

Occupational Health Guideline for Crag Herbicide

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: $2,4\text{-Cl}_2\text{C}_6\text{H}_3\text{OC}_2\text{H}_4\text{G}_1^{OSO}_3\text{Na}$
- Synonyms: Sesone; Crag herbicide No. 1; sodium 2-(2,4-dichlorophenoxy)ethyl sulfate
- Appearance and odor: Colorless solid with no odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for Crag herbicide is 15 milligrams of Crag herbicide per cubic meter of air (mg/m^3) averaged over an eight-hour work shift. The American Conference of Governmental Industrial Hygienists has recommended for Crag herbicide a Threshold Limit Value of $10 \text{ mg}/\text{m}^3$.

HEALTH HAZARD INFORMATION

• Routes of exposure

Crag herbicide can affect the body if it is inhaled or if it comes in contact with the eyes or skin. It can also affect the body if it is swallowed.

• Effects of overexposure

Animal experiments have shown that exposure to Crag herbicide may cause tremors, muscle spasms, and convulsions. It has also caused congestion of the lungs, liver, and kidneys in animals. A solution of Crag herbicide dropped in animal eyes caused damage. The solution applied to animal skin has caused skin irritation and damage.

• Reporting signs and symptoms:

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to Crag herbicide.

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to Crag herbicide at potentially hazardous levels:

1. Initial Medical Screening: Employees should be screened for history of certain medical conditions (listed below) which might place the employee at increased risk from Crag herbicide exposure.

—Chronic respiratory disease: In persons with impaired pulmonary function, especially those with obstructive airway diseases, the breathing of Crag herbicide might cause exacerbation of symptoms since it causes pulmonary hemorrhage in animals at lethal doses.

—Liver disease: Crag herbicide causes liver damage in animals. The importance of this organ in the biotransformation and detoxification of foreign substances should be considered before exposing persons with impaired liver function.

—Kidney disease: Crag herbicide causes kidney damage in animals. The importance of this organ in the elimination of toxic substances justifies special consideration in those with impaired renal function.

—Skin disease: Crag herbicide is a primary skin irritant. Persons with pre-existing skin disorders may be more susceptible to the effects of this agent.

—Convulsive disorders: Crag herbicide (Sesone) causes convulsions in animals. Persons with a history of such disorders may be more susceptible to the effects of this agent.

2. Periodic Medical Examination: Any employee developing the above-listed conditions should be referred for further medical examination.

• Summary of toxicology

Crag herbicide (Sesone) dust affects the nervous system in animals and causes convulsions. In rats the oral LD50 ranged from 0.73 to 1.09 g/kg; effects were a fine

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

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muscular tremor, myotonus, a tendency to extend the hind feet caudally, and convulsions. Autopsy findings in animals that died were pulmonary hemorrhage, with mild liver and kidney damage. A 5% aqueous solution dropped in the eye of a rabbit caused corneal necrosis. The application of 0.01 ml of a 5% suspension of Sesone in acetone to the shaved rabbit belly resulted in edema and necrosis.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 309
2. Boiling point (760 mm Hg): Decomposes
3. Specific gravity (water = 1): Greater than 1
4. Vapor density (air = 1 at boiling point of Crag herbicide): Not applicable
5. Melting point: 170 C (338 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 25
8. Evaporation rate (butyl acetate = 1): Not applicable

• Reactivity

1. Conditions contributing to instability: None.
2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions.
3. Hazardous decomposition products: Toxic gases and vapors (such as hydrogen chloride, sulfur dioxide, and carbon monoxide) may be released when Crag herbicide decomposes.
4. Special precautions: None.

• Flammability

1. Not combustible.

• Warning properties

Union Carbide Corporation, in the *Chemical Company Guide* for Crag herbicide, states that "flooding the rabbit eye with a saturated solution of the chemical in propylene glycol caused a reaction similar to moderate inflammation. The dry powder can be expected to have an additional mechanical irritant action."

MONITORING AND MEASUREMENT PROCEDURES

• General

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

• Method

An analytical method for Crag herbicide is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 3, 1977, available from the Government Printing Office,

Washington, D.C. 20402 (GPO No. 017-033-00261-4).

RESPIRATORS

- Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.
- In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

- Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with Crag herbicide or liquids containing Crag herbicide.
- If employees' clothing may have become contaminated with Crag herbicide or liquids containing Crag herbicide, employees should change into uncontaminated clothing before leaving the work premises.
- Non-impervious clothing which becomes contaminated with Crag herbicide should be removed promptly and not reworn until the Crag herbicide is removed from the clothing.
- Employees should be provided with and required to use dust- and splash-proof safety goggles where Crag herbicide or liquids containing Crag herbicide may contact the eyes.

SANITATION

- Skin that becomes contaminated with Crag herbicide should be promptly washed or showered to remove any Crag herbicide.
- Employees who handle Crag herbicide or liquids containing Crag herbicide should wash their hands thoroughly before eating, smoking, or using toilet facilities.
- Eating and smoking should not be permitted in areas where solid Crag herbicide is handled, processed, or stored.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to Crag herbicide may occur and control methods which may be effective in each case:

Operation	Controls
Formulation of weedicides in agricultural operations	Process enclosure; local exhaust ventilation; personal protective equipment
Application of weedicides in agricultural operations	Personal protective equipment
Manufacture of Crag herbicide	Process enclosure; local exhaust ventilation; general dilution ventilation

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• Eye Exposure

If Crag herbicide or liquids containing Crag herbicide get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses should not be worn when working with this chemical.

• Skin Exposure

If Crag herbicide or liquids containing Crag herbicide get on the skin, promptly wash the contaminated skin with water. If Crag herbicide or liquids containing Crag herbicide penetrate through the clothing, remove the clothing promptly and wash the skin with water. If irritation is present after washing, get medical attention.

• Breathing

If a person breathes in large amounts of Crag herbicide, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

• Swallowing

When Crag herbicide or liquids containing Crag herbicide have been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

• Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Under-

stand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

SPILL AND DISPOSAL PROCEDURES

• Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.

• If Crag herbicide is spilled, the following steps should be taken:

1. Ventilate area of spill.
2. Collect spilled material in the most convenient and safe manner and deposit in sealed containers for reclamation or for disposal in a secured sanitary landfill. Liquid containing Crag herbicide should be absorbed in vermiculite, dry sand, earth, or a similar material.

• Waste disposal method:

Crag herbicide may be disposed of in sealed containers in a secured sanitary landfill.

REFERENCES

• American Conference of Governmental Industrial Hygienists: "Crag Herbicide (Sesone)," *Documentation of the Threshold Limit Values for Substances in Workroom Air* (3rd ed., 2nd printing), Cincinnati, 1974.

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• Union Carbide Corporation, Industrial Medicine and Toxicology Department: *Toxicology Studies - Crag Herbicide (Sesone)*, New York, 1958.

RESPIRATORY PROTECTION FOR CRAG HERBICIDE

Condition	Minimum Respiratory Protection* Required Above 15 mg/m ³
Particulate Concentration	
75 mg/m ³ or less	Any dust and mist respirator, except single-use.
150 mg/m ³ or less	Any dust and mist respirator, except single-use or quarter-mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
750 mg/m ³ or less	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
5000 mg/m ³ or less	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 5000 mg/m ³ or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any dust and mist respirator, except single-use. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.