

SUBJECT: PRELIMINARY ASSESSMENT OF CONTAMINATION ASSOCIATED WITH
CCA TIMBER TREATMENT PLANTS IN THE AUCKLAND REGION

FROM: Group Manager
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(This report is confidential until it has been considered by the Committee and is not to be construed as Council policy until adopted).

REPORT

INTRODUCTION

A preliminary survey of CCA (copper-chromium-arsenic) timber treatment plants was initiated to identify potential "problem" sites that may have been contaminated as a result of CCA timber treatment activities. CCA timber treatment solution is considered a "hazardous substance", which is defined in the Resource Management Act 1991 as any substance that may impair human, plant or animal health or may adversely affect the environment.

At the time the survey was carried out there were sixteen known CCA timber treatment sites in the region and fifteen of these formed the basis of the survey, one of the sites being discounted because it had already been the subject of extensive contamination assessments. The survey included the inspection of all the timber treatment plants and carrying out an initial sampling and analysis program. The aim of the sampling program was to determine whether contamination is present on-site and if off-site contamination of watercourses had occurred.

Contamination assessment has been based on site history, site condition and the sample analysis results. As there was little historical information available for most of the sites, the assessment has relied primarily on the condition of the site during inspection and the results of sample analyses.

Regional Councils have responsibility under the Resource Management Act for the control of the use of land for the purpose of the prevention or mitigation of any adverse effects of the storage, use, disposal or transportation of hazardous substances and the control of discharges of contaminants into or onto land, air or water. This survey was initiated as a part of an on-going programme of activity specific surveys being undertaken by the Council and in accordance with these statutory responsibilities.

To assist in clarifying the contaminated site issue, the Ministry for the Environment released a document last year entitled "Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites" which was prepared by the Australian and New Zealand Environment and Conservation Council. The guidelines provide a framework for the assessment of contamination and this survey was performed in accordance with this framework. In addition, the Department of Labour and the Ministry for the Environment released the "Code of Practice for the Safe Use of Timber Preservatives and Antisapstain Chemicals" last year. The Code sets standards to protect worker safety and health, as well as provisions concerning the protection of the environment from these chemicals. The guidelines and the Code are discussed in more detail in Section 3 of this report.

As a result of the preliminary assessment it is proposed to extend investigations beyond contamination from CCA treatment plants to include all treatment plants with the objective of identifying contamination from other treatment chemicals considered to be hazardous substances, particularly organochlorine pesticides such as pentachlorophenol (PCP). Also, an assessment for groundwater contamination is about to be carried out at one of the sites surveyed which is situated above the edge of two volcanic aquifers.

2.**BACKGROUND**

Exotic timber grown in New Zealand is often treated with antisapstain chemicals and preservatives. Antisapstain treatment is utilised to provide temporary protection of freshly cut timber from fungal and bacteria attack. Long term protection of timber from decay caused by insects, mites, bacteria and fungi, is achieved by treatment with preservatives such as CCA and light organic solvent preservative (LOSP).

Treatment of timber with CCA solution has been one of the more common methods of long term protection, or "preservation", of exotic timber since the 1940's. The process has become more sophisticated over the years, but basically consists of the impregnation of timber with CCA solution in a chamber under pressure.

Briefly, the process utilises a steel pressure vessel into which the dry untreated timber is placed. Air within the vessel is pumped out to create a vacuum and hence remove as much air as possible from the wood cells. CCA solution is then pumped into the vessel and the timber becomes pressurised with the solution. The pressure is maintained until the required uptake of the preservative chemicals is achieved. This is usually followed by a final vacuum stage to remove surplus solution from the timber, minimising drip from the timber after treatment.

Contamination of the treatment site soils and any nearby watercourses typically results from spillages and inadequate containment of solution dripping from freshly treated timber. Many treatment plants have sealed and banded areas, known as "drip pads", where freshly treated timber is stacked to dry. These pads have totally enclosed drainage systems so that dripped solution can be recycled. However, in practice dripping timber is often removed from the drip pad before it has dried sufficiently and there are numerous plants in the Auckland region with no sealed or banded drip area.

The Auckland Regional Council recently successfully prosecuted a timber treatment company for the discharge of CCA solution at one of the plants surveyed. Two other companies are currently subject to legal action after the discharge of organochlorine and tributyl tin treatment chemicals. The Council has previously prosecuted several other companies for CCA discharges under the repealed Water and Soil Conservation Act (1967). The Council has also been the subject of an unsuccessful High Court liability case regarding Hickson Timber Ltd's Onehunga timber treatment site which was contaminated with timber treatment chemicals.

