Legionella Link
Managing the health risks

November 2003

Legionella strategy update

Dr Robert Hall
Director Public Health and Chief Health Officer
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The government's Legionella Reform Strategy, which took effect back in March 2001, involves a working partnership between the Department of Human Services, Building Commission, Plumbing Industry Commission and industry groups.

Each phase of the strategy's implementation has seen a reduction in the number of Legionnaires' disease notifications in Victoria.

Currently, about 5,500 cooling tower systems (6,531 cooling towers) are registered with the Building Commission.

The past 12 months have seen the following achievements:

- an accredited independent auditor training program for cooling tower system Risk Management Plans
- training and certification of 125 independent auditors
- the commencement of annual auditing of Risk Management Plans
- 260 audits completed by Department of Human Services (DHS) officers
- follow-up of 1159 Risk Management Plans that had reported non-compliance issues
- over 1000 site inspections or investigations by departmental officers
- 150 improvement notices issued under the *Building Act 1993*
- survey and investigation of domestic cooling tower system risks
- electronic mapping system linked to the Cooling Tower System Register. It is now much easier for investigating officers to identify cooling tower systems linked with cases of Legionnaires' disease.

Although implementation of the strategy is now complete, the Legionella Program will continue its education, monitoring and investigation work, to further reduce the incidence of Legionnaires' disease.

This issue of *Legionella Link* aims to:

- provide feedback from the first round of Risk Management Plan audits, including the most common reasons for non-compliance
- offer examples of good and bad practice
- encourage consideration of these issues during the coming annual plant maintenance/shut down period.

For more details on *Legionella* risk management, please feel free to contact the Legionella Program on 1800 248 898.

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Director Public Health
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Risk Management Plans

Under the *Building Act 1993*, a Risk Management Plan (RMP) for a cooling tower system is a document that identifies risks associated with the system and that sets out steps to be taken to –

- manage the risks; and
- ensure compliance with any requirements relating the system imposed by or under the *Building Act 1993*, *Health Act 1958* and regulations under both of these Acts.

The *Building Act 1993* requires the owner of any land on which there is a cooling tower system to take all reasonable steps to ensure that an RMP is prepared, in respect of each cooling tower system on the land. In most cases, separate RMPs are necessary for each cooling tower system. One exception may be a system consisting of a number of identical evaporative condensers, located in close proximity to each other.

To meet the requirements of the Act, both for an RMP and an RMP audit, the document must address the risks specified in the *Building (Legionella Risk Management) Regulations 2001*.

The Act does not specify whom may prepare an RMP but, for high risk or complex sites, or where large workforces are involved, the department recommends that a risk management consultant is used.

The department published *A Guide to Developing Risk Management Plans for Cooling Tower Systems* to assist landowners, cooling tower system

Plumbing Industry Commission
Building Commission
State Government Victoria Department of Human Services

owners and managers to provide a safe environment for their staff, contractors, customers and the public, and to comply with Victorian legislation.

The Guide incorporates an RMP template, to be completed when a risk assessment has been carried out and decisions made on appropriate risk management measures. At least 90 per cent of current RMPs use the template, or a modification of the template.

Remember: The RMP (plus implementation plan or schedule) must be a practical, easy-to-read document, that has been dated and reflects the owners' intentions.

When developing an RMP, it is important that **recommendations be translated into statements of the owners' intent, together with appropriate timelines**. The department's view is that recommendations not yet accepted by the owner of the land or system are not part of the RMP.

When a risk assessment or a draft RMP document has been prepared, it is important that:

- all statements in the document referring to proposed system improvements and the system's operational program reflect the owner's intentions and include timelines, **or**
- it is accompanied by an implementation plan or schedule, setting out the owner's intentions, timelines for system improvements and the system's operational program.

Schedules help document the locations, risk classification, proposed actions and timelines for removal/activation of 'dead legs'.

The department's view is that, unless relevant timelines have been specified in the RMP, the document should be read as though:

- operational programs will be commenced from the commencement date of the RMP
- proposed system improvements will be completed by the end of the following audit period.

Legionella legislation

The Victorian Government is committed to minimising the risk of Legionnaires' disease in the community. Legislative requirements in the *Building Act 1993* and various regulations, including the *Health (Legionella) Regulations 2001*, were introduced in 2001.

