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## **Treated Timber, Toxic Time-bomb: The Need for a Precautionary Approach to the Use of Copper Chrome Arsenate (CCA) as a Timber Preservative**

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# **Treated Timber, Ticking Time-bomb**



## **The Need for a Precautionary Approach to the Use of Copper Chrome Arsenate (CCA) as a Timber Preservative**

February 2005

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## IS ARSENIC-TREATED TIMBER A PROBLEM AT ALL?

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“In less than 2 weeks, an average 5 year old playing on a CCA-treated playset would exceed the lifetime cancer risk considered acceptable under [US] federal pesticide law”.

(Sharp and Walker, 2001: 2)

“I’ve worked with it every day for 25 years. I don’t worry about it. I mean, I don’t wash my hands before I eat my sandwich or anything”

(Carpenter (name unknown) of Jolly Jumbuk Playsets, *Pers. Comm.*, 8/11/04)

“If timber workers are advised to wear gloves when handling the timber, where are the gloves for the children playing on the play equipment or in the sandpit?”

(Loveridge, K., Croydon Conservation Society, *Pers. Comm.*, 7/11/04).

“The soft green colour of the timber [playsets] blends in to the natural garden and backyard settings.”

(Jolly Jumbuk, 2000).

“An excess risk of leukaemia amongst millwrights probably is associated with exposure to various components used in wood preservation”

(PineSolutions, 2000).

“[CCA] is not like asbestos or smoking, where there is a health risk...we don’t have the same line-up of problems associated with treated timber”.

(Cookson, L., CSIRO Forests and Forestry Products, *Pers. Comm.* 14/12/04).

“We’re failing if asbestos and CCA keep coming forward as problems arise 20 years after coming onto the market...There is a systemic failure for assessing chemical use in terms of environmental and health impacts”.

(Immig, J., APVMA Community Consultative Committee member, *Pers. Comm.*, 22/11/04).



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Photos are by Sharon Beder unless otherwise labelled.

## ABBREVIATIONS

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APVMA	Australian Pesticides and Veterinary Medicines Authority
CCA	Copper Chrome Arsenate
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	Department of Environment and Conservation
EPA	Environmental Protection Authority or Agency
EPR	Extended Producer Responsibility
FWPRDC	Forest and Wood Products Research and Development Corporation
LOSP	Liquid Organic Solvent Preservative
TPAA	Timber Preservers' Association Australia
µg	microgram, 1 thousandth of a milligram (mg)
L	litre

## EXECUTIVE SUMMARY

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Timber preserved with Copper Chrome Arsenate (CCA) is ubiquitous in Australia. Wood, such as radiata pine, is treated with CCA to protect it from insects, rot and fungus. CCA-treated timber is commonly used on telegraph poles, decking, fencing, landscaping, vineyard stakes, picnic tables and in playgrounds. However the arsenic in CCA leaches out of CCA-treated timber and arsenic is toxic and can cause cancer in the long-term. Sealants are only effective at reducing arsenic levels on the surface of the wood for about six months.

There is a growing body of scientific evidence that timber treated with CCA poses a danger to both humans and the environment. As a result, authorities around the world are imposing tighter restrictions on its manufacture, use and disposal. This report investigates a range of concerns and issues surrounding its manufacture, use and disposal.

Children who play on CCA-treated structures are particularly vulnerable because of their hand-to-mouth behaviour. Several overseas studies have shown that they are exposed to arsenic and may increase their lifetime risk of getting cancer as a result. No comprehensive study has been done on this in Australia. However the Australian Pesticides and Veterinary Medicines Authority (APVMA) has decided to prohibit the further use of CCA-treated timber for situations where the public are likely to come into close contact with it. This is in line with the Precautionary Principle but their opinion that nothing needs to be done about CCA-treated timber that is already in the community, even though it poses the same dangers, contravenes the Precautionary Principle. Arsenic continues to be found on the surfaces of CCA-treated timber for at least 20 years after it has been applied.

People who treat the timber and work with it once it has been preserved are also exposed to health risks if they do not take sufficient precautions. A number of studies have shown that workers exposed to CCA-treated timber fumes and dust have experienced a range of debilitating health problems. For this reason the AWU has imposed a ban on certain construction methods involving CCA-treated timber.

A survey of hardware retailers, building industry information centres and treated timber industry representatives found that Australian consumers are receiving little quality information about the hazards associated with CCA-treated timber and the correct methods of handling and working with it. Although material safety data sheets recommend safe working practices, these are sometimes not made available to workers and are seldom provided to amateur home handypeople.

As could be expected, there has been a number of lawsuits in the US against manufacturers of CCA-treated timber over the last 20 years because of the health impacts on consumers and workers. The threat of class actions is now looming. In Australia the potential liabilities for authorities are being discussed but no lawsuits have yet been initiated. The timber preservation industry continues to deny that CCA-treated timber poses any health or environmental risks if handled properly.

Because CCA leaches out of the treated timber over time there can be residues of arsenic, copper and chromium on the surfaces of the wood and it can be washed off by rain to accumulate in the soil or water below. The environmental impacts of heavy metal leaching into surrounding soil and water, and toxins being released into the air when treated timber is burned, particularly after bushfires, have been the subject of a number of academic studies.

The eventual disposal of CCA-treated timber is also of great concern because of the large volume of anticipated waste and the lack of safe disposal options, given the toxicity of the treated timber. If CCA-treated timber is incinerated the smoke and the ash can be toxic, so it is usually disposed of in

municipal landfills in Australia, where it continues to leach arsenic. In Europe it is categorised as a hazardous waste for these reasons.

CCA-treated timber may be incinerated accidentally as a result of house fires and bushfires, or by people ignorant of its dangers when they dispose of waste treated timber in backyard burn-offs. Perhaps of most concern is the fact that people sometimes burn it in their home combustion heaters, wood ovens and fireplaces, without realizing the dangers to which they are exposing their families and neighbours.

Reuse options are limited because of the risks associated with them but they are being developed to minimize this risk. In particular, CCA-treated timber should not be reused for garden mulch or animal bedding or for any use where humans and animals can have close contact with it. Methods to remove the toxic components from the treated wood are still in their infancy and have cost or environmental problems associated with them.

There are restrictions on CCA use in the US, the European Union, Canada and Japan, and it has been banned altogether in several countries including Denmark, Switzerland, Vietnam and Indonesia. Indeed, Australia is one of the last major CCA-producing countries to take an official position on the availability and use of CCA-treated timber. Here the CCA preservative is approved and regulated by APVMA and national standards relating to the treatment and use of treated timber are set by Standards Australia. However the preservatives committee that sets the relevant standards is dominated by those with an interest in the continued wide use of CCA-treated timber.

The APVMA has reviewed existing studies and made recommendations for CCA to be restricted and its labels changed to prevent it being used on picnic tables, deckings, handrails and children's play equipment and to provide more guidance on safe handling, use and disposal. However the APVMA does not have the powers to directly regulate the use of timber treated with the CCA preservative and its review has stopped short of dealing with in-situ and waste CCA-treated timber.

There are several alternative chemicals being promoted as alternatives to CCA but, although they do not involve arsenic or chrome, they still pose environmental and health risks. However, there is a broad spectrum of non-chemical wood treatments as well as substitute materials that do not require treatment. For example, untreated hardwoods that are naturally pest-resistant can provide a timber alternative and timber can be substituted for by other materials. This is not an attractive option to the timber industry.

This report concludes with a set of policy recommendations to adequately and effectively deal with CCA. On the basis of the Precautionary Principle, an immediate ban should be placed on the manufacture and use of CCA-treated timber, as there is enough scientific evidence to argue that CCA may impose serious health impacts and environmental impacts, even though these cannot be proven. There are also recommendations on disposal, the need for increased community awareness of the issues surrounding CCA-treated timber, the need for changes to the regulatory system with respect to CCA-treated timber, and future research needs.

# 1 INTRODUCTION

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## 1.1 Research Aims

Timber preserved with Copper Chrome Arsenate (CCA) is ubiquitous in Australian homes, playgrounds and public spaces, and residential and commercial structures. There is a growing body of scientific evidence that timber treated with CCA poses a danger to both humans and the environment. As a result, authorities around the world are imposing tighter restrictions on its manufacture, use and disposal. This report investigates a range of concerns and issues surrounding CCA-treated timber.

A review of CCA has been carried out by the Australian Pesticides and Veterinary Medicines Authority (APVMA). APVMA is the national registration authority for CCA. It decides whether CCA is safe to use, whether its use and disposal are safe for the environment, and what warnings and instructions should be put on the label of CCA products. The review has been undertaken ‘because of public health concerns primarily about potential exposure of children to arsenic from close contact with treated timber surfaces. The APVMA was also concerned about the potential for environmental effects arising from the use of the timber treatment products’ (APVMA, 2003c).

The APVMA’s draft review recommends that CCA-treated timber be considered a restricted chemical; that the labels of CCA containers be changed to prevent its use for certain residential and public applications, such as picnic tables, deckings, handrails and children’s play equipment; and that those labels include information about how the chemical mixture should be handled and applied. However the draft recommendations don’t deal adequately with the risks to environmental and human health of CCA treated timber that is already in place; the looming disposal crisis; the need for an adequate community awareness program; and the need for further independent research.

This report attempts to bridge that gap. It:

- Surveys the information provided by vendors when consumers are seeking information about the risks of CCA;
- Identifies the lack of independent funding for Australian research and development;
- Considers alternatives beyond the current focus on chemical timber preservatives;
- Identifies the need for a regulatory authority to be involved in the life cycle management of CCA-treated timber;
- Warns of an imminent disposal crisis;
- Questions the continued use of CCA-treated timber given CSIRO findings that arsenic is not required for the control of termites; and
- Calls for waste CCA-treated timber to be classified as hazardous to ensure its proper management.

This report brings together the concerns of key stakeholders on the issue of CCA, through 30 interviews with concerned individuals, environmental and health non-government organisations, industry representatives, academic researchers, and government researchers and research bodies. Also included is a review of national and international literature on the environmental and health impacts of CCA-treated timber; a survey of CCA-treated timber retailers; and an examination of the international regulatory systems restricting CCA. It concludes with policy recommendations for the future management of CCA-treated timber and the waste that is anticipated to grow exponentially over the next 20 to 30 years.

## 1.2 CCA-Treated Timber

For this research, the term ‘CCA-treated timber’ will be used to refer to wood treated with Copper Chrome Arsenate or Chromated Copper Arsenate, as it is known in some countries. The copper (23-25%) and arsenic (30-37%) in CCA act as fungicides and insecticides, while the chromium (38-45%) fixes the chemicals into the wood (APVMA, 2003e; Greaves 2003). The chemical mixture is injected into the wood under pressure so that the wood is saturated with the chemicals.

Wood, such as radiata pine, is treated with CCA to prolong its life. CCA is used for the ‘control and prevention of damage to timber and timber structures by insects, wood rot, wood fungus and general timber decay. CCA is generally used on wood intended for outdoor uses, such as telegraph poles, decking and fencing, in landscaping, and in building structures’ (APVMA, 2003a). It is also commonly used in playgrounds, children’s cubby houses, public picnic tables, garden edgings, handrails, boat bulkheads, dock pilings and vineyard stakes. CCA-treated timber can often be identified when it is new by its green tinge but this fades with time.

Australia is a major international manufacturer of CCA-treated timber, and the high sales each year ensure this product is cost competitive with any alternative-treated timber or other material. Koppers Arch, one of the largest manufacturers of CCA-treated wood, estimates that up to 1 million cubic metres of CCA-treated timber is used in Australia each year (cited in Rouse, 2004a) or 6500 tonnes per year, according to the Waste Management Association of Australia (Bell, 2005). According to the CSIRO, ‘preservation allows about \$500 million dollars worth of timber to be used in Australia in areas and applications where it would otherwise be unsuitable’ (CSIRO, 2003). CCA is also widely used in the US (Sharp and Walker, 2001). Australia, New Zealand and the US are the three largest per capita users of treated timber in the world (Greaves, 2003).

Of greatest concern to those opposed to this widely used, inexpensive timber preservative is the seepage of arsenic, a known human carcinogen, onto the surfaces of CCA-treated timber from where it can be dislodged onto hands and washed off into nearby soil or surrounding water. Chromium is also a human carcinogen. Also, there is a lack of health studies on the combined health impact of copper, chromium and arsenic.

Recently, CSIRO research has determined that copper chromate is sufficient to control termite activity, and that the major advantage of having arsenic in CCA is to control copper-tolerant fungi (CSIRO, 2005). This raises questions regarding whether continued use of arsenic can be justified, considering the documented health and environmental impacts.



## 2 HEALTH IMPACTS

Copper, chromium and arsenic are all heavy metals which means that they are metallic chemical elements that have a high density and are toxic to humans at very low concentrations. Arsenic is of most concern in this context because there is evidence from several published scientific studies (see Table 2.2) that the arsenic leaches out of CCA-treated wood over time.

According to the World Health Organisation (cited in Sharp and Walker, 2001: 2) and the US Environmental Protection Agency (Office of Pesticide Programs, 2002b) arsenic is ‘a known carcinogen and is acutely toxic’. It can cause various cancers including lung, bladder and skin cancer, as well as non-cancer damage, including reproductive and neurological problems (CPSC, 2003b: 14). People can be exposed through touching the timber as surface arsenic sticks to human skin (Gray and Houlihan, 2002: 9). It can be absorbed by the skin (less likely), breathed in with wood dust particles, or transferred to the mouth, for example by subsequent handling of food (CPSC, 2003b: 10).