The issue of concern to the Environmental Management Department is one of a range of historical contaminated site issues resulting from the use, storage and disposal of environmentally hazardous materials.

3.**NATIONAL OVERVIEW**

As mentioned in the introduction, the Department of Labour (Occupational Safety and Health) and the Ministry for the Environment last year issued the "Code of Practice for the Safe Use of Timber Preservatives and Antisapstain Chemicals" ("the Code"). The Code was developed in consultation with timber industry representatives and regional councils. It is intended to protect the safety and health of workers and provide protection for the environment. The environmental provisions of the Code are expected to be a guide for regional and territorial

councils when preparing plans and policy statements and when considering consents under the Resource Management Act 1991 (RMA). However, the Code only deals with current activities and does not consider past contamination, nor does it deal comprehensively with the potential for environmental contamination.

Environmental provisions in the Code include requirements for adequate bunding of timber drying areas, minimum retention times within the drying area and appropriate stormwater management. The implementation of these provisions should significantly reduce potential future contamination of the environment from timber treatment chemicals. The Ministry for the Environment expects all timber treatment plants to comply with the environmental provisions of the Code within 3 years.

In early 1991 the Ministry for the Environment convened a National Task Group (NTG) for the purpose of investigating the significance of environmental contamination from the use of timber treatment chemicals, particularly the antisapstain pentachlorophenol (PCP). The NTG undertook and commissioned studies into PCP contamination of the environment from Waipa Saw Mill near Rotorua, and the use of PCP in New Zealand as well as setting up a register of sawmill and timber treatment sites where PCP may have been used.

The NTG was disbanded in July of this year after completing its brief and releasing its final report. However on the recommendation of the NTG, the Ministry for the Environment is currently convening a national Steering Committee with various technical sub-groups to develop long term controls to prevent and mitigate site contamination from the timber treatment industry. The Steering Committee will be made up of representatives from the Ministry for the Environment, Department of Health, Regional Councils and the Timber Industry. The Steering Committee is to act as an advisor to the Ministry for the Environment which intends to engage consultants to undertake the following work:

- a) To prepare a set of criteria on scientifically defensible water and soil criteria, guidelines or standards for timber treatment chemicals, particularly PCP and CCA.
- b) To ensure that in developing these guidelines that both health and environmental aspects are taken into account.
- c) To develop techniques for the rapid assessment of sites for contamination by PCP, dioxin and CCA.
- d) To develop techniques for ranking sites in terms of their potential for adverse effects on health and the wider environment.
- e) To develop protocols for sample collection, sample analysis and clean-up.
- f) Investigate clean up and Code of Practice best practicable option.

It is anticipated that a draft report covering these issues will be circulated to the regional councils by April 1993. Clearly once this information is available regional councils will be able to address timber treatment site contamination with an approach that is consistent throughout New Zealand.

The previously mentioned Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, known as the ANZECC guidelines, were developed from international practice for the Australian and New Zealand environment. The guidelines specify typical background levels of potential soil contaminants and "interim investigation threshold" levels above which a contamination assessment should be carried out. The threshold levels were taken from Dutch regulations and only intended to be used as a guide and site specific factors need to be considered when applying these values.

COPPER-CHROMIUM-ARSENIC

Copper, chromium and arsenic are generally classified as heavy metals and are usually stored and used on timber treatment sites in a water based solution. "Liquid concentrate" solution may be up to 60% (weight/volume) CCA, while the "working solution", as used in the treatment process, is typically up to 6% (weight/volume) CCA. The ratios of copper-chromium-arsenic in the solution are such that after treatment and drying, the chemicals react with the wood and with each other to produce insoluble complexes that are extremely resistant to leaching. It is the drippage of wet timber and spillages outside banded and sealed areas that result in contamination of the environment.

CCA solution would typically come into contact with soil as the first point of entry into the environment. On contact with soil arsenic may become complexed with organic matter or adsorbed onto clays. The chromium portion of the solution is made up of trivalent and hexavalent chromium. The trivalent compounds tends to be strongly adsorbed to inorganic and organic particles in soil, while the more toxic hexavalent chromium compounds are not readily adsorbed by soil components. Copper is a common constituent in some soils and is an essential element for plants and animals. However, excessive copper is highly toxic in the aquatic environment.

