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IMPORTANT

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"PROJECT POTBELLY" carries a lot of weight

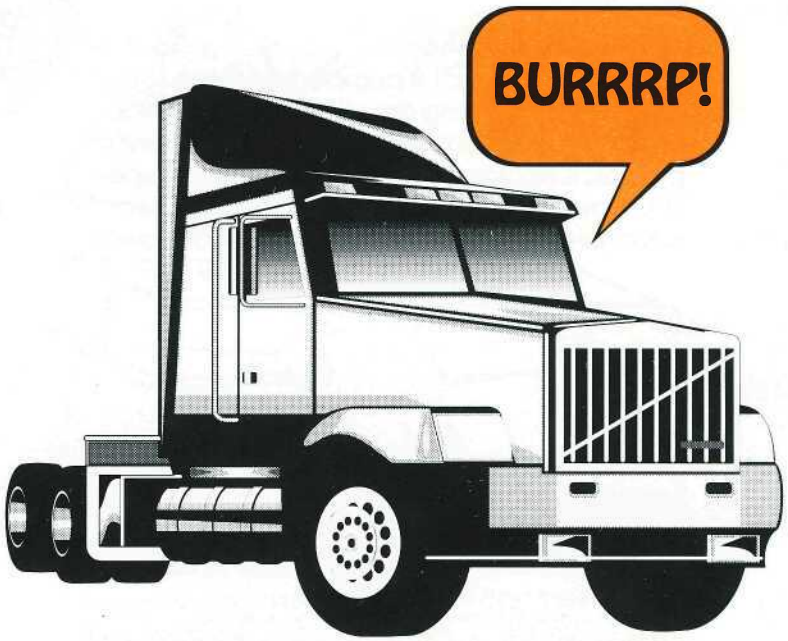
A joint collaboration between fast food outlets and truck drivers in Sweden has lead to a great change in the drivers' eating habits and, consequently, health,

The roadside diners, fast food restaurants and other food outlets started serving lighter, leaner, healthier food in a drive called "Project Potbelly", The truck drivers followed the trend and started to ask for food rich in fibre, salads, fruit, boiled and natural dishes rather than deep fried.

In a short time, 36 per cent of the professional drivers claimed to have changed their dietary habits for the better.

Several surveys have pointed to an over-abundance of cardio-vascular disease among long haul drivers. A change in diet could lower the risk.

Source: Arbetarskydd 9/91 p9



IN THIS ISSUE:

The perils of

EXPLODING DUST

Chemicals in dust form are often convenient, easy to handle and hygienic. But the facts on dust can become quite an explosive story.

Put a burning match into a bowl ot flour, and nothing happens. But as many readers would remember from their childhood, blow a handful of flour into the air near an open flame, and it becomes a cloud of fire, It's all got to do with fine powder particles being dispersed in the air and surrounded by oxygen molecules.

- **Case story:**

We're in a chemical processing plant. A powdered product is pumped from the top of the 4-storey building down to the ground floor, where it is packaged in large bags. The entire process is enclosed in a system of sealed pipes. The powder is helped along with an upward counter-flow of air, This un-cakes and loosens the powder to a fine dust that runs smoothly down the pipes,

The packed bags are transported on a conveyor belt to pallets outside the building.

One morning, as the air counter-flow is connected, a rubber joint ruptures, and a cloud of fine powder is released inside the building, A small spark in a fuse box or light switch causes a massive dust explosion, resulting in a strong pressure wave. Workers receive burns and are knocked down to the floor, The roof is damaged, and windows are smashed by the pressure. The explosion is so strong that concrete beams collapse and crash onto the floor.

What to do to minimise dust explosions

In this case, several factors contributed to the accident, and many weaknesses could be found in the structure of the building and organisation of the operation, The primary cause was a faulty rubber seal. Later, fixed metal cuffs were fitted around all pipe joints. The building itself was not properly designed; the explosion was allowed to build up to the enormous expanding force that eventually shattered the structure like an exploding bomb shell.

