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# **HEXAVALENT CHROMIUM EMPLOYEE TRAINING**

*(Concise)*

**Leader's Guide, Fact Sheet  
& Quiz**

**Item Number: 1654**  
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***This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation.***

## **PREPARING FOR THE MEETING**

Here are a few suggestions for using this program:

- a) Review the contents of the Fact Sheet that immediately follows this page to familiarize yourself with the program topic and the training points discussed in the program. The Fact Sheet also includes a list of Program Objectives that details the information that participants should learn from watching the program.
- b) If required by your organization, make an attendance record to be signed by each participant to document the training to be conducted.
- c) Prepare the area and equipment to be used for the training. Make sure the watching environment is comfortable and free from outside distractions. Also, ensure that participants can see and hear the TV screen or computer monitor without obstructions.
- d) Make copies of the Review Quiz included at the end of this Leader's Guide to be completed by participants at the conclusion of the presentation. Be aware that the page containing the answers to the quiz comes before the quiz itself, which is on the final page.

## **CONDUCTING THE PRESENTATION**

- a) Begin the meeting by welcoming the participants. Introduce yourself and give each person an opportunity to become acquainted if there are new people joining the training session.
- b) Introduce the program by its title and explain to participants what they are expected to learn as stated in the Program Objectives of the Fact Sheet.
- c) Play the program without interruption. Upon completion, lead discussions about your organization's specific policies regarding the subject matter. Make sure to note any unique hazards associated with the program's topic that participants may encounter while performing their job duties at your facility.
- d) Hand out copies of the review quiz to all of the participants and make sure each one completes it before concluding the training session.

## 1654 HEXAVALENT CHROMIUM EMPLOYEE TRAINING (*Concise*) FACT SHEET

**LENGTH: 9 MINUTES**

### **PROGRAM SYNOPSIS:**

Hexavalent chromium is essential to a number of industrial applications: chromate pigments are used in dyes, ink and plastics, chromic acid is used in chrome plating and chromates are used to prevent corrosion in paints and other coatings. While these compounds can be very beneficial, they can also be harmful or lethal to those employees exposed to them. This program discusses the safe work practices these workers must follow to avoid exposures to this hazardous substance.

Topics include characteristics and properties of hexavalent chromium, effects of exposures, engineering and work practice controls, medical surveillance and protective clothing and equipment.

### **PROGRAM OBJECTIVES:**

After watching the program, the participant will be able to explain the following:

- The effects of exposures to hexavalent chromium;
- The purpose of exposure assessments and medical surveillance;
- The importance of wearing respiratory protection and other protective clothing and equipment;

### **INSTRUCTIONAL CONTENT:**

#### **CHARACTERISTICS & PROPERTIES OF HEXAVALENT CHROMIUM**

- Hexavalent chromium compounds are almost always man-made and are used in a variety of industries. Some of the prominent uses of hexavalent chromium in industry include chromate pigments in dyes, inks, and plastics, chrome-plating in which chromium metal is deposited on a surface using chromic acid and chromates used to prevent corrosion in paints, primers and other coatings.
- In addition, hexavalent chromium can also be found as a byproduct of industrial processes and maintenance operations.
- In fact, OSHA estimates that 48 percent of all workers affected by hexavalent chromium will be welders. Welders can be exposed to chromium 6 when fumes are released while welding stainless steels, chromium alloys and chrome-coated metal.
- The amount of exposure from welding depends on the material being welded, the amount of ventilation and the type of welding being performed.
- Some welding applications require little or no respiratory protection, while others require a high level of respiratory protection to keep exposure levels below the permissible exposure level.
- Air monitoring is used to determine the level of protection needed.
- Particles may also be released during smelting of ferro-chromium ore and trace amounts may also be found in portland cement.
- Chromium 6 compounds are essential in many industrial applications; however, they can be harmful or lethal to those employees who are exposed to them. This is why it's so important to understand the hazards, routes of entry and exposure symptoms of hexavalent chromium.

#### **EFFECTS OF INHALATION**

- There are several ways chromium 6 can enter our bodies; these are called "routes of entry".
- Inhalation is the primary route of entry. Employees can inhale dusts, mists and fumes containing chromium 6 while performing tasks such as welding on stainless steel or applying paints and coatings containing chromates.
- Repeated or prolonged exposure to the inhalation of hexavalent chromium can lead to harmful health effects including bronchitis, pneumonia, asthma, and lung cancer.
- Some symptoms of inhalation exposure to chromium 6 include a runny nose, sneezing, coughing, itching and a burning sensation.
- Chronic exposure may also produce sores in the nose, nosebleeds and in severe cases a perforation of the wall separating the nasal passages.

## **EFFECTS OF SKIN EXPOSURES**

- Direct skin contact with hexavalent chromium can lead to a variety of ailments.
- Some employees who come in contact with hexavalent chromium may develop an allergic reaction known as allergic contact dermatitis. When an employee becomes allergic, brief skin contact causes swelling and a red, itchy rash; allergic contact dermatitis becomes longer-lasting and more severe with repeated skin exposure.
- Direct skin contact with chromatic substances can also lead to skin ulcers. These are small crusted skin sores that heal slowly and leave scars. These are commonly referred to as “chrome holes.”

