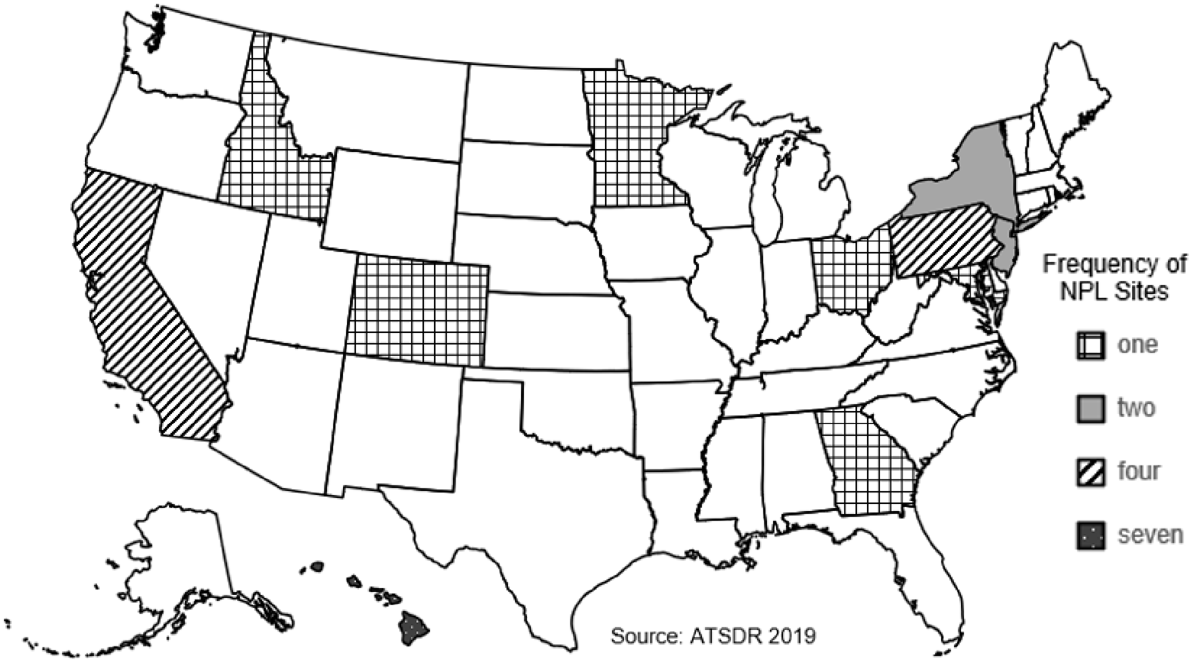
CHAPTER 5. POTENTIAL FOR HUMAN EXPOSURE

5.1 OVERVIEW

1,2,3-Trichloropropane has been identified in at least 25 of the 1,867 hazardous waste sites that have been proposed for inclusion on the EPA National Priorities List (NPL) (ATSDR 2019). However, the number of sites in which 1,2,3-trichloropropane has been evaluated is not known. The number of sites in each state is shown in Figure 5-1.

Figure 5-1. Number of NPL Sites with 1,2,3-Trichloropropane Contamination



Source: ATSDR 2019

- The most likely route of exposure for the general population is through ingestion of contaminated water. Additional exposure may occur through the inhalation of contaminated air, especially for those who live near facilities that manufacture or use 1,2,3-trichloropropane or at treatment or disposal facilities.

- Releases to the environment are likely to occur as a result of its manufacture, formulation, and use as a chemical intermediate.

- In ambient air, the primary removal process is expected to be the vapor phase reaction with photochemically generated hydroxyl radicals. In surface waters, the primary removal process is likely to be volatilization. In soil, the primary removal processes are volatilization from near-surface soil and leaching to groundwater. Aerobic biodegradation is probably a slow process in natural waters and soil.

