0	0	0	0
Du Pont Beaumont Works	Beaumont, TX	400	0	0	No Data	400	No Data	200
Chevron U.S.A. Inc. El Paso Refinery	El Paso, TX	250	0	0	0	250	0	0
Ethyl Corporation Houston Plant	Pasadena, TX	1,200	0	0	0	1,200	0	250
Chevron U.S.A. Inc. Port Arthur Refinery	Port Arthur, TX	250	0	0	0	250	0	0
Diamond Shamrock Refining And Marketing Company	Sunray, TX	0	0	0	0	0	0	0

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TABLE 5-1 (Continued)

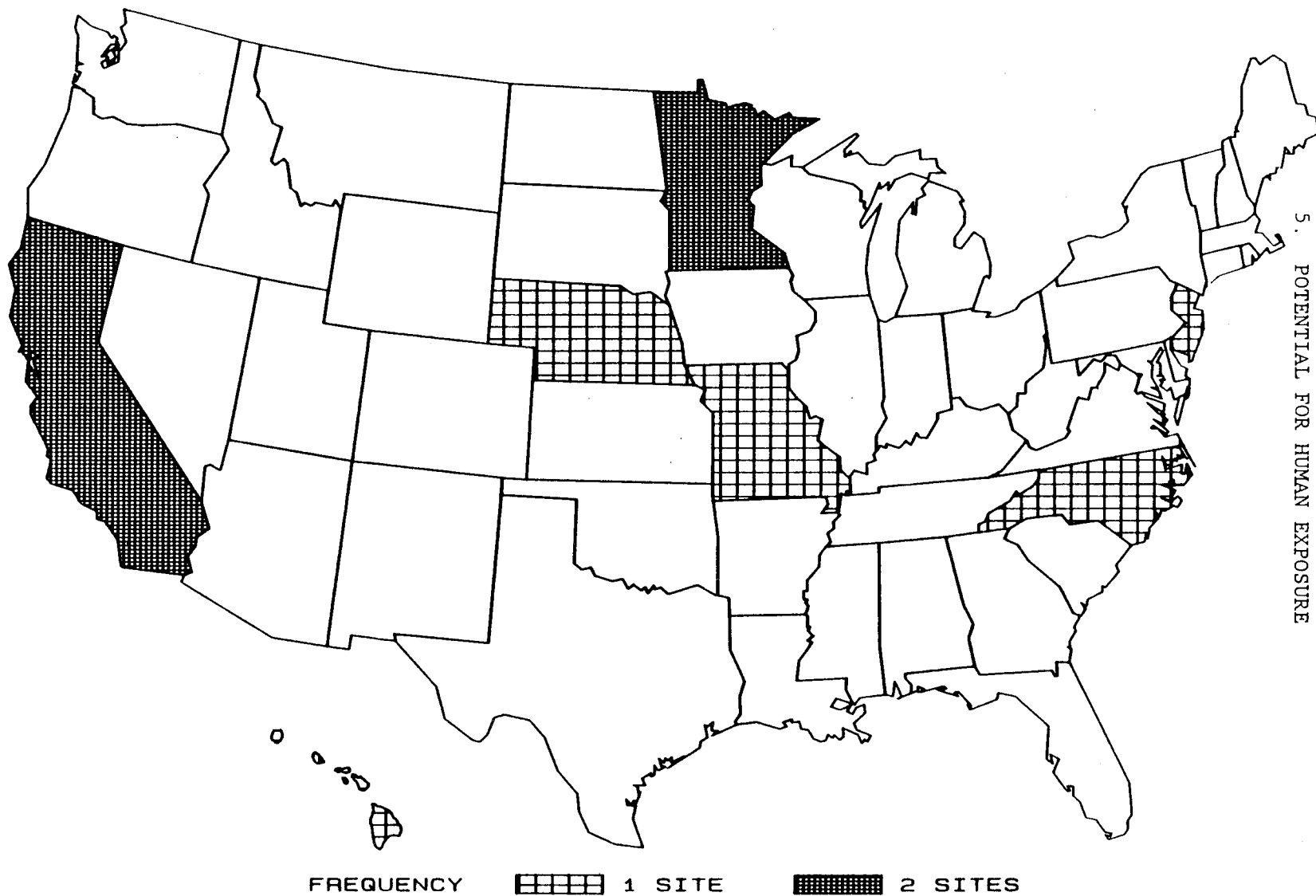
Facility	Location	Total (lbs)						
		Air	Underground injection	Water	Land	Environment	POTW ^b transfer	Off-site transfer
Phillips 66 Company Sweeny Refinery And Petrochemical	Sweeny, TX	2	0	0	0	2	0	37
Marathon Petroleum Company	Texas City, TX	1,300	0	0	0	1,300	0	0
Diamond Shamrock Refining And Marketing Company	Three Rivers, TX	1	0	0	2	3	0	2
Totals		65740	44	934	1702	68420	503	40100

