



PUBLIC HEALTH STATEMENT

DINITROCRESOLS

CAS#: 534-52-1 (4,6-DNOC)

Division of Toxicology

August 1995

This Public Health Statement is the summary chapter from the Toxicological Profile for Dinitrocresols. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™ is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-888-422-8737.

This statement was prepared to give you information about dinitrocresols and to emphasize the human health effects that may result from exposure to them. The Environmental Protection Agency (EPA) has identified 1,350 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 cleanup activities. Dinitrocresols have been found in at least 50 of the sites on the NPL. However, the number of NPL sites evaluated for dinitrocresols is not known. As EPA evaluates more sites, the number of sites at which dinitrocresols is found may increase. This information is important because exposure to dinitrocresols may cause harmful health effects and because these sites are potential or actual sources of human exposure to dinitrocresols.

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 substances such as dinitrocresols, 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 ARE DINITROCRESOLS?

Dinitrocresols are a group of organic chemicals that can contain up to 18 individual compounds. This document contains information on mainly one dinitrocresol that is commercially most important. This dinitrocresol is called 4,6-dinitro--o-cresol and is abbreviated as DNOC. Industries manufacture dinitrocresols, and this is the major source of exposure. DNOC is sold under many trade names, some of which are Antinonin®, Detal®, and Dinitrol®. EPA has canceled the registration of these pesticides. DNOC is a yellow solid with no smell. The taste of DNOC is not known. It dissolves slightly in water. DNOC in water and soil does not easily evaporate to air. DNOC was primarily used to protect fruit trees and other food crops from insect damage. Another less expensive chemical that is more effective in controlling pests is replacing DNOC. In the 1930s, DNOC was used in pills for reducing weight. It is no longer used for this purpose because of bad effects on health.

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1.2 WHAT HAPPENS TO DINITROCRESOLS WHEN THEY ENTER THE ENVIRONMENT?

DNOC enters the air, water, and soil during its manufacture and transport. It also enters the environment when formulated products are prepared and used. Very small amounts of DNOC may form in the atmosphere in the presence of other compounds. Wastes containing DNOC are produced during its manufacture and use. These DNOC-containing wastes are often disposed in landfills. DNOC enters the environment from these landfills. DNOC also enters the environment from accidental spills during manufacture and transport and from leaks during storage.

DNOC destruction in air from chemical reactions with other pollutants or from interaction with sunlight may be insignificant. It eventually returns from air to land and water by settling and washout by snow and rainwater. We do not know how long DNOC stays in the air before it is fully removed. No known chemical reaction removes significant amounts of DNOC from water. DNOC in water may be broken down slowly by microorganisms. DNOC does not appreciably evaporate from water. Some of the DNOC sticks to particles present in water. This process partially transfers DNOC from water to the bottom sediment. When DNOC was accidentally spilled into the Rhine River in Germany, the level of DNOC in water decreased to half its initial value in an estimated 30 days. No known chemical reaction removes significant amounts of DNOC from soil. Microorganisms break down DNOC in soil. The loss of DNOC from soil by evaporation is not significant. DNOC has been found in groundwater from fields where it was applied. The level of DNOC in soil may decrease to

half its original level in an estimated 14 days to 1 month or longer.

1.3 HOW MIGHT I BE EXPOSED TO DINITROCRESOLS?

People can be exposed to DNOC by breathing contaminated air, drinking contaminated water, or eating contaminated food. Other than in certain workplaces, levels of DNOC in the air we commonly breathe in the United States have not been measured. However, the ambient level is expected to be very low. The levels of DNOC in drinking water and food also have not been detected. Certain people may be exposed to slightly higher levels of DNOC. People who live near sites containing DNOC wastes may be exposed primarily by breathing contaminated air. Children playing at or near these sites will be exposed by touching and eating soil if that soil contains DNOC. You may be exposed to DNOC if your work involves manufacturing, preparing, or using formulated DNOC products. You may be exposed if you work as a sprayer of DNOC. You also may be exposed to DNOC if your work involves incinerating waste containing DNOC or cleaning up sites contaminated with DNOC. According to one study, the estimated skin contact of workers spraying apple orchards was 22.5 milligrams of DNOC per hour (mg/hour) (1 milligram is one thousandth of a gram or a 30,000th fraction of an ounce). The workers also breathed less than 0.05–0.4 mg DNOC per hour while spraying. The blood and urine of some of the spray operators contained DNOC.

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1.4 HOW CAN DINITROCRESOLS ENTER AND LEAVE MY BODY?

