

# MICROBIOLOGICAL MONITORING

## DESCRIPTIONS OF COMMON PATHOGENS



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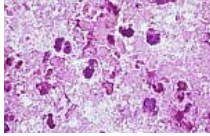

## KNOW YOUR ENEMY

This is a general description of the various organisms that may be found in the pool water.

*Please note:* We will not necessarily test for all these organisms at every visit.



Regular monitoring, as per the recommendations of the Pool Water Advisory Board, will help to ensure your clients' comfort and enjoyment whilst in your Pool.

<p><b><u>Total Viable Counts (TVC)</u></b></p> <p>The Total Viable Counts give an indication of the level of all living bacteria present in the Pool Water. The test is carried out at 37°C and will count organisms which may, because of their temperature requirements, emanate from humans or animals.</p> <p><i>The presence of a high number of TVC's may be due to poor chlorine and pH control or excessive bather load.</i></p>	<p><b><u>Coliforms</u></b></p>  <p>The term 'Coliform' is a catch-all word for a large group of many different species of bacteria that share a few key characteristics such as being Gram-negative bacilli and possessing the ability to break down lactose. <i>A large number of the species concerned may be found in the bowel</i> but some are found in the environment, particularly plant material and soil.</p>	<p><b><u>E. coli</u></b></p>  <p>E. coli (full name Eschericia Coli) inhabits the animal bowel - including humans. <i>It's presence in bathing waters indicate recent faecal contamination by animal or human.</i> Some strains of E. coli can cause gastrointestinal disease in themselves but it's presence, while indicating faecal contamination, reveals the possibility of contamination of the water by other disease-causing organisms excreted from the bowel.</p>
<p><b><u>Pseudomonas</u></b></p>  <p>Pseudomonas aeruginosa, one of the Pseudomonads, has been implicated in waterborne infection.</p> <p><i>It may cause ear infection, a skin rash, and possibly urine infections.</i> The infections have been associated mostly with it's presence in spas, Jacuzzis and other aerated waters because of the Pseudomonas highly aerobic growth requirement. Pseudomonads, in general, require higher levels of disinfection / antiseptic than many other species to kill them.</p>	<p><b><u>Legionella</u></b></p> <p>Legionella / Legionellosis, the bacterial cause of Legionnaire's Disease is commonly linked with cooling towers and air conditioning units but it <i>can also be found in Spas</i>, due to the aeration and the operating temperature.</p>  <p><i>If the infected particles are inhaled into the lungs, tissue damage can occur leading to a pneumonia type illness which may be fatal.</i></p>	<p><b><u>Streptococci</u></b></p> <p>These bacteria are specific <i>inhabitants of the animal or human gut and are indicators of possible contamination with harmful bacteria.</i> These bacteria tend to occur in large numbers and to survive longer than many harmful bacteria.</p>  <p><i>Streptococci can cause pharyngitis, sinusitis, middle ear infection, food poisoning, puerperal fever, skin and wound infections.</i></p>

**FOR TECHNICAL ADVICE PLEASE CALL 01933 410066**

## **SITE ACTION TABLE**

### **(Swimming Pools and Spas)**

#### **Colony Count (Total Viable Count - 24 hours @ 37°C)**

<b>Absent in 1ml</b>	<ul style="list-style-type: none"> <li>• Hygienic conditions and operational management of the facility are satisfactory</li> </ul>
<b>Not more than 10cfu/ml and no Coliforms or E-coli present</b>	<ul style="list-style-type: none"> <li>• Site to check daily water test results</li> <li>• Site to review cleaning schedule</li> <li>• The facility to stay open if results within Pool Operational Parameters</li> </ul>
<b>An occasional sample result of between 10cfu/ml and 100cfu/ml</b>	<ol style="list-style-type: none"> <li>1. Acceptable providing no Coliforms or E-coli are present and the operating conditions of the pool are satisfactory</li> <li>2. Site to check water clarity</li> <li>3. Site to check chemical balance and pH</li> <li>4. Site to shock dose pre filter at the end of the day</li> <li>5. Site to undertake backwash and clean thoroughly at the end of the day</li> <li>6. Site to carry out water test, before opening in the morning, to ensure parameters are achieved</li> </ol>
<b>More than 1 consecutive sample result of between 10cfu/ml and 100cfu/ml</b>	<ol style="list-style-type: none"> <li>1. Site to check water clarity</li> <li>2. Site to check chemical balance and pH</li> <li>3. Site to shock dose pre filter at the end of the day</li> <li>4. Site to undertake backwash and clean thoroughly at the end of the day</li> <li>5. Site to carry out water test before opening to ensure parameters are achieved</li> <li>6. Specialist Investigation required – site to prepare report ie: pool results / dosing equipment</li> </ol>
<b>Any sample result of more than 100 cfu/ml</b>	<ol style="list-style-type: none"> <li>1. Site to close the pool at the end of the day and carry out recommendations – eg shock dose</li> <li>2. Site to re-open the pool the following day providing water test parameters are achieved</li> </ol>

