

1. PUBLIC HEALTH STATEMENT

This statement was prepared to give you information about jet fuels JP-4 and JP-7 and to emphasize the human health effects that may result from exposure to them. The Environmental Protection Agency (EPA) has identified 1,397 hazardous waste sites as the most serious in the nation. These sites make up the National Priorities List (NPL) and are the sites targeted for long-term federal clean-up activities. JP-4 has been found in at least 4 of these sites. JP-7 has not been found in any NPL site. However, the number of NPL sites evaluated for JP-4 and JP-7 is not known. As EPA evaluates more sites, the number of sites at which JP-4 and JP-7 are found may increase. This information is important for you to know because JP-4 and JP-7 may cause harmful health effects and because these sites are potential or actual sources of human exposure to JP-4 and JP-7.

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, does not always 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 JP-4 or JP-7, 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.

1.1 WHAT ARE JET FUELS JP-4 AND JP-7?

JP-4 and JP-7 (jet propellant-4 and jet propellant-7) are substances that are used by the U.S. Air Force as aircraft fuels. They are also called jet fuel-4 and jet fuel-7. JP-4 is a colorless

1. PUBLIC HEALTH STATEMENT

to straw-colored liquid. It smells like gasoline and/or kerosene. JP-7 is also a liquid, usually colorless. It smells like kerosene. Both JP-4 and JP-7 are flammable. JP-4 can be made by refining either crude petroleum oil or shale oil. JP-7 is made by refining kerosene, a product of refined crude petroleum. Both JP-4 and JP-7 are blends of other chemicals made according to standards specified by the U.S. Air Force for each fuel. Both JP-4 and JP-7 are liquids at room temperature, but they can also change into vapor.

In this profile, JP-4 and JP-7 are discussed together. See Chapter 3 for more information on the chemical and physical properties of JP-4 and JP-7. More information on the production and use of JP-4 and JP-7 is found in Chapter 4.

1.2 WHAT HAPPENS TO JET FUELS JP-4 AND JP-7 WHEN THEY ENTER THE ENVIRONMENT?

We have information about what happens to JP-4 or its components in the environment. Although JP-7 is similar, there is not much information about what happens to it in the environment. JP-4 enters the environment when it spills or leaks into water or soil. It can enter the air during manufacturing, by evaporation of spills, and when it is discarded or jettisoned from jets during flight. JP-4 is a mixture of many chemicals. After it is released, the mixture spreads out in the atmosphere, and the component chemicals behave differently than they did in the liquid mixture. The behavior of each component in the environment depends on its individual chemical and physical properties. When JP-4 enters the air from flying jets as unburned fuel, some of the constituent chemicals fall back to the earth and land on water or soil. Other chemicals stay in the air and may change to different compounds when they react with light or other chemicals. Most of the chemicals in JP-4 evaporate when JP-4 spills into water. Some of the chemicals that do not evaporate as fast may dissolve in the water. If the water is very rough when the spill occurs, more JP-4 components will dissolve in the water. The chemicals that dissolve in the water are broken down further by microorganisms or become attached to the solid materials, called sediment, in the water. The chemicals that bind to this sediment may settle to the bottom of the water and stay there for a

1. PUBLIC HEALTH STATEMENT

long time. When JP-4 spills or leaks to soil, some of the chemicals evaporate, but many of them are broken down by microorganisms. Some of them may also stick to the soil. Components that do not break down easily and components that stick to soil particles may stay in the soil for a long time. Currently, no information is available about what happens to JP-7 or its components in the environment, but it is similar in composition to JP-4 so it would probably act like JP-4 when it enters the environment.

We know that many chemicals found in JP-4 can break down in the atmosphere to other chemicals, but we do not know what many of these breakdown products are. We have some information on several chemicals found in jet fuel (for example, benzene, toluene, hexane, xylene, and lead). We know more about what happens to them when they enter the environment as individual chemicals. When they enter the environment as part of jet fuel, they may behave the same way as when they are released alone. You can find more information on several individual components of jet fuel in the ATSDR toxicological profiles for these chemicals. See Chapters 4 and 5 for more information on what happens to JP-4 when it enters the environment.

