

1. PUBLIC HEALTH STATEMENT

This public health statement tells you about cresols and the effects of exposure to these substances.

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. *o*-Cresol, *m*-cresol, *p*-cresol, and mixed cresols have been identified in at least 210, 22, 310, and 70 of the 1,678 current or former NPL sites, respectively. Although the total number of NPL sites evaluated for these substances is not known, the possibility exists that the number of sites at which cresols are 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 these substances 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 cresols, 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.

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1.1 WHAT ARE CRESOLS?

Description	<p>Three types (or isomers) of cresols exist: <i>ortho</i>-cresol, <i>meta</i>-cresol, and <i>para</i>-cresol; abbreviated as <i>o</i>-cresol, <i>m</i>-cresol, and <i>p</i>-cresol.</p> <p>Pure cresols are solid, while mixtures tend to be liquid.</p> <p>Cresols have a medicinal smell.</p>
Uses <ul style="list-style-type: none"> • Manufacturing • Consumer products 	<p>Cresols are both manufactured chemicals and natural components in many foods. Large amounts of cresols are produced in the United States.</p> <p>Cresols are used to manufacture other chemicals and as solvents.</p> <p>Cresols kill microorganisms and are added to soaps as disinfectants.</p>

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

1.2 WHAT HAPPENS TO CRESOLS WHEN THEY ENTER THE ENVIRONMENT?

Sources	Cresols are released to the environment during the burning of wood, coal, and fossil fuels, as well as from their manufacture and the use of products containing cresols.
Break down <ul style="list-style-type: none"> • Air • Water • Soil 	<p>Cresols are quickly broken down in the air, usually within 1–2 days. They can also be removed from the air by rain.</p> <p>Cresols in water are degraded within days by microorganisms.</p> <p>Cresols are degraded rapidly in soil by microorganisms, but a portion may move into groundwater.</p>

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

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1.3 HOW MIGHT I BE EXPOSED TO CRESOLS?

Air—primary source of exposure	<p>The primary way you can be exposed to cresols is by breathing air containing them. Releases of cresols into the air occur from:</p> <ul style="list-style-type: none"> • industries using or manufacturing cresols • automobile exhaust • cigarette smoke • wood and trash burning <p>A national emissions study conducted from 1990 to 1998 reported an average county-level concentration of 31.7 nanograms per cubic meter (ng/m³) for all cresol isomers combined.</p>
Water	<p>Cresols have been detected in surface waters and groundwater, but generally at low levels (approximately 1 microgram per liter [µg/L] or less).</p> <p>Higher levels have been detected:</p> <ul style="list-style-type: none"> • where petroleum spills have occurred • near hazardous waste sites • in industrial effluents
Workplace	<p>A large number of workers are potentially exposed to cresols. Potential exposures occur in:</p> <ul style="list-style-type: none"> • manufacture of cresols • chemical laboratories • coal gasification facilities • paint and varnish application • application of insulation lacquers to copper wires • wood-preserving facilities <p>Exposure may occur through breathing and dermal contact with contaminated air and/or liquid cresols or products containing cresols.</p>
Food	<p>Low levels of cresols have been found in some foods such as tomatoes, tomato ketchup, asparagus, cheeses, butter, bacon, and smoked foods.</p> <p>Some drinks also contain cresols (coffee, black tea, wine, Scotch whisky, brandy, and rum).</p>
Consumer products	<p>Exposure may occur through accidental or intentional ingestion or contact of the skin with cleaners or disinfectants containing cresols.</p>

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

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1.4 HOW CAN CRESOLS ENTER AND LEAVE MY BODY?

Enter your body <ul style="list-style-type: none"> • Inhalation • Ingestion • Dermal contact 	<p>There is no information to determine whether cresols can enter the bloodstream through your lungs if you breathe air contaminated with these substances.</p> <p>Cresols in food or water may rapidly enter your body through the digestive tract.</p> <p>Cresols may enter through your skin when you come into contact with liquids containing cresols.</p>
Leave your body	<p>Once in your body, cresols are transformed into other chemicals called metabolites. Most of these metabolites leave your body in the urine within 1 day.</p>

For more information on how cresols enter and leave the body, see Chapter 3.

1.5 HOW CAN CRESOLS AFFECT MY HEALTH?

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

Humans <ul style="list-style-type: none"> • Inhalation • Oral • Dermal 	<p>Brief exposures to 6 mg/m³ <i>o</i>-cresol in the air caused nose and throat irritation.</p> <p>Ingestion of liquid products containing cresols can cause serious gastrointestinal damage and even death.</p> <p>Application of concentrated cresols to the skin can cause severe skin damage and even death.</p>
Laboratory animals <ul style="list-style-type: none"> • Inhalation • Oral • Dermal 	<p>Short-term exposure to cresols in air has caused irritation of the respiratory tract and muscle twitching.</p> <p>Placing cresols in the stomach of animals by means of a feeding tube has caused muscle twitching and loss of coordination.</p> <p>Eating food contaminated mostly with <i>p</i>-cresol or with a mixture of <i>m</i>- and <i>p</i>-cresol for 28 days or longer has caused lesions inside the nose of rats and mice; mice also developed lesions in the lungs and in the thyroid gland.</p> <p>Short-term application of cresols to the skin of animals has produced skin irritation.</p>

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Cancer	The EPA has determined that cresols are possible human carcinogens. The International Agency for Research on Cancer (IARC) has not classified cresols as to their carcinogenicity.
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Further information on the health effects of cresols in humans and animals can be found in Chapters 2 and 3.

1.6 HOW CAN CRESOLS 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	There are no studies of children exposed to cresols, but it is expected that children exposed to cresols will suffer the same effects observed in exposed adults. There is a report of a baby who suffered serious damage to the skin, liver, and kidneys, went into a coma, and eventually died 4 hours after liquid cresol was accidentally spilled on his head.
Birth defects	Fetal toxicity and birth defects have been reported in animals given cresols. This generally occurred with doses that were also toxic to the mothers.
Breast milk	There is no information on levels of cresols in breast milk.

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

Tobacco smoke	Cresols are components of tobacco smoke. Avoid smoking in enclosed spaces like inside the home or car in order to limit exposure to children and other family members.
Consumer products	Household cleaners and disinfectants containing cresols should be stored out of the reach of young children to prevent accidental poisonings and skin burns and follow manufacturer's directions on the label.

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

Detecting exposure	Cresols can be measured in blood and urine. Cresols are normal constituents of human urine.
Measuring exposure	<p>A higher-than-normal concentration of cresols in the urine may suggest recent exposure to these substances or to substances that are converted to cresols in the body.</p> <p>The detection of cresol and/or its metabolites in your urine cannot be used to predict the kind of health effects that might develop from that exposure.</p>

Information about tests for detecting cresols in the body is given in Chapters 3 and 7.

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. These are levels of a toxic substance in air, water, soil, or food that do not exceed a critical value. This critical value 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.

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Some regulations and recommendations for cresols include the following:

Drinking water	EPA has not established drinking water standards and health advisories for cresols.
Workplace air	OSHA set a legal limit of 5 parts per million (ppm) cresols (all isomers) in air averaged over an 8-hour work day.

For more information on regulations and advisories, 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 ToxProfiles™ 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/>