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LEAD

Action

NEWS

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Editorial

This issue of LEAD Action News has several articles on the theme of Lead and Women: Women and the Environment. Chloë Mason provided numerous articles tracing the fascinating recent history of women's struggle to work in the lead industry, from which women have been excluded. If occupational health and safety practices are adequate to protect women and their foetuses, then all lead industry workers benefit.

Theresa Gordon's article focusses on women's unpaid work, including a discussion on the politics of blame and guilt in housework as it relates to lead-poisoned children. Theresa describes and celebrates the enormous contribution which women make, usually in a voluntary capacity, to protect our environment.

Two young women present a well thought out strategy in the article on "Urban Lead Abatement". I hope State and Federal Environment Ministers pick up some ideas from them.

And finally, a six year old girl has provided some drawings of women at home and at work. I hope you enjoy them.

The theme for the next issue is the overseas experience. Your roving editor will be reporting on events at several OS/International lead conferences, plus a visit to the United Nations Commission on Sustainable Development in New York. Any info from around the world to do with lead, much appreciated.

Elizabeth O'Brien, Editor



Graphic by Rose Lennon, aged 6.

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Margaret Miller,
NRMA's Manager,
Community Liaison
wrote:



Dear Elizabeth,

Please find enclosed a cheque for the sum of \$2,500 as a donation for the forthcoming year.

The NRMA acknowledges the contribution of The LEAD Group to recent gains made in reducing the consumption of leaded petrol and we wish you and your supporters well in your endeavours.

Thank you NRMA and NRMA members!

Dedication: This issue of LEAD Action News is dedicated to Noela Whitton for her contribution to the environment. Her support takes the form of child care, payments for child care and financial and other support for me without which these newsletters would never see the light of day. Her media watch service and taping of interviews is invaluable. Without even regarding herself as an active environmentalist, she empowers me to make a significant contribution.

Laboratory Analysis for Lead Research at Home

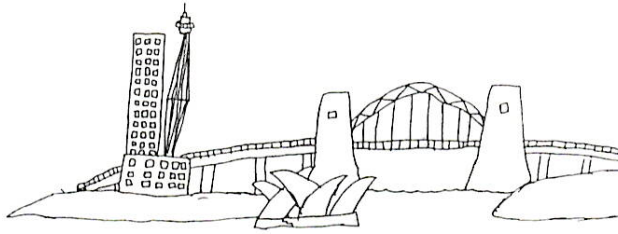
A special thank you to Graeme Waller, for allowing us to come up with some preliminary research results without spending a cent on laboratory analysis.

It has long concerned me that the system of soil and dust control, which I invented, may contribute to lead contamination of our clothing. My system involves placing beach towels wet (spun, not dripping) from the washing machine and laying them at doorways to the outside, at the bottom of stairs, beside the bath and beside beds, and anywhere else where children, pets and especially people with big feet (their shoes carry more dirt) might be going from a place of greater dustiness to a cleaner place in the house. The wet beach towels are many times more efficient at taking dirt off the soles of shoes or feet than a dry towel or mat. (Experiment for yourself by laying wet and dry towels side by side at the back door.) By the time the towel is dry it is ready to be picked up, carefully so as to avoid getting yourself dusty or allowing the dust to fall back on the floor, and washed in the washing machine, in a load dedicated to dusty floor towels. Half my towels (all the dark coloured ones) are now used solely on the floor. After the load is washed and the towels replaced on the floor, (even on top of carpet according to my friends), the washing machine must be rinsed out using a hose connected to the laundry taps. I was concerned that even this rinsing and spinning off of the rinse water, plus emptying of the filter, might not be sufficient to protect the next load of clothes from being contaminated with lead. But here are the results:

Water from the washing machine, obtained after the floor towels had been agitated for five minutes with detergent, contained 93 micrograms of lead per litre of water ($\mu\text{g/L}$). In the following load, after 5 minutes agitation with detergent but without any clothing in the machine, the water obtained contained 10 $\mu\text{g/L}$. In Australia, the safe drinking water level is 50 $\mu\text{g/L}$, although other OECD countries regard 10 or 15 $\mu\text{g/L}$ as the safe drinking water level. Just as a comparison, I also had a sample of first flush water from the laundry tap analysed, after it had been sitting in the pipes all night. The result was 22 $\mu\text{g/L}$ which finally convinced me that flushing the water whenever it has been sitting in the pipes for more than six hours, is excellent advice even in Australia.

Isn't it a crying shame that there's no well-funded Lead Centre in Australia to carry out proper research to answer this kind of vital house dust control question?

Elizabeth O'Brien



Urban Lead Abatement

by Sandra Eager and Juliet Suich

In 1987 the National Health and Medical Research Council declared that there were "no benefits of human exposure to lead and that all demonstrated effects of such exposure are adverse". Lead Abatement strategies must be implemented to reduce environmental lead levels and lead exposure. The concept of a "hierarchy of control measures" is a useful model in such an overall management strategy. The closer a control measure is to the source the higher up the hierarchy it is and the more effective it will be.

The first control measure for primary prevention of lead exposure would be to limit its use, followed by substitution of less hazardous substances or processes. Then engineering measures can be applied to reduce emission and dispersal.

At the bottom would be measures which have little impact on the source of the problem. Such as the clean up of contaminated sites or individual measures to minimise personal exposure. (Mason 1993) These may be considered as secondary preventative lead abatement strategies. Both primary and secondary measures are discussed below.

Primary Preventative Lead Abatement

Primary methods of lead abatement involve removing or reducing lead at its source. Perhaps the most important example of this is the removal/reduction of the lead content in petrol however, the physical characteristics of lead make it an attractive material for a variety of applications. It therefore provides large economic benefits to all its users. This, coupled with the fact that lead is an elemental pollutant and can never be removed from the environment completely make total removal of lead as a pollutant impossible. Lead in the environment is cumulative and once present is difficult and expensive to remove.

Lead in petrol represents one of the largest sources of continuing addition to urban environmental lead loads. Lead is added to petrol for two reasons:

- 1) to raise the octane level; and
- 2) to lubricate engine valves. (CEPA 1993)

All new cars in Australia since 1986 have been fitted with catalytic converters. The resulting increase in the use of ULP has greatly reduced lead and other emissions. However, while it is estimated that demand for leaded petrol will have decreased to almost zero by 2004 (NRMA 1993), more must be done to reduce

urban lead levels because of the serious effects it has on humans especially children.

Other strategies to reduce urban lead loads involve a reduction in the maximum permissible concentration of lead in petrol, the introduction of a tax on lead as an additive, the introduction of a price differential between unleaded petrol and leaded petrol [a one cent differential came into being in Feb 1994], and the introduction of increased stamp duty or registration on leaded vehicles. (CEPA 1993)

It is clear that all the above options have some negative repercussions. Therefore we must question our dependence on private vehicles. The only sure way to reduce environmental lead loads is to reduce total petrol consumption which can only be achieved through a far greater use and extension of the public transport system.

Further Strategies

There are several other common sources of lead to which reduction/abatement strategies can be applied. An important method is through the use of alternative substances in common uses of lead.

