

# Report on the Workshop Termiticide Applications and Potable Water Supplies

Held on 14th December 2001 at  
Queensland Health Scientific Services

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**Queensland Government**  
**Queensland Health**

## **ACKNOWLEDGEMENTS**

This report was prepared in consultation with Dr Gerard Neville, Senior Medical Officer, Paul Florian and Philip Flay, Senior Environmental Health Officers, Queensland Health. The draft report was circulated to stakeholders and their contributions incorporated into the final report.

Queensland Health would like to thank Mr Kris Nangia (Building Code Queensland, Department of Local Government and Planning), Mr John Field (Australian Environmental Pest Managers Association), Mr Kim Watson (FMC), Mr David Chappell (AUSPOLY Association) and Dr Bill Tiganis (Commonwealth Scientific Investigation and Research Organisation) for their presentations at the Workshop.

Queensland Health would also like to thank the stakeholders for their contribution during the Workshop towards identifying the key areas of concern and collectively supporting identified management options.

## **DISCLAIMER**

This document has been prepared in good faith expressing due care and attention. Views expressed are that of the authors and not policy of Queensland Health.

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## INTRODUCTION

Over the last year, there have been a number of reports where the occupier of a property has complained of taste and odour problems shortly after termiticide treatment of the soil surrounding the property. Subsequent laboratory testing of the reticulated water has revealed the presence of both the active ingredient and/or metabolite and solvent of termiticide formulations.

To appropriately address the public health concerns of termiticides in potable water Queensland Health facilitated a Workshop on the 14<sup>th</sup> December 2001 to improve industry and government understanding across key public health issues. These issues included:

- The health risk of potable water contaminated with termiticides
- The potential for drinking water supplies to be contaminated as a result of termiticide treatment to the soil surrounding a property
- Whether further research was required to determine permeation of termiticides into potable water supplies
- Identify appropriate control and management procedures to address past and future incidents from an industry and regulatory perspective.

To provide an overview of how different stakeholder groups perceive the problem representatives from these groups were approached to provide a short presentation at the Workshop. The presentations also provided the opportunity for different stakeholder groups to better understand the range of issues that would need to be considered during the Workshop.

The following stakeholder groups were invited to the Workshop:

- Pipe manufacturers: AUSPOLY
- Local Governments: Gold Coast, Brisbane, Logan
- Consultants: LTD Services
- Property Managers: Frank Knight
- Chemical Manufacturers: FMC, Dow, Bayer
- Pest Control Companies: Amalgamated Pest Control
- State Government: DLGP, BSA, QH
- Industry Bodies: MPA, AEPMA
- Research: CSIRO, NRCET

Stakeholders were invited to the Workshop on the basis of their commercial or regulatory interest in the area. A list of delegates is provided in Attachment 1.

Presentations were provided by:

- Mr Ian Marshall, Principal Advisor Environmental Health (General)  
**Queensland Health's perspective**
- Mr Kris Nangia, Senior Project Officer, Department of Local Government and Planning:  
**Building Standards' perspective**
- Mr John Field, Manager, Amalgamated Pre-Construction representing Australian Environmental Pest Managers Association  
**Pest Control Industry's perspective**
- Mr Kim Watson, Zone Development Manager, Speciality Products Division, FMC (Chemicals) Pty Ltd  
**Chemical Industry's perspective**
- Mr David Chappell, AUSPOLY Association  
**Pipe Industry's perspective**
- Dr Bill Tiganis, CSIRO  
**Research perspective**

At the conclusion of the Workshop it was agreed that a draft report detailing the major issues and outcomes of the Workshop should be prepared and circulated to delegates for comment prior to finalisation. The final report would then be the vehicle through which to promulgate the outcomes of the Workshop.

## BACKGROUND

### *Queensland Health's Involvement*

Queensland Health has received several complaints concerning the taste and odour of drinking water following the application of termiticide preparations to soil surrounding or under homes or commercial premises.

