

1. PUBLIC HEALTH STATEMENT

This statement was prepared to give you information about gasoline and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,397 sites on its National Priorities List (NPL). Gasoline has been found in at least 23 of these sites. However, we do not know how many of the 1,397 NPL sites have been evaluated for gasoline. As EPA evaluates more sites, the number of sites at which gasoline is found may change. This information is important for you to know because gasoline may cause harmful health effects and because these sites are potential or actual sources of human exposure to gasoline.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, may lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous chemical such as gasoline, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, lifestyle, and state of health.

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1.1 WHAT IS GASOLINE?

Gasoline is a complex manufactured mixture that does not exist naturally in the environment. However, for the most part, chemicals that are in gasoline are generally present in several physical states (gaseous, liquid, or others) in human settlements. Gasoline is produced from petroleum in the refining process. The gasoline discussed in this profile is automotive gasoline used as a fuel for engines in automobiles and other vehicles. Aviation gasoline and other types of fuels, such as diesel and jet fuels, fuel oils, and products that result when gasoline is burned, are not discussed in this profile. The ATSDR toxicological profiles on jet fuels, Otto Fuels II, and fuel oils have further information on other types of fuels.

Typically, gasoline contains more than 150 chemicals including small amounts of benzene, toluene, xylene, and sometimes lead. How the gasoline is made determines which chemicals are present in the gasoline mixture and how much of each is present. The actual composition varies with the source of the crude petroleum, the manufacturer, and the time of year.

Gasoline is a colorless, pale brown, or pink liquid. Gasoline is very flammable; it catches on fire quite easily, evaporates quickly, and forms explosive mixtures with air. Most people can begin to smell gasoline at 0.25 parts of gasoline per million parts of air (ppm). Gasoline may be present in the air, groundwater, and soil. Gasoline does not dissolve readily in water. However, some of the chemicals that make up gasoline can dissolve easily in water. See Chapter 3 for more information on the chemical and physical properties of gasoline and Chapter 4 for its production and use.

1.2 WHAT HAPPENS TO GASOLINE WHEN IT ENTERS THE ENVIRONMENT?

Gasoline is a mixture of many different chemicals. Small amounts of these chemicals evaporate into the air when you fill the gas tank in your car or when gasoline is accidentally spilled onto surfaces and soils or into surface waters. Other chemicals in gasoline dissolve in

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water after spills to surface waters or underground storage tank leaks into the groundwater. The movement of individual chemicals in gasoline is influenced by physical and chemical properties, such as how easily they dissolve in water, how quickly they evaporate, and whether they stick to soil. In surface releases, most chemicals in gasoline will probably evaporate; others may dissolve in and be carried away by water; a few will probably stick to soil. The chemicals that evaporate are broken down by sunlight and other chemicals in the air; the completion of this process may take from hours to weeks. The chemicals that dissolve in water also break down quickly by natural processes. Most chemicals in gasoline do not build up to high levels in plants or animals. For more information on what happens to gasoline when it enters the environment, see Chapter 5.

1.3 HOW MIGHT I BE EXPOSED TO GASOLINE?

The most likely way that you might be exposed to gasoline is by breathing its vapors at a service station when you are filling your car's fuel tank. If an attendant fills your car's fuel tank, you may still be exposed to vapors, but not as much as when you fill it yourself. If the hose from the gas tank leaks or you overfill your tank, you may be exposed to more gasoline vapors or some gasoline may spill on your skin. If you work at a service station, you will be exposed to more gasoline and its vapors than someone who just fills the car up occasionally. Air levels as high as 99 ppm were measured at one gas station during filling of a car's tank with gasoline. When you use equipment that runs on gasoline (for example, a lawn mower), you may be exposed to gasoline or its vapors when you fill the gas tank (especially when the engine is hot) or operate the machine.

You may also be exposed to gasoline if you use or drink contaminated water. However, most of the chemicals in gasoline are usually removed by purification processes before the water enters drinking water supplies. Gasoline can seep into groundwater from leaking underground pipelines or storage tanks. There is no information on how much gasoline may be in

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groundwater after a leak, but in some instances gasoline has been found floating on top of groundwater that is used to supply drinking water to homes. According to one estimate, as many as 75,000-100,000 underground storage tanks leak millions of gallons of gasoline into groundwater each year. Some of the chemicals making up the gasoline mix with the water; you would be exposed to these chemicals when you drink the water, bathe or shower with it, or otherwise use it.

Another way you might be exposed to gasoline or its vapors is by being close to a spot where gasoline has spilled or leaked into the soil. Information on the amount of gasoline that has seeped into the soil from spills, storage tanks, or pipelines is not available.