*Derived from TRI87 1989

^bPOTW -- publicly owned treatment works

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FIGURE 5-1. FREQUENCY OF NPL SITES WITH 1,2-DIBROMOETHANE CONTAMINATION *



* Derived from View 1989

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Class and Ballschmitter (1988) suggested that 1,2-dibromoethane may be produced naturally in sea water from a dibromomethane precursor via a halogen exchange reaction. The dibromomethane is produced by brown algae via haloperoxidase enzymes and released to sea water.

5.2.1 Air

1,2-Dibromoethane releases to the atmosphere historically have been due to fugitive emissions from leaded gasolines, automobile exhaust, and the former use of the compound as a fumigant (Fishbein 1979).

An estimated total of at least 149,854 pounds of 1,2-dibromoethane was released to the atmosphere from manufacturing and processing facilities in the United States in 1987 (TR187 1989) (see Table 5-1).

5.2.2 Water

The use of 1,2-dibromoethane as a solvent and chemical intermediate has led to release of the compound to surface waters in industrial process effluents (Fishbein 1979).

An estimated total of at least 1,034 pounds of 1,2-dibromoethane was released to surface waters from manufacturing and processing facilities in the United States in 1987 (TR187 1989) (see Table 5-1).

1,2-Dibromoethane has been detected in an estimated 0.23% of the groundwater samples analyzed for the 2,783 hazardous waste sites participating in the Contract Laboratory Program (CLP); a positive geometric mean concentration value was not reported. 1,2-Dibromoethane has not been detected in surface water samples taken at hazardous waste sites (CLPSD 1988). Note that the CLP Statistical Database (CLPSD) includes data from both NPL and non-NPL sites.

5.2.3 Soil

The main sources of 1,2-dibromoethane release to soils appear to be the historical use of the compound as a soil fumigant and land disposal of wastes containing the compound.

An estimated total of at least 1,702 pounds of 1,2-dibromoethane was released to soils from manufacturing and processing facilities in the United States in 1987 (TR187 1989) (see Table 5-1).

1,2-Dibromoethane has been detected in an estimated 0.12% of the soil samples collected from the 2,783 hazardous waste sites that have had samples analyzed by the CLP; a positive geometric concentration value was not reported (CLPSD 1988). Note that the CLPSD includes data from both NPL and non-NPL sites.

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5.3 ENVIRONMENTAL FATE

5.3.1 Transport and Partitioning

The vapor pressure (11 mmHg at 25°C) of 1,2-dibromoethane suggests that the compound readily partitions to the atmosphere following release to surface water and soils. As the data in Section 5.4.1 indicate, 1,2-dibromoethane can be transported for long distances in the atmosphere before removal in wet and dry deposition or degradation.

Volatilization is the most important removal process for 1,2-dibromoethane released to surface waters. Volatilization half-lives of 1-16 days have been estimated for flowing and standing surface waters. Sorption to sediment or suspended particulate material is not expected to be an important process (EPA 1987a, 1987b; HSDB 1989).

