

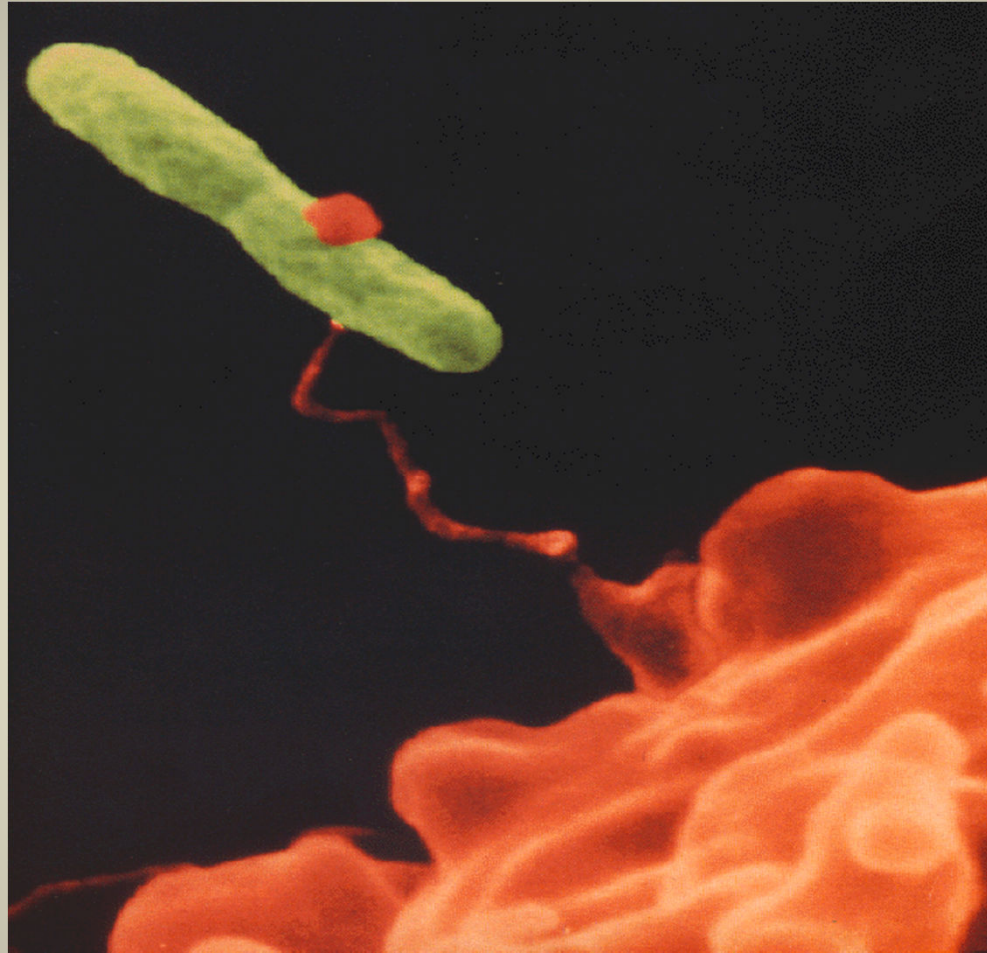
Practical Legionella Risk Management - A Southern African Perspective



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Ecosafe Company Background

- Company started in 2004
- Operate throughout Southern, Central and Northern Africa
- Specialise in Industrial & Commercial Legionella & General Water Hygiene Consulting
- Main area of expertise is in Legionella Risk Assessment, Management Plans and Retrospective Investigation

International Legislation / Guidelines

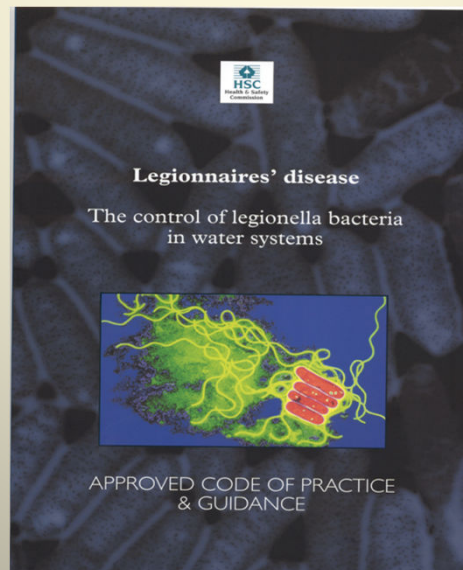
- **United Kingdom**

- Legislation

- Health and Safety at Work etc Act 1974 (revised 1987) (HSWA)
 - Control of Substances Hazardous to Health Regs 1999 (COSHH)

