FILE NAME: National Safety Council (NSC)

DATE: 1978

DOC#: NSC500

DOCUMENT DESCRIPTION: NSC Chemical Newsletter - Workers Exposed to Asbestos Require Special Protection

National Safety Council
Chemical Newsletter

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JULY 1978

# Workers Exposed to Asbestos Require Special Protection

Asbestos is mined in lumps of white material from which fine fibers of considerable length can be broken off. Asbestos conducts heat very poorly, and therefore it is an electrical insulator. Resistance to fire, heat and electricity makes asbestos a valuable substance that can be used for many purposes. For example, asbestos is woven into cloth for fire protective garments, and blankets of asbestos fibers are used to seal off welding sparks and burning embers while maintenance work is being done.

In chemical plants, asbestos has been used to insulate pipes for both safety and conservation of heat. Asbestos cement is a useful material for insulating irregular shapes such as turns and valves. Asbestos tape is also a versatile insulation material.

Up until a few years ago, vessels were insulated with asbestos and asbestos cements. These are still used to some degree. Metal coverings are used to protect the asbestos insulation against weather.

Gaskets made of asbestos give excellent service in high temperatures. Transite pipe and transite sheets are made of cement reinforced with asbestos. These are widely used in waterworks and in industry.

Within the last few years, asbestos has been recognized as a serious health hazard. One of the effects of breathing asbestos fibers is asbestosis, which develops over a long period of time. Asbestos fibers become deposited in the lungs and produce scarring of the tissues so the lungs cannot perform their proper function. In some severe cases, shortness of breath can result. People who breathe dust containing asbestos fibers can develop a type of lung cancer, which could take as long as 20 or 30 years to appear. Some asbestos workers develop mesothelioma, a cancer in the tissues surrounding the lungs or abdominal organs. This condition also shows up many years after initial exposure to asbestos.

Smoking greatly increases the potential for developing asbestosis, as well as other lung diseases. A person who smokes is 20 times more likely to develop lung cancer as a non-smoking worker who inhales the same amount of asbestos fiber.

Because of information concerning the adverse effects of asbestos fibers on the worker, the process industries sought other insulation materials to replace asbestos. A number of materials have become available, and in recent years, *practically all* insulation installed has been free of asbestos.

A lot of old insulation, however, is in place on process pipes and vessels, containing considerable amounts of asbestos. It is hard to tell with the untrained eye which insulation contains asbestos and which does not. Therefore, the only safe approach in the removal of old insulation is to assume that it contains asbestos.

There are safe ways of working with asbestos insulation, new or old. They are described as follows:

Before removal of insulation, all insulating material should be wet down as much as possible. Metal coverings or cement coatings may need to be loosened in order to allow water to penetrate.

Asbestos insulation which has been allowed to fall to the ground will be walked on, and as it dries out, asbestos fibers will be released to the atmosphere and possibly inhaled. This can be prevented by picking up and bagging all asbestos scrap as soon as it is removed. The ground or surface underneath should be wet down and swept frequently in order to keep it clean. The asbestos scraps should be put into plastic bags which are tagged for identification and appropriate warning. The bags of scrap are then grouped together for special disposal procedures; usually some kind of landfill operation.

In a shop or other location where exhaust ventilation can be set up, all cutting, fabrication, manipulation or dismantling should be done in such a way that the dust is effectively removed by the system. A band saw used for cutting insulation should have its own exhaust ventilation. Exhaust air should be cleaned before release to the atmosphere, usually by passing through a cyclone and then a high efficiency filter. Particulate and spent filters should be carefully disposed of in special facilities.

Warning signs are required where asbestos is being torn out or handled in any way. Signs should be provided so that they are readily accessible for-

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312-527-4800

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posting as required Those who are working in the area where asbestos work is under way should heed the signs, stay out of the area, and particularly avoid walking on material that could be asbestos scrap.

Workers who are installing or removing asbestos insulation materials must have adequate personal protection at all times. Personal protection is not only necessary for insulators, but also for those who may be working with them, such as pipefitters, riggers, welders, laborers, drivers and others in the area. Proper clothing and respiratory protection are needed for every job where asbestos is involved or suspected, no matter how small.

Special change houses are sometimes provided for those doing insulation or asbestos work. The employee assigned to a job involving insulation enters the clean room of the change house and removes his outer clothing. He is issued a pair of coveralls, which fasten snugly at the neck and wrists. He then dons a disposable paper head protector to keep asbestos out of the hair. Usually he wears his hard hat over the disposable cap. He adjusts a dust respirator to a snug fit. He puts on his goggles and then slips on a pair of rubber or neoprene gloves with gauntlets that go well up over the wrists of the coveralls. Bootees or boots are then put on the feet and the legs of the coveralls are pulled down over the tops of the footgear. Thus attired, the man is ready to do his job involving asbestos with reasonable assurance that he will be protected.

Upon completion of the job, the employee returns to the "contaminated" side of the change room. Before removing any garments, he vacuums himself, his tools and any other equipment that he has, using a special vacuum cleaner with a high efficiency filter especially suited for this type of service. He carefully cleans all parts of his coveralls around the neck and head. He removes the disposable paper cap and discards it in a special plastic bag. He washes his gloves prior to removal and places them on pegs to dry. He washes his boots, removes them, and places them upside down on pegs to

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# Toxic Gases Produced by Welding Can Cause Metal Fume Fever

The potential harm from gases and fumes generated by a welding operation depends upon the chemical composition of the fume, the concentration in the breathing zone, and the length of worker exposure.