- **All connections, pipes, joints, holding tanks and so on should be regularly checked, and should be suitable for powder handling.**
- **Electrical appliances should be dust proof**
- **Make sure that dust cannot spread throughout the premises.**
- **Open flames, hot surfaces and electrical appliances should be encased in impervious housings.**

- **The building should be fitted with special explosion hatches that give way in case of an explosion. Flexible roof partitions may also be installed.**
- **Rapid response sprinkler systems may be used.**
- **Machinery and appliances should always be kept clean. Dust should not be allowed to gather.**
- **Find out about the explosive characteristics of the dust. Some substances are more prone to explode than others.**

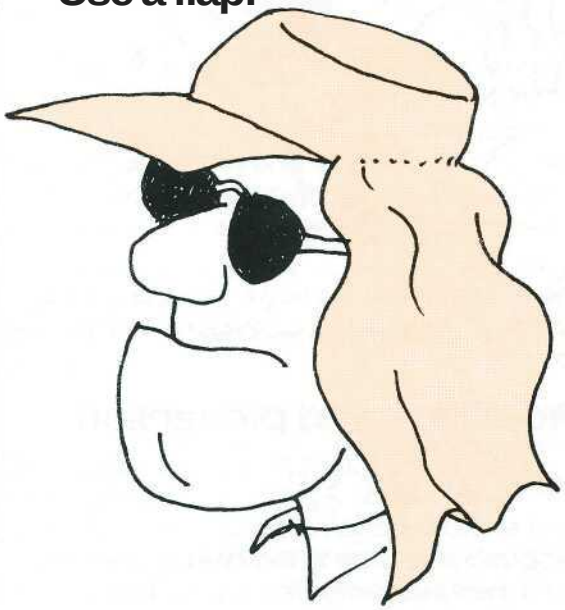
Risk areas

Dust explosions can occur wherever fine dust is released into the air. Common areas include chemical and food industry, wood and plastics operations,

Source: Arbetsmiljö 10/91, p38 - report from Swedish Work Inspection

Handy Hints

Don't be a flop: Use a flap!

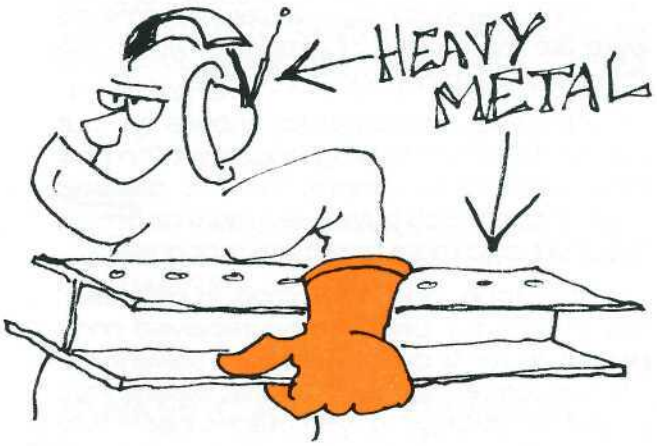


at the back of your headgear if your neck is exposed to the sun

That's my choice of noise!

Hearing protection is music to your ears

Ear muffs and plugs can be a pain, They can be uncomfortable, heavy, too tight, itchy and generally unpleasant to use. However, it is very important to wear the protection — all the time — while in a noisy environment, Even a few minutes without the muffs can ruin a whole day's adequate protection.



Two large companies in Sweden, Volvo and PLM, have found that music makes all the difference: they use hearing protectors fitted with stereo headphones and a small radio receiver. This means a worker can select from a variety of radio channels or taped music, Workers' acceptance of the hearing protection was rapid and significant, Stress, fatigue and headaches diminished after only a month's use. The common feeling of isolation would probably also disappear, The ear muffs became a popular, attractive safety item.

To complement the stereo muffs, "musical plugs" are also being developed for those workers who prefer plugs, The Swedish Work Environment Fund has approved a substantial grant to finalise the project.

Source: Arbetarskydd 10/91 p7

SOLVENTS

Do they get on your nerves?

Lung damage, skin disorders, skeletal conditions... they're all easy to diagnose, and seem much more "real" than the insidious neurological problems that can occur as a result of exposure to solvents, Slight memory lapses that slowly become worse and more frequent; unexplained bouts of sleeplessness; mysterious changes in temperament are so much more intangible. Their causes, after all, could be entirely explicable through a death in the family, a divorce, diminished job satisfaction and so on.

Only five years ago, solvent neurotoxins were like the proverbial giraffe, of whom the child said "such animals don't exist".

However, the quest for knowledge has proceeded at a cracking pace over the past few years. What's more, nervous diseases caused by solvents have been more and more reported, and more and more recognised.

In Europe, and in Denmark in particular, vast numbers of people have received compensation for a condition called solvent encephalopathy, which basically means that you're not as bright as you used to be.

