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1.1 WHAT IS N-NITROSODI-n-PROPYLAMINE?

N-Nitrosodi-n-propylamine is a yellow liquid at room temperature that does not dissolve in water and evaporates slowly. It is a man-made chemical made in small amounts for use in research. There is no evidence that N-nitrosodi-n-propylamine exists naturally in soil, air, food, or water. Small amounts of N-nitrosodi-n-propylamine are produced as a side reaction during some manufacturing processes, as a contaminant in some commonly available weed killers (dinitroaniline-based), and during the manufacture of some rubber products. When exposed to sunlight, N-nitrosodi-n-propylamine usually does not last for more than a day. Without sunlight (e.g., in water deeper than sunlight reaches or in subsurface soil) N-nitrosodi-n-propylamine breaks down slowly. It takes between 14 and 80 days for one-half of any certain amount of N-nitrosodi-n-propylamine to break down when it is released to the subsurface soil. More information can be found in Chapters 3, 4, and 5.

1.2 HOW MIGHT I BE EXPOSED TO N-NITROSODI-n-PROPYLAMINE?

Persons may be exposed to N-nitrosodi-n-propylamine by eating foods treated with nitrite preservatives (e.g., cheeses, cured meats) and drinking certain alcoholic beverages. N-Nitrosodi-n-propylamine forms in the stomach during digestion of nitrite-treated foods and foods that contain certain amines, particularly di-n-propylamine. Amines occur in some medicines and in a variety of foods. Levels of N-nitrosodi-n-propylamine found in food and alcoholic beverages range between 0.03 parts per billion (ppb) in fried, salt-preserved fish to 30 ppb in cheese. The general population may be exposed to N-nitrosodi-n-propylamine in cigarette smoke. Workers making molded rubber products have been exposed to levels of N-nitrosodi-n-propylamine in workroom air that were measured in parts of compound per trillion parts (ppt) of air. Workers applying contaminated weed killers may also be exposed to extremely low (ppt) levels of N-nitrosodi-n-propylamine. At this time, N-nitrosodi-n-propylamine has been found in at least 1 of 1177 hazardous waste sites on the National Priorities List (NPL) in the United States. Workers and the general population at these sites could possibly be exposed to this compound by skin contact, breathing, and eating contaminated items. For more information, refer to Chapter 5.

1.3 HOW CAN N-NITROSODI-n-PROPYLAMINE ENTER AND LEAVE MY BODY?

N-Nitrosodi-n-propylamine can enter the body when a person breathes air that contains N-nitrosodi-n-propylamine, or eats food or drinks water contaminated with N-nitrosodi-n-propylamine. N-nitrosodi-n-propylamine is not likely to get into your body unless you eat certain foods, drink alcoholic beverages, or are exposed to it at a waste disposal site by breathing N-nitrosodi-n-propylamine vapors. It is likely that N-nitrosodi-n-propylamine can enter the body by direct skin contact with wastes,

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pesticides, or soil that contains it. Experiments with animals suggest that if N-nitrosodi-n-propylamine enters the body, it will be broken down into other compounds and will leave the body in the urine. More information on how N-nitrosodi-n-propylamine can enter and leave your body is given in Chapter 2.

1.4 HOW CAN N-NITROSODI-n-PROPYLAMINE AFFECT MY HEALTH?

The effects of short- or long-term exposures to N-nitrosodi-n-propylamine on human health have not been studied. Little is known about the health effects of short exposures to N-nitrosodi-n-propylamine in experimental animals except that eating or drinking certain amounts of this chemical can cause liver disease and death. Long-term exposure of experimental animals to N-nitrosodi-n-propylamine in food or drinking water causes cancer of the liver, esophagus, and nasal cavities. Although human studies are not available, the animal evidence indicates that it is reasonable to expect that exposure to N-nitrosodi-n-propylamine by eating or drinking could cause liver disease and cancer in humans. It is not known whether other effects, such as birth defects, occur in animals or could occur in humans exposed to N-nitrosodi-n-propylamine by eating or drinking. It is also not known whether exposure to N-nitrosodi-n-propylamine by breathing contaminated air or contact with the skin can affect the health of animals or humans. Liver disease and cancer due to exposure to N-nitrosodi-n-propylamine by breathing or skin contact are, however, a possibility and a health concern. More information on the health effects of N-nitrosodi-n-propylamine is given in Chapter 2.