Investigation of these complaints has indicated that chemicals similar to the solvents present in pesticide formulations were present in the water and on occasion the active ingredient and/or metabolite was also detected. Chemicals in the water attributed to termiticide formulations have been described as C<sub>3</sub> and C<sub>4</sub> substituted benzenes, aromatic hydrocarbons, and volatile organics. The active ingredient chlorpyrifos and its biologically active form, chlorpyrifos oxon, have been detected.

### *Summary of Investigations*

The following table summaries the results of investigations undertaken by Queensland Health. Queensland Health Scientific Services would generally quantify the levels of chemicals detected in water samples. Where levels are not reported, a different laboratory conducted the testing.

<b>Case</b>	<b>Post Termite Treatment</b>	<b>Compounds detected</b>	<b>Levels detected (ug/L)</b>	<b>Pipe Material</b>
1	Yes	Substituted benzenes. Volatile organics	Up to 147  Not determined	Polyethylene
2	Yes	Chlorpyrifos. Chlorpyrifos oxon. Aromatic hydrocarbons	0.03 to 0.12 3.5 to 160  Up to 596	Polyethylene
3	Yes	Aromatic hydrocarbons. Volatile organics	Not determined  Not determined	Not known
4	Yes	Aromatic hydrocarbons	Not determined	Not known
5	Yes	Volatile organics. Xylene isomer	<1 300	Not known
6	Yes	Solvent detected	Not determined	Not known

## **CASE STUDY (Case 2)**

A large commercial complex was constructed without pre-treatment with a termiticide as it had a concrete slab, and had concrete side panels and a metal frame. Termites had affected floors and other wooden structures in the complex.

The complex was treated by drilling holes through the slab on a grid basis and injecting a 2% emulsion of chlorpyrifos under low pressure and applied at an application rate of 100L per 20 square metres.

Following treatment tenants complained of odour and taste problems with water especially on Monday mornings.

Polyethylene pipes were reported to be used under the slab with copper being used in the individual shop units and to standpipes.

Laboratory testing indicated low levels of chlorpyrifos and chlorpyrifos oxon as well as a range of C<sub>3</sub> and C<sub>4</sub> substituted benzenes.

The water reticulation system for the complex was rerouted to avoid contact with soil treated with the termiticide preparation.

Other incidents than those listed above have also been reported by QHSS, Gold Coast City Council (approximately 12 incidents in the last year), and Sunshine Coast (2 incidents). It is likely that further incidents have occurred that have not been reported.

Investigation of cases has been limited. Early indications highlight the role of a slab/path/driveway in sealing the ground surface as a contributing factor in impeding the normal migration / evaporation of the organic solvent from the soil. In some cases long lengths of pipe along the perimeter of the building were exposed.

Contamination of drinking water pipes with other compounds such as mineral turpentine, petrol, and hydrocarbons solvents used prior to concrete stenciling has also been reported.

### *Health Risk Assessment*

Where levels have been quantified, the risks these chemicals present were generally found not to present a risk to human health at least as far as acute exposure is concerned. It is difficult to make a categorical statement as regards chronic exposure, which is much less well understood. For a number of incidents levels were not detected and consequently the risk the water presented to human health could not be assessed. It is important that for any incident where the drinking water supply is suspected to be contaminated laboratory testing should quantify the level of contaminants to allow for a health risk assessment to be undertaken.

When assessing the risks that these compounds present to human health it is important to recognise the limitations of the assessment. In particular:

- the toxicological profile of many of these compounds is not known and toxicity information on structurally similar compounds may need to be used
- assessments are generally based on the analytical results for water samples taken at a single point in time and may not reflect the highest levels of the compound in the water, e.g. levels may be higher during the first flush
- assessments need to make assumptions regarding duration of exposure, intake of water, and bodyweights.

Although assessments to date have indicated that adverse health effects were unlikely, it is a fundamental principle of public health that drinking water should be as free as possible from contamination. Where contamination has occurred Queensland Health has advised that an alternate source of water should be used until the problem has been rectified.

