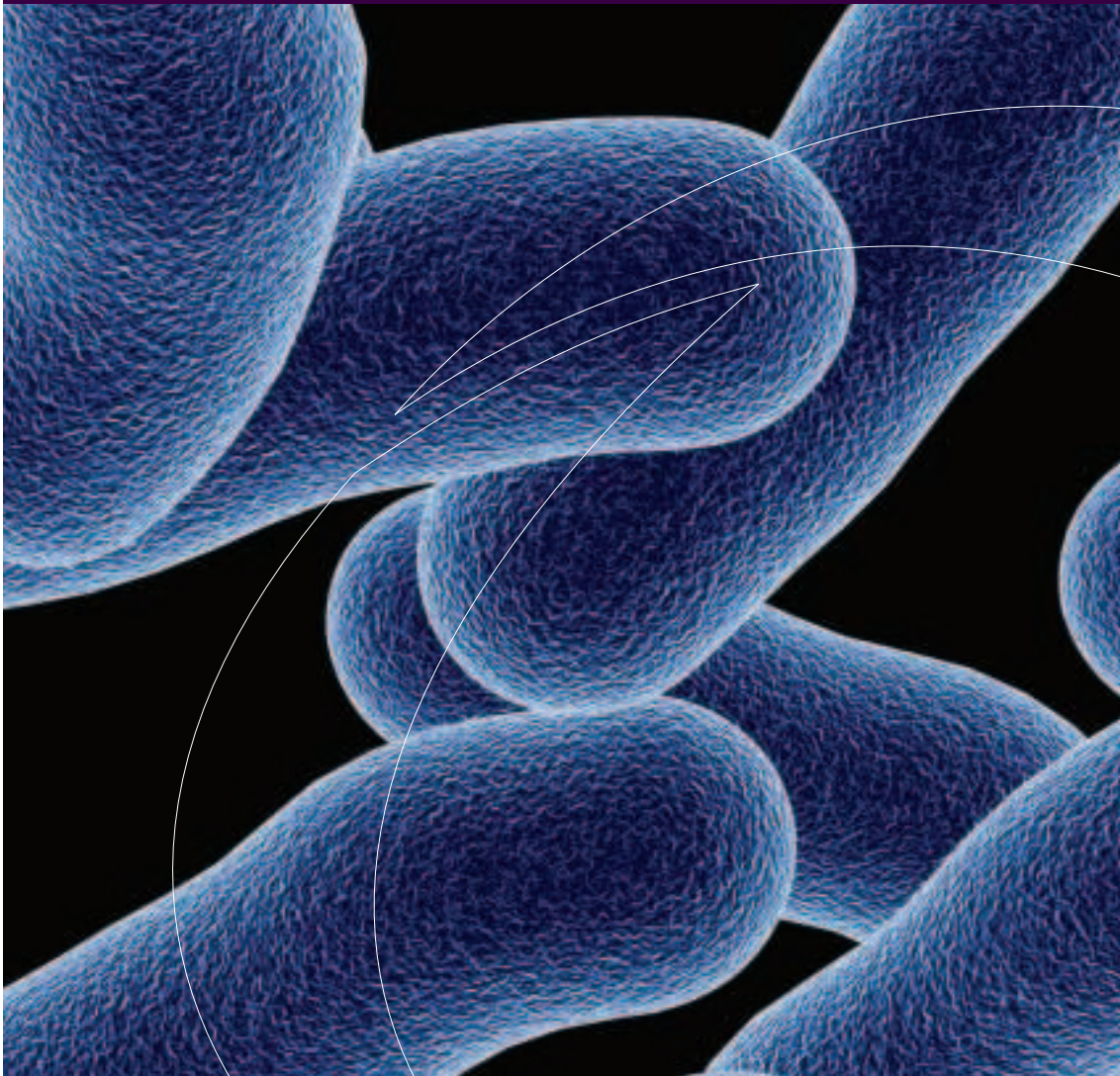
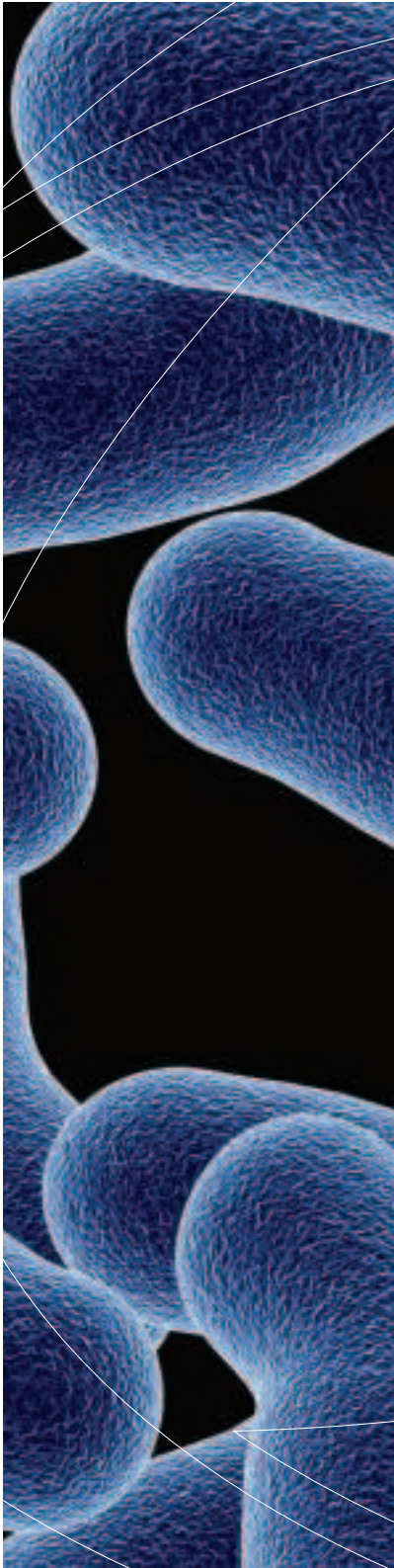




Management of Spa Pools

Controlling the Risks of Infection





MANAGEMENT OF SPA POOLS CONTROLLING THE RISKS OF INFECTION

This guidance has been prepared by the Health and Safety Executive and Health Protection Agency.

This guidance represents what is considered to be good practice by members of the working group. Following the guidance is not compulsory and you are free to take other action but if you do follow it you will normally be doing enough to comply with the law. Health and Safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.

Authorship

This report has been written by the Joint Health and Safety Executive and Health Protection Agency Spa Pools Working Group chaired by John Newbold. The document was edited by Jillian Deans, Steve Copping, and Sarah Senior of the HSE and John V. Lee, Susanne Surman-Lee and Gordon Nichols of the HPA Centre for Infections

Citation

Management of Spa Pools: Controlling the Risk of Infection. London: Health Protection Agency. March 2006.

