

Occupational Health Guideline for ANTU

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: $C_{11}H_{10}N_2S$
- Synonyms: alpha-Naphthyl thiourea; alpha-naphthylthiocarbamide; N-1-naphthyl-thiourea; 1-(1-naphthyl)-2-thiourea
- Appearance and odor: Colorless, odorless solid.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for ANTU is 0.3 milligrams of ANTU per cubic meter of air (mg/m^3) averaged over an eight-hour work shift.

HEALTH HAZARD INFORMATION

- Routes of exposure
ANTU can affect the body if it is inhaled. It can also affect the body if it is swallowed.
- Effects of overexposure
 1. *Short-term Exposure:* Swallowing ANTU may cause vomiting, shortness of breath, and a bluish discoloration of the skin. ANTU is a rat poison causing death in rats by excessive secretion in the lungs which produce severe breathing difficulties. It also upsets the blood sugar levels in rats.
 2. *Long-term Exposure:* None known
 3. *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 ANTU.

- Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to ANTU 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 ANTU exposure.

—Chronic respiratory disease: ANTU causes pulmonary damage in animals. In persons with impaired pulmonary function, the ingestion of ANTU might cause exacerbation of symptoms.

—Liver disease: ANTU 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.

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

- Summary of toxicology

ANTU (alpha-naphthyl-thiourea) dust causes pulmonary edema and pleural effusion in certain animal species, especially rats. Oral administration to rats of 35 mg/kg was fatal to 60% of the animals; effects were labored respiration and muscular weakness; autopsy revealed pleural and pericardial effusion, as well as mild liver damage. Tolerance to the acute toxicity of ANTU was induced in rats by administration of progressively increasing doses at 3- to 4-day intervals; daily doses of 20% of the median lethal dose in rabbits were cumulative, causing death within 5 to 6 days. In humans, the lethal dose by ingestion is estimated to be approximately 4 g/kg. In one instance of human intoxication by ANTU, 80 g of a rat poison containing 30% ANTU was ingested along with a considerable amount of ethanol; signs attributable to ANTU were prompt transient vomiting, dyspnea, cyanosis, and coarse pulmonary rales; no pleural effusion occurred, and the pulmonary

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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signs gradually cleared. ANTU is stated to be nonirritating to the human skin.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 202.3
2. Boiling point (760 mm Hg): Decomposes
3. Specific gravity (water = 1): Greater than 1
4. Vapor density (air = 1 at boiling point of ANTU): Not applicable
5. Melting point: 198 C (388 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 0.06
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 sulfur dioxide, oxides of nitrogen, and carbon monoxide) may be released in a fire involving ANTU.
4. Special precautions: None

• Flammability

1. Flash point: Data not available
2. Autoignition temperature: Data not available
3. Flammable limits in air, % by volume: Data not available
4. Extinguishant: Water

• Warning properties

ANTU is not known to be an eye irritant.

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 ANTU is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 5, 1979, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00349-1).

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

• If employees' clothing may have become contaminated with ANTU, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing contaminated with ANTU should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of ANTU from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the ANTU, the person performing the operation should be informed of ANTU's hazardous properties.

SANITATION

• Eating and smoking should not be permitted in areas where ANTU or liquids containing ANTU are handled, processed, or stored.

• Employees who handle ANTU or liquids containing ANTU should wash their hands thoroughly with soap or mild detergent and water before eating or smoking.

COMMON OPERATIONS AND CONTROLS

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

Operation	Controls
Use as a rodenticide in locations where rats feed, water, or travel	General dilution ventilation; personal protective equipment
Manufacture of ANTU	General dilution ventilation; personal protective equipment

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 ANTU or liquids containing ANTU 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 ANTU or liquids containing ANTU get on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If ANTU or liquids containing ANTU soak through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water.

• Breathing

If a person breathes in large amounts of ANTU, 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 ANTU or liquids containing ANTU 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. Understand 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 ANTU is spilled, the following steps should be taken:

1. Ventilate area of spill.

2. For small quantities, sweep onto paper or other suitable material, place in an appropriate container and burn in a safe place (such as a fume hood). Large quantities may be reclaimed; however, if this is not practical, dissolve in a flammable solvent (such as alcohol) and atomize in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

• Waste disposal methods:

ANTU may be disposed of:

1. By making packages of ANTU in paper or other flammable material and burning in a suitable combus-

tion chamber equipped with an appropriate effluent gas cleaning device.

2. By dissolving ANTU in a flammable solvent (such as alcohol) and atomizing in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

REFERENCES

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RESPIRATORY PROTECTION FOR ANTU

Condition	Minimum Respiratory Protection* Required Above 0.3 mg/m ³
Particulate Concentration	
3 mg/m ³ or less	Any chemical cartridge respirator with an organic vapor cartridge(s) and dust and mist filter(s), including pesticide respirators which meet the requirements of this class. Any supplied-air respirator. Any self-contained breathing apparatus.
15mg/m ³ or less	A chemical cartridge respirator with a full facepiece, organic vapor cartridge(s), and dust and mist filter(s), including pesticide respirators which meet the requirements of this class. A gas mask with a chin-style or a front- or back-mounted organic vapor canister and dust and mist filter, including pesticide respirators which meet the requirements of this class. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
100 mg/m ³ or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode. A powered chemical cartridge respirator with an organic vapor cartridge and a high efficiency filter, including pesticide respirators which meet the requirements of this class.
Greater than 100 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 gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class. Any escape self-contained breathing apparatus.

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