1. PUBLIC HEALTH STATEMENT

This public health statement tells you about guthion 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. Guthion has been found in at least 5 of the 1,699 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 guthion 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 guthion 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 guthion, 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 GUTHION?

Description	Guthion is the common name of an organophosphorus insecticide. It is a formulation that includes the active ingredient of azinphos-methyl. Guthion does not occur naturally in the environment. Pure guthion is a colorless to white odorless crystalline solid. Technical-grade guthion is a cream to yellow-brown granular solid.
Uses **• Pestide uses**	Guthion is used to control pest insects on many crops, especially apples, pears, cherries, peaches, almonds, and pistachios. Many uses of guthion have been cancelled by the EPA and its few remaining uses are being phased out.

For more information on the physical and chemical properties of guthion, and its production, disposal and use, see Chapters 4 and 5.

1.2 WHAT HAPPENS TO GUTHION WHEN IT ENTERS THE ENVIRONMENT?

Sources	Guthion is primarily released to air from its use as an insecticide. Guthion is sprayed on crops primarily using ground-based spray equipment, although it can also be sprayed on crops from light-weight planes and helicopters. Although a large part of the spray lands directly on the crop, some of the smaller droplets that make up the spray can be carried away from the crop by the wind to nearby water bodies and soils. Guthion residues may also reach nearby rivers, streams, lakes, or ponds by water runoff and erosion that occurs during rainfall. Manufacturing facilities that produce guthion can also release it to the environment during the production process.
How guthion breaks down	Guthion is not very persistent in the environment. Guthion is degraded to many other compounds by microorganisms found in soil and water. It is also degraded by sunlight and by reacting with water. Guthion does not evaporate very quickly from soil and water. It attaches strongly to soil surfaces and does not easily move into groundwater below the soil surface.

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

1.3 HOW MIGHT I BE EXPOSED TO GUTHION?

Food—primary source of exposure	You are primarily exposed to guthion by ingesting foods treated with this pesticide. Apples, pears, peaches, and cherries are crops most likely to contain guthion residues, but fewer residues are being found as guthion use in agriculture has been diminishing.
Air	You may be exposed to guthion in air in areas close to fruit orchards or other crops where guthion is used.
Workplace	People who work in agricultural jobs such as pesticide applicators, fruit pickers, and other farm workers can be exposed to higher levels of guthion than the average individual, probably by skin contact with the insecticide and by inhalation. Families of workers can also be exposed because residues on workers' hands, clothes, vehicles, or other personal items can be brought into the home.
Children	Children playing on or near areas that have been treated with guthion may be exposed to guthion in soil by skin contact, when they accidentally or intentionally put soil into their mouths, and through hand-to-mouth activity. Children can also be exposed through food and drink. Since children have more fruit in their diets, their exposure to guthion may be higher than for adults on a body weight basis.

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

1.4 HOW CAN GUTHION ENTER AND LEAVE MY BODY?

Enter your body • **Inhalation**	If you breathe air containing guthion, you may absorb it into your body through the lungs.
• **Injection**	Most guthion in food or water can be absorbed from the digestive tract.
• **Dermal contact**	Guthion may enter your body across the skin.
Leave your body	Once in the body, guthion is rapidly broken down and eliminated from the body mainly in the exhaled air, urine, and feces.

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

1.5 HOW CAN GUTHION AFFECT MY HEALTH?

This section looks at studies concerning potential health effects in animal and human studies.

Human exposure	Guthion affects the normal function of the nervous system by interfering with an important enzyme called acetylcholinesterase. Exposure to guthion can result in signs or symptoms of nervous system damage shortly after exposure. If you experience these symptoms, you should seek medical attention immediately. Emergency rooms have drugs that stop the harmful effects of guthion.
Laboratory animals	Symptoms observed in animals exposed to high levels of guthion include excess saliva, watery eyes, and mustle twitching. It is likely that humans exposed to high levels of guthion will have similar effects.
Cancer	Guthion has not been shown to cause cancer in people or animals. The Department of Health and Human Services (DHHS), the EPA, and the International Agency for Research on Cancer (IARC) have not classified the carcinogenic potential of guthion in humans.

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

1.6 HOW CAN GUTHION AFFECT CHILDREN?

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

Effects in children	We do not know whether children are more sensitive than adults to the health effects of guthion. The main target for guthion in adults is the nervous system, in particular acetylcholinesterase. It is expected that this will also be the main target in children.
Birth defects	We do not know if guthion can cause birth defects or other damage to developing children. Studies in animals have found decreases in fetal growth, nervous system damage, and reduced survival, but only at doses that also caused harmful health effects in the mothers.

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

Wash fruits and vegetables	To reduce the risk of exposure to guthion residue on fresh fruits or vegetables, wash the foods prior to eating them. If you go to an orchard and pick your own fruit, make sure you wash your hands when you are finished since guthion residues can be absorbed through the skin.
Those who live in agricultural areas	If you live near a farm where frequent ground or aerial spraying takes place, you may want to remain indoors with your children and pets while the crops are being sprayed to lessen your exposure. You should discourage your children from entering areas treated with guthion. Discourage your children from eating dirt and putting their hands in their mouth. Make certain your children wash their hands frequently, especially before eating. If children play in grass fields or orchards, any pesticides used in these areas could collect on clothing. Regular laundering of clothing can reduce the potential for this exposure.

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

Measuring effects	Guthion, like other organophosphorus pesticides, interferes in the human body with an enzyme called acetylcholinesterase. Most of the signs and symptoms resulting from guthion poisoning are due to this interference with acetylcholinesterase. A blood test that measures acetylcholinesterase in the red blood cells or a similar enzyme in plasma may be useful for detecting exposures to potentially harmful levels of guthion.
Detecting exposure	Because guthion changes to other compounds in the body quickly, it is difficult to directly analyze the amount of guthion in a person's body. Three chemicals formed when guthion breaks down can be measured in the urine. However, these three compounds are not specific to guthion only, but may also indicate exposure to other organophosphorus pesticides.

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.

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 guthion include the following:

Food	The EPA has set tolerances for residues of guthion in various raw food products of 0.2–5 parts of guthion per million parts of food (ppm).
Workplace air	OSHA set a legal limit of 0.2 milligrams per cubic meter (mg/m^3) guthion in air averaged over an 8-hour work day. NIOSH designated a limit of 10 mg/m^3 as a concentration that is immediately dangerous to life and health.

For more information on standards and guidelines for guthion, 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 ToxProfilesTM CD-ROM by calling the toll-free information and technical 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-32
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/