ISBN: 0 901144 80 0

Cover Image

Legionnaires' disease bacteria,
ALFRED PASIEKA / SCIENCE PHOTO LIBRARY

Acknowledgements

Spa Pools' Working Group Members

Mr John Newbold (Chair)
Health and Safety Executive

Mr Steve Copping
Health and Safety Executive

Ms Jillian Deans
Health and Safety Executive

Mrs Sarah Senior
Health and Safety Executive

Mrs Paula Stam
Health and Safety Executive

Dr John V Lee
Health Protection Agency

Dr Susanne Surman-Lee
Health Protection Agency

Dr Gordon Nichols
Health Protection Agency

Mr Howard Price
Chartered Institute of Environmental Health

Mr Howard Gosling
Swimming Pool and Allied Trades Association
Pool and Water Treatment Advisory Group

Mr Martin Steer
Institute of Sport and Recreation Management

Mr John Murfin
British and Irish Spa and Hot Tub Association

Mr Stephen Crabb
British and Irish Spa and Hot Tub Association

Ms Janice Calvert
Consultant

Ms Maggie Tomlinson
Department of Health

Mr Mike Johnson
Office of the Deputy Prime Minister

Mr Peter White
Drinking Water Inspectorate

Mr Peter Firth
Westminster City Council

Mr Steve Tuckwell
Water Regulations Advisory Scheme

Contents

FOREWORD	9
INTRODUCTION	10
<i>Background to the control of infectious agents in spa pools</i>	10
What is a spa pool?	10
Why do we need this guidance?	10
Which infectious agents grow in spa pools?	10
Why are people using or working near spa pools at risk of contracting an infection from the spa pool?	10
Legislation – health and safety, and other relevant law	10
Introduction	10
Duties under Section 3 of the HSWA	11
Management of Health and Safety at Work Regulations 1999	11
Control of Substances Hazardous to Health Regulations 2002 (as amended)	11
Enforcement	12
The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR)	12
The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP)	13
The Construction, Design and Management (CDM) Regulations 1994 (as amended)	13
The Biocidal Products Regulations 2001 (BPR)	13
Water Supply (Water Fittings) Regulations 1999 and Water Byelaws 2004 (Scotland)	13
Liabilities and workmanship	14
Consumer legislation	14
1. PART 1: REGULATORY REQUIREMENTS	17
1.1 Scope and application	19
1.1.1 Who is this guidance aimed at?	19
1.1.2 Definition of a spa pool	19
1.1.2.1 Commercial spa pools	19

Contents

1.1.2.2	Domestic spa pools	21
1.1.2.3	Whirlpool baths	21
1.1.2.4	Swim-spa	21
1.1.3	Other equipment not covered by this guidance	21
1.1.4	Microbiological hazards	21
1.1.4.1	Legionella species	21
1.1.4.2	Pseudomonas aeruginosa	22
1.1.4.3	Mycobacterium avium and similar mycobacteria	22
1.1.4.4	Amoebae	22
1.1.4.5	Other potential infections	22
1.1.4.6	Natural spas	23
1.1.5	Non-microbiological hazards	23
1.1.5.1	Chemical	24
1.1.5.2	Thermal	24
1.1.5.3	Electrical	24
1.1.5.4	Slips and trips	24
1.1.5.5	Confined spaces	25
1.1.5.6	Manual handling	25
1.1.5.7	Entrapment	25
1.2	<i>Identification and Assessment of the risk</i>	26
1.2.1	Carrying out the risk assessment	27
1.3	<i>Managing the risk: Management responsibilities, training and competence</i>	29
1.3.1	Competence	29
1.3.2	Implementation of the control scheme	30
1.4	<i>Preventing or controlling the risk from exposure to infectious agents</i>	31
1.4.1	Using and reviewing control measures	31
1.4.2	Dealing with accidents, incidents and emergencies	31
1.5	<i>Record keeping</i>	33

Contents

1.6	<i>Responsibilities of designers, manufacturers, importers, suppliers and installers</i>	35
1.6.1	Designers	36
1.6.2	Importers	36
1.6.3	Suppliers	36
1.6.4	Installers and commissioning engineers	36
1.6.5	Summary	37
2.	PART 2: GUIDANCE ON THE CONTROL OF INFECTIOUS AGENTS IN SPA POOLS	41
2.1	<i>Background</i>	42
2.1.1	Operating spa pools	43
2.1.2	Operating natural spa pools	44
2.1.3	Storing water	44
2.1.4	Spa pool water purification	44
2.1.5	Information managers should provide for users	45
2.2	<i>Treatment programmes</i>	47
2.2.1	Maintaining water quality	49
2.2.1.1	The effect of pH on disinfectants	49
2.2.1.2	The effect of disinfectants on pH	50
2.2.1.3	Water balance	50
2.2.1.4	Clarity	50
2.2.1.5	Total Dissolved Solids (TDS)	50
2.2.1.6	Biofilms	51
2.2.1.7	Algae	51
2.2.1.8	Green algae	51
2.2.1.9	Cyanobacteria	51
2.2.1.10	Brown or red algae	51
2.2.2	Spa pool area hygiene	51
2.2.3	Chemical storage	51
2.3	<i>Monitoring</i>	53

Contents

2.3.1	General monitoring	55
2.3.2	Sampling for chemical analysis	56
2.3.3	Monitoring for infectious agents	56
2.3.4	Microbiological tests	57
2.3.4.1	Sampling procedure	60
2.3.5	Recommended microbiological standards for spa pools	60
2.3.5.1	Aerobic colony count	61
2.3.5.2	Total coliforms	61
2.3.5.3	Escherichia coli	61
2.3.5.4	Pseudomonas aeruginosa	61
2.3.5.5	Legionella pneumophila	62
2.3.6	Closing a spa pool	62
2.3.7	Additional testing in outbreaks	63
2.3.8	Summary of Checks	64
2.4	<i>Cleaning and disinfection</i>	65
2.4.1	Cleaning	67
2.4.2	Routine disinfection	68
2.4.2.1	Removal of algae	69
2.4.3	Disinfectants	69
2.4.3.1	Sodium hypochlorite	69
2.4.3.2	Calcium hypochlorite	69
2.4.3.3	Chloroisocyanurates	69
2.4.3.4	Solid bromine based disinfectants	70
2.4.3.5	Non-halogen disinfectants	70
2.4.3.6	Ozone with residual disinfection	70
2.4.3.7	Ultraviolet light	71
2.4.3.8	Other disinfectants	71
2.5	<i>Design and construction</i>	73
2.5.1	Specific design issues	75
2.5.1.1	Pipework	75

Contents

2.5.1.2	Design	75
2.5.1.3	Manufacture	76
2.5.1.4	Construction	76
2.5.1.5	Plant space and location	77
2.5.1.6	The water treatment system	78
2.5.1.7	The balance tank	79
2.5.1.8	Circulation	79
2.5.1.9	Filtration	79
2.5.1.10	Heating	80
2.5.1.11	Chemical dosing and control systems	80
2.5.1.12	Booster jets	80
2.5.1.13	Air blower system	81
2.5.1.14	Spa pool water make up supply	81
2.5.1.15	Location	81
2.5.2	Basic design features	82
2.5.2.1	Design bathing loads	82
2.5.2.2	Water replacement	82
2.5.2.3	Physical operation	82
2.5.2.4	Dehumidification	82
2.6	<i>Whirlpool baths</i>	85
2.6.1	Design of whirlpool baths	87
2.6.2	In use hygiene and cleaning	87
2.6.3	Whirlpool baths in healthcare settings	88
2.7	<i>Hiring and other commercial uses</i>	89
2.7.1	Holiday Home and shared Spas and Hot tubs	91
2.7.2	'Party Rental' or 'Entertainment Spas'.	91
	APPENDIX 1 AUDIT CHECKLISTS	95
	APPENDIX 2 TROUBLE SHOOTING GUIDE	100
	APPENDIX 3 SPA POOL WATER TESTING PROCEDURES	101
	INDEX AND GLOSSARY	105

Contents

SOURCES OF INFORMATION	114
REFERENCES IN THE TEXT	115
OTHER USEFUL PUBLICATIONS	118
CONTACT DETAILS	119



Foreword

This guidance has been produced by the Health and Safety Executive (HSE) and the Health Protection Agency (HPA) to increase understanding of the microbiological risks associated with using a spa pool or whirlpool bath, and to give advice on some of the control measures that can be used to manage these risks effectively.