1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO N-NITROSODI-n-PROPYLAMINE?

The presence of N-nitrosodi-n-propylamine in blood and urine can be measured by chemical analysis, but this analysis is not usually available at your doctor's office and has not been used to test for human exposure or to predict possible health effects. These considerations are discussed in more detail in Chapter 2.

1.6 WHAT LEVELS OF EXPOSURE HAVE RESULTED IN HARMFUL HEALTH EFFECTS?

Tables 1-1 through 1-4 show the relationship between exposure to N-nitrosodi-n-propylamine and known health effects. As indicated in Tables 1-1 and 1-2, nothing is known about the health effects on humans or animals of breathing N-nitrosodi-n-propylamine. Also, nothing is known about the health effects in humans of eating food or drinking water containing N-nitrosodi-n-propylamine (Table 1-3). A Minimal Risk Level (MRL) is also included in Table 1-3. This MRL was derived from animal data for short-term exposure as described in Chapter 2 and in Table 2-1. The MRL provides a basis for comparison with levels that people might encounter in drinking water. If a person is exposed to N-nitrosodi-n-propylamine at an amount

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TABLE 1-1. Human Health Effects from Breathing
N-Nitrosodi-n-propylamine*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term exposure of humans to air containing N-nitrosodi-n-propylamine are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term exposure of humans to air containing N-nitrosodi-n-propylamine are not known.

*See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-2. Animal Health Effects from Breathing
N-Nitrosodi-n-propylamine

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term exposure of animals to air containing N-nitrosodi-n-propylamine are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term exposure of animals to air containing N-nitrosodi-n-propylamine are not known.

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TABLE 1-3. Human Health Effects from Eating or Drinking
N-Nitrosodi-n-propylamine*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term exposure of humans to food containing N-nitroso-di-n-propylamine are not known.
<u>Levels in Water (ppm)</u>		
3.3		Minimal risk level (based on animal data; see Section 1.6 for discussion).
Long-term Exposure (greater than 14 days)		
<u>Levels in Food</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term exposure of humans to food containing N-nitroso-di-n-propylamine are not known.
<u>Levels in Water</u>		
		The health effects resulting from long-term exposure of humans to food containing N-nitrosodi-n-propylamine are not known.

*See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-4. Animal Health Effects from Eating or Drinking
N-Nitrosodi-n-propylamine

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>		
308	4 days	Liver injury in mice.
<u>Levels in Water (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
3429	once	Liver injury and death in rats.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term animal exposure to food containing specific levels of N-nitrosodi-n-propylamine are not known.
<u>Levels in Water</u>		The health effects resulting from long-term animal exposure to water containing specific levels of N-nitrosodi-n-propylamine are not known.

*These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.

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below the MRL, it is not expected that harmful (noncancer) health effects will occur. Because this level is based on information that is currently available, some uncertainty is always associated with it. Also, because the method for deriving MRLs does not use any information about cancer, an MRL does not imply anything about the presence, absence, or level of risk of cancer. The levels of N-nitrosodi-n-propylamine in food and drinking water linked with known health effects in animals are given in Table 1-4. It is not known whether skin contact with N-nitrosodi-n-propylamine can affect the health of humans or animals. More information on levels of exposure linked with adverse health effects can be found in Chapter 2.

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

The EPA controls the release of N-nitrosodi-n-propylamine. It is proposed that releases or spills of 10 pounds or more of N-nitrosodi-n-propylamine must be reported to the National Response Center.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have more questions or concerns, please contact your State Health or Environmental Department or:

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