The most common symptoms of solvent exposure include fatigue, irritability, memory lapses, switching emotions, failure to control impulsive behaviour, lower concentration ability and learning difficulties, The most serious consequences, according to the American National Institute for Occupational Safety and Health (NIOSH), are irreversible deterioration in intellect and memory (i.e. dementia), and structural damage to the central nervous system.

Most cases of neurological trauma have developed over a number of years of solvent exposure. But this does not preclude damage from short-term exposure: there are cases of solvent-related symptoms after only three days.

Differing views

There are two major schools of thought in the solvent debate: those who would like to see all solvents labelled as neurotoxins; and those who believe that only certain solvents are capable of causing neurological trauma.

The biggest problem in testing people for damage to the central nervous system is that there is no performance data from before the solvent exposure, Some researchers believe that many of the European compensation cases could have been overdiagnosed as solvent-induced.

Another difficulty arises in the case of painters, for instance: it is impossible to state conclusively that the damage stems from one solvent or another. Could the damage not also be influenced (or perhaps caused) by the lead in the paint, or any other chemicals used in the painting operation?

Lifestyle could also have an impact on

the extent of the damage, Alcohol intake, for instance, could be a contributor to the symptoms.

Protection and prevention

Massive ventilation systems mean massive investments. Rapid air exchange rates and enclosed chemical handling systems will probably never be a reality in smaller operations. Personal protection is still a feasible solution. Respirators, gloves and other protective devices are within the reach of even the smallest company.

Change rooms and showers should be available to workers in case of spills and splashes.

And training, training, training. Workers should know what they're handling, how to handle it safely, how to use and maintain their protective equipment, the importance of wear, and what to do in an emergency.

What the future holds

More and more research is being done on the effects of neurotoxins. Government authorities, at least in Europe, are becoming very aware of the dangers of these substances, and restrictive legislation has been passed in many cases, Meanwhile, the search for viable substitutes to the hazardous chemicals still continues.

However, this doesn't help the worker who suffers from solvent encephalopathy. Nothing does. There is no treatment. And compensation does not help the brain to function better,

At least, solvent encephalopathy is not a progressive disease, It stops in extent when solvent exposure stops, It may be cold comfort, but although people who suffer from it won't get better, they won't get worse either.

Source: Smith S. L., Occupational Hazards Dec 1990p37-40

NEW SPRAY PAINT RULES

Who will police them?

An article in a recent issue of the Sun-Heraldnewspaperposessomeserious questions on the new spray painting regulations.

The article quotes the executive director of the NSW branch of the Motor Traders' Association, Don Holstock, as saying that policing of the regulations seems to be undetermined, Nobody has done anything about policing, including unions, employers and government.

Lead is still used in many paints, constituting up to 24 per cent of the dry content, Isocyanates used in two-pack paints are an even bigger problem.

The law stipulates yearly medical checks must be conducted. Two-pack paints and compounds containing lead can only be used in a ventilated spray booth.

Moreover, workers spraying isocyanate paints in the booth must wear an airline respirator,

By March 1992, all spray painting shops in NSW, numbering about 3,000, must be fitted with spray booths, as stipulated by the Motor Vehicle Repair Industry Council. But the high cost of a booth ($15,000 minimum) will be prohibitive in the current economic climate, according to Mr Holstock, who holds little hope that complete compliance to new legislation will actually happen.

Source: Stephen Skinner, environment reporter, Sun-Herald, 22 Sep 1991

TANKER-CANCER RELATION-SHIP

A doctorate paper at Bergen University in Norway warns that the risk of contracting cancer is six times greater among oil tanker crews than among their counterparts on other types of ships.

In addition, the risk of damage caused by solvents is also greater on board tankers, and many sailors have sustained brain damage.

Source: Arbetarskydd 9/91 p9

SKIN LIKE A SPONGE!

Here is a list of some common chemicals that can be absorbed through the skin. When handling these substances, take care to avoid skin contact. Wash off splashes immediately, and discard soiled clothing.

