

VI. RECOMMENDATIONS

The major NIOSH recommendation for the synthetic rubber industry is complete conversion from the use of the powdered form of ETU to the "encapsulated" form (see Section III-A and D of this review). In this "encapsulated" formulation, ETU is least likely to escape into the environment and subsequently be taken into the body of the worker. The efficacy of this recommendation is apparent from the preliminary report of the NIOSH Health Hazard Evaluation on ETU (Salisbury, 1977). While approximately 100 rubber fabrication plants are presently utilizing "encapsulated" ETU, it is estimated that approximately 100 to 150 companies have not made this change in procedure (personal correspondence, Wyrough & Loser, Inc. 1977).

Further recommendations include proper labeling of all non-encapsulated ETU as carcinogenic and teratogenic, adequately informing employees of the potential hazard, and proper use of sanitation practices in the workplace. Compliance with all sections of these recommendations should at a minimum reduce the risk of ETU-induced cancer and prevent other adverse effects of occupational exposure to ETU. "Occupational exposure to ETU" is defined as work in any place in which ETU is produced, stored, used, packaged, or distributed. Work in a place utilizing "encapsulated" ETU only is not considered "occupational exposure". Detailed recommendations are as follows.

Informing Employees of Hazards from ETU

At the beginning of their employment in an ETU area, workers should be informed of the hazards, relevant symptoms of overexposure, appropriate emergency procedures, and proper conditions and precautions for safety. The information should be kept on file and should be readily accessible to the worker at all places of employment where occupational exposure to ETU is likely.

Employers should institute a continuing educational program to ensure that all workers have current knowledge of job hazards, proper maintenance procedures, and cleanup methods, and that they know how to use respiratory protective equipment and protective clothing correctly. Employees should be informed of the possible additive effects from taking antithyroidal medication. Employees breast-feeding an infant should be informed that ETU fed to experimental animals was found in the milk of those animals.

Personnel who must move supplies of ETU, clean up spills, and repair leaks should be properly trained in such procedures and adequately protected against the attendant hazards.

Labeling and Posting

(a) Labeling

Containers of ETU should bear the following label in addition to, or in combination with, labels required by other statutes, regulations, or ordinances:

ETHYLENE THIOUREA

WARNING

MAY CAUSE CANCER OR BIRTH DEFECTS

IF INHALED OR SWALLOWED

AVOID SKIN CONTACT

No smoking.

Avoid breathing dust or spray mist.

Avoid contact with eyes, skin, and clothing.

Wash hands and face thoroughly before eating (a bitter taste indicates residual ETU on hands).

Wear long-sleeved work clothes.

Shower or bathe and change into clean clothing after work.

(b) Posting

The following sign should be posted in a readily visible location at or near entrances to manufacturing and formulating areas containing ETU and at other areas in which there is a risk of exposure:

ETHYLENE THIOUREA

CAUTION!

MAY CAUSE CANCER OR BIRTH DEFECTS

HARMFUL IF INHALED OR SWALLOWED

NO SMOKING

AVOID SKIN CONTACT

Avoid breathing dust or spray mist.

Avoid contact with eyes, skin, and clothing.

Wash hands and face thoroughly before eating.

Wear long-sleeved work clothes.

Shower or bathe and change into clean clothing after work.

Warning signs should be printed in English and in the predominant language of non-English-reading employees, if any, unless employers use equally effective means to ensure that non-English-reading employees know the hazards associated with ETU and the areas in which there is exposure to ETU. Employers should ensure that employees having difficulty reading signs also know these hazards and the locations of these areas.

Engineering Controls

Engineering controls, such as process enclosure or local exhaust ventilation, should be used whenever possible to prevent airborne concentrations of ETU or contact with the skin. Ventilation systems should be designed to prevent the accumulation or recirculation of ETU in the workplace and to remove ETU effectively from the breathing zones of employees. Ventilation systems should undergo regular preventive maintenance and cleaning to ensure maximum effectiveness, and this effectiveness should be verified by monthly airflow measurements. In addition, environmental monitoring is recommended to determine the effectiveness of engineering controls. The recommended sampling and analytical method described in Appendix A, if used, will detect

environmental levels of ETU as low as 30 micrograms per cubic meter of air.

General Medical Recommendations

Those workers with a history of thyroid disease, pulmonary disease, cardiovascular disease, or renal disease, and those using antithyroid drugs should be counseled about working in jobs involving exposure to ETU. Workers should be advised that a review of the available scientific data warrants consideration of possible effects of ETU on reproduction, and that information based on experimental animal studies indicates the possible induction of severe defects in the developing fetus, especially in the central nervous system. Female workers of reproductive age should be advised of the potential for malformation of the developing fetus. Pregnant workers or workers breast-feeding an infant should not be exposed to ETU under any circumstances.

For employees assigned to an area where ETU is used, medical examinations should be made available on a yearly basis or at some other interval determined by the responsible physician. Special attention should be paid to the function of the thyroid during the medical evaluation of the health status of the worker.

At the time of the preplacement examination, it is recommended that a pre-exposure baseline be determined for thyroid-stimulating hormone, thyroxine and triiodothyronine.

Sanitation Practices

Employees working in areas where ETU is manufactured, processed, handled, or stored should wash their hands before eating, drinking, smoking, or using restroom facilities during the work shift.

No food or beverages should be stored, prepared, or consumed in areas when ETU is manufactured, processed, handled, or stored.

Contaminated clothing should be removed before entering areas where food or beverages are consumed.

Smoking should be prohibited in areas where ETU is manufactured, processed, handled, or stored in unsealed containers.

Employees should shower or bathe and change clothing after the workday if any possible dermal exposure could have occurred.

Disposal

Work areas, fixtures, equipment, etc, contaminated by ETU spills should be cleaned promptly. ETU powder on floors should be blotted with absorbing clay which, in turn, may be removed with a sweeping compound. An alkaline solution of hypochlorite will oxidize ETU into ethylene urea (Hylin, 1973). Thus, a one to ten dilution of commercially available 5% hypochlorite solutions may be used to mop up areas contaminated with ETU.

In work areas where ETU is used in powder form, proper exhaust ventilation should be used. In many secondary uses of ETU, the dust hazard may be eliminated by the substitution of sheets or pellets of ETU (dispersed in a plastic material) for powdered ETU when it is used as a direct additive. These specialty forms of ETU ("encapsulated"

pellets or sheets) are available for various elastomer products made by rubber companies in the U.S. Special formulations are available on a custom-made basis from several companies. Whenever possible, these dust-free "encapsulated" formulations should be utilized.

Personal Protective Equipment and Clothing

(a) Protective Clothing

Any employee whose work involves likely exposure of the skin to ETU should wear full-body coveralls or the equivalent, impervious gloves, ie, highly resistant to the penetration of ETU, impervious footwear, and, when there is danger of ETU coming in contact with the eyes, goggles or a face shield. Any employee engaged in mixing operations where use of powdered ETU is required, should be provided with the following protective clothing and equipment: goggles, full-body coveralls, impervious footwear, and a protective head covering.

(b) Respiratory Protection

Engineering controls should be used to maintain airborne ETU concentrations at the lowest possible level. Respiratory protective equipment should be used in the following circumstances: during the time necessary to install or test the required engineering controls, for operations such as nonroutine maintenance and repair activities, and during emergencies when concentrations of airborne ETU may exceed the lowest detectable level of ETU (30 micrograms/cubic meter) in air.

In all cases where respiratory protective equipment is required, only supplied - air respirators should be used.

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