

CASE STUDY



# COOLING TOWER WATER AUDIT

# Royal Melbourne Hospital



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Cooling tower setup at Royal Melbourne Hospital, Victoria.

## COOLING TOWER WATER AUDIT

# Melbourne Health finds that extra one percent

Being environmental responsible while managing the risk of Legionella is a fine line the Royal Melbourne Hospital has learned to walk while managing its cooling towers. Although an ideal world would see the risk removed altogether, this site is proof that saving water and managing risk isn't necessarily chalk and cheese.

Royal Melbourne Hospital is the oldest public hospital in Victoria, built in the mid 1800s during an era in which Melbourne's population was booming as a consequence of the gold rush.

Originally known as The Melbourne Hospital, the City Campus has remained on its current site in Grattan Street Parkville, just north of the city's CBD, since it was first built in 1848; while the Parkville Campus nearby was originally the Immigrant's Aid Society built in 1853.

Over time, the Royal Melbourne (as it is often referred to) has become a sanctuary for the ill, providing specialist and general medical and surgical services, as well as becoming one of the state's three major trauma hospitals under the umbrella of Melbourne Health.

The Grattan Street site has undergone many renovations over its 162 year history, and as building and hospital technologies have developed, every effort has been made to accommodate them, such that the site has

undergone a number of transformations (including construction of the current main building in 1948) making it a complicated one from a mechanical services standpoint.

In response to the tragic Legionnaires disease outbreak sourced to cooling towers in Melbourne in 2000, the Royal Melbourne, along with many other high profile public buildings, reviewed its array of cooling towers and while the initial response was to replace them all with low risk alternatives, the realities of the cost, limited available footprint (space) and other technical issues eventually saw a program implemented which replaced all cooling towers beyond a certain age.

"We were able to rid ourselves of some pretty old cooling towers, however some of the existing cooling towers weren't old enough or were difficult to replace," said Ian Christie, Engineering Systems Manager for Melbourne Health.

"So now we have, I believe, the number of towers down to the smallest number that we can possibly have under the circumstances."

Many of the original cooling towers were replaced with a large bank of adiabatic condensers in 2006. They are said to have saved around 60 megalitres of potable water each year, while also reducing the Legionella risk. Now just nine cooling towers remain on the site.

Like other high risk facilities around the state, stringent management programs have been put in place that centre squarely on the management of the Legionella risk. Other factors such as water consumption and environmental impact, not surprisingly, become secondary management issues.

"You need to balance it against risk," explained Christie.

"Whilst we've always known there was an opportunity to save water if you were prepared to reduce your chemical concentrations, it's a brave man that wants to run that one up the flag pole."

He added that the hospital, while erring on the side of caution, has employed a number of technicians along with a water treatment service provider to develop appropriate chemical and testing regimes which balance risk versus water consumption to an appropriate level.

"For me, as the person responsible for essential services and critical services like fire and Legionella, it is a double-edged sword because we have to try and do things economically, but by the same token the public expect us to be on the leading edge of this stuff."

However being one of Victoria's Top 200 water users, water management has become an increasingly important issue for the hospital's operators in recent years, and while programs have been implemented to reduce water use in non-critical areas, the site's remaining cooling towers have been among the last pieces of infrastructure to be targeted for savings.

So when the Royal Melbourne Hospital was invited to participate in a cooling tower water audit program being delivered by AIRAH for the Victorian Government, Christie said it was an opportunity too good to pass up.

The audit would measure the performance of the site's cooling towers relative to best practice standard and provide a score as well as recommendations on where water savings could be made in the system.

Conducting the audits on behalf of AIRAH, Sven Denton of AquaKlar Analytical Services already had some experience and knowledge of the Royal Melbourne site and appreciated the challenges placed on its management to reduce water while managing risk.

The audit reviewed four cooling tower systems, and found on the multi tower system servicing the Parkmore Medical Centre building that one tower was out of balance when compared to the other two. This balancing issue had resulted in almost 2.86 megalitres of excess water being used, 20% above best practice.

The audit revealed that because the offending tower was slightly higher than the others, its ball valve would drop lower, thus making up more water. Compounding the problem further was that the third tower in the system had an overflow pipe which was too low, resulting in constant and substantial water loss.

Essentially, as one tower made up water, the other lost it.

"Sven discovered some overflow issues and, in years gone by, they would have probably gone unchanged because water was cheap and it wasn't an issue," explained Christie.

"But in today's world they are an issue, and so with greater vigilance, we have been able to take advantage of opportunities like these audits and realise some water savings which didn't impact on the management of the Legionella risk."

The remedial action recommended was both simple and economical.

A collar and a 'china hat' were attached to the overflow pipe on the third tower, thus extending it to the correct height and preventing water raining. This eliminated the constant overflow, and because each tower was connected to the other, the ball valves came back into synch.

This example just goes to show that while the fixes can be fairly straight forward, the most difficult part is being able to identify the problem in the first place," said Denton.

By the time a secondary audit was carried out some months later, such was the improvement that excess water had been reduced to just 86 kilolitres, an excellent figure and within 1% of best practice.

This translated into water savings of 2.77 megalitres, representing a 1% potable water saving over the site.

While small in percentage terms, such a saving would otherwise be difficult to identify on a site so reliant on water for maintaining facility and personal hygiene, as well as heating and cooling the accommodation of 3000 patients at any one time.

"It's fairly difficult to achieve easy water savings in a hospital, because it is a risk averse environment, so no one is going to complain about saving almost 3 megalitres per year," said Denton.

"The challenge now is to maintain the saving."

This challenge is not lost on Christie or the management at Royal Melbourne Hospital, with the audit providing impetus to engage with its water treatment service provider further and ensure monitoring of issues such as this is part of their contract.

"From time to time they do point things out to us, such as bleed rates and things which can influence the amount of water you use, so when we have these sort of issues discovered we can then make it more topical, if you like, with our service providers and specialist maintenance contractors," said Christie.

"It will serve us well."

1 Cycles of concentration (referred here as chemical concentrations) refers to the ratio of mineral concentration in the cooling system to that in the water supply.



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