Acrylamide
Acrylonitrile
Aldrin
Allyl alcohol
Allyl 2,3-epoxypropyl ether
Allyl glycidyl ether
Aminodimethylbenzene
Aniline
Anisidines, o- and p- isomers
Azinphos-methyl
Aziridine

Bromoform
γ-BHC
Bromomethane
Butan-1-ol
2-Butoxyethanol
n-Butyl alcohol
n-Butylamine
2-sec-Butylphenol

Captafol
Carbon disulphide
Carbon tetrachloride
Chlordane
Chlorinated biphenyls
2-Chlorobuta-1,3-diene
1-Chloro-2,3-epoxy-propane
2-Chloroethanol
1-Chloro-4-nitrobenzene

EGDN
Endosulfan
Endrin
2-Ethoxyethanol
2-Ethoxyethyl acetate
Ethyl acrylate
Ethylene chlorohydrin
Ethylene dibromide
Ethylene dinitrate
Ethylene glycol dinitrate
4-Ethylmorpholine

Furfural
2-Furaldehyde
Furfuryl alcohol

Glycerol trinitrate
Guthion

Heptachlor
γ-HCH
γ- Hexachlorocyclohexane
Hexahydro-1,3,5-trinitro-1,3,-triazine
Hexan-2-one
Hexone
Hydrazine
Hydrogen cyanide
2-Hydroxypropyl acrylate

Iodomethane

Mevinphos
MIBK
Monochloroacetic acid
Morpholine

Nicotine
4-Nitroaniline
Nitrobenzene
Nitroglycerine
Nitrotoluene, all isomers

Octachloronaphthalene

Parathion
Parathion-methyl
Pentachlorophenol
PGDN
Phenol
p-Phenylenediamine
Phenylhydrazine
Phorate
Phosdrin
Picric acid
Piperidine
n-Propanol
Propan-1-ol
Propan-2-ol
Propargyl alcohol
Propylene dinitrate
Propylene glycol dinitrate

Cresols, all isomers
Cumene
Cyanides (except hydrogen cyanide, cyanogen and cyanogen chloride (as -CN))
Cyclohexylamine
Cyclonite

DDVP
2,2'-Diaminodiethylamine
Diazinon
1,2-Dibromoethane
2,2'-Dichloro-4,4'-methylene dianiline
1,3-Dichloropropene, cis and trans isomers
Dichlorvos
Dieldrin
2-Diethylaminoethanol
Diethylene triamine
Diisopropylamine
NN-Dimethylacetamine
NN-Dimethylaniline
Dimethylformamide
Dimethyl sulphate
Dinitrobenzene, all isomers
1,2-Dinitroethane
Dinitro-o-cresol
1,2-Dinitropropane
2,4-Dinitrotoluene
1,4-Dioxane, tech grade
Dioxathion

Isopropyl benzene

Lindane

Malathion
Manganese cyclopentadienyl tricarbonyl
MbOCA
Mercury alkyls (as Hg)
Methacrylonitrile
Methanol
Methomyl
2-Methoxyethanol
2-Methoxyethyl acetate
1-Methoxypropan-2-ol
Methyl alcohol
N-Methylaniline
Methyl bromide
Methyl-n-butyl ketone
2-Methylcyclohexanone
Methylcyclopentadienyl manganese, tricarbonyl (as Mn)
2-Methyl-4,6-dinitrophenol
Methyl isobutyl carbinol
Methyl isobutyl ketone
Methyl parathion
4-Methylpentan-2-ol
4-Methylpentan-2-one
N-Methyl-N,2,4,6-tetranitroaniline

