1. PUBLIC HEALTH STATEMENT

This statement was prepared to give you information about Otto Fuel II and its components, 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. Otto Fuel II has been found at two of the sites on the NPL. However, the number of NPL sites evaluated for Otto Fuel II and its components is not known. As EPA evaluates more sites, the number of sites at which Otto Fuel II and its components are found may increase. This information is important for you to know because Otto Fuel II and its components may cause harmful health effects and because these sites are potential or actual sources of human exposure to Otto Fuel II and its components.

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 Otto Fuel II and its components, 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, life-style, and state of health.

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1.1 WHAT ARE OTTO FUEL II AND ITS COMPONENTS?

Otto Fuel II is a distinct-smelling, reddish-orange, oily liquid that the U.S. Navy uses as a fuel for torpedo and other weapons systems. It is a mixture of three synthetic substances. It contains mostly propylene glycol dinitrate, but it also contains dibutyl sebacate and 2-nitrodiphenylamine.

Propylene glycol dinitrate is the explosive part of Otto Fuel II. It is a colorless liquid with an unpleasant odor. Other names for propylene glycol dinitrate are PGDN, 1,Zpropylene glycol dinitrate, and 1,2-propanediol dinitrate.

Dibutyl sebacate is a clear liquid. It is most often used for making plastics, many of which are used for packaging food. It is also used to enhance flavor in foods such as ice cream, candy, baked goods, and nonalcoholic drinks. Some shaving creams also contain dibutyl sebacate. Other names for dibutyl sebacate are decanedioic acid, dibutyl ester; sebacic acid, dibutyl ester; and dibutyl decanedioate.

2-Nitrodiphenylamine is a solid. Otto Fuel II contains 2-nitrodiphenylamine to control the explosion of propylene glycol dinitrate. It is also used as a solvent dye. Other names for 2-nitrodiphenylamine are 2-nitrobenzenamine, 2-nitro-N-phenyl; 2-nitro-N-phenylaniline; and Sudan Yellow 1339.

See Chapters 3 and 4 for more information.

1.2 WHAT HAPPENS TO OTTO FUEL II AND ITS COMPONENTS WHEN THEY ENTER THE ENVIRONMENT?

Otto Fuel II enters the environment mainly in waste water from Navy facilities that produce it or are involved in torpedo rework operations. Otto Fuel II may also be spilled by accident or be disposed of improperly and contaminate soil. We do not have much information on what happens to Otto Fuel II and its components when they enter the environment. We do know

that Otto Fuel II enters the environment as a mixture of three separate components. A large portion of the propylene glycol dinitrate will evaporate very rapidly from the water or the surface of wet soil, but a small portion of it will be broken down by light to other chemicals. Propylene glycol dinitrate that enters the air is probably also broken down by light. Some studies suggest that propylene glycol dinitrate in water or soil is broken down by microorganisms that are normally present, but not all studies agree about this point. It is unlikely that 2-nitrodiphenylamine will evaporate from water or soil into the air. 2-Nitrodiphenylamine will also probably not stay dissolved in water because it does not dissolve easily in water and because it most likely sticks to particles in the water or soil. 2-Nitrodiphenylamine that enters the water is broken down by light. A portion of 2-nitrodiphenylamine in the water or soil also is broken down by microorganisms. We do not know which of the two processes (light- or microorganism-assisted) is more important in breaking down this chemical in the environment. Many microorganisms in water and soil have the capability to break down dibutyl sebacate. We do not have any information on other ways that dibutyl sebacate might be broken down in water or soil. There is no evidence that dibutyl sebacate evaporates into the air from soil or water. You will find more information about the fate and movement of Otto Fuel II and its components in the environment in Chapter 5.

1.3 HOW MIGHT I BE EXPOSED TO OTTO FUEL II AND ITS COMPONENTS?

Humans are most likely to be exposed to Otto Fuel II or its components in areas where Otto Fuel II is used as a torpedo fuel or where it is made. The most likely ways these people will be exposed to Otto Fuel II are by breathing contaminated air and by touching the fuel during handling. One of the chemicals that makes up Otto Fuel II, propylene glycol dinitrate, was measured at levels of less than 1 part per million (ppm) parts of air in a facility where Otto Fuel II was used. Another chemical found in Otto Fuel II, 2-nitrodiphenylamine, was measured at levels of 1-14 ppm in waste water released from a plant where torpedo fuel was being manufactured. This chemical was also measured at levels of 0.5-12.2 ppm in the sediment of the river where the waste water was dumped. Almost nothing is known about levels of Otto Fuel II or its components at hazardous waste sites or at other places. It is not

known whether exposure of persons living or working near hazardous waste sites occurs. Exposure to 2-nitrodiphenylamine also may occur as the result of its manufacture and use as a solvent dye. Exposure to dibutyl sebacate also may occur as a result of its manufacture and use as a flavor enhancer, as an ingredient in plastic food containers, and as an ingredient in shaving lotions. See Chapter 5 for more information.

