

# HESIS Fact Sheet



## Wood Preservatives Containing Arsenic and Chromates

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### TABLE OF CONTENTS

- [USES AND CONTENTS OF WOOD PRESERVATIVES](#)
- [HOW ARSENIC AND CHROMATES ENTER AND AFFECT YOUR BODY](#)
- [LEGAL EXPOSURE LIMITS AND MEDICAL MONITORING](#)
- [REDUCING YOUR EXPOSURE](#)
- [RESOURCES](#)

**Health Hazard Summary:** *Wood preservatives that contain arsenic or chromates can cause effects similar to those caused by exposure to pure inorganic arsenic or chromate compounds. Overexposure to inorganic arsenic or chromate compounds can irritate the eyes, nose, throat, lungs, and skin, and can cause lung cancer. Inorganic arsenic can damage the nervous system and can cause skin cancer.*

### USES AND CONTENTS OF WOOD PRESERVATIVES

The two most common arsenic-containing wood preservatives are *chromated copper arsenate (CCA)* and *ammonium copper arsenate (ACA)*. Arsenic has many chemical forms and is present in many compounds; these compounds are commonly classified as either organic (containing carbon) or inorganic (without carbon). Arsenic compounds are called "arsenicals." Chromates are compounds of chromium metal with oxygen. This fact sheet will focus on the properties and health effects of inorganic arsenicals and chromates. However, because much of the available medical information is based mainly on exposure to *pure* arsenic and chromium metals, this fact sheet also includes specific references to the pure metals. The copper and ammonia in wood preservatives are not likely to cause health effects.

Inorganic arsenic and chromates are used in wood preservatives to prevent rotting when wood is exposed to damp soil, standing water, or rain. Preserved wood products are widely used in the construction, railroad, and utilities industries. After wood is pressure-treated with wood preservatives, residues of the preservatives can collect on the surface. Although initial residues may wash off, new layers of treated wood are continuously exposed as the wood weathers. Thus, when treated wood is used, it may carry surface residues of arsenic and chromates that may be harmful. Arsenic and chromates are also present in some paints used to cover the cut ends of treated wood.

Trade names for wood preservatives registered for use in California are Osmose K-33 C<sup>R</sup> (CCA) and Osmose Special K-33<sup>R</sup> (CCA).

Under California's Hazard Communication Standard (*GISO 5194*), your employer must tell you if you are working with any hazardous substances, such as inorganic arsenic or chromates, and must train you to use such substances safely. If you think you may be exposed to arsenic or chromates, ask to see the Material Safety Data Sheets (MSDSs) for the products you are using.

An MSDS lists a product's hazardous chemical contents, describes its health and safety hazards, and gives methods for its safe use, storage, and disposal. The MSDS should also include information on fire and explosion hazards, reactivity, first aid, and procedures for handling leaks and spills. Your employer must have an MSDS for any workplace product that contains a hazardous substance, and must make the MSDS available to employees on request.

This Fact Sheet is an aid for worker training programs. It does not take the place of a Material Safety Data Sheet.

## **HOW ARSENIC AND CHROMATES ENTER AND AFFECT YOUR BODY**

Arsenicals and chromates can enter your body when you breathe in dusts or mists or swallow dusts or liquids. They do not easily pass through unbroken skin, but they are likely to be swallowed or inhaled if you get them on your skin. You can inhale them when you smoke a cigarette contaminated with dust, and you can swallow them when you eat contaminated food or drink. For this reason it is important to keep food and cigarettes out of the work area and to wash your hands before eating or smoking if you are working with these or any other toxic substances.

The health effects information in this fact sheet is based on exposure to pure inorganic arsenicals encountered in industries such as smelting, mining, and pesticide manufacturing, and exposure to pure chromates in a number of industries. Dusts that contain wood preservatives are less likely to cause harm than pure arsenic and chromate dusts, because the amount you are exposed to is less. However, under some circumstances, working with treated wood may result in exposure to hazardous levels of arsenic or chromates.