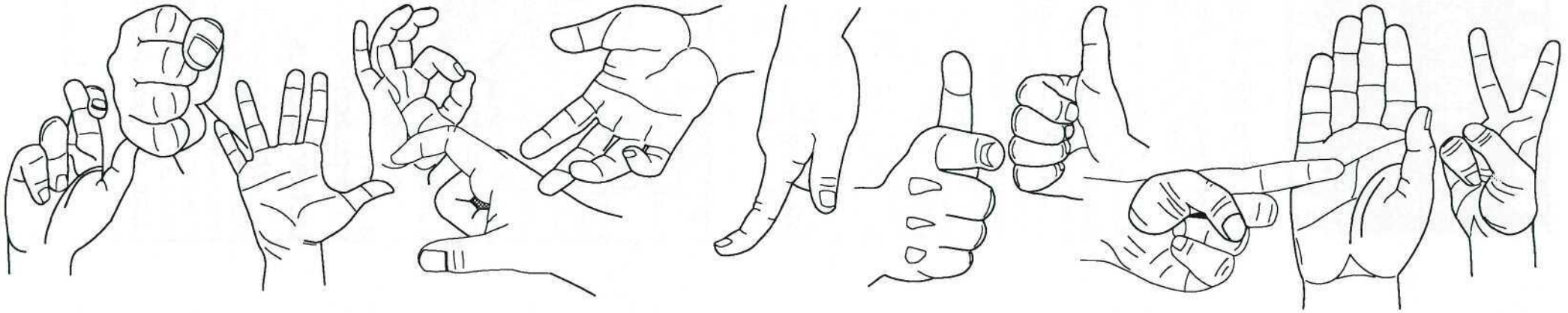
RDX

Sodium fluoroacetate
Sulfotep

TEPP
1,1,2,2-Tetrabromoethane
O,O,O',O'-Tetraethyl pyrophosphate
Tetramethyl succinonitrile
Tetryl
Thallium, soluble compounds (as Tl)
Tin compounds, organic, except Cyhexatin (as Sn)
Toluene
1,4,7-Tri-(aza)-heptane
Tribromomethane
Tricarbonyl(eta-cyclopentadienyl)manganese (as Mn)
1,1,2-Trichloroethane
Trichloroethylene
2,4,6-Trinitrophenol

Xylene, all isomers
Xylidine, all isomers

Source: British Health and Safety Commission, London 1991



SKIN DAMAGE in film labs

— not a black & white case

Skin disease in photographic laboratories has been a well-known complaint since 1901. Still, many offending substances are still used in modern film processing operations.

The working conditions vary greatly between different laboratories, as does the exposure to chemicals.

The affected groups include mixers, developers, service technicians and other workers who are in daily contact with powders, concentrates and batch solutions used in film processing.

A recent survey showed that about half of film workers in the study had experienced skin conditions, and around 57 per cent displayed contact allergy to film chemicals.

The most severe cases of contact allergy were associated with developer agents (CD-2, CD-3 and CD-4), as well as metol, hydroquinone and PBA-1.

PBA-1 (Persulphate Bleach Accelerator) was labelled as allergenic already in 1982, but has remained in use. In Sweden, PBA-1 is a restricted substance that requires express approval for use by the Swedish Work Inspection.

Most serious skin complaints were found in old laboratories, whereas modern operations had significantly fewer — and milder — cases of skin disease.

The report suggested that new photographic products be allergy tested before being released on the market.

Lichen planus

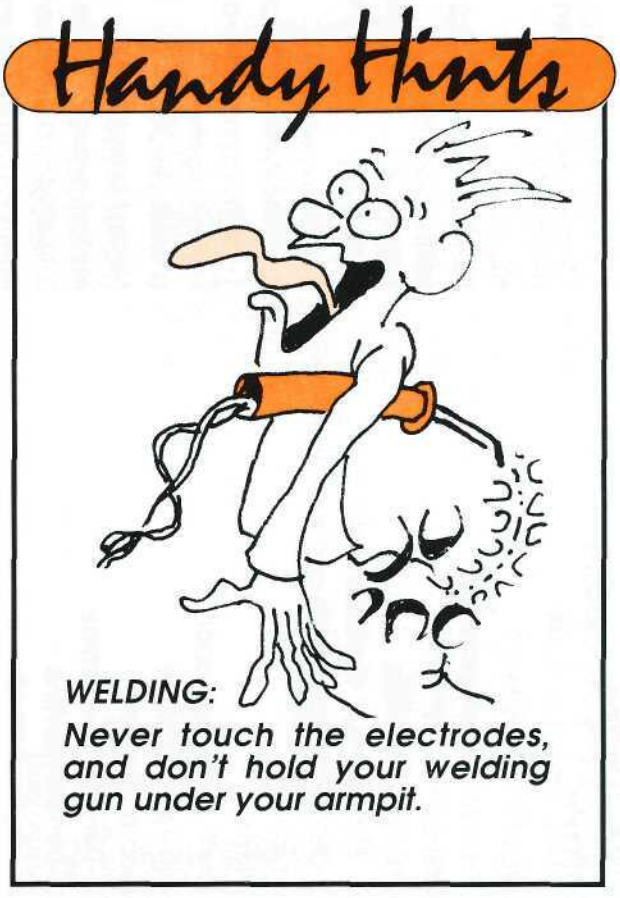
Lichen planus, or "lichenoid reaction" is a relatively common skin disease that affects mucous membranes, skin and nails. The symptoms include itching, irregular, flat, brown to violet patches on the skin. The patches may occur anywhere on the body, but are most common on the wrists, ankles and lower back. Lichen planus can be caused by colour developing agents.