As a result of its low sorption potential, high vapor pressure, and high water solubility, 1,2-dibromoethane is rapidly lost from soils by volatilization to the atmosphere or leaching to surface water and groundwater (EPA 1987a). In studies with two silty clay loam soils and cation saturated montmorillonite clays, a maximum of only 4% of applied 1,2-dibromoethane was found to be sorbed to soil particulates; an experimental soil sorption coefficient (K_{oc}) value of 66 was reported (Rogers and McFarlane 1981). However, Steinberg et al. (1987) have reported that a small fraction of 1,2-dibromoethane released to soils (that is not rapidly volatilized, leached, or degraded) is sorbed strongly to soil micropores where it persists for long periods of time, resistant to mobilization and degradation. This residual 1,2-dibromoethane may slowly leach (half-life = years) from micropore sites to contaminate groundwater.

As a result of its high water solubility, 1,2-dibromoethane is not expected to bioconcentrate or biomagnify in terrestrial and aquatic food chains.

5.3.2 Transformation and Degradation

5.3.2.1 Air

Direct photolysis of 1,2-dibromoethane in the troposphere is not expected to occur (Jaber et al. 1984). 1,2-Dibromoethane reacts with hydroxyl radicals in the atmosphere; the half-life for the reaction has been estimated to be about 40 days (EPA 1987a).

5.3.2.2 Water

Biotic and abiotic degradation of 1,2-dibromoethane in surface waters is slow relative to volatilization of the compound to the atmosphere (EPA 1987b). 1,2-Dibromoethane is resistant to hydrolysis (Jaber et al. 1984); the

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hydrolytic half-life of the compound has been reported to range from 2.5 years (Vogel and Reinhard 1982) to 13.2 years (HSDB 1989). As a result of its hydrolytic stability and the limited biological activity in subsurface soils, 1,2-dibromoethane leached to groundwater is expected to persist for years.

5.3.2.3 Soil

1,2-Dibromoethane undergoes biodegradation in aerobic surface soils; the rate has been reported to decrease with increasing concentrations of the compound (Pignatello 1986). Biodegradation appears to be limited under anaerobic conditions (Bouwer and McCarty 1983). Residual 1,2-dibromoethane sorbed to soil micropores is resistant to biodegradation, chemical transformation, and mobilization; Steinberg et al. (1987) detected the compound in a surface soil 19 years after 1,2-dibromoethane had been applied for the last time as a fumigant.

5.4 LEVELS MONITORED OR ESTIMATED IN THE ENVIRONMENT

As a result of its persistence in soil and groundwater, and past widespread use as a gasoline additive and fumigant, 1,2-dibromoethane has been detected in ambient air, soils, groundwater, and food. However, most of the monitoring data reported in this section, although the latest available, are not current. Volatilization is the most important removal process for 1,2-dibromoethane released to surface waters. Since only a small fraction of the compound is sorbed to soil, sorption to sediment and subsequent persistence in sediment is not expected to be an important process in the removal of 1,2-dibromoethane from the environment. The data may reflect ambient concentrations of a decade or more ago, but because of the phaseout of the use of leaded gasoline and the ban on fumigant uses of 1,2-dibromoethane, current ambient media concentrations, with the potential exception of groundwater concentrations, are expected to be much lower than the levels reported here.

5.4.1 Air

1,2-Dibromoethane has been detected in ambient air samples collected at a number of sites in the United States. In a review of available monitoring data for volatile organic compounds, Brodzinsky and Singh (1983) reported the following median concentrations of 1,2-dibromoethane in ambient air samples in the United States: rural and remote areas--less than detection limit; urban and suburban areas--2.6 parts per trillion (ppt); and source-dominated areas--1.9 ppt. Typical daily concentrations at four sites in the metropolitan Los Angeles area in 1983 were reported to range from less than 5 ppt to 17 ppt (Kowalski et al. 1985b). Ambient air concentrations for other metropolitan areas in the United States in 1980 were reported by Singh et al. (1981) as follows:

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1,2-Dibromoethane (ppt)

<u>Location</u>	<u>Mean</u>	<u>Range</u>
Houston, TX	59	10-368
St. Louis, MO	16	8-26
Denver, CO	31	10-78
Riverside, CA	22	10-47

1,2-Dibromoethane has also been detected in ambient air samples collected at two hazardous waste sites in New Jersey at geometric mean concentrations of 20-50 ppt; the maximum value reported was 6,710 ppt (La Regina et al. 1986).