5.2 PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

5.2.1 Production

1,2,3-Trichloropropane can be produced via the chlorination of propylene (Lewis 2007). Other reported methods for producing 1,2,3-trichloropropane include the addition of chlorine to allyl chloride, reaction of thionyl chloride with glycerol, and reaction of phosphorus pentachloride with either 1,3- or 2,3-dichloropropanol (NIOSH 1981; Williams 1949). 1,2,3-Trichloropropane also may be produced in potentially significant amounts as a byproduct of processes primarily used to produce other chemicals, including dichloropropene (a soil fumigant and nematocide), propylene chlorohydrin, propylene oxide, dichlorohydrin, and glycerol (Baier et al. 1987; NIOSH 1981). Technical-grade 1,2,3-trichloropropane reportedly varies between 97.5 and 99.4% purity (Albert 1982; Shell Oil 1983a). The material tested in Shell Oil (1983a) contained the following impurities: 0.066% water, 0.14% unspecified chlorohexene, two unspecified chlorohexadienes (0.24 and 0.13%), and total acidity of 48 ppm (as HCl). Table 5-1 summarizes information on U.S. companies that reported manufacturing, processing, or using 1,2,3-trichloropropane in 2018 (TRI18 2020).

Table 5-1. Facilities that Produce, Process, or Use 1,2,3-Trichloropropane

State[a]	Number of facilities	Minimum amount on site in pounds[b]	Maximum amount on site in pounds[b]	Activities and uses[c]
LA	2	0	9,999	1, 4, 5, 13
TX	2	100,000	999,999	1, 3, 4, 5, 6, 12, 13

[a] Post office state abbreviations used.
[b] Amounts on site reported by facilities in each state.
[c] Activities/Uses:

1. Produce
2. Import
3. Used Processing
4. Sale/Distribution
5. Byproduct
6. Reactant
7. Formulation Component
8. Article Component
9. Repackaging
10. Chemical Processing Aid
11. Manufacture Aid
12. Ancillary
13. Manufacture Impurity
14. Process Impurity

Source: TRI18 2020 (Data are from 2018)

5.2.2 Import/Export

No data concerning the import or export of 1,2,3-trichloropropane were located.

5.2.3 Use

1,2,3-Trichloropropane has, in the past, been used mainly as a solvent and extractive agent. No current information is available that indicates that the compound is still used for these purposes today. It dissolves a variety of resins, oils, waxes, and other materials while having a low solubility in water (Williams 1949). Common uses have included use as a paint and varnish remover, cleaning and degreasing agent, and cleaning and maintenance reagent (Lewis 2007; NIOSH 1981). It is used as a chemical intermediate (e.g., in the production of polysulfone liquid polymers and dichloropropene, the synthesis of hexafluoropropylene, and as a crosslinking agent in the synthesis of polysulfides) (Baier et al. 1987; Ellerstein and Bertozzi 1982; Gangal 1980; NLM 2020). No data were found concerning the approximate amounts currently used for particular purposes.

5.2.4 Disposal

1,2,3-Trichloropropane has been identified as a hazardous waste by the EPA, and the disposal of this compound is regulated under the Resource Conservation and Recovery Act (RCRA). Specific information regarding the federal regulations of land disposal of 1,2,3-trichloropropane is available (EPA 1988a). No data were found concerning the approximate amounts disposed by the various methods.

5.3 RELEASES TO THE ENVIRONMENT

The Toxics Release Inventory (TRI) data should be used with caution because only certain types of facilities are required to report (EPA 2005). This is not an exhaustive list. Manufacturing and processing facilities are required to report information to the TRI only if they employ ≥10 full-time employees; if their facility is included in Standard Industrial Classification (SIC) Codes 10 (except 1011, 1081, and 1094), 12 (except 1241), 20–39, 4911 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4953 (limited to facilities regulated under RCRA Subtitle C, 42 U.S.C. section 6921 et seq.), 5169, 5171, and 7389 (limited S.C. section 6921 et seq.), 5169, 5171, and 7389 (limited to facilities primarily engaged in solvents recovery services on a contract or fee basis); and if their facility produces, imports, or processes ≥25,000 pounds of any TRI chemical or otherwise uses >10,000 pounds of a TRI chemical in a calendar year (EPA 2005).

5.3.1 Air

Estimated releases of 957 pounds (~0.4 metric tons) of 1,2,3-trichloropropane to the atmosphere from 4 domestic manufacturing and processing facilities in 2018, accounted for about 44% of the estimated total environmental releases from facilities required to report to the TRI (TRI18 2020). These releases are summarized in Table 5-2.

