

OBSERVATIONS ON THE EFFECT OF ALGARID IN COOLING TOWERS

Cooling towers should be operated and maintained with clean battens for evaporative surfaces. A common form of batten is to use rough sawn, usually treated wooden battens. The rough finish more than doubles the surface area, which in turn provides more evaporation and therefore more cooling effect. If bacterial or algal slime clog up this rough finish then the surface area decreases – less evaporation – less cooling effect. This in turn means longer running times for the whole system to do its job, higher pressures in the compressors and much more electricity to run the plant. Chemicals are used as a biocide to kill the bacteria but the bacteria then sediments to the bottom of the pan in the form of sludge. If a bleed -off is employed to reduce the buildup of sludge, then chemicals are wasted. Chemicals are expensive. A catch 22 situation.

EXPERIMENTS ON 18 COOLING TOWERS

Sample water was taken both from the make-up valve (tap water) and from the pan or base of the 18 towers. 11 of the towers had Algarid fitted to the circulating system and in most cases to the make-up water as well. The size of the towers varied and their applications varied from air-conditioning to industrial use i.e. plastic molding machines and multiple use towers such as the ones at Commonwealth Serum Laboratories where each of the towers had multiple circuits working from a single tower.

The samples were taken and the containers placed immediately in a portable refrigerator at approx. 7 °C. and delivered straight to East Melbourne Laboratories Pty. Ltd. for counting. These tests took place over a period of 9 weeks, two sets of samples per week from 30 -9-81 to 25-11-81.

To our disappointment only 4 of the 11 towers with Algarid units that were tested had bleed -offs of any sort. The results of counts show how necessary a bleed-off is on both Algarid treated and chemically treated towers. Bleed-off is generally thought to be necessary for stopping the build-up of total dissolved solids so that scaling of pipes will be minimized. It is also essential to stop the accumulation of bacteria. In most water supplies at times very high counts can be obtained. If these bacteria are not allowed out of the system they will die and become extra nutrient for further multiplication.

IMPORTANCE OF CORRECT BLEED-OFF

Bleed-off in chemically treated towers can be overdone as in one pair of towers from which we took samples. Both towers were of approximately 100 tons capacity and had been thoroughly cleaned 11½ weeks before we took our samples. One of these towers was fitted with Algarids and the other was chemically dosed once a week. In our opinion both towers had far too much bleed-off. Both were supplied with fresh water from the same supply, which had an average count of around 13,000 total viable aerobic bacteria per ml. The count from the pans was the same i.e. 21,000 and 22,000 respectively. The difference in the condition of the towers was very marked in that the Algarid tower had clean, rough battens and the chemically treated tower had smooth, slimy battens.

We came to the conclusion from this situation that, as the chemicals were put in on Fridays, with the high rate of bleed-off they would probably all be flushed out by Saturday and in fact, that tower was running without any treatment most of the time, hence the high degree of slime contamination. The other tower, fitted with Algarids remained clear of slime as no multiplication could take place anyway. The temperatures were 15° C for the clean tower against 22°C for the dirty tower. Both towers had a similar load at the time of taking the temperatures.

To highlight the importance of the correct bleed-off, the average count on the 4 Algarid treated towers with bleed-off was 43,675 against the average of the 7 towers with Algarid but no bleed-off 392,785 i.e. a factor of 13.5. This difference is logically the accumulation factor.

BLEED-OFF GUIDELINES

As a rule of thumb formula for the amount of bleed-off required to keep stability bacteria-wise in a tower, 1½ - 2 times the volume of the system per week. Some water authorities have a formula for maximum allowable bleed-off in order to conserve water. A typical one is that bleed-off must not exceed the rate of 1 litre per min. per 100kw cooling capacity. 1 ton = 3.5168kw. Most towers with Algarid units can maintain stability using only 20% of the maximum allowed using the above formula - and of course, no chemicals.

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SUMMARY OF BACTERIA COUNTS - 18 TOWERS TESTED

When you average the bacteria count of the 11 Algarid treated towers, you have a figure of 391,290. The average of the 7 chemically treated towers was 2,911,657.

A factor of 7.4 times less bacteria than in the chemically treated towers.

However, if you average the count from the 4 Algarid treated towers with bleed-off, you get 43,675 against the chemically treated towers 2,911,675.

A factor of 66.6 times less bacteria than in the chemically treated towers.

NOTE: These tests were originally carried out to try to show that no legionella would multiply in the Algarid treated towers. This aspect of the tests failed as no legionella was found in any of the towers, probably because of the time of the year and the temperatures recorded in the towers.

However, we still believe that the process would stop multiplication of legionella for 2 reasons:

1. It controls multiplication of other bacteria.
2. Legionella requires amino acids, which come from other bacteria.

In other words, legionella cannot multiply in a tower free from bacterial slime.

