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Confined space

Thaddeus E. Tomczak of OSHA's directorate of safety standards, spoke out about attitudes towards work in confined spaces at a meeting of the American Institute of Chemical Engineers in Philadelphia recently.

Mr. Tomczak outlined the new OSHA confined space standard, intended to prevent a problem that is distressingly common in both the USA and Australia.

He expressed his regret about chemical manufacturers and engineers to focus their interests on "What can I make with this chemical?", rather than paying attention to "what will this chemical do to the people who are exposed to it?".

Mr. Tomczak called this line of thinking sheer bad attitude, and wished that chemical engineers would consider carefully the effects raw materials, products and by-products would have on people.

He suggested that a better attitude towards responsible labelling would lead to users being more aware of the hazards associated with a product.

Material Safety Data Sheets should comprise not only information on the properties of the chemical, but also easily understood knowledge of oxygen deficiency and

the hazards of reagents, catalysts, and intermediates.

The combined effect of knowledge and attitude, claimed Mr. Tomczak, would promote compliance with safety regulations and reduced injuries.

Independent OSHA and NIOSH studies have found that about 50% of all confined space fatalities are caused by fire or explosion, one quarter by oxygen deficiency, and the rest by miscellaneous factors.



Respiratory Protection Newsletter, Sep/Oct 1989, Hebron, Connecticut

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Plastic workers risk visual damage

Triethylamine, used in the plastics industry, may produce temporary visual disturbances after only a few hours' exposure. The Swedish WorkSafe Directorate reports on a survey that recommends a cut of 3/4 of the present TLV of the substance.

Bengt Akesson, researcher at the School of Occupational & Environmental Medicine in Lund, Sweden, has already caused certain industries to lower the concentrations in their work areas. The Swedish WorkSafe Directorate has decided to lower the TLV for triethylamine as from January 1990.

Triethylamine is used as a catalyst in the plastics industry, chiefly in the production of plastic foam. It is also used in foundries and in the pharmaceutical industry.

"Triethylamine is an aggressive compound that causes irritation in the eyes and upper respiratory tracts", says Mr. Akesson. "However, we also received complaints of foggy vision among plastic workers, and started to explore which substance would prove to be the culprit."

Occupational hygiene literature contains references to visual aberrations caused by amines. By mapping the work places and the employees' clinical symptoms, Mr. Akesson

came to the conclusion that triethylamine caused the visual problems.

"Exposure to triethylamine above a certain concentration will result in foggy vision for longer or shorter periods. The cornea becomes swollen and milky upon contact with triethylamine. However, it's only a local effect. We have tested the substance on volunteers, and we can't detect any other harmful physiological effects", says Mr. Akesson.



The attacks of foggy vision lasted from only a brief period to several hours, depending on the concentration. The same result occurred in both field studies and controlled laboratory conditions.

Further experiments showed that people who were exposed to triethylamine during an 8-hour day at the TLV concentration ($40\text{mg}/\text{m}^3$) were affected with severe, persistent fogged vision. In fact, the symptoms did not disappear until the next day.

"A person working in this sort of environment can barely find his way home after work", Mr. Akesson said.

No permanent damage

Exposure to triethylamine does not cause any irreversible damage. The milkiness of the cornea disappears even in people who have been working for years in atmospheres containing the substance, and who may have experienced regular fogged vision.

"The greatest risk is that they may injure themselves on a machine or in the traffic on their way home after work", Mr. Akesson said. "We feel that the TLV should be lowered to a level where 8 hours' work won't cause any visual problems.

The recent review of Swedish TLVs has taken Mr. Akesson's advice, and cut the limit from $40\text{mg}/\text{m}^3$ to a low $8\text{mg}/\text{m}^3$.



Arbetarskydd, 7/89 p.12

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A sticky question

Glues & Adhesives

Glue often contains hazardous compounds. In industrial situations, there are three major concerns associated with glues:

- The least hazardous type of glue should be used
- Workers should not have to wear respirators all day
- Glue workers should be appropriately educated in safety precautions

Solvents

The solvents used in glue are often hazardous. The solvents are absorbed through the skin and lungs, and may affect the central nervous system.

