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ENVIRONMENT DESIGN GUIDE

LEAD HAZARDS IN CONSTRUCTION — A DESIGNER'S GUIDE

Nigel Bell

This note, PRO 20, originally published in November 1998, was reviewed by Nigel Bell in September 2004. This summary page includes recent updates to the topic since publication.

SUMMARY OF

ACTIONS TOWARDS SUSTAINABLE OUTCOMES

Environmental Issues/Principal Impacts

- The health dangers of lead have been known for thousands of years, yet its use has continued to grow. It was in 1897 that the *Australasian Medical Gazette* first described lead poisoning in children. A 1927-28 Royal Commission found that in spite of the illness and deaths attributable to lead mining, smelting and contact with lead products, lead was too useful a substance to restrict or ban (!).
- Lead is commonly found in metallic sheet (flashings); pre-1970 paint (up to 50 per cent lead content by weight); in PVC as a heat and light stabiliser; lead-contaminated dust (roof space, underfloor); lead fumes from heating/melting/welding materials with lead content (e.g. painted steel); drinking water (pre-1930s lead pipes and/or leaching from lead-solder in copper pipes or water tanks). Lead in petrol has been phased out since 2002.
- Inner-city and industrial sites are at greatest risk from point-sources (e.g. factories) and building renovations, where a century or more of accumulated lead from paints, plumbing, glazed tiles, dust, traffic fumes, etc. may be released and affect the next generation. Most inner-city sites *will* be contaminated, even though they may not be listed as such on government registers.
- Occupational lead exposures occur for those involved in demolition, renovation, maintenance and construction – and those that live nearby, supervise, or even visit a contaminated property.
- Take-home lead exposures occur from lead dust on clothes, skin, hair, boots, tools, equipment and vehicles.
- Lead poisoning is cumulative and occurs from inhaling (dust, fumes), ingestion (eating, smoking), skin absorption (some lubricants, dust on sweaty skin) and in-utero absorption as blood-lead levels are passed on to the baby pre-birth. Foetuses, young children and people who work with lead have greatest long-term health risk.

Basic Strategies

- Accept that a professional 'duty of care' exists to ensure lead (and other) hazardous substances are not released through construction to harm workers or occupants – especially in relation to construction pre-1970.
- Apply the occupational health and safety hierarchy of controls: elimination, substitution, isolation, control measures, safe work practices, administrative control procedures, personal protective equipment.
- Engage a professional dust removalist (Australian Dust Removalists Association) to remove contaminated dust prior to *every* inner-city renovation, plus a lead-trained member of the Master Painters Association if paint is peeling or chalking, for the benefit of your client, workers, occupants and neighbours. If in doubt, get paint/dust samples tested (inexpensively) with a spot test kit or at a laboratory.

Cutting EDGe Strategies

- Specify lead-free or lead-reduced materials and products.
- Clarify through construction contract and specification, remediation responsibilities and costs.
- Identify persons and procedures responsible for site 'lead-safe' work practices within the contract documents.
- Take personal precautions (personal protective clothing and equipment) when visiting construction sites.

Synergies and References

- http://www.epa.nsw.gov.au/leadsafe
- http://www.deh.gov.au/atmosphere/airquality/lead/
- http://www.lead.org.au Lead Advisory Service Australia (LASA), 1800 626 086, is a community-based organisation with much useful web-based information developed over 15 years.
- http://www.adra.com.au Australian Dust Removalists Association Inc.
- http://www.ceilingsuckers.com.au for useful outline of problems and remediation
- *BDP Environment Guide*: PRO 4, PRO 5, PRO 6

LEAD HAZARDS IN CONSTRUCTION – A designer's guide

Nigel Bell

Lead is a health hazard. A useful material for thousands of years is now recognised as a slow cumulative poison that is affecting ever-greater proportions of the populace – including workers within the building, construction and demolition industry. But architects, engineers, building occupants and the public near the construction site are at risk too. We are all exposed to lead as we breathe in lead fumes, ingest lead dust and absorb organic lead compounds through the skin. With occupational health and safety responsibilities widening to include those commissioning, designing and documenting construction work, every practitioner needs to be aware of the importance of managing occupational lead hazards.