Regardless of soil chemistry, it is inevitable that uncontained drips and spillages of CCA solution will result in some or all of the solution reaching stormwater drainage systems and hence into natural water and sediments. Aquatic organisms may accumulate these heavy metals in their tissues through their food intake, by a process known as "bioaccumulation", and may "bioconcentrate" the metals directly from water by simultaneous uptake, eg. by gill or epithelial tissue. The term "biomagnification" refers to the concentration of elements through the food chain and is not commonly found for heavy metals in the environment, with the exception of mercury compounds.

In summary, in the volumes used by the timber preservation industry copper, chromium and arsenic pose an environmental hazard if not used under strictly controlled conditions.

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SURVEY METHOD

As outlined in section 1, the preliminary assessment of environmental contamination from CCA timber treatment plants was based on the history, inspection and sample analyses from each treatment site. The sites were identified from Environmental Management Department records and information obtained from the Department of Labour (Occupational Safety and Health). The assessment included disused treatment plants as well as those currently operating.

5.1 Site History

As noted previously, little information relevant to this survey was obtained on the history of the treatment plants surveyed. However, three of the plants surveyed have been subject to previous contamination assessments as a result of CCA solution spills. Copies of these assessment were obtained and this information was used in selecting sample locations at these plants.

5.2 Inspection

The sites were inspected in an attempt to identify any obvious pollution problems and to ascertain current compliance with the environmental provisions of the Code of Practice. Indicators of potential pollution that were noted during the inspections included;

- unpaved areas where no vegetation was apparent,
- discoloured soil,

- degraded water quality of any nearby water courses,
- location of chemical and waste containers, and
- condition of the treatment plant buildings and associated pipework, etc.

The provisions of the Code that are of particular concern to this survey are the layout of the plant, location of stormwater outlets, bunding of drip pads and adequate retention of freshly treated timber within the drip area.

5.3 Sampling

Soil samples were taken from approximately the top 10mm of soil, in areas where contamination was suspected as well as where it was not, based on the site history and inspection. In the case where there were no obvious indicators of contamination, samples were taken randomly.

At sites adjacent to water courses, upstream and downstream sediment samples were taken as these were considered to provide an integrated sample of previous discharges from the site. Water samples were also taken at one particular site where it was suspected that the nearby water course was heavily contaminated.

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RESULTS

6.1 Site History

Of the fifteen timber treatment plants which were the subject of this survey, four have been previously prosecuted for illegal discharges of CCA solution. Three under the Water and Soil Conservation Act (1967) and the other earlier this year under the Resource Management Act 1991. Another is currently the subject of a prosecution for the discharge of LOSP chemicals. There have been discharges of significant quantities of CCA solution in the last four years at three other timber treatment plants visited in this survey. However, due to the circumstances resulting in these discharges, it was decided at the time that the incidents did not warrant prosecution.

Seven of the treatment plants are known to have or currently use boric dip antiseptant treatment as well as CCA treatment, of which at least three have utilised LOSP treatment. One of the sites surveyed had recently ceased CCA treatment operations.

It is suspected that there are up to another sixteen sites, currently operating as sawmills, on which CCA treatment operations may have been carried out but were not included in this survey. A further twelve sites in the Auckland Region were identified late last year by the Timber Industry Environmental Council (a group operating under the umbrella of the Timber Industry Federation) as having been used as timber treatment sites, however the precise location of nine of these sites is not known.

Prior to inspection and sampling, five of the sites surveyed were suspected to have levels of on-site contamination potentially requiring remedial works.

6.2 Site Inspection

Only five of the sites inspected complied with the minimum environmental protection provisions of the Code. Three of the non-complying plants could be brought into compliance with only minor work, while the remaining seven will require major up-grading in order to comply with the Code within the three year deadline specified by the Ministry for the Environment.

Despite only one third of the plants complying with the Code's environmental provisions, more than half appeared to be operated in a responsible manner with regard to protection of the

environment from contamination. However, seven of the plants are currently subject to follow-up action to prevent environmentally inappropriate practices continuing.

The main reasons for non-compliance with the Code are lack of sealed drip pads or inadequate bunding and absence of roofing over the treatment plant. The recent prosecution of one of the treatment plants revealed a potential design fault in the venting arrangement in any plant currently using the alternating pressure method of CCA treatment. All these plants are currently being checked. The general condition and integrity of the plant pipework and hazardous substance storage areas appeared adequate at all the plants and no chemicals were seen leaking from these sources.