**Table 2.1 Pathways of Human Exposure to CCA-Treated Timber**

Activity	Contaminated Material	Exposure Route	
Sawing, cutting, drilling etc	Wood dust	Direct contact	Inhalation*
			Ingestion
			Dermal
Touching	Surface residues	Direct contact	Ingestion*
			Dermal
Leaching	Soil/Waterways	Direct contact	Ingestion*
			Dermal
			Inhalation
		Plant uptake	Ingestion
Disposal	Ash, soil, air	Direct contact	Inhalation*
			Dermal
			Ingestion

\*Principle Exposure Route

Adapted from (Standards Australia, 2003: 7)

There is a wide range of research from international sources documenting the effects of cumulative exposure to arsenic:

- the US Consumer Product Safety Commission (CPSC, 2003a) cites studies showing high levels of arsenic in drinking water are linked with increased incidence of lung and bladder tumours in Taiwan.
- Lee *et al* (2003) report that in rats exposed to CCA, arsenic was detected in lung, liver, heart and the viscera, and copper was detected in the liver.
- Research on toenail clippings by Beane Freeman *et al* (2004) found an increased risk of melanoma for participants with arsenic exposure, measured through toenail arsenic concentrations. The majority of participants who reported they had been exposed to arsenic on the job had the highest arsenic levels of all participants, ‘indicating that occupational exposure may be an important source of arsenic contamination’.
- Kaltreider *et al* (2001) found that, at extremely low levels of exposure, arsenic is found to alter hormonal function in the ‘glucocorticoid’ system, which influences physiological processes, such as growth control, glucose regulation and protein metabolism.

Nevertheless there is not enough epidemiological evidence to ensure agreement about the health impacts of CCA exposure. This is explained by Belluck *et al* (2003) as due to:

- Physicians not being trained to recognize soil arsenic exposures;
- No mandatory surveillance and reporting system (or tabulation of data) for soil-induced health impacts;
- Non-carcinogenic effects (eg dermal, cerebrovascular and cerebral effects) being attributed to other causes;
- Adverse health effects from exposure not being observed until the damage is advanced; and
- Arsenic being associated with more than thirty different health effects.

The authors are aware that correlating health impacts with soil-related arsenic exposures in highly mobile populations is very difficult, but reiterate that there is not sufficient data to rule out elevated surface soils levels of arsenic as a cause of human morbidity or mortality (Belluck *et al*, 2003).

The situation is exacerbated by the fact that during the decades that timber has been treated with CCA, there has been no real effort collate the long term health records of people working in the industry. The APVMA is only now belatedly recommending that health data be kept by the industry.

A further uncertainty is whether the CCA components (copper, chromium and arsenate) in combination differ from effects caused by an exposure to each metal separately. For example, the presence of chromium and copper may alter the health impacts of the arsenic, such as absorption, retention and excretion (US EPA, 2003).

## **2.1 Children's Health**

The findings that heavy metals can be dislodged from CCA-treated timber has raised concerns about the health impacts of this on children. This is because children are especially vulnerable due to

- their hand-to-mouth behaviour which can transfer the heavy metals into their bodies both during and after play (CPSC, 2003a),
- their close contact with treated timber structures when playing in backyard cubby houses and crawling and sitting on decks,
- their faster metabolic rate (Belluck *et al*, 2003).

There is a lack of direct health studies to determine how arsenic affects children so extrapolations have to be made from studies on adults or rats. Currently, risk assessment is undertaken to determine the lethal dose for 50 percent of rats (LD50), and this is then extrapolated to an 80 kilogram male adult, and further extrapolations have to be made for a child. As Jo Immig of the APVMA's Community Consultative Committee remarked, 'children are the most vulnerable in our society, and health standards needs to be calculated to protect them' (*Pers. Comm*, 22/11/04).

Belluck *et al* (2003) warn that infants and children may be more susceptible than adults to arsenic exposure, with ingestion of soil as the main pathway for arsenic intake. Another means of exposure is through children handling treated timber play equipment and then putting their arsenic-coated hands in their mouths. Children living near industrial and hazardous waste sites may also be at risk through dust inhalation. The health symptoms experienced by children exposed to high levels of arsenic have been found to be similar to adults, and including respiratory, cardiovascular, dermal and neurological effects.

A number of overseas studies have been undertaken to find out the amount of arsenic, chromium and copper that can be dislodged and ingested from contact with CCA-treated timber. The amounts

of arsenic dislodged from CCA-treated timber varies from study to study. Table 2.2 below displays some of this information for ease of comparison.

**Table 2.2: Results of Arsenic Exposure to Children from CCA-treated Timber**

Source	Finding
Sharp and Walker (2001)	'A 4-6 year old child's daily exposure to arsenic has been found to be 5 micrograms/l in food, 23 µg/L in water, 25 µg/L from playing on CCA-treated wood and up to 480 µg/L from playing on CCA treated playground equipment' (p.1). Children could exceed the legally-acceptable lifetime cancer risk in 2 weeks by playing on a treated play set.
Anon. (2004)	7 of 20 play areas in Central Park, New York tested positive for arsenic above safe levels. The highest reading (316.6 µg) is a 1-in-500 lifetime risk of lung or bladder cancer if playing there three hours a week from ages 1 to 6. The play equipment was all regularly painted or sealed with polyurethane.
Sharp <i>et. al.</i> (2001)	Wipe tests the size of an average four-year-old child's hand found 18 to 1,020 µg arsenic, more than the US EPA's proposed 10 µg per day allowable exposure level for arsenic in drinking water. It was estimated that 1 in 500 children regularly playing on treated play sets will develop lung or bladder cancer in later life due to this exposure.
Lerche Davis (2003)	'In the US' southern states, 10% of all children face a cancer risk that is 100 times higher because they spend more time outdoors playing'.
Kwon et al (2004)	The mean amount of arsenic on children's hands from CCA-treated playgrounds was 0.50 µg, significantly higher than the control mean amount of 0.095 µg. The maximum amount logged, however, was less than the Canadian allowable daily intake of arsenic (4 µg) in water and food.
Enviros Consulting et al (2003)	Sand from sand playboxes built from treated wood contained a maximum of 12.9 mg arsenic per kilogram of sand 2 to 4 years after construction. Natural soils may contain from 1 to 50 mg arsenic/kg. Little risk to children being poisoned by eating the sand.

The Consumer Product Safety Commission also conducted peer-reviewed scientific studies of exposure to arsenic via playground equipment. Their scientists found that 'exposure to arsenic from CCA-treated playgrounds could be a significant source of arsenic' for children (CPSC, 2003a). They estimated that children between 2 and 6 years old who play regularly on CCA-treated playground equipment have a significantly increased lung or bladder cancer risk over their lifetimes (CPSC 2003b: 1).

As described in more detail in section 3 (Environmental Impacts), there are a number of factors that control the level of dislodgement, or leaching from CCA-treated timber, including:

- acidity of the wood and surrounding soil,
- UV exposure, and
- amount of weathering to the wood.

Some of these factors contribute to the range of heavy metal levels found to wipe off during testing.

In Australia, children are likely to spend more time outdoors playing on treated timber equipment than in many northern industrialised nations because of the warmer more temperate climate. However, Australian authorities have been remiss in not carrying out any soil or wipe test in children's playgrounds. The only known published residue testing carried out in Australia since CCA-treated timber was put on the market was a limited wipe test on playground equipment in the City of Maroondah, Victoria. The tests were commissioned by the Croydon Conservation Society and undertaken by the State Chemistry Laboratory, in June 2003. Noting that the maximum safe

amounts of arsenic in Australia for a 12kg child is 3.4  $\mu$ /day, the results showed a range of 21  $\mu$ g to 710  $\mu$ g from a single wipe, compared to a background control of less than 0.1  $\mu$ g (See Table 2.3 below). These amounts available to children from contact with the CCA-treated timber far exceed the maximum amount of arsenic allowed in a glass of drinking water (Loveridge, 2004b).

**Table 2.3: Results from wipe-testing of playground equipment in City of Maroondah**

Sample	Total Arsenic ( $\mu$ g)	Total Chromium ( $\mu$ g)	Total Copper ( $\mu$ g)
1	21	22	20
2	24	23	22
3	91	190	88
4	140	630	140
5	710	310	670
Control	<0.1	<0.6	<0.2

Source: Loveridge, 2004b

In contrast to the CPSC the APVMA does not admit that children are likely to be subjected to an increased cancer risk. The APVMA estimated that a child ingests 0.5  $\mu$ g/kg body weight per day (bw/d) of inorganic arsenic from air, food, drinking water and soil. On the basis that a child gets 7.6  $\mu$ g/handload from playing on treated timber equipment on any given day and transfers less than half of this to its mouth and only plays every second day, it estimated that the child would get 0.12  $\mu$ g/kg bw/d from playing on or near CCA-treated playground and other structures. They found this total amount of 0.63  $\mu$ g/kg bw/d to be less than the tolerable daily intake of 2  $\mu$ g/kg bw/d set by the Joint Food and Agriculture Organisation/ World Health Organisation Expert Committee on Food Additives (APVMA, 2003b: 24). However, 7.6  $\mu$ g/handload seems unduly conservative given the data in Table 2.3, which is the only data available for Australia. Also, the APVMA's calculations are based on averages and clearly some children will play for longer and more often than others, have varying arsenic exposure from other sources, and some structures will dislodge more arsenic than others. It is unlikely that parents will be reassured by their estimates.

## **2.2 Precautionary Principle**

The APVMA's CCA review found there was 'insufficient information to conclude that it is safe to continue the use of arsenic treatments for timber in structures that children are likely to have frequent close contact with', and thus recommended a 'highly protective approach' that 'these uses no longer be permitted' (APVMA, 2003c).

In particular the APVMA noted the lack of Australian data regarding arsenic-related playground exposure. It stated that there was a 'very limited amount of Australian data to quantify the amount of arsenic which can transfer or leach from in-service CCA-treated timber structures'. It claimed that international studies may not correlate with Australia's 'local climatic conditions'. Actually Australian conditions may be worse because of the warmer climate. The APVMA also noted that Australians are exposed to arsenic in various ways, aside from CCA-treated timber, and 'the data available for the review were not sufficient' to decide whether Australian children would transfer so much arsenic to their mouths, whilst playing on treated timber play equipment, that their health would be impacted (APVMA, 2003a: 8).

The APVMA concluded that there was 'no compelling evidence ... to conclude that there was likely to be an unacceptable risk to public health from exposure to arsenic from CCA-treated timber' (APVMA, 2003b, p.25). Nevertheless, it could not 'be satisfied that there is no undue risk from the continuing use of products containing CCA... with which the public are likely to come into frequent contact'. The APVMA therefore decided it was necessary to prohibit CCA-treated timber from being used on products 'with which members of the public are likely to come into

intimate and frequent contact', including play equipment, decking, picnic tables and handrails (APVMA, 2003a: 8).

The APVMA's action is a good example of the exercise of the precautionary principle, which states:

When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if cause and effect relationships are not fully established scientifically (Wingspread Statement on the Precautionary Principle, 1998).

This means that although further independent research is required that involves a large sample size, under Australian conditions, the lack of data should not be used as an excuse to do nothing about CCA-treated timber, because there is scientific evidence that it may pose a harm to human health.

The APVMA does not use the term 'precautionary' and is loath to have its actions labelled in this way. This can best be understood in terms of the international chemical industry's campaign to discredit the term because of fears that it will lead to the banning of some of its products. Nevertheless, the precautionary principle is well established in Europe and is evolving into a principle of international law. In recent times it has been included in almost all treaties and international policy documents, and has been into environmental law in many countries, including Australia (Andorno, 2004).

The APVMA has not applied the precautionary principle to existing CCA-treated timber structures already in the community, particularly play equipment, picnic tables and decking. Instead the APVMA clearly stated that, 'while there is not enough scientific evidence to meet the high standard of confidence necessary to confirm the safety of ongoing use of CCA for the treatment of timber in applications such as decks and play equipment', they do not suggest that existing structures are removed (APVMA, 2003b).

Existing structures, that is, in-service treated timber, pose the same risks as proposed uses. The APVMA stance is therefore contradictory: why is future CCA-treated timber use a problem, but not current or spent timber? (Immig, J., APVMA Community Consultative Committee, *Pers. Comm.*, 22/11/04).

## **2.3 Working with Treated Timber**

The Australian Workers' Union (AWU) took a precautionary approach in October 2004 and banned 'certain methods of usage of construction materials treated with copper chrome arsenate' due to the material's capability for releasing arsenic and 'therefore exposing workers to unacceptable risks'. The AWU requires workers to assess the risk of working with the CCA-treated timber before they work with it, and if high and continued exposure cannot be avoided, these tasks 'must be banned outright'. The AWU requires any site using CCA-treated material to appoint a CCA Officer to supervise all handling of CCA-treated timber. Unless these requirements are followed, the AWU warned they would place a ban on handling all CCA-treated timber (AWU, 2004).

The preventative measures taken by the AWU are not without supportive evidence. The US EPA's Incident Data System contains reports of injury from CCA-treated timber, listing incidents of 'itching, burning, rashes, neurological symptoms, and breathing problems after handling lumber; damage to nerves in feet and legs from CCA sawdust and fumes from construction; chronic rash; eye swelling from dust; headache, nausea, shakiness, and thirst from cutting timber; rashes on arms from dust; nausea and headache from drilling timber' (cited by Feldman, 2002).

The Scientific Committee on Toxicity, Ecotoxicity and the Environment (CSTEE) of the European Commission noted ‘a number of studies... have reported urinary arsenic concentrations to be substantially elevated (up to ca. tenfold as compared to controls) in wood impregnation workers’ (CSTEE, 1998). Such information did not go unnoticed by the APVMA review, which made a specific recommendation for ‘worker exposure data ... required to address the identified concerns for worker safety, for both dermal and inhalation for both arsenic and chromium’ (APVMA, 2003b, p.10).

The Australian National Occupational Health and Safety Commission 1987 Code of Practice (later replaced by AS5605 – see Section 6.4) stated that ‘material safety datasheets for CCA-treated timber should include a warning on precautions to be taken when machining internally wet timber. These precautions should include the use of respirators with particulate filters in dust-producing operations, and gauntlet gloves.’