1.0 INTRODUCTION

The harmful effects of lead upon the body have been known for thousands of years ("lead makes the mind give way", Dioscorides, 200 BC) yet only recently have moves been made towards minimising communities exposure to lead. Sheet lead has been used in plumbing and roofing from Roman times; ground lead has been the basis for paints for 150 years; lead 'rope' has been used as pipe lagging; cast lead is still used as fishing sinkers, shot and yacht keels. The malleability, corrosion resistance, low melting point, low cost and wide availability of lead has ensured its continuing use, in spite of the hazards it can pose. Lead materials remain in widespread use.

Lead mining, smelting and manufacturing processes have always been regarded as dirty and polluting of air, soil and water. Yet the extent and location of manufacture involving lead products and processes is not documented, nor the legacy of contaminated sites left behind. Identifying, classifying and remediating contaminated sites (of all kinds) has become a major priority. Too commonly we may be called upon to demolish and re-build upon un-recorded, lead-contaminated sites. Perhaps a bigger risk again is the failure to recognise that virtually *every* older (pre-1970) building could have lead captured in the roof space, walls, carpets and underfloor, where it is liberated at time of disturbance. This occurrence may affect architects, engineers, building inspectors and others making inspections without appropriate precautions.

Information is also limited on the extent of lead used in a range of every day products including consumer goods, building products, automotive batteries, anti-oxidants in asphalt, leaded glass, TV and personal computers, radiation and sound shielding, electrical cabling, solders and the like. Lead may be released during maintenance, repair, recycling or disposal, depending upon the processes used and the safety regime followed (or otherwise).

This century has seen organic lead additives added to petrol and lubricants. This has resulted in the widespread distribution of lead into the environment (air, water, soil). After a measurable decrease in airborne lead following the introduction of unleaded petrol across Australia in 1986 (strictly, *less* leaded), rates have risen again with increasing vehicle usage. Lead fumes, dust and particles are now widespread throughout urban areas.

Lead does not bio-degrade, it only changes form. It accumulates. It is now found in the air, soil, water, dust, sediments and even foods – and it will be found on virtually every construction site.

2.0 LEAD RESPONSIBILITIES

With safety concerns and litigation in mind, manufacturers are now producing lead-reduced/ lead-free products. These range from 'duragal' (galvanised) products ('99.97% lead free'); lead-free solders; reduced lead paints (maximum 0.1%) through to lead-free electrical PVC cabling (Pirelli 'Eco-line'). Safer lead products are increasingly available (e.g. 'Acrylead' – polymer coated lead sheet). Now lead safe work practices are coming under closer scrutiny by unions, industry, government, plus those adversely affected. These changes impact not just upon those on the construction site, but flow through to architects, engineers and other consultants who have a 'duty of care'.

2.1 Duty of care

The professional 'duty of care' includes to **not exposing anyone** to a hazard defined as 'something which can injure someone or harm their health'. Lead in all its forms *is* harmful. A Cautionary Note from RAIA Practice Services, AN14.01.612 Occupational health and safety legislation, July 1998, states that:

> *'Architects should be aware that they may be held liable if their construction documents*

specify unsafe materials (for example products containing formaldehyde), require unsafe construction procedures, practises or techniques, or if the design itself could be regarded as unsafe. It is of increasing concern that an architect could be found negligent because a design could not be constructed, repaired, serviced or maintained in a safe way.'

Workplace procedures on construction sites commonly release lead dust and particles that are hazardous to workers. Without adequate controls, the hazard may extend to adjoining properties and remain on, around, in or under the building. The hazards remain for those who repair, service or maintain the building or structure over the years and decades – and for the building occupants. Arguably, building design and specification, as well as construction that caused or precipitated these hazards, could be seen as inadequate, or even negligent. Professional risks and liability over lead safe practises have grown to include architects and others.

2.2 Occupational health and safety

The National Occupational Health and Safety Commission (NOHSC) has produced a *National Standard for the Control of Inorganic Lead at Work* [NOHSC:1012 (1994)] and a *National Code of Practice for the Control and Safe Use of Inorganic Lead at Work* [NOHSC:2015 (1994)]. These define a 'lead risk job' as a work activity in which blood lead levels can reasonably be expected to rise beyond a specified level and sets out employer responsibilities. Not all states have adopted the National Standard.

