

Advisory note

A service to A.G. Coombs clients

May 2003

Managing Water Usage in Cooling Towers

Cooling towers are responsible for the consumption of large amounts of potable water. A cooling tower installation serving a large commercial building may consume in excess of 500,000 litres of water in a week through the evaporative effect alone.

With concerns increasing over water consumption and its future scarcity water usage in cooling towers has become an important issue that we must manage.

There are six ways in which water is used in cooling towers:

1. Evaporation: As part of the heat rejection process, as a general rule the greater the heat rejection the greater the evaporation rate. It is however a complex relationship with a number of variables including flow rates, cooling tower design, fan operation and effectiveness, wet and dry bulb ambient temperatures, prevailing wind conditions, condenser water temperature set points and system control regimes. A well managed system whether it be industrial plant or building air-conditioning will reject less heat, use less energy and consume less water.

2. Bleed: Because of the evaporative effect the concentration of dissolved salts in the system will increase leading to scale and deposit build up and corrosion. Automatic "bleed" systems work to manage and limit concentration levels by draining water and replacing it with fresh water. The bleed can be at a set rate by fixed valve or timed discharge, or it can be variable based on sensing the water properties as they are affected by dissolved salts e.g. conductivity. Either method can result in excessive bleed rates if the system is not set up properly and **checked regularly**.

3. Carry Over or "Drift": Inappropriately sized cooling towers, poorly modified cooling towers, cooling towers with ineffective or no drift eliminators can all result in excessive amounts of carry over or drift in the discharge air. Aside from the water wastage aspect this is a public health risk circumstance and is now the subject of strong regulatory control in most Australian States. There should be minimal carry over from cooling towers.

4. System leakage: Because cooling tower systems are "open systems" leakage often goes unnoticed. Leaks may be due to faulty glands in pumps or a number of other sources. The rate of system water loss from splash out from cooling tower basins and

exposed fill can be significant in poorly designed installations. Systems should be audited regularly and leaks rectified.

5. Cleaning and Remedial Actions: Draining down cooling towers and systems for scheduled cleaning and as a part of the "disinfect – clean – disinfect" remedial process required by law now consumes significant amounts of water. Cleaning with high-pressure washers also uses large amounts of water. These activities are by and large at present carried out with little or no regard to the amount of potable water consumed. There needs to be a heightened awareness of water usage during these activities and water should be conserved where possible without compromising public health.

6. Maintenance of system components: Maintenance, modification and repair of cooling tower system components such as chillers, pumps, valves and heat exchangers can sometimes require the drain down of the system. These activities are often carried out with little or no regard to the amount of potable water consumed.

There are a number of areas that need attention and a strategic approach is required to manage and minimise water consumption in cooling tower systems.

Water usage in cooling tower systems should be accounted for. It is possible to develop and monitor a water balance for the system to ensure water consumption is managed and not wasted. To accurately measure water consumption the incoming make-up water, wash down water and bleed discharge water should be metered. Specific activities that consume water such as drain downs should be recorded and the consumption event noted.

An increased awareness of the amount of water used by cooling towers must be encouraged and plant management and maintenance practices need to be improved to reduce water consumption.

For more information contact:

Bryon Price at A.G.Coombs
on 03 9248 2700 or
bprice@coombs-contracting.com.au

A.G. Coombs Pty Ltd 26 Cochranes Road Moorabbin Victoria 3189 Australia

Phone 03 9248 2700 Fax 03 9248 2751 www.coombs.com.au ACN 005 653 332

While every effort has been made to ensure the accuracy of the information in this publication A.G. Coombs assumes no responsibility for errors or omissions or for any consequences of reliance on this publication.



A.G.Coombs
Together we achieve the extraordinary