### *Evidence*

In reviewing the literature, contamination is likely to occur through permeation and infiltration. Permeation is known to occur through polyethylene and other materials used in the manufacture of water pipes. Permeation is also reported to occur through materials used to join pipes. Infiltration is likely to occur through pipe joints or where the integrity of the pipe has been compromised. Permeation of short lengths of pipe (e.g. 150mm) from the structure to the boundary of the treatment zone can occur subject to the method and type of application.

In a report titled 'Permeation of potable water piping systems' prepared by an Ad Hoc Committee on Permeation convened by the US Plastic's Pipe Industry high levels of hydrocarbons (toluene, xylene, petroleum hydrocarbons) in soil have been reported to contaminate drinking water supplies. The report also details the results of testing undertaken that indicates that at 'high concentrations' of hydrocarbons permeation can occur through pipe material as well as through material used to join pipes. At 'low concentrations' of aromatic and chlorinated hydrocarbons permeation was found to be similar for high-density polyethylene (HDPE) and low density polyethylene (LDPE) pipes. Permeation is claimed to be related to the type of pipe, presence of joints and duration of exposure.

The report provides strong evidence in support of permeation. However, the relevance of the 'high' and 'low' soil concentrations stated in the report to the soil concentration of contaminants following treatment of soil with a termiticide preparation is not known.

The Building Construction and Engineering Branch of the CSIRO recently completed research investigating the migration through polyethylene pipes of active ingredients and solvents used in termiticide formulations when applied as a barrier treatment. The results of this study indicated that migration through polyethylene (PE) pipes is unlikely to occur, even for pipes laid in 'saturated soil'.



While the results of this study conflict with studies undertaken by the US Plastic's Pipe Industry, the authors of the CSIRO study highlighted that many factors could potentially influence whether permeation would occur (eg. different soil types). In addition, the limit of detection for the analytical method used (5 ug/L) was higher than some of the levels that have been reported. There is considerable evidence of vapour permeation through HDPE containers, resulting in the contamination of "clean" samples by ones containing VOCs.

## REGULATION

### *Queensland Health*

Under the *Health Act 1937* and *Health Regulation 1996* there are provisions for the licensing of pest control operators, the labelling of pesticide containers and the storage and disposal of pesticides. However, there are no provisions concerning the inappropriate use of pesticide.

### *Department of Primary Industries*

Under the *Chemical Usage (Agricultural and Veterinary) Control Act 1988* there are provisions for action to be taken if a registered product is not used in accordance with the directions on the label.

### *Department of Local Government and Planning*

The *Sewerage and Water Supply Act 1949* administered by local governments provides a number of options relating to the approval of plumbing and drainage work. The by-laws in force before that time had very little flexibility and even basic maintenance work needed to be approved by Council.

The Act makes provision for local government to adopt the National Plumbing and Drainage Code – AS 3500.1.2 -1998 Water Supply –Acceptable Solutions. The Standard sets out the requirements for the installation of water services from the local government's water main or alternative potable water supplies to the points of discharge. The Standard applies to new installations as well as alterations, additions and repairs to existing installations.

The Standard accepts polyethylene (PE) pipes and fittings for the installation of water services from a local government's water supply or alternative potable water supplies to the point of discharge. However, under Section 2.4.9 (F) of this Standard it states that 'PE pipes and fittings shall not be used in areas subject to contamination by petroleum products'. A similar restriction is also placed on pipes constructed of polybutylene, cross-linked polyethylene, polypropylene, unplasticized polyvinyl chloride, and chlorinated polyvinyl chloride.

Section 5.13 of the Standard (Contaminated Areas) specifies conditions that must be met if pipes are to be laid in soil that is contaminated or is likely to be contaminated. For contaminated soil, installation is only permitted if the water service is laid through a watertight, corrosion resistant conduit of sufficient length and strength to afford adequate protection to the water service. For ground that is likely to be contaminated the pipe is to be fixed not less than 600 mm above the surface of the ground likely to be contaminated.

