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Formaldehyde: Low dose on the nose

Formaldehyde in much lower concentrations than the limit level cause blocked noses. People who live in "sick buildings" suffer quicker and stronger reactions than others. Those who move away from the sick buildings still have symptoms after a year.

Dr Jan Falk of the Söder hospital in Stockholm explained that people who live in sick buildings are often suffering from blocked noses. This had nothing to do with allergy, but sensitive mucous membranes. The mucous membranes protect the body from foreign substances in the air, and may react suddenly to chemicals in the environment.

For a long time now, scientists have believed that sick-building syndrome is caused by low levels of formaldehyde in the air. Homes and offices, schools and daycare centres and many other environments are affected.

New measuring techniques have been able to establish even the tiniest changes in the mucous membranes in the nose. People who lived in sick buildings showed significant swelling in the nasal mucous membranes when subjected to low-level formaldehyde exposure. Strong reactions were found even in those who had moved out of their previous homes one year or more ago.

WHO recommendations

The World Health Organisation (WHO) has recommended a maximum formaldehyde level indoors of 0.125 mg/m^3.

However, the test panel's mucous membranes started swelling already at 0.073 mg/m^3.

The scientists were surprised at the low levels required to produce strong reactions.

Source: Nora Weintraub, Arbetarskydd 3/93 p6

IN THIS ISSUE:

Low exposure— high risk

A Finnish study shows that exposure to low concentrations of solvents still produced brain damage.

The study involved sets of single-egg twins, where one had been exposed to solvents and the other had not.

Those twins who had been exposed to solvents were significantly poorer than their counterparts in several memory tests and spatial tests, as well as in psychomotor reaction time tests.

The exposed group comprised carpenters, painters, carpet layers and other professions. Overall, the average exposure amongst the group was estimated at only one third of the permissible threshold level.

Even those who had left their profession, and who had not been exposed to solvents for a number of years, performed poorer in the tests.

None of the subjects had claimed workerscompensation.

Source: Arbetsmiljö 13/92 p7

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CHEMICAL FACTS:

Turpentine

Other names:	Gum spirits, Turps, Wood turpentine, Gum turpentine
Characteristics:	Colourless liquid
Odour:	Characteristic paint smell
Aust. TWA:	100 ppm — 560 mg/m^3
Fire:	Flammable. Vapour may produce explosive mix with air. Spontaneous combustion of rags, towels etc possible. Reacts violently with oxidisers.
Inhalation:	Nose and throat pain, coughing, headache, dizziness, nausea. High concentrations may cause heart palpitation, kidney damage, unconsciousness.
Skin contact:	Degreases the skin. Causes irritation and cracking of the skin. Eczema possible after prolonged or repeated exposure. Allergic contact eczema.
Eye splashes:	Intense pain,
Ingestion:	Burning sensation in mouth and throat. Abdominal pains, vomiting, diarrhoea. Symptoms similar to inhalation. Pneumonia may occur after a few hours, if turpentine has been drawn into the lungs during vomiting.
Prevention:	Good ventilation required. Mechanical exhaust preferable. Vapour may gather in along floors and low-lying areas. Keep containers closed. Eye rinse stations should be available. No smoking, no open flames, no welding. Tools should be non-spark and insulated. Wear gloves and eye protection. Respiratory protection may be required.

Source: Skyddsblad; NIOSH guide

YOU AND UV

Australia is well-known for its sun. It is also becoming well-known for its high incidence of skin damage due to UV radiation.

UV radiation is a natural component in sunlight, and is also created in some industrial processes. UV light is usually described as light of wavelengths spanning from 100 nanometres (nm) to 380 nm.

The ultra-violet light is further placed in three categories:

UV—A	380—315 nm
UV—B	315—280 nm
UV—C	280—100 nm

All of these have the capacity to damage the skin. The three most common effects are:

Erythema (reddening of the skin)

Pigmentation (tanning of the skin)

Callosity (thickening of the skin)

Both UV—A and UV—B rays hit our skin daily. UV—C rays are extremely harmful, but are of such short wavelength that they are absorbed by the ozone layer, and do not reach earth. However, it should be kept in mind that UV—C rays are produced artificially in welding processes.