- 1) Thermoplastic insulators can be used as an alternative to lead sheathing. Aluminium, polyethylene and PVC have also been used successfully in countries such as Sweden.
- 2) Several organic and inorganic substitutes are available for lead based pigments. Iron oxide is suitable in most applications. The use of lead in paint pigments is now banned and cost effective substitutes exist.
- 3) Metal alloys such as tin/antimony, tin/silver, or bismuth/tin may be used in solders but cost and performance limitations of these have slowed the phase out of lead solders. Some of these substitute metals may also pose health concerns.
- 4) Iron and steel shot make adequate substitutes for lead, however there is a loss in performance, higher cost and increased wear on gun barrels associated with these substitutes. It is also difficult to prevent the use of imported lead shot.
- 5) Some substitutes exist for some applications of glass making and ceramic glazing, however, the majority are costly, prone to problems and of similar health/toxicity concern. (OECD 1991, Mason 1993, Kenworthy & Newman 1993)

Additional primary lead abatement strategies which can be applied to common sources of urban lead (and which in many cases relate to the substitutes listed above) are complex and in some cases difficult to monitor. The worth of these strategies however cannot be questioned in light of the serious nature of lead toxicity. Some of them include:

- 1) the implementation of standards for metal food containers. Five percent of food cans in Australia use lead as a solder. In some cases regulations require that the solder be applied only on the outer side of these containers.
- 2) the cessation or reduction of the use of brass fittings in plumbing, or the implementation of maximum lead content or a maximum lead leaching rate from these fittings.
- 3) the control of lead shot and fishing weights by limiting their use in areas of high ecosystem exposure or sensitivity, or banning their use altogether.
- 4) exposure to lead in products for which no substitutes exist such as lead acid batteries can be limited through deposit refund systems, recycling and the encouragement of technological development in the area of substitutes.
- 5) the regulation of emissions from industry sources and waste incinerators are also a vital method of controlling lead levels.
- 6) new uses for lead continue to be identified. Their development should be based strictly on an assessment of net costs and benefits, taking into consideration the global environmental effects of lead. (OECD 1991)

In Australia, an integrated strategy to reduce our exposure to lead will have to cross the boundaries of traditionally disparate jurisdictions, bringing together initiatives in all areas - food, air, soil and other relevant areas. Global co-operation is also necessary because poorer countries tend to suffer higher exposure to lead overall. The OECD and the International Organisation of Consumers Unions state there must be international standards, trade agreements, marketing conventions and international technology transfer to ensure that the lead burden within the global environment can be significantly reduced and is not unduly placed on poorer countries. (OECD 1991)

Secondary Preventative Lead Abatement

Secondary prevention measures must be implemented to reduce exposure to lead which has already accumulated in the environment over the long term. The main sites of lead contamination include:

- buildings with lead-based paint and their surroundings;
- contaminated soil or accumulated dust from air pollution, resulting from lead in petrol, past poor mining and smelting practices;
- and possibly drinking water from lead pipes.

Abatement measures to address each of these sources of lead poisoning include:

Decontamination of houses, child care centres, schools, and the local area.

This is a priority in areas frequented by young children and prospective mothers.



Lead abatement may involve:

- the safe removal of ceiling dust;
- wet removal of flaking paint and repainting or recladding;
- repairs internally and externally to prevent dust entry (where there is the possibility of continued exposure to air borne lead and dust);
- the removal or cleaning of carpets and soft furnishings.
- the removal and/or treatment of the contaminated layer of soil (usually the top 5cm);
- the replacement of lead piping for drinking water, and/or piping and water tanks with lead solder.
- paving and planting of trees, shrubs and groundcovers to consolidate the soil and provide a barrier between children and soil. Plants also catch air borne lead.

Successful implementation of these measures may require:

- Identification of housing at high risk including public housing which is known to be particularly prone to contamination. In the case of private housing, implementation of an inspection program particularly between buyers and a mechanism for notification of potential purchasers of homes containing lead-based paint and contaminated soil and dust.
- Mapping cases of lead poisoning to determine 'at risk' areas, especially near potential point sources of lead emission.
- Programs to warn householders of the dangers during renovation and distribution of guidelines for safe abatement techniques.

- Developing training programs for Environmental Health Inspectors employed by local councils. Training must also be provided for lead abatement workers to carry out decontamination. This must include safe disposal of the contaminated material.
- An equitable program to reduce lead exposure must ensure funding for household lead abatement with low interest or no interest loans. Such a scheme is in operation in Massachusetts, USA (Executive Office of Communities and Development & Massachusetts Housing Finance Agency). The Australian proposal for reducing lead exposure includes subsidies for temporary accommodation for children during abatement procedures. (Berry et al 1993) World Health Organisation principles for public policy state that special attention must be paid to disadvantaged and high-risk populations. (WHO 1989)
- Lead abatement for drinking water requires a program of testing for lead in first flush drinking water. Household lead exposure would also be addressed by conducting education programs to inform home handypersons of the dangers in using lead solder in plumbing. (Berry et al 1993)
- Paving and the planting of trees, shrubs and groundcovers. The smelter town of Port Pirie in South Australia has accelerated road and footpath sealing and carried out extensive planting. (Berry et al 1993)

Nutrition Programs

To reduce calcium, iron, and zinc deficiencies especially among young children and prospective mothers. Deficiencies of calcium and iron clearly enhance lead absorption. (Goyer 1990) Increasing zinc in the diet reduces tissue accumulation and toxicity of lead. (cited in Goyer 1990)

This, in particular may require the consideration of socio-economic factors in creating good health and well-being.

Workplace Programs

To ensure that workers exposed to lead in the workplace, including domestic premises where paint, soil or dust is being removed, undertake additional hygiene practices to minimize the transfer of lead to the home. (Heyworth et al 1993)

At the workplace the hazard should be concentrated in one area. There are encapsulating methods which can be employed. It may be possible to mechanise and

automate hazardous processes. Effective ventilation and control of dust with moisture applications and vacuuming are essential, along with the supervision and maintenance of these controls. (OECD 1991)

Disseminate guidelines for lead poisoning detection and prevention to health professionals.

Medical professionals may readily detect cases of high dose acute lead poisoning but may be unaware of the effects of chronic low dose exposure. Guidelines concerning this must be user-friendly and would easily be disseminated through the Department of Health, Community Services, Local Government, Professional Bodies and Universities. (The LEAD Group)

Community Support Program

Education and awareness campaigns to detail the above and other potential sources of exposure including lead shot, lead in children's toys, paints and crayons; fishing weights, curtain weights, pottery glazes, lead crystal, makeup, incinerators, and traditional medicine. (Berry et al 1993)

The provision of family support and counselling to those affected and undergoing abatement procedures is essential. (Calder & Collings 1989)

The WHO Charter on Environment and Health outlines the involvement of individuals and communities in consultation and management as an essential strategy to prevent adverse impacts on health. (WHO 1989)

Screening and Monitoring Program

It is essential to develop a screening and monitoring program to identify sites of possible lead contamination and to ensure that abatement measures are having the desired effect. (Heyworth et al 1993)

Biological monitoring of blood lead levels in children below the age of seven years at six monthly intervals is necessary to determine changes before, during and after abatement interventions. (Calder & Collings 1989)

The prevention of lead poisoning requires the involvement of the whole community in ensuring the implementation of primary and secondary measures. If these measures are successfully implemented the incidence of lead poisoning should decrease and tertiary measures including medical treatments will become less necessary. ●

For the Bibliography and Reading List, please contact The Community Lead Information Centre on 550 0095.



Women and the Environment

by Theresa Gordon

The following is from a speech given to CAPOW (Coalition of Australian Participating Organisations of Women) in 1993 by Theresa Gordon, one of the truly great Australian environmental campaigners. Theresa became a lead campaigner after growing up in the shadow of a lead zinc smelter.

It is a challenge being a messenger for the environment. It is virtually impossible not to paint a gloomy picture. To be knowledgeable on the environment is a very uncomfortable burden. Late last year 99 of the world's greatest scientists (many Nobel prize winners) got together to look at world wide environmental problems. The conclusion was; they warned that we only have 30 years before the world becomes very significantly qualitatively less habitable.

But speaking here today is different. Today is the day I get to talk about the environment in the only place that there is not only a world of hope but I believe it is one of the only places that there is hope, and that is in the united voice and strength of women.

I will speak later about the impact we as individuals and a group can have on the environment, but first I will look at the spiritual nature of environmental degradation.