Long-range transport of 1,2-dibromoethane from industrialized areas may have been the source of the compound found in ambient air samples collected in the Arctic by Rasmussen and Khalil (1984). 1,2-Dibromoethane concentrations in the 1983 study were reported to range from 1.0 to 1.9 ppt.

Natural production was speculated to be the source of 1,2-dibromoethane found in ambient air samples collected from open areas of the North and South Atlantic Ocean by Class and Ballschmitter (1988); concentration levels were reported to be less than 0.001-0.003 ppt.

5.4.2 Water

As a result of its volatility, 1,2-dibromoethane has been detected at only low levels in surface water samples collected in the United States. Ewing et al. (1977) reported that 1,2-dibromoethane was detected (i.e., concentrations greater than 1,000 ppt) in only 2 of 204 surface water samples collected near heavily industrialized sites throughout the country. 1,2-Dibromoethane was detected at a maximum concentration of 200 ppt in 11 of 175 surface water samples collected in New Jersey from 1977 to 1979 (Page 1981). However, the compound has been widely detected in groundwater samples collected in the United States. States with reported 1,2-dibromoethane groundwater contamination problems include Wisconsin (Krill et al. 1986), Hawaii (Oki and Giambelluca 1987), New Jersey (maximum concentration of 48,800 ppt in 34 of 421 samples) (Page 1981), and Georgia (1,000-94,000 ppt) (Marti et al. 1984). According to the interim data available in the Pesticides in Ground Water Data Base, 1,2-dibromoethane detection in groundwater has been confirmed in six states: California, Connecticut, Georgia, Massachusetts, New York, and Washington. The median and maximum concentrations reported were 900 and 14,000 ppt, respectively (Williams et al. 1988).

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Class and Ballschmitter (1988) suggested that brown algae may be the source of the <0.01-0.03 ppt of 1,2-dibromoethane found in the marine water samples collected from the North and South Atlantic Oceans.

5.4.3 Soil

No information was found in the literature regarding current ambient concentrations of 1,2-dibromoethane in surface soils in the United States.

5.4.4 Other Environmental Media

1,2-Dibromoethane residues in foods have decreased since the use of the compound as a fumigant was banned by EPA. For example, Daft (1989) reported finding 1,2-dibromoethane in only 2 of 549 samples of fatty and nonfatty foods analyzed for fumigant residues in a recent survey. 1,2-Dibromoethane was detected in samples of peanut butter and whiskey at a mean concentration of 7 µg/g (range 2-11 ng/g). Historical foodstuff residue levels have been reviewed by EPA (1983).

5.5 GENERAL POPULATION AND OCCUPATIONAL EXPOSURE

Current human exposure to 1,2-dibromoethane for most members of the general population appears to be limited to ingestion of low levels of the compound in contaminated drinking water. According to EPA (1985), daily intake from drinking water has been estimated to range from 0 to 16 µg/kg/day. Ingestion of contaminated foodstuffs does not appear to be an important source of exposure; EPA (1983) estimated that the maximum intake of 1,2-dibromoethane from contaminated foods was 0.09 µg/kg/day. Average inhalation of ambient air also appears to be of less importance than ingestion of groundwater, although the available data are not current and variable. Daily respiratory intake was estimated by EPA (1985) to range from 0 to 79 µg/kg/day. Average inhalation exposures in four metropolitan areas of the United States in 1980 were estimated by Singh et al. (1981) to range from 2.8 to 9.9 µg/day (or 0.04-0.14 µg/kg/day for a 70-kg human). However, inhalation of 1,2-dibromoethane released to indoor air from contaminated groundwater (e.g., during showering) may be an important source of human exposure. For example, McKone (1987) modeled the mass transfer of several volatile organic compounds, including 1,2-dibromoethane, from water to air and calculated a maximum concentration of 1,2-dibromoethane in household air of 2.4×10^{-4} mg/L, assuming a tap water concentration of 1 mg/L.