The department administers this legislation in partnership with the Building Commission and the Plumbing Industry Commission. The Department's website www.legionella.vic.gov.au/ has links to all the relevant Acts and Regulations.

Health (*Legionella*) Regulations 2001

These Regulations specify:

- definitions for *cooling tower, cooling tower system, biocide, clean, disinfect, HCC, Legionella, responsible person* and *warm water system*
- continuous treatment to control the growth of microorganisms, including *Legionella*, and to minimise scale formation, corrosion and fouling; ongoing maintenance and testing of cooling tower systems; six-monthly cleaning and disinfection of systems; HCC testing at least monthly
- remedial action for high HCC readings or when *Legionella* is detected
- notification requirements when *Legionella* is detected in 3 consecutive samples
- maintenance and testing of warm water systems
- record keeping requirements.

Important points are that:

- the requirements refer to the entire cooling tower system, not just the cooling tower
- the person responsible for meeting the requirements is not the water treatment service provider, but the "responsible person" ("the person who owns, manages or controls the system")
- the owner or manager of the system must ensure that the routine maintenance and testing of the system, as well as any required remedial action and record keeping, **address the risks of the system and meet the requirements of the regulations**.

More on sampling, remedial action and record keeping can be found later in this issue.

RMP reviews

The *Building Act 1993* requires that all RMPs be reviewed, and if necessary updated, **at least once annually** prior to renewal of registration.

This may happen at any time, but an RMP review should be considered following:

- changes to the water system or its use
- changes to the use of the building in which the system is installed
- the availability of new information or technology
- results indicating that control measures are no longer effective
- a case of Legionnaires' disease possibly associated with the system
- unusual factors, for example demolition or construction of buildings on or near the site, or road works or other construction activities likely to generate dust
- a change in number, or level of vulnerability, of people who may be exposed to aerosols from the system.

The process should include, as a minimum, a review of:

- risks and risk categories associated with the system
- results of microbiological and chemical tests for the previous 12 months
- details of service records for the previous 12 months
- the environment surrounding the system and
- changed conditions, if any, under which the system is operating

Risks specified in the *Building (Legionella Risk Management) Regulations 2001*

- **stagnant water** (including the lack of water recirculation in a cooling tower system and presence of dead-end pipework and other fittings in a cooling tower system)
- **nutrient growth** (including the presence of biofilm, algae and protozoa in a cooling tower system, water temperature within a range that will support rapid growth of micro-organisms in a cooling tower system, and the exposure of the water of a cooling tower system to direct sunlight)
- **poor water quality** (including the presence of solids, Legionella and high levels of micro-organisms in a cooling tower system)
- **deficiencies in the cooling tower system** (including deficiencies in the physical design, condition and maintenance of a system)
- **the location of and access to a cooling tower or cooling tower system** (including the potential for environmental contamination of the system and the potential for exposure of people to aerosols from the system)

Undertaking a review **prior to an RMP audit** means:

- maintenance and testing records can be assembled and checked by the owner
- the records are available for the audit
- an assessment can be made as to whether the plan is still relevant to the risks, or requires an update
- issues can be addressed by the owner, before the audit.

The review should be documented and attached to the RMP, which may or may not require re-drafting.

The review can be conducted in-house, with the assistance of the water treatment service provider, or by a consultant. In more high risk or complex sites, or where large workforces are involved, the department recommends that an independent consultant be engaged to conduct the review.

RMP audits

Legal need

Each cooling tower system RMP requires an annual audit.

Section 75FA of the *Building Act 1993* states: "The owner of any land on which there is a cooling tower system must take all reasonable steps to ensure that a risk management plan audit is conducted in relation to the risk management plan prepared in respect of the system in the 3 months before the registration of the system is due to expire."

Purpose

The audit determines two things:

- whether the RMP addresses the risks specified in the regulations
- whether the RMP is being implemented.

What the auditor needs

To assess whether the RMP addresses the risks, the auditor requires a copy of the RMP, to check that it contains references to the the risks specified in the regulations. The auditor is not required to determine the extent to which the risks are being managed.

To form a view that the RMP is being implemented, the auditor will require repair, maintenance and testing records, together with any other relevant records for the interval between the previous registration renewal date and the audit.