For example, NSW WorkCover currently has no blood lead standard for industry compliance. There are also disparities within regulatory cover. The *Factories, Industries and Shops Act, 1982* requires the screening of workers for lead exposure only in the workplaces covered by that Act. This excludes most of the construction and building trades. These industries must rely upon the *Occupational Health and Safety (Hazardous Substances) Regulation* and *Code of Practice, 1995*. These govern a range of hazard control measures for specified hazardous substances. But control measures are not always used, even when provided. Architects, suppliers, tradesmen, union officials, in fact everyone who enters a work site, have a right to be protected under OHS legislation. There is serious doubt at present that the lead hazards are recognised, let alone controlled, and therefore, that the OHS responsibility is actually met.

3.0 LEAD IN CONSTRUCTION

The building industry commonly uses materials and products containing lead. It engages in processes that create and liberate lead dust, particles and fumes. The sites we work upon may be lead contaminated, whilst we all are subject to airborne lead (petrol) emissions and may inadvertently take lead home or use it in hobbies.

3.1 Lead products and materials

Metallic sheet lead

Lead sheet has been used across Australia for older plumbing, drainage, waterproof trays, flashings, very occasionally roofing, and commonly, damp proof coursing. We are all likely to have to deal with it at some stage – and workers have to handle it. Those involved in heritage work especially, continue to encounter and use sheet lead. As sheet lead surfaces oxidise and break down to a fine lead dust over time, workers should always wear gloves and wash hands thoroughly after handling it.

Paints

Lead was and is extensively used in paints- Specialised finishes (e.g. aerospace, automotiv and marine paints) still contain high lead levels Industrial paints as used on a wide variety of stee structures, buildings, infrastructure, machinery an equipment contain high lead levels. When th lead content equals or exceeds 1.0 percent industrial paints are now required to display safet warnings. However, labels do not always contain adequate warnings, especially for imported paints. Sometimes, industrial lead paints have been used in residential work for a cheap paint job. When any of these painted materials are sanded, abraded, burnt, cut or welded, lead fumes and dust are created.

Lead was a major ingredient in commercial and residential paint from the 1800's to 1970. It was used as a base, a drying agent, a colouring pigment, and to protect iron and steel from rust. Lead content had been as high as 50% by dry weight. It was first regulated and reduced (1971) to 1% lead by dry weight, thence 0.25% (1991) and again 0.1% maximum (December 1997). Therefore, most Australian buildings (commercial and residential) built before 1970 most probably contain paints with high lead levels, both internally and externally. Any past or current work to older buildings involving disturbing the lower levels of paint is now regarded as unsafe unless strict precautions are taken.

New Australian Standards have been formulated to provide guidance on safe management of lead paint and a Painting Contractors Certification Program (PCCP) has been introduced to focus on contractors' ability to handle lead paints (Grade 5). AS 4361 *Guide to lead paint management, Part 1: Industrial applications (1995)* has been joined by *Part 2: Residential and commercial buildings (1998)*. There is litigation on cases where lead safe painting practises were not followed and contamination ensued.

PVC

Lead is used as a heat and light stabiliser in PVC plastic. National media attention was drawn to this in January 1997 when Worksafe Australia (the national OHS body) reported on an electrician who became severely lead poisoned from chewing PVC coated electrical cable (1.5m per day) in his attempt to give up smoking. Other plastic products from extrusions, tubing, conduits, coated wires, mouldings, cladding profiles, flooring sheeting and window frames are having their lead content reviewed through a new Code of Practice. Imported products such as mini-blinds and wall tiles have fewer controls.

The lead safe issues are:

- handling the material without personal protective equipment;
- inadequate personal hygiene; disposal of off-cuts; recycling of scrap; and
- burning of the material.

In each case, lead may be liberated into circulation. Zinc is now replacing lead in some PVC.

Lead glazed tiles

Ceramic products with lead-based glazes, fired at low temperatures are hazardous where they can leach into water or food. Such products include (imported, low cost) vitreous china baths and basins, tiles and the like. Leaded glass products can also leach lead when in contact with mildly acidic substances (e.g. lead crystal decanters, PC/TV monitor glass where lead content reduces radiation, some heat-resistant window glass).