Spa pools are becoming increasingly popular, providing health benefits through massage, relaxation and pain relief. They can be found in sports complexes, health clubs, hotels, holiday complexes, cruise ships, private houses, and on display. They are of varying size. The agitated water is usually maintained at a relatively high temperature. Such factors place a high demand on the spa pool's disinfection and filtration systems and this can lead to an increase in microbial growth and a consequent risk of infection. The spa pool must, therefore, be managed carefully to ensure water quality does not deteriorate. Experience has shown that inadequate management has led to illness for users, people in the vicinity or passing nearby the spa pool. Such illnesses include Legionnaires' disease, which in some cases has proved fatal.

This guidance is intended to help those designing, manufacturing, supplying, installing, displaying and most importantly managing spa pools meet their legal responsibilities under health and safety legislation, but may also be useful for the domestic owner.

Other water systems, eg cooling towers, also have associated microbiological risks that need to be managed under health and safety legislation – further information on this can be obtained from the HSE.



PROFESSOR PAT TROOP CBE

Introduction

Background to the control of infectious agents in spa pools

What is a spa pool?

1. A spa pool is a self-contained body of warm, agitated water designed for sitting in - see section 1.1.2 for further definitions.

Why do we need this guidance?

2. Infectious agents can be easily introduced to a spa pool via bathers, from dirt entering the pool or from the water source itself. Once in the spa pool, conditions often exist for these infectious agents to grow and proliferate. There have been several examples of people contracting infections from spa pools, for example Legionnaires' disease, and in all known cases the spa pools were not being managed as required by existing health and safety regulations and guidelines. This guidance has been written to help managers, designers and manufacturers of spa pools meet their legal duties under health and safety legislation.

Which infectious agents grow in spa pools?

3. The bacteria that cause Legionnaires' disease frequently grow in poorly designed and managed spa pools. Other bacteria commonly found in spa pools, which can cause infection, are *Pseudomonas aeruginosa* and environmental mycobacteria. More information on the hazards associated with spa pools can be found in Section 1.1.

This is particularly important with *Legionella*. In outbreaks, research showed that *Legionella* antibody levels were higher in individuals who were closer to the source of the contamination¹. People using the spa pool are also at risk from skin infections because prolonged immersion in warm water increases the likelihood of infectious agents entering the body via the skin.

Legislation – health and safety, and other relevant law

Introduction

Why are people using or working near spa pools at risk of contracting an infection from the spa pool?

4. Spa pools are designed to contain water that is vigorously agitated and this leads to the formation of aerosols that can be inhaled. This means even people not in the immediate vicinity of the spa pool can breathe in the aerosol.

5. The Health and Safety at Work etc Act 1974 (HSWA)², the Management of Health and Safety at Work Regulations 1999 (MHSWR)³ and the Control of Substances Hazardous to Health Regulations 2002 (as amended) (COSHH)⁴ impose certain statutory duties on all managers of non-domestic spa pools. Duties under the HSWA extend

to risks from infectious agents arising from work activities, ie risks to non-employees. The MHSWR provide a broad framework for controlling health and safety at work. COSHH provides a framework aimed at controlling the risks from hazardous substances including infectious agents.

Duties under Section 3 of the HSWA

6. If people working under the control and direction of others are treated as self-employed for tax and national insurance purposes, they are nevertheless treated as employees for health and safety purposes. It may, therefore, be necessary to take appropriate action to protect them. If any doubt exists about who is responsible for the health and safety of a worker, this could be clarified and included in the terms of a contract. However, a legal duty under Section 3 of HSWA cannot be passed on by means of a contract and there will still be duties towards others under Section 3 of HSWA. If such workers are employed on the basis that they are responsible for their own health and safety, legal advice should be sought before doing so.

Management of Health and Safety at Work Regulations 1999

7. Under these Regulations the manager of a spa pool is required to

- assess the risks in their workplace,
- use competent help to apply health and safety legislation,
- establish procedures to use if an employee is presented with serious and imminent danger, and
- co-operate and co-ordinate health and safety if there is more than one employer in a workplace.

Control of Substances Hazardous to Health Regulations 2002 (as amended)

8. Under COSHH the manager is required to

- assess the risks of exposure to hazardous substances in their workplace,
- prevent exposure or substitute with a less hazardous substance or process/method if possible,
- control exposure if prevention or substitution are not reasonably practicable,
- maintain, examine and test the control measures, eg automatic dosing systems,
- provide information, instruction and training for their employees, and
- provide health surveillance of employees if appropriate.

9. More information on COSHH in general can be found in the COSHH Approved Code of Practice (ACoP)⁴ and on *Legionella* in Legionnaires' disease: The control of legionella bacteria in water systems ACoP⁵ (L8).

10. L8 gives practical advice on the requirements of the HSWA, MHSWR and COSHH concerning the risk from exposure to *Legionella* bacteria.

This ACoP applies to employers in control of premises where *Legionella* bacteria could be found, and also sets out the responsibilities of suppliers of services such as water treatment, as well as those of manufacturers, importers, suppliers and installers. L8 gives guidance and practical advice on identifying and assessing the risk, managing the risk and record keeping; with detailed guidance on managing cooling towers, and hot and cold water services, along with some information on other risk systems, eg spa pools, humidifiers, car washes. Although only a court can give an authoritative interpretation of the law when considering the application of health and safety legislation, HSE and Local Authority inspectors expect employers to follow the guidance in the ACoP or be able to demonstrate that their alternative procedures/processes provide an equivalent level of protection. The information and advice provided in *Management of Spa Pools: Controlling the Risks of Infection* is intended to help managers, designers, manufacturers etc meet the legal requirements explained in L8 in the context of spa pools.

Enforcement

11. Enforcement of health and safety legislation falls to two bodies, the Health and Safety Executive and Local Authorities (LAs). The HSE are responsible for enforcement with respect to designers, manufacturers and installers and for spa pools in premises where HSE is the enforcing authority eg government

buildings, factories. LAs are responsible for enforcement in hotels, retail outlets, and private sports and fitness clubs.

The majority of commercial spa pools will be under the enforcement of Local Authorities. Both HSE and LA inspectors will expect employers to meet their legal responsibilities as explained in the COSHH ACoP⁴ and L8⁵. Each LA will make their own arrangements for inspections and water quality monitoring.

12. The enforcing authorities have the power to close a spa pool (Prohibition Notice) if there is an imminent risk to health. They can also require improvements (Improvement Notice) where the management of a spa pool is falling below legal standards.