There are several other chemicals in the film industry that may cause skin damage. They include **ethylene diamine**, used in developers; ***formaldehyde***, *used as stabilising baths* in colour processing; **alkaline substances** used to clean tanks and processing machines; **potassium bichromate; sulphuric acid; acetic acid;** and **sodium hydroxide**. **Organic solvents** are also used in film cleaning.

The researchers found that CD-2, CD-3, CD-4 and PBA-1 are extremely sensitising compounds. CD-2 caused more allergic reactions than CD-3.

The study, conducted over a number of years, comprised two large film laboratories, one of which had undergone thorough modernisation since the start of the survey. It was shown that workers in the modernised operation suffered much less from skin disorders than the conventional laboratory.

Source: Liden C., Occupational dermatoses from photographic chemicals, Arbete och Hälsa 1990:39 pp1-26; Weintraub N., Arbetsmiljö magazine 10/91 p11



CHEMICAL PLANT SAFETY

A matter of concern in America

After a number of chemical plant disasters, the Oil, Chemical & Atomic Workers Union (OCAW) in the United States has drawn up an action plan for the industry. The president of the Union, Joseph M Misbrener, has described the action plan as "draconian", but adds that it has to be done.

Two years ago, a major disaster occurred at the Phillips Petroleum chemical plant in Houston, Texas. Four flammable gases were released and ignited. The massive explosion killed 23 people and injured 270. There were three causes of the accident:

- **Inadequate maintenance lockout policy**
- **The use of subcontractors in critical areas**
- **Flawed design**

Mr Misbrener believes that every single chemical plant in the United States could suffer a similar tragedy, and says that something must be done to current policies.

Although the industry's problems are significant, they are not unsolvable, according to Mr Misbrener. The OCAW action plan includes the following major elements:

- **Companies must become part of the community and work with the community in order not to be seen as adversaries. This could be achieved by making all hazard and risk assessments public, including insurance assessments.**
- **Workers must become equal to management in the areas of safety and health. They should have the power to inspect and monitor the operation. And they should have the power to shut down processes that poses danger.**
- **All workers, including non-union workers, should have the right to refuse hazardous work without threats or intimidation from management.**
- **Concealing hazards, endangering workers, putting the public at risk, and attempting to silence whistleblowers should all be treated as criminal acts.**
- **New legislation should cover stringent training, operating procedures, record-keeping, engineering and design of plant and process controls.**
- **Companies should be required to insure workers against loss of wages due to the destruction or condemnation of a plant.**
- **Subcontractors must be given the same training, and must comply to the same safety requirements as plant employees, and should be included in the same health monitoring and record keeping schemes.**

Mr Misbrener believes that this seven-point action plan could lead to a safer, more socially accepted chemical industry. The OCAW union is currently pushing hard to make chemical operations take part in the drive, and help to make major plant disasters a thing of the past.

Source: Misbrener J. M., Occupational Hazards, Jul 1990 p35

A ladder inspector in summery Perth
Was known for his weight and voluminous girth
He used to detect
An unsafe defect
By breaking a rung and crashing to earth.

CHEMICAL ATTACK!

How multiple chemicals can affect gas filter performance

Gas filters are usually tested under ideal laboratory conditions with a single specific gas. But what happens in the mishmash atmosphere of the real working world?

A relatively new research project (March 1990) concerns itself with the service life of respirator cartridges, that is, gas filters, in environments containing more than one chemical.

Normally, filters are tested in a controlled laboratory environment containing a specific concentration of a specific compound,

But such conditions are rare in the actual work situation. It is not unusual for several kinds of vapours to be present simultaneously, with many chemical fumes lingering in the air at fairly high concentrations.

How long a filter will last depends on the concentration of gas. At any concentration there is a breakthrough point, i.e. a point where the activated carbon in the filter becomes saturated and cannot absorb any more gas, The result is that the gas goes straight through the filter and into the lungs. This is why it is important to replace the filter according to a predetermined replacement schedule,

Acetone

The breakthrough time for any one chemical is rather easy to determine in a laboratory setting.