Exposure of the general population to higher concentrations of 1,2-dibromoethane may result from contact with contaminated hazardous waste site media, principally soils and groundwater. No information was found in the available literature regarding the size of the human population potentially exposed to 1,2-dibromoethane through contact with contaminated waste site media.

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In occupational settings, current exposures are expected to be substantially reduced from historical levels (Santodonato et al. 1985). The large numbers of people exposed to 1,2-dibromoethane in the workplace through its manufacture and use as a gasoline additive and fumigant have decreased as these uses of the compound have been limited. NIOSH (1977) estimated that as many as 108,000 workers were potentially exposed to 1,2-dibromoethane during production and fumigant related uses, and an additional 875,000 workers were exposed to lower levels of the compound through its use in leaded gasoline. Current exposure levels are also expected to be substantially reduced from the historical inhalation and dermal exposures reported in manufacturing and processing facilities by Rumsey and Tanita (1978) and in fumigation operations reviewed by EPA (1983).

5.6 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES

Members of the general population with potentially high exposure to 1,2-dibromoethane include individuals living near the nine NPL sites currently known to be contaminated with the compound. The size of the population and the concentrations of 1,2-dibromoethane in all of the contaminated media to which these people are potentially exposed have not been completely characterized. Other populations with potentially high exposures to 1,2-dibromoethane include individuals in the six states with confirmed groundwater contamination, and workers involved in the manufacture and continued use of 1,2-dibromoethane.

5.7 ADEQUACY OF THE DATABASE

Section 104(i)(5) of CERCLA as amended directs the Administrator of ATSDR (in consultation with the Administrator of EPA and agencies and programs of the Public Health Service) to assess whether adequate information on the health effects of 1,2-dibromoethane is available. Where adequate information is not available, ATSDR, in conjunction with the NTP, is required to assure the initiation of a program of research designed to determine the health effects (and techniques for developing methods to determine such health effects) of 1,2-dibromoethane.

The following categories of possible data needs have been identified by a joint team of scientists from ATSDR, NTP, and EPA. They are defined as substance-specific informational needs that, if met, would reduce or eliminate the uncertainties of human health assessment. In the future, the identified data needs will be evaluated and prioritized, and a substance-specific research agenda will be proposed.

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5.7.1 Data Needs

Physical and Chemical Properties. The physical/chemical properties of 1,2-dibromoethane, described in Table 3-2, are sufficiently well characterized to enable assessment of the environmental fate of the compound.

Production, Import/Export, Use, and Disposal. According to the Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. Section 11023, industries are required to submit chemical release and off-site transfer information to the EPA. The Toxic Release Inventory (TRI), which contains this information for 1987, became available in May of 1989. This database will be updated yearly and should provide a list of industrial production facilities and emissions.

Although 1,2-dibromoethane is currently produced and used in the United States, increased government regulation and restriction on products containing the compound probably have decreased the potential for exposure of the U.S. population (Fishbein 1980; Santodonato et al. 1985). The most recent information on the annual U.S. production of 1,2-dibromoethane is for 1982 (169.8 million pounds); this is lower than the average for the 1970s (280 million pounds) (Santodonato et al. 1985). The most recent import and export data are for 1980 (0.861 million pounds) and 1981 (29.8 million pounds), respectively; import volumes reportedly fluctuated between 1977 and 1981 and the 1981 export volume is substantially lower than that for 1978 (84.8 million pounds) (Santodonato et al. 1985). 1,2-Dibromoethane may be found in air and water as a result of its use, e.g., as a chemical intermediate, although its uses as a lead scavenger in gasoline and as a soil and grain fumigant have been decreased or eliminated by governmental regulation (Fishbein 1979, 1980; HSDB 1989; Santodonato et al. 1985; Stenger 1978). In addition, the general regulations governing organic pesticide disposal developed by EPA are applicable to 1,2-dibromoethane. It is disposed of mainly by incineration and by burial; however, the amounts disposed of by each method are not reported (HSDB 1989). Therefore, more recent production, import, export, use, and disposal volumes of 1,2-dibromoethane would be useful in assessing the potential for the release of, and exposure to, this chemical.