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR)⁶.

13. These Regulations require employers and others to report accidents and some diseases arising out of or in connection with work to the Health and Safety Executive. For example, certain case(s) of Legionnaires' disease are reportable under RIDDOR. Further information on RIDDOR can be found in HSE guidance⁷ or on the HSE website at <http://www.riddor.gov.uk>

The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP)

14. These Regulations require suppliers of chemicals to

- identify the hazards of the chemicals they supply;
- give information about these chemicals; and
- package the chemicals safely.

The supplier must do this using labels^{8,9} and safety data sheets¹⁰.

The Construction, Design and Management (CDM) Regulations 1994 (as amended)

15. The CDM Regulations require that health and safety is taken into account and managed throughout all stages of a project, from conception, design and planning through to site work and subsequent maintenance and repair of the structure. These regulations apply to most common building, civil engineering and engineering construction work (including demolition, dismantling and refurbishment). Clients and designers have specific duties under the regulations. Further information on health and safety during construction can be obtained from the HSE website (<http://www.hse.gov.uk/construction/>) where there is information on these regulations and references to relevant leaflets and guidance.

The Biocidal Products Regulations 2001 (BPR)¹¹

16. BPR aims to ensure all biocidal products on sale are safe when used properly. Biocidal products are any chemicals intended to control unwanted organisms, including bacteria, viruses and fungi; public health disinfectants are classed as biocidal products. It is important the manager follows the classification and labelling information on a biocide product's packaging. There will be clear instructions on how to use it safely. Under the BPR the manager has a legal responsibility to use the correct product for the job and to use it properly. Further information for the users of biocidal products can be found in the HSE guidance *A guide to the Biocidal Products Regulations for users of biocidal products*¹².

Water Supply (Water Fittings) Regulations 1999¹³ and Water Byelaws 2004 (Scotland)¹⁴

17. This legislation is intended to prevent contamination, waste, misuse, undue consumption and erroneous measurement of water supplied by the water undertaker. It imposes requirements on the plumbing system, water fittings, and on appliances connected to it or receiving water from it. Guidance on following this legislation can be found in the *Water Regulations Guide*¹⁵ published by the Water Regulations Advisory Scheme (WRAS), and on the Defra website (<http://www.defra.gov.uk/environment/water/industry/wsregs99/guide/index.htm>).

Liabilities and workmanship

18. Under Section 73 of the Water Industry Act 1999¹⁶, as well as Regulations 3 and 4 of the Water Supply (Water Fittings) Regulations [in England and Wales] and Water Byelaws (Scotland), responsibilities and liabilities are set out on managers and owners to ensure that water installations comply with requirements in the Regulations. These particularly apply to the suitability of the water fittings and appliances, the quality of workmanship, the maintenance of fittings in good order, and that water supplies are not contaminated.

Consumer legislation

19. Under the Consumer Protection Act 1987¹⁷ consumers have the right to expect their purchased spa pool to

- be of satisfactory quality, ie of a quality that a reasonable person would expect given the description, price and other relevant circumstances;
- be fit for purpose, ie it can be used for the purpose expected; and
- match its description (verbal or written), and if the spa pool is chosen after seeing a sample it must match this. (It is a criminal offence for a trader to put a false description on goods.)

20. Further information on consumer rights can be obtained from the Department of Trade and Industry (Dti) at www.consumerdirect.gov.uk, in the Dti's guide to the Consumer Protection Act (available via their website www.dti.gov.uk) called *Guide to Consumer Protection Act 1987*¹⁸,

from Trading Standards (www.tradingstandards.gov.uk), and from the European Consumer Centre at www.euroconsumer.org.uk (if the trader is based outside the UK but elsewhere in the European Union).

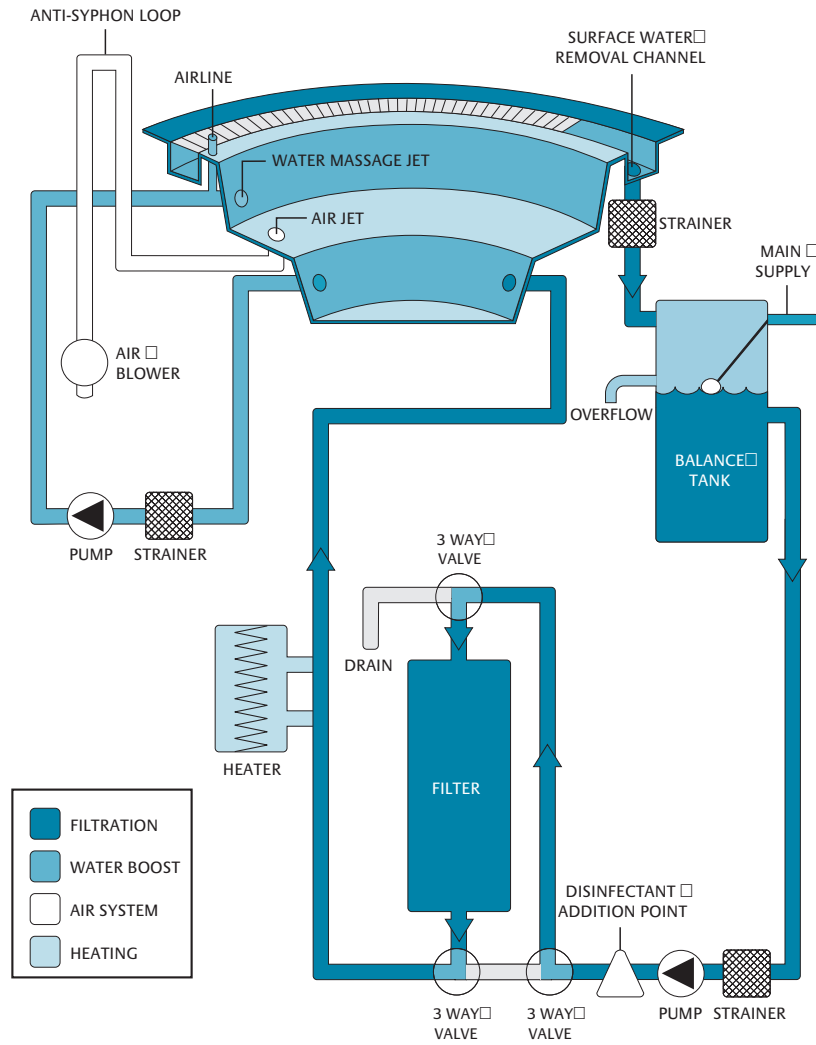


Figure 1: Diagram of a typical commercial spa pool and associated water system



Part 1

Regulatory Requirements

1.1

Scope and application. 19

1.2

Identification and assessment of the risk. 26

1.3

Managing the risk: management responsibilities, training and competence. 29

1.4

Preventing or controlling the risk from exposure to infectious agents. 31

1.5

Record keeping. 33

1.6

Responsibilities of designers, manufacturers, importers, suppliers and installers. 35