The US EPA advises ‘Saw, sand and machine CCA-treated wood outdoors. Wear a dust mask, goggles, and gloves. Clean up all sawdust, scraps, and other construction debris thoroughly... Do not compost or mulch sawdust or remnants... Do not burn CCA-treated wood, as toxic chemicals may be released as part of the smoke and ashes. After working with the wood, wash all exposed areas of your body, especially the hands, thoroughly with soap and water before eating, drinking, toileting, or using tobacco products. Wash your work clothes separately from other household clothing before wearing them again.’ (Office of Pesticide Programs, 2002b)

Even the timber treatment industry recognises the risks associated with CCA-treated timber. The Material Safety Data Sheet for PineSolutions’ CCA-treated plantation pine, states ‘WARNING: This substance has been classified by the IARC as Group 1: Carcinogenic to humans’. Furthermore, it states that ‘Wood dusts produce dermatitis and an increased risk of upper respiratory disease. Epidemiological studies in furniture workers show an increased risk of lung, tongue, pharynx and nasal cancer. An excess risk of leukaemia amongst millwrights probably is associated with exposure to various components used in wood preservation’ (PineSolutions, 2000).

Auspine’s Material Safety Data Sheet recommends to ‘avoid generating dust. Wood dust is classified as carcinogenic to humans ... adverse health effects are usually associated with long term exposure to high dust levels’ (Auspine, 2004). Koppers Arch’s Safety sheet goes further, stating:

Repeated inhalation of dust from this product may cause nasal and other respiratory cancers. Some compounds of arsenic are associated with an increased risk of lung cancer. Some chromium compounds have been associated with an increased risk of nasal cancer. Wood dust is associated with an increased risk of nasal cancer. Exposure to wood dust in some susceptible people may result in respiratory and skin sensitisation leading to asthma and dermatitis respectively (Koppers Arch, 2002).

However renovation and do-it-yourself television programmes seldom demonstrate these safety practices, so that home handy-people are misled into thinking no precautions are necessary when they saw and sand CCA-treated timber, and as will be seen in the survey of retailers in section 5, they do not receive any information to the contrary from timber retailers where they buy the timber.



## 2.4 Health-related litigation

As could be expected, there has been a number of lawsuits in the US against manufacturers of CCA-treated timber over the last 20 years because of health impacts on consumers and workers. Table 2.4 shows some of the successful cases brought by one lawyer, David McCrea, during the 1980s and 1990s. McCrea uncovered an internal industry memo, dated 1977, which showed that the industry knew of the health hazards associated with CCA but failed to inform the public or the EPA about them (McArdle, 2002).

**Table 2.4 Successful Lawsuits by Indiana lawyer David McCrea**

Plaintiff	Injury	Defendant	Award
		20 defendants	\$667,000
Parks' employee who made picnic tables	Elevated levels of arsenic, vomiting blood	Osmose – manufacturer of wood preservative	\$100,000
Parks' employee	Elevated levels of arsenic and nasal bleeding	Osmose	\$334,000
Treatment plant worker	Polyps hanging from nose	Osmose	\$120,000
County park worker who made walkways	Lost feeling in hands and feet	Wood treating companies	\$460,000
Woman who got wood splinter	Two fingers amputated		\$150,000

Source: McArdle 2002

This failure to inform the public was particularly poignant to McCrea because he remembers building a deck from CCA-treated wood and then using some of the leftover wood to make a fire in his home fireplace for his 5 year old son to play camping. 'He was this little guy in a yellow jumpsuit with bunny feet on it. The damn stuff was so wet with preservative that it didn't burn. It made me so mad they could put my son at risk' (McArdle, 2002).

The threat of class actions is now looming. For example, a class action was filed in January 2005 by workers and residents living near a wood treatment plant operated by Kerr-McGee and the T.P. Corporation in the US. They are alleging that they "developed skin, liver and lung cancer, asthma, leukemia, myeloma and non-Hodgkin's lymphoma due to the release of hazardous chemicals used at the facilities" (Lewis, 2005).

During 2002 at least three class actions were filed against companies producing and applying the CCA preservative and retailers such as Home Depot and Loews (McArdle, 2002; Pianin, 2002). One such class action has been finalised in California. The group filing the law suit alleged that the manufacturers of CCA-treated timber products, such as picnic tables and play equipment, had violated the *Safe Drinking Water Toxic Enforcement Act*, 1987. This act requires warnings to be placed on products that contain chemicals known by the state to cause cancer or reproductive problems. This included CCA, which is classified as a carcinogen in the US. One outcome of the lawsuit is that 31 manufacturers have agreed to notify purchasers and distributors of CCA-treated products of the potential cancer risks associated with these products. They will also mail advice to purchasers on how to reduce exposure (eg sealing the wood and washing hands after use). Significantly, 28 of these companies agreed to stop selling CCA-treated timber products worldwide (Whetzel, 2003).

Commentators have warned that this could be the 'next tobacco' or the 'next asbestos', because of the large numbers of people exposed to treated timber who might have a case and the denials of the manufacturers. However the difficulty with CCA-treated timber, as opposed to asbestos, is that there is no trade mark illness, and people can be exposed to arsenic in a variety of ways so cause

and effect are difficult to prove, except where people have been exposed occupationally and even then a lack of medical record-keeping on the part of the companies involved makes this difficult.

Litigation lawyers Natali Junior et al (2003) say that ‘purchasers of CCA-treated wood for use in outdoor decks or playgrounds, individuals injured by virtue of contact with structures made from CCA-treated wood, and contractors who work with CCA-treated wood in the course of their daily activities’ are all potential claimants for CCA-treated timber legal action. Beyond litigation based on health impacts, they describe the potential for environmental litigation for impacts created through arsenic leaching into soil, surface waters or groundwater, and the impacts of waste CCA-treated timber in unlined landfills.

In Australia the potential liabilities for authorities are being discussed but no lawsuits have yet been initiated. Commentating on the ‘lax use and disposal requirements [that] are fundamentally at odds with the basic principles of responsible product stewardship’, the Worldwide Fund for Nature warns that allowing manufacturers and retailers to continue to make and sell CCA-treated timber could become a ‘major liability to authorities’ (Rouse, 2004b).

## **2.5 Industry Responses**

The response by the timber preservation industry has been to deflect claims of hazard, with statements such as ‘CCA has been extensively used in Australia and New Zealand since the 1950’s. In all that time and with literally millions of users and people who have had contact with it to some extent, there have been very few if any validated adverse health affects associated with it when used as recommended with normal common sense handling precautions....’ (The Centre for Treated Timber Information, 2005).

Harry Greaves, chair of Timber Preservers Association of Australia’s technical committee, who previously worked for the CSIRO on CCA timber research, stated: ‘I don’t believe the evidence that has been emerging in recent reviews is actually indicating that it’s more hazardous than other particular dust-generating product’ (ABC, 2004). Osmose Australia, a timber-preserving company, maintains that ‘CCA-treated timber does not pose any significant health risk when used and handled correctly’, but has publicly agreed to comply with the APVMA’s recommendations, such as label variations (Osmose, 2004), aware that non-compliance will result in their products being prohibited from sale.

The website of The Centre for Treated Timber Information (2005) includes these ‘frequently asked questions’:

Q. Is treated timber harmful to the environment?

A. No

Q. Is CCA-treated timber safe for playground equipment, decking, patios, etc?

A. Yes.... If necessary a surface coating of paint or varnish may be applied to treated playground equipment, decking, etc. This provides protection from direct contact, if you are worried.

Koppers Arch refers to itself as ‘the leading name for wood protection in Australia, NZ, Fiji, Asia and South Africa’. When the US Consumer Product Safety Commission published its findings in 2003 that children playing on CCA treated timber had an increased risk of getting cancer (CPSC, 2003a), Koppers Arch declared that the ‘wood preservation industry was taken aback.’ For years the wood preservative industry had referred to an earlier 1990 CPSC study that the industry had interpreted as approving of the use of CCA-treated timber for playground equipment even though it clearly found that children playing on CCA-treated equipment got arsenic on their hands. On its web page Koppers Arch states: ‘Our industry has often referred to that original study when

defending CCA so it is particularly concerning that the CPSC has now apparently changed its position.’ (Koppers Arch 2003a).

Not to be put off by CPSC’s damning report, Koppers Arch now contends that CPSC is not ‘an expert authority in this type of epidemiological risk analysis’ even though it previously suited them to consider it as an expert authority. Koppers Arch also attempts to play down CPSC findings by claiming it only predicted ‘a slightly increased risk of certain cancers (lung and bladder cancers)’. However, paradoxically, Koppers Arch also attempts to dismiss the study by asserting ‘if the estimates of the risks from this level of arsenic exposure are anywhere near correct, then there should be epidemic levels of those cancers in the community as a result of this exposure.’ Since there aren’t, Koppers Arch concludes, CCA-treated timber must be safe (Koppers Arch 2003a).

Both Koppers Arch and the Timber Preservers Association of Australia (TPAA) maintain that CCA-treated timber is safe if it is handled correctly (Koppers Arch, 2003b; Greaves, 2003) but this is where they come unstuck, because CCA-treated timber does not come with instructions about how it should be handled. Nor do municipal or household installations made of treated timber.

Commercial play equipment manufacturers based outside Australia are influenced by international findings and public pressure. Kompan Playsets Australia builds commercial playground equipment for use in public areas, and does not use CCA-treated timber because of the Danish company’s policy of ‘no hidden dangers’ and Denmark’s ban of CCA-treated timber. Its choice of timber building materials must meet a number of European and US standards, which prohibit the use of CCA-treated timber for use in contact with children. Where timber is requested in the playsets, Kompan uses imported Baltic pine treated with copper-based Tanalith-E for small pieces, and untreated cypress pine for large structural pieces. Both materials are appropriate for in-ground use, and cypress pine is not used for small sections due to the tendency to warp and split.

The Kompan representative doubted whether treated timber was used for commercial playsets anymore but stated that ‘backyard cubby houses have a different brief, [manufacturers] can get away with using treated timber’ (Kompan, S, Kompan Playsets Australia, *Pers. Comm.*, 15/11/04).



### 3 ENVIRONMENTAL IMPACTS

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Because CCA leaches out of the treated timber over time there can be residues of arsenic, copper and chromium on the surfaces of the wood and it can be washed off by rain to accumulate in the soil or water below. All three metals pose a potential threat to the environment. According to the US EPA: 'The amount and rate at which arsenic leaches, however, varies considerably depending on numerous factors, such as local climate, acidity of rain and soil, age of the wood product, and how much CCA was applied.' (Office of Pesticide Programs 2002b)

The environmental impacts of heavy metal leaching into surrounding soil and water, and dioxins and furans being released into the air when treated timber is burned, particularly after bushfires, have been the subject of a number of academic studies. The APVMA concluded that there are 'unintended harmful environmental effects... [such as] contamination during the treatment process, leaching of arsenic from treated timber into soils or water, and disposal or burning of discarded timber' (APVMA, 2003a, p.9). Environmental contamination from CCA-treated timber can occur at many points along the life cycle of the product, from manufacture, to handling and use, and to disposal. An audit undertaken by the NSW EPA of five timber treatment plants found contamination through inadequate storage of materials and wastes at 5 plants, failure to maintain drains, dams or treatment facility at 4 plants, and inadequate surface water controls at 4 plants (NSW EPA, 2003a). There have been no corresponding audits of Victorian timber treatment plants by the Victorian EPA.

The treatment plants can also get particularly contaminated. The Scientific Committee on Toxicity, Ecotoxicity and the Environment (CSTEE) of the European Commission noted: 'There is extensive documentation of past substantial soil and groundwater contamination at wood treatment sites... There is also evidence in the published literature... that contamination of the soil and vegetation can extend to the area beyond the immediate boundaries of such sites, something that has been attributed to wind erosion, percolation, surface drainage as well as on-site incineration of wood waste' (CSTEE, 1998).

#### 3.1 *Leaching into Soil and Groundwater*

A number of international studies, and at least one Australian study (Kennedy, 2004) have documented the impacts of heavy metals from CCA-treated timber leaching into surrounding soil and groundwater. The amounts leached vary for each study, depending on climatic and geological conditions, UV exposure and acid levels. However, the studies listed here all found results that proved arsenic levels were raised through leaching to above acceptable standards.

Solo-Gabriele *et al* (2003b), found that the soil below and around CCA-treated timber decks contained an average arsenic concentration of 28.5 mg/kg, well above average background soil arsenic concentrations of 1.5 mg/kg. Runoff collected from the decks was found to contain over 1 mg/L arsenic and chromium. In another study, by the same researchers, soil below the CCA-treated timber decks contained an average of 34 mg/kg chromium and 40 mg/kg of copper, in contrast to an average background level of 10 mg/kg for both metals (Townsend *et al*, 2001).

Similar results have been found in the wine-growing region of Marlborough in Australia. Robinson *et al* (2004), found that a quarter of soil samples exceeded the Australian National Environment Protection Council's 'Guidelines on the Investigation Levels for Soil and Groundwater' for arsenic, set at 100 mg/kg, and 10 percent of the soil samples exceeded these guidelines for chromium (set at 100 mg/kg). Note that these guidelines set 20 mg/kg as the level of ecological concern in urban areas (National Environment Protection Council, 1999).

The main impacts of leaching into soil are localized. Townsend *et al* (2001) found that the highest concentrations of arsenic, chromium, and copper were found within five centimetres (laterally) of the CCA-treated timber, with the soil metal levels decreasing with distance. The highest median concentrations were found in the upper 20 centimetres of soil.

These elevated heavy metal levels have been found by some studies to have been taken up by plants. For example, Aziz Shiralipour (2004) from the Department of Agronomy, at the University of Florida, found that different vegetables absorb inorganic arsenic at different rates. For carrots and turnips the arsenic is absorbed by the root more than the leaves but in lettuce it is absorbed by the leaves and in higher concentrations than in root crops. The closer the vegetables are to CCA-treated timber the more inorganic arsenic they absorb. However, television and radio programmes in Australia continue to recommend the reuse of CCA-treated timber for garden bed borders.

The amount of leaching from CCA-treated timber depends on the local conditions and occasionally age of the timber. Ultraviolet exposure increases the amount of arsenic removed through rainfall by five times (Lebow *et al*, 2003). Weathered wood leaches more of the toxic trivalent arsenic than unweathered wood (Solo-Gabriele *et al*, 2003a). Acid levels can also increase leaching. The CCA chemical itself is acidic, and if this chemical is not properly fixed into the wood, can raise the levels of chromium in surrounding soils. Humic acid in mulch also poses an increased risk of leaching. Research cited by Enviros Consulting *et al* (2004) found that 'metal concentrations in humic matter can be up to one thousand times greater than those not containing humic matter, and that copper is most affected'. Farm soils with applied fertilizer containing calcium, magnesium, potassium and phosphorous also increases the chance of leaching from CCA-treated timber.