## Total Coliforms

<b>Absent in 100ml</b>	<ul style="list-style-type: none"> <li>• Hygienic conditions and operational management of the pool are satisfactory</li> </ul>
<b>Less than 10 per 100ml with no E-coli, the colony count is less than 10cfu/ml and the residual disinfection and pH values are within the recommended ranges</b>	<ul style="list-style-type: none"> <li>• Acceptable as a single reading</li> <li>• Site to check daily water test results are in range – if not, close facility</li> <li>• Site to review cleaning and maintenance schedule</li> <li>• The facility to stay open if results within Pool Operational Parameters</li> </ul>
<b>More than 10 but less than 100 in 100ml</b>	<ol style="list-style-type: none"> <li>1. BWT to notify site</li> <li>2. Site to check water clarity</li> <li>3. Site to check chemical balance and pH</li> <li>4. Site to shock dose pre filter at the end of the day</li> <li>5. Site to undertake backwash and clean thoroughly at the end of the day</li> <li>6. Site to carry out water test before opening to ensure parameters are achieved</li> <li>7. <b>Microbiological re-sample required – contact BWT when remedial works have been completed</b></li> </ol>
<b>More than 100 per 100ml</b>	<ol style="list-style-type: none"> <li>1. BWT to notify site</li> <li>2. Site to close the pool at the end of the day and carry out remedial actions</li> <li>3. Site to re-open the pool the following day providing water test parameters are achieved</li> <li>4. <b>Microbiological re-sample required – contact BWT when remedial works have been completed</b></li> </ol>

## E. Coli

<b>Absent in 100ml</b>	<ul style="list-style-type: none"> <li>• Hygienic conditions and operational management of the pool are satisfactory</li> </ul>
<b>1 →10 cfu/100ml</b>	<ol style="list-style-type: none"> <li>1. BWT to notify site</li> <li>2. Site to check water clarity</li> <li>3. Site to check chemical balance and pH</li> <li>4. Site to shock dose pre filter at the end of the day</li> <li>5. Site to undertake backwash and clean thoroughly at the end of the day</li> <li>6. Site to carry out water test before opening to ensure parameters are achieved</li> </ol>
<b>Present in excess of 10 per 100ml</b>	<ol style="list-style-type: none"> <li>1. BWT to notify site</li> <li>2. The pool should be closed</li> <li>3. Site to carry out remedial actions</li> <li>4. Site to re-open the pool providing water test parameters are achieved</li> <li>5. <b>Microbiological re-sample required – contact BWT when remedial works have been completed</b></li> </ol>

## Pseudomonas Aeruginosa

Absent in 100ml	<ul style="list-style-type: none"> <li>• Hygienic conditions and operational management of the pool are satisfactory</li> </ul>
Up to 10 in 100ml	<ul style="list-style-type: none"> <li>• BWT to notify site</li> <li>• Site to check daily water test results</li> <li>• Site to review cleaning schedule</li> <li>• The facility to stay open if results within Pool Operational Parameters</li> </ul>
More than 10 but less than 50 in 100ml	<ol style="list-style-type: none"> <li>1. BWT to notify site</li> <li>2. Site to check water clarity</li> <li>3. Site to check chemical balance and pH plus spa maintenance</li> <li>4. Site to shock dose pre filter at the end of the day</li> <li>5. Site to undertake backwash and clean thoroughly at the end of the day</li> <li>6. Site to carry out water test before opening to ensure parameters are achieved</li> <li>7. The facility to stay open if results within Pool Operational Parameters</li> </ol>
More than 50 in 100ml	<ol style="list-style-type: none"> <li>1. BWT to notify site</li> <li>2. Site to close the pool at the end of the day and carry out recommendations</li> <li>3. Site to re-open the pool the following day providing water test parameters are achieved</li> <li>4. <b>Microbiological re-sample required – contact BWT when remedial works have been completed</b></li> </ol>

## Legionella

Present	<ul style="list-style-type: none"> <li>• <b>BWT to notify Management</b></li> <li>• <b>BWT and Client to agree an appropriate response and remedial action</b></li> <li>• <b><i>MICROBIOLOGICAL RE-SAMPLE REQUIRED</i></b></li> </ul>
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## SITE ACTION TABLE – Domestic Water Services