Table 5-2. Releases to the Environment from Facilities that Produce, Process, or Use 1,2,3-Trichloropropane[a]

Reported amounts released in pounds per year[b]									
							Total release		
State[c]	RF[d]	Air[e]	Water[f]	UI[g]	Land[h]	Other[i]	On-site[j]	Off-site[k]	On- and off-site
LA	2	15	0	0	0	0	15	0	15
TX	2	942	1,199	0	10	0	2,151	0	2,151
Total	4	957	1,199	0	10	0	2,166	0	2,166

[a] The TRI data should be used with caution since only certain types of facilities are required to report. This is not an exhaustive list. Data are rounded to nearest whole number.
[b] Data in TRI are maximum amounts released by each facility.
[c] Post office state abbreviations are used.
[d] Number of reporting facilities.
[e] The sum of fugitive and point source releases are included in releases to air by a given facility.
[f] Surface water discharges, wastewater treatment-(metals only), and publicly owned treatment works (POTWs) (metal and metal compounds).
[g] Class I wells, Class II-V wells, and underground injection.
[h] Resource Conservation and Recovery Act (RCRA) subtitle C landfills; other onsite landfills, land treatment, surface impoundments, other land disposal, other landfills.
[i] Storage only, solidification/stabilization (metals only), other off-site management, transfers to waste broker for disposal, unknown.
[j] The sum of all releases of the chemical to air, land, water, and underground injection wells.
[k] Total amount of chemical transferred off-site, including to POTWs.

RF = reporting facilities; UI = underground injection

Source: TRI18 2020 (Data are from 2018)

Data on releases of 1,2,3-trichloropropane to the atmosphere are lacking. Based on the few data available, current releases to the air are expected to be relatively small. 1,2,3-Trichloropropane may have been released in the past into the air as a result of its use as a paint and varnish remover, a degreasing agent, and a cleaning and maintenance reagent (Hawley 1981; NIOSH 1981). No information was found that indicates that 1,2,3-trichloropropane is still used for these purposes today. Very small amounts may be released during its use as a chemical intermediate and as a result of its formation during the synthesis of other organic chemicals. Volatilization from contaminated surface waters, effluent waters, and near surface soils may also be minor atmospheric sources of this compound. This includes volatilization from identified and unidentified hazardous waste dumps that contain 1,2,3-trichloropropane and from farmland treated with 1,2,3-trichloropropane-contaminated fumigants and nematocides (no information is available to determine whether or not the soil fumigants and nematocides currently manufactured contain 1,2,3-trichloropropane). Small amounts may be released to the air during treatment of water containing 1,2,3-trichloropropane, because some of the chemical may be removed via evaporative stripping from the water.

5.3.2 Water

Estimated releases of 1,199 pounds (~0.5 metric ton) of 1,2,3-trichloropropane to surface water from 4 domestic manufacturing and processing facilities in 2018, accounted for about 55% of the estimated total environmental releases from facilities required to report to the TRI (TRI18 2020). These releases are summarized in Table 5-2.

Data on the release of 1,2,3-trichloropropane to environmental waters are lacking. Based on the few data available, current releases to environmental waters are expected to be relatively small. Releases to surface water may have occurred through runoff of wastewater from hazardous waste sites containing 1,2,3-trichloropropane and runoff from farmland treated with certain soil fumigants and nematocides that contain 1,2,3-trichloropropane. Releases to surface and groundwater may have occurred as a result of the improper disposal of 1,2,3-trichloropropane-containing industrial wastes or wastes from its use in paint and varnish removers, cleaning and degreasing agents, and maintenance reagents. Releases to groundwater may have occurred as a result of the chemical leaching through soil at waste sites and agricultural soil treated with fumigants that contain the chemical. Small amounts of the chemical may have entered surface waters as a result of washout from 1,2,3-trichloropropane-contaminated air; however, some of the 1,2,3-trichloropropane removed from the atmosphere by washout is likely to have re-entered the atmosphere by volatilization.

5.3.3 Soil

Estimated releases of 10 pounds (~0.005 metric tons) of 1,2,3-trichloropropane to soils from 4 domestic manufacturing and processing facilities in 2018, accounted for about 0.5% of the estimated total environmental releases from facilities required to report to the TRI (TRI18 2020). No 1,2,3-trichloropropane was released via underground injection (TRI18 2020). These releases are summarized in Table 5-2.