Solvents are designed to dissolve fat. Many body or-

gans — including the brain — are rich in fat: thus the danger. Symptoms include dizziness, fatigue, nausea, headache and concentration difficulties.

Ventilation

Work areas where glues are used should be effectively ventilated. If possible, fanned booths or point exhaust should be used. Don't forget that the glue may release hazardous substances not only while stirring, mixing and applying, but also during drying, setting and hardening. Glues that require heat during hardening are particularly dangerous.

Epoxy glues also require very careful handling.

Allergic reactions

Certain glues contain severely allergenic compounds. Once you have been

sensitised, you have to cope with the allergy for the rest of your life. Avoid all skin contact with the glue itself, and with polishing dust.

Glue fumes may also cause allergic asthma.

Again, epoxy glues are to be regarded as particularly nasty. However, acrylate adhesives, polyurethanes and glues containing formaldehyde are allergenic.

People who already suffer from eczema or allergies should not work with these substances.

Personal protection

Avoid skin contact by using protective gloves with long gauntlets. Remember that splashes are common, and make sure every bit of exposed skin is covered. Use safety glasses and face shields.

The eyes are particularly vulnerable. An eye rinse station should be set up nearby. Peroxy hardeners in polyester glues are especially harmful to eyes.

Washing off splashes

Never use solvents to wash off spills and splashes from your skin! The solvent will only spread the glue over a large area, and may

render the skin more susceptible to allergic reactions.

Dry skin is always extra sensitive. Before and after work, use a skin lotion or creme (unscented!). Reapply the creme every time you wash. Wash off all creme before every smoko and meal break, and reapply afterwards.

If brushes and other tools must be cleaned in solvent solutions, make sure ventilation is very effective.

Last but not least: don't forget the fire risk. Certain glues are extremely flammable, and may be ignited by sparks from polishing equipment, hammering and staple guns.



Swedish WorkSafe Directorate, publ. ADI215, 1987

Petrol fumes

Station attendants & repair shop workers at risk

Changing fuel filters, work on petrol tanks, and carburettor repairs inevitably lead to high exposure to carcinogens and other harmful petrol components. The STEL (short term exposure limit) is often exceeded. A recent survey points to real dangers for workers in petrol stations and car repair workshops.

To lower the risks, new work procedures are recommended, as well as improved ventilation, use of personal protection, and more "maintenance friendly" fuel systems in cars.

Auto mechanics should depressurise the system before starting to work on it. Petrol tanks should be emptied by using liquid extraction appliances. Fuel filters may be punctured and drained. Point exhaust and good general ventilation should be installed, and half mask respirators with carbon filters and long gauntlet gloves made from nitrile should be available,

The report (Auto mechanics and petrol fumes 1989:17) was produced by the Swedish WorkSafe Directorate, Umea.

Another research project, conducted by the Occupational Health Clinic of the Sahlgrenska Hospital in Gothenburg, is mainly concerned with the total leakage of hydrocarbons into the air during fuel handling. The survey starts at the port of Gothenburg, where fuel is transferred from ships to refineries through pipe lines, then onto tanker trucks for transport to petrol stations. It is estimated that about 760 tons of hydrocarbons every year at the port of Gothenburg alone.