DNOC can readily enter your body through the lungs if breathed in, through the stomach and intestines if swallowed, or through the skin if touched. The amount of DNOC that enters your body depends on the amount in air, food, and water, and the length of time you are exposed. After DNOC enters your body, your blood can carry it to your lungs, brain, liver, kidneys, spleen, muscles, and heart. DNOC can build up in these organs and tissues if you are repeatedly exposed. Animal studies show that DNOC is broken down to harmless products that do not cause health effects, but leave the body in urine, feces, and exhaled air. We do not know whether DNOC is broken down in people the same way it is in animals. However, we do know that DNOC leaves the bodies of people more slowly than it leaves the bodies of animals. This might mean there are other differences in the way people and animals break it down. DNOC can be found in human urine for as long as 20 days after the last exposure.

1.5 HOW CAN DINITROCRESOLS AFFECT MY HEALTH?

Adverse health effects can result from breathing too much DNOC, from excessive skin contact, and from swallowing too much of it. Some of what we know about how DNOC can affect your health comes from reports of workers who became ill after making DNOC in factories or spraying it on crops. These workers breathed in the DNOC dusts or had skin contact with it, but we do not know to how much they were exposed. Most of what we know about how DNOC can affect your health comes from old reports from doctors who prescribed

DNOC for their patients who wanted to lose weight. DNOC has not been used as a diet pill for almost 60 years because of the harmful effects to those patients. The amount of DNOC that the patients took in pill form was as low as 0.35 milligram of DNOC per kilogram of body weight per day (mg/kg/day). DNOC increases your basal metabolic rate, which can increase your pulse and heart rates, and cause profuse sweating and fever. These effects can occur after breathing in, swallowing, or having skin contact with DNOC for a short period. DNOC also may make it difficult for you to breathe and causes headaches, drowsiness, dizziness, and weight loss. DNOC stains the whites of the eyes and the skin yellow, and can cause mild damage to the stomach, the kidneys, and the liver. If swallowed for long periods, DNOC may cause cataracts in your eyes and skin rashes. If you breathe in, swallow, or have skin contact with large amounts of DNOC for short periods, you could have convulsions, become unconscious, and even die. High environmental temperatures, such as in tropical climates, can worsen these effects.

DNOC causes similar health effects in animals. In addition, injection of other dinitrocresols into animals caused similar effects. High environmental temperatures can worsen the harmful effects in some animals that swallow DNOC. Some animals exposed to DNOC for a long period show blood cell changes. Ducklings given high levels of DNOC in the diet for a short period developed cataracts.

We do not know whether DNOC causes reproductive effects, birth defects, or cancer in people. One animal study suggests that swallowing DNOC may decrease the number of sperm in the testes of males or cause damage to the ovaries of females. Swallowing DNOC does not appear to

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cause developmental effects in animals. We do not know whether DNOC causes cancer in animals.

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

DNOC can be measured in the blood, urine, and feces of exposed people. DNOC has been detected in human blood as many as 40 days after the last dose was swallowed. Measuring the amount of DNOC in blood may not be a reliable test to determine how much DNOC you were exposed to or for how long, but it can be used to predict whether you would experience harmful effects, such as headache and depression. DNOC has been found in urine for more than 13–20 days after the last exposure, but much of the DNOC also remains in the body. This means that measuring DNOC in the urine may not be a reliable test to determine how much you were exposed to or for how long. Testing urine can determine only whether or not you have been exposed to DNOC, not whether you will experience any harmful health effects. Breakdown products of DNOC are reported one study of human exposure and have been found in the urine of exposed animals. Yellow-stained skin and eyes can alert a doctor that you may have been exposed to DNOC, but other similar chemicals also cause yellow staining.

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

EPA lists DNOC as a hazardous air pollutant. The Occupational Safety and Health Administration (OSHA) regulates DNOC levels in the workplace. The occupational exposure limit for an 8-hour

workday, 40-hour workweek, is 0.2 milligrams of DNOC per cubic meter of air (mg/m³). The National Institute for Occupational Safety and Health (NIOSH) recommends that exposure in air not exceed 0.2 mg DNOC/m³ for a 10-hour workday, 40-hour workweek. Federal regulations limit the amount of DNOC that factories can release into waste water. The EPA requires industries to report releases or spills of 10 pounds or more.

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, Mailstop F-32
Atlanta, GA 30333

Information line and technical assistance:

Phone: 888-422-8737
FAX: (770)-488-4178

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

To order toxicological profiles, contact:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 800-553-6847 or 703-605-6000

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