### Sources of Exposure

**General Populations**
- Bromodichloromethane is formed as a byproduct of water disinfection methods using chlorination.
- The primary source of exposure for the general population is chlorinated household water.
- Chlorinated swimming pools are also sources of bromodichloromethane exposure.

**Occupational Populations**
- Workers in chemical plants or laboratories where bromodichloromethane is made or used may be exposed to higher amounts.
- People working at chlorinated pools (especially indoor pools), such as lifeguards, may be exposed to bromochloromethane more often than the general population.

### Toxicokinetics and Normal Human Levels

**Toxicokinetics**
- Bromodichloromethane is rapidly absorbed through the gastrointestinal tract and skin and is presumed to be rapidly absorbed through the respiratory tract.
- Absorbed bromodichloromethane is distributed throughout the body with the highest concentrations in the fat, liver, lungs, and kidneys.
- The primary pathway for bromodichloromethane metabolism is cytochrome P450 oxidation. It is also metabolized via reduction to a dichloromethyl radical and by glutathione conjugation.
- Bromodichloromethane is rapidly excreted; the half-life of a single oral dose was 1.5–2 hours in rats and mice. The primary route of excretion is exhaled air; smaller amounts are excreted in urine and feces.

**Normal Human Levels**
- The geometric mean urinary bromodichloromethane levels in a representative sample of the U.S. population is below the detection limit of 6.00 pg/mL.

### Biomarkers/Environmental Levels

**Biomarkers**
- Bromodichloromethane can be measured in blood, exhaled air, and urine. Because it is rapidly excreted, these biomarkers assess recent exposure.
- There are no specific biomarkers of effect for bromodichloromethane.

**Environmental Levels**
- **Air:**
  - Maximum annual mean concentration across the United States is 0.033 ppbv
- **Water:**
  - Groundwater: >0.2 µg/L
  - Drinking water: 1.62 µg/L

### Reference
**Bromodichloromethane is a Colorless Liquid**
- Bromodichloromethane has a relatively high vapor pressure and high water solubility.
- It is a disinfection byproduct formed during water chlorination.
- Bromodichloromethane is used as a chemical intermediate for organic synthesis and as a chemical laboratory reagent.

**Bromodichloromethane in the Environment**
- Bromodichloromethane has a relatively high vapor pressure. Over 99% of the bromodichloromethane present in the environment is estimated to exist in air. Low levels are found in groundwater and soil.
- Only trace amounts of bromodichloromethane are found in food.
- Bromodichloromethane in the atmosphere likely degrades via oxidative reactions with hydroxyl radicals or singlet oxygen. Its atmospheric lifetime is estimated to be 2–3 months.
- The environmental fate of bromodichloromethane in water and soil involves volatilization and biodegradation.
- Bromodichloromethane is not likely to bioaccumulate in fish or other aquatic species.

**Routes of Exposure**
- **Inhalation** – Exposure from bromodichloromethane volatilized from water during showering, bathing, washing dishes, and swimming pool activity is a primary route of exposure.
- **Oral** – Exposure to bromodichloromethane formed as a byproduct of water disinfection is a primary route of exposure.
- **Dermal** – Dermal contact with chlorinated water is also a primary route of exposure.

**Health effects are determined by the dose (how much), the duration (how long), the frequency (how often), and the route of exposure.**

**Minimal Risk Levels (MRLs)**

**Inhalation**
- No acute-, intermediate- or chronic duration inhalation MRLs were derived for bromodichloromethane.

**Oral**
- An acute-duration oral MRL of 0.07 mg/kg/day was derived for bromodichloromethane.
- No intermediate-duration oral MRL was derived for bromodichloromethane.
- A chronic duration oral MRL of 0.008 mg/kg/day was derived from bromodichloromethane.

**Health Effects**
- Studies in laboratory animals have identified several targets of toxicity including the liver, kidney, immune system, and developing organism.
- The effects observed in laboratory animals occur at exposure levels much higher than what humans normally encounter through residential or environmental exposure to bromodichloromethane.
- Hepatic effects are a presumed health effect for humans. They include increases in serum enzymes and hepatocellular fatty degeneration. Bile duct damage has also been observed.
- Renal effects are a suspected health effect for humans. Renal tubular degeneration and decreases in immune responses to stimulants have also been observed in rats and mice exposed to bromodichloromethane.
- Developmental effects are a presumed health effect for humans. Increases in full litter resorptions, delays in skeletal ossification, and decreases in birth weight have been seen in animals.

**Children’s Health**
- Children exposed to high levels of bromodichloromethane would be expected to experience the same effects as expected in adults.