- Guidelines

- Health and Safety Commission Approved Code of Practice – L8 Document
 - Came into effect 8th Jan 2001 replacing the 1995 approved code of practice and the HSG70 technical guidance document



- European Union
- Cannot legislate due to number of individual republics however:
 - European Guidelines for the Control and Prevention of Travel Associated Legionnaires Disease
 - Cross reference cases to assist in identifying sources of infection
 - ‘Name and Shame’ sources who are identified as being negligent by posting details on internet (ELDSNET)
 - Based on UK ACoP L8 Document / Standards



- USA

- American Society of Heating, Refrigerating and Air-Conditioning Engineers Guideline 12-2000
- Recently upgraded Guideline to a National Standard SPC188P Oct 2008
- Duty upon building owners (not tenants) to establish Legionella auditing and prevention programs
- Tenants might manage program, however, ultimate responsibility remains with owner

- **Australia**

- Australian Standard, AS/NZS 3666: Air-handling and water systems of buildings, microbial control 1989, 1996, 2002
- Individual Territories also have ‘regional’ requirements
- Standard written into statutory law
- Production of additional standards by Standards Australia to cover
 - Methodology for laboratory culturing and enumeration of *Legionella* in environmental samples (AS 3896)
 - Field measurement of drift loss from cooling towers (AS 4180)
 - Requirements for thermostatic mixing valves (AS 4032)

South African Legislation

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993
REGULATIONS FOR HAZARDOUS BIOLOGICAL AGENTS

The Minister of Labour has under section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) on the recommendation of the Advisory Council for Occupational Health and Safety, made the regulations in the Schedule.

SCHEDULE

Definitions

1. In these Regulations any word or expression to which a meaning has been assigned in the Act shall have the meaning so assigned and, unless the context indicates otherwise--