It is unknown just how long arsenic leaches out of timber but the studies that have been done have found that older timber is just as likely to leach arsenic as freshly treated timber. A 2002 study by the Washington DC-based Environmental Working Group (EWG) found that arsenic levels on CCA-treated wood remained high for 20 years and sealants are only effective at reducing arsenic levels on the surface of the wood for about six months (Gray and Houlihan, 2002: 4-6).

Similarly, a study by David Stilwell (1999) of the Department of Analytical Chemistry, Connecticut Agricultural Experiment Station involved a study of treated decks that were between 4 months and 15 years old. He took 45 wipe samples from horizontal deck plank surfaces and 12 from vertical poles holding up decks and found arsenic in all cases. There was no correlation between the amount of arsenic and the age of the deck although there was large variability between decks and also places on the deck.

Stilwell (1999) also found that there were elevated levels of copper, chrome and arsenic in the soils below the decks and that the amounts increased with the age of the deck. The average amount of arsenic was 76 mg/kg (138 mg/kg after 8 years) compared with a state safety limit of 10 mg/kg in residential soils. The EWG study (Gray and Houlihan, 2002: 7) found that in 'two of five backyards and parks, the soil tested had enough arsenic to qualify as a Superfund site.' (The Superfund Program in the US was set up to locate and clean up the most contaminated sites in the country.) This means that if these backyards and parks were industrial sites they would be considered hazardous and have to be cleaned up.

Stilwell *et al* (2003) describe an unusual pattern of leaching over the years. During the first year they observed a steady decline. Then erosion and weathering 'rejuvenated' the surface and could increase leaching. These phases were observed for several years. The resultant heavy metal levels in the soil can remain for many years. In Washington, US, the Everett Smelter hazardous waste site still contains high levels of arsenic trioxide, 85 years after production was discontinued. 9000 years is one cited estimate of the residence time for arsenic in soil (OEHAS, 1999).

### 3.2 Impacts on Marine Water

There is less literature and information available regarding CCA-treated timber impacts on marine waters, where it is most commonly used for marine piles. Townsend *et al* (2003) found that copper, rather than arsenic, was most toxic for the aquatic environment. However, when copper was present in the CCA combination, it appeared to be more toxic than when it was on its own, raising concerns about the effects of the combination of copper, arsenic and chromium.

Weis and Weis (2004) point out that the “deleterious effects” of CCA-treated timber on many aquatic organisms have been well documented. The heavy metals, particularly the copper, accumulates in the sediments near the wood and in the organisms, particularly those that live in the sediments or attach themselves to the wood. The metals can then bioaccumulate up the food chain. Impacts include reduced growth, altered behaviour and mortality at the individual level, and reduced numbers and diversity at the community level. They note that any alternative preservative to CCA would still be harmful to an aquatic environment if it contained copper.

Initial research findings from the CSIRO into bio-accumulation of CCA in barnacles has found that barnacles on CCA-treated marine piles have elevated heavy metal levels, although barnacles on adjacent untreated piles do not have elevated levels. Barnacles on piles treated with CCA then sealed in by creosote have not been found with elevated levels of arsenic, although they do have slightly higher levels of copper (Cookson, L., CSIRO Forestry and Forest Products, *Pers. Comm.*, 14/12/04).



## 4 WASTE OPTIONS

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The eventual disposal of CCA-treated timber is of great concern to many stakeholders, due to the volume of anticipated waste and the lack of safe disposal options, given the toxicity of the treated timber. If CCA-treated timber is burned the smoke and the ash can be toxic (APVMA, 2003e: 6), so it is usually disposed of in municipal landfills where it continues to leach arsenic. In the US, material that leaches arsenic is classified as a hazardous waste and cannot be disposed of in municipal landfills. However, CCA-treated timber has been granted an exemption (Sharp & Walker, 2001: 11).

According to academics at the University of Florida, the exemption in the US was due to CCA involving pentavalent arsenic—a less toxic species of arsenic—and the presumption that the leaching mainly occurred with newly-treated timber. However, recent research on timber weathered for over ten years has found that the pentavalent arsenic is somehow converting to the ‘highly toxic’ trivalent arsenic, in volumes well over the limit for non-hazardous waste. In addition, it is surmised that as the timber’s lignin decomposes, large quantities of arsenic are released from the older wood (Fauteux, 2003). Another study in the *Journal of Hazardous Wastes* has found that arsenic leaching from CCA-treated timber waste disposed of in landfills “is a major concern from a disposal point of view with respect to ground water quality” (Townsend, 2004).

Similarly, in the UK the requirements for safe disposal of hazardous waste now also apply to waste CCA-treated timber so as to prevent air and other polluting emissions (DEFRA, 2003). In Europe discarded CCA-treated timber has been classified as a hazardous waste since 2000 (Commission of the European Communities, 2003: 9). This was after the CSTEE raised concerns about the disposal of treated-timber in landfills: ‘The CSTEE wishes to underline that a major source of concern regarding the use of arsenic-containing wood preservatives relates to the high degree of uncertainty regarding the speciation of arsenic during its long-term storage in landfills (the major points of arsenic accumulation), making reliable quantitative predictions about its migration and bioavailability extremely difficult. This is a serious knowledge gap which the CSTEE recommends should be addressed by further research. In the meantime, it would be advisable to exercise caution by limiting the use of arsenic-based wood preservation to those situations where it is absolutely necessary’ (CSTEE 1998).

In Australia, CCA-treated timber waste is not classified as hazardous waste and there is a lack of clear information about how this waste should be disposed. Currently, CCA-treated timber is accepted at the discretion of the landfill operator in NSW, South Australia and Victoria (Smith and Mollah, 2004) and is often collected with other municipal waste. In NSW, CCA-treated timber is a priority waste (although a priority 2 waste rather than a priority 1 waste) on the Extended Producer Responsibility list but it is still accepted at a number of municipal landfill locations (Mitchell, S., NSW Department of Environment and Conservation, *Pers. Comm.*, 15/11/04). In Victoria, “product stewardship agreements on waste avoidance and recovery” will not be established for treated timber till 2009/10 (Ecocycle Victoria, 2003: 17).

Waste Services NSW, which operates 4 landfills and 7 transfer stations, could not provide adequate advice on the customer information line to this researcher as to whether treated timber is a hazardous waste and whether it could be disposed of at any of its four landfill sites (Waste Services NSW, Customer Enquiries, *Pers. Comm.*, 15/11/04). However the Waste Services website stated that no treated timbers would be accepted by Waste Services, as timber waste was reused for chipping for landscape mulches and as biofuel (Waste Services NSW, 2004).

## 4.1 Volumes

The scale of the waste-treated timber is enormous, particularly if existing CCA-treated timber structures are to be replaced by safer alternatives, as this report recommends. However there are already large amounts of waste CCA-treated timber being produced annually in Australia and overseas. A major source of this is the wine industry.

In 1999, a report prepared for the South Australian Environmental Protection Authority (EPA) found that wineries were the largest purchasers of preservative CCA-treated timber in South Australia. They estimated that 75% of the approximate 60 to 120 million vineyard stakes were made from CCA-treated timber. The SA EPA has found the growth of the wine industry has paralleled the increase in CCA timber manufacture. Since annual stake damage is around 15%, it is anticipated that in 2024, a peak volume of between 8 and 16 million posts will require disposal (cited in Smith and Mollah, 2004). There are already 816,000 posts stockpiled (Bell, 2005). The South Australian EPA warns that a toxic disposal crisis is looming, with ‘no acceptable disposal option for CCA’ in SA and no life cycle management for the heavy metals in the CCA. One way of easing the waste problem would be to encourage the wine industry to change its material choice for vineyard stakes. (Scott, 2004).

A treated timber disposal crisis is already being experienced in California. San Joaquin grape-growers turned to other crops after several difficult seasons, and removed thousands of tonnes of CCA-treated stakes. They are not permitted to burn these due to air pollution risks, and disposal to a landfill is not only costly but brings with it the ‘lifetime liability’, as disposer identities are logged and they can be held responsible in the event of ensuing problems at the landfill site (Pollock, 2004).

Matthew Warken (2004: 44) notes in his Masters thesis on wood waste in Sydney that “there would still be treated timber in the waste stream for the next 10 – 25 years, even if CCA treatment was banned today”.

## 4.2 Incineration

Combustion of CCA treated timber involves a number of environmental hazards. Ash from CCA-treated timber contains elevated levels of heavy metals. Once burnt, the ash continues to leach heavy metals. Solo-Gabriele *et al* (2003a) confirmed CCA-treated wood ash exceeded the 5 mg/L regulatory level for total arsenic leaching under the US EPA standards. The CSIRO warns that the ash from burnt CCA-treated timber on rural properties should be removed or buried away from stock, as the ‘salty contaminated ash ... can cause problems’ (CSIRO, 2005). The smoke can also contain high levels of arsine gas and dioxins: ‘Studies show that, depending on the combustion conditions, 10-90% of the arsenic present in CCA-treated wood’ may go up in the smoke (APVMA, 2003a: 47).

Australian research by Tame *et al* (2003), has tested ash from burnt CCA-treated pine for polychlorinated dioxins (dibenzo-p-dioxins) and furans (polychlorinated dibenzofurans, PCDD/F), well-known atmospheric pollutants. They concluded that these pollutants formed mainly during the smouldering of the char (ash), raising concerns about the impacts after bushfires in residential areas, such as Canberra during 2002. In Canberra 55 sites were contaminated with treated timber ash. Site remediation required removal of 2000 tons of soil, took a year to complete and cost around \$3,000,000 (Godson, W. *Pers. Comm.*, 27/2/05)

The APVMA review recognised the risks associated with incineration and warned that it ‘should only occur in very controlled facilities where release of arsenic to the atmosphere is minimised and the potentially highly toxic ash is processed and disposed of appropriately.’ For this reason the authority recommends that CCA chemical labels be varied to prevent waste CCA-treated timber

from being incinerated (APVMA, 2003a, p.47). However because of its limited powers the APVMA is not able to regulate potential incineration, although it could have made recommendations on this.

Incineration of CCA-treated timber is in fact banned in some states including NSW. EPA Victoria (2003) has raised concerns about horticulturalists who burn waste such as CCA-treated timber and has fined at least one grapegrower in 2003 for this because of the 'significant risk to human health, the environment and the clean green image...' The South Australian EPA warns that 'Children, pets and farm animals should be excluded from land where CCA ash is present [for example after bushfires]. Animals will want to lick or eat the salty residue and young children, especially those under 5 years, are at high risk from personal contact and ingestion. Animal deaths from ingesting ash have previously been reported on farms in the USA and UK' (SA EPA, 2005).

CCA-treated timber may be incinerated accidentally as a result of house fires and bushfires, or by people ignorant of its dangers when they dispose of waste treated timber in backyard burn-offs. People can also put treated timber into garbage streams that go to municipal incinerators. Fire-fighting organizations such as the country fire services are aware of the hazards associated with burning CCA but seldom know, when they attend a fire, whether the burning timber is CCA.

Perhaps of most concern is the fact that people sometimes burn it in their indoor home fireplaces, without realizing the dangers that they are exposing their families and neighbours to. Because traditional sources of heating wood are becoming scarce and therefore more expensive, scrap timber and off-cuts from building sites are turned to as free sources of timber. 'It is not uncommon to see this rubbish wood, including treated pine etc, piled high in Canberra backyards... not only treated pine but other treated timbers' (Darryl Johnston, *Pers. Comm.* 1/8/03).

CCA-treated timber may also be incinerated when it is mixed with other wood that is used as fuel wood. Often waste wood piles contain some CCA-treated wood, so that it would be hazardous to use them for fuel. Previous research found that 'visual sorting', based on the colour of the treated timber, is not accurate. To prevent the ash being classified as hazardous in the US, wood reused for fuel must contain less than five percent of CCA-treated timber (Solo-Gabriele, *et al*, 2001).

A more specific method for identifying CCA-treated timber is through a stain test. Although this is a workable method, the cost and time required to administer the stain were of particular concern to large recycling facilities. Solo-Gabriele *et al* (2001) claim that the Laser Induced Breakdown Spectroscopy (LIBS) and X-ray Fluorescence Spectroscopy (XRF) that they are developing will provide a faster and cheaper method for sorting waste wood. However both technologies have technological drawbacks and are not ready for commercial use. A trial of a portable hand held X ray device called a XRF metal analyser is being used at Medley USA.

Some research into safer controlled incineration methods that would capture the arsenic and toxic residues has begun but it is in its early states. At the University of Sydney's Chemical Engineering laboratories, research is underway into the possibilities of incinerating CCA-treated timber to recover both the energy as well as the metals (as environmentally stable residues). So far, the researchers have found that at temperatures greater than 400°C the copper and chrome are contained in the ash, while the arsenic is volatilized. The researchers are aiming to recover all three metal components from the waste wood (Stewart *et al*, 2004).

In earlier work undertaken at the University of Sydney for the Western Sydney Waste Board, it was found that at a combustion temperature of 900°C, energy was more efficiently produced than in pyrolysis and gasification at lower temperatures, and arsenic (present as arsenate) was produced in a stable form. The researchers noted that the arsenic produced as off-gas was a concern, although if

combusted in a flash smelter such as those used in the copper industry, the arsenic could probably be captured (CRESTA, 2000). Solo-Gabriele *et al* (2001) report that in Europe pyrolysis technology appears to be further advanced, with ‘two full-scale pyrolysis operations’ in France which claim to recover most of the heavy metals.