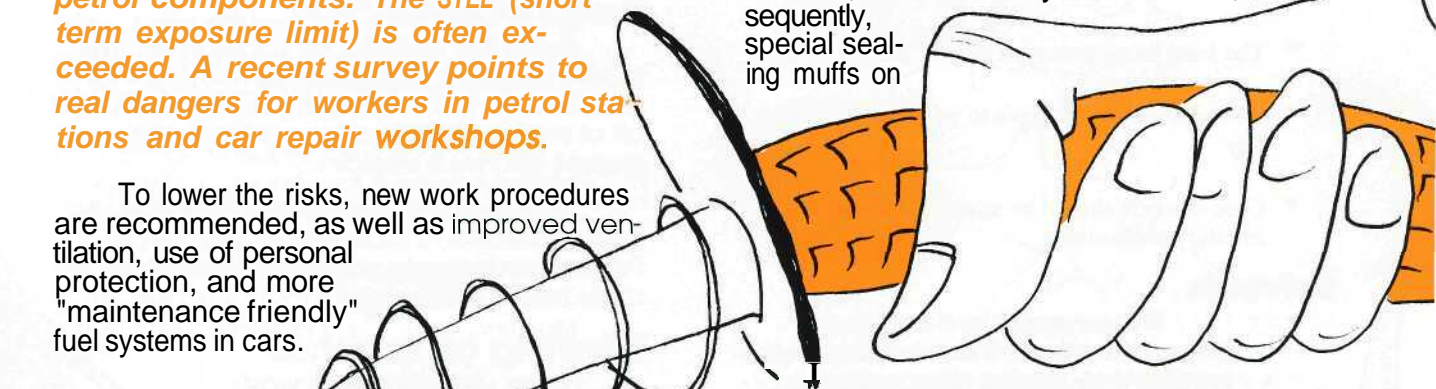
Out of 66 deck workers, 56 complained of temporary headaches, nausea, dizziness, fatigue or a sense of drunkenness associated

with loading or tank cleaning. Eye and throat irritation were also common.

The report quotes several international studies that express

"... a fairly strong suspicion of an increased risk of certain forms of leukaemia and skin cancer among refinery workers. The leukaemia risk seems to be connected with exposure to benzene, while the cause of the skin cancer is unclear."

At present, much attention is paid to the petrol fume leakage occurring in petrol stations, where ordinary cars are filled, Consequently, special sealing muffs on



the pumping pistol nozzle are a requirement.

A spokesman from the Shipworkers' Union, Sten-Ove Niklasson, has strong views on the problem:

"We've known about these problems for a long time", he says. "There are an enormous number of down-and-out people who have worked on oil tankers. But the problem is well hidden: it takes a long time before the damage is obvious. It's like an insidious alcoholism - the people affected don't notice it."

"The fumes make you intoxicated. Painters have got the solvents out of paints because they were considered dangerous. Well, what do you think about a fellow standing with his nose over a tankful of fuel?"

A big problem is the escaping air when a tank or cistern is filled. A new filling system means that two hoses are fitted: one for fuel going in; one for gas coming out, which is collected and recycled. The twin-tube system is implemented right down the line from oil tankers to the last replenishing of the bowser.

The Swedes regard the escaping fume problem as solved. Now, only the combustion exhaust remains to be tackled.



"Bilreparatörer & bensinångor", Arbetsskyddsstyrelsen, Umea, Sweden (Börje Nentzén - Arbetsmiljö magazine 10/89, p. 6); Lennart Lund; Arbetarskydd magazine 14/89 p.6.

Pssst!—Want a job in Thailand?

Hold your breath, close your eyes, and don't listen to anything you hear!

And you thought your working conditions left something to be desired! Take part of this new study of 19 small textile factories in Thailand:

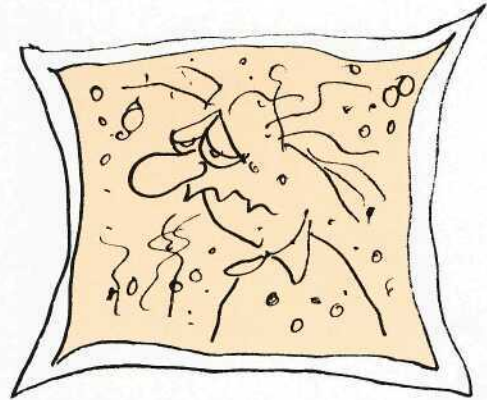
The study provides some very disturbing results:

- Women work in a daily noise level of over 90 dB(A) - around four times the "safe" level.
- Cotton dust concentration exceeds 15 mg/m³ (0.5 mg/m³ is the TLV in Australia)
- Lighting is usually less than 300 lux (recommended: 3,000 lux)
- Air temperature hovers around +45 °C
- Ten working hours a day
- Only one 30 minute break per day
- No safety regulations or protection scheme

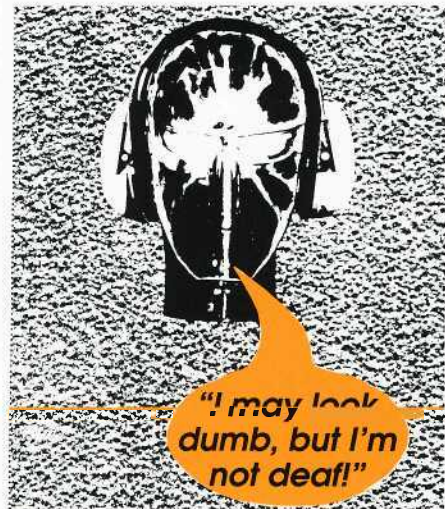


Pranee Chavalitsakulchai & Houshang Shanavaz, Lulea University, Sweden (Arbetsmiljö 12/89 p.52)

Handy Hints



Never enter a car, tractor, booth, driver's cabin or any other confined area wearing soiled clothing, if you've been handling hazardous chemicals.



Courtesy J. M. Hayman, Uki

An arrogant sprayer from Yap
Said "Trainina's a gutful of crap"
He died from exposure
His mask wasn't kosher:
He failed to tighten the strap.



RESPIRATOR SAFETY

How do you score?

YES

NO

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Do all your respirators, filters and other devices display the Australian Standards seal? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do they carry DIR approval? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is each respiratory device used in concentrations that are lower than the capacity of the mask? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are respirators kept in A1 condition? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are respirators inspected before and after use? |
| <input type="checkbox"/> | <input type="checkbox"/> | Is emergency protection inspected and tested at least monthly? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are respirator repairs performed by a qualified person with documented training and experience? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are all spares & consumables supplied by the same manufacturer as the respirator? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are all parts & pieces used in the intended way? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are all add-ons and accessories supplied by the same manufacturer as the respirator? |
| <input type="checkbox"/> | <input type="checkbox"/> | Are the add-ons and accessories approved for use on the respirator? |

- Have you considered "engineering-out" the problem by ventilation before deciding to use respirators?
- Are all types of respirators and filters available for any given routine or emergency?
- Have you performed an air sampling & assessment in the workplace?
- Are the respiratory protection devices selected by sufficiently knowledgeable people?
- Have the physical aspects of the work area been accounted for, such as ladders, confined space, distances, escape routes etc.?
- Have the workers using the respirators been educated about the characteristics of the chemical hazards, such as smell, exposure effects, warning signals, handling procedures etc.?
- Is an issue log kept?
- Are respirators effectively limited only to workers who need them, and who have been trained in the use of the respirators?
- Do you ensure that users have been properly instructed before issuing a respirator?
- Are respirators stored securely?
- Is respirator training kept up-to-date? (New staff, refresher courses etc.)
- Do you conduct medical screening of respirator users?
- Do you conduct individual fit testing?

SOUND FOR SORE EARS

...or SOUND OR SORE EAR

...or SOUND OR SORE EAR

Pick a sentence at random out of today's paper, or out of this issue of PPM. Then proceed to scratch out every "c", "ch", "f", "s", and "x". You could probably still read the sentence, with some imagination. Now delete every "h", "k", "p", "q", and "t". This makes it hardly possible to guess what the sentence is. If you then take out voiced consonants, such as "b", "d", "g", "j", "v" and "z", it becomes completely indecipherable.

Admittedly, this is a non-scientific attempt at explaining loss of hearing. However, it does show the general progression from high-pitched hissing sounds (that are the first to go) to the vowels that could be the only sounds remaining in a case of severe hearing loss.

What's this business of Decibels?