Commercial overflow/level deck spa pool

1.1 Scope and application

1.1.1 Who is this guidance aimed at

21. This guidance is intended to help people **who manage and/or operate spa pools** to control the risks from infection to their staff, the users, and anyone else potentially exposed to the spa pool water or aerosols from it. However, it should also provide useful advice for the following groups of people:

designers;	architects;
manufacturers;	suppliers;
installers;	maintenance staff;
consultants;	environmental health officers;
cruise ship operators;	tour operators;
domestic owners;	rental companies;
and	
organisers of events where spa pools are displayed	

1.1.2 Definition of a spa pool

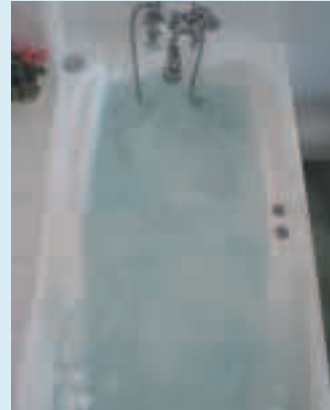
22. A spa pool is designed for sitting or lying in up to the neck, and not for swimming. It is a self-contained body of water that is filtered and chemically disinfected. A spa pool is not drained, cleaned or refilled after each user, but after a number of users or a maximum period of time. Spa pools contain water heated to 30°C to 40°C, and have hydrotherapy jet circulation with or without air induction bubbles. Spa pools can be sited in- or outdoors. Common terms for spa pools are hot spa, hot tub, whirlpool spa and portable spa. Jacuzzi® is the registered trade name of a specific manufacturer and should not be mistaken for a generic name for spa pools.

1.1.2.1 Commercial spa pools

23. A commercial spa pool is an overflow/level deck spa pool installed in a commercial establishment or public building, and generally used by people visiting the premises. Typical sites for commercial spa pools include hotels, health clubs, beauty salons, gymnasias, sports centres and clubs, swimming pool complexes, and holiday camps. A spa pool in such a location is considered commercial even if payment for use is not required. A domestic spa pool installed in a hotel bedroom or holiday home should also be managed as a commercial spa pool. Similarly spa pools rented out to domestic dwellings for parties etc must also be considered commercial.



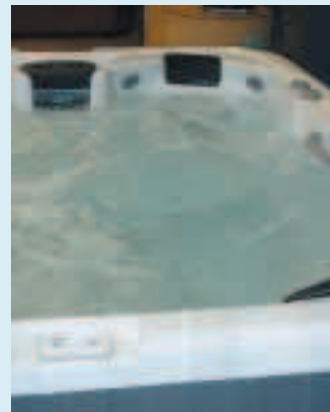
Commercial spa pool



Whirlpool bath
(by kind permission of
Howard Gosling)



Swim spa
(by kind permission of Spa De La Mare Ltd)



Domestic spa

1.1.2.2 Domestic spa pools

24. A domestic spa pool or hot tub is a freeboard or overflow/level deck spa pool installed at a private residence, for the use of the owner, family and occasional invited guests.

1.1.2.3 Whirlpool baths

25. Whirlpool baths are typically found in beauty parlours, health suites, hotels and dwellings. Water within the bath is untreated and the bath is drained following each session. Whirlpool baths have experienced similar problems to spa pools with the formation of biofilms within the pipework system associated with the air and water booster jets, so regular disinfection is recommended.

1.1.2.4 Swim-spa

26. A swim- or fitness-spa is a small combined swimming pool with hydrotherapy jets, air induction and counter-current exercise unit; or joined swimming pool and spa pool compartments. Such installations can be for residential or light commercial use. Bather loads and water temperature will not be as high as in spa pools.

1.1.3 Other equipment not covered by this guidance

27. The equipment not covered by this guidance includes

- swimming pools¹⁹,
- hydrotherapy pools²⁰,
- foot spas, and
- flotation tanks.

1.1.4 Microbiological hazards

28. A variety of infectious agents are associated with the recreational use of water and these can affect the skin, ears, eyes, gastrointestinal and respiratory tracts. However, most spa pool users do not immerse their heads in the water (and are strongly advised not to do so), so there are relatively few reported outbreaks associated with ear, eye or gastrointestinal tract infections.

29. Spa pools are much smaller than swimming pools and have a much higher ratio of bathers to water volume, so the amount of organic material in spa pools is far higher than in swimming pool water. These conditions can allow pathogens such as *Pseudomonas aeruginosa* and *Legionella* species to readily grow in spa pools. Water disinfection is, therefore, a key control measure, but the raised temperature and high organic content of spa pool water can make it difficult to maintain effective disinfection.

1.1.4.1 Legionella species

30. *Legionella* infection can present as a respiratory infection called Legionnaires' disease or a self-limiting flu-like illness called Pontiac fever or sometimes Lochgoilhead fever. There have been a number of outbreaks linked to spa pools, including those

- in leisure centres²¹,
- in hotels²²,
- in holiday homes²³,
- on cruise ships²⁴, and
- on display²⁵.

Experience has shown that those most at risk from infection are smokers, men, people over 50 years old, as well as immunocompromised individuals (see HPA website http://www.hpa.org.uk/infections/topics_az/legionella/menu for further information).

- An outbreak in 1984, associated with a spa pool in a hotel in Saltdean, Sussex, caused 23 cases of Legionnaires' disease.
- An outbreak in Lochgoilhead, Scotland of acute Pontiac fever affected 170 people.
- Within four days of their installation one or both of two new spa pools on display at a Netherlands flower show were the source of one of the world's largest outbreaks of Legionnaires' disease in 1999. There were 188 (133 laboratory confirmed) cases and 21 deaths. People pausing at the spa pools had an increased chance of developing the disease.
- Again in 1999 an outbreak of Legionnaires' disease was considered to be due to demonstration hot tubs at a Belgian fair. Stand employees, technical staff and visitors were amongst the 93 cases and 5 deaths.

1.1.4.2 *Pseudomonas aeruginosa*

31. There have been numerous outbreaks of folliculitis caused by *P. aeruginosa* associated with spa pools and hot tubs²⁶. The folliculitis presents as a red rash and involves infection of the hair follicles. Disease is related to the duration of spa pool immersion as well as the degree of contamination of the water, and children and young adults are most susceptible.

1.1.4.3 *Mycobacterium avium* and similar *Mycobacteria*

32. *Mycobacterium* species are common in water and some of them are important respiratory pathogens. Respiratory disease has been associated with non-tuberculous mycobacteria, particularly *Mycobacterium avium*, in association with spa pools and hot tubs²⁷.

1.1.4.4 *Amoebae*

33. *Naegleria fowleri*, an amoeba found in warm water, is a rare cause of fatal meningitis that has been associated with natural spas. *Acanthamoeba* species are common in water, including swimming pools, where they normally graze on bacteria. They can cause keratitis, a severe eye infection particularly associated with contact lens wearing; this can lead to loss of sight. This amoeba can also cause encephalitis, an infection of the brain.

1.1.4.5 Other potential infections

34. The gastrointestinal infections associated with swimming pools might also be expected to be potential infections from spa pool use. However, since users do not normally ingest spa pool water the chance of transmission of enteric infections is much reduced. However, exceptions have occurred, particularly when behaviour was abnormal. Thus an outbreak of Hepatitis A affected seventeen young men using a spa pool, although infection appeared to be caused by head immersion and 'whale spitting'²⁸.