Sunscreen lotions

People who work in the open should take care of their skin by wearing shirts and hats, and by using good quality sunscreen lotions.

It is important to ensure that the lotion protects the skin from the whole range of ultra-violet radiation. Many preparations concentrate on eliminating the erythema-forming range, allowing pigmentation to take place. Often, the lotion protects very well in a range of wavelengths, say, 250 to 330 nm. Such a lotion therefore fails to protect the skin from much of the UV light.

Workers who wish to protect their skin should not only ensure that their sunscreen is of high quality and a high protection factor, but also that they provide effective protection across the entire UV—A and UV—B range.

Welders should take special care to protect themselves from exposure to UV—C rays.

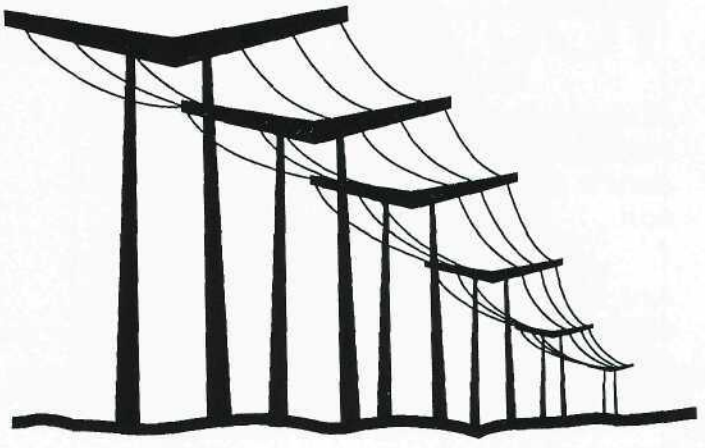
Source: Stockhausen News 2/88 and 5/88, Krefeld, Germany

Handy Hints

AURAL GYMNASTICS: STRRRRETCH!

Stretch your ears backwards when fitting your earplugs

New evidence connects electric fields and cancer



It has been found before, and it is reported again: There is a connection between electric fields and cancer. The fields affect the body cells. Corroborating findings were presented at a recent scientific convention in San Diego, USA.

Several studies were presented at the convention, among them a large Swedish study on leukaemia and brain tumours, a Danish survey on child cancer, and an American report on leukaemia and the use of electric shavers.

Swedish findings

The Swedish Work Environment Institute covered men who had been diagnosed with laukaemia and brain tumours during the period 1983—1987, numbering 511 people (250 with leukaemia; 261 with brain tumours). A control group of 1,121 randomly selected males was also used.

The study showed that the risk of contracting cancer increased in proportion to the exposure to electric fields. People who had been exposed to daily doses of 0.28 microTesla (μT) had a chance of developing cancer three times higher than those subjected to 0.16 μT or less.

The results were not affected by exposure to solvents, ionising radiation, or benzene.

Brain tumours

Younger people, under 40 years of age, were found to be doubly at risk of contracting brain tumours of the astrocytome type if they were exposed to a daily average dose of 0,20 μT. Short term exposure produced the same risk as long term exposure. Again, the results could not be explained by exposure to benzene, ionising radiation or solvents.

The head of the study, Birgitta Flodérus, said that the next step would be to determine which occupations were most at risk.

People who worked in shunting boxes, pilots, train drivers and electric arc welders were exposed to strong electromagnetic fields. Some researchers believe that office workers and computer operators may also be in the high risk group.

Power lines

Another Swedish study showed an increased risk of developing cancer in children who lived less than 600 metres from high power lines. A yearly average of 0.2 μT produced a doubling of the risk, and an average of 0.3 μT increased the risk of developing leukaemia three times.