The intensity (or loudness) of noise is measured in *decibel* (abbreviated dB). Seeing that the human ear is damaged by high frequency (high pitch) noise in particular, industrial noise is often measured with emphasis on high-pitched noise. Such a measure is called and "A-weighted decibel scale", or dB(A). This simply means that a special noise filter has been attached to the measuring device. The filter sorts out low frequency (humming) noise, and pays special attention to high frequencies. Here are a few samples of different dB(A) levels:

- Whispering 30 dB(A)
- Normal speech 60 dB(A)
- City traffic 80 dB(A)
- Sheet metal workshop 100 dB(A)
- Jet engine 140 dB(A)

It is generally considered that 85 dB(A) and below is quite safe for your hearing, and that any noise above this level can be injurious.

Warning

The decibel scale is not a straight scale, but a logarithmic one. Each 10 dB step means TEN TIMES increase in intensity — and multiplying the hearing damage tenfold. For instance, 90 dB is ten times as loud as 80 dB. 100dB is a hundred times as loud as 80 dB. In fact, every 3 dB increase means a doubling of the noise level.

This is why you must never think that a noise level is only "slightly over" the safe one: 88 dB(A) is actually DOUBLE the noise at 85 dB(A) and, consequently, TWICE the hearing hazard.



Dosage

Hearing loss depends on the loudness of the noise — and the duration of the exposure to that noise. Noise has an accumulating effect on the hearing: it "adds up" or in the body over an extended period of time. Even if you work most of the day in noise below the danger level, a short period in loud noise can still cause hearing loss.

As explained before, 85 dB(A) is considered the safe level for work without hearing protection during an 8-hour day, 5-day week,

Now, if we double the noise level to 88 dB(A), we must halve the exposure time to 4 hours. If the noise level is 100 dB(A), say, the noise created in a sheet metal workshop, you should only work for 15 minutes per day in order to save your hearing!

The answer, of course, is hearing protection. However, it is most important to wear hearing protection ALL THE TIME. Because even brief exposure to noise above the safe level will ruin your protection factor. Remember that hearing is a time concern — every instance of overexposure counts, no matter how brief: you'll carry it with you all day,

Therefore, select a hearing protection device that is comfortable. It should be easy to use and easy to clean. Don't choose big, heavy-duty muffs unless you really need them: you'll only keep taking them off every so often.

Over-protection is almost as dangerous as no protection at all. You may feel uncomfortable, the clamp pressure is too tight, you experience a sense of isolation when you're shut-off from your environment, and communication is impossible: you simply have to take the muffs off in order to hear what a work mate is saying.

It is much better to wear comfortable, light weight muffs (or plugs) that allow you to wear them all day, and that make conversation possible.

How to recognise early signs

Noise-induced hearing loss is an insidious condition: you may not notice it until it's too late. Some of the symptoms, in order of increasing severity, are as follows:

- Ringing in the ears after work
- Feeling tired, maybe irritated after work
- Intermittent ringing in the ears (tinnitus)
- Can't hear watch ticking
- Difficult to follow a conversation where there is background noise (in a pub, cafeteria etc.)
- Other family members complain about TV or radio being turned up too loud
- Conversation becomes very difficult to follow. Telephone is impossible. The sufferer has to look at people's lips in order to understand

The consequences of hearing loss

Hearing loss can be a thoroughly incapacitating condition. Not only is it difficult or impossible to carry on a normal conversation with friends, family and relatives, but there are many other consequences that af-

fect life. Soft pleasant sounds disappear, such as the rustling of leaves, the sound of lapping waves, and so on. Music loses clarity. Television and radio are hard to understand. Communication over the telephone becomes impossible. To make things worse, persistent, never-ending tinnitus may be a mentally destructive factor.

Hearing damage is physically painless. You don't feel a thing. But it really results in a distinct decline in the quality of life.



"Saving your hearing assets for life", BHP Engineering 1985;
"Noise and your work", Queensland Health Department, 1988; Black's Medical Dictionary, London 1987



WRITE TO US!