Information regarding the various modes of production, use, and disposal of 1,2-dibromoethane is well documented. However, more recent data describing present domestic production levels, the proportions of 1,2-dibromoethane consumed by the various uses, as well as data on export levels and the countries to which these exports are made would be helpful in providing a broader, more up-to-date picture of the U.S. 1,2-dibromoethane industry as a whole.

Environmental Fate. 1,2-Dibromoethane partitions to the atmosphere and groundwater (Windolz 1983). It is transported in the atmosphere where it undergoes degradation by hydroxyl radicals (EPA 1987a). 1,2-Dibromoethane is

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mobile and biodegradable in soils, although 1,2-dibromoethane sorbed to soil micropores is immobile and persistent (Pignatello 1986; Steinberg et al. 1987). 1,2-Dibromoethane is volatilized from surface waters before it can undergo degradation (EPA 1987b). Additional information is needed on the persistence of 1,2-dibromoethane in groundwater and sorbed to soil micropores. This information will be helpful in establishing the half-life of the compound in the media of most concern for human exposure.

Bioavailability from Environmental Media. 1,2-Dibromoethane can be absorbed by inhalation of contaminated ambient air, dermal contact, and ingestion of contaminated drinking water and foodstuffs (EPA 1983; Jakobson et al. 1982; Letz et al. 1984; Rowe et al. 1952; Saraswat et al. 1986; Stott and McKenna 1984). Ingestion of contaminated groundwater is the exposure route of concern at hazardous waste sites. Additional information is needed on the absorption of 1,2-dibromoethane from soil following ingestion or dermal contact. This information will be useful in determining the bioavailability of residual 1,2-dibromoethane in soils.

Food Chain Bioaccumulation. 1,2-Dibromoethane is not expected to bioconcentrate in plants, aquatic organisms, or animals, or biomagnify in terrestrial or aquatic food chains as a result of its high water solubility (NIOSH 1978; Parrish 1983). Additional information is needed on bioconcentration and biomagnification of the compound to confirm this predicted environmental behavior.

Exposure Levels in Environmental Media. 1,2-Dibromoethane has been detected in ambient air, groundwater, soils, and foodstuffs (Brodzinsky and Singh 1983; EPA 1983; Ewing et al. 1977; Daft 1989; Page 1981; Pellizzari et al. 1978; Singh et al. 1981; Williams et al. 1988). However, the monitoring data for these media are not current. Estimates of human intake have been made on the basis of these older data. Additional information is needed on the current levels of 1,2-dibromoethane in ambient air, soils, and groundwater and on human intake levels, particularly at the nine hazardous waste sites known to be contaminated with the compound. This information will be helpful in estimating human exposure to the compound via contact with contaminated media.

Exposure Levels in Humans. 1,2-Dibromoethane can be measured in blood and metabolites can be detected in urine (Letz et al. 1984; Nachtoml et al. 1965). However, since the compound is rapidly and extensively metabolized in mammals, and 1,2-dibromoethane metabolites do not persist in tissues, these biomarkers have not been useful in identifying or quantifying human exposure to the compound.

Exposure Registries. No exposure registries for 1,2-dibromoethane were located. This compound is not currently one of the compounds for which a subregistry has been established in the National Exposure Registry. The

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compound will be considered in the future when chemical selection is made for subregistries to be established. The information that is amassed in the National Exposure Registry facilitates the epidemiological research needed to assess adverse health outcomes that may be related to the exposure to this compound.

5.7.2 On-going Studies

As part of the Third National Health and Nutrition Evaluation Survey (NHANES III), the Environmental Health Laboratory Sciences Division of the National Center for Environmental Health and Injury Control, Centers for Disease Control, will be analyzing human blood samples for 1,2-dibromoethane and other volatile organic compounds. These data will give an indication of the frequency of occurrence and background levels of these compounds in the general population.

On-going remedial investigations and feasibility studies conducted at the nine NPL sites known to be contaminated with 1,2-dibromoethane will add to the available database on exposure levels in environmental media, exposure levels in humans, and exposure registries.