The research is continuing, No safe limit legislation exists as yet, and it is still unclear exactly how the electromagnetic field affects the body.

Danish research

A Danish study concurs with the Swedish findings, All the 1,707 Danish children who had developed cancer between 1968 and 1986 were surveyed. The study team found that children living near power lines were more prone to developing lymphatic cancer. However, the study was criticised for not taking in a higher number of cases.

Another Danish study showed that people who regularly work in environments with high electromagnetic fields stood a 60% greater likelihood of developing leukaemia. No increase in brain tumours was found. Particular risk occupations were electrical installation workers and foundry workers. Train drivers and power station workers did not belong to the high risk groups, according to the study.

American findings

Several American studies agree that high electromagnetic fields affect the cell chemistry and the genetic code in the cell. The connection is significant both in terms of exposure time and the strength of the field,

The electromagnetic field affects calcium ions in the cell, whose function is to transmit messages between the cell and its environment.

It was also found that the concentration of melatonin is lowered during exposure to electromagnetic fields. Melatonin acts to regulate the body clock. The amount of melatonin is also lowered by exposure to light. Anti-jetlag tablets available in the United States often contain melatonin.

Shavers & Blowers

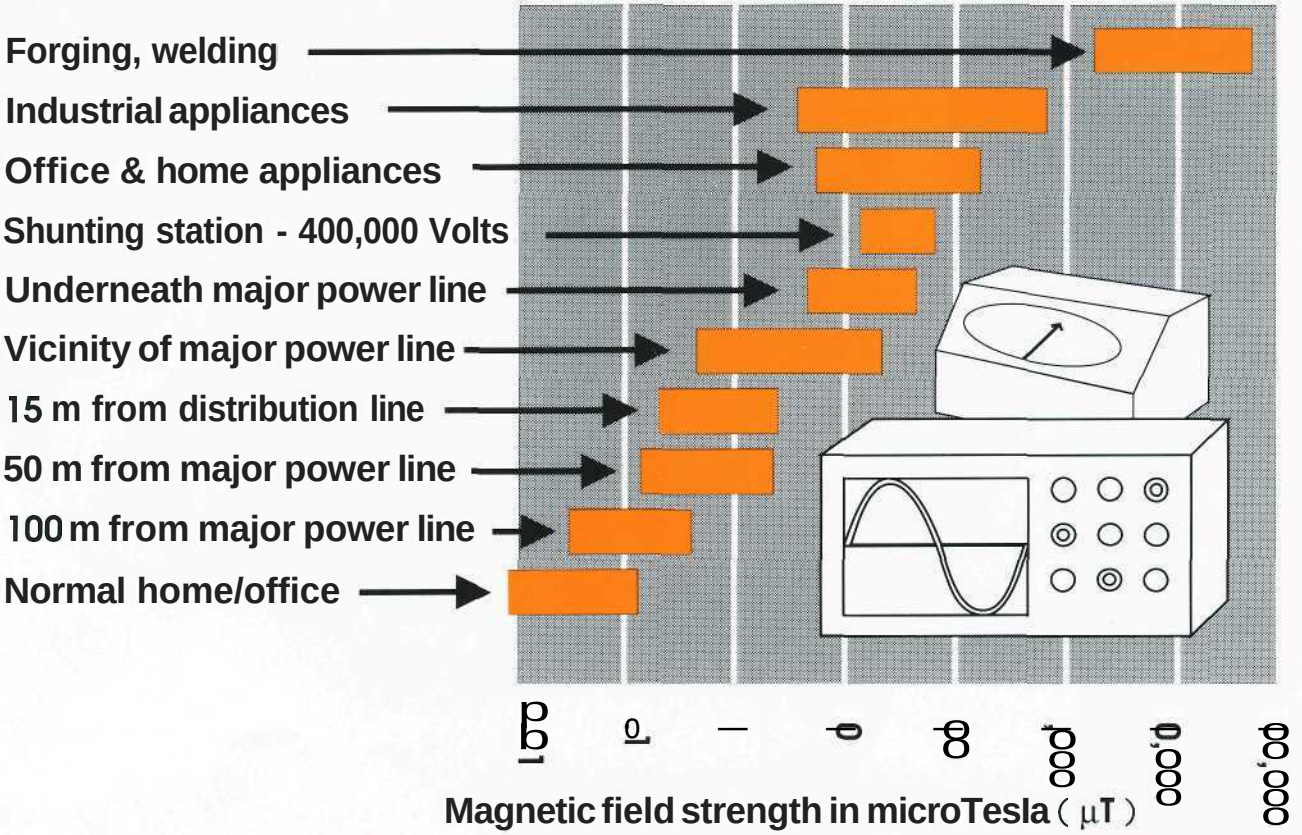
The electromagnetic field is strong near the source, Electric shavers are held very close to the skin. A study showed a strong connection between electric shavers and leukaemia, even when taking smoking and allergies into account. Hair dryers also produce strong electromagnetic fields near the source.