### MICROBIOLOGICAL WATER ANALYSIS

#### RECOMMENDED LEVELS

	<b>TOTAL VIABLE COUNT</b> *cfu/ml (2 days @ 37°C)	<b>TOTAL VIABLE COUNT</b> *cfu/ml (3 days @ 22°C)	<b>LEGIONELLA</b> *cfu/litre	<b>PSEUDOMONAS</b> *cfu/100ml	<b>E.COLI</b> *cfu/100ml	<b>COLIFORM</b> *cfu/100ml	<b>FAECAL ENTEROCOCCI</b> *cfu/100ml
<b>DRINKING WATER</b>	Less than 10	Less than 100	Less than 1000	Absent	Absent	Absent	Absent
<b>DOMESTIC HOT &amp; COLD WATER</b> ie. basins, showers & storage tanks	Less than 100	Less than 1000	Less than 1000	Absent	Absent	Absent	Absent

\* cfu = *colony forming unit*  
or the number of viable (breeding) bacteria in the sample

**MICROBIOLOGICAL WATER ANALYSIS**  
**REMEDIAL ACTION**

<b>DRINKING WATER</b>	TVC up to 10 cfu/ml @ 37°C; 100 cfu/ml @ 22°C	Acceptable.
	TVC 10 - 50 cfu/ml @37°C; 100 - 500 cfu/ml @ 22°C	Slightly high but not excessive.
	TVC 50 - 200 cfu/ml @ 37°C; 500 - 2000 cfu/ml @ 22°C	TVC too high; flush the outlet thoroughly and clean if inspection shows it to be dirty.
	TVC over 200 cfu/ml @ 37°C; over 2000 cfu/ml @ 22°C	TVC excessive; clean and disinfect the outlet as soon as possible.
<p style="color: red;">NB. If Legionella, Pseudomonas, E. Coli, Coliforms, Faecal Enterococci are present, the outlet should be labeled 'Out of Order', until remedial actions are complete.</p>		

## MICROBIOLOGICAL WATER ANALYSIS

### REMEDIAL ACTION

<b>DOMESTIC HOT &amp; COLD WATER</b> ie. basins, showers & storage tanks	TVC up to 100 cfu/ml @ 37°C; 1000 cfu/ml @ 22°C	Acceptable.
	TVC 100 – 500 cfu/ml @ 37°C; 1000 - 5000 cfu/ml @ 22°C	Slightly high; We would recommend flushing the outlets and checking for any debris in spray plates or shower heads.
	TVC over 500 cfu/ml @ 37°C; over 5000 cfu/ml @ 22°C	TVC excessive; definitely clean and disinfect outlets and/or shower heads and flush thoroughly. It may be advisable to inspect the water storage.

**NB.** If Legionella, Pseudomonas, E. Coli, Coliforms, Faecal Enterococci are detected, then sterilise outlet, flush through and retest immediately. If result is verified then the entire system may require disinfecting.

**PLEASE NOTE:** If high bacteria levels persist then it may be advisable to review the overall water hygiene procedures.



# EXAMPLE REPORT

## BACTERIOLOGICAL ANALYSES REPORT

CLIENT :	LEISURE CENTRE
SITE :	SITE ADDRESS

Our ref: EXAMPLE

DATE SAMPLED :	08.10.06
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PREVIOUS RESULTS FROM	17.09.06
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MAIN POOL
SPA

FREE CHLORINE	TOTAL VIABLE COUNT /1ML 24HRS @ 37°C	PASS OR FAIL
OK	0	PASS
OK	8	PASS

FREE CHLORINE	TOTAL VIABLE COUNT /1ML 24HRS @ 37°C
OK	4
OK	3

MAIN POOL
SPA

PSEUDOMONAS AERUGINOSA /100 MLS	MOST PROB No of COLIFORMS /100ML	MOST PROB No of E.COLI/100ML
0	0	0
0	0	0

PSEUDOMONAS AERUGINOSA /100 MLS	MOST PROB No of COLIFORMS /100ML	MOST PROB No of E.COLI/100ML
0	24	0
0	0	0

### REPORT STATUS

REMEDIAL ACTION COMPLETED BY xxxxxxxxxxxxxxxx  
 IN THE EVENT OF A FAILURE  
 (Please refer to advice sheets)

SIGNATURE..... DATE.....



TEL: 01933 410066 FAX: 01933 410077