### **Other Relevant Standards**

AS 2033 – 1980 Installation of polyethylene pipe systems

Appendix A of this Standard provides details on the chemical resistance of polyethylene pipes. The Standards states that PE is permeable to volatile substances, the extent depending generally on wall thickness of the pipe and the chemical concerned. Information is also provided on the chemical resistance of PE pipe. A number of chemicals (eg. toluene and benzene) are classified as unsuitable for use with PE pipes. These chemicals are structurally similar to the type of chemicals that have been detected in water samples and are also used in termiticide formulations. This would suggest that PE pipes would not be suitable in areas where pipes may come into contact with hydrocarbon solvents.

AS 3660.1 – 2000	Termite management Part 1: New building work
AS 3660.2 – 2000	Termite management Part 2: In and around existing buildings and structures - Guidelines

The application of termiticides, as described in Section 8 of AS3660.1 and Appendix E of AS 3660.2 outline the requirements. Horizontal barriers shall be used to prevent vertical access of termites to the substructure of the building. When viewed in plan, the area of treated soil shall be at least 150 mm wide and abut the substructure walls on both sides. When a vertical barrier is used to prevent horizontal access of termites to the fabric of the building through the substructure, the area of treated soil (when viewed in elevation) shall be at least 150 mm wide, installed to a depth 50mm below the top of the footing, and abut the substructure or superstructure wall and footing. Horizontal or vertical chemical soil barriers shall surround all connections between the building and the soil.

AS 3660.1 and AS 3660.2 do not address the importance of preventing run-off or seepage into water supply pipework.

## WORKSHOP DISCUSSION

### *Characterising the Problem*

It was recognised that drinking water supplies were being contaminated as a result of soil termiticide treatments. In the main delegates considered that contamination was likely to be the result of permeation and that further research was not necessary to determine whether permeation occurs.

In view of the small number of incidents relative to the number of houses treated, further investigative work was necessary to identify factors contributing to contamination.

It was proposed that an investigation tool be developed that could be used for future incidents as well as to gather more detailed information on past incidents. The investigation tool should address issues such as what needs to be investigated, the type of chemical analyses required, and sampling techniques.

### **Actions:**

1. It was decided that Stakeholder groups should communicate the findings of the Workshop to other states and territories and determine the extent to which contamination occurs around Australia and report back in June 2002.
2. Queensland Health will table the report of the Workshop at the next enHealth Council meeting and endeavour to seek agreement by Council members to ascertain the extent to which contamination has been occurring within their jurisdictions.
3. Director Environmental Health Services, Southcoast Public Health Unit, Queensland Health will convene a working party to develop tools/ procedures to assist in the investigation of past and future incidents. Queensland Health will establish a central register of incidents.

Working party to consist of:

- Industry representatives (Zone Development Manager, FMC; Technical Manager, PPI Corporation)
- Private consultants (Manager, Amalgamated Pre-construction; Manager, LTD Services)
- Queensland Health (Scientific Adviser, Queensland Health Scientific Services; Director Environmental Health Services, Southcoast Public Health Unit)

Working party to be convened in early January 2002.

### *Current Management*

For a number of incidents where contamination of the water supply has occurred the affected water pipes have been replaced. For other incidents, problems concerning taste and odour were transient and usage of the water reticulation system returned to normal. Where Queensland Health has assessed the health risk that contaminated water presents, users of the water have been advised not to use the water and that remedial work was necessary.

Mr Kris Nangia (Department of Local Government and Planning) advised that pipes and fittings installed in ground that is contaminated or may be subject to contamination could be wrapped in an impermeable protective tape. Mr Nangia indicated that this treatment may be included as a requirement under the National Plumbing and Drainage Code – AS 3500.1.2 - 1998 Water Supply – Acceptable Solutions.