Source: Eva Ekelöf, Arbetsmiljö 14-15/92 p 8

Handy Hints

When using skin protection cream, make sure the cream gets into the tricky areas, such as the cuticles. To do this, rub your nails against the inside of your hand.

Magnetic fields:



Tip of the iceberg:

For every 1 serious injury

There are 10 minor injuries

30 property damage accidents

Source: Frank E Bird Jr/Greg LaBarr, Occupational Hazards Magazine, March 1990, Cleveland Ohio

Fatal connection

Deaths due to incorrect compressed air connections

In a previous issue of Professional Protection Magazine (PPM October 1992), we pointed out the importance of incompatible compressed air connectors in order to prevent breathing device to be connected to a source of non-breathing air. This matter has received even greater attention in a recent American study, examining fatal cases where breathing devices have been mistakenly connected to sources supplying toxic or inert gases.

Elevenfatalitieswerestudied,allinvolving the inadvertent connection of air-line respirators to inert gas supplies. In seven of the cases, the respirator was connected to a hose that normally carried gas. In the remaining four cases, gas had somehow entered hoses that normally carried breathing air (through leakage or backfill). Ten of the cases involved nitrogen, the eleventh death occurred from argon gas.

The fatalities occurred during the four years between 1984 and 1988.

Here are short descriptions of each fatality:

1. A painter was working inside a water tank on a ship. He connected his spray gun to a compressed air outlet. Another outlet was fitted with a breathing air filter, to which he connected his full face mask. He was found dead in the water tank. The air outlet had been connected to an argon gas supply on the pier. The argon gas outlet had been fitted with a breathing-air-type coupling,
2. A foundry worker was given an unmarked plant airline by a co-worker. He donned his respirator and was asphyxiated. The line contained nitrogen instead of breathing air.
3. A blender operator died when he connected a respirator-hooded overall to a nitrogen gas outlet with a quick-connect fitting, The gas outlet was the same size, type and colour as breathing air outlets.
4. In contradiction to instructions, a painter connected a supplied air respirator to an outlet marked "Tool air — do not breathe". The line had been mislabelled: it contained nitrogen,
5. A sandblaster connected his airline respirator to an unlabelled nitrogen line. Nitrogen and air lines were identical, and both had couplings that were compatible with the respirator connector.
6. A sandblaster tampered with unapproved hoses and quick-connect couplings to make them fit the air outlet. Outlets were not properly labelled. He mistakenly connected his respirator to a nitrogen line.

7. A plant piped both nitrogen and breathing air through its pipe system. During the daytime, air was pumped; during the night shift, nitrogen. A worker started his shift early, and died of nitrogen inhalation. He was aware that the nitrogen had not been switched,
8. Two workers died when they inhaled nitrogen that had backfilled the air lines during an electrical failure at the plant.
9. A contract worker connected his respirator to a pneumatic-tools-only outlet. Elsewhere in the plant, the air compressor was shut down for maintenance, and nitrogen backfilled the line.
10. A cleaner died of nitrogen inhalation when plant management decided to create a bypass so that nitrogen could be fed through the airline system.