Certain workers have a greater risk of exposure to gasoline vapors. These include service station attendants, drivers of gasoline tank trucks, workers at bulk loading terminals and marine loading docks, workers who remove and service underground storage tanks and gasoline pipelines, workers who find and clean up gasoline spills and leaks, and refinery workers. If you have any of these jobs, you are probably exposed to small amounts of gasoline vapors every day you work. If you work at a job using gasoline-powered equipment or vehicles, you may be exposed to gasoline and its vapors. See Chapter 5 for more information on exposure to gasoline.

1.4 HOW CAN GASOLINE ENTER AND LEAVE MY BODY?

Gasoline can easily enter your body when you breathe in air or drink water that is contaminated with gasoline. No information is available on how much gasoline enters your body when it gets on your skin. When products like gasoline get on your skin, however, they enter your body more slowly than when they are taken into your mouth. Some of the chemicals in gasoline, such as benzene, are expected to penetrate the skin more easily than some of the other chemicals in gasoline. Most of the gasoline that you breathe in or swallow

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is breathed out unchanged, but some of it can enter your blood rapidly. Gasoline in your blood travels throughout your body. When the chemicals in gasoline reach your liver, they are changed into several different chemical substances. Most of these new substances travel in your blood until they reach your kidneys and then leave your body in urine. However, some of the new substances formed in the liver do not leave your body as rapidly.

Chapter 2 has more information on how gasoline enters and leaves your body.

1.5 HOW CAN GASOLINE AFFECT MY HEALTH?

Many of the harmful effects seen after exposure to gasoline are due to the individual chemicals in the gasoline mixture, such as benzene and lead in very small amounts. Inhaling or swallowing large amounts of gasoline can cause death. The levels of gasoline that killed people are about 10,000-20,000 ppm when breathed in and about 12 ounces when swallowed. High concentrations of gasoline are irritating to the lungs when breathed in and irritating to the lining of the stomach when swallowed. Gasoline is also a skin irritant. Breathing in high levels of gasoline for short periods of time or swallowing large amounts of gasoline may also cause harmful effects on the nervous system. These effects become more serious as the amount of gasoline breathed in or swallowed increases. Less serious nervous system effects include dizziness and headaches, while more serious effects include coma and the inability to breathe. Effects on the nervous system have also occurred in people exposed to gasoline vapors for long periods of time, either in their jobs or because they intentionally sniff gasoline for its ability to cause hallucinations. Harmful effects on the lungs can occur when a person swallows large amounts of gasoline because the gasoline in the stomach can enter the lungs during vomiting.

Some laboratory animals that breathed high concentrations of unleaded gasoline vapors continuously for 2 years developed liver and kidney tumors. However, there is no evidence that exposure to gasoline causes cancer in humans. There is not enough information available

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to determine if gasoline causes birth defects or affects reproduction. For more information on the health effects of gasoline, see Chapter 2 and the ATSDR toxicological profiles for benzene, toluene, xylene, ethylbenzene, 1,2-dibromoethane, 1,3-butadiene, and lead.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO GASOLINE?

There are laboratory tests that can determine if you have been exposed to gasoline. However, these tests are not generally available in your doctor's office. The tests involve measuring elevated blood or urine levels of lead (as an indication of exposure to leaded gasoline only), benzene, or other substances that may result from exposure to gasoline or other sources. These methods are sensitive enough to measure background levels and levels when health effects may occur. If you have these substances in your body, however, they may be there as the result of exposure from sources other than gasoline. Nevertheless, these tests are useful if exposure to gasoline is suspected. Refer to Chapters 2 and 6 for more information on tests to determine whether you have been exposed to gasoline. Also, for more information on the tests for measuring exposure to the individual components in gasoline, refer to the ATSDR toxicological profiles on lead, benzene, toluene, xylene, and ethylbenzene.

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

The government has developed regulations and guidelines for gasoline. EPA has established many regulations 'to control air pollution. These are designed to protect the public from the possible harmful health effects of gasoline. To protect workers, the Occupational Safety and Health Administration (OSHA) has set a legal limit of 300 ppm for workroom air.

The Occupational Safety and Health Administration (OSHA) regulates levels of gasoline in the workplace. The maximum amount of gasoline allowed in workroom air during an 8-hour

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workday of a 40-hour workweek is 900 milligrams of gasoline vapor per cubic meter of air (mg/m^3), or 300 ppm. However, this level is not intended to be used as a standard for pollutants outside the workplace. See Chapter 7 for more information on recommendations the federal government has made to protect human health from the effects of gasoline.

1.8 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:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop E-29
Atlanta, Georgia 30333

This agency can also tell you where to find the nearest occupational and environmental health clinic. These clinics specialize in the recognition, evaluation, and treatment of illnesses resulting from exposure to hazardous substances.