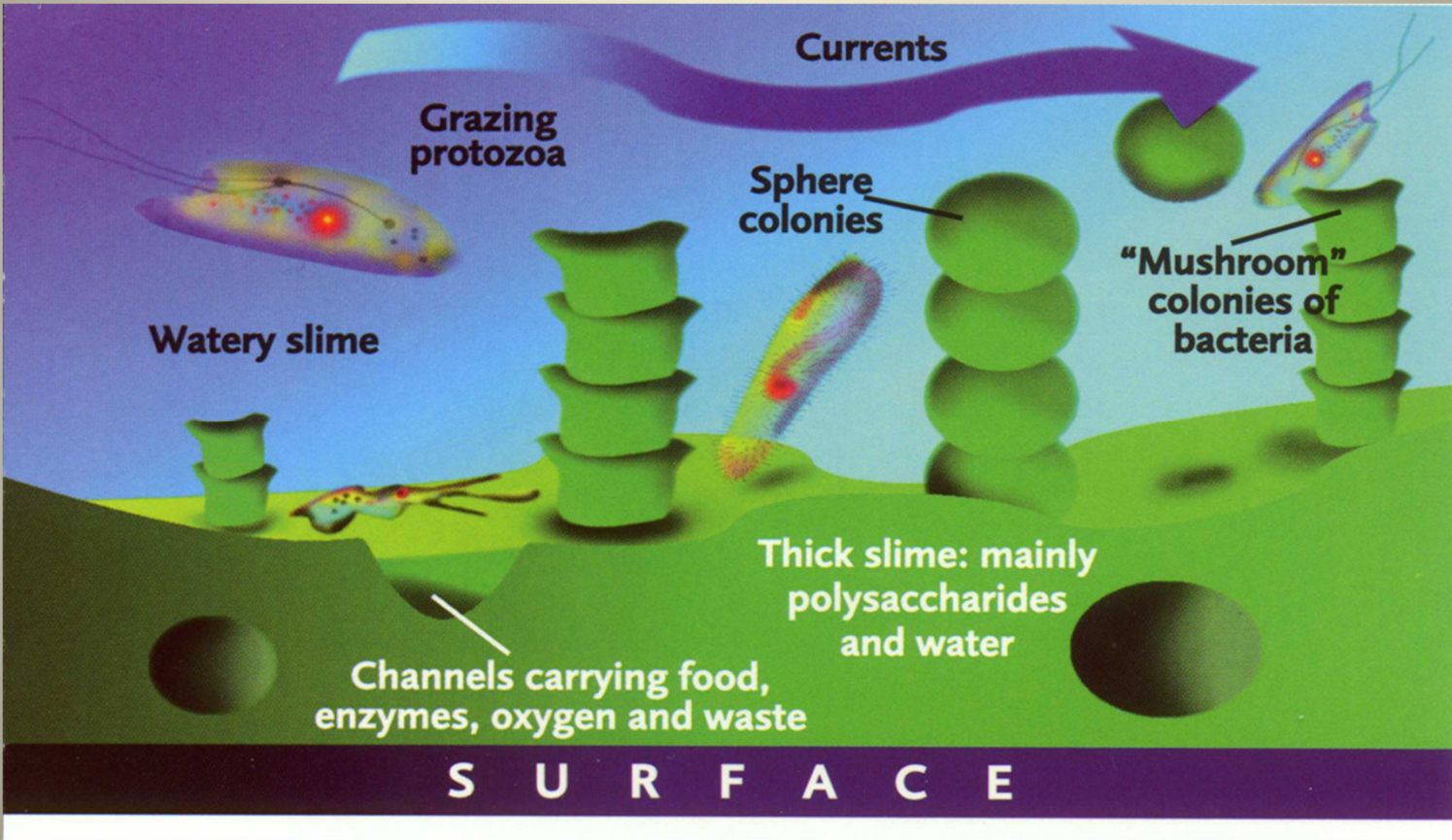
biological agent means any micro-organism, cell culture or human endoparasite, including any which have been genetically modified, which may cause an infection, allergy or toxicity, or otherwise create a hazard to human health;

- Legionella falls under the Occupational Health and Safety Act, No 85 of 1993 – Regulations for Hazardous Biological Agents (HBA's)
- Legionella Identified in Hazardous Biological Agent Regulations as “Group 2 HBA” – Demands the control of exposure of individuals to Legionella
- HBA Regs – Highlight the need for Risk Assessment, Control Program, Training & Auditing
- While Legionella is legislated in South Africa, the legislation is poorly policed and no actual guidelines currently exist
- **Legally have to take action without suitable guidelines!**
- Legionella Action Group (LAG) actively trying to pass through guidelines based on UK's ACoP L8
- Some Companies adopting proactive Approach and implementing internal “codes of practice” aligned with U.K. & European requirements

Understanding Legionella – Proliferation and High Risk Systems

- Temperature - prefers 20 - 45 °C
- Below 20°C Bacteria lies dormant
- Above 50°C effective kill (pasteurization)
- Stagnation / low flow areas
- Presence of any organic material
- Corrosion within systems – provides suitable microhabitat
- Algae, amoebae & other bacteria serve as hosts – increased proliferation
- Presence of Biofilm & Sediment

Biofilm



Systems Typically Associated with Outbreaks

- Cooling towers and evaporative condensers
- Hot and Cold water systems especially showers
 - Spa baths
 - Water Features / Fountains
- Bottle washers & other process systems
 - Lathe cooling systems
- Water misting systems for food or agriculture
 - Hospital patient humidifiers
 - Air Handling Units / Aircon Systems
 - Emergency Showers & Fire Hoses
 - Sprinkler systems and hose reels
 - Car / train / vehicle washers

** Any system where the water is between 20-45 degrees & generates an aerosol**

Insight into Legionella Risk Assessment & Management



Risk Profiling / Matrix

- Any system carries an inherent Risk Rank (Low, Moderate, High)
- How a System is managed / maintained Determines a 'Risk Score' that can be applied to that particular system
- The Risk Assessment is based on a combination of the Inherent Rank Vs Risk Score = Risk Profile of System