35. *Cryptosporidium* infections have been associated with swimming pools. *Cryptosporidiosis* is a particular problem in swimming pools because it is resistant to chlorine. *Cryptosporidium* infection is especially dangerous for people infected with HIV. In a US study the serological response to *Cryptosporidiosis* as a marker of infection was associated with spa pool use²⁹ but infection appeared to be associated with sexual activities in the spa pool rather than from ingesting water.

36. It has been suggested that Herpes virus might survive within the spa pool environment and cause infections³⁰ but there is little evidence that this occurs in practice. Normal disinfection regimes should prevent survival of the virus in a spa pool.

37. Other infections have been associated with using spa pools but in reality were probably transmitted by other means in the changing rooms, eg furunculosis caused by *Staphylococcus aureus*³¹ and molluscum contagiosum (a viral skin infection producing papillomas).

1.1.4.6 Natural spas

38. The hazards associated with the use of natural spas are essentially the same as artificial spa pools.

1.1.5 Non-microbiological hazards

39. This guidance does not give detailed advice on how to manage the risks associated with non-microbiological hazards in the workplace. However, managers need to be aware that other hazards do exist and will need to be managed. A few of these are highlighted below with, where appropriate, references to other documents that will give further advice on how to manage them.

40. For users, the most immediate danger arises from accidental drowning, but they may also risk slipping or tripping, and getting caught in fittings such as the outlets. An analysis of deaths linked to spa pools and saunas in the US found 151 deaths related to spa pool use and only 7 to saunas. Children under 12 years old were involved in 6 out of the 151 deaths³². The chief risk factors were

- alcohol ingestion (38%),
- heart disease (31%),
- seizure disorders, eg epilepsy (17%), and
- cocaine and alcohol abuse (14%).

Accidental drowning in uncovered or improperly covered spa pools and, to a lesser extent, entrapment by suction, were the chief causes of childhood drowning. Shortening the time of exposure, lowering the water temperature, and using warning notices are options to help prevent deaths.

1.1.5.1 Chemical

41. The Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended) cover hazardous chemicals as well as infectious agents. The risks associated with working with the chemicals used in a spa pool also need to be managed. Further guidance on managing such risks can be found in the COSHH Approved Code of Practice⁴ and on the COSHH Essentials website (<http://www.coshh-essentials.org.uk/>).

1.1.5.2 Thermal

42. Thermal hazard will generally be an issue for users rather than people working near or passing by a spa pool. Animal experiments suggest that prolonged immersion in water above body temperature can lead to delayed shock³³, and also lead to adverse effects on the foetus in pregnancy³⁴. It is therefore important to note that the warm temperature of spa pools could pose a risk of ill health to users who are pregnant, have cardiovascular problems, or are subject to fits. People taking medication for cardiovascular and nervous system conditions, and those with physical disabilities³⁵ should seek medical advice before using a spa pool.

43. It is possible that the high temperature and humidity around the spa pool could affect people working for long periods close to it.

1.1.5.3 Electrical

44. Standards covering the installation of swimming pools and spa pools were introduced in 1992 and updated in 2001 and 2004 (BS 7671:2001³⁶). For spa pools used by the public the Electricity at Work Regulations 1989³⁷ will also need to be complied with. Further information on the standards can be obtained from the Institution of Electrical Engineers (IEE); the IEE also sell the standards. Further information on the risk of working with electrical equipment can be found on the HSE website (www.hse.gov.uk) and in the free leaflets *5 steps to risk assessment*³⁸ and *Electrical safety and you*³⁹.

1.1.5.4 Slips and trips

45. A slip or trip accident happens every three minutes in the workplace to employees or members of the public; they are the most common causes of major injuries at work. Water in and around the spa pool will present a slip hazard for users and those walking close to the equipment. Obstructions around the spa pool could present a trip hazard. The spa pool manager is legally required to assess the risk of slips or trips under health and safety law. HSE publishes advice on managing the risks of slips and trips in the free leaflet *Preventing slips and trips at work*⁴⁰ and the priced book *Slips and trips: Guidance for employers on identifying hazards and controlling risks*⁴¹. Information on designing spa pools to minimise slip and trip hazards can be found in the SPATA Standards⁴².

1.1.5.5 Confined spaces

46. Care must be taken if working in confined spaces, for example in/around the balance tank. Work in the space may also be risky due to the difficulties in getting emergency help into the space. Ideally the spa pool area should be designed to ensure there are no confined spaces.

47. The risk of working in a confined space must be assessed under the Management of Health and Safety at Work Regulations 1999³ and the Confined Spaces Regulations 1997⁴³ may also apply. Further information on assessing the risk of working in confined spaces can be found in the free leaflet *Safe work in confined spaces*⁴⁴ and the Approved Code of Practice *Safe work in confined spaces*⁴⁵.

1.1.5.6 Manual handling

48. Care must be taken when handling heavy and/or awkward loads to avoid manual handling injuries. Such injuries can lead to cumulative damage that can be severe and debilitating. The Manual Handling Operations Regulations 1992⁴⁶ (as amended in 2002) require the spa pool manager to avoid manual handling operations if it is reasonably practicable to do so. If it is not reasonably practicable, they must carry out a manual handling assessment. Further information can be found in the guidance on the Regulations⁴⁷ and *Getting to grips with manual handling – a short guide*⁴⁸.

1.1.5.7 Entrapment

49. For spa pool users there is a potential risk of trapping their hair or body parts in spa pool inlets, outlets and grilles (particularly if they put their head underwater, which should be strongly discouraged). Appropriate control measures, including use of design features, should be used to reduce the risk of entrapment.

1.2 Identification and assessment of the risk

50. The purpose of the microbiological risk assessment is to enable the manager to make a valid decision about the measures necessary to prevent or adequately control the exposure of people near or in the spa pool to infectious agents that could grow in it. The manager will not be able to implement a formal health and safety management system for their spa pool without first conducting a risk assessment. The risk assessment will show that the manager has considered all pertinent factors. The legal requirement for a risk assessment with advice on how to conduct one is explained in the COSHH ACoP⁴ and L8⁵.

51. It is the responsibility of the person operating the spa pool (the dutyholder) to

- assess the risks associated with running the spa pool,
- prevent or control exposure to any hazards identified for their employees and other people affected by the running of the spa pool,
- maintain, examine and test any measures used to control exposure,
- monitor exposure in the workplace, if appropriate,
- keep employees and others informed about the hazards and the measures taken to control them,
- train their employees so they can use the control measures correctly, and
- have arrangements in place to deal with accidents, incidents and emergencies.

52. The person who conducts the risk assessment should

- have adequate knowledge, training and expertise to understand the hazard (ie the presence of infectious agents in the spa pool) and risk,
- know how running the spa pool produces the hazard,
- have the ability and authority to collect all the information needed to do the assessment, and
- have the knowledge, skills and experience to make the right decisions about the risks and the precautions needed.

53. If the dutyholder (spa pool manager) is confident they understand the hazards and risks of running a spa pool, they may choose to do the risk assessment themselves. Alternatively, a responsible employee, safety representative or safety officer within a larger organisation may help with the assessment. If the dutyholder is not confident the expertise to do a risk assessment resides in their organisation they may choose to get help from another competent source, for example a consultant experienced in risk assessment. However, the dutyholder is ultimately responsible for the risk assessment, whoever else was involved in producing it.