Quick death

If you connect a respirator to an inert gas line, your breathing supply contains 0% oxygen. Unconsciousness occurs in about 12 seconds. If you collapse with the respirator still fitted, you will continue to breathe 0% oxygen, and death will occur.

There are few warnings that something is awry: the lungs continue to remove carbon dioxide from the blood and exhale it, and there is little sense of breathlessness. The victim is fooled by the lung function, and blackout can occur very quickly without warning. Collapse could occur before any opportunity of self-rescue.

There is one recurring theme in most of these tragic cases: connections. The major factors are:

- **Lines are not labelled**
- **Lines are wrongly labelled**
- **Connectors are identical**
- **Non-breathing air connectors are compatible with respirators**
- **Tampering with pipes, hoses and couplings**

It follows that many deaths and accidents can be prevented if the integrity of the breathing air system is absolutely maintained at all times.

This integrity depends very much on the incompatibility of the connectors: it should be impossible to connect respirators to any outlet other than breathing quality air.

Source: J B Hudnall, A Suruda, D L Campbeli; Division of Safety Research, National Institute for Occupational Safety and Health, Morgantown, W Virginia: American Industrial Hygienists Association Journal 54(1):32-35, January 1993

CHEMICAL FACTS:

Mercury

Other names:	Quicksilver
Characteristics:	Silvery liquid metal
Odour:	Odourless
Aust. TWA:	0.05 mg/m^3 (elemental); 0.01 mg/m^3 (alkyl compounds); 0.1 mg/m^3 (inorganic compounds) — as Hg
Fire:	May cause explosive product in contact with ammonia and chlorodioxide. Reacts violently with bromine.
Inhalation:	Symptoms may occur several hours after exposure. Throat irritation, nausea, diarrhoea, violent cough, breathing impairment. Prolonged and repeated exposure may cause loss of appetite, diarrhoea, inflamed and discoloured gums, tremor in the hands, muscular fatigue, headaches, irritability, insomnia, depression, loss of memory. Kidney damage, irregular menstruations and impotence are possible symptoms,
Skin contact:	Allergic reactions have been reported.
Eye splashes:	Prolonged or repeated exposure to mercury fumes may cause changes in the eye.
Ingestion:	Small amounts do not have major effects.
Prevention:	If fumes may be present, use enclosed systems if possible, Local exhaust and mechanical ventilation may be required, Keep containers closed. Direct contact with mercury should be avoided. Eye rinse stations should be available, Do not heat or weld appliances that contain mercury.

Source: Skyddsblad; NIOSH

Cool Asphalt

Road workers are often subjected to extremely hot working conditions — especially on our Australian latitudes. Now, there may be a solution: cold asphalt. Now, a Scandinavian project seems to have succeeded in developing a product that could provide a welcome relief to road workers.

Many road workers in Sweden believe in the new cool asphalt.

"It is very suitable for indoors paving, for instance in tunnels and garages", says Mats Pers, a road worker from the Swedish construction company Skanska. "You don't get the uncomfortable smoke and heat."

The cold asphalt has been developed by the oil company Nynds.

So far, the cool material has some drawbacks compared to normal, hot bitumen. It is harder to shape, and is not suitable for fine work around drains and in small areas.

Another problem is the stickiness of the cool asphalt, making it hard to clean shovels and other tools.

Still, Nynds believes that the new bitumen will become more and more accepted, and will sooner or later replace hot asphalt in many situations.

Conventional asphalt must be warmed up to at least 150 degrees Centigrade. At this temperature, the bitumen "glue" melts and can be thoroughly mixed with gravel. The hot mixture is poured onto the road and compressed. When it cools, the asphalt becomes extremely hardy, and capable of withstanding years of traffic wear and tear.