However, seven of the surveyed treatment sites showed clear signs of on-site contamination such as discoloured soil, typically the green/yellow colour of CCA solution.

In summary, the more remote and small volume treatment plants were generally in the poorest condition and had little or no environmental protection controls. The situation seems to have arisen because, unlike most other industries handling such toxic chemicals, the timber industry has only in recent times come under specific scrutiny as a potentially environmental and health hazardous industry. Consequently, questionable practices aimed at improving productivity and reducing labour, such as removing treated timber from drip pad areas before drying properly, have remained unchecked, particularly at the smaller and more remote facilities.

6.3 Sample Results

Soil samples were taken from all the treatment sites in this survey and sediment samples taken from the six sites with adjacent watercourses. Water samples were taken from one site suspected of discharging CCA contaminated stormwater. A total of 64 soil samples and 21 stream sediment samples were analysed.

In four of the sites a significant proportion of the soil samples had copper, chromium and arsenic concentrations less than the "interim investigation threshold levels" specified in the ANZECC guidelines. The analytical results for the uncontaminated soils from these four sites compare favourably with "control" soil samples taken from an undeveloped area in Riverhead. However, the concentrations of copper, chromium and arsenic in all the soil samples taken from the other twelve sites were in excess of the ANZECC guidelines. This exceedence was often by more than two orders of magnitude.

For further comparison, the Australian Environmental Protection Authority (EPA) has various criteria for the disposal of contaminated material. The same four sites noted above, generally had copper, chromium and arsenic concentrations within the Australian EPA limits for contaminants permitted for disposal as clean fill. While eight of the sites had contaminant concentrations which were not appropriate for disposal as clean fill, they were less than the Australian EPA limits for non-hazardous waste landfills.

There are no corresponding criteria for sediments, however four of the six sites from which sediment samples were taken from adjacent water-courses had highly elevated levels of copper, chromium and arsenic when compared to sediments taken from the control site or background levels reported in "Heavy Metals in the New Zealand Aquatic Environment: A Review", published by the former National Water and Soil Conservation Authority. Similarly, the water samples taken from Beresford Timber's Bradly Road, Helensville site were far in excess of expected background levels.

A summary of the survey findings, along with descriptions of the treatment plant sites, is shown in tabular form in the Appendix.

DISCUSSION

Thirteen of the fifteen timber treatment sites included in this survey must be considered as sites contaminated with copper, chromium and arsenic requiring further investigation. Of these thirteen, four have adjacent watercourses which have been contaminated with CCA solution. Furthermore, according to the Timber Industry Environmental Council there are up to another twenty six sites in the Auckland region where timber treatment chemicals may have been used or stored, hence these sites must be considered as potentially contaminated. Unfortunately, the precise location of around half of these historical sites is not known.

There is also the issue of the disposal of hazardous wastes generated by the industry. All of the treatment plants surveyed now dispose of their waste appropriately, but historically these wastes have been buried on-site, dumped in municipal landfills and other unspecified locations.

The Environmental Management Department is currently following up problems identified in this survey and clearly needs to locate and carry out further investigations at the twenty six other potentially contaminated sites. Further, as mentioned, sampling and analyses of ground water is about to be carried out adjacent to Carter Holt Harvey's Mount Eden site which is located above two of the regions volcanic aquifers. The Department has also been liaising as appropriate with the Steering Group (set up as a result of the National Task Group), the Timber Industry Environmental Council, Auckland Area Health Board and territorial local authorities regarding contaminated site issues resulting from the preservation of timber.

As investigations progress, the Council needs to resolve how to regulate and prevent environmental effects caused by the industry within the Auckland Region. One option is to specify timber treatment as a Controlled or Discretionary Activity and to require discharge permits for all treatment plants. Potential problems with the discharge permit option include the absence of defensible quality criteria for contaminant levels in stormwater discharges. To assist, the Steering Group's technical committee has proposed to set up a working party to develop environmental guidelines. Furthermore, the Ministry for the Environment's requirement for all timber treatment plants to comply with the environmental provisions promulgated in the Code of Practice within 3 years, will greatly assist in preventing future contamination.

The Department is attempting to keep track of ownership of sites used for timber treatment, particularly when the use of the site changes from timber treatment to some other activity. To help accomplish this, all territorial authorities have been requested to notify this Department of any new land use consent applications related to timber treatment.