Table 1. Sources/products of lead in construction

Source: LRC:1994

Industrial paints **Commercial paints** **Residential paints** **Marine coatings, automotive acrylic lacquer**	Protective coatings have had up to 80% lead content Special paints (e.g. sign writing, road marking etc) have 10% - 59% lead Pre-1971 buildings had high lead content; from 1971 reduced to 1%; from 1991 reduced to 0.25%; and from December 1997 only 0.1% permitted Paints and primers range from 5% - 40% lead
Building products	Porcelain baths and basins, roofing,
Cable sheathing	Electronic and telephone cables contain lead
Brass fittings	Brass (alloy of copper, tin and lead) can leach lead when worn
Flashings and DPC	Sheet lead is common in pre-1970's buildings, especially heritage work
Sound proofing	Sheet lead linings, or as part of suspended scrim within walls
Radiation shielding	X-ray protection, or as part of suspended scrim within walls
Electrical solders	Lead-free solders are now available
Lead solders	Older solders contained up to 70% lead, most 35% or more
Water reticulation systems	Lead pipes (heritage), lead-soldered copper pipes, older rainwater tanks
PVC	Lead is used as a heat stabiliser and pigment

3.2 Lead-contaminated dust

Many industrial, commercial and residential buildings contain lead-contaminated dust, built up over many years from sources such as:

- industrial pollution;
- exhaust emissions;
- previous unsafe maintenance, renovations and demolitions;
- pollution from wood-burning or coal-burning appliances.

Dust will build up on any surface where it can settle and remain undisturbed, such as building cavities, ledges, roofs, under-floor, carpet, behind fittings and under appliances or machinery. Particle size may be invisible but respirable into the body. Building work on older buildings is therefore inherently hazardous through liberating dust that usually includes lead. This affects not only workers on site but those inspecting buildings at close quarters. Dust need to be removed before, during and after work with appropriate equipment and hazard controls.

3.3 Lead fumes

Many construction activities generate lead fumes. Fumes created by heating lead alloys, paint, plastics, solder, welding rods or other materials, contain very fine particles of lead which, if breathed in, penetrate deep into the lungs. Power and pneumatic tools used to sand, cut or grind lead painted surfaces can also create fumes as well as dust. There is considerable medical evidence of the risks from lead fumes faced by demolishers, metalworkers, welders, steel fabricators, painters and many others (particularly when working in confined spaces). The particles may also collect to contaminate buildings, soil and water. Avoidance is the best policy, followed by a hierarchy of controls – see Table 3 on page 6.

3.4 Lead in cigarettes

Even cigarettes have been shown to contain traces of lead. Smokers are generally at greater risk from occupational sources of lead than non-smokers. Apart from inhaling (nicotine, tar and lead) fumes directly into the body, particles are easily taken in

through the mouth from handling cigarettes with dusty, lead-contaminated hands. Lead dust landing on cigarettes will be volatised (lead has a low melting point) and inhaled. Workplace smoking without first washing hands will increase chances of excessive lead exposure.

3.5 Petrol and lubricants

Organic lead compounds have been added to petrol and lubricants since the 1920s to enhance octane ratings, lubricate valves and as an 'anti-knock' agent. These compounds can be inhaled and absorbed through the skin. Exhaust fumes from leaded petrol can also be hazardous, especially for people who work in confined spaces with engines running or who live near main roads. The lead hazard extends to those who subsequently undertake work on those buildings, releasing the particles back into the environment.

4.0 LEAD PATHWAYS

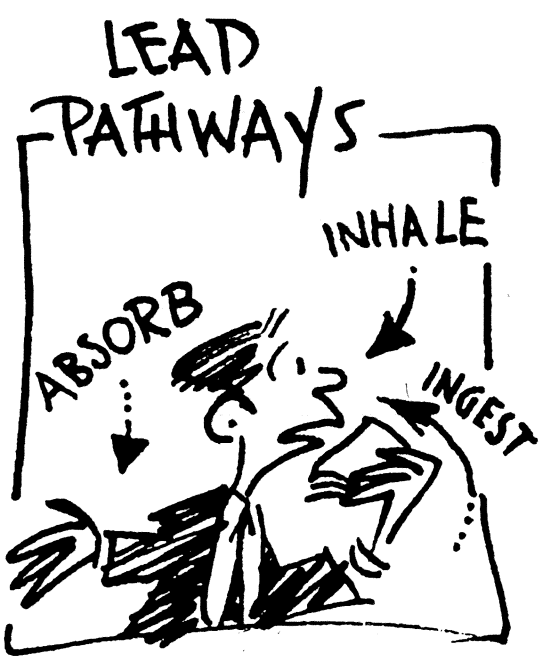
4.1 Pathways into the body

Inhalation into the lungs is the primary source of occupational lead exposure. Lead fume and dust particles inhaled deep into the lungs can be transferred directly into the blood stream, posing an immediate as well as longer-term threat. All construction and demolition workers, supervisors, site visitors and even neighbours can easily be exposed to significant risk through common building practises.

