Toxicological Profile for

CHRYSENE

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

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1. PUBLIC HEALTH STATEMENT

1.1 WHAT IS CHRYSENE?

Chrysene is one of the polycyclic aromatic hydrocarbon (PAH) compounds. Because it is formed when gasoline, garbage, or any animal or plant material burns, it is usually found in smoke and soot. This chemical combines with dust particles in the air and is carried into water and soil and onto crops. Chrysene is found in the coal tar pitch that industry uses to join electrical parts. It is also found in creosote, a chemical used to preserve wood.

1.2 HOW MIGHT I BE EXPOSED TO CHRYSENE?

People may be exposed to chrysene from environmental sources such as air, water, and soil and from cigarette smoke and cooked food. Workers who handle or are involved in the manufacture of PAH-containing materials may also be exposed to chrysene. Typically, exposure for workers and the general population is not to chrysene alone but to a mixture of similar chemicals.

The general population may be exposed to dust, soil, and other particles that contain chrysene. The largest sources of chrysene in the air are open burning and home heating with wood and coal. Factories that produce coal tar also contribute small amounts of chrysene to the air. People may come in contact with chrysene from soil on or near hazardous waste sites, such as former gas-manufacturing sites or abandoned wood-treatment plants that used creosote. At this time, chrysene has been found at 71 out of 1,177 sites on the National Priorities List (NPL) of hazardous waste sites in the United States. As more sites are evaluated by the Environmental Protection Agency (EPA), this number could change. The soil near areas where coal, wood, or other products have been burned is another source of exposure. Exposure to chrysene and other PAHs may also occur through skin contact with products that contain PAHs such as creosote-treated wood, asphalt roads, or coal tar.

People may be exposed to chrysene by drinking water from the drinking water supplies in the U.S. that have been found to contain low levels of the chemical. Foods grown in contaminated soil or air may contain chrysene. Cooking food at high temperatures, as occurs during charcoal-grilling or charring, can increase the amount of chrysene in the food. Chrysene has been found in cereals, vegetables, fruits, meats, beverages, and in cigarette smoke.

The greatest exposure to chrysene is likely to take place in the workplace. People who work in coal tar production plants; coking plants; asphalt production plants; coal-gasification sites; smoke houses; municipal trash incinerators; and facilities that burn wood, coal, or oil may be exposed to chrysene in the workplace air. Chrysene may also

be found in areas where high-temperature food fryers and broilers are used.

1.3 HOW DOES CHRYSENE GET INTO MY BODY?

The most common way chrysene enters the body is through the lungs when a person breathes in air or smoke containing it. It also enters the body through the digestive system when substances containing it are swallowed. Although chrysene does not normally enter the body through the skin, small amounts could enter if contact occurs with soil that contains high levels of chrysene (for example, near a hazardous waste site) of if contact is made with heavy oils containing chrysene.

1.4 HOW CAN CHRYSENE AFFECT MY HEALTH?

Chrysene causes cancer in laboratory animals when applied to their skin. This finding suggests that it is likely that people exposed in the same manner could also develop cancer.

Because studies of chrysene are not complete, we don't know if chrysene that is breathed in or swallowed could cause cancer or if it can cause harmful effects other than cancer.

1.5 IS THERE A MEDICAL TEST TO DETERMINE IF I HAVE BEEN EXPOSED TO CHRYSENE?

Very few tests are available that can tell if exposure to chrysene has taken place. In the body, chrysene is changed to related chemical substances called metabolites. The metabolites can bind with DNA, the genetic material of the body. The body's response after exposure can be measured in the blood. However, this test is still being developed. Chrysene can also be found in the urine of individuals exposed to PAHs. It is not possible to know from these tests how much chrysene a person was exposed to or to predict what health effects may happen at certain levels. Also, none of these tests have been used in exposure situations outside the workplace.

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

No information has been found about specific levels of chrysene that have caused harmful effects in people after breathing, swallowing, or touching the substance.

Skin cancer has developed in mice that had chrysene on their skin throughout their lives. Skin cancer is the only harmful effect that can be predicted when animals are exposed to chrysene. It is not known if similar levels could cause cancer in people. No information has been found about harmful effects of chrysene in animals that breathed in or ate the chemical.

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

Based on information from another PAH chemical, the federal government has developed standards and guidelines to protect individuals from the potential health effects of PAHs, including chrysene, in

drinking water. EPA has provided estimates of levels of total cancer-causing PAHs in lakes and streams associated with various risks of developing cancer in people. EPA has also determined that any release of PAHs of more than 1 pound should be reported to the National Response Center.

Pure chrysene is produced in the United States only as a laboratory chemical. However, chrysene is a PAH, and PAHs are found in coal tar and in the creosote oils and pitches formed from the production of coal tar. The government's goal has been to protect workers involved with the production of coal tar products. Although government standards are not for chrysene alone, they are useful in controlling exposure to total PAHs.

The National Institute for Occupational Safety and Health (NIOSH) has determined that workplace exposure to coal products can increase the risk of lung and skin cancer in workers and suggests a workplace exposure limit for coal tar products of 0.1 milligram of PAHs per cubic meter of air (0.1 mg/m^3) for a 10-hour workday, 40-hour workweek. NIOSH has not suggested a specific workplace limit for chrysene. The Occupational Safety and Health Administration (OSHA) has set a legal limit of 0.2 milligram of all PAHs per cubic meter of air (0.2 mg/m^3).