1. PUBLIC HEALTH STATEMENT

This statement was prepared to give you information about RDX and to emphasize the human health effects that may result from exposure to it. 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. RDX has been found in at least 16 of the sites on the NPL. However, the number of NPL sites evaluated for RDX is not known. As EPA evaluates more sites, the number of sites at which RDX is found may increase. This information is important because exposure to RDX may cause harmful health effects and because these sites are potential or actual sources of human exposure to RDX.

When a substance 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. This 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 substances containing the substance or by skin contact with it.

If you are exposed to a substance such as RDX, many 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 IS RDX?

RDX stands for Royal Demolition Explosive. It is also known as cyclonite or hexogen. The chemical name for RDX is 1,3,5-trinitro-1,3,5-triazine. It is a white powder and is very explosive. It is used as an explosive and is also used in combination with other ingredients in

explosives. Its odor and taste are unknown. It is a synthetic product that does not occur naturally in the environment. It creates fumes when it is burned with other substances. For more information, see Chapters 3 and 4.

1.2 WHAT HAPPENS TO RDX WHEN IT ENTERS THE ENVIRONMENT?

RDX particles can enter the air when it is disposed of by burning. RDX can enter the water from disposal of waste water from Army ammunition plants, and can enter water or soil from spills or leaks from improper disposal at these plants or at hazardous waste sites. RDX dissolves very slowly and to a limited extent in water, and it also evaporates very slowly from water. It does not cling to soil very strongly and can get into the groundwater from soil. RDX can be broken down in air and water in a few hours, but it breaks down more slowly in soil. RDX does not build up in fish or in people. See Chapters 4 and 5 for more information on RDX in the environment.

1.3 HOW MIGHT I BE EXPOSED TO RDX?

Few people will be exposed to RDX. Less than 500 people are known to work with RDX, but these people can breathe dust with RDX in it or get RDX on their skin. You may be exposed to RDX by drinking contaminated water or by touching contaminated soil if you live near factories that produce RDX. RDX has been found in water and soil at some ammunition plants. Surface water samples contained from nondetectable to 36.9 parts of RDX per 1 million parts (ppm) of water. Groundwater samples had levels of 0.001-14.1 ppm. RDX is present at higher levels in soil, with concentrations ranging from less than 5 ppm to 602 ppm. You may be exposed to RDX in the water or soil if it is disposed of improperly. We do not know how much inight be in food or drinking water or how much is in the air. -See Chapter 5 for more information on exposure to RDX.

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1.4 HOW CAN RDX ENTER AND LEAVE MY BODY?

RDX can get into your lungs if you breathe in the fumes of burning RDX or breathe in the dust from powdered RDX. It can also enter your body if it is in water that you drink. Soldiers have accidentally eaten it when they used it as cooking fuel and it got on their food. It may also pass through the skin into the bloodstream or enter through cuts or breaks in the skin. If you consume RDX, it enters your bloodstream very slowly. We do not know how much can enter through the lungs or skin. The most likely route of exposure at or near hazardous waste sites is contaminated drinking water. We know that it changes into other chemicals in your body, but we do not know which chemicals it changes to. Some of these other chemicals may be hazardous to your health. RDX will leave your body in the breath and urine within a few days. For more information, see Chapter 2.

1.5 HOW CAN RDX AFFECT MY HEALTH?

RDX can cause seizures (a problem of the nervous system) in humans and animals when large amounts are inhaled or eaten. We do not know the effects of long-term, low-level exposure on the nervous system. No other significant health effects have been seen in humans. Rats and mice have had decreased body weights and slight liver and kidney damage from eating RDX for 3 months or more. We do not know if RDX causes cancer in people, but it did cause liver tumors in mice. We do not know whether RDX causes birth defects in humans; it did not cause birth defects in rabbits, but it did result in smaller offspring in rats. We also do not know whether RDX affects reproduction in people. For more information, see Chapter 2.

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

Medical tests are available to determine whether you have been exposed to RDX. These tests measure RDX levels in your blood or urine. However, these tests can only be used if you have come in contact with RDX in the last few days. These tests can determine if you have

has been exposed to RDX, but they cannot be used to determine how much RDX entered your body. The tests are not routinely available in the doctor's office, but may be ordered by the doctor. They cannot be used to determine long-term health effects from RDX. The usual immediate health effects are seizures, muscle twitching, or vomiting from very high exposures. These would probably occur before you had the blood or urine test.

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

The government has developed regulations and guidelines for RDX to protect the public from potential harmful health effects of the chemical. The Department of Transportation has many regulations on the transportation of explosives, and the Environmental Protection Agency (EPA) has recommended a drinking water guideline of 2 micrograms per liter μg/L) for RDX.

The Occupational Safety and Health Administration (OSHA) regulates levels of RDX in the workplace. The maximum allowable amount of RDX in workroom air during an 8-hour workday, 40-hour workweek, is 1.5 milligrams per cubic meter (mg/m^3). People's health will probably not be affected by being exposed to this amount of RDX. The National Institute of Occupational Safety and Health (NIOSH) recommends guidelines for RDX in the workplace. The NIOSH recommended exposure limit (REL) for RDX during an &hour workday, 40-hour workweek is 1.5 mg/m 3. The NIOSH short-term exposure limit (STEL), which is the highest level of RDX that they recommend workers be exposed to for 15 minutes, is 3.0 mg/m^3. See Chapter 7 for more information on these and other regulations and guidelines concerning RDX.

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:

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

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.