### *Future Management*

Following general discussion, a number of solutions were proposed that could significantly reduce the potential for water to be contaminated following treatment of surrounding soil with a termiticide preparation. These include:

### **Review of Standards**

#### AS 3500.1.2: 1998 National Plumbing and Drainage Code

- The statement in Section 2.4 of the Australian Standard 3500.1.2: 1998 National Plumbing and Drainage Code that states 'pipes and fittings shall not be used in areas subject to contamination by petroleum products' should be revised. Statements in this Section should make reference to the potential for soil to be treated with termiticide preparations.
- Australian Standard 3500.1.2 should include a section that deals specifically with measures to be taken when laying pipes in soil to be treated with termiticide preparations. Issues that would need to be addressed in this section would be specifying burial depth of water pipes in soil that could be treated or requiring that water pipes traversing contaminated or potentially contaminated pipes be wrapped in impermeable material. The minimum depth for water pipes under a concrete slab is only 75 mm and that rod injection of termiticide preparations under concrete slabs would exceed this minimum depth. Given this, the minimum depth under concrete slabs may need to be revised or a requirement for the pipe to be wrapped in an impermeable sleeve may need to be specified.
- If pipes susceptible to permeation by hydrocarbons were required to be laid outside the area to be treated by termiticide preparations then the pipe would not be exposed to termiticide preparations. It was proposed that new structures should be required to have a 500 to 600 mm zone around the structure where water pipes must be laid at right angles to the structure to minimise the length of pipe exposed to the preparation. It was discussed that copper pipes should be used up to this distance; however, concern was raised that the copper pipe may react with the treated soil. There may be a need to consider whether the proposal to use copper pipes as a replacement is suitable.

- To assist pest control operators to identify the area where water pipes enter a building or other structure it was suggested that the Australian Standard should require that a small plaque be fixed to the wall indicating where water pipes enter the structure.

*Actions:*

4. Mr Kris Nangia (Department of Local Government and Planning) advised that he would raise the issue at the next meeting of the Queensland and the National Plumber's Reference Group and to discuss the outcomes of the meeting with Ian Marshall, Queensland Health.
5. Delegates agreed that a separate submission to Standards Australia was necessary to ensure that the issues identified through the Workshop were considered by Standards Australia.

AS 3660.1 – 2000	Termite management Part 1: New building work
AS 3660.2 – 2000	Termite management Part 2: In and around existing buildings and structures - Guidelines

To ensure that pest control operators are aware of the problem concerning contamination of potable water supplies as a result of termiticide applications to soil it was considered that a section should be included in AS 3660.1 and AS 3660.2, addressing measures the operator needs to take to ensure contamination does not occur.

*Action:*

6. Delegates agreed that a separate submission to Standards Australia was necessary to ensure that this issue was considered during the next review of the Standard.

***Risk Management Strategy***

It was proposed by Mr Kim Watson (FMC) that Pest Control Operators should assess each case separately and where it is not known what type of water pipes have been used or if the location of the pipes is not known then the pest control operator should use a termiticide formulations that would not be expected to permeate water pipe material.

*Action:*

7. A working group be established to develop a Risk Assessment / Risk Management Strategy that will assist Pest Control Operators in deciding on the most appropriate treatment.

Working party to consist of:

- Industry representatives (Zone Development Manager, FMC)
- Private consultants (Manager, Amalgamated Pre-construction; Manager, LTD Services)
- Queensland Health (Principle Advisor, Environmental Health (General); Scientific Officer, Environmental Health (General)).

Working party to be convened in early February.

8. On completion of the Strategy, Queensland Health will circulate a communication to licensed pest control operators detailing the issues identified through the Workshop and encouraging them to incorporate the strategy within their work practices.

### ***Contingency Planning***

There was a need to provide some direction to local government when investigating complaints of odour and taste of drinking water that may be attributed to contamination by hydrocarbons.

It was proposed that on completion of the investigation tool, local governments should be encouraged to use the tool to investigate such complaints and information from the investigation should be provided to Queensland Health for collation. At the end of 6 months and 12 months, Queensland Health will prepare a report of the investigations and convene a meeting of relevant stakeholders to review the results and determine any further action that needs to be taken.

It was proposed that QHSS should advise the Environmental Health Unit, Queensland Health of any new incidents so that Local Governments can be advised that further investigation may be necessary.