Overexposure most commonly affects the throat and lungs, skin, and nervous system.

**Eyes, Nose, Throat, and Lungs:** Arsenic and chromate dusts can irritate your eyes, causing swelling, redness, and pain. Inhalation of either material can cause respiratory irritation, coughing, swelling of air passages, chest pain, and irritation of the nose. High-level or long-term exposures can cause holes in the tissue that separates the nostrils, a condition called perforation of the nasal septum.

Repeated exposure to these compounds, as with other respiratory irritants, can cause chronic bronchitis, with symptoms such as cough and sputum (phlegm), shortness of breath, and chest discomfort. Long-term inhalation exposure can cause lung cancer (see below).

**Skin:** Repeated skin contact with arsenicals and chromates can cause redness, itching, swelling, and skin rash. Severe skin reactions, such as blisters, burns, and sores, can result. Repeated skin contact with chromates can cause open sores (ulcers) to appear in the skin on the hands and forearms.

Long-term exposure to chromates can cause an allergic skin rash (allergic dermatitis) to appear. Long-term exposure to arsenicals can cause darkening of the skin, often with a "raindrop" appearance; development of thick cracking skin; brittleness in the nails, with pale horizontal bands (called Mees lines); loss of hair and nails; and skin cancer (see below).

**Nervous System:** Arsenicals can affect the nerves in your arms and legs, causing tingling ("pins and needles")

sensation), pain, tenderness, numbness, and weakness.

**Cancer:** Some inorganic arsenicals have caused lung and skin cancer in humans. Under Cal/OSHA regulations, all inorganic arsenicals (except arsine) are considered carcinogenic. Exposure to chromates has been found to cause lung cancer in humans. The specific chromium compounds that cause lung cancer in humans have not been identified.

**Reproductive System:** The effects of arsenicals and chromates on the reproductive system are not fully understood. Both have been shown to cause birth defects when directly injected into pregnant animals. However, it is not certain what these animal studies mean in terms of human risk, because the animals were exposed in a very different way (injection) from the types of occupational exposure in humans (inhalation or ingestion). Therefore, there is not enough evidence to say whether arsenicals and chromates can cause birth defects in humans.

We do know that arsenic and chromates can cross the placenta in a pregnant woman to reach a fetus. Because of the effects of these chemicals in animals, and because there is evidence that they may be able to harm genetic material, we recommend that pregnant or nursing women minimize their exposure.

Whether these compounds have any effect on the male reproductive system has not been well studied. Because of the possible effects on genetic material, men should also minimize their exposure.

## LEGAL EXPOSURE LIMITS AND MEDICAL MONITORING

Cal/OSHA sets and enforces workplace exposure limits. If you are working with inorganic arsenic or chromates and have any of the symptoms described above, you may be exposed at more than the legal limits. Talk to your supervisor and/or your union. If any worker might be exposed to a substance at more than the legal exposure limit, the employer must measure the amount of the chemical in the air in the work area. You have the right to see the results of such monitoring relevant to your work.

You, your union representative, and your physician have the right to see and copy your own work-related medical records, and records of your exposure to toxic substances. These records are important in determining whether your health has been affected by your work. Employers who have such records must keep them and make them available to you for at least 30 years after the end of your employment.

### ARSENIC

Cal/OSHA's Inorganic Arsenic Standard applies to the manufacture and use of wood preservatives that contain inorganic arsenic, but does not apply to the use of arsenically preserved wood. Although there are no specific regulations for end-use of arsenic-treated wood, the standard contains several provisions concerning health and safety and monitoring which may be helpful for those who use wood products. The standard sets a Permissible Exposure Limit (PEL) of 0.01 milligrams of inorganic arsenic per cubic meter of air ( $0.01 \text{ mg/m}^3$ ), *averaged* over an 8-hour workshift, for the amount of inorganic arsenic in your breathing zone. The National Institute for Occupational Safety and Health (NIOSH) has proposed reducing the PEL to  $0.002 \text{ mg/m}^3$ .