Data on releases of 1,2,3-trichloropropane to soils are sparse, which makes a quantitative estimation of the magnitude of such releases impossible. However, releases to soils are expected to be relatively small based upon the available data. Releases to farmland soil have occurred as a result of the use of certain soil fumigants and nematocides known to contain 1,2,3-trichloropropane as an impurity. No current information is available, however, that indicates that these soil fumigants and nematocides still contain 1,2,3-trichloropropane. Very small amounts of the chemical may be brought to the surface of the earth as a result of washout from 1,2,3-trichloropropane-containing air; however, much of the 1,2,3-trichloropropane removed from the atmosphere by washout may re-enter the atmosphere by volatilization from near-surface soil. Land disposal of wastes from its use in paint and varnish removers, cleaning and degreasing agents, and cleaning and maintenance reagents may have released 1,2,3-trichloropropane to soil.

5.4 ENVIRONMENTAL FATE

5.4.1 Transport and Partitioning

No experimental or predictive data were located in the literature regarding the transport of 1,2,3-trichloropropane in the atmosphere. 1,2,3-Trichloropropane is expected to exist in the atmosphere predominantly in the vapor phase, based on its vapor pressure (Table 4-2) (Eisenreich et al. 1981; MacKay et al. 1982). The speculation that substantial amounts of 1,2,3-trichloropropane are not likely to be present in the particulate phase indicates that dry deposition to the earth's surface will not be an important removal process. Based upon its low water solubility and moderate vapor pressure (Table 4-2), very small amounts of 1,2,3-trichloropropane present in air may be removed by wet deposition; however, much of the 1,2,3-trichloropropane removed from the atmosphere by washout is likely to re-enter the atmosphere by volatilization. Based upon an estimated soil organic carbon partition coefficient (K_{oc}) of 98 (calculated from water solubility) (Lyman et al. 1982; Riddick et al. 1986), 1,2,3-trichloropropane is expected to display high mobility in soil (Swann et al. 1983); therefore, it has the potential to leach into groundwater. This predicted mobility is confirmed by the detection of 1,2,3-trichloropropane in groundwater from various locations. The vapor pressure of 1,2,3-trichloropropane (3.1 mmHg at 25°C) (MacKay et al. 1982) and the calculated Henry's law constant (3.17×10^{-4} atm-m^3/mol at 25°C) (Lyman et al. 1982) suggest that volatilization from either dry or moist soil to the atmosphere will be a significant environmental process. 1,2,3-Trichloropropane in surface water is expected to volatilize rapidly to the atmosphere. An experimental half-life of 56.1 minutes has been measured for evaporation of 1,2,3-trichloropropane from a 1 ppm solution, with a depth of 6.5 cm, stirred with a shallow pitch propeller at 200 rpm at 25°C under still air (<0.2 mph air currents) (Dilling 1977). Using the Henry's law constant, a half-life of 6.9 hours was calculated for evaporation from a model river 1 m deep, flowing at 1 m/second, with a wind velocity of 3 m/second, and neglecting adsorption to sediment (Lyman et al. 1982). A volatilization half-life of 3.5 days from a model pond can be estimated (EPA 1985a). 1,2,3-Trichloropropane is not expected to significantly adsorb to sediment and suspended organic matter based upon the estimated K_{oc} of 98 (calculated from water solubility) (Lyman et al. 1982; Riddick et al. 1986). It is also not expected to significantly bioconcentrate in fish and aquatic organisms based upon an estimated bioconcentration factor (BCF) of 31.2 (calculated from log octanol-water partition coefficient [K_{ow}]) (Lyman et al. 1982; NLM 2020). No data were located to indicate a potential for 1,2,3-trichloropropane to biomagnify from lower to higher trophic states of the food chain, but based upon the estimated BCF, this is not likely.

5.4.2 Transformation and Degradation

Air. The primary degradation process for 1,2,3-trichloropropane in the atmosphere is expected to occur via gas-phase reaction with photochemically produced hydroxyl radicals. The rate constant for this process is an estimated 1.0475×10^{-12} cm^3/molecule-second (Atkinson 1987). This corresponds to a half-life of 15.3 days at an estimated atmospheric concentration of 5×10^5 hydroxyl radicals/cm^3. Direct photolysis of 1,2,3-trichloropropane is not expected to occur in the atmosphere because the chemical lacks a chromophore that absorbs light at environmentally significant wavelengths (>290 nm) (Silverstein et al. 1974).