### 4.3 Reuse

A UK analysis of treated wood waste streams found that the ‘Best Practicable Environmental Option’ is reuse, findings that are consistent with the principals of the waste hierarchy employed both in the UK and Australia. (Not producing the waste in the first place, is of course preferable.) However, the researchers did note that reuse markets for wood waste are limited and the value of the waste is low. Additionally, the quality of the wood waste and the risk of contamination were also cited as barriers to this option (Enviros Consulting *et al*, 2004). Similar research from the US found that up to 86 percent of CCA-treated timber from residential decks could be recovered for reuse (Smith *et al*, 2004). Yet in practice it has been found that parks and recreation facilities, in Florida at least, are concerned about the structural integrity of used CCA-treated timber, and prefer not to use it (Solo-Gabriele *et al*, 2000).

However, whilst reuse may deal with the waste disposal problem, it can exacerbate the health and environmental problems associated with the use of CCA-treated timber because it prolongs that use. In Florida, waste CCA-treated timber was prohibited from co-generation plants because of the resulting heavy metals in the ash but the waste was then diverted to mulch production, raising the risk to soil and groundwater through leaching (Solo-Gabriele, *et al*, 2001). Leachate from mulch manufactured from construction and demolition waste, which often contains waste CCA-treated timber failed water quality standards set by the US EPA (Townsend *et al*, 2001). And although the CSIRO highlights the potential use of CCA-treated timber as garden edging and fence posts, it warns against use of CCA-treated products being reused in mulch, animal bedding, beehives’ as well as food chopping boards and boxes used to store or transport food (CSIRO 2005).

Researchers at Michigan State University have investigated the use of CCA-treated timber fibres in wood-cement particle composites. The resulting composite was found to have comparable strength to normal concrete and to withstand strains at peak load that are ten fold greater than normal concrete. This led the researchers to propose this material for use in energy dissipation applications (Gong *et al*, 2004).

USDA Forest Products researchers have found that oxalic acid extraction and bioleaching with a metal-tolerant bacterium can successfully remove up to 78 percent of copper, 97 percent of arsenic and all chromium from CCA-treated pine, which can then be recovered for reuse or disposal. It is noted that this remediation is currently ‘cost prohibitive’, but could become financially viable if landfill restrictions are imposed (Clausen and Kenealy, 2004).

Researchers from the USDA Forest Service have developed a metal-tolerant wood decay fungi to degrade waste CCA-treated timber (Illman *et al*, 2004). This reduces the volume of waste rather than reusing it.

## 5 WHAT ARE CCA CONSUMERS BEING TOLD?

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A survey of hardware retailers, building industry information centres and treated timber industry representatives in Sydney was undertaken in November 2004 as a 'snapshot' of the level of information provided, to interested customers, on the precautions needed for using CCA-treated timber. The questions covered health and safety issues and environmental impacts, alternatives and sources for further information. The researcher posed as a potential customer. The responses to the seven questions are provided in Table 5.1 below.

This survey raises many concerns for the level of information (and misinformation) that potential consumers of CCA-treated timber are receiving. Six of the 10 respondents recommended using CCA treated timber for children's cubby houses, and 8 of the 9 respondents recommended using it for edging vegetable gardens. This confident recommendation contradicts many of the experimental research findings regarding CCA dislodging onto hands and leaching into soil, described previously in Sections 2 and 3.

Six of the 9 respondents denied that arsenic posed a danger, with some respondents using very persuasive language and personal experience to prove this, stating there is 'no proof in the world' that it harms health (treated timber yard), 'there's no scientific evidence to prove it...I've worked with it every day for 25 years. I don't worry about it. I mean, I don't wash my hands before I eat my sandwich or anything' (playset manufacturer), and 'there's no real proven truth yet that it does damage' (timber company). One respondent even confronted the issue of arsenic by stating 'there's more arsenic in seafood and dairy', and suggested that any timber treatment workers who have tested positive had 'eaten prawns in the last 48 hours'. She then concluded that 'there are no fully-fledged detrimental effects of CCA' (timber treatment company). This statement is actually misleading, as naturally occurring arsenic in seafood is organic, rather than the inorganic variety used in timber preservation. In response to a question about safety precautions, the five respondents asked confirmed that it was safe for the general public to work with, and only when pushed recommended wearing safety equipment, such as gloves and mask.

When asked about alternative, non-arsenic based building materials for use in cubby houses and as garden edging, most respondents suggested Liquid Organic Solvent Preservative (LOSP). However, those staff actually working with the product dismissed it as a true alternative due to not being available for in-ground use; to not coming in logs suitable for edging or cubbies; and giving off nauseating fumes. It can also be up to 30 percent more expensive, as it is imported. Some other more feasible alternatives were mentioned, including wax-coating to seal in the CCA, using hardwood sealed with creosote, or even moving away from timber to cement or fibro sheeting.

Despite the expectation by industry representatives that there was free and available information for the general public about safe usage of CCA-treated timber, only one of the 5 retailers in the survey stocked pamphlets. Others directed the researcher to a website or the industry association telephone number, or displayed a poster, 'Debate on CCA'. One retailer informed the researcher that they didn't hold any pamphlets 'because people know what they want'. None of the respondents suggested reading the Materials Safety Data Sheet for the CCA-treated products.

Additional advice on the dangers of CCA-treated timber was sought from the Poisons Information Centre, a recommended source of information on toxicity dangers for children. However, the spokesperson there dismissed any danger, stating 'Don't keep kids away from playgrounds with treated wood....the compound is impregnated into the wood and doesn't come off...don't worry [about negative media stories] because the media jump on the issue...' (Poisons Information Centre spokesperson, (2004), *Pers. Comm.*, 26/10/04).

**Table 5.1: Attitudes and Knowledge about CCA-treated timber Precautions by Timber Industry**

Respondent	Hardware store B	Hardware store A	Treated timber yard A	Treated timber yard B	Timber yard A	Timber yard B	Timber yard C	Timber Treatment Company	Playset manufacturer	Timber company
<b>Is CCA safe for kids' cubby houses?</b>	Yes	Yes	Yes- but suggested sealing it with acrylic paint	Yes- cubby house kits available	No- warned against children using it and mentioned staining on hands and gloves when stacking in shop	No- instead they sell a waxed product preserved using copper, and rec'd painting or oiling it to protect from sun damage.	No-no longer stock cubby house kits as CCA is 'no longer rec'd for kids' playgrounds'	Yes- but rec'ds sealing it with a stain or paint to prevent weathering	Yes- 'I've worked with it every day for 25 years. I don't worry about it. I mean, I don't wash my hands before I eat my sandwich or anything'	No- suggested finding an alternative product OR paint it with an oil-based primer and then an acrylic paint
<b>Is CCA safe for veggie garden beds?</b>	Yes- suggested painting or inserting plastic lining on the inside of the garden bed if a concern.	Yes	Yes- but recommended planting 100mm in from the sides to prevent plants touching	Yes- and it is expected to continue in this use post APVMA review. 'They have done lots of soil testing' and found no proof of leaching.	Yes- but only H4 level. Warned against using H2 or H3 for in-ground use, as the treatment leaches visibly into the soil.	No- instead they sell a waxed product preserved with copper	Yes- 'there is no leaching'	Yes- 'it doesn't leach out ... it's such a minimal amount that leaches out'	—	Yes- but plants need to be 100mm from the wood as 'it's possible it will leach into the soil'
<b>Is Arsenic a danger?</b>	No- 'treated timber is not as bad as it used to be' (and provided a leaflet for LOSP but without explaining the difference)	No- CCA 'must be all right because they build cubbies out of them'	—	No- it 'doesn't seep out of the timber onto hands or into soil'. There is 'no proof in the world' that it harms health	Yes- warned about As in dust when cutting, coming off on hands when handling and leaching into soil.	Yes- but have found waxing CCA can seal to prevent leaching	Yes- hence don't stock cubby house kits	No- 'it's only a 1% solution in 99% water'	No- 'there's no scientific evidence to prove it'	No – 'there's no real proven truth yet that it does damage'
<b>Is CCA safe to handle?</b>	Yes	—	Yes- 'no problems for the general public'. Rec'ds wearing a mask and gloves (optional)	Yes- wear a mask and gloves if cutting. 'I've been handling it for 20 years'	Yes- if wearing a mask and gloves.	—	—	—	—	Yes- but advises to wear gloves or wash hands afterwards, and wear a mask

<b>Are there alternatives to CCA?</b>	Yes- LOSP (provided leaflet). Both CCA and LOSP are stocked. Suggested using cement or fibro sheeting or hardwood for a chemical-free alternative.	Yes- 'depends on price and look'	Yes- but not for in-ground use	Yes- but not for in-ground use. Have LOSP for decking and handrails, but 'CCA last much longer'	Yes- rec'd green hardwood painted with creosote.	Yes- they sell a waxed product preserved using copper- the 'only place to use waxing in Australia'	Yes- but hardwood is difficult to work with (too hard) for a cubby house, and LOSP is a very expensive product compared to CCA	Yes- the copper-based preservatives are 30% more expensive and thus there's minimal interest and has to be imported.	Not really- LOSP is for above-ground use only, doesn't come in logs and 'the fumes make me feel crook.'	Yes- durable hardwood, such as cypress pine that is raw aboveground or painted with a non-As preservative in ground
<b>Is there additional information?</b>	No- but provided a brochure on LOSP	No- 'because people know what they want'	—	Yes- brochures available in store	No- but provided contact details for the Timber and Building Materials Association NSW	—	—	Yes- on the website	Yes- available to read in the factory but not to give away.	Yes- directed to website

‘—’ indicates the question was not asked

LOSP = Liquid Organic Solvent Preservative

In 2001 manufacturers in the US agreed to put warning labels on CCA-treated timber (see example below) and provide consumer safety information sheets. The proposed labels for Australia are far less informative. According to Subbu Putcha at the APVMA, in the future timber will merely be branded with 'Treated with Copper Chrome Arsenate' (Putcha, S. APVMA, *Pers. Comm.*, 21/12/04).

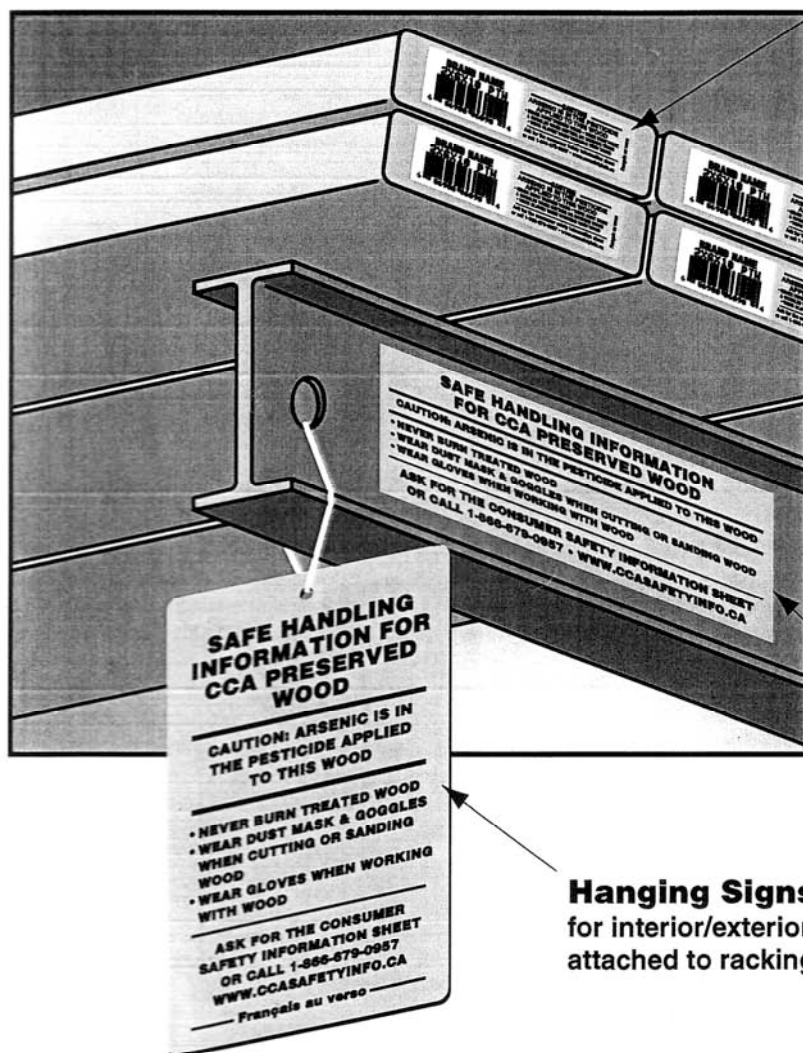
**CAUTION: ARSENIC IS IN THE PESTICIDE APPLIED TO THIS WOOD**  
 • NEVER BURN TREATED WOOD • WEAR DUST MASK & GOGGLES WHEN CUTTING OR SANDING WOOD • WEAR GLOVES WHEN WORKING WITH WOOD  
 Ask for the consumer safety information sheet or call 1-800-282-0600 [www.ccasafetyinfo.com](http://www.ccasafetyinfo.com)

**Consumer Information** This wood has been preserved by pressure treatment with an EPA registered pesticide containing inorganic arsenic. Some chemical may migrate from treated wood into surrounding soil over time and may also be dislodged from wood surface upon contact with skin. Exposure to inorganic arsenic may present certain hazards. Take the following precautions when handling, determining where to use, using or disposing of the treated wood. Use Site Precautions All sawdust and construction debris should (continued on back)

# CCA Preserved Wood Consumer Awareness Program

A voluntary information program of signage and Consumer Safety Information Sheets for consumers of CCA treated wood products to go into effect for Spring 2002

## Signage



**Lumber end tags**  
on each piece of decking, dimensional lumber, timbers and landscape mini-ties, or

**CAUTION**  
**ARSENIC IS IN THE PESTICIDE APPLIED TO THIS WOOD**  
• NEVER BURN TREATED WOOD • WEAR DUST MASK & GOGGLES WHEN CUTTING OR SANDING WOOD  
• WEAR GLOVES WHEN WORKING WITH WOOD  
Ask for the consumer safety information sheet or call 1-866-679-0957 • [www.ccasafetyinfo.ca](http://www.ccasafetyinfo.ca)  
Français au verso

**Bundle tags 5" x 3"**  
on fence posts, accessories and other material not individually labeled

**Stickers 8" x 3"**  
for interior/exterior use on racking, shelving and signage placards

**Hanging Signs 5" x 8"**  
for interior/exterior use, can be attached to racking, shelving, fences

End tags, bundle tags, stickers and hanging tags all give basic safe handling information and encourage the consumer to ask for a Consumer Safety Information Sheet, dial the toll-free line or visit the web site for more information.