ADDENDUM

On 9th August 1994 Algarid received approval by the New South Wales Health Department (Approval No. PDA.067) as an approved process of disinfection for Microbial Control Issues, including the control of Legionnaires disease.

APPROVED PROCESSES OF DISINFECTION

Company Name	Address	Process of Disinfection	Approval No.	Conditional Approval Date
Algarid	1/14 Apollo Court, Blackburn, Vic	Algarid Magnetic Units	PDA.067	9 August 1994
Anco Australasia	102 Derby Street, Silverwater, NSW	Hatacide LP5 Ancocide 36-44 & 36-14 Ancocide 36-85 Ancocide 36-56 & 36-57 Biosolve Program	PDA.003 PDA.023 PDA.044 PDA.045 PDA.078	1 December, 1992 12 February, 1993 11 May, 1993 2 August, 1993 29 September, 1997
Aquazon	26 Greenway Drive, Pymble, NSW	Ozone Cooling Water Treatment System	PDA.021	15 February, 1993
Australian Water Treatment	10/10-12 Old Castle Hill Road, Castle Hill, NSW	AWT 800	PDA.080	6 January, 1998
Australia Asia Marketing	2/64A Avenue Road, Mosman, NSW	Purogene - Chlorine Dioxide	PDA.056	3 August, 1993
Baltimore Aircoil	RMB 3977 Wisemans Ferry Road, Somersby, NSW	lo-Bio Water Treatment System	PDA.022	15 February, 1993

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Sample	Location, Type of Tower & Use Sample date	Temp °C	Chemicals, if any	Vol filtered	Max Filter Pressure PSI	Approx time Algarid fitted	Pneumophil a L. Um	Tap Count	Tower Count
1	Hume Ltd 30/9/81 Cnr Lower Dandenong Road & Bell Grove Braeside 100 ton - plastic molding	20	None	7.0	15	4 years		26,000	140,000 Good
2	Hume Ltd 30/9/81 As above	17	None	8.0	25	1 year		280	9,000 Good
3	Beecham Laboratories 7/10/81 Winterton Road, Clayton 50 ton	23	None	7.2	15	2 years		1200	46,000 Good – no bleed off
4	Cadbury Schweppes Ltd 7/10/81 323 Canterbury Road Ringwood	36	Yes	4.0	25	No Algarid		27	460,000 bad
5	36 Albert Road 14/10/81 South Melbourne 100 ton office cooling	16.4	None	8.2	25	2 years		1100	4,400 Good – overflows regularly
6	33 Park Street 14/10/81 South Melbourne 100 ton office cooling	20.2	None	8.0	25	2 years		3	520,000 Good – no bleed off
7	C S L 21/10/81 Parkville 100 ton approx. treated	15	Yes, but very high bleed off	7.2	25	1.5 years		1500	21,000 Good
8	C S L 21/10/81 Parkville 100 ton approx. very fast bleed off & overflowing	22	Yes	8.8	20	No Algarid		26,000	22,000 Good. Slimy battens
9	Melbourne University 28/10/81 Civil Engineering 100 ton	18	Some for scale	1.8	28	3 years		12	13,500 Good. Water green with chemicals
10	Melbourne University 28/10/81 Brownless Library 150 ton	26	Yes	2.2	30	No Algarid		1	3,600 Good Water green with chemicals
11	Gilbeys Aust Pty Ltd 4/11/81 970 Nepean highway, Moorabbin 50 ton	23.6	None	1.6	30	2 years		1	2,200,000 Fair only, no bleed off
12	Gilbeys Aust Pty Ltd 4/11/81 970 Nepean highway, Moorabbin 400 ton Large outdoor tower	17.4	Some Copper Sulphate	1.4	30	No Algarid		16	17,000,000 Fair only
13	St Vincents Hospital 11/11/81 Bootty Wing 150 ton	14	Yes	3.9	30	No Algarid		19 from b/v	800,000 Good Tower not working
14	Consulting Rooms 11/11/81 Victoria Parade 150 tone	22	Yes	2	30	No Algarid		4400 from hose	2,000,000 Fair Green L/D
15	Southdown Press 18/11/81 Top Tower 150 tons	22	Yes	3.5	30	3 Years		51	410,000 Cloudy. Foam on top cleaned 3 weeks
16	Southdown Press 18/11/81 Lower Tower 150 tons	15.2	Yes	1.4	30	3 years		420	630,000 Milky Clean battens
17	Spartan Paints 25/11/81 Industrial use 150 tons	13	Some	3.6	30	12 mos		3300	310,000 Muddy
18	Spartan Paints 25/11/81 Industrial use 150 tons	13	Yes	6	25	Feed Water only		3300	96,000 Muddy