1.4 HOW CAN THE COMPONENTS OF OTTO FUEL II ENTER AND LEAVE MY BODY?

Propylene glycol dinitrate, the explosive chemical in Otto Fuel II, enters your bloodstream when you breathe it in, when you drink water containing it, eat food or soil containing it, and when your skin comes in contact with it. 2-Nitrodiphenylamine and dibutyl sebacate, the other two components in Otto Fuel II, enter your bloodstream when you drink water or eat food with either of these two chemicals in it. We do not know how much of these two chemicals can enter your bloodstream by breathing or touching them. Within a day, propylene glycol dinitrate is rapidly and completely broken down in your blood to chemicals that are normally found in your body. Some of the breakdown products leave your body in your urine, and others are used by your body to make other chemicals. One study reported that dibutyl sebacate is rapidly broken down in your body by the same process that your body uses to break down fat. We do not know what happens to the breakdown products of dibutyl sebacate in your body. We also do not know what happens to 2-nitrodiphenylamine in your body or how it is eliminated. Chapter 2 contains more information on how the chemicals in Otto Fuel II enter and leave your body.

1.5 HOW CAN OTTO FUEL II AND ITS COMPONENTS AFFECT MY HEALTH?

People who work around Otto Fuel II report experiencing a number of effects which include headaches, loss of balance, poor eye-hand coordination, eye irritation, congested noses, nausea, dizziness, and difficulty breathing. The most common side effect of overexposure is headache. It can occur when there are no other reported side effects, even when the degree of overexposure is minimal. The greater the overexposure, the larger the number of reported

symptoms. Some people who work around Otto Fuel II get used to being around it, and after a period of time, they do not seem to experience discomfort. People who have worked around Otto Fuel II, but later are no longer exposed to this chemical, might feel chest pain or rapid beating of the heart, or have heart attacks. We do not know if Otto Fuel II affects the ability of people to have children or if it causes children to have birth defects. We also do not know if this chemical affects the ability of people to fight disease or if it causes cancer in people. Most of the effects of Otto Fuel II on people's health are believed to be caused by its major component, propylene glycol dinitrate. Exposure to levels of propylene glycol dinitrate as low as 0.2 ppm in the air for several hours causes headaches in some persons. At 0.2 ppm, some brain wave patterns are also altered, and at 0.5 ppm, dizziness and nausea are common. We do not know anything about the effects of propylene glycol dinitrate on the ability of people to have babies or to fight disease. We also do not know whether propylene glycol dinitrate causes birth defects or cancer. Very little is known about the other two components of Otto Fuel II, 2-nitrodiphenylamine or dibutyl sebacate. We do not know anything about the human health effects of the component 2-nitrodiphenylamine. The only thing we know about the human health effects of the component dibutyl sebacate is that it was not irritating to the skin of volunteers who were tested.

Animal studies show effects of propylene glycol dinitrate that are related to the effects seen in people. Results from animal studies also show additional effects of propylene glycol dinitrate that have not been reported in people exposed to this chemical. Exposure of animals to moderate-to-large amounts of propylene glycol dinitrate for several weeks causes problems in blood, like anemia and a decreased ability of the blood to carry oxygen. The livers and kidneys of some animals exposed to moderate levels of propylene glycol dinitrate all day, every day, for several months showed some damage. We do not know whether these effects might also occur in persons exposed to sufficiently high concentrations. We also do not know whether propylene glycol dinitrate affects the ability of animals to have babies or whether it causes birth defects in animals. However, we know that rats that had Otto Fuel II applied to their skin during pregnancy gave birth to babies with low birth weights. Propylene glycol dinitrate has not been sufficiently tested to see whether or not it causes cancer in animals.

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Animal studies also examined the effects of dibutyl sebacate. These studies showed that eating large amounts of this chemical for long periods did not affect the health of the animals that ate it. The babies of animals that ate large amounts of this chemical grew more slowly than babies of animals that did not eat it. We do not know whether dibutyl sebacate causes cancer in animals.

We do not know anything about the health effects of 2-nitrodiphenylamine in animals.

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency have not reviewed Otto Fuel II to determine what classification of carcinogenicity it should receive.

More information on the health effects of the chemicals found in Otto Fuel II is given in Chapter 2.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO OTTO FUEL II AND ITS COMPONENTS?

There is no routinely available test that can directly measure an individual's exposure to Otto Fuel II. Sensitive methods have been used to measure propylene glycol dinitrate, the major component in Otto Fuel II, in both the blood and the exhaled air of the exposed individual. Tests that measure the amount of a breakdown product of propylene glycol dinitrate in your urine could give some information about whether a person has been exposed to this chemical. These tests, which assume the same breakdown products for humans and animals, could be easily performed by clinical laboratories. Your body rapidly breaks down propylene glycol dinitrate, and the breakdown products leave your body in your urine within a day. Therefore, the tests are only helpful if given within a few hours of exposure. The tests also are not specific for exposure to propylene glycol dinitrate. Many other chemicals, such as those found in fertilizers, explosives, some heart and diarrhea medications, and, some food preservatives, also raise the amount of this breakdown product in the urine. No tests are

known for measuring the other two components of Otto Fuel II in your body. Chapters 2 and 6 contain more information on these tests.

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

The government has developed regulations and guidelines for Otto Fuel II and the chemicals in it. These are designed to protect the public from potential harmful health effects of the chemical. The Department of Transportation regulates the transportation of Otto Fuel II because of its potential health effects.

The National Institute for Occupational Safety and Health (NIOSH) recommends that workers not be exposed to air containing more than 0.05 ppm propylene glycol dinitrate during an 8-hour workday, 40-hour workweek. For more information, see Chapter 7.

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, E-29
Atlanta, Georgia 30333
(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.