These materials are available from your treated wood supplier.

US Labelling

## Consumer Safety Information Sheet on CCA Preserved Wood

This wood has been preserved by pressure treatment with Chromated Copper Arsenate (CCA). CCA contains inorganic arsenic, chromium and copper and is a pesticide registered for use in Canada under the Pest Control Products Act. Treatment with CCA extends the life of wood, thus reducing demand on forest resources. Exposure to arsenic and chromium may present certain hazards. Below are steps you can take to reduce significantly releases to the environment and human exposure to these chemicals.

**NEVER BURN TREATED WOOD.** Arsenic and chromium may be released into the environment as part of the smoke or remain in the ashes.

### Use

Wood treated with CCA should be used only when such protection is important, as in areas where the wood is subject to decay or insect attack or is in contact with damp soil or water. Treated wood is not a substitute for good building design. Proper design and construction principles must be followed to ensure long service and prevent decay. CCA-treated wood should be used in the interior of constructions only when there is a risk of accidental wetting and replacement is difficult (for example, in foundations, basements, ground-floor joists and sub-floors).

### Do not use CCA-treated wood where:

- direct food contact is possible (for example, cutting boards, counter tops, beehives)
- the chemicals in the preservative may enter the food chain (for example, animal feed storage, silos, water troughs, compost bins, mulch); or
- the chemicals in the preservative may come into contact with public drinking water (for example, well or reservoir covers), except for uses involving incidental contact such as docks and bridges.

### Safe Handling

- ▶ Only purchase CCA-treated wood that is visibly clean and free of surface residues, as these may contain dislodgeable toxic chemicals.
- ▶ Wear gloves and long sleeves when handling treated wood.
- ▶ Wear dust mask, eye protection, gloves and long sleeves when sawing, sanding, shaping or otherwise machining treated wood to avoid skin contact with or inhalation of sawdust.
- ▶ Where possible, cut or otherwise work with treated wood out-of-doors.

▶ Wash hands after working with the wood, and before eating, drinking, or smoking.

▶ Launder clothing before reuse. Wash separately from other clothing.

▶ After construction, all cut ends, sawdust and construction debris should be cleaned up and disposed of in accordance with local regulations.

### Installation and Maintenance

▶ If wood is cut during construction, apply an appropriate "end-cut" preservative (e.g., copper naphthenate for above or below ground or zinc naphthenate for above ground only) to protect exposed, untreated wood. Use these products according to the manufacturers instructions.

▶ The service life of CCA-treated wood may be extended by regular application of coating or sealer which can protect the wood from weathering effects. Such maintenance may also reduce the potential release of toxic chemicals from the wood.

▶ The use of bleaches, deck cleaners or brighteners that contain sodium hypochlorite, sodium hydroxide, sodium percarbonate, oxalic acid, or citric acid is not recommended as they may release toxic chemicals from CCA-treated wood.

▶ Use corrosion-resistant fasteners to minimize damage and discoloration caused by moisture.

### Reuse and Disposal

▶ Reuse treated wood to the extent possible.

▶ Do not dispose of CCA-treated wood remnants or sawdust in compost heaps, wood chips, or mulch as chemicals from the preservative may enter the food chain

▶ Dispose of construction wastes or material removed from service in accordance with local regulations. Contact your municipality or provincial government to find out how to dispose of CCA-treated wood in your area. (Most areas use ordinary trash collection or burial.)

**NEVER BURN TREATED WOOD.** Arsenic and chromium may be released into the environment as part of the smoke or remain in the ashes.

This information sheet is reviewed annually.

Revised: October 2001

Environment Canada Strategic Options Process  
Treater/Manufacturers Steering Committee

## 6 REGULATORY CONTEXT

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Both internationally and in Australia there is an active discussion by policy and decision-makers regarding the future regulation and availability of CCA as a timber preservative. This debate, according to the CSIRO, has arisen because of concerns ‘principally about CCA’s arsenic content’ and have resulted in restrictions to CCA use in the US, European Union, Canada and Japan, as well as reconsideration in New Zealand (CSIRO 2005). CCA-treated wood has been banned altogether in several countries including Denmark, Switzerland, Vietnam and Indonesia (CSIRO 2005; Hauserman, 2001).

Indeed, Australia is one of the last major CCA-producing countries to take an official position on the availability and use of CCA-treated timber. In advance of its final report the APVMA has sent official letters to timber treatment companies requiring variations to CCA container labels. However the APVMA position is weak compared with some other countries.

### 6.1 *European Union*

Since June 2004, the use of CCA-treated timber has been severely curtailed with an amendment of the European Union Commission Directive 76/769/EEC. This amendment now states that arsenic compounds may not be used ‘in the preservation of wood. Furthermore, wood so treated may not be placed on the market’. The only exceptions are wood to be used in industrial installation that ‘the structural integrity of the wood is required for human or livestock safety and skin contact by the general public during its service life is unlikely’. The following uses are specifically not allowed (Commission Directive 2003/2/EC, 6 January 2003):

- in residential or domestic constructions, whatever the purpose,
- in any application where there is a risk of repeated skin contact
- in marine waters,
- for agricultural purposes other than for livestock fence posts and structural uses...
- in any application where treated wood may come into contact with intermediate or finished products intended for human and/or animal consumption.

The EU amendment therefore restricts the marketing and use of both the CCA chemical as well as timber treated with CCA, and will also apply to imported treated wood and waste wood in re-use. In addition, it is anticipated that from 2007, CCA preservatives will require authorisation according to The Biocidal Products Directive (BPD)19 (Enviros Consulting *et al*, 2004). The EU regulations, however, do not apply to CCA-treated wood already in service. CCA-treated timber has not been as extensively used in Europe as it has in Australia however.

The EU amendment is the consequence of a risk assessment by the European Commission Enterprise Directorate General that identified a number of unacceptable risks, including risks to children from CCA-treated timber play equipment, environmental risks from combustion and disposal (including leaching in landfill) and to aquatic organisms, and health risks from use of CCA-treated timber (cited in DEFRA, 2003).

The European Communities’ Scientific Committee for Toxicity, Ecotoxicity and the Environment (CSTEE) evaluated this risk assessment, and determined that no threshold exists for the carcinogenic effects of arsenic (which is also known to be genotoxic). The CSTEE could not establish the arsenic-related risks of landfill disposal of CCA-treated timber, which is classified as a hazardous waste by the Commission in 2000, and thus concluded that it was appropriate to apply

the precautionary principle and, in the absence of proof of harm, reduce the production of CCA-treated timber as much as possible because it is likely to cause serious harm (CSTEE, 2003).

The treated timber industry has responded to these Directives by considering alternative treatments in order to maintain their market share over other materials. A representative from Arch Timber Protection UK, has boasted that since moving away from arsenic- and chromium-based timber preservatives in the mid-1990s, 'companies embraced the challenge and through the change to copper based preservatives, aggressively marketed own brands and unique features of their products. Contrary to many forecasts, the industry has flourished and benefited from the changes as treated wood continues to be the material of choice' (Connell, 2004).

In 2003, after a consultation process by the Department of Environment, Food and Rural Affairs, Great Britain adapted the above EC regulations (DEFRA, 2003). This resulted in closer attention being put on the timber treatment industry, with legal action being taken against a CCA timber treatment company for improper and unsafe use of pesticides and a fine of £30,000. Anglian Timber was found guilty of machining timber within 48 hours of treatment, transporting wet (unfixed) timber, and not providing personal protective equipment for employees (EHN Online, 2004).

In addition, in Northern Europe the use of chromium-based preservatives is also being restricted and they are banned in Denmark (Connell, 2004).

## **6.2 North America**

In February 2002 the US EPA announced that manufacturers had agreed to voluntarily phase out the production of CCA-treated timber for residential uses over the following 2 years and in January 2004 the EPA would officially ban the manufacture of CCA-treated timber for residential use. Although the EPA had not completed its latest risk assessment of CCA at that time, it claimed that because arsenic was a known carcinogen 'any reduction in the levels of potential exposure to arsenic is desirable' (Office of Pesticide Programs 2002a). A similar voluntary phase out for non-industrial uses was instituted in Canada (CPSC 2003a: 8).

From December 31, 2003, 'wood intended to be used in residential settings' could not be treated with CCA in the US. This includes use in playground equipment, decks, picnic tables, landscaping timbers, residential fencing, patios, and walkways and boardwalks (US EPA, 2004a). However, this regulation does allow retailers to continue to sell, and for consumers to buy and use the wood, until stocks are depleted (US EPA, 2004b). It is calculated that this will reduce CCA-treated timber production in the US by around 80 percent (NSW EPA, 2003b). A similar restriction applies to CCA-treated wood in Canada.

Although the US move away from CCA-treated timber in residential uses was supported by many concerned stakeholders, it is also criticized as not going far enough for some. Environmental groups who had been lobbying the EPA to ban CCA-treated timber immediately pointed out that the decision not only allowed continued sales of CCA-treated timber, but did nothing to deal with treated-timber already in the community. Older timber is just as likely to leach arsenic (Gray and Houlihan, 2002).

Belluck *et al* (2003) strongly criticize the US government failure to restrict public access in areas with high risks of arsenic contamination, which may include decking and playgrounds. They compare public spaces and residences containing arsenic-contaminated soils with hazardous waste sites, suggesting that there is an 'incorrect presumption that a given level of arsenic in surface soils at a hazardous waste site somehow poses more risk than the same level at an equally contaminated residential/public space site'. Indeed, they remind readers that hazardous waste sites have controlled access through fences or covers, unlike public and residential areas. The authors note that hazardous

waste sites are properly monitored and managed under statutes, while the ‘magnitude of [public and residential spaces] requiring investigation’ are unmanaged and provide open access to the public.

### 6.3 Australia

In Australia, there are currently a number of developments occurring with regard to management and regulation of CCA-treated timber by authorities with responsibility for CCA use and management. The CCA preservative is approved and regulated by APVMA and is only available to commercial treatment plants. National standards relating to the treatment and use of treated timber are set by Standards Australia (see below).

The Australian and NZ Environment and Conservation Council also produced *Australian Guidelines for Copper Chrome Arsenate Timber Preservation Plants* in 1996. The National Environment Protection and Heritage Waste Working Group have been asked to consider a national approach to CCA-treated timber waste (NSW EPA (2003b)). In a 2002 meeting, the EPHC acknowledged the economic importance of arsenic-based timber treatments, but also acknowledged the scientific and community concerns about impacts, the need to prevent harm, and the international trend to precautionary regulation (Scott, 2004).

NSW and Queensland have their own state regulations for CCA treated timber. In NSW, CCA-treated timber is registered for use under the *Timber Marketing Act 1977*, while the CCA chemical is regulated under the *Pesticides Act 1999*. Wood Preservation treatment plants must hold an environment protection licence, and are regulated in NSW under the *Protection of the Environment (Operations) Act 1997* (NSW EPA, 2003b; NSW EPA, 2003c).

The NSW Department of Environment and Conservation (DEC - incorporating the EPA) has identified CCA-treated timber as a ‘waste of concern’ that is suited to the extended producer responsibility scheme but it has not extended that producer responsibility to it yet as it is awaiting the APVMA recommendations. CCA-treated waste from the National Parks and Wildlife Service and the Botanic Gardens is sent to solid waste landfills that have a leachate collection system (NSW DEC, 2004a: 11).

As it has been deemed a ‘secondary priority’ as a waste of concern, the Expert Reference Group will meet with the timber industry and then decide on a course of action, to be determined by mid-2005. (As noted earlier, Victoria is delaying action on treated timber waste till 2009/10.) The options being considered in NSW are:

- to track the industry and keep a watching brief,
- to upgrade the waste to a priority waste (which then requires industry to take steps towards meeting EPR requirements within 12 months), or
- to drop the waste from consideration (although this is unlikely).

The EPR framework encourages industry to undertake voluntary action in order to seek waste solutions, but under the Waste Avoidance and Resource Recovery Act (NSW), the Minister has the power to legislate if industry fails to adequately address the issue, and if the national initiatives recommended by the APVMA are not effective in NSW. This is supposed to put additional pressure on industry act voluntarily. (Young, A., Director, Extended Producer Responsibility Framework, NSW Department of Environment and Conservation, *Pers. Comm.*, 29/11/04).

## 6.4 Standards Australia

It is the existence of Australian standards that has reassured shire councillors and others responsible for installing treated timber in public areas with the thought: 'Of course its OK for kiddies to play on CCA timber, the standard says it's OK'. But how reliable are these standards? The relevant standards produced by Standards Australia are:

- AS/NZS 2843 *Timber Preservation Plant Safety Code*
- AS/NZS 1604 *Standards for Specification of Preservative Treatment*
- AS/NZS 1605 *Methods for sampling and analysing timber preservatives and preservative-treated timber*
- AS5605 Guide to the safe use of preservative-treated timber (Interim standard)

These standards are currently undergoing revision.