Letters and articles are welcome. Direct your correspondence to:

The editor,

PPM

Private Bag 1001

Mona Vale NSW 2103

WORKING WITH EPOXY?

You'd better have a damned good reason!

Before commencing work with epoxy materials, several factors should be taken into consideration. Most importantly, the reason for using epoxy at all should be thoroughly explored.

Epoxy is an allergenic material. Everyone who comes into contact with epoxy stands a risk of becoming sensitised and consequently suffer allergic reactions upon every encounter with the substance — often for life.

The allergenic properties of the substance are very strong: you can become allergic to epoxy already after one single exposure. Others may work with epoxy for years without discomfort, then suddenly display severe symptoms.

Once you're sensitised, it takes only minute amounts of the material to produce a severe reaction.

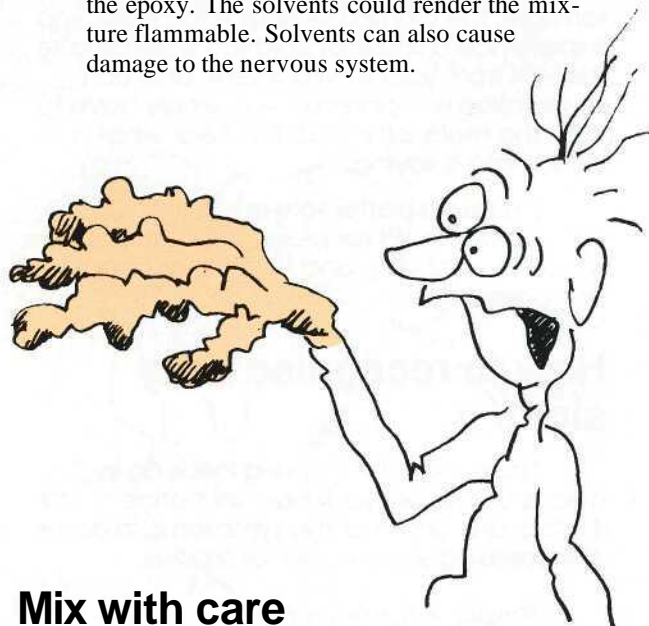
The allergy mainly presents itself as troublesome eczema.

Different epoxy materials have different allergenic qualities. The lower the molecularity, the fiercer the allergenic properties. Amine hardeners are more hazardous than amide types. Room temperature hardening epoxies are more dangerous than heat setting ones.

Avoid all contact

- Workers with eczema or other allergies should not work with epoxy.
- Indirect exposure should be avoided. People who may come in contact (cleaners and others) should be informed.
- Never ever let any part of your skin come in contact with epoxy. Never breathe the fumes.
- Rub in skin creme or lotion before and after work, even if you're wearing gloves. (Besides, the creme makes it easier to put on and take off the gloves).

- Remove wedding rings, bracelets and wrist watches before work.
- Do not smoke, eat or drink in an area where epoxy is used or has been used recently.
- Wash hands before smoking or eating.
- Only use disposable rags for cleaning, and throw them out straight away.
- Make sure there is a washing facility and emergency eye rinse device on the premises.
- Don't forget the solvents that may be used in the epoxy. The solvents could render the mixture flammable. Solvents can also cause damage to the nervous system.



Mix with care

- Use only disposable containers when mixing.
- Mixing should be done in a separate room or a partitioned part of the work area.
- Ensure good ventilation. Point exhaust may be required.
- A waste bin with a lid should be available. If possible, the lid should be operated through a foot pedal, so you won't have to touch the outside of the bin.

Could something else be used?

- Epoxy should only be used when necessary. When used, the least possible allergenic type of epoxy should be selected.