Queensland Health advised that where contamination of a drinking water supply has occurred the water should not be used for drinking purposes and action should be taken to rectify the problem.

To implement the investigation it was proposed that information be sent to Local Governments, Queensland Health Public Health Unit Networks (PHUNs) and industry groups encouraging their support and participation in undertaken investigations.

#### ***Action:***

9. See Action concerning development of investigation tool.
10. Queensland Health to disseminate report to local government and completed investigation tools to the Department of Local Government and Planning, Local Governments, Queensland Health, and industry groups and will seek their support and participation in undertaking investigations.

## ***Communication Strategy***

It was proposed that the report be disseminated to all relevant stakeholders and stakeholders should be advised on the actions to be taken to address the problems identified during the Workshop.

Stakeholders were to include the National Registration Authority, Therapeutic Goods Administration, Standards Australia, the Department of Local Government and Planning, and the Australian Water Association.

In addition, Mr Kris Nangia indicated that he would be willing to advise relevant industry partners through existing communications such as the 'News Flash' or 'Technical Bulletins'.

### *Action:*

11. Queensland Health to disseminate report to stakeholders.
12. Mr Kris Nangia (Department of Local Government and Planning) to communicate Workshop findings and Actions to be taken through existing communication channels.

## **End of Report**

## SUMMARY OF ACTION ITEMS

No.	Action Item	Responsible Agency	Timeframe
1	It was decided that Stakeholder groups should communicate the findings of the Workshop to other states and territories and determine the extent to which contamination occurs around Australia and report back in June 2002.	All Stakeholder	To be completed by 30 June 2002
2	Queensland Health will table the report of the Workshop at the next enHealth Council meeting and endeavour to seek agreement by Council members to ascertain the extent to which contamination has been occurring within their jurisdictions.	Queensland Health	To be completed by 31 March 2002
3	Director Environmental Health Services, Southcoast Public Health Unit, Queensland Health will convene a working party to develop tools/ procedures to assist in the investigation of past and future incidents. Queensland Health will establish a central register of incidents.	Queensland Health	To be completed by 28 February 2002
4	Mr Kris Nangia (Department of Local Government and Planning) advised that he would raise the issue at the next meeting of the Plumber's Reference Group and to discuss the outcomes of the meeting with Ian Marshall.	DLGP	To be completed by 28 February 2002
5	Delegates agreed that a separate submission to Standards Australia was necessary to ensure that the issues identified through the Workshop were considered by Standards Australia.	Queensland Health	To be completed by 28 February 2002
6	Delegates agreed that a separate submission to Standards Australia was necessary to ensure that this issue was considered during the next review of the Standard.	Queensland Health	To be completed by 28 February 2002
7	A working group be established to develop a Risk Assessment/Risk Management Strategy that will assist Pest Control Operators in deciding on the most appropriate treatment.	Queensland Health	To be completed by 28 February 2002
8	On completion of the Strategy, Queensland Health will circulate a communication to licensed pest control operators detailing the issues identified through the Workshop and encouraging them to incorporate the strategy with their work practices.	Queensland Health	To be completed by 31 March 2002
9	See Action concerning development of investigation tool.	Queensland Health	To be completed by 28 February 2002



No.	Action Item	Responsible Agency	Timeframe
10	Queensland Health to disseminate report to local government and completed investigation tools to the Department of Local Government and Planning, Local Governments, Queensland Health, and industry groups and will seek their support and participation in undertaking investigations.	Queensland Health	To be completed by 31 March 2002
11	Queensland Health to disseminate report to stakeholders.	Queensland Health	To be completed by 31 March 2002
12	Mr Kris Nangia (Department of Local Government and Planning) to communicate Workshop findings and Actions to be taken through existing communication channels.	DLGP	When considered appropriate

## Attachment 1: List of Delegates

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<b>Last Name</b>	<b>First Name</b>	<b>Title/ Position</b>	<b>Company</b>	<b>Phone</b>	<b>Mobile</b>	<b>Email</b>
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