Standards Australia has attracted some criticism for the way its standard setting committees are stacked with industry people as can be seen in Table 6.1 below:

**Table 6.1: Membership of the Standards Committee for Timber Preservatives**

Timber Interests	Independent Members
<ul style="list-style-type: none"> <li>• A3P – a merger of Plantation Timber Association of Australia (PTAA) and the Australian Plantation Products and Paper Industry Council (APIC)</li> <li>• Australian Timber Importers' Federation</li> <li>• CSIRO Forestry &amp; Forest Products</li> <li>• Forests New South Wales</li> <li>• Glued Laminated Timber Association of Australia</li> <li>• Independent Chairman</li> <li>• LOSP Treated Timber Association</li> <li>• New Zealand Forest Research Institute</li> <li>• New Zealand Timber Industry Federation</li> <li>• New Zealand Timber Preservation Council</li> <li>• Plywood Association of Australasia Limited</li> <li>• Timber Preservers Association of Australia (TPAA)</li> <li>• Timber Promotion Council</li> <li>• Timber Queensland</li> </ul>	<ul style="list-style-type: none"> <li>• Australian Pesticides and Veterinary Medicines Authority (APVMA)</li> <li>• Consumers' Federation of Australia</li> <li>• Department of Primary Industries and Fisheries Queensland</li> <li>• Engineers Australia</li> <li>• Housing Industry Association</li> <li>• RMIT University</li> </ul>

Source: Standards Australia, 2005a

The 'independent' chairperson has been placed in the timber interests camp because it is Harry Greaves, who is chair of the Timber Preservers Association of Australia's (TPAA) technical committee. The TPAA is 'an organisation comprising timber treaters, suppliers of preservatives, research organisation and individuals and organisation having an interest in the use of preservative treated timber.' TPAA has worked closely with Koppers Arch in defence of CCA. Some say TPAA was specifically formed to add another industry voice to the standards committee. Its former technical committee chair was an employee of Koppers-Hickson and represented the TPAA on the standards committee.

Greaves supplied the content for the TPAA website which states that 'In normal conditions, the use of treated timbers presents no hazards to people or animals or the environment' and that CCA preservatives 'will not leach out even when in contact with running water' (<http://www.tpaa.com.au/>). Greaves was recently quoted in the Tasmanian *Mercury* as saying that

‘A child would need to crawl on a fresh deck every day of its life and lick up every piece of arsenic to have an increased risk.’ (Whinnett, 2003)

The CSIRO Division of Forest Products, has also been placed in the timber interests camp because it has been funded by various timber preservation companies, including Koppers Arch. CSIRO Forestry and Forest Products candidly states on its web page: ‘We work closely with industry, and are keen to provide collaborative or contracted services to complement our efforts in fundamental research’ (CSIRO, 2003). The Housing Industry Association and Department of Primary Industries and Fisheries Queensland do have interests in timber, but they have been given the benefit of the doubt and labelled as independent.

The situation of perceived bias is exacerbated by the fact that the consumers’ representative and the independent expert from RMIT do not seem to attend the meetings (see Table 6.2). This means that the person representing Engineers Australia is one of the few members of the committee without a vested interest. Peter Campbell, who has represented Engineers Australia on the committee, has pointed out although he has been the only engineer on the committee, he had great difficulties having his concerns incorporated in the standards because of what he calls ‘vendor capture’ of the Standards (Beder 1999).

**Table 6.2: Standards Australia Timber Preservation Committee Meeting Attendance**

	Aug 03	Feb 04	April 04	Aug 04
A3P				
APVMA	present	present	present	present
Aust. Timber Importers’ Federation				
CSIRO	present	present	present	present
Consumers Federation of Australia				
Dept. Primary Ind. & Fisheries, Qld	present	present	present	present
Engineers Australia	present	present	present	present
Forests NSW	present	present	present	present
Glued Laminated Timber Assn				
Housing Industry Association	present	present	present	present
Chair	present	present	present	present
LOSP Association			present	present
NZ Forest Research Institute	present	present	present	present
NZ Timber Industry Federation				
NZ Timber Preservation Council	present	present	present	present
Plywood Association	present	present	present	present
RMIT				
Timber Preservers Ass. Of Aust.	present	present	present	present
Timber Promotion council				
Timber Qld	present	present	present	present

Source: (Standards Australia, 2005b)

The committee has drafted a new standard, AS5605: Guide to the Safe Use of Preservative-Treated Timber. Given the composition of the committee which drafted it and the attendance at meetings it is not surprising that this is a very weak document. In the forward it states that “routine monitoring by state occupational health authorities in Australia over the past decade has not produced any evidence to suggest that properly treated, commercially used timber in Australia is damaging to individual health when appropriate personal protection measures are employed” and the risk is “quite minimal” because “preservatives are localized on and within the wood” (Standards Australia, 2003). However it does not note that no health studies have been done of the impacts of CCA treated timber on health and that the long-term chronic health impacts, such as lung cancer, are not specific to treated timber exposure and are unlikely to be identified as such.

The standard does however recognise that some people are more sensitive than others and that people should “take normal common-sense precautions” when handling treated timber “to avoid splinters and inhalation of dust” and that “offcuts and waste material should not be burnt in confined spaces or in barbeques”. In addition it recommends that CCA-treated timber should not be placed in direct contact with foodstuffs or drinking water, although it seems to think that CCA-treated timber structures in large bodies of water upstream of water supply, such as wharves, docks and bridges, are okay. Surprisingly, the standard says that small quantities of CCA-treated timber off-cuts and waste “may be disposed by ordinary waste collection or burial” (Standards Australia, 2003).

The Worldwide Fund for Nature (WWF) is amongst those concerned about several aspects of this proposed standard. In its submission, WWF criticised the Standard’s lack of mandatory restrictions for the use of CCA treated timber and the lack of management suggestions to prevent CCA-treated timber contaminating used wood intended for fuel wood (Rouse, 2004a)

## 6.5 APVMA Review

When reconsidering the registration of a chemical, the APVMA undertakes a substantial review of available literature and information, then analyses this information in collaboration with government departments, including the Office of Chemical Safety in the Department of Health, the Department of Environment and Heritage, and the National Occupation Health and Safety Commission. A call for submissions is made, and for the review of arsenic-based timber treatments the APVMA received submissions from a ‘wide spectrum of the community, including individuals, relevant state departments, CSIRO, environmental groups and timber industry groups’ (APVMA, 2003b). Of particular note, the APVMA does not conduct independent testing, but relies on existing data provided by industry, academics and individuals. This can result in significant data gaps, which was a concern for this review.

The APVMA engages with a number of committees, including the Community Consultative Committee (CCC), which receives concerns from community members. During the CCA review, CCC representatives from the WA Farmers Federation and the Australian Workers Union reported Occupational Health and Safety concerns by farmers and fencers who work with CCA-treated timber. It also received enquiries from parents, schools and pre-schools, and people with CCA-treated timber in their gardens (Stanton, A., APVMA Community Consultative Committee, *Pers. Comm.*, 4/11/04).

Before the draft review was finalised, the APVMA sent out a press release to ‘put industry on notice that it intends to stop the use of Copper Chrome Arsenate (CCA) as a timber treatment in certain domestic situations’, and stating intentions to prohibit the use of CCA-treated wood in decking and children's playground equipment (APVMA, 2003d).

The APVMA (2003a, p.11) review made 5 recommendations in its draft review, namely:

1. CCA timber treatment products be declared Restricted Chemical Products...
2. CCA product labels be varied to recommend that timber treatment facilities be designed and operated to meet appropriate Australian Standards...
3. Product labels be varied such that uses of CCA timber treatment products are not permitted on timber intended for use in structures such as picnic tables, deckings, handrails and children’s play equipment.\*
4. Product labels be varied to include more detailed instructions for application, mixing and vacuum/pressure operations, management of freshly treated timber, management of liquids, sludge or waste material containing CCA residues, protection of wildlife, fish, crustaceans and the environment, and storage and disposal.

5. Registrants be required to generate worker exposure data in relation to risks associated with arsenic and chromium (VI) in CCA.

\* Implementation of this recommendation is contingent upon the successful development of effective ways to segregate CCA-treated timber products that should not be used in specified domestic applications.

Despite the improved management that these recommendations should bring, there are some concerns that they do not go far enough. While Recommendation 1 requires the CCA chemical to be restricted, CCA-treated timber will still be available to be purchased and used by untrained laypeople for a permitted use, such as for use as garden edging or a fence around the backyard (Putcha, S. APVMA, *Pers. Comm.*, 21/12/04). The effectiveness of recommendation 2 is dependent on Australian standards set by a committee where the timber industry is overrepresented. The variations to labels in Recommendation 3 only apply to the chemical container, not to pieces of treated timber. The timber will merely be branded 'Treated with Copper Chrome Arsenate' (Putcha, S. APVMA, *Pers. Comm.*, 21/12/04).

In late 2004 the APVMA sent letters to the timber treatment, advising them that the recommendations from the draft review will involve changes to instructions on chemical labels and mandatory user training. In this letter, the APVMA invited timber treatment registrants and the timber industry to 'work with us to develop suitable new label instructions'. The latest date for providing amended labels is February 2005. (Hogg, 2004).

## **6.5 Responses to APVMA Review**

The reactions to the APVMA's review have been varied. The CSIRO's Forestry and Forest Products division is anticipating improvements in CCA industry safety, including introductions of a test to ensure that treated timber is completely dry before leaving the workshop, and improved awareness through the label changes and a pamphlet on the 'do's and don'ts' for handling treated timber that will be available to all consumers (Cookson, L., Forestry and Forest Products, CSIRO, *Pers. Comm.*, 14/12/04).

The treated timber industry, although they consider the findings to be an 'over-reaction by the APVMA', are intending to cooperate. Koppers Arch, the largest timber preserver, states 'it is now incumbent upon us to comply with our obligations and work through the necessary changes' (Koppers Arch, 2004). The wine industry, one of the most significant users of CCA-treated timber, is relieved there is no recommendation to limit this use. One of their publications stated 'many grapegrowers will sigh with relief at this outcome; the continued use of CCA-treated posts in vineyards is assured' (Smith and Mollah, 2004) as are the significant volumes of hazardous waste from used vineyard stakes.

Community representatives consider that the review has some considerable short-comings arising from the fact that the APVMA does not undertake its own research and the limited scope of APVMA's powers. The majority of chemicals reviewed by APVMA can be adequately managed through variations to their labels. However, many of the environmental and social impacts associated with CCA occur during use and disposal of the products that are treated with CCA, not the CCA itself (Immig, J., APVMA Community Consultative Committee, *Pers. Comm.*, 22/11/04). Varying the label information for CCA may be unlikely to have sufficient impact on the use of wood treated with CCA, and the APVMA has explicitly stated that they have 'no regulatory authority over existing CCA-treated timber structures' (APVMA, 2003a, p.31). Nor can they make recommendations regarding disposal of used CCA-treated timber.

This situation requires another authority to develop strong policies to manage these, such as EnHealth, a government body formed under the National Environmental Health Strategy to address both traditional and modern health hazards. The hazards pertaining to the adverse affects of CCA-treated timber, which would be covered by EnHealth, include water pollution from industry and hazardous waste accumulation, although CCA is not currently formally defined as hazardous waste in Australia. State-based environmental authorities should also regulate CCA-treated timber to minimise waste impacts, as the NSW DEC is intending to do under the Extended Producer Responsibility framework (NSW DEC, 2004).

A further concern with the APVMA review is the need for more research. Marianne Lloyd-Smith of the National Toxics Network (*Pers. Comm.*, 1/11/04), is concerned that the APVMA only reassesses existing data rather than doing its own original research. Its review is therefore hampered by the limitations of the existing studies and a resultant lack of data, which then limits the knowledge base on which the APVMA can make recommendations.

In this review, the APVMA identified data gaps for oral and dermal intake of arsenic related to playground exposure for Australian situations, and in the understanding of whether additional inorganic arsenic dislodged from treated timber surfaces would raise the level of arsenic above an acceptable level. The APVMA has also called for more worker exposure data. However the APVMA is not explicitly concerned about where funding sources for research will come from to close these knowledge gaps, such as epidemiological studies and studies into plant uptake of arsenic into the root tissue (Putchá, S. APVMA, *Pers. Comm.*, 21/12/04).

This situation is further compounded by the lack of available non-industry funding to research bodies such as the CSIRO which have been unsuccessful in attracting research grants or industry contributions for work that may result in limiting the treated timber industry market. As 35% of CSIRO's research budget comes from industry contributions (CSIRO, 2004), research proposals that may lead to the banning of CCA have not attracted funding from the timber treatment industry.

The CSIRO's Laurie Cookson has identified a number of research possibilities that would broaden Australia-specific knowledge on the impacts of CCA treated timber. These include leaching trials of treated timber being used in Australian conditions; further research into the issue of spent vineyard stakes; and studies of the uptake of CCA chemicals by oysters. None of these projects have successfully secured funding, and he stated that 'it is easier to get funding for termite research'. This situation is despite innovations by CSIRO's forest products laboratory that have resulted in the granite guard against termites; plastic wraps for marine piles that reduce the level of treatment required; and creosote-treated poles covered in plastic to prevent leaching. The knowledge gaps are likely to remain whilst the CSIRO and the universities are reliant on industry funds for expensive and long-term research (Cookson, L., Forestry and Forest Products, CSIRO, *Pers. Comm.*, 14/12/04).



## 7 ALTERNATIVES TO CCA

There is an active international discussion regarding substitute materials for treated timber and alternative preservatives for timber, particularly in those jurisdictions where the use of CCA-treated timber has been significantly limited, such as the EU and US. International symposiums are regularly planned for industry, government and academic researchers. Indeed, in March 2005, the American Chemical Society is hosting the *Health, Environment And Efficacy Issues In The Development Of Commercial Wood Protection Systems*, and the International Research Group on Wood Preservation is planning their 6<sup>th</sup> symposium for February 2005, which will consider issues new wood preservatives and treatments and risk and waste management in wood preservation.

### 7.1 Chemical Alternatives to CCA

There are several alternative chemicals being promoted as alternatives to CCA, as listed in Table 7.1. None of the available alternatives is a complete substitute on its own for all the uses of CCA and, although they do not involve arsenic or chrome, they still pose environmental and health risks.