1.2.1 Carrying out the risk assessment

54. A number of factors are required to create the risk of acquiring an infectious disease from a spa pool

- the presence of infectious agents (eg *Legionella* bacteria) in the spa pool;
- suitable conditions for the growth of the infectious agents, eg a temperature of 30°C to 40°C, a source of nutrients (organic matter from bathers);
- a way of exposing employees and users to the infectious agents, eg to *Legionella* bacteria in the aerosol created by agitated water; and
- the presence of people who could be exposed to the infectious agents, eg people working on the spa pool, people passing near a spa pool.

55. When conducting the risk assessment the manager must consider the individual nature of their premises and spa pool(s). To help achieve this it is important that an up to date schematic diagram is kept of the spa pool(s) and associated plant. This can be used to decide which parts of the system pose a risk to workers and users.

56. The following general factors need to be considered when carrying out the risk assessment

- The source of the supply water, eg from the mains supply or an alternative.
- Possible sources of contamination of the supply water, eg biofilms within the pipework, bathers, soil, grass, leaves (the latter for spa pools sited outdoors).

- The normal operating characteristics of the spa pool.
- The people who will be working on or near the spa pool or using it.
- The measures chosen to adequately control exposure, including the use of personal protective equipment (PPE).
- Unusual, but reasonably foreseeable, operating conditions, eg breakdowns.

57. In addition, the following specific factors also need to be considered

- The type, design, size, approximate water capacity and designed bather load of the spa pool.
- The type of dosing equipment, including the use of automatic controls, pump arrangements, balance tanks, air blowers etc.
- The piping arrangements and construction materials
- The type of filtration system.
- The heat source and design temperature.
- The chemical dosing equipment, including chemical separation, personal protective equipment, chemical storage arrangements eg bunding.
- The type of treatment to control microbiological activity, eg chlorine.
- The method used to control pH, eg sodium bisulphate.
- The cleaning regime – ease of cleaning, what is cleaned, how and when.
- The testing regime, including microbiological tests – the frequency of tests, operating parameters, action required when the results are outside parameters.

58. The significant findings of the risk assessment should be recorded (if the manager has five or more employees). Even if the manager has less than five employees they should consider whether it would be easier to demonstrate to enforcing authorities that a suitable risk assessment has been done if there is a written version.

59. The written risk assessment should be linked to other health and safety records, eg

- the up-to-date plan of the spa pool and plant,
- the description of the correct and safe operation of the spa pool,
- the precautions to take when running/using the spa pool,
- the checks required to ensure the spa pool is working safely, and
- remedial action required in the event the spa pool is not running safely.

60. It is important to link the risk assessment for infectious agents to the assessments for other hazards associated with using a spa pool, eg slips and trips, manual handling, particularly ensuring the control measures implemented for hazards are compatible.

61. Employers are required to consult their employees or their representatives on the identified risks of exposure and the proposed control measures, giving employees the opportunity to comment.

62. It is essential the effectiveness of control measures is monitored. The risk assessment should be reviewed regularly (at least every two years) and whenever there is reason to suspect it is no longer valid, eg

- there are changes to the spa pool or the way it is used,
- there are changes to the premises the spa pool is installed in,
- new information is available about the risks or control measures,
- the results of tests indicate control measures are not effective, and
- an outbreak of a disease (eg Legionnaires' disease) is associated with the spa pool.

1.3 Managing the risk: management responsibilities, training and competence

63. As well as poor design and bad installation, inadequate management, lack of training and poor communication is often associated with the outbreak of diseases such as Legionnaires' disease. Everyone involved in the risk assessment and management of the spa pool must be competent, trained and aware of their responsibilities.

64. The manager of the spa pool should appoint someone to take day-to-day responsibility for controlling the risk identified from infectious agents in the spa pool – they are the responsible person. The responsible person should be a manager, director or someone with similar status and authority. They must be competent and knowledgeable about the spa pool to ensure all operational procedures are carried out effectively. The responsible person must also have a clear understanding of their duties and the overall health and safety management structure and policy of their organisation. If the manager is self-employed they may appoint themselves the responsible person.

1.3.1 Competence

65. The staff who undertake the day-to-day running of the spa pool, ie are implementing the control measures, need to be suitably informed, instructed and trained, and their suitability assessed. They must be able to carry out their duties in a safe, technically competent manner. Regular refresher training should be given. Records of all initial and refresher training need to be kept. Professional organisations and consultants offer training courses (see *Sources of Information* for details of relevant professional organisations and trade associations).

66. Training is not the only requirement to ensure the staff looking after the spa pool can do their job. Their competence will be a product of sufficient training, experience, knowledge and other personal qualities. Competence depends on the specific situation of each spa pool and the associated risks.

67. The manager must satisfy themselves of the competency of anyone they bring in to help them run their spa pool.

1.3.2 Implementation of the control scheme

68. The control measures and their implementation should be regularly and frequently monitored. Everyone involved in the running of the spa pool will need proper supervision. Staff responsibilities and lines of communication need to be clearly defined and documented. Communication and management procedures are particularly important if several people are responsible for different aspects of the spa pool's operation. The communication procedures should be regularly checked to ensure they are effective; this also applies to any external people used in the operation of the spa pool.

69. Arrangements should be in place to ensure appropriate staff levels are maintained while the spa pool is being operated. The responsible person or an authorised deputy should be available to discuss the spa pool at all times it is in use.

70. The manager is always responsible for ensuring the control procedures are carried out to the standard required even if they have employed contractors or consultants to help with the running of the spa pool.

1.4 Preventing or controlling the risk from exposure to infectious agents

1.4.1 Using and reviewing control measures

71. It is the spa pool manager's duty to ensure the chosen control measures are used properly and not made less effective by other work practices or improper use. This can be achieved by

- making visual checks and observations at appropriate intervals,
- ensuring PPE is being used correctly,
- supervising employees to ensure defined methods of work are being followed, and
- taking prompt remedial action when required.

72. It is the responsibility of the staff working on the spa pool to ensure the control measures are being used as intended and as they have been instructed. This will include

- using the control measures provided, eg the disinfectant,
- following the defined methods of work, eg standard operating procedures,
- wearing PPE if provided, storing it correctly and removing it in such a way that it cannot cause contamination before eating, drinking, smoking etc,
- practising a high standard of personal hygiene, and
- reporting promptly any defects discovered in the control measures.

73. The condition and performance of the spa pool will need to be monitored to ensure the control measures used remain effective. This should be the responsibility of the responsible person, although it is acceptable for consultants or contractors to provide assistance and advice. This review should include:

- checking the performance of the spa pool and its component parts,
- inspecting the accessible parts for damage and signs of contamination, eg biofilms, and
- monitoring to ensure the treatment regime is controlling the growth of infectious agents.

Further details about monitoring are provided in Section 2.3.

1.4.2 Dealing with accidents, incidents and emergencies

74. The Management of Health and Safety at Work Regulations³ and COSHH⁴ place a duty on employers to establish procedures to deal with situations involving serious and imminent danger. According to COSHH an accident, incident or emergency is any situation where an employee is (or is threatened to be) exposed to a hazardous substance beyond that associated with normal day-to-day activity. During the management of a spa pool this could be exposure to a serious spillage of a chemical used to treat the water or a disease outbreak arising from exposure to infectious agents in the spa pool.