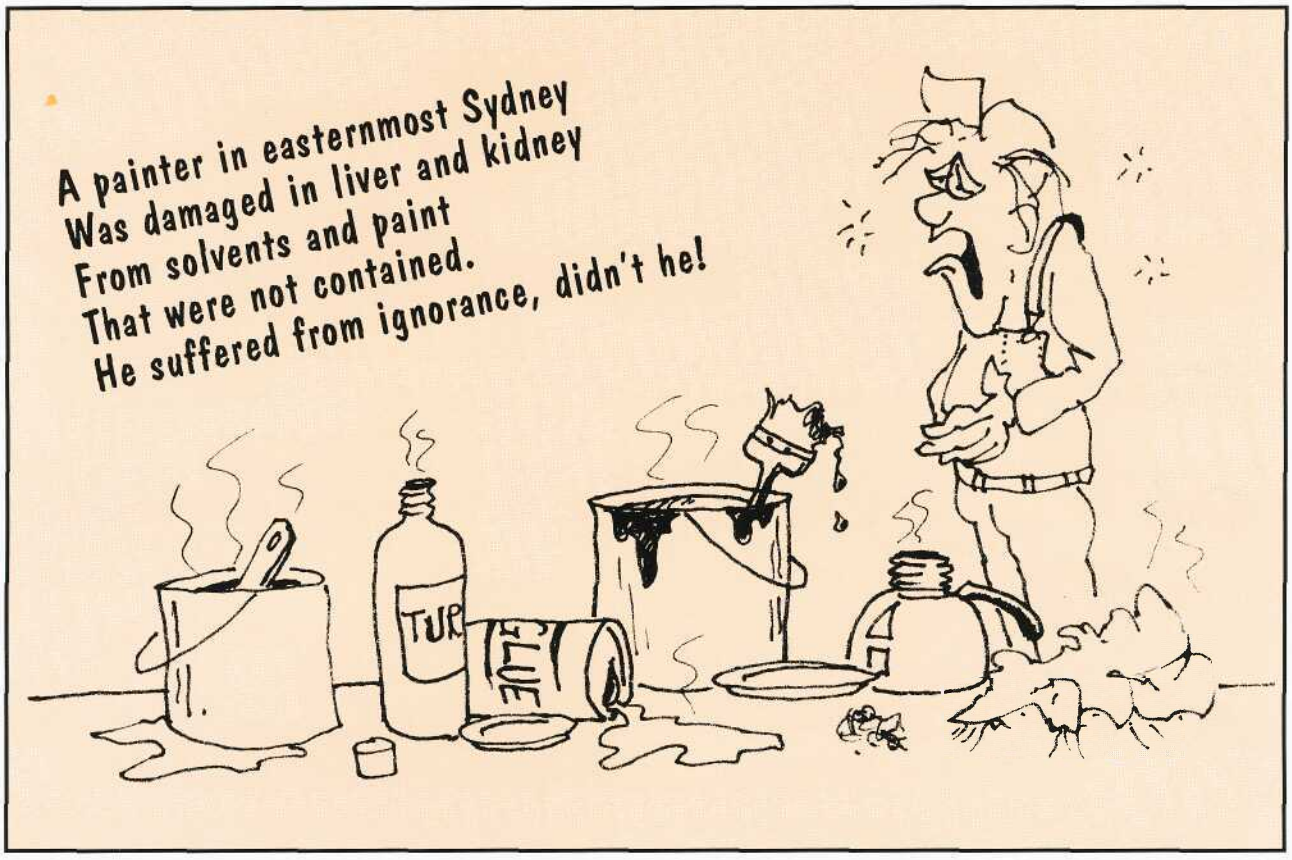
The new cool asphalt comprises small granules of bitumen, mixed with water. The solution can be mixed with gravel without heating.

The main problem is to determine when the asphalt will harden. Nynds have developed a new additive which makes it possible to control when the water will evaporate and the asphalt will harden. The material can be mixed on location, and is ready for immediate use.

The new additive is a secret. However, the manufacturer claims that it does not contain any harmful substances.