In pre-Christian times the fertility of women and the earth were celebrated. The gods and goddesses were not distant gods of the sky but gods and goddesses of the earth connected to fundamentals of life such as the fertility of both the earth and women. At around the same time as Christianity took a dominating hold over these so called pagan attitudes, the powers of women as the healers and midwives were crushed by three hundred years of witch burnings during which 9 million European women were killed. This ever effective tool, fear, forced women to disconnect themselves from their skills and intuition, and as a consequence they became disempowered and devalued. We have since been dominated by patriarchies both within the church and the medical field, including birthing practices, technology, agriculture and society in general. The effect of this on the environment has seen man plunder and dominate, controlling and exploiting our natural resources. I believe women must regain power and also allow themselves to redevelop intuitive skills and not devalue our gift of nurturing. I also believe it is time to bring the gods (whatever doctrine) down out of the sky and connect them to the mother earth. We need to realise our spirituality should be connected to the air, the water and the land in a way that will ensure we no longer take these essential life giving elements for granted. We must look upon environmental degradation as a sin not only to our gods, but to ourselves.

This extract from a prayer by Michael Leunig, from his book *A Common Prayer*, although harsh, highlights for me the nature of our environmental sins.

Father do not forgive them for they know precisely what they do. Those destroyers of earth's beauty and goodness, those killers of nature, do not forgive them. Those betrayers of nature's love. Those exploiters of nature's innocence. Those poisoners. Do not forgive them.

It is true. There are no more excuses. We must stop and move towards positions. In this area we can learn much from the indigenous people of the world that have struggled against the tide to hold on to this gift of oneness that they still share with the earth and its elements. There is none more beautiful and powerful as our own Australian Aboriginal dreaming, to highlight what I mean. And as this year is the year of the indigenous people, it is a great opportunity to reach out and learn, and hopefully regain the feeling that we are a part of this complex web of life, and that we must stop the destructive domination of our natural resources.

On a more practical level, we must look at women's place in the environmental debate today. "Women are the mainstay of the majority of current programmes for environmental conservation in Australia. Household recycling, tree-planting programmes, Landcare groups and domestic energy conservation are activities in which most of the actual work is done in a voluntary capacity by women. Yet the great majority of waste production, land development and energy use is in industry, in which women hold few decision-making positions" [Brown & Broom, 1992] This serious imbalance must be addressed. Women also have to cope with conflicting environmental messages. "As the principal teachers and managers of households, we are expected to practice recycling, reusing and renewing materials and reducing consumption, so that our impact on the earth is less" [Brown & Broom, 1992] Yet we are expected to do these things in an environment that continually subjects us and our families to messages of wasteful hyper-consumerism. It is not an easy job to find a balanced perspective. Do we pour phosphates into our mop buckets and washing machines everyday and therefore be party to toxic algal blooms? Or do we use more environmentally friendly detergents which do not remove the lead dust?

An ominous trend is developing that is seeing women being handed the burden of responsibility and guilt for environmental matters. "Manufacturers should be held responsible for their environmentally damaging products. We must not allow the onus to be put on women to solve problems such as domestic waste when it is the manufacturers who create waste." [Brown & Broom, 1992] This is where women's groups working together can make the difference. If the groups represented here today put collective energy into the forcing of legislation to combat excess packaging and ban heavy metals from packaging inks and adhesives, it would not only be helping the environment, but also telling governments that women will not allow themselves to be used.

As some of you may be aware, I have been involved for two years with the problem of lead contamination in the Boolaroo area. The situation at Boolaroo is again one that is seeing housekeepers, whom we all know are mainly women, being handed the area's problem. When the discovery was made that the majority of the children had excessive blood lead levels, the answer came in the form of "behavioural guidelines". This means training the house keeper, changing behavioural patterns so that a family can learn to safely live with lead. This includes damp mopping daily, damp wiping all food preparation surfaces before preparing food, washing children's hands frequently, washing all toys frequently, only vacuuming whilst children are out of the room...the list goes on, but I would think that you get the idea. This has neatly handed the burden of responsibility onto women. Of course, what happens when some poor woman does all she can humanly possibly do, and her child's blood lead level does not come down? Well, she can blame herself.

Last year at the Speers Point Park annual Environfest, I overheard a conversation at a company display. Some women were enquiring about the problem of children's lead levels. They were told by the industry representative that there was nothing to worry about because the children that had high blood lead levels came from dirty homes. He didn't mention that the Industry emits 30 tonnes of lead from the stack each year, along with an estimated additional 15 tonnes of uncontrollable emission from buildings. You still may be thinking "Behavioural guidelines" seem a sensible short term solution. Well yes, but they were never originally offered as short term, and the NO LEAD group thought it prudent to make a fuss to ensure that the words "short term" accompanied these guidelines after finding out the women of Port Pirie in SA have been following behavioural guidelines for fourteen years. Two years down the track, in Boolaroo, behavioural guidelines are still all that has been offered, along with a lot of research, and there has been no change in blood lead levels.

They knew from Port Pirie that these guidelines were largely ineffective and unsustainable, but they do effectively shift the burden of responsibility, and relieve the pressure of obligation to do something about the cause. Whether it has to do with waste management or contaminated sites, we must stop this insidious shifting of the burden of guilt and responsibility onto women. It is happening, it is serious, and we must again take collective action to halt this becoming normal practice.

There are, however, obvious and important individual actions which we should take responsibility for, such as recycling, reusing, reducing, composting and conserving. But I believe that, along with the usual preaching of these practices, it should be pointed out that it is not easy to do all these things, and that it is yet another burden for women to handle. So I would like to say again, try to find the balance. Don't expect yourself to do everything instantly, and don't feel guilty if you find something is too much. It would be negligent to make no effort at all, but it is enough to set realistic goals and chip away at your own pace.

It is also very much the time for women to reach in and use their intuition and common-sense to decipher the truth on environmental matters. The unfortunate situation is that the vast amount of research money lies with the multinational companies. International truth has been, and continues to be, distorted time and time again. I will give only a few examples out of the many which I have experienced in my own issue. In an area that found a lead industry not wanting to rehabilitate toxic soils, they produced a report which concluded that lead in air has more impact on children's health than lead in soil. In the case that finds an industry not wanting to bring down emissions, they produced a report which concluded that avoiding soil and dust exposure is more important to children's health than lead in air. Similar situations can be found for pesticide use, herbicides, effects on water quality... the list is endless. Along with vested interest come the many reports supporting the appropriate weight of evidence to suit. So it is time to ask, firstly, who may have funded this study and who would benefit from this result? Then use your own judgement and stick to it. I suggest this is prudent practice in health matters as well as environmental. The cold hard facts are that governments can not afford to produce enough independent research to keep abreast of the times, and this offers the advantage to industry.

Apart from the outward practical things we must do, we also, as educators, nurturer's and givers of life, must take the responsibility of helping ourselves and our families cease taking for granted the basic gifts that this earth and this life hold for us. We must connect our human spirit with our physical environment. ♡

German Composting Grabs International Attention



By John Denlay

Composting Feature reprinted from Waste Management and Environment Nov 1992

With up to 1% of municipal waste in Australia being lead, there's definitely room for strong initiatives from local government and state environment protection and waste authorities in organising recycling. The system described in the following article has appeal for all household recyclers (often women and children) and would-be recyclers.

The Germans are getting quite a name in waste minimisation - recyclable cars, refillable P.E.T. bottles and radical new packaging laws. Lesser known, though possibly more important, are the German's composting initiatives.

The Germans have a long, though chequered history in composting. Faced with landfill shortages in the 1970s, numerous mixed waste composting plants were established. Plagued with operational problems and contaminated compost which could not find markets, this quick fix solution soon fell from favour.

After efforts failed to clean-up the mixed waste compost by collecting recyclables separately. The Germans realised clean compost could only be produced when the organic materials are collected separately.

In 1982, the village of Witzenhausen was the first to put this into practice. Each household was given an additional 240 litre bin for food and garden materials. Mixed waste and organics are collected on alternate weeks.