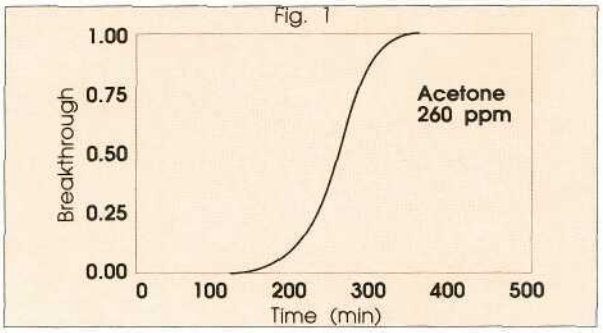
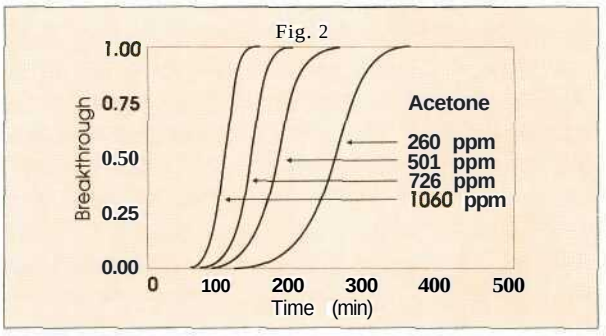


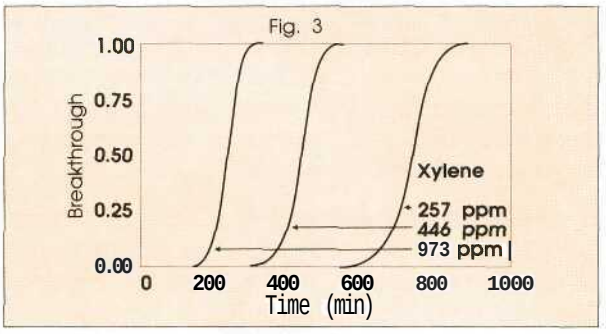
Fig 1 shows the breakthrough pattern for acetone in a cartridge filter, The concentration of acetone was 260 ppm in this particular instance. As we can see, the acetone starts slowly to break through after about 150 minutes (or two and a half hours). After just over 4 hours (260 minutes), 50% of the acetone passes through the filter, and after six hours, the filter has lost all its capacity to absorb acetone.

Fig 2 shows the filter breakthrough at about double the concentration, 501 ppm, as well as three even higher concentrations. The curve looks about the same, but the breakthrough happens sooner.



Xylene

Xylene is another common chemical. The curves for xylene are about the same shape as acetone, although the breakthrough occurs later and, consequently, the filter lasts longer (Fig 3).



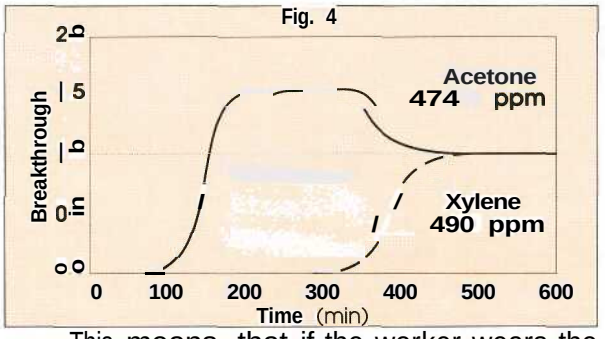
Acetone+Xylene

Let us imagine a workshop where both xylene and acetone are used at the same time in about the same concentrations. The combined concentration is about 1,000 ppm, This may not be an unusual case. What is unusual is the breakthrough pattern of the filter (Fig 4):

The xylene curve looks very much like the curve for xylene alone.

However, something extraordinary is happening with the acetone. It starts off as expected, but the breakthrough concentration soon rises well above the air concentration of acetone and ends up at a level of about

one and a half the surrounding concentration of acetone.



This means, that if the worker wears the respirator, more acetone is inhaled than without a mask, Meanwhile, the filter obviously continues to protect quite effectively against xylene.

Figs 5 and 6 provide even more impressive illustrations of the phenomenon:

Fig 5 shows the breakthrough pattern in an atmosphere containing approximately three times as much xylene as acetone, The combined concentration is still approximately 1,000 ppm.

The curve for xylene is still relatively normal, but the higher concentration pushes up the maximum concentration of acetone to two and a half times the concentration in the room.

With about 90% xylene and 10% acetone (Fig 6), the acetone is pushed even higher, to over three times the surrounding concentration.

