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1. PUBLIC HEALTH STATEMENT

This public health statement tells you about ethylbenzene and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Ethylbenzene has been found in at least 829 of the 1,689 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which ethylbenzene is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may be harmful.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to ethylbenzene, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

1.1 WHAT IS ETHYLBENZENE?

Colorless liquid that smells like gasoline	You can smell ethylbenzene in the air at 2 parts of ethylbenzene per million parts of air (2 ppm). It evaporates at room temperature and burns easily.
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Used in industry and in consumer products	<p>Ethylbenzene is found naturally in oil. Large amounts of ethylbenzene are produced in the United States, most of which is used to make styrene. Ethylbenzene is also used in fuels and solvents.</p> <p>Consumer products containing ethylbenzene include:</p> <ul style="list-style-type: none"> • gasoline • paints and inks • pesticides • carpet glues • varnishes and paints • tobacco products • automotive products
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For more information on the physical and chemical properties of ethylbenzene and its production, disposal, and use, see Chapters 4 and 5.

1.2 WHAT HAPPENS TO ETHYLBENZENE WHEN IT ENTERS THE ENVIRONMENT?

Most commonly found in air	Ethylbenzene moves easily into the air from water and soil. Ethylbenzene in soil can also contaminate groundwater.
Rapidly broken down in air	<p>Air: Ethylbenzene in air is broken down in less than 3 days with the aid of sunlight.</p> <p>Water: In surface water such as rivers and harbors, ethylbenzene breaks down by reacting with other compounds naturally present in water.</p> <p>Soil: In the soil, ethylbenzene is broken down by soil bacteria.</p>

For more information on ethylbenzene in the environment, see Chapter 6.

1.3 HOW MIGHT I BE EXPOSED TO ETHYLBENZENE?

Air	<p>If you live in a city or near many factories or heavily traveled highways, you may be exposed to ethylbenzene in the air. Releases of ethylbenzene into the air occur from burning oil, gas, and coal and from industries using ethylbenzene.</p> <p>The median levels of ethylbenzene in air are:</p> <ul style="list-style-type: none"> • 0.62 ppb in city and suburban locations • 0.01 ppb in rural locations • 1 ppb in indoor air
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Water	<p>Ethylbenzene is infrequently detected in private and public groundwater wells used for drinking water. Higher levels of ethylbenzene may be found in private residential wells near landfills, waste sites, or leaking underground fuel storage tanks.</p> <p>People with ethylbenzene-contaminated tap water could be exposed by drinking the water or eating foods prepared with it. Exposure could also result from breathing in ethylbenzene while showering, bathing, or cooking with contaminated water.</p>
Soil	<p>Background levels in soils have not been reported. Ethylbenzene may get into the soil by gasoline or other fuel spills and poor disposal of industrial and household wastes.</p>
Workplace air	<p>Gas and oil workers may be exposed to ethylbenzene either through skin contact or by breathing ethylbenzene vapors. Varnish workers, spray painters, and people involved in gluing operations may also be exposed to high levels of ethylbenzene. Exposure may also occur in factories that use ethylbenzene to produce other chemicals.</p>
Consumer products	<p>You might be exposed to ethylbenzene by using any of the following products:</p> <ul style="list-style-type: none">• gasoline• carpet glues• varnishes and paints• tobacco products• automotive products

For more information on human exposure to ethylbenzene, see Chapter 6.

1.4 HOW CAN ETHYLBENZENE ENTER AND LEAVE MY BODY?

Rapidly enters your body	<p>When you breathe air containing ethylbenzene, it enters your body rapidly and almost completely through your lungs. Ethylbenzene in food or water may also rapidly and almost completely enter your body through the digestive tract. It may enter through your skin when you come into contact with liquids containing ethylbenzene.</p>
Typically leaves your body within 2 days	<p>Once in your body, ethylbenzene is broken down into other chemicals. Most of these other chemicals leave your body in the urine within 2 days.</p> <p>Small amounts of ethylbenzene can also leave your body through the lungs and in feces.</p>

For more information on how ethylbenzene enters and leaves the body, see Chapter 3.

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1.5 HOW CAN ETHYLBENZENE AFFECT MY HEALTH?

Scientists use many tests to protect the public from harmful effects of toxic chemicals and to find ways for treating persons who have been harmed

The effect of ethylbenzene on human health depends on how much ethylbenzene is present, how you are exposed to it, and the length of exposure.