Understanding Legionella – The 'Causation Chain'

- 1) System becomes contaminated
- 2) Legionella multiplies to significant numbers
- 3) Legionella dispersed in an aerosol
- 4) Aerosol comes in contact with a susceptible individual
- 5) Contaminated aerosol incubates & is present long enough to cause infection

If one link in the chain is missing – The risks of exposure to Legionella Bacteria are greatly reduced

Risks to be Considered

- Risk of Legionella entering the system
 - Municipal Mains
 - Borehole
 - River
 - Dam
 - Cross Contamination / Airborne
 - Process
 - Deadlegs

Cross Contamination



Deadlegs



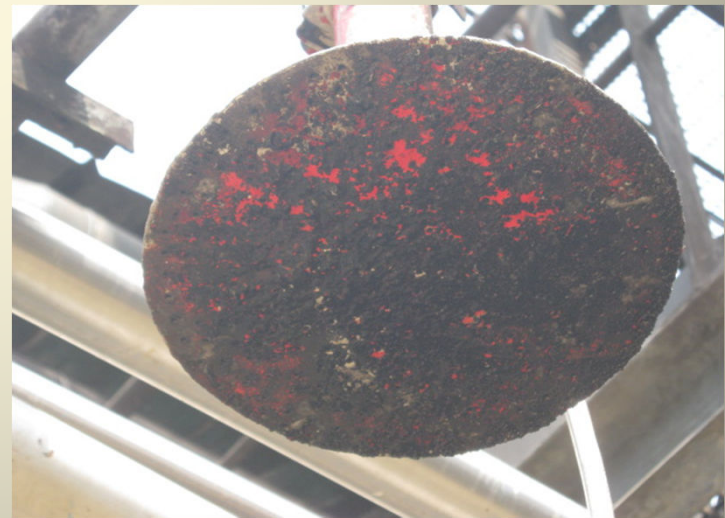
Risks to be Considered

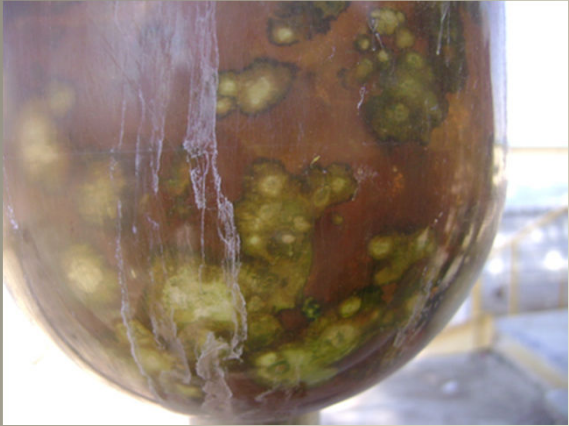
- Risk of Legionella entering the system
- Risk of proliferation

Nasty Systems









Risks to be Considered

- Risk of Legionella entering the system
- Risk of proliferation
- Risk of aerosol generation / release

Poorly Maintained Systems



Damaged Drift Eliminators



Generate Aerosol by Design



Risks to be Considered

- Risk of Legionella entering the system
- Risk of proliferation
- Risk of aerosol generation / release
- Risk of exposure

Risk of Exposure



Risk of Exposure



Risks to be Considered

- Risk of Legionella entering the system
- Risk of proliferation
- Risk of aerosol generation / release
- Risk of exposure
- Duration of exposure and susceptibility of individuals
- **Industry Risk - The cost associated with an outbreak, in both human & financial terms, is far greater than the cost of prevention**