1.3 HOW MIGHT I BE EXPOSED TO JET FUELS JP-4 AND JP-7?

It is unlikely that you would be exposed to JP-4 unless you work with jet fuel or live very close to where it is used or spilled. Exposure to JP-4 can occur if you touch soil or water contaminated from a spill or leak. If you drink water contaminated with JP-4 you will be exposed to the chemicals in the mixture. You might breathe in some of the chemicals evaporating from a spill or leak site if you stay in the area where an accident has occurred. Exposure to some components might occur from air releases if the components settle to the ground near populated areas.

Workers involved in making or transporting JP-4 or in refueling military aircraft that use JP-4 might breathe air containing it. They might also spill some on their skin. Occupational data from 1981 to 1983 show that about 4,866 workers employed in 633 plants might have been exposed to JP-4. See Chapter 5 for more information on how exposure to JP-4 might occur.

1. PUBLIC HEALTH STATEMENT

No information is available specifically on exposure of individuals to JP-7. However, it is similar in composition to JP-4 and it is reasonable to assume that you could be exposed to it in the same way as described above for JP-4.

1.4 HOW CAN JET FUELS JP-4 AND JP-7 ENTER AND LEAVE MY BODY?

JP-4 and JP-7 can enter your bloodstream when you breathe them in, when you drink water containing them, or when your skin comes in contact with them. This can occur in the workplace or if you live near a manufacturing facility or an Air Force base. We do not know how much of the compounds your body might take up if you breathe them, drink them, or get them on your skin. We have no information on what happens to these chemical mixtures once they enter your body. We do not know if they remain in any tissues in the body. We also do not know whether these compounds leave the body in the urine or feces. See Chapter 2 for further discussion.

1.5 HOW CAN JET FUELS JP-4 AND JP-7 AFFECT MY HEALTH?

We know very little about the human health effects caused by JP-4 and JP-7. Breathing in large amounts of JP-4 would cause you to feel suffocated and breathing would be painful. Animal studies showed that breathing in extremely high levels of JP-4 and JP-7 does not cause death. We do not know if breathing in large amounts could cause death in people. Breathing in high levels of JP-4 has caused harmful effects on the nervous system. Some of the nervous system effects in people include headache, dizziness, nausea, depression, anxiety, memory loss, and irritability. Nervous system effects have occurred in people exposed to vapor from jet fuels like JP-4 for short and long periods in their jobs. Laboratory animals that breathed very high levels of JP-4 vapor for a short time developed nervous system effects, including poor coordination and convulsions. In lower doses, JP-4 vapor has caused animals to have a depressed level of activity compared with animals that were not exposed. Experimental animals have also had decreased numbers of white blood cells after breathing JP-4 vapor. Changes in liver cells have also been seen in animals exposed to either JP-4 or JP-7 vapor. Studies in animals show that both JP-4 and JP-7 can cause skin and eye

1. PUBLIC HEALTH STATEMENT

irritation. JP-4 may cause skin cancer in mice or rats after exposure by skin contact. The data about cancer effects from breathing in JP-4 or JP-7 are not clear-cut. No data about cancer effects exist for exposure to JP-4 or JP-7 by eating or drinking. We do not know if JP-4 or JP-7 causes cancer in people. We do not have any information on whether JP-4 or JP-7 can cause birth defects or if they affect reproduction. For more information on the health effects of JP-4 and JP-7, see Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO JET FUELS JP-4 AND JP-7?

There is no medical test that shows if you have been exposed to JP-4 or JP-7. For information on tests for measuring exposure to some individual components of jet fuels, see the ATSDR toxicological profiles on benzene, toluene, xylene, and polycyclic aromatic hydrocarbons. See Chapters 2 and 6 for more information on medical tests.

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

The government has developed regulations and guidelines for JP-4 and JP-7 and the chemicals in them. These are designed to protect the public from the possible harmful health effects of the chemicals. The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) regulate levels of petroleum products in the workplace. The maximum allowable amount of petroleum distillates in workroom air during an 8-hour workday, 40-hour workweek, is 500 parts per million (ppm). For more information on regulations and guidelines, see Chapter 7.

1. PUBLIC HEALTH STATEMENT

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, E-29
Atlanta, GA 30333
Phone 404-639-6000

This agency can also provide you with information on the location of the nearest occupational and environmental health clinic. These clinics specialize in the recognition, evaluation, and treatment of illnesses resulting from exposure to hazardous substances.