Choosing an auditor

The *Building Act 1993* specifies that audits may only be conducted by **approved auditors**. See the Legionella website for a list of approved auditors: www.legionella.vic.gov.au/

Check with the auditor about the level of service provided; some may provide a **single contact**-only service, which does not provide the opportunity to locate missing documents. With this service, there is **an increased risk of the auditor forming the view that the RMP is not being implemented**.

Note To avoid conflicts of interest, the auditor cannot be the owner of the land or the cooling tower system, or be associated with the water treatment service for the system, the design of the system, or the development of the RMP.

Timing

The RMP audit is best undertaken early in the three months before the registration is due to expire. This helps ensure that the audit is completed within the registration period.

Efficient audits

To keep costs down and to assist with compliance:

- Make sure that the RMP is clearly set out, addresses the the risks specified in the regulations, is dated and is signed off by the responsible person for the cooling tower system. If the RMP has been reviewed and changes made, a record of this should be kept and attached to the RMP.
- Ensure that target dates or timelines are shown for all proposed actions:
  - If any action is undated in the RMP, it is expected that the action be completed by the end of the following audit period.
  - If the RMP states that an action is required within a timeline – such as every fortnight, or monthly – ensure that the timeline is complied with.
- Work towards showing the relevant registration (CTS) number on all maintenance and testing records – avoid using local names for each cooling tower system, unless the auditor is provided with a link between the CTS numbers and the local names.
- Where possible, keep all service records etc for a cooling tower system separate from other cooling tower systems on the site.
- Keep these records on-site in chronological order, and make sure they are each dated and identify the CTS number. If records are sent off-site for audit, copies should be kept on-site with each respective RMP.
- Some complex sites with multiple systems have employed an auditor to conduct the first audit on-site. While not required under the legislation, some companies have found advantages in this approach.

Outcomes

The auditor will provide a certificate for each RMP, stating whether it addresses the critical risks and whether it is being implemented. The auditor's reasons for a finding of non-compliance will be stated on the certificate.

Where an RMP is non-compliant, a copy of the certificate will be forwarded by the auditor to the department for follow-up.

A non-compliant audit may have adverse effects on site industrial relations, quality programs and site/business insurances.

Audit feedback

To date, the department has received notices of 1159 non-compliant audits.

Many were non-compliant because they lacked documentation (such as missing service reports, test results, invoices or proof of work) to show that the RMP had been fully implemented.

Where management believes that an activity has occurred, but is not able to locate the record for the audit, the service provider should be contacted to obtain a copy.

In some cases, photographs have been included in the records showing specific actions taken - such as the removal of redundant pipework or installation of signage.

Keeping better and more practical records will ensure a higher success rate in future audits.

Microbiological sampling

Purpose

Testing the microbiological quality of the water in a cooling tower system is an integral part of any RMP, as it measures the microbiological performance of the system.

Testing also provides feedback on the effectiveness of the biocidal treatment program, which owners pay for as part of the water treatment service contract.

Water samples must be representative of the circulating water system

Sampling points

Inspectors are still seeing systems where the samples are taken immediately downstream of the biocide dosing point. In some other poor examples, the samples are taken from the cooling tower basin in which the biocide is added. The results of testing may have little meaning, as the samples are not representative of the circulating system.

Sampling should be taken from a point near the area of highest risk. For cooling tower systems, the highest risk of release of aerosols containing Legionella is from the drift or exhaust of a cooling tower. It is appropriate to sample near this release of aerosols to the atmosphere. **A sampling point on the return line close to the cooling tower would be best**.

The *Australian Standard AS 3666.3 Air-handling and water systems of buildings - Microbial control Part 3: Performance-based maintenance of cooling water systems* and *Code of Practice for Water Treatment Service Providers (Cooling Tower Systems)* also support this approach.

Until a sampling point is installed on the return line, it is better to sample falling water from just below the fill – rather than from the basin, if that is where the dosing occurs.

Identify and label this preferred sampling point, as a cooling tower system may have many potential sampling sites.

HCC sampling

Heterotrophic Colony Count (HCC) is a measurement of the number of bacteria that are able to grow in a general-purpose growth medium at 37ºC. The department adopted the limit of 100,000 cfu/mL in the new legislation (down from 500,000 cfu/mL) to be consistent with Australian Standards (AS/NZS 3666.3) and levels adopted or to be adopted by other states. The measurement of bacteria by the HCC method does not include *Legionella*, which has very specific growth requirements for testing in a laboratory. There is no direct correlation between HCC levels and *Legionella* concentrations.