Water. Degradation of 1,2,3-trichloropropane in natural waters is expected to be a slow process. The chemical should volatilize from surface waters before significant degradation can occur. Hydrolysis of 1,2,3-trichloropropane in natural waters is not expected to be a significant removal process. The measured neutral and base hydrolysis rate constants at 25°C are 1.8×10^{-6} $hour^{-1}$ and 9.9×10^{-4} M^{-1} $hour^{-1}$, respectively (EPA 1988b). These rate constants correspond to a hydrolysis half-life of 44 years over a pH range of 5–9. Direct photolysis of 1,2,3-trichloropropane is not expected to occur in environmental waters because the chemical lacks a chromophore that absorbs light at environmentally significant wavelengths (>290 nm) (Silverstein et al. 1974).

No studies were located regarding the biodegradation of 1,2,3-trichloropropane in natural waters. An aqueous screening study with activated sewage sludge has indicated that 1,2,3-trichloropropane can be removed by biological treatment processes and that at least part of the removal was due to volatilization. However, this study cannot be used to predict the biodegradability of this compound under natural conditions. Other authors have observed that halogenated hydrocarbons, in general, and especially those with multiple chlorine substitution, such as 1,1,2-trichloroethane and 1,1,2,2-tetrachloroethane, are recalcitrant towards biodegradation (Kawasaki 1980; Tabak et al. 1981). No data concerning the potential for anaerobic aqueous biodegradation of 1,2,3-trichloropropane were found.

Sediment and Soil. No data specifically regarding the degradation of 1,2,3-trichloropropane in soil were found. However, it has been observed that 1,2-dichloropropane will not significantly biodegrade in soil (Roberts and Stoydin 1976). Therefore, 1,2,3-trichloropropane is expected to be even less biodegradable because it contains an additional chlorine. The rate of 1,2,3-trichloropropane loss from soil due to biodegradation may not be significant when compared with its loss by volatilization and leaching from soil. 1,2,3-Trichloropropane will be lost from the soil by evaporation (from both moist and dry near-surface soil) and by leaching to groundwater before 1,2,3-trichloropropane will hydrolyze in soil. Direct photolysis on the surface of soil will not occur.

5.5 LEVELS IN THE ENVIRONMENT

Reliable evaluation of the potential for human exposure to 1,2,3-trichloropropane depends, in part, on the reliability of supporting analytical data from environmental samples and biological specimens. Concentrations of 1,2,3-trichloropropane in unpolluted atmospheres and in pristine surface waters are often so low as to be near the limits of current analytical methods. In reviewing data on 1,2,3-trichloropropane levels monitored or estimated in the environment, it should also be noted that the amount of chemical identified analytically is not necessarily equivalent to the amount that is bioavailable.

Table 5-3 shows the lowest limit of detections that are achieved by analytical analysis in environmental media. 1,2,3-Trichloropropane has not been detected in most environmental media samples.

Table 5-3. Lowest Limit of Detection Based on Standards[a]

Media	Detection limit	Reference
Air	0.3 mg/sample	NIOSH 1987
Drinking water	0.03 µg/L	EPA 1986a; Ho 1989
Surface water and groundwater	No data	EPA 1986b
Soil	No data	Lopez-Avila et al. 1987

[a]Detection limits based on using appropriate preparation and analytics. These limits may not be possible in all situations.

Detections of 1,2,3-trichloropropane in air, water, and soil at NPL sites are summarized in Table 5-4.

Table 5-4. 1,2,3-Trichloropropane Levels in Water, Soil, and Air of National Priorities List (NPL) Sites

Medium	Median[a]	Geometric mean[a]	Geometric standard deviation[a]	Number of quantitative measurements	NPL sites
Water (ppb)	0.8	7.20	283	11	8
Soil (ppb)	13,000,000	79,000	3,400	2	1
Air (ppbv)	No data				

[a] Concentrations found in ATSDR site documents from 1981 to 2019 for 1,867 NPL sites (ATSDR 2019). Maximum concentrations were abstracted for types of environmental media for which exposure is likely. Pathways do not necessarily involve exposure or levels of concern.