Effective Legionella Management

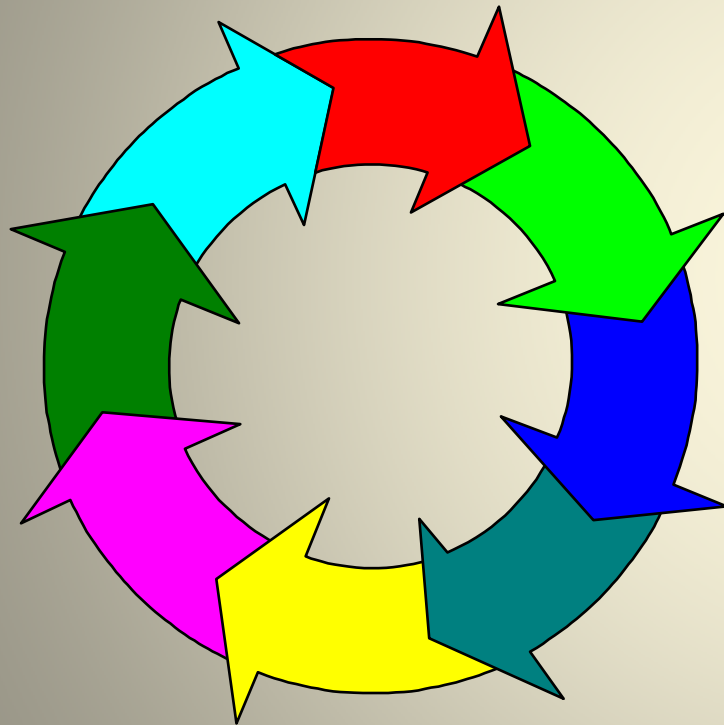
“A Well Managed System is a Safe System”

- Legionella Management broken into 4 components
 - Legionella Risk Assessment & Management Plan
 - Identify On site Risks
 - Develop Site Specific Management, Implementation Plan & Defect Action Log
 - Implement Legionella Program
 - Chemical, Physical & Thermal
 - Effective chemical dosing
 - Thermal pasteurisation – mainly domestic systems
 - Cleaning/Housekeeping **** Major Component****
 - Scheduled cleaning program of all high risk systems
 - As needed basis at least biannually for towers
 - Training, Monitoring & Review Process
 - Training of all individuals involved
 - Defined inspection, monitoring & review program
 - Effective Logbook System & Regular Reviews

What Other Information is Needed?

- You should not just look at the cooling tower or hot water systems in isolation. You need to look at the total system operation, from the water coming in, passing through the process, to the water going out. The range of information you also need is:
 - Asset register - a full register of all water related plant
 - Schematic diagrams - a full updateable schematic
 - Source of water supply - is it from the town's mains or from another source?
 - ID any sources of contamination - possible process contamination?
 - Plant operating conditions – infrequent use?
 - Plant shutdowns/breakdowns - start up/shutdown periods?

Continuous Improvement



- Plan / do / measure / act
- Satisfactory level of competence
- Performance reviewed
- Active supervision
- Training Records

Example Implementation Plan

| Task | By Whom | As needed | Daily | Weekly | Monthly | Quarterly (3-Monthly) | Bi-annually (6-Monthly) | Annually |
|-------------------------------------|-----------------------|-----------|-------|--------|---------|-----------------------|-------------------------|----------|
| PROGRAM: | | | | | | | | |
| Physical checks | Site | | x | | | | | |
| Conductivity, pH, and biocide check | Site/ Service Co. | | | x | | | | |
| Bacteria dipslide | Site / Service Co. | x | | x | | | | |
| Tower Internal Inspection | Service Co. | x | | | x 2 | | | |
| Water treatment service visit | Service Co. | | | x | | | | |

Example Defect Action Log

| Remedial Action | Who | When / Priority | Completed |
|----------------------------------------------------------------------------------------|-------------------------|------------------------|------------------|
| Implement Domestic Water Hygiene Program | Site/Service Co. | IMMEDIATELY | |
| Identify & remove / flush all deadlegs / little used outlets | Site/Service Co. | IMMEDIATELY | |
| Ensure all hot water stored at 60 & returns at 50 degrees | Site/Service Co. | IMMEDIATELY | |
| Install temperature gauges on Calorifiers | Site/Service Co. | IMMEDIATELY | |
| Identify & ensure correct operation of all TMV's | Site/Service Co. | IMMEDIATELY | |
| Investigate on site water storage & turnover & make appropriate changes | Site/Service Co. | IMMEDIATELY | |
| Install shunt pumps of calorifiers | Site/Service Co. | IMMEDIATELY | |
| Implement Regular internal inspections of CWST | Site/Service Co. | IMMEDIATELY | |

Any Questions?

Thank you for your time

For additional info consult

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