- For engineers or operators, HCC is a measurement of the microbiological control in a cooling system; high HCCs can lead to bio-fouling and poor heat transfer, particularly at the condenser tubes or heat exchangers, resulting in system failure.
- From the microbiological perspective, a rising or high HCC is a warning of a lack of system control and provides an opportunity to correct this. There are often simple reasons for this rise – a sudden intake of dirt-laden air, a large piece of dirt/sludge/bio-film dislodged into the system, the biocide reservoir has been depleted, or the biocide pump has failed.
- From the risk management perspective, additional bacteria in the system shows a lack of microbiological control, the presence of nutrients and a possibility that *Legionella* could be developing in the system.

HCC and the new Australian Standard method (AS/NZS 4276.3.2 (2003)

A new standard method for the determination of HCC in waters containing biocides has been published. This method uses a different growth medium (R2A agar) for bacterial enumeration. Biocide treatments of water injure or stress bacterial cells and R2A agar was introduced, as it is a better recovery medium for such cells.

The impact of the use of R2A agar on the HCC levels of cooling tower water is not known and the department has not moved to adopt this method. Most laboratories use Plate Count Agar for cooling tower HCC tests.

DHS test results

DHS is currently compiling a summary of Departmental cooling tower system water sample test results for HCC and Legionella, with the view to providing information for industry.

A summary of the results will shortly be available at the DHS website www.legionella.vic.gov.au and these will be periodically updated.

Taking an interest in results

There have been reports of samples being taken immediately after disinfection or dosing with biocide – without waiting the legislatively prescribed 2-4 days. This practice reduces the meaning of the results and is also not supported by the *Australian Standards (AS/NZS 3666.3)*.

It is expected that HCC results will fluctuate during the year, taking into account different patterns of use of the cooling tower system and climatic variations.

Some concerned owners have contacted the department after adverse HCC or *Legionella* results have been obtained. An adverse result presents an opportunity for the owner to discuss the reasons for such a result with the water treatment service provider. It may also be an opportunity to review the RMP and put improvements in place.

Owners and managers of systems should periodically assess the performance of their water sampling programs, including any remedial action required.

There is potential for false sampling to mask sub-standard maintenance. The department is monitoring for instances of improper practice, and would consider legal action if examples came under notice.

Microbiological testing is an important measure in assessing the performance of water treatment programs. These programs are vital in managing the risk of Legionnaires' disease.

There are no penalties for a single high test result. The penalties provided by the regulations are for failing to take the prescribed remedial action.

Legionella testing

The time taken for *Legionella* testing (up to 10 days) is considerably longer than for HCC. In the absence of a *Legionella* result, it is often appropriate to take action in the meantime on a high HCC result. This action should also have an effect on any *Legionella* present. It is hoped in the future that there will be rapid tests developed for *Legionella* detection.

In 2000, the Legionella Working Party did not support mandatory routine *Legionella* testing for all cooling tower systems, because of long delays before test results become available, the costs involved and the potential for negative results to give a false sense of security. It was decided that a risk management approach should be taken on maintenance of cooling tower systems and that discussions regarding *Legionella* testing be made according to the risk classification of the system.

The legislation identifies disinfection actions if *Legionella* is detected in samples taken. Given the time delay in obtaining test results, the concentration in the system could have changed considerably in the meantime and rapid action is required to ensure the risk is reduced.

Remedial biocide dosing for high HCC

Under the Health (Legionella) Regulations 2001, the responsible person must, within 24 hours of receiving a report that a sample of cooling tower system water has an HCC count exceeding 100,000 cfu/mL, **manually treat the water of the system with additional quantities of biocide or with an alternative biocide**.

To fully meet this requirement, the responsible person would need to either:

- have an agreement with the water treatment service provider (WTSP) under which the WTSP would attend within 24 hours, including public holidays and weekends **or**
- be able to self-treat the cooling tower system, (and know which biocide to use, where to locate it, how much to use, and how and where to dose the system) **or**
- have an agreement with the WTSP under which the WTSP would provide telephone advice on self-treatment.

Consider sampling at a time that takes into account:

- the required delivery time to the laboratory (no longer than 24 hours from sampling)
- the required laboratory incubation period of 48 hours
- sufficient opportunity for the WTSP to respond within normal work hours.

The who, what and where of records for cooling tower systems

WHO keeps the records?