The compost produced from separately collected organics meets the compost market's demands of low contamination - in particular, heavy metals, glass and plastics.

Witzenhausen's clean compost renewed German interest in composting. In the last decade, 88 source separated collection programs have been introduced, experimenting with a range of collection systems.

Consistently good results have been found from these programs. For single houses, 70-80% of organics are separated with contamination as low as two to five per cent. Even in the difficult task of collecting food waste from apartments, an impressive figure of 50% separation is obtained.

The German's advances in collection systems are matched by their developments in composting techniques. The open windrow is now only one of a wide range of options available.

A low-cost technique, mattress composting, involves large mats of thinly spread garden materials built to a

height of three metres. The material is occasionally loosened during a period of three to four months after which it is piled into tall windrows for a further two to three months.

Enclosed composting systems include rotating vessels and stationary systems. Box composting is a stationary system which involves modular "containers" in which the decomposition is controlled through forced air.

Anaerobic composting is attracting considerable interest. Its main advantage is the capturing of the energy content in the organics through the collection of methane. Proponents claim the energy recovery from organics in anaerobic composting exceeds incineration.

Of all the advances the Germans have made in composting, the country's market creation initiatives are possibly of most significance.

To avoid the situation of compost quality not meeting end user requirements, a co-operative of compost producers and users was formed. This Federal Compost Quality Assurance Organisation - Bundesgutegemeinschaft Kompost - e.V., has set quality criteria for compost which meets the needs of users and is achievable by existing composting techniques using source separated feedstocks.

The Organisation provides a certification for compost quality (see logo). On-going independent monitoring of quality is built into the certification; a feature which gives users confidence in the product. Any compost not meeting the quality criteria will have a hard time finding a market.

Governments have played important roles in these developments. On state, Hessen, has issued a directive requiring all communities to have composting facilities by 1995. The Federal Government is considering legislation which would limit the organic content of waste landfilled to only five per cent.

Governments are also working on national standards for compost quality and compost use. According to the German Federal Environment Agency, these standards will be the first step towards an overall legislation to control input of contaminants to German soils - a "soil protection law".

Lead and Other Heavy Metals

Heavy Metal Speciation in Waters, Sediments and Biota from Lake Macquarie, NSW

Extracts from a 1987 paper by G.E. Batley
Division of Energy Chemistry, CSIRO, Lucas Heights

Abstract

The distribution and bioavailability of heavy metals in waters and sediments from Lake Macquarie (NSW) have been examined. Elevated concentrations of zinc, lead, cadmium and copper detected in surface sediments and waters from the northern end of the lake are attributable to discharges from a lead-zinc smelter on Cockle Creek. The majority of the metals are in bioavailable forms and are shown to be accumulated in seagrasses, seaweeds and bivalves...

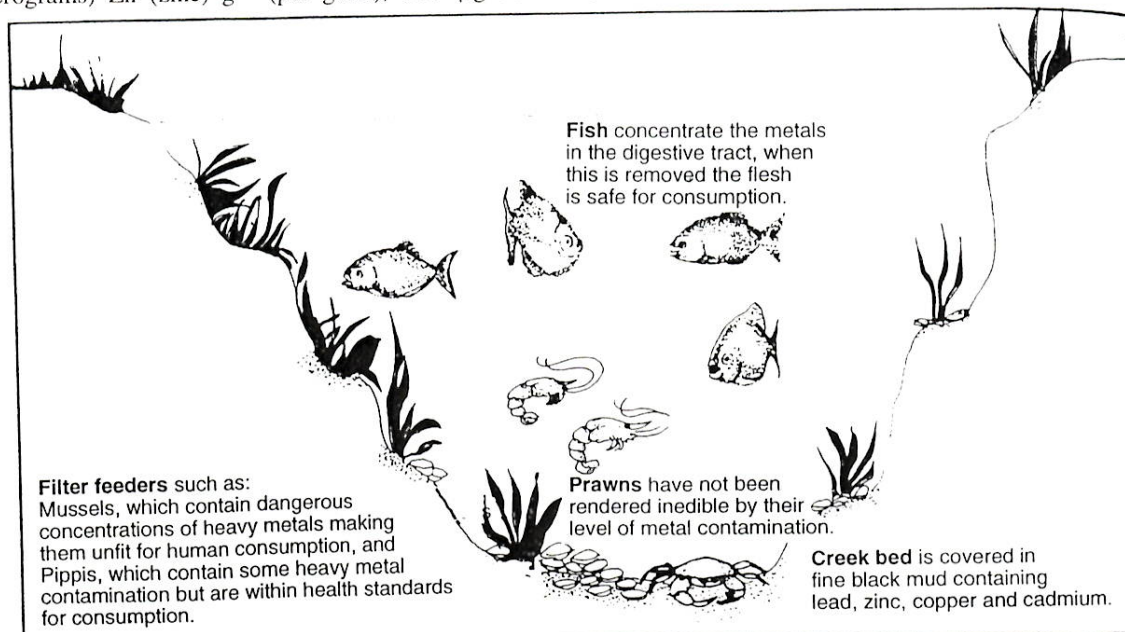
Bivalve molluscs

Samples of the hairy mussel *Trichomya hirsuta* (5-6 cm length) and the cockle *Anadara trapezia* (8-9 cm length) were collected from Fennels Bay, at the northern end of the lake. No live samples were found during sampling of the sediments at southern lake sites. The soft flesh of these samples was freeze-dried, homogenized and determined by neutron activation analysis, for a range of elements, to identify other elements in addition to lead and zinc which might have been concentrated in these species as a result of inputs to the lake. For *Trichomya*, average values of 70 µg (micrograms) Zn (zinc) g⁻¹ (per gram), 0.99 µg Pb

(lead) g⁻¹, 4.9 µg Cd (cadmium) g⁻¹, 2.6 µg Cu (copper) g⁻¹, 7.9 µg As (arsenic) g⁻¹ and 33 µg Se (selenium) g⁻¹ were found on freeze dried, whole-body flesh samples. For *Anadara*, the corresponding values were 84 µg Zn g⁻¹, 1.2 µg Pb g⁻¹, 12.9 µg Cd g⁻¹, 1.7 µg Cu g⁻¹, 12.0 µg As g⁻¹ and 6.4 µg Se g⁻¹. Gold and cobalt were also detected but at less significant concentrations.

Furner (1979) has previously reported a comprehensive study of copper, lead, cadmium and zinc in these species from Lake Macquarie. At comparable sites, his measured concentrations, especially for lead (9.3 µg g⁻¹ and 9.2 µg g⁻¹ respectively for *Trichomya* and *Anadara*), were significantly higher in both species than those found in this study.

Cadmium was also higher in Furner's *Trichomya* samples. The high cadmium concentrations found in *Anadara* were confirmed by our data, and similar levels are found in samples analysed by the NSW Department of Agriculture (private communication). Harris et al (1979) noted that *Anadara* bio-concentrated cadmium to a greater extent than did oysters or mussels. Samples from Westernport Bay in Victoria typically contained 4 µg Cd g⁻¹, 1 µg Pb g⁻¹, 45 µg Zn g⁻¹ and 800 µg Fe g⁻¹. Only cadmium and zinc levels differed from our data. It would appear that cadmium concentration may limit the suitability of this species for human consumption.



Don't eat the cockles in Cockle Creek. Shellfish such as pippis and hairy mussels are commonly known as cockles and while the first Europeans in the area named the creek after the abundance of edible cockles, today the hairy mussel is dangerously polluted by lead, copper, zinc and cadmium. The effects of this heavy metal pollution on other forms of marine life are summarised in the diagram above. Reprinted from "Australia: Environments and People" (p.242) by Margaret Martin and Gary Allenby with kind permission of the publisher, Science Press.

Is cadmium worse than lead?

Reprinted from Toxic, March 1994 with permission.