Short-term exposure in air	<p>Humans: Exposure to high levels of ethylbenzene in the air for short periods can cause eye and throat irritation. Exposure to higher levels can result in vertigo and dizziness.</p> <p>Animals: Exposure to very high levels (about 2 million times the usual level in urban air) can cause death.</p>
Long-term exposure in air	<p>Hearing: Exposure to relatively low concentrations of ethylbenzene for several days to weeks resulted in potentially irreversible damage to the inner ear and hearing of animals.</p> <p>Kidney: Exposures to relatively low concentrations of ethylbenzene for several months to years caused in kidney damage in animals.</p> <p>Reproduction: There is no clear evidence that ethylbenzene affects fertility.</p> <p>Cancer: An increase in kidney tumors in rats and lung and liver tumors in mice were found after they were exposed to ethylbenzene in air for 2 years. The International Agency for Research on Cancer (an expert group that is part of the World Health Organization) has determined on that long-term exposure to ethylbenzene may cause cancer in humans.</p>
Long-term exposure by ingestion	<p>Hearing: Rats exposed to large amounts of ethylbenzene by mouth had severe damage to the inner ear.</p>
Short-term eye and skin contact	<p>Irritation: Liquid ethylbenzene caused eye damage and skin irritation in rabbits.</p>

Further information on the health effects of ethylbenzene in humans and animals can be found in Chapters 2 and 3.

1.6 HOW CAN ETHYLBENZENE AFFECT CHILDREN?

This section discusses potential health effects in humans from exposures during the period from conception to maturity at 18 years of age.

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Children are likely to have similar effects as adults	<p>No information is available about the effect of exposure to ethylbenzene on children. It is likely that children would show the same health effects as adults. We do not know whether children will have effects at the same exposure levels as adults.</p> <p>In immature animals, exposure to inhaled ethylbenzene produced small decreases in weight gain.</p>
Birth defects	<p>We do not know whether ethylbenzene causes birth defects in people. Minor birth defects and low birth weights have occurred in newborn animals whose mothers were exposed air contaminated with ethylbenzene.</p>
Exposure from breast milk	<p>We do not know whether ethylbenzene can accumulate in breast milk.</p>

1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO ETHYLBENZENE?

Limit children's exposure to consumer products containing ethylbenzene	<p>Use adequate ventilation to minimize exposure to ethylbenzene vapors from consumer products such as</p> <ul style="list-style-type: none"> • gasoline • pesticides • varnishes and paints • newly installed carpeting • automotive products <p>Sometimes older children sniff household chemicals in an attempt to get high. Your children may be exposed to ethylbenzene by inhaling products containing it, such as paints, varnishes, or gasoline. Talk with your children about the dangers of sniffing chemicals.</p>
Store household chemicals out of reach of young children	<p>Always store household chemicals in their original labeled containers out of reach of young children to prevent accidental poisonings. Never store household chemicals in containers children would find attractive to eat or drink from, such as old soda bottles.</p> <p>Gasoline should be stored in a gasoline can with a locked cap.</p>
Follow directions on label	<p>Always follow directions on household products (for example, use only with adequate ventilation.)</p>
Limit exposure to tobacco smoke	<p>Ethylbenzene is a component of tobacco smoke. Avoid smoking in enclosed spaces such as inside the home or car in order to limit exposure to children and other family members.</p>

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1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ETHYLBENZENE?

Can be measured in blood and breath	Ethylbenzene can be measured in blood and in the breath of people exposed to ethylbenzene. This should be done within a few hours after exposure occurs because these metabolites leave the body very quickly.
Metabolites can be measured in urine	The presence of ethylbenzene breakdown products (metabolites) in urine might indicate that you were exposed to ethylbenzene; however, these breakdown products can also form when you are exposed to other substances, such as styrene. The detection of these metabolites in your urine cannot be used to predict the kind of health effects that might develop from that exposure. You should have this test done within a few hours after exposure occurs because these metabolites leave the body very quickly.

For more information on the different substances formed by ethylbenzene breakdown and on tests to detect these substances in the body, see Chapters 3 and 7.

1.9 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but cannot be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as “not-to-exceed” levels, that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value that is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

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Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that provides it.

Some regulations and recommendations for ethylbenzene include the following:

Levels in drinking water set by EPA	The EPA has determined that exposure to ethylbenzene in drinking water at concentrations of 30 ppm for one day or 3 ppm for 10 days is not expected to cause any harmful effects in a child. The EPA has determined that lifetime exposure to 0.7 ppm ethylbenzene is not expected to cause any harmful effects.
Levels in surface water set by EPA	If you eat fish and drink water from a body of water, the water should contain no more than 0.53 ppm ethylbenzene.
Levels in workplace air set by OSHA	OSHA set a legal limit of 100 ppm ethylbenzene in air averaged over an 8-hour work day.

For more information on regulations and advisories, see Chapter 8.

1.10 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below.

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

Toxicological profiles are also available on-line at www.atsdr.cdc.gov and on CD-ROM. You may request a copy of the ATSDR ToxProfiles™ CD-ROM by calling the toll-free information and technical

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assistance number at 1-800-CDCINFO (1-800-232-4636), by e-mail at cdcinfo@cdc.gov, or by writing to:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
1600 Clifton Road NE
Mailstop F-62
Atlanta, GA 30333
Fax: 1-770-488-4178

Organizations for-profit may request copies of final Toxicological Profiles from the following:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 1-800-553-6847 or 1-703-605-6000
Web site: <http://www.ntis.gov/>