The owner, manager or operator of the cooling tower system is responsible for maintaining records and keeping them current.

WHAT records must be kept?

- Microbiological test results of water samples (copies of laboratory reports for HCC and *Legionella* tests). To assist with monitoring the process, identifying trends and assembling documentation for reviews and audits, it is useful to maintain a spreadsheet or summary, showing dates of the samples and results of the tests.
- Repair, maintenance and corrective activities (monthly servicing, cleaning, disinfection, installation or upgrading of drift eliminators or signage, removal of 'dead legs' and so on).
- Details of any alternative maintenance or testing methods approved under regulation 24.

WHERE must these records be kept?

These records must be kept on the site where the cooling tower is located and be available for inspection upon request by an authorised officer.

They may be stored in the site kit provided by the Building Commission at the time of the system's initial registration. Records must be kept for at least seven years.

WHY must these records be kept?

The auditor requires the above records, plus a copy of the RMP, to enable the annual RMP audit. Presenting the auditor with all of the required records in an orderly sequence will help achieve a compliant audit result and expedite the auditor's work.

Requirements for record keeping are specified in the *Health (Legionella) Regulations 2001*, *Building (Legionella Risk Management) Regulations 2001 (as amended)* and the *Building Act 1993*.

REMEMBER: maintain complete records and keep them on-site.

Decommissioning or recommissioning a cooling tower system

Disused cooling tower systems remain registered with the Building Commission until they have been appropriately decommissioned.

The *Building Act 1993* requires the land owner to notify the Commission within 30 days of the removal or permanent decommissioning of a cooling tower system.

When the land owner contacts the Commission, they will be asked to confirm that the following steps have been undertaken, according to the *Guide to Developing Risk Management Plans for Cooling Tower Systems*:

- the cooling tower system has been drained in accordance with any advice from the local water authority
- the chemical dosing tanks (where fitted) have been removed
- both power and water supplies have been disconnected
- if the cooling tower has not been removed, a sign has been placed on the tower indicating that it must not be re-activated without first contacting the department or the Building Commission.

A *Decommissioning a Cooling Tower System Form* may be downloaded from the Commission's website www.buildingcommission.com.au/

Before a decommissioned cooling tower system is re-commissioned:

- it must be registered/re-registered with the Building Commission
- it must have a chlorine compatible bio-dispersant added to the re-circulating water, and then be disinfected, cleaned and re-disinfected according to the *Health (Legionella) Regulations 2001*
- a Risk Management Plan must be developed and implemented for the system.

Cooling Tower Systems Register

The Building Commission maintains a register to ensure that cooling tower systems can be promptly identified and investigated in the event of a case or outbreak of Legionnaires' disease. It is essential that this information is current.

Under the *Building Act 1993*, the owner of the land is required to notify the Building Commission within 30 days of any of the following changes:

- ownership of the land on which the cooling tower system is located
- addition or removal of a cooling tower to or from the cooling tower system
- removal or permanent decommissioning of the cooling tower system
- relocation of the cooling tower system on the lot of land on which it stands.

A *Cooling Tower Systems Change Form* may be downloaded from www.buildingcommission.com.au/

Further information on registration of cooling tower systems may be obtained at **http://www.buildingcommission.com.au/** or by contacting the Registrations Coordinator at **(03) 9285 6498** or email **ctreg@buildingcommission.com.au**

AIRAH accreditation program for water treatment technicians

Jennifer Pelvin
CEO AIRAH

The Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH) accreditation program for water treatment technicians is now being implemented in Victoria, and the first participants have recently been awarded their certification.

"The accreditation program gives added credibility to water treatment companies, by confirming that their technicians are skilled. By accrediting technicians individually, the program gives confidence in the ability of each and every technician that is accredited," says Jennifer Pelvin, CEO of AIRAH. "It also confirms, for customers, that a company's service forces as a whole have achieved that standard."

As part of the technician-level program, participants are given a self-paced workbook to complete, along with a copy of AIRAH's *DA18 - Water Treatment manual*. The workbook includes questions on state regulations and tests participants on the *Victorian Code of Practice for Water Treatment Service Providers (Cooling Tower Systems)* and the *Guide to Developing Risk Management Plans for Cooling Tower Systems*. Once the workbook has been completed, the participants sit an exam to demonstrate their understanding of the content of the manual and workbook.