The composition of the fume is determined by the various materials involved in the welding process and by the temperature of the welding operation. The more important air contaminants that may be involved are ozone, carbon dioxide, carbon monoxide, the oxides of nitrogen, and the various specific constituents of the rods, rod coatings, and the metals themselves.

The oxides of nitrogen and ozone are the principal toxic gases produced by welding on steel. Ozone, an intensely irritating gas, is produced by the action of the electric arc. Other toxic fumes may be generated if the steel has been coated with various materials or on alloys containing certain materials.

Some non-toxic paints may produce toxic fumes when heated under the welding torch. For example, certain phthalic-base paints may give off extremely irritating fumes.

Fumes from metals such as copper and zinc are capable of producing metal fume fever. Metal fume fever is self-limiting and is never known to be fatal; however, the distress and discomfort are quite objectionable and for this reason exposure should be controlled.

*—National Institute for Occupational Safety and Health*



Welding with certain metals produces toxic fumes, causing potential breathing difficulties.

**Editor:**
James I. Nickerson
Director, Corporate Loss Prevention
Abbott Laboratories
1400 Sheridan Rd.
North Chicago, Ill. 60064

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dry.

The coveralls are removed and placed in a special bag for laundering. A warning tag is attached to the bag to identify the contents and to warn the laundry personnel. (Special instructions should be given to the laundry, informing them of the asbestos hazards and how to perform the washing procedure.) The respirator is removed and turned in for cleaning, servicing and storage.

The employee then should take a shower and wash his hair before putting his regular clothes back on. In a well-designed change room, he can enter the shower from the contaminated side and exit into the clean side where his clothes locker will be.

Periodically, the amount of asbestos to which the employee is exposed should be determined by personnel sampling. This is achieved by attaching a portable sampling pump to him which draws air through a filter membrane in a special plastic sampling device. The asbestos fibers caught on the membrane are then counted with a microscope to determine the number of the fibers in the air drawn through the pump. Sampling may be over a two or four hour period as the man goes about his work, but it should be limited to the time that his work is actually associated with asbestos or insulation handling. If tests show more than two fibers (over five microns long) per cubic centimeter of air, respiratory protection is required.

Employees involved or associated with asbestos work should be given thorough medical examinations at regular intervals. The medical examination should provide special attention to the lungs and their function, as observed by the physician. A chest x-ray should be taken to detect any foreign material deposited in the lungs. A careful interpretation of the x-ray film by an experienced physician is essential in the detection of changes. Another important medical evaluation is the pulmonary function test, using a spirometer. This is a device to evaluate the lung's efficiency. Under the nurse's direction, the employee blows into the spirometer to exhale as nearly as possible the full contents of his lungs. A graph is drawn by the instrument, diagramming lung efficiency.

Cooperation between all parties involved is essential to an asbestos control program. The employer must furnish protective clothing, respirators and so on, as well as suitable changing facilities. The company must conduct periodic monitoring to determine the extent of exposure and provide periodic medical examinations changes early. Supervisors should insist that all employees in this type of work take all of the necessary precautionary steps to protect themselves and others. Nothing can be left out for the sake of expediency. No job is so small that full precautionary measures should not be taken. The supervisor should prevent unauthorized or unprotected people from entering the area where insulation work is going on.

The employee has a responsibility to follow these procedures. For his own sake and that of his family, he should quit smoking if he has any possible exposure to asbestos fibers. Smoking greatly increases the chances of any related medical problems. Every effort should be made to convince the employee of the danger of this combination.

A well-designed program is essential if the employees' health is to be protected and to ensure that the company conforms to legal requirements regarding exposure to asbestos fibers.

*—William S. Wood, PE, CSP*
*Chemical Safety Consultant*

## Are Your Safety Attitudes Imprisoned Within a Chalk Circle?

A farmer claims that if you draw a circle with chalk on a barn floor and then swing a hen around in the air and set her down inside the circle, she won't be able to cross the line. She has become a prisoner in the chalked circle.

This may or may not be true, but it seems that a lot of people draw their own tight circles and then become prisoners within them. They fence themselves in with habits, beliefs, superstitions and their own ideas. There are many good ideas of course, but even so, they may be closing their eyes to ideas that are even better.

Take safety, for example. Suppose you have been doing something a certain ways for years, and you have never been hurt. Can you assume that you have been doing the job the right way and the safe way?

More has been learned about accident prevention at home, on the job and on the highway in the past few years than in the first two decades of organized safety programs. Why? More time and effort have been devoted to the analysis of injuries, equipment and the human element than ever before.

It's time each of us analyze ourselves and see how we really feel about safety. Are we willing to change our ideas and the way we are presently doing things for a better, a safer way? Are we willing to take the time to show our families the safe way to develop their attitudes towards safety?

The safe way starts when you get up in the morning, and it doesn't end till you go to bed at night. We must recognize the relationship between good thinking and safety.

To improve our jobs, we must accept safety as the primary part of our jobs; to improve our driving and our home safety we must live according to the same premise.

If we can find better and safer ways of doing things, let's not fence ourselves in with our own outmoded ideas. Remember, safe methods and procedures have been developed at the price of many accidents and injuries. Let's use them and teach to our loved ones so that all of us can provide a good living for ourselves and our families. Safety Saves!

*—T. C. Heisig*
*The Lubrizol Corp.*