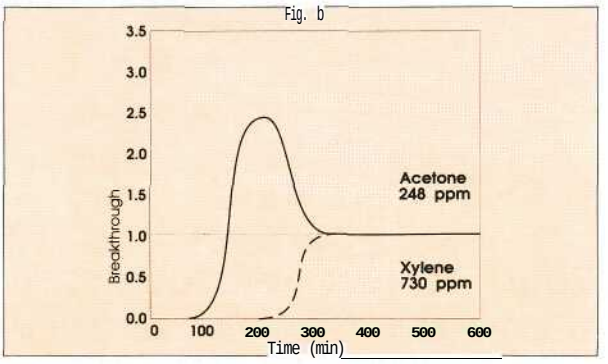
What really happens?

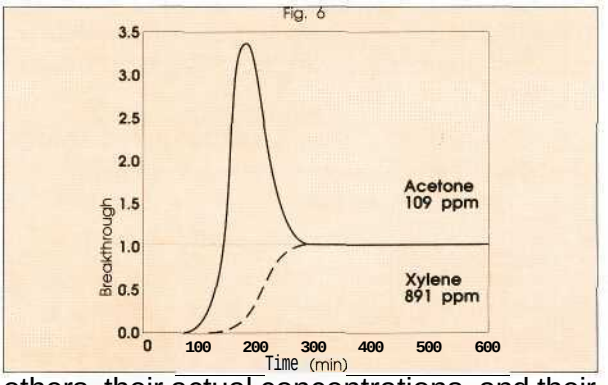
What happens is that at a certain stage in the absorption process, the xylene starts to push already absorbed acetone off the absorption surface of the carbon.

These dislodged acetone molecules are drawn into the respirator with every breath, And seeing that the 100% breakthrough has already been reached, the dislodged acetone is added to the concentration that's already in the air. And so we end up with a combined concentration that's much higher than the level in the surrounding air.

In a way, the xylene "kicks the acetone out" of the filter, and takes its place.

Think about the implications of this. We'll have to rethink the way we determine the life span of a filter. And they certainly make it impossible to give a blanket recommendation as to how often the filter should be replaced. That, it seems, depends entirely on the chemicals present in the air, their effect on each





others, their actual concentrations, and their relative concentrations.

The only sensible conclusion of this is a simple rule of thumb:

when in doubt, use compressed air equipment.

Source: Young Hee Yoon, Ph.D. & James H. Nelson, Ph.D.; *A theoretical interpretation of the service life of respirator cartridges in the binary acetone/m-xylene system;* Submitted to the *American Industrial Hygiene Association Journal;* DataChem Laboratories; Salt Lake City, Utah, USA; 21 March 1990

ON THE ROAD AGAIN...

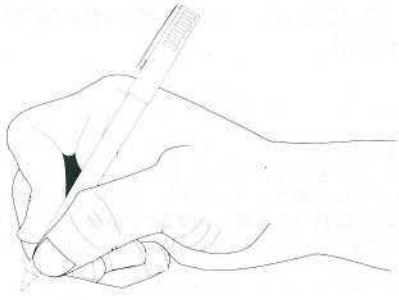
Road workers have tough skin

Some of the hottest working conditions about are experienced in road construction. The sun beating down on your back, reflections from stark white walls and mirror windows, and the steaming fumes from the hot bitumen underfoot,

The nature of the work means that road workers often are exposed to sunlight from the same angle for hours on end. The upper neck takes the brunt of the hot assault.

Some road workers have worked for years in the sun, and it shows: the skin is leathery, hard and rough. Burns that won't heal are common.

Various types of skin cancer have been extensively reported in the media, melanoma being the severest form, But other kinds of cancer can also occur, causing great health problems.



Sun creams are soon washed off with perspiration. Broad brimmed hats may be a hindrance. Some road workers prefer to let their hair grow to shoulder length - a kind of natural protection, Another option is the "Foreign Legion" type of cap with a shading flap at the back.

The eyes can suffer, too. Strong sunlight may contribute in the development of cataract. Sunglasses are often a great help, but may again be uncomfortable, especially if you perspire a lot. They may also collect a lot of dust and smoke, and may need to be cleaned frequently.

Heat stress is a real hazard. Perspiration is the body's only way to get rid of excess heat. Ordinary clothes and protective clothing should not hinder perspiration in any way.

Sweating leads to dehydration, which in turn means fatigue and stress. It is important to replenish lost liquid throughout the day. Doctors recommend that workers should not rely on their thirst to tell them how much to drink. In other words, drink more than your thirst tells you, A litre an hour is not an uncommon requirement, To neglect liquid intake can really put a worker in the hot seat,

Source: Ekelöf E., Arbetsmiljö 7/91 p31