Cadmium is a heavy metal with wide use and distribution in industrial processes. Sources include mining and metallurgy; manufacturing and processing industries; metal finishing; sewage disposal; combustion of fuels and wastes; pesticides and fertilisers. Cadmium is a by-product of zinc and lead smelting. The toxicology of cadmium is comprehensively reviewed by Friberg et al 1986, and Robards and Worsfold 1991.

Along with lead and mercury it is a "heavy" metal of environmental significance because of documented adverse effects in animal studies at low doses and in human epidemiology - and because of widespread environmental distribution.

Environmental sources

Cadmium is present in all mediums. Airborne cadmium in urban air is in the range up to $0.060 \mu\text{g}/\text{m}^3$. Meat, fish and fruit contain 1 to $50 \mu\text{g}/\text{kg}$ and grains from 10 to $150 \mu\text{g}/\text{kg}$. The greatest concentration is in the liver and kidney of animals, and in shellfish such as muscles and oysters which concentrate cadmium up to levels of 100 to $1000 \mu\text{g}/\text{kg}$. In developed countries the total daily cadmium intake from all mediums may be in the range 10 to $40 \mu\text{g}/\text{kg}$.

Cadmium is more readily taken up by plants than other metals such as lead. In this context, the cadmium content of phosphate fertiliser is a significant source. Cadmium content of Aust. fertilisers is in the range 20-60 ppm, and is derived mainly from rock phosphate. Williams has reported the problems of trace metals in superphosphate. Tobacco, tomatoes and brassicas take up cadmium more efficiently from soils than some other crops. Studies have shown a slow but steady increase in the cadmium content of vegetables over the years, and consequent increase in body burdens.

Toxicology

Cadmium is more efficiently absorbed from the lungs than the gastrointestinal tract. Calcium and iron deficiencies may enhance the uptake of cadmium. Cadmium, like zinc, has a predisposition for the male reproductive organs, particularly the prostate. Dietary zinc decreases cadmium absorption. Blood cadmium in non-occupationally exposed persons is usually less than $1 \mu\text{g}/\text{dl}$ (micrograms per decilitre).

Although high levels of cadmium can cause acute effects, the principal long-term effects of low-level exposure to cadmium are chronic lung disease,

emphysema and chronic kidney disease. Effects on the cardiovascular and the skeletal system have also been reported. People heavily exposed in Japan developed Itai-Itai disease which is characterised by bone pain, osteomalacia and osteoporosis.

Kidney and skeletal effects appear not to be reversible and may be progressive according to follow-up studies of exposed populations. As with lead, cadmium is associated with increased blood pressure in several studies of occupationally-exposed workers. Electrical and biochemical heart disturbances have also been reported in experimental animals.

The IARC rates cadmium as a probable human carcinogen, category 2A, based on animal studies and human occupational epidemiology. This evidence is much more developed than for lead. Human studies have found increases in lung cancer and to a lesser extent, cancer of the prostate.

Much recent interest centres on the spermatogenic effects of low levels of cadmium exposure. A recent paper by Kok-War Hew et al shows that a single dose of $1 \text{ mg}/\text{kg}$ of cadmium chloride resulted in failure of spermiation in experimental rats. Poor sperm characteristics have been correlated with high cadmium blood levels (mean $1.35 \mu\text{g}/\text{dl}$) in human studies. (Archives of Andrology 29/2, 177-183, 1992, abstract).

Cadmium is a toxic, persistent and bioaccumulating metal which is increasing in the environment and human tissue.

Industry Report to the Community

*Pasminco Metals-Sulphide Pty. Ltd. Community Report
Extract from Issue 4, Nov 92*

The Public Health Unit (PHU) conducted a review of research into heavy metal concentration in fish in Lake Macquarie, in response to requests from residents.

Furner (1979) found **liver** (not flesh) concentration of lead in mullet and bream to be markedly higher in Cockle Creek samples than for the rest of Lake Macquarie. Only marginal increases of lead in the muscle of the same fish was found. This follows research by Wharfe and Van den Brock (1977) which notes that heavy metals tend to accumulate in the soft organs (liver, kidney, spleen).

The Environment Protection Authority and PHU warned that molluscs and oysters should not be eaten from any estuary (including Cockle Creek) entering Lake Macquarie because of possible pesticide contamination from urban runoff. Commercially grown oysters, however, do not pose a risk.

Don't Boil the Fish!

Theresa Gordon of NO LEAD asks why the Health Department does not warn residents against boiling the whole fish when it is known that, especially Asian families cook fish caught locally, in this way. The warnings would need to be accessible to non-English speaking background residents. Theresa points out that lead accumulates in the bones as well as in the soft organs of fish. No community group has been funded to carry out community education yet the industry can afford regular community reports.

Arsenic and Old Lace

Extracts from a paper by Sandra Eager

Industry

Arsenic (III) oxide, the major basic chemical of arsenic industry, is emitted as a by-product in smelting, mainly copper and lead ores. It is recovered from flue dust in a reasonably pure form. Arsenic is also used in metallurgy; in the treatment of silicon; and small amounts are used in the glass and ceramics industry.

Pesticides

Inorganic compounds of arsenic such as arsenic trioxide, and the lead and calcium salts of arsenic and arsenous acids were once widely employed for killing rodents, termites, fungus and insect pests of crops and pastures. Today the use of these substances is either totally banned or their use is severely restricted. (Environmental Trusts & Total Env't Centre 1994)

Tobacco

Tobacco may also be treated with arsenic-containing pesticides. During the first part of this century, in the US, the use of arsenic-containing insecticides [eg lead arsenate] brought about a steady increase in the content of arsenic in tobacco products. In the 1950s, levels up to 52mg/kg were reported. However, in the 20 years up to 1981, the concentrations of arsenic have decreased to below 8mg/kg because of a great reduction of the use of inorganic arsenic compounds in agriculture. (WHO 1981)

Food

Arsenic levels in food, with the exception of some seafoods are generally well below 1mg/kg wet weight. Certain bottom feeding fish, crustacea and shellfish may contain arsenic concentrations of several tens of milligrams per kilogram through bioaccumulation. (WHO 1981)

Arsenic concentrations of between 0.6 and 58mg/kg dry weight have been found in some food supplements prepared from kelp. Edible seaweed has been reported to have a mean concentration of 112mg/kg dry weight. (WHO 1981)

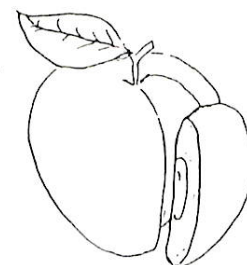
Biological indicators

Biological indicators of arsenic exposure are blood, urine, and hair. Because of the short half-life of arsenic, blood levels are only useful within a few days of acute exposure but are not useful to assess chronic exposure. Urine arsenic is the best indicator of current or recent exposure to arsenic. (Klaassen et al 1986)

Full bibliographical details can be obtained by contacting The Community Lead Information Centre on 550 0095.



Natural Treatments



Principles of Homeopathy

*Extract from the book Homeopathic Medicine at Home
by Masimund B. Panos MD and Jane Heimlich
A Corgi Book by Transworld Publishers Ltd. 1980*

The Law of Similars

The term homeopathy (sometimes spelled homoeopathy) comes from the Greek homoios ("similar") and pathos ("suffering" or "sickness"). The fundamental law upon which homeopathy is based is the law of similars, or "Like is cured by like". The law of similars states that a remedy can cure a disease if it produces in a healthy person symptoms similar to those of the disease. ♁

Sing a Song of Symptoms

The following two poems were written to help homeopaths remember the laws of homeopathy and the symptoms of lead poisoning in particular.

From "A song of Symptoms" by Patersimilias, B Jain Publishers Pty Ltd, New Delhi, India. Reprinted edition 1991. Originally published in 1974 by Health Science Press, N. Devon, UK. (Patersimilias is the pseudonym of a medical practitioner and member of the Faculty of Homoeopathy.)