## **OTHER EXPOSURES**

- Direct eye contact with chromate dust or chromic acid can cause permanent eye damage.
- Dust particles of chromium can contaminate clothing, hands, food and other items and lead to ingestion by employees.
- Damage to the liver, kidneys and gastrointestinal system has been experienced by individuals who have ingested high levels of hexavalent chromium.
- Some symptoms of chromium 6 ingestion include severe abdominal pain, vomiting and hemorrhaging.

## **OSHA’S HEXAVALENT CHROMIUM STANDARD**

- To prevent workers from suffering one or more of these ailments, OSHA has established regulations to protect workers from the hazards of hexavalent chromium. Your organization has incorporated the OSHA regulation into its safety and health program.
- Your employer will train you on the contents of OSHA’s Hexavalent Chromium Standard applicable to your work and a copy of the standard will be made readily available for your review at no cost.

## **ENGINEERING & WORK PRACTICE CONTROLS**

- Your employer will implement controls to limit exposures when there is an average exposure of five micrograms of chromium 6 per cubic meter of air over the course of any eight-hour work shift. The five microgram per cubic meter measurement is known as the permissible exposure limit, or PEL.
- To protect workers, exposure to hexavalent chromium must be reduced to the permissible exposure limit or below. Engineering and work practice controls are the primary means used to reduce exposure.
- Examples of engineering controls include substituting a less toxic material for chromium 6.
- Changing a process to reduce exposure is another example. For example, TIG welding on stainless steel reduces exposure compared to traditional stick welding.
- Also, isolating the source of exposure with barriers and reducing the hazard with ventilation and exhaust systems are examples of engineering controls.
- If engineering and work practice controls do not sufficiently reduce exposure, then appropriate respirators must be used to further reduce employee exposure to the permissible exposure limit or below.

## **PROTECTIVE CLOTHING & EQUIPMENT**

- You will also be supplied with protective clothing and equipment if skin or eye contact with hexavalent chromium is likely.
- Be sure you know precisely what protection is needed for each job task you perform and be sure you wear it. Simple tasks may only require gloves for adequate protection while others may require a higher level of protection.

## **EXPOSURE ASSESSMENTS & MEDICAL SURVEILLANCE**

- When levels of hexavalent chromium cannot be reduced below 2.5 micrograms per cubic meter of air averaged over an 8-hour work shift, your employer will establish a program of exposure assessments. This 2.5 microgram per cubic meter measurement is known as the action level.
- Exposure assessments use air sampling and measurements to determine an employee’s exposure to chromium 6. The purpose of the exposure assessment is to ensure that employee exposure levels do not exceed the permissible exposure limit.
- When the action level is reached, a program of medical surveillance is implemented. Medical surveillance is the process by which an employee is examined to a) determine if he or she can be exposed to chromium 6 without experiencing adverse health effects; b) identify chromium 6 related adverse health effects, so appropriate intervention measures can be taken; and c) determine the employee’s fitness to use personal protective equipment such as respirators.

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**ANSWERS TO THE REVIEW QUIZ**

1. a

2. a

3. b

4. e

5. a

6. b

7. b

8. a

9. d

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**REVIEW QUIZ**

*The following questions are provided to determine how well you understand the information presented in this program.*

Name \_\_\_\_\_ Date \_\_\_\_\_

1. OSHA estimates that 48 percent of all workers affected by hexavalent chromium will be welders.
  - a. True
  - b. False
  
2. Welders can be exposed to chromium 6 when fumes are released while welding stainless steels, chromium alloys and chrome-coated metal.
  - a. True
  - b. False
  
3. There are several ways chromium 6 can enter our bodies; these are called \_\_\_\_\_.
  - a. Entry methods
  - b. Routes of entry
  - c. Paths of exposure
  
4. Repeated or prolonged exposure to the inhalation of hexavalent chromium can lead to which of the following harmful health effects?
  - a. Bronchitis
  - b. Pneumonia
  - c. Asthma
  - d. Lung cancer
  - e. All of the above
  
5. Allergic contact dermatitis is an allergic reaction caused by direct skin contact with hexavalent chromium.
  - a. True
  - b. False
  
6. The permissible exposure limit (PEL) for hexavalent chromium, measured over an 8-hour work shift is:
  - a. 20 micrograms per cubic meter
  - b. 5 micrograms per cubic meter
  - c. 15 micrograms per cubic meter
  - d. 50 micrograms per cubic meter
  
7. When engineering and work practice controls do not sufficiently reduce exposure, then appropriate respirators must be used to reduce employee exposure to the \_\_\_\_\_ or below.
  - a. Action level
  - b. Permissible exposure limit
  - c. Threshold limit value
  
8. When levels of hexavalent chromium cannot be reduced below 2.5 micrograms per cubic meter of air averaged over an 8-hour work shift, your employer will establish a program of exposure assessments and medical surveillance. This 2.5 microgram per cubic meter measurement is known as the \_\_\_\_\_.
  - a. Action level
  - b. Trigger point
  - c. PEL
  - d. TLV
  
9. Which of the following is determined by the medical surveillance process?
  - a. Determine if a worker can be exposed without adverse health effects
  - b. Determine a worker's ability to use a respirator
  - c. Identify adverse health effects
  - d. All of the above