Ingestion through the mouth (eating and swallowing) is the next most common route of exposure, be it from eating, drinking, smoking, or even nail-biting with lead-contaminated hands or in lead-contaminated work environments. Appropriate cleaning and maintenance procedures plus good personal hygiene and protective equipment are essential to minimise lead hazards.

Absorption of organic lead through the skin occurs with the use of petrol and lubricants, and some chemical and manufacturing processes. Recent research by CSIRO suggests that very fine particles of lead may also be able to pass through the skin.

In-utero absorption is significant to pregnant women and the unborn, as lead is transferred from mother to foetus, as well as through breast milk to infants. This may pose a considerable threat to female workers of reproductive age.



4.2 Storage in the body

When lead enters the body and is absorbed, it passes quickly into the blood stream. It has been calculated that 1% remains circulating in the blood, 4% goes to brain, kidney and livers, whilst the vast majority (95%) goes to bone. Here it may be stored for decades, accumulating with each further exposure. This stored lead can be recirculated when calcium (and accompanying lead) is released from bone tissue, either during pregnancy, breastfeeding, chronic illness, immobilisation or with increasing age. Thus, it remains a source of long term internal exposure and health consequences.

4.3 Pathways out of the body

The body tries to eliminate as much lead as possible, but the means are limited to faeces, urine, sweat and hair and fingernail growth. What the body cannot excrete will be absorbed and accumulate in the body. If exposure continues and excretion remains limited, the 'body burden' of lead increases.

5.0 HEALTH EFFECTS OF LEAD

Lead is a cumulative poison. When inhaled, ingested or absorbed through the skin, lead is toxic to virtually every human organ. From a single exposure, lead is quickly distributed and stored around the body, where it can remain. Health consequences depend upon the length and severity of exposure. Generally, the greater the exposure, the greater the impact on health. Young children are affected at lower exposure levels than adults through eating dirt, dust and paint flakes. The consequences may include lowered IQ and behavioural problems.

5.1 Types of exposure

Chronic exposure is the repeated exposure to lead hazards that results in an elevated blood lead level, lead storage in the body, and possible long term health effects.

Acute exposure involves a high dose of lead that may result in a rapid increase in blood lead levels. Dangerously high levels may be quickly reached – especially through intake of fumes. If no additional exposure occurs, the level of lead in the

body will dissipate over time though long term health effects may result from acute exposure, depending upon the level.

5.2 Health effects

Lead is circulated around the body through the blood. Lead that is not excreted accumulates in teeth and bone where it may remain for decades. Depending upon gender, age, diet, further exposures, etc, it continues to affect the body. Lead harms many body systems, impairs biochemical processes and affects vital organs with cumulative impacts, some of which are non-reversible.

5.3 Signs and symptoms

Early symptoms of excessive lead exposure includes a fall off in physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles and digestive symptoms such as stomach pains and decreased appetite. Further effects include forgetfulness, alienation, decreased eye-hand coordination and impaired intellectual functioning. Such symptoms are so non-specific they are often not linked to lead exposures unless the person is recognised as a 'lead worker'. Higher blood lead levels again give elevated blood pressure, tremor, kidney damage, loss of libido and male infertility. Severe exposure ('lead poisoning') can cause permanent memory loss, nerve problems, colic, fits, paralysis and less commonly today, death.

5.4 Lead testing

Blood tests are used to test recent (3 - 6 week) lead exposure. These are available on request from a medical practictioner. Depending upon test results, actions to reduce exposure may include:

- education on minimising lead exposures;
- monitoring of blood lead levels;
- removal from the source of exposure;
- notifications to WorkCover if levels are over set limits;
- for medical emergencies, chelation therapy.

Chelation is regarded as a medical emergency requiring specialised hospital treatment. This involves introducing chemical agents into the body, removing lead from the bones and increasing excretion. The treatment is not pleasant and has known side effects, ensuring that it is saved for severe cases.