Source: Hans Lundgren, Arbetsmiljö 12/92 p 40

Attitude beats education hands down!



TAKING ON THE SPRAY CANS

The high-pressured job of graffiti removal

The war against graffiti is fought with high-pressure water guns and super-strong solvents.

Graffiti has become a major scourge of the times. The spray bottle and indelible felt tip can do the damage in a matter of seconds. Removal is slow and tiresome, often requiring hazardous chemicals and uncomfortable positions.

A common removal method is to apply special graffiti stripper — a viscous, pungent solvent — to the defaced wall, and then to blast it off with high- pressure (150 bar) hot water.

The stripper may contain methyl pyrrolidine and limonenes. The methyl pyrrolidine is both fat- and water soluble.

Another, stronger, solvent is methyl chloride, but is less used because of its hazardous characteristics.

Methyl pyrrolidine has not been thoroughly researched, but is considered to be less hazardous than methyl chloride. It is used in veterinary medicine and may soon be used in certain skin preparations for humans. Research is underway but, so far, nobody knows the effects of daily exposure to the substance.

It is known, however, that the material can be easily absorbed through the skin: a fact which many scientists interpret as a warning sign.

Limonenes are used as a degreasing agent, derived from citrus peel. Limonenes have not yet been thorouahly analysed, but have been found to be capable of causing allergic reactions.

A recent study of workers using graffiti removers showed that their exposure to methylene chloride was way above acceptable levels. Methylene chloride increases the risk of kidney and liver cancer.

When the body absorbs methylene chloride, the substance is converted to carbon monoxide, which results in impaired oxygen absorption in the blood. The carbon monoxide also increases the risk of heart attack.

The survey found that among the graffiti cleaners, five per cent of the haemoglobin was blocked by carbon monoxide: about the same amount as a person who smokes a packet of cigarettes per day.

Irritation to mucous membranes and skin were also common complaints,

Ordinary textile or skin gloves were often used, which only added to the susceptibility of the skin. Such gloves absorb the moisture and wrap the hands in solvent. Plastic or rubber gloves should be used instead.

Source: Patrik Grönberg, Arbetarskydd 2/93 p8

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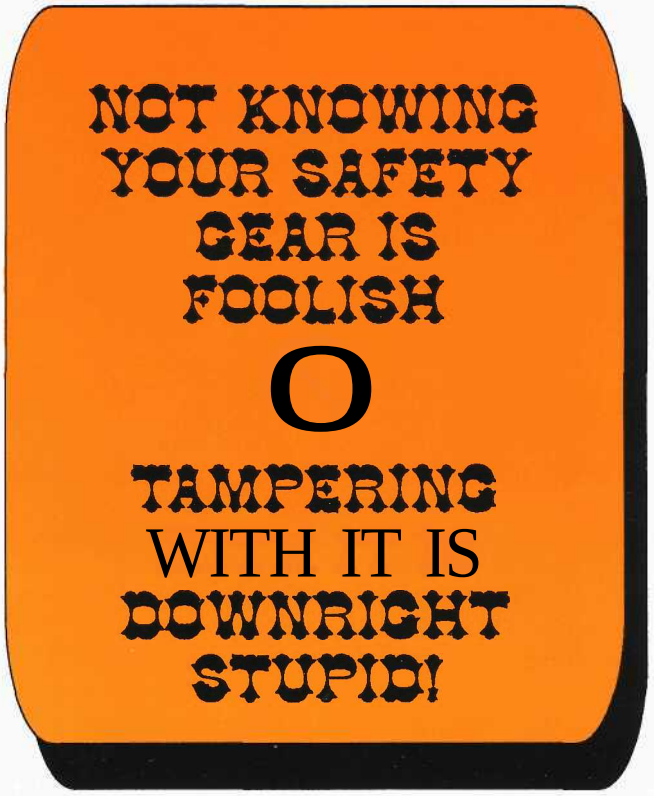

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