5.5.1 Air

No data were located regarding the detection of 1,2,3-trichloropropane in ambient air in the United States. Therefore, no estimate of U.S. atmospheric levels of the chemical, including background levels, is possible.

About 40% of 1,2,3-trichloropropane volatilizes from water while showering. Volatility from other household uses of water ranges from about 20% (sinks, toilets) to 60% (dishwashers). Thus, there is potential for inhalation exposure during showering, bathing, and other household water uses, such as dishwashers, clothes washers, toilets, and sinks. ATSDR’s three-compartment Shower and Household Water-Use Exposure (SHOWER) model predicts air concentrations in the shower stall, bathroom, and main house throughout the day for households with up to eight members; the model is a desktop application that is available by sending a request to showermodel@cdc.gov. Using concentrations in water and human activity patterns, the model estimates a daily time-weighted average exposure concentration from breathing indoor air. The model also estimates dermal uptake from skin contact while bathing and washing hands.

A review of vapor intrusion data from 121 ATSDR public health assessments completed between 1994 and 2009 did not identify any sites with 1,2,3-trichloropropane levels in groundwater, soil gas, or air that required further evaluation (Burk and Zarus 2013). In 2013, a Letter Health Consultation on Mackenzie Chemical Works, Inc. site in New York identified shallow groundwater levels up to 14 ppm offsite and 91 ppm onsite (NYDOH 2013). Soil gas concentrations ranged from 0.05 ppm offsite to 0.33 ppm onsite.

A follow-up vapor intrusion investigation of 16 offsite residences detected no 1,2,3-trichloropopane in the sub-slab soil gas or indoor air samples. Soil vapor extraction and *in-situ* chemical oxidation reduced the groundwater concentrations to levels that are not likely to pose a health hazard.

5.5.2 Water

Data are available regarding the detection of 1,2,3-trichloropropane in environmental waters. In the past, 1,2,3-trichloropropane has been qualitatively detected in the drinking water of Cincinnati, Ohio, sampled during 1978 (EPA 1984), and Ames, Iowa, on an unspecified date (EPA 1987). Water quality data from the U.S. Geological Survey (USGS) California Water Science Center report that 1,2,3-trichloropropane was not detected (detection limit 5.0–120 ng/L) in finished water samples collected from 2010 to 2012 (WQP 2020). 1,2,3-Trichloropropane was detected at levels of >0.005 μg/L in 395 of 5,863 public water wells in California between 2007 and 2017 (California Water Boards 2017). It has been found at concentrations ranging from 0.1 to 5.0 μg/L; typical concentrations ranged from 0.2 to 2.0 μg/L in groundwater samples from California and Hawaii during small- and large-scale retrospective studies of farmlands possibly treated with fumigants and nematocides that contained 1,2,3-trichloropropane as an impurity (Cohen et al. 1986, 1987). 1,2,3-Trichloropropane has been detected in groundwater from 2 of 10 sites in an agricultural community in Suffolk County, New York, at concentrations of 6 and 10 μg/L (EPA 1985b). Water quality data compiled from the Storage and Retrieval (STORET) Data Warehouse and the USGS National Water Information System (NWIS) report that 1,2,3-trichloropropane has been analyzed for, but was not detected at or above detection limits of 0.0416–50.0 μg/L, in groundwater samples tested across the United States in the last 5 years (WQP 2020).

Similarly, water quality data compiled from STORET and NWIS reported 1,2,3-trichloropropane was not detected at or above detection limits of 0.20–5.0 μg/L in surface water samples collected from 2016 to 2020 throughout the United States (WQP 2020). 1,2,3-Trichloropropane was not detected in storm water samples collected 2011 and 2016 from the New Mexico Environmental Department or storm water samples collected in 2015 from the State of Oregon Department of Environmental Quality (WQP 2020). The chemical was qualitatively detected in effluent from an advanced waste treatment plant in Lake Tahoe, California, in 1974 (EPA 1984).

5.5.3 Sediment and Soil

Sediment samples collected in California, Illinois, and Texas, in general, did not contain 1,2,3-trichloropropane, but it was found in samples reported by the EPA Great Lakes National Program at concentrations as high as 4,200 µg/kg (WQP 2020). 1,2,3-Trichloropropane has been found in soil samples from California and Hawaii during small- and large-scale retrospective studies at levels typically ranging from 0.2 to 2 µg/kg (Cohen et al. 1987). Soil samples collected from various sites in the United States did not contain reportable levels of 1,2,3-trichloropropane (WQP 2020).