Sing a song of Symptoms
That match the patient's ills,
Find the drug which corresponds
And make it into pills.
When the pills are taken
In proper potency,
Results will prove a triumph
For Homoeopathy.

Plumbum

Paul the plumber isn't chatty
His cerebation isn't quick;
He's thin and pale, his heart is fatty,
And after food he's very sick.

He can't see well, his vision's bleary,
He suffers frequently from colic.
His twitching limbs feel weak and weary,
He hardly feels inclined to frolic.

His shooting pains will make him cry out
"Oh! my back" and Oh! my head!"
Surely now's the time to try out
An efficacious dose of Lead. ♁

The Healing Herbs!

*by Michael Castleman
Published by Schortz Books.*

Healing with Apples

Modern medical science has found that Johnny Appleseeds' passion for fruit has tremendous value in healing - thanks to its pulp, which is high in pectin, a soluble form of fibre.

Lead Poisoning

European studies suggest apple pectin helps eliminate lead, mercury, and other toxic heavy metals from the body. Cleansing the body of these poisons is yet another reason for people who live in polluted cities to enjoy the proverbial apple a day.

Rx for Apples

Eat the whole fresh fruit to enjoy a wide range of healthful benefits. Wash apples with soap and water before eating to eliminate any pesticide residues. ♁

Please tell us your experience of Natural Treatments or Chelation Therapy

Here at the Community Lead Information Centre, people often enquire about the efficacy of natural treatments for lead poisoning, such as the use of plumbum, i.e. lead itself, in homeopathic treatment.

Chelation therapy, is the usual medical treatment for severe childhood lead poisoning, i.e. when the blood lead level is above 55 micrograms per decilitre. It would be fascinating to hear from the parent of a chelated child, just how it was for that child.

EDTA chelation therapy for adults, is also used by alternative therapists with medical training, to reduce the ongoing production of free radicals within the body by removing accumulations of metallic catalysts (lead, mercury, cadmium, etc) which accumulate as a person grows older. Free radical pathology is said to be the "underlying process triggering the development of most age-related ailments, including cancer, dementia and arthritis, as well as atherosclerosis". Please write about your experience of any of these therapies, and send it to The Editor, LEAD Action News, PO Box 63, Dulwich Hill, NSW 2203. ♁

Lead and Women: Women and the Environment

by Elizabeth O'Brien

As soon as I announced that the theme of the next issue of LEAD Action News would be Lead and Women, Women and the Environment, Dr Chloë Mason kindly sent in a vast array of articles to add to the excellent library here at the Community Lead Information Centre (CLIC).

Here is an annotated bibliography and selected quotes. Full bibliographical details, plus the articles themselves, can be obtained from CLIC by phoning (02) 550 0095.

Lead and Women at Work

Reproductive Hazards in the Workplace. A book review by Chloë Mason, in *Refractory Girl* (1991 ?).

Reproductive Hazards, by Regina Kenen, successfully draws together the diverse subjects of reproductive health, the assessment of health risks from hazards and conditions in the workplace, legal provisions to protect occupational health and the rights of women (and all workers) to safe employment. Kenen's book also covers the social history of health and safety rights at work and ensures that the reader appreciates how current regulations have grown from social action for change. The reader is engaged with topical issues; for example, the so-called foetal protection policies - excluding women from jobs where reproductive health hazards exist - which the US Supreme Court recently struck down in a class action case under Title VII of the Civil Rights Act.

Lead and Foetal Protection Policies. By Chloë Mason, in *Refractory Girl* No 40, 1992.

Since 1977 women have been objecting to a rash of company policies barring women from jobs on account of some reproductive health risk. The campaign was started in Willow Islands, West Virginia where five women underwent sterilisation rather than lose their jobs in the lead pigment department of a company. The company had informed the women that they had the option of leaving jobs which paid \$225 per week plus overtime and transferring to janitorial jobs which paid \$175 per week with no extras. Many US companies had adopted so-called "foetal protection policies" which operated by excluding women from jobs involving a wide range of chemicals and physical processes that are a reproductive health hazard (often to men as well) rather than by controlling the hazard at its source.

Mt Isa Mines injunction. By Chloë Mason, in *Refractory Girl*, Mar 1992, No 42.

This article summarises the ramifications of a US Supreme Court decision, and sets the scene for the battle to prevent Australian companies from adopting discriminatory "foetal protection policies".

By September 1991, the National Occupational Health and Safety Commission (also known as Worksafe Australia) through a tri-partite Taskforce had made considerable progress in revising the Draft Standard and Code of Practice for all lead workers. Those revisions overcame, in large part, the discriminatory impact on women's employment and the unduly high levels of exposure allowed to lead, a toxic substance. However, in late November, Mt Isa Mines - a corporation mining lead ore and smelting lead - took legal action against the actions of the National Commission in relation to lead and in relation to its consideration of the Sex Discrimination Act, 1984. Specifically, Mt Isa Mines sought an injunction restraining the Commission from "further considering the formulation of and the publication of the [lead] Standard and Code." The legal action, and a successful injunction, stops the development of the lead standard and code dead in its tracks, although it has been in the making since 1986.

Controlling women, controlling lead by Chloë Mason in *Refractory Girl* No 43, 1992

Teachers at the local schools near the Pasmenco Smelter at Lake Macquarie have been issued with curriculum materials on children and lead. These materials communicate to teachers that the family unit is the key to coping with excessive exposure to lead.

For example, 'Children who are supported and confident in their family unit will be better able to deal with problems associated with the lead issue.'

It's a far cry from controlling the hazard at source. However, these are excellent resource materials on the ideology of the family and the use of victim-blaming to manage hazards.

This article also describes progress in the Mt Isa Mines case.

Anti-Discrimination Law and Occupational Health and Safety

In this speech to the Forum on Women's Occupational Health and Safety (Brisbane, 1992) Chloë Mason uses foetal protectionism as one of three examples in the complete history of anti-discrimination law in Australia.

Feminism in the 90s by Chloë Mason, in OSWomen, (newsletter of the Office of the Status of Women) 1992

Chloë raises several important issues in the Mt Isa Mines case.

In the US several papers have been published on the general lack of attention that science pays to paternal exposure to lead.

A concern for women is that lead is not the only toxic material used in modern industry and allowing one industry to exclude women may set a dangerous precedent for other industries to apply for similar exemptions. Women have argued that foetal protectionism has the potential to bar women from millions of jobs, and also denies men the right to work in a safe and healthy workplace, since it reinforces the idea that it is acceptable for men to do dangerous work.

Federal Court endorses safe use of lead at work by Andrea Durbach (April 1994) in Public Interest Advocacy Centre (PIAC) Bulletin

The Full Federal Court encouraged WorkSafe to continue working towards an appropriate lead standard which is fair to women in recognising that exposure to lead may affect reproductive capacity of women more than men, may harm the unborn foetus and may affect the health and welfare of a child breast-fed by a mother with undue lead levels.

Lead standard saga continues by Winder and Mason Feb. 1994

WorkSafe has to be clear about what equal opportunity is. The equal opportunity principle is not about ensuring fair conditions for a specific group of workers, but about ensuring fair conditions for all workers.

WorkSafe has been working on a lead standard since 1986 and, prior to the Mount Isa Mines challenge, was working closely with government, industry, and equal employment bodies to resolve issues relating to the entry of women into the lead processing industry. It is likely that the draft standard that was ready to go to the National Occupational Health and Safety Commission in December 1991 before the MIM challenge will be dusted off and the relevant passages relating to equal employment will be deleted or modified. Consideration of this "minimalist" amendment to the draft standard by WorkSafe's Standards Development Standing Committee and finalisation by the National Occupational Health and Safety Commission should follow, possibly as early as June 1994.



Graphic by Rose Lennon, aged 6.