Cal/OSHA requires that workers who are exposed to inorganic arsenic at or above  $0.005 \text{ mg/m}^3$  for more than 30 days a year have regularly scheduled medical examinations, including blood and sputum (phlegm) testing and full chest X-rays. Other tests for arsenic exposure and health effects should be selected by a health practitioner on a case-by-case basis (see Appendix C - "Medical Surveillance Guidelines" - of the Inorganic Arsenic Standard).

Arsenic can be measured in urine, and when properly collected and analyzed, it can be used as an indicator of exposure *over the previous few days*. Testing urine can be helpful in evaluating illness that may be due to *recent* arsenic exposure,

but it is not recommended as a routine test. Levels can be elevated from eating seafood.

When exposure exceeds the PEL, Cal/OSHA also requires employers to furnish protective work clothing and equipment and clean changing rooms, lunch rooms, and end-of-shift shower facilities, at no cost to the worker. In addition, employers must ensure that food, beverages, tobacco products, and cosmetics are not present except in the proper facilities provided, and that workers wash their hands and face before using such items.

## CHROMATES

The PEL for chromates is 0.05 milligrams of chromates per cubic meter of air (0.05 mg/m<sup>3</sup>). The PEL for chromates, like the PEL for arsenic, refers to your *average* exposure for any 8-hour workshift.

Although chromate can be measured in urine, it is probably not the same form of chromate present in CCA. Routine urine testing is not recommended or legally required. However, it is generally recommended that workers regularly exposed to chromium or other hazardous substances receive a complete physical examination, including an occupational and medical history, at the beginning of employment. We also recommend periodic follow-up examinations.

## REDUCING YOUR EXPOSURE

When engineering controls cannot sufficiently reduce exposures, a respirator must be worn and a respiratory protection program must be developed, as outlined in Cal/OSHA regulations (*GISO 5144*). An industrial hygienist or other knowledgeable person should be consulted, to ensure that the equipment is appropriate and is used correctly.

In July 1984, the US Environmental Protection Agency (EPA), which regulates the use of pesticides (including wood preservatives) proposed new regulations on the use of preserved wood products. These regulations have not yet gone into effect. The following recommendations are based upon the EPA proposal.

**Skin:** To prevent skin contamination when handling and sawing wood, it is a good work practice to wear gloves made of a material, such as rubber, which is resistant to inorganic arsenicals and chromates, although the EPA has concluded that arsenic from treated wood is not absorbed through the skin.

After using treated wood products, wash thoroughly before eating, drinking, or smoking. If oily wood preservatives or sawdust accumulate on clothes, launder before re-use. Wash work clothes separately from other clothing.

**Eyes:** When power sawing or sanding, wear goggles to protect your eyes from flying particles.

**Respiratory:** Dust masks, well sealed around the face, should be worn when sawing or sanding treated wood. In order to avoid indoor accumulation of sawdust from treated wood, sawing and sanding should be performed outside, if possible.

**Substitution:** One way to control hazardous exposures is to use safer chemicals in place of more toxic ones. However, the health and safety hazards of substitutes must also be carefully considered, to ensure that they are actually safer.

Wood preservatives are necessary in moist climates where wood rarely dries out or in areas where wood contacts soil. Water repellants may be an adequate substitute in above-ground applications where there is less risk of rot.

In addition to water repellants, there are some products (polyurethane or epoxy sealers) that soak into the wood and slow down the process that allows the wood preservative to free itself from the wood and accumulate on the surfaces.

Copper-8-quinolate and copper naphthenate are less toxic wood preservatives than the arsenic-containing products;

however, their toxicity has not been well studied.

**Disposal:** Arsenic-treated wood must be disposed of at a municipal refuse landfill in accordance with regulations of the Regional Water Quality Control Board.

## [RESOURCES](#)