The other major issue is the clean-up or remediation of contaminated sites. Current legislation makes the property owner and/or the site operator liable for clean-up costs, which can often be extremely expensive. This may tempt owners to ignore or conceal contamination, or dispose of contaminated material illegally. The problem has reached enormous proportions in the United States where the government has implemented the so-called "Superfund" system, to which funds are contributed to by industries known to contribute to contamination. These funds are made available for clean-up after the sites are no longer used for that activity.

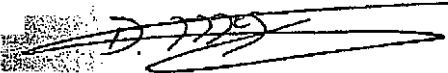
At this stage it is recommended that investigations, including sampling and analyses, are continued. Further, the National Task Group has estimated that a large percentage of timber treatment plants have used highly toxic organochlorine pesticides, such as pentachlorophenol (PCP), which were not considered in the preliminary assessment. It is therefore recommended that sample analyses be extended to include these compounds.

Of the sites identified by this survey as contaminated, the Environmental Management Department has assigned highest priority to plants causing off-site contamination and sites that are known to be earmarked for sale in the near future. The Department is requiring compliance with the environmental provisions of the Code of Practice and clean-up procedures to be initiated.

8.

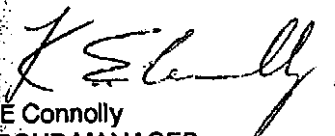
RECOMMENDATIONS

- a. That the report be received.
- b. That copies of this report be forwarded to the Ministry for the Environment, the Timber Industry Environmental Council, Auckland Area Health Board and all Territorial Local Authorities in the Region.



D McKnight
RESOURCE QUALITY OFFICER

Approved for Submission



K E Connolly
GROUP MANAGER
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**TABLE 1: SUMMARY OF RESULTS FROM PRELIMINARY CONTAMINATION
ASSESSMENT SURVEY OF CCA TIMBER TREATMENT PLANTS IN**

THE AUCKLAND REGION															
Name	Proud treat	CHH - Mt Eden	Chemicca	Puketutu is Timber	CHH - Papakura	CHH - Waluku	Cypress Sawmill	Carter Ltd (Kumeu)	G & O Cashmore Ltd	Kumeu Timber Ltd (Anderson & O'Leary)	Beresford Timber	Beresford Timber	Helensville Timber	Kowhai Timber	Hamatana Enterprises
Location	36 Cartwright Rd Glen Eden	Normandy Rd Mt Eden	14 Mayo Rd Wiri	Puketutu is Mangere	250 Great South Rd Takapuna	Belgium St Waluku	Kahikatea Flat Rd Dairy Flat	Deacon Rd Kumeu	Foundary Rd Silverdale	SH 16 Kumeu	Bradley Rd Helensville	West St Helensville	West St Helensville	Matakana Rd Matakana	Hamiltons Rd Mahurangi
Map Reference (NZMS 260)	R11 583 764	R11 676 798	R11 759 638	R11 656 690	R12 820 597	R12 638 373	R10 532 058	R10 510 925	R10 611 075	Q10 489 910	Q10 363 982	Q10 402 025	Q10 401 125	R09 634 392	R09 638 295
Teritorial Local Authority	WCC	ACC	MCC	MCC	PDC	FDC	RDC	RDC	RDC	RDC	RDC	RDC	RDC	RDC	RDC
Currently Operating	Yes	Yes	Manufact. Chemicals Only	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Volumes of Timber Treated On-Site	Medium	Large	None	Medium	Large	Large	Small	Large	Medium	Large	Medium	Medium	Small	Small	Small
Significant CCA spill Known to have Occurred On-Site	No	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No
Previously Prosecuted or Currently Subject of Prosecution for Discharges	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	No	No
Historical Evidence of On-Site or Off-Site Contamination	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No
Visible Evidence of On-Site or Off-Site Contamination	No	Yes	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
General Compliance with Environmental Provisions of Code of Practice	Predominantly	Partly	Predominantly	Partly	Nil	Fully	Partly	Predominantly	Nil	Predominantly	Nil	Nil	Nil	Nil	Nil
Percentage of Soil Samples Analyses Results below ANZECC "Investigation Threshold" Levels	0%	0%	45%	0%	0%	0%	25%	66%	0%	0%	0%	0%	0%	0%	25%
Contamination of Sediments in Adjacent Water Course	N.A.	N.A.	Yes	N.A.	N.A.	Yes	N.A.	No	N.A.	Yes	Yes	Yes	Yes	No	N.A.
Other Chemicals used On-Site	No	Yes	Yes	?	Yes	?	No	Yes	Yes	No	No	No	No	No	No