On the next page, a few examples of applications that may motivate (or justify) the use of epoxy materials:

AREA OF USE	APPLICATION	BENEFITS
Grocery & large kitchens	Floors, walls, fittings	Easy cleaning, no maintenance, non-porousness
Operation theatres & culverts in hospitals	Floors, walls, fittings	Sanitation, non-porousness, no maintenance, resistance to mechanical wear
Laboratories (chemical, biological)	Floors, walls, fittings	Easy cleaning, chemical resistance, non-porousness
Chemical handling, pharmaceutical industries, storage of chemical substances and motor fuels	Floors, walls, drains, tanks, containers, appliances, inaccessible surfaces & hard-to-clean details	Chemical resistance, easy cleaning, non-porousness, low maintenance
Pools in public baths, waterworks & water purification plants	Bottom, walls, joint surfaces, appliances	Easy cleaning, chemical resistance, non-porousness
Heavy transport	Floors & truck paths	Tenacity, resistance to mechanical wear
Mechanical constructions in corrosive environments	Manifolds and other inaccessible surfaces. Parts subjected to significant wear and tear or corrosion	Low maintenance, durability, chemical and moisture resistance
Power stations	Steel and concrete constructions that may be affected by water	Resistance to mechanical wear by water and solid items
Concrete constructions	Cracks and other damage to concrete. Concrete joints. Anchoring.	Capacity to seep into crevices, rapid hardening, durability, adhesion, resistance to mechanical wear
Bridge building	Damaged concrete blocks, certain steel constructions, edge sealings	Capacity to seep into crevices, durability, adhesion, rapid hardening, resistance to mechanical wear
Rock reinforcement	Cracks in rock (walls)	Capacity to seep into crevices, strength, adhesion
Ships	Tanks, oil pipes, engines, inaccessible surfaces and details	Low maintenance, chemical and moisture resistance, durability
Electrical & telecommunications equipment	Tight seals in cables & wires, assembly of & repairs to electrical equipment, insulation of cables	Rapid setting (even in humid conditions), adhesion, moisture resistance. Running reliability even when subjected to simultaneous high voltage, mechanical, thermal and chemical effects.

Australian survey shows:

Safety people suffer from lassitude, apathy and lack of creative thinking!

The response to our Christmas "Simon Says" competition was disappointing. The quality of the entries was high - but there weren't many entries. Thus, the five sets of Peltor ear muffs were all too easy to win.

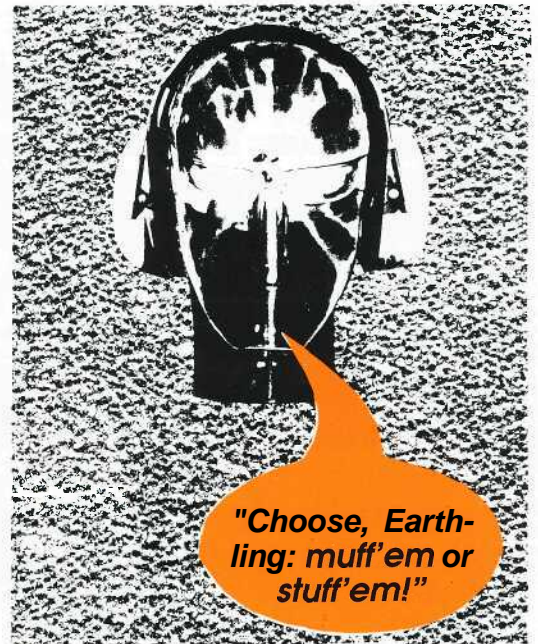
We thank the two dozen entrants for going to the trouble, and at the same time we hope that the rest of our readers are kicking themselves for missing the opportunity to crank up the old thinktub a bit and winning a valuable prize.

You will see a selection of entries (winners and runners-up) in the next few issues of PPM.

The winners are (in alphabetical order):

- **B. Andersson** — safety officer, Wauchope NSW (foldable)
- **J. Aresbury** — safety coordinator, Boronia Pk NSW (over-the-head)
- **G. Boag** — production foreman, Mount Isa Qld (foldable)
- **J. M. Hayman** — ex Dist M.O., Uki NSW (neck band)
- **J. Langley** — occupational hygienist, Perth WA (over-the-head)

The winners will receive their preferred ear muffs in the mail.



Courtesy G. Boag, Mount tea



Courtesy J. Langley, Perth

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