6.0 PEOPLE AT RISK

We are all at risk, to varying degrees, due to the widespread historical and current uses of lead.

6.1 Occupational exposures

Construction sites

All those involved in demolition, renovation, maintenance and construction are at risk, but

Table 2. Construction practices which may pose lead hazards

Source: Lead Reference Centre: 1994

Creating lead dust	Drilling, chiseling, cutting, sawing through lead containing or painted materials Preparing lead-painted surfaces without dust-limiting equipment Using a heat gun to burn off paint Chasing pipes/cables into (older) painted walls
Installing/removing materials containing lead	Demolishing or removing components in an older building Removing old water pipes
Disturbing, spreading and transporting lead dust	Demolishing structures and components that contain lead Opening up walls/ceilings/floor cavities containing lead dust Entering and moving around in ceiling and/or underfloor areas Excavation around or under older buildings Failure to contain dust within work areas Failure to prevent dust creation whilst preparing surfaces Moving or removing old carpets and rugs
Disposing of hazardous materials	Burning wastes containing lead Transporting and disposing of lead based materials to other than hazardous waste depot Failure to clean up work areas with HEPA vacuum cleaner
Ingesting/inhaling lead	Eating, drinking or smoking in lead contaminated environments Not washing hands and face before eating, drinking or smoking Failure to change clothes and clean up properly before going home Not using appropriate personal protective equipment

especially:

- painters and decorators
- electricians
- builders (including bricklayers)
- carpenters and joiners
- other construction and demolition workers
- heritage specialists
- plumbers
- other trades including stonemasons
- ceramic tilers
- structural steel workers, boilermakers and welders.

But simple everyday tasks expose everyone to lead risk - a worker drilling through old layers of paint; carpenters reusing old painted timbers; an excavator digging in contaminated soils; carpet layers lifting old carpet; glaziers raking out painted putty; plumbers replacing old pipes; renovators burning off paints - see Table 2. All sites tend to have lead hazards. Architects and others are also exposed to risk.

Take-home lead exposures

Workers can carry hazardous substances home from work on their clothes, bodies, tools and vehicles. Studies have shown that children of lead-exposed construction workers were *six* times more likely to have elevated blood lead levels. Studies have also shown the need to wash work clothes separately (using a phosphate detergent) and use a high efficiency particulate air (HEPA) vacuum cleaner. Ordinary vacuum cleaners re-circulate lead particles, making them easily ingested.

Contaminated land/buildings

Contamination of the environment occurs from certain industries discharging lead emissions into air, water, soils and sediments. Many of the worst sites are being identified, assessed and remediated at considerable cost. But lead contamination also occurs from solid waste, hazardous waste, sewerage sludge, industrial wastewater discharges, industrial excavation and fill. Illegal dumping and the excavation and reuse of contaminated fill continues to be a problem. Prudence suggests that architects and others should be commissioning more widespread site investigation, assessment, and requiring evidence of adequate remediation.

Deteriorated lead paints (and leaded petrol emissions) have created high lead levels in soils around painted walls in older (pre 1970) buildings. Contaminated soils are easily tracked inside buildings. For example, a survey of inner Sydney (see references in LRC:1994) showed that 50.6% of children (the most vulnerable group to permanent damage) had *higher* blood lead levels than recommended.

6.2 Other exposures

Some hobbies contribute to lead exposures. These include handling lead shot or lead sinkers, shooting, lead-lighting, pottery, china-painting, furniture restoration, electronics and some car or boat repair and restoration jobs.

Incineration of refuse containing lead (even bodies from non-scrubber crematorium stacks!) emits fumes and particles which may be absorbed. Water from lead-soldered water tanks, pipes or run-off from lead painted roofs may all be lead contaminated. A considerable number of consumer products contain lead – especially those imported. Even some jewellery, cosmetics, hair dyes and traditional medicines and remedies contain lead.

7.0 MINIMISING LEAD HAZARDS

The move to *eliminate* leaded petrol has prevented thousands of tonnes of lead per annum entering the atmosphere. Product manufacturers are developing *substitutes* for lead. With greater awareness in the community, consumers are demanding contractors use lead-safe work practises and work sites are becoming safer. Increasingly, workers and others are required to be *isolated* from lead and other hazards. Stronger OHS regulations and site safety requirements now adopt dust and fume *control measures*. *Safer work practices* for lead usage are being sought throughout industry, including the construction and demolition industry. *Administrative controls* to regulate and reduce workplace exposure to lead are tightening. The provision of *personal protective equipment* is becoming mandated, and the use encouraged.