Home Based Interventions

In a study, (Galvin et al, 1993) of lead levels near the Pasmenco Metals-Sulphide lead and zinc smelter, published late last year, the following results were reported:

- soil lead concentrations ranging from 20 up to 21460 parts per million (ppm)
- household dust lead concentrations ranging from 23 up to 35870 ppm
- 85% of 1-4 yr olds living at Boolaroo, near the smelter, had blood lead levels above 10 µg/dL. The goal for all Australians is a blood lead level below 10 µg/dL and there is particular urgency in reaching this goal for children under 5.

While we have come to expect a section titled "Behavioural Management" to focus on hand-washing and floor-mopping, this study by Judy Galvin et al faces the reality, that the best home-based intervention is finding another home:

"Research in Port Pirie, in the areas of high risk, has shown relocation to be the most effective means of lowering blood lead levels [Luke, 1991] . . . Luke has shown, that while general hygiene and having a healthy balanced diet are behaviours which can assist in lowering blood lead, they will be limited in their effectiveness in high-exposure areas."

With inner Sydney lead concentrations and household dust lead concentrations ranging up to 16000 ppm and 7000 ppm respectively, and 50% of 1-4 year olds having blood lead levels above 10 µg/dL (Fett et al, 1992), parts, if not all, of the Inner Sydney area would have to be regarded as "high-risk" for childhood lead poisoning. Relocation is a popular choice of the upwardly mobile, but the concept has barely penetrated the mind of the average inner-city resident with young children. Relocation was not mentioned as an option in the Commonwealth Environment Protection Agency's \$4mil lead education campaign, let alone as the most effective means of lowering blood lead levels in high-risk areas.



Women's Environmental Network

The following two articles are reprinted from Grapevine Section, OSWomen magazine, Jan 1994, No 19

Y Conserve?

Our World-Our Home is one of the themes of "Y Conserve". It features articles about an International Association for Feminist Economics, about green jobs and unpaid conservation efforts. It shows how vital women's contributions are in changing structures for our mutual preservation. The future of this magazine, formerly funded as Conserve by the Victorian Department of Conservation and Environment, is in doubt. The Melbourne Young Women's Christian Association (YWCA) has published several issues. Contributions to support the Women's Conservation and Environment Network are welcome. Jenni Mitchell is the Editor. She can be contacted at YWCA Melbourne, 489 Elizabeth St, Melbourne VIC 3000, Ph 03 329 5188, fax 03 328 2931.

Ecofeminism

Two prominent thinkers on ecology and feminism have put together this synthesis of women's perspectives, from North and South on the world's ecological state. Ecofeminism authors Maria Mies and Vandana Shiva draw attention to the escalating deterioration of the environment and identify ecofeminist strategies and perspectives. They show how affluent societies stubbornly cling to the hope that we can preserve our environment and continue to over-consume. They argue for a view of progress which makes diversity, not growth, its central tenet.

Published by Spinifex Press, PO Box 212, North Melbourne, VIC 3051. Ph 03 329 6088, fax 03 329 9238. Available from all good bookshops, \$29.95.

Financial Liability for Contaminated Land

In an Editorial in the Australian Journal of Public Health 1993 Chloë gives her usual brilliant overview of lead pollution and makes the following important point:

It is difficult to achieve a carefully coordinated program of decontamination in

the face of many unresolved issues (addressed in a recent ANZECC discussion paper, available from NSW Environment Protection Authority) including financial liability for contaminated land and the uncertain responsibilities of different spheres of government. (ANZECC 1993)

Petrol Sniffing - Lead Kills

Local Strategies Needed to Counter Petrol Sniffing



*News Release from AMA
Contact Dr John Dunne (09) 224 2593 or
Dr Ross Goodheart Phone (018) 905 696.*

Petrol sniffing is an important cause of sickness and death in some rural Aboriginal communities, according to a research article in the Medical Journal of Australia (MJA Vol 160, 21 Feb 1994, pp 178-181).

The authors, neurologists Dr Ross Goodheart and Dr John Dunne of the Royal Perth Hospital, said that petrol sniffing can cause death or irreversible encephalopathy and, despite treatment, those severely affected have a poor prognosis.

The article follows a study of 29 admissions from 25 patients to Perth teaching hospitals between 1984 and 1991 where intentional petrol sniffing was diagnosed.

Of the 25 patients, 22 were male and three female. Ages ranged from five to 27. Twenty were Australian Aborigines, 18 of whom were chronic petrol sniffers and 17 of whom had been transferred from the Eastern Goldfields and Western Desert regions of Western Australia (WA).

Of the chronic sniffers, a high prevalence of seizures and an alarmingly high case fatality ratio - eight of 20 - was found. Eighteen of the 20 patients were treated with specific agents to reduce the lead load, but the results were "extremely disappointing".

While the short term effects of petrol inhalation were the likely result of several constituents of petrol, the long term effects were currently considered to be largely due to organic lead poisoning.

Ten to 15 breaths were sufficient to produce intoxication for three to six hours. Absorption of petrol components through the lungs was rapid and symptoms became evident within three to five minutes.

An initial euphoria was experienced which may be accompanied by hallucinations, delusions, nausea and vomiting and after prolonged inhalation there may be delirium, loss of consciousness and coma and sudden death may occur.

The authors said that primary care of petrol sniffers posed many practical problems as most were from remote areas where a solitary health nurse was in attendance.

The replacement of leaded with unleaded petrol may reduce the morbidity associated with petrol sniffing but it may be some time before leaded petrol was unavailable in remote areas of WA, and the contents of other highly toxic ingredients of petrol, leaded and unleaded, should not be underestimated.

While primary prevention strategies had so far had limited success, the poor prognosis of those severely affected, even with treatment, further emphasised the need for locally based strategies for prevention. The researchers reported "a highly significant association between the mean admission blood lead level and survival" (see graph).

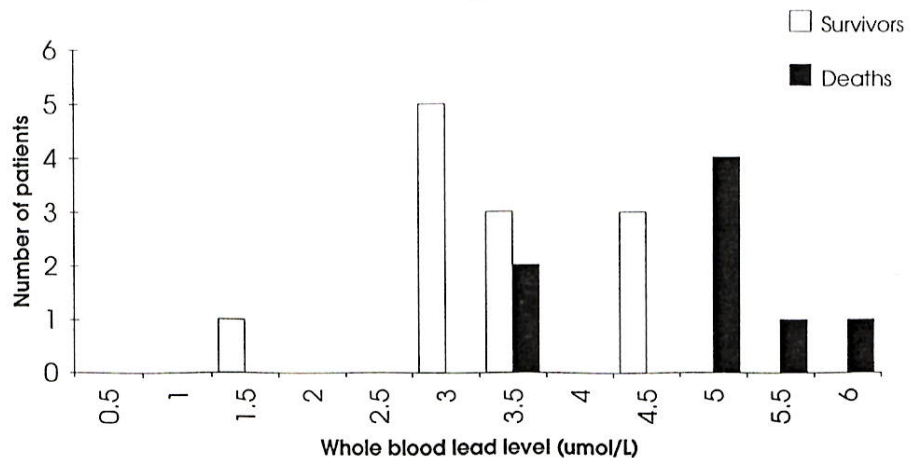
"For the survivors, length of acute admission averaged 33 days, but was as long as 147 days. Ataxia and dementia were common at the time of discharge with only one patient being functionally independent."

[The goal for all Australians is to have a blood lead level below 0.48µmol/L (micromoles per litre) which converts to 10µg/dL (micrograms per decilitre).] ♣

Whole blood lead levels in chronic petrol sniffers on admission to hospital

Conversion table

µmol/L	µg/dL
0.5	10.35
1	20.7
1.5	31.05
2	41.4
3	62.1
3.5	72.45
4	82.8
4.5	93.15
5	103.5
5.5	113.85
6	124.2



History of Lead

by Christopher Winder

This is the second of a series of articles by Dr. Winder on the history of lead. Reprinted with permission, from his book "The Developmental Neurotoxicity of Lead" MTP Press 1984.