5.5.4 Other Media

1,2,3-Trichloropropane has been qualitatively identified as a component of ethylene dichloride tar, a tarlike, oily waste byproduct of vinyl chloride production that had been disposed of by dumping into the sea (Jensen et al. 1975). The chemical has been found in the volatile products from the thermal oxidative degradation of the flame-retardant plasticizer, tris(dichloropropy1) phosphate (DOI 1977). In an U.S. Food and Drug Administration (FDA) Total Diet Study conducted in the 1990s, specific date not reported, of 234 table-ready food items, 1,2,3-trichloropropane was detected 9 times, with the highest concentration of 6.12 µg/kg occurring in sandwich cookies (Heikes 1995). More current data for the presence of 1,2,3-trichloropropane in food were not located. Because of the lack of recent comprehensive monitoring data, the average daily intake of 1,2,3-trichloropropane and the relative significance of each source of exposure cannot be determined.

5.6 GENERAL POPULATION EXPOSURE

Based upon the data available, the exposure of the general population to 1,2,3-trichloropropane is expected to be limited. A small part of the population may be exposed to very low levels of 1,2,3-trichloropropane through the ingestion of contaminated drinking water or food; however, no monitoring data were located that would suggest 1,2,3-trichloropropane exists in drinking water or food products. General exposure to air containing low levels may occur near chemical manufacturing facilities that produce 1,2,3-trichloropropane and certain other chemicals, near 1,2,3-trichloropropane-containing hazardous waste dumps, and farmlands treated with fumigants that contain 1,2,3-trichloropropane. No current information is available, however, that indicates that 1,2,3-trichloropropane is still present in soil fumigant formulations, and commercial manufacturing processes generally occur in closed and tightly sealed systems (NIOSH 1981). Inhalation and dermal exposure may occur during the use of 1,2,3-trichloropropane as a solvent and extractive agent, in paint and varnish removers, in cleaning and degreasing agents, and in cleaning and maintenance reagents, although there is no current information that indicates that the compound is still used for these purposes (Lewis 2007; NIOSH 1981). No data regarding the detection of 1,2,3-trichloropropane in humans in the United States were located.

Occupational exposure to 1,2,3-trichloropropane is expected to be higher in facilities where the chemical or products containing the chemical are used than in facilities that produce 1,2,3-trichloropropane either directly or as a byproduct, since the commercial manufacturing processes generally occur in closed and tightly sealed systems (NIOSH 1981). Occupational exposure may result from procedures that require direct handling of the material; these include purification, formulation of products, sampling and quality control, packaging and storage, leakage of equipment, startup and shutdown procedures, maintenance, cleanup, spills, and other plant emergencies (NIOSH 1981).

5.7 POPULATIONS WITH POTENTIALLY HIGH EXPOSURES

Data regarding the presence of 1,2,3-trichloropropane in the environment are lacking, which prevents the thorough assessment of the potential for high exposure in various populations. Populations with potentially high exposure to 1,2,3-trichloropropane will generally include those that may be exposed to environmental contamination over long periods of time. These may include populations exposed to low levels of 1,2,3-trichloropropane via inhalation of contaminated air at or near both identified and unidentified 1,2,3-trichloropropane-containing waste disposal sites and landfills. Children playing in and around these sites may also be dermally exposed to soil containing 1,2,3-trichloropropane, although any 1,2,3-trichloropropane in surface soil would be expected to volatilize or leach through the soil. Persons whose drinking water is derived from 1,2,3-trichloropropane-contaminated groundwater or surface water for a long period of time may be exposed to relatively high levels of 1,2,3-trichloropropane. Workers involved in the manufacture or use of 1,2,3-trichloropropane or 1,2,3-trichloropropane-containing products may have the highest potential for exposure to 1,2,3-trichloropropane. Exposure through the manufacture or use of 1,2,3-trichloropropane-containing products may not be significant, however, since current manufacturing processes generally occur in closed and tightly sealed systems (NIOSH 1981) and no current information indicates that 1,2,3-trichloropropane is still used for those purposes listed.