**Table 7.1: Description of Chemical Alternatives to CCA**

CCA Alternative	ACQ	CBA	CDDC	CC	LOSP	CCA (for comparison)
<b>Full name</b>	Alkaline copper quaternary	Copper boron azole	Copper dimethyl-dithiocarbamate	Copper citrate	Liquid Organic Solvent Preservative, including tri-butyl-tin (TBT) and permethrin	Copper chrome arsenate
<b>Delivery of treatment</b>	Water-based solution <sup>4</sup>	Water-based solution <sup>4</sup>	Water-based solution <sup>4</sup>	Water-based solution <sup>4</sup>	Hydrocarbon solvent <sup>4</sup>	
<b>Applications</b>	For all except marine immersion <sup>4</sup>	For all except marine immersion and freshwater <sup>4</sup>			For above ground applications only <sup>4</sup>	
<b>Impact of copper</b>	More leaching than CCA—thus higher aquatic toxicity <sup>1</sup>	More leaching than CCA—thus higher aquatic toxicity <sup>1</sup>	Less leaching than CCA (likely due to being more strongly 'fixed') <sup>1</sup>	More leaching than CCA—thus higher aquatic toxicity <sup>1</sup>		
<b>Corrosivity</b>	More corrosive to brass and bronze than CCA <sup>3</sup>	Same as CCA <sup>3</sup>	Same as CCA <sup>2</sup>	More corrosive to brass and bronze than CCA <sup>3</sup>		
<b>Other risks</b>	Leached most boron <sup>1</sup>	Leached most boron <sup>1</sup>			Hydrocarbon solvents risky as air and storm-water pollution at treatment plants; volatile organic compounds make it difficult to work with <sup>4</sup>	As listed in this report. Confirmed to leach As, Cu and Cr. Groundwater contamination 2-20 times higher than other chemical treatments <sup>1</sup>
<b>Benefits</b>	No leaching of As or Cr <sup>1</sup> ; Lower mammalian toxicity than CCA <sup>3</sup>	No leaching of As or Cr <sup>1</sup> ; Lower mammalian toxicity than CCA <sup>3</sup>	No leaching of As or Cr <sup>1</sup> ; Lower mammalian toxicity than CCA <sup>3</sup>	No leaching of As or Cr <sup>1</sup> ; Lower mammalian toxicity than CCA <sup>3</sup>		
<b>Cost</b>	10-30% higher than CCA <sup>3</sup>	N/a	10-30% higher than CCA <sup>3</sup>	N/a	Higher than CCA	Cheapest- perhaps due to high demand

<sup>1</sup>Townsend *et al*, 2003a; <sup>2</sup>Solo-Gabriele *et al*, 2000; <sup>3</sup>Lebow, 2004b; <sup>4</sup>NSW EPA, 2003c.

In addition, many of the alternatives listed in the table cost between 8 and 15 percent more than CCA-treated timber, although it is anticipated that costs will fall if demand rises because of limitations to the use of CCA (NSW EPA, 2003b).

These alternative chemicals employ copper as the main biocide, but also include co-biocides mainly to prevent copper-tolerant fungal decay (Lebow, 2004b). In their evaluation of alternative

chemicals, Solo-Gabriele *et al* (2000) noted that ‘viable non-arsenical waterborne alternatives are available for above ground and ground contact applications’, which accounts for 60% of the treated wood volume. However, little is known of the impact of the co-biocides, and they recommend that their environmental impacts be further evaluated before they are promoted. Townsend *et al* (2003a) also warn against complete changeover to these chemicals, recommending chemical alternatives to CCA for all situations except those that might ‘impact sensitive aquatic ecosystems’, especially those with limited flushing (Townsend *et al*, 2003a).

Finally, if CCA-treated timber is to remain in place, the leaching and dislodgement impacts can be reduced temporarily by coating with a stain. Research by Strömberg (2003) found that acrylic coatings and stains provided the longest protection. She also determined that the manual application and drying of this stain was the most important phase in terms of minimizing the resultant environmental impacts. Lebow *et al* (2003) also determined that paint or pigmented stains provided an effective short term barrier to prevent CCA leaching from the treated timber, noting that clear stains or not sealing the timber quintupled the rate of leaching due to ultra-violet exposure.

## 7.2 Physical Alternatives

Much of the discussion around CCA looks toward less toxic, chemical treatments. However, there is a broad spectrum of non-chemical wood treatments as well as substitute materials that do not require treatment with toxic metals.

Untreated hardwoods that are naturally pest-resistant, such as cedar, redwood, beech, and some species of Eucalyptus, can provide a timber alternative (Feldman, 2002; Robinson *et al*, 2004). Alternatively, wood susceptible to termites and fungal rot can be heat- or radiation-treated. This treatment, which has been commercialized by some European companies, alters the ‘structure and/or composition of the wood, rendering it less susceptible to biological attack or alternatively destroys wood degrading organisms in situ’. An additional benefit to this treatment is that the waste wood can be easily reused as fuel wood (Enviros Consulting *et al*, 2004, p135).

Timber can be substituted by other materials, depending on the required performance. These include steel, concrete, plastic marine pilings, composite lumber made with recycled plastic, some of which can be recycled material to reduce the environmental impacts of its manufacture and disposal (Feldman, 2002; Robinson *et al*, 2004). Alternative materials for vineyard stakes might include untreated hardwood, creosote-treated pine and hardwood, precast concrete, old rail line, steel, plastic, and plantation thinnings (Smith and Mollah, 2004). Physical barriers such as metal mesh, specially graded granite chips, or an exposed concrete floor slab, can be installed to prevent termite damage in homes, supplemented by active early detection facilitated by raised floors and ant caps (WA DOCEP, 2004).

The CSIRO continues to promote the use of CCA-treated timber because alternatives include ‘more environmentally harmful materials such as aluminium, steel and concrete. These are not renewable, and greenhouse gases are generated in large quantities during their manufacture’ (CSIRO, 2005). When interviewed, it appears they have evaluated ‘environmental harm’ based on embodied energy and its greenhouse implications (Cookson, L., CSIRO Forestry and Forest Products, *Pers. Comm.*, 14/12/04) whilst neglecting CCA-treated timber’s potential to create soil and water contamination, health problems, toxic waste, and an ongoing legacy of spent timber and ash.

The problem is that there is little incentive to research and develop cost effective alternatives whilst CCA is readily available for use. *Chemistry and Industry*, the magazine of the Society of Chemical Industry in the UK, reported that in Europe, the ‘increasing scrutiny’ that CCA treatments was coming under in the 1990s was ‘one of the major driving forces in the development of new wood preservation systems.’ (Suttie, 1997).

In Australia, the Forest and Wood Products Research and Development Corporation, a government statutory body, has not sponsored much non-biocidal R&D, reasoning that industry prefers a 'treatment that has been tested in a range of climatic and geographical applications'. It claims there is 'reluctance by design engineers to use/specify any materials that have not been treated to a stated degree of uniformity, and a concern that the physical treatments would alter the mechanical properties (eg durability and performance) of the wood' (Lafferty, C., Forest and Wood Products Research and Development Corporation, *Pers. Comm.*, 29/11/04). The focus of Australian funding on biocidal R&D for wood preservation will obviously limit the development of non-chemical alternatives in Australia.

### 7.3 Industry Responses

Koppers Arch sells an alternative called Ecowood (treated with ACQ), which it says performs just as well as CCA-treated timber. In answer to the question of why it promotes alternatives to CCA if CCA is so safe, Koppers Arch responds: 'We want to give the consumer and user more choice and balanced information on the alternatives available.' It states 'We do not support the discrediting of, or negative references to CCA as a way of promoting alternatives' (Koppers Arch, 2003b).

So why does the timber industry promote and market CCA-preservatives when they are likely to be hazardous and there are alternatives available? The answer may be found in one of Koppers Arch's industry newsletters 'The CCA Question: What should we do?' (Carruthers, 2002), which examines the options available to the industry in Australia in the light of regulatory actions overseas:

1. Do absolutely nothing and see what happens.
2. Dig in deep and defend CCA to the hilt for the sake of the local markets.
3. Proactively change from using CCA to alternatives in selected applications/products that are perceived to be more "sensitive".
4. Withdraw CCA for all uses.

The article, by Kopper Arch's marketing manager, Peter Carruthers, considers that doing nothing and withdrawing CCA are not viable options. Whilst he admits there is considerable support for changing to alternative treatments he points out that these alternatives are expensive (complete arsenic removal from treatment plant machinery during conversion also adds to costs). Significantly he notes that 'there could be a risk that enforcing this change in certain product areas may just cause loss of market to substitute materials' (Carruthers, 2002). If the price of treated timber increased then consumers might choose other materials such as plastic, steel or concrete, which would mean a loss of business for the timber industry.



## 8 CONCLUSIONS AND RECOMMENDATIONS

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This report has highlighted a large number of CCA-treated timber issues that pose environmental and health risks to the community. Below are some Australia-specific recommendations that address both immediate and longer-term concerns.

### **In-situ CCA-treated timber**

CCA-treated timber that is currently in-service or in-situ leaches chemicals and these chemicals can be transferred onto people's hands and wash into the surrounding soil. Combustion of CCA-treated timber fences and decks, for example during bush-fires, produces environmentally-harmful dioxins and furans, as well as elevated levels of heavy metals. Although the APVMA review recommends that CCA-treated timber not be used in certain residential situations in future, it does not address the timber currently in place in similar situations. If it isn't safe for future use, it isn't safe for current use. It is recommended that:

- CCA-treated timber is removed from use in all residential and public spaces within the next two years;
- Whilst CCA-treated timber remains in place it should be sign-posted with warning signs to ensure that people do not touch it, as already occurs in parts of the US;
- CCA-treated timber that remains in place should be coated with water-borne acrylic paints and stains every six months but permanently tagged so that it can later be identified;
- All access to arsenic-contaminated public and residential sites should be publicly listed by governments on a contaminated site registry and controlled until the sites can be fully remediated;
- Funding should be allocated for removal and cleanup with significant contributions from the timber preservative industry.

### **Disposal**

There is currently no adequate management of waste CCA-treated timber. As the waste is not classified as hazardous in Australia, it is being deposited in unlined landfills and burned (a regular practice in vineyards during autumn). Both are dangerous methods of disposal. The APVMA review does not provide any useful recommendations to alter this situation. Despite the lack of options, CCA-treated timber continues to be manufactured and widely used, increasing the volume that will require disposal. It is recommended that:

- CCA-treated timber waste is immediately classified as hazardous waste;
- Landfill disposal is a last resort and only properly engineered, lined landfills are used for this purpose;
- 'Cradle to grave' life cycle management of CCA products should be adopted immediately to minimise environmental and health risks;
- Reuse, recovery and recycling of CCA products be employed where they are fully researched and demonstrated to be safe;
- Further research be commissioned into waste management technologies for the waste;
- CCA registrants be required to demonstrate that emissions and waste arising from their activities do not pose an off-site health or environmental risks; and
- Incineration only be carried out if toxic gases, ash and other by-products can be captured and dealt with safely.

## Community awareness

As the survey of CCA-treated timber retail outlets and information services in this report demonstrates, there is little balanced information being provided to consumers about the risks associated with CCA-treated timber. It is recommended that:

- Full information on the environmental and health risks associated with handling, use and disposal of CCA-treated timber be provided immediately at all retail outlets through pamphlets accompanying every purchase, labels on all treated wood products, and informed staff. Materials Safety Data Sheets should accompany all stocked products;
- A nation-wide community awareness campaign (that includes schools) be conducted that ensures widespread awareness of the need for proper handling, use and disposal of CCA-treated timber be carried out immediately;
- Local councils, television renovation and ‘do-it-yourself’ programs, and other influential information sources be required to communicate safety requirements, risks and alternatives to CCA-treated timber.

## Regulation of CCA

The APVMA has limited authority in terms of managing CCA-treated products and can only make recommendations on the use and management of the CCA chemical. This authority does not have the mandate to make significant changes to the use, disposal and available alternatives to CCA-treated timber. It is recommended that:

- An authority, or a set of authorities working collaboratively, be given responsibility to:
  - manage the replacement of current in-service CCA-treated timber;
  - regulate and monitor industries that manufacture, use and dispose of CCA-treated timber;
  - undertake or commission necessary research into the risks associated with CCA-treated timber (manufacture, use and disposal);
  - regulate and monitor restrictions on future CCA uses and recommend alternatives;
  - classify CCA-treated timber waste as hazardous waste and ensure its safe disposal;
- Standards Australia reconstitute its timber preservative committee to better reflect community concerns and to ensure that it is not dominated by timber industry interests;
- The reconstituted standards committee revise AS5605: *Guide to the safe use of preservative-treated timber* and other relevant standards according to the Precautionary Principle; and
- Industries that may inadvertently recycle or re-use CCA treated timber be better regulated and monitored.

## Research and Development

There is a lack of knowledge about the impacts of CCA-treated timber in the Australian environment. Since the timber industry is unlikely to fund such research, there is a need for independent research. Furthermore, the research that is being undertaken focuses mostly on alternative chemicals, although they pose a range of environmental and health risks as well. It is recommended that non-industry linked research funding is made available in sufficient amounts to enable researchers to:

- Investigate non-biocidal wood treatment alternatives and the performance of alternative materials;
- Conduct epidemiological research on the health impacts of CCA exposure on timber workers, as well as on agricultural animals, such as horses;
- Carry out a comprehensive mass testing programme of Australian playgrounds to determine how much arsenic children are ingesting;

- Undertake epidemiological studies that are properly extrapolated to the risks for children, taking into account the different rate of metabolism for children;
- Measure the actual amount of arsenic residue on the surface of CCA-treated timber of different ages, as well as levels of arsenic in the surrounding soil, and investigate the factors that influence this;
- Investigate synergistic toxicity of CCA acting as a combination, rather than extrapolating the risks of each element acting alone;
- Determine the environmental risk to aquatic environments posed by CCA-treated timber;
- Understand the environmental risk associated with the use of CCA-treated timber in commercial applications, such as farm fencing, poles and bollards;
- Measure the level of plant uptake of arsenic in Australia, including through the roots; and
- Develop technologies to safely remove arsenic, chromium and copper from CCA-treated timber prior to landfill or re-use.

## Conclusions

The Precautionary Principle requires that action be taken to minimise the health and environmental impacts of CCA-treated timber before this research is carried out. Should it later be demonstrated to everyone's satisfaction that CCA-treated timber is actually safe to use, then its use can be permitted. Until such time, it is appropriate to limit its use to situations where health and environmental impacts are likely to be minimal and to use safer alternatives whenever feasible. Since, as the CSIRO have found, arsenic is not required for the control of termites (CSIRO, 2005), non-arsenic alternatives can be used effectively in most situations.



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