The Industrial Revolution

The huge increase in demand for lead caused by the Industrial Revolution brought about the problem of industrial disease, of which the most widespread was lead poisoning (Legge and Goadby, 1912). Women and children were employed indiscriminately in all lead processes, including the highly dangerous jobs of pottery glazing, smelting of lead ores and manufacture of lead compounds, particularly white lead (Hunter, 1975). In 1883, the first act of Parliament directed against a specific occupational disease, the Factories (Prevention of Lead Poisoning) Act, was passed. This required lead factories to conform to prescribed standards. After 1900, intensive studies of industrial hygiene in the lead trades were carried out by such pioneers as Oliver, Legge and Goadby in Britain, Meillere in France and Hamilton in the USA. As a result, a large body of legislation was passed to safeguard workers and to compensate them for their disabilities.

In Great Britain, the work of the first Medical Inspector of the Factories Inspectorate, Dr T. M. Legge actively investigated the question of lead poisoning from 1892 onwards, with the result that notification was enjoined by section 29 of the Factory and Workshop Act (1895), which consequently became section 73 of the Act of 1901. This enactment requires every medical practitioner attending on or called to see a patient believed to be suffering from lead poisoning contracted in a factory or workshop, to notify the case forthwith to the Chief Inspector of Factories at the Home Office. A similar obligation was imposed on the owner or manager of a factory or workshop to send written notice of such cases to the local Factories Inspector. Following this, a gratifying fall occurred in the incidence of this disease. Lead encephalopathy virtually disappeared from industry, and it was unusual to find cases of severe colic or extensive palsy. The cases that did arise were few and mild (Legge & Goadby, 1912). This decline is especially marked when it is remembered that during this period consumption of lead increased steadily.

Present day lead pollution

In the last 60 years, significant numbers of cases of lead poisoning have come from the extensive use of alkylated lead compounds tetramethyl and tetraethyl lead (TML and TEL). From 1923, when TEL was first added to petrol as an antiknock agent, cases of lead poisoning associated with its use began to appear, causing considerable alarm. The cleaning of storage tanks and indiscriminate handling of TEL by workers and chemists caused numbers of deaths, and its manufacture was prohibited in 1925, pending investigation by the US Public Health Service. Awareness of the toxicity of TML and TEL, their rapid absorption across skin and lungs and the establishment of more stringent safety precautions in the

manufacturing industries allowed their reintroduction in 1926. Organo-lead compounds were introduced into Britain against opposition during the 1930s when it was established that their addition to petrol was not a serious health hazard (Kehoe *et al.*, 1934).

In summary, lead poisoning as a recognizable clinical condition has become rare in recent times, due to the introduction of



Graphic by Alexander Claud, aged 9

stringent safety precautions in industry and restrictions elsewhere. It is salutary that the number of deaths attributable to this cause has fallen to a very low figure during the course of this century. However, the use of lead is still increasing and there has been much speculation in recent years as to whether the massive release of lead into the environment consequent to its addition to petrol is having an adverse effect on public health.



Lead in Literature

The Little Red Hen

*Reprinted with kind permission from
The HELEN OXENBURY Nursery Story Book
Published by William Heinemann Ltd, London, 1988*

You may be asking why our Lead in Literature section features "The Little Red Hen". You only have to read the second paragraph to see the connection between the obvious lead sources in the young fox's environment and his behaviour. Read it aloud to your children - it's a well-told moral tale.

Once there was a pretty, neat little house. Inside it lived a Cock, a Mouse and a Little Red Hen.

On another hill, not far away, was a very different little house. It had a door that wouldn't shut, windows that were dirty and broken, and the paint was peeling off. In this house lived a bad old mother Fox and her fierce young son.

One morning the mother Fox said, "On the hill over there you can see the house where the Cock, the Mouse and the Little Red Hen live. You and I haven't had very much to eat for a long time, and everyone in that house is very well fed and Plump. They would make us a delicious dinner!"

The fierce young Fox was very hungry, so he got up at once and said, "I'll just find a sack. If you will get the big pot boiling, I'll go to that house on the hill and we'll have that Cock, that Mouse and that Little Red Hen for our dinner!"

Now on the very same morning the Little Red Hen got up early, as she always did, and went downstairs to get the breakfast. The Cock and the Mouse, who were lazy, did not come downstairs for some time.

"Who will get some sticks to light the fire?" asked the Little Red Hen.

"I won't," said the Cock.

"I won't," said the Mouse.

"Then I'll have to do it myself," said the Little Red Hen. So off she ran to get the sticks.

When she had the fire burning, she said, "Who will go and get the kettle filled with water from the spring?"

"I won't," said the Cock again.

"I won't," said the Mouse again.

"Then I'll have to do it myself," said the Little Red Hen, and off she ran to fill the kettle.

While they were waiting for their breakfast, the Cock and the Mouse curled up in comfortable armchairs. Soon they were asleep again.

It was just at this time that the fierce young Fox came up the hill with his sack and peeped in at the

window. He stepped back and knocked loudly at the door.

"Who can that be?" said the Mouse, half opening his eyes.

"Go and find out, if you want to know," said the Cock crossly.

"Perhaps it's the postman," said the Mouse to himself. So, without waiting to ask who it was, he lifted the latch and opened the door.

In rushed the big fierce Fox!

"Cock-a-doodle-do!" screamed the Cock as he jumped onto the back of the armchair.

"Oh! Oh! Oh!" squeaked the Mouse as he tried to run up the chimney.

But the Fox only laughed. He grabbed the Mouse by the tail and popped him into the sack. Then he caught the Cock and pushed him in the sack too.

Just at that moment, in came the Little Red Hen, carrying the heavy kettle of water from the spring. Before she knew what was happening, the Fox quickly snatched her up and put her into the sack with the others. Then he tied a string tightly around the opening. And, with the sack over his shoulder, he set off down the hill.

The Cock, the Mouse and the Little Red Hen were bumped together uncomfortably inside the sack.

The Cock said, "Oh, I wish I hadn't been so cross!" And the Mouse said, "Oh, I wish I hadn't been so lazy!"

But the Little Red Hen said, "It's never too late to try again."

As the Fox trudged along with his heavy load, the sun grew very hot. Soon, he put the sack on the ground and sat down to rest. Before long he was fast asleep. Then, "Gr -- umph . . . gr -- mph," he began to snore. The noise was so loud that the Little Red Hen could hear him through the sack. At once she took her scissors out of her apron pocket and cut a neat hole in the sack. Then out jumped: first the Mouse, the Cock, and last, the Little Red Hen.

"Quick! Quick!" she whispered. "Who will come and help me get some stones?"

"I will," said the Cock.

"And I will," said the Mouse.

"Good," said the Little Red Hen.

Off they went together and each one brought back as big a rock as he could carry and put it into the sack. Then the Little Red Hen, who had a needle and thread in her pocket too, sewed up the hole very neatly.

When she had finished, the Little Red Hen, the Cock and the Mouse ran off home as fast as they could go. Once inside, they bolted the door and then helped each other to get the best breakfast they had ever had!

After some time, the Fox woke up. He lifted the sack onto his back and went slowly up the hill to his house.

He called out, "Mother! Guess what I've got in my sack!"

"Is it - can it be - the Little Red Hen?"

"It is - and the Cock - and the Mouse as well. They're very plump and heavy so they'll make us a splendid dinner."

His mother had the water all ready, boiling furiously in a pot over the fire. The Fox undid the string and emptied the sack straight into the pot.

Splash! Splash! Splash! In went the three heavy rocks and out came the boiling hot water, all over the fierce young Fox and his bad old mother. Oh, how sore and burned and angry they were!

Never again did those wicked foxes trouble the Cock, the Mouse and the Little Red Hen, who always kept their door locked, and lived happily ever after. ♣



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