"The advantage of having both the workbook and exam is that it gives water treatment companies an independent assessment of each technician - a benchmark of their progress," remarks Ms Pelvin.

"The workbook ensures that new technicians cover the important aspects of water treatment in detail. The course is also suitable for those who are tertiary qualified, as there is no tertiary course that assesses practical water treatment knowledge."

The course content also includes:

- the need for water treatment
- safety in water treatment
- characteristics and chemistry of water
- overview of cooling water systems
- understanding control methods
- maintenance, sampling, testing and recording.

"This is the first step of the accreditation process" explains Ms Pelvin. "We are looking forward to implementing the program for supervisors and managers and the accreditation of water treatment companies, which will include independent verification of each company's compliance with the Code of Practice".

For further information or to register, phone Lea at AIRAH on 1300 308 838 or email education@airah.org.au

Plumbing Industry Commission

The Plumbing Industry Commission is responsible for licensing and registering people who construct and maintain cooling towers and cooling tower components.

The standard of work must comply with the *Plumbing Regulations*, which are made under the *Building Act 1993*, and place into regulation the AS/NZS 3666 series of specifications.

Cooling tower work, as defined by the *Plumbing Regulations*, does not include water treatment.

The Commission supports the continual improvement of knowledge and skills within the industry, through targeted training and information. This is critical if the safe construction and maintenance provisions for the cooling towers are to be met. It also recognises the importance of AIRAH, with the accreditation program for water treatment technicians as integral to the total approach towards safer cooling towers.

Legionella contact information

Department of Human Services

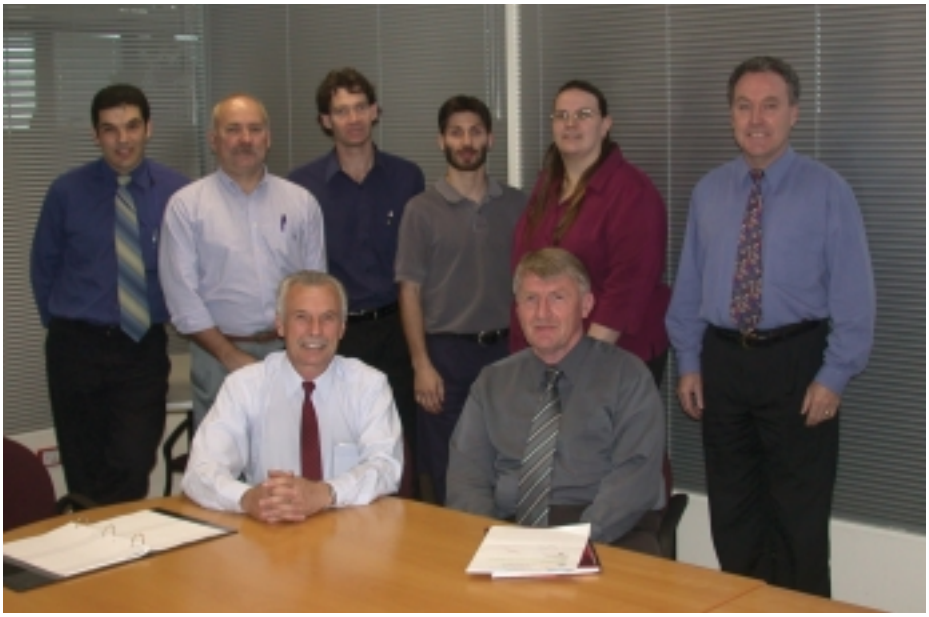
Website:	www.legionella.vic.gov.au/
LRMP address:	lrmp@dhs.vic.gov.au
Past issues of *Legionella Link*	www.legionella.vic.gov.au/resources.htm
Telephone:	1800 248 898
Facsimile:	(03) 9637 4657

Building Commission

Website:	www.buildingcommission.com.au/
Telephone:	(03) 9285 6498
Facsimile :	(03) 9285 6497

Plumbing Industry Commission

Website:	www.pic.vic.gov.au/
Telephone:	(03) 9889 2211
Facsimile :	(03) 9889 2244



DHS Legionella Team. Back row: Philip Montalto, Anthony (AJ) Simon, Stuart Adcock, Mark D'Agostino, Natalie Blyth and Stephen Waddington. Front row: Bernie Zwolak and Ray Goudey (A/Manager).

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