Table 3. Control measures and strategies

Source: [NOHSC:1012 (1994)]

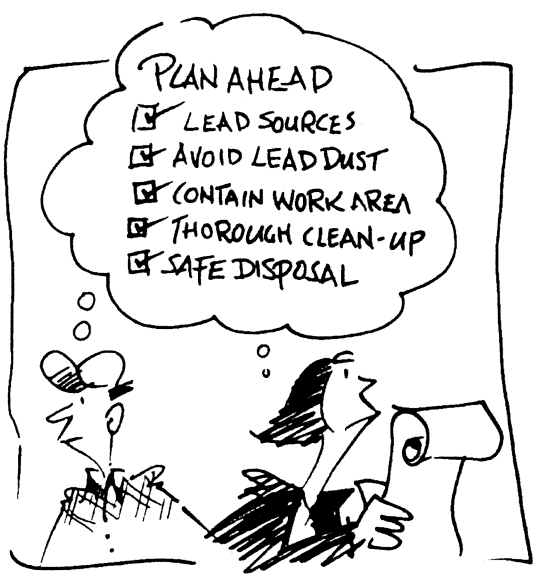
Elimination Substitution	Use of alternative materials or products
Isolation	Plant or materials enclosed or kept at a distance from workers
Engineering control measures	Minimise creation or spread of lead dust or fumes
Safe work practises	Use wet techniques where possible, cleaning, hygiene
Administrative control procedures	Job rotation, work organisation, training, induction programs
Personal protective equipment (PPE)	Use, maintenance and training in the use of specified Australian Standard approved PPE

8.0 CONCLUSIONS

Lead safe work practises require a thorough and consistent approach to the hazards and the risks.

No longer is this purely a matter for traditional 'lead-workers', nor even builders and contractors – it now affects us all personally and professionally.

- Be informed on lead hazards and safer work practises (to protect self and others).
- Implement company policies requiring lead safe work practises for your projects.
- Specify lead-free or lead-reduced materials and products.
- Consider testing soils and dust for contaminates in advance of site activities for all inner-urban and (former) industrial sites.
- Clarify through specification and contract remediation responsibilities and costs.
- Identify persons and procedures responsible for site lead safe work practises within the contract documents.
- Take personal precautions (personal protective clothing and equipment) when visiting sites.
- Don't take lead dust and dirt back to the office or your home.



ACKNOWLEDGEMENTS

The assistance of Ann Carroll and Richard Birdsey from the Lead Reference Centre is acknowledged.

FURTHER INFORMATION

Advice on specific lead safe work practises is beyond the scope of this Note, but is available from the sources noted below.

The (NSW) Environment Protection Authority (Lead Reference Centre) has published a range of fact sheets and booklets *Lead Safe: Renovators guide to the dangers of lead; Lead Safe: A guide to keeping your family safe from lead; Lead Safe: a guide for health care professionals;* and (forthcoming) a TAFE vocational training product *Lead Safe Work Pratices.* Materials can be obtained by phoning the NSW EPA's Info-line on 131 555 (NSW callers only).

Lead advice, contacts and links (Australian and international) can be obtained from the NSW LRC through the web on http://www.epa.nsw.gov.au/leadsafe

Worksafe Australia (National Occupational Health and Safety Commission) information can be accessed directly, or web contact made on http://www.worksafe.gov.au

Each state has its own OHS body with responsibilities including lead safety. For example, NSW WorkCover can be contacted on 131 050.

The former federal Environment Protection Agency (now Environment Australia) published *Lead Alert – Painting your Home?,* and *Lead Alert: Lead and Health* which is still available from some paint suppliers and hardware stores.

BIOGRAPHY

Nigel Bell, B.Sc (Arch), B.Arch (Hons) is principal of ECO Design Architects and ECO Design Consultants, specialising in ecologically sustainable design, research and education. A Churchill Fellowship holder, Nigel is a casual university and TAFE lecturer, whilst undertaking doctoral studies. He has recently completed *Lead Safe Work Practices* educational package for the Lead Reference Centre, administered by the NSW Environment Protection Authority.

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