75. The response to an emergency should be proportionate to the risk, so for example a small chemical spillage might not require full evacuation of the whole premises but the detection of certain levels of *Legionella* bacteria in the spa pool water could require it to be closed down.

76. The spa pool manager must ensure their emergency procedures are capable of

- mitigating the effects of the incident,
- restoring the situation to normal as soon as possible, and
- limiting the extent of any risks to health of the people working on or near and using the spa pool.

77. The emergency procedures (sometimes known as the Emergency Action Plan or EAP) should include details of the following

- the identity of the relevant hazardous substances present, where they are stored and used, and the estimated amount in the workplace on an average day – this would be relevant for the water treatment chemicals,
- the foreseeable types of accidents, incidents or emergencies that might occur with the hazardous substances on the premises – chemical and microbiological – eg spills, growth of *Legionella* bacteria in the spa pool water,
- the special arrangements to deal with the emergency situations not covered by general procedures,
- the safety equipment and PPE required when dealing with an emergency,

- first aid facilities sufficient to deal with an incident until the emergency services arrive, and where the facilities are,
- the role, responsibilities and authority of the people nominated to manage the accident, incident or emergency, eg the person(s) responsible for shutting the spa pool down,
- procedures for employees to follow,
- procedures for clearing up and safely disposing of any hazardous substances or contaminated cleaning equipment,
- regular safety drills, and
- the special needs of any disabled employees or spa pool users, eg assigning employees to help them leave the affected area.

78. As with the overall risk assessment the emergency procedures should be reviewed and updated if circumstances change, eg a new disinfectant is used. A record of procedures must be kept and readily accessible. If appropriate, emergency procedures should be displayed in prominent positions in the workplace for employees or spa pool users to read.

1.5 Record keeping

79. In general the following records must be kept when managing a water system

- the names of the people responsible for conducting the risk assessment, managing and implementing control measures,
- the significant findings of the risk assessment,
- the scheme for controlling the microbiological hazard and details of its implementation (otherwise known as the Normal Operating Plan or NOP), and
- the results of any monitoring, inspection, test or check carried out on the spa pool, along with dates.

80. Together the NOP and EAP are sometimes known as the Pool Safety Operating Procedure or PSOP.

81. Records need to be signed by the person who has produced them, eg recorded monitoring results.

82. The records need to be kept throughout the time they remain current and for at least two years after this. The results of monitoring, inspections, testing or checks should be kept for at least five years.

83. It is recommended the following records are kept specifically for spa pools.

- The name and position of the people who are responsible for managing the spa pool, their respective responsibilities and their lines of communication.
- The names and positions of people responsible for carrying out the various tasks identified to control the microbiological risks.
- The risk assessment(s) and a written scheme of actions and control measures, which will form part of the NOP.
- The plans or schematic drawing(s) of the spa pool and plant.
- Details of precautionary measures that have been carried out, including enough detail to show that they were carried out correctly and the dates done.
- Remedial work required and carried out, and the date of completion.
- A log detailing visits by contractors, consultants etc.
- Cleaning and disinfection procedures and associated reports and certificates.
- The results of the chemical analysis of the spa pool water.
- Information on other hazards, eg chemical, slips and trips.
- Training records of the staff who work on the spa pool.
- Records showing whether the spa pool is out of operation, whether it has been drained down, when it was recommissioned etc.
- The signature of anyone carrying out work on the spa pool or other form of authentication if appropriate.

84. These records can be usefully kept together as the spa pool logbook. This should be a living document and continually amended as its contents change.

85. Further information on records to be kept for spa pools can be found in the HSE guidance on managing health and safety in swimming pools¹⁹.

1.6 Responsibilities of designers, manufacturers, importers, suppliers and installers

86. In the commercial setting, the law is enforced under the Health and Safety at Work etc Act 1974 (HSWA)² but there is also relevant legislation that covers the use of spa pools in a domestic setting¹⁷. Responsibilities for enforcement are allocated to HSE for products designed for use at work, and to trading standards departments for consumer products. HSE is also responsible for regulation of the supply of products designed for use at work whether the workplace itself is HSE or Local Authority enforced.

87. Section 6 of the HSWA places a duty on any person who designs, manufactures, imports or supplies a spa pool, to ensure, so far as reasonably practicable, that the spa pool is so designed and constructed that it will be safe and without risks to health at all times. This duty is owed to those who use, set, clean or maintain this equipment.

88. Within this duty there is a requirement to provide persons supplied with the spa pool adequate information about the use for which it is designed and about any conditions necessary to ensure that it will be safe and without risks to health. This applies not only for use of the spa pool but also for its dismantling and disposal.

89. The duty holder must also take steps, so far as reasonably practicable, to ensure that revisions of information are provided, after supply, should any hazard become known that may give rise to a serious risk to health and safety. Where, for example, design faults come to light, the supplier should provide appropriate information to previous clients, as far as is reasonably practicable. There is no time limit specified as to when such a duty to provide information retrospectively should cease; it will depend on what is reasonable in the circumstances.

90. Where certain items are regularly or frequently supplied to the same customer, it is not necessary for information to accompany each delivery, provided the information first supplied remains relevant and up to date. However, it is important to note that the duty to supply information is an ongoing one.

91. Trading standards officers enforce a wide range of legislation but their principal product safety legislation is the Consumer Protection Act 1987¹⁷. The General Product Safety Regulations 1994⁴⁹ make no substantial changes to the general requirements of the Consumer Protection Act 1987 but they have largely replaced Section 10 of that Act. The Regulations apply to products supplied to consumers for their private use and apply to all persons in the business supply chain who are established in the UK and supply consumer goods in the UK. Suppliers are categorised as 'producers' or 'distributors'.

92. Producers are required to

- place on the market only safe products within the limits of their activities;
- provide relevant information to customers; and
- take measures to keep themselves informed of the risks that products may present and take appropriate action, eg withdraw products from the market if necessary.

93. Distributors are required to act with due care to help ensure that products supplied by them are safe. A 'safe product' under the Regulations presents either no risk or only minimum risk compatible with the product's use.

1.6.1 Designers

94. Designers must carry out such testing and examination as is necessary to ensure they comply with the general duty detailed above but they are also required to eliminate or minimise any residual hazards that may exist by conducting any necessary research and innovation.

1.6.2 Importers

95. Importers are responsible for defects in items, which they supply, even though they may have no control over the manufacturing or design activities that gave rise to those defects. The term 'importer' is not defined in the legislation, but in practice, the person responsible will normally be the person who appears as the importer in the entry for customs purposes.

1.6.3 Suppliers

96. Suppliers must take into account all of the reasonably foreseeable risks from operator error or inattention but not from reckless or wholly inappropriate use. The legislation requires suppliers to take account of any relevant information or advice, which is available to them, which they should have known. Suppliers may also be responsible for defective goods even if they were not aware of the (potential) defects.

1.6.4 Installers and commissioning engineers

97. Installers and commissioning engineers have a duty to ensure, so far as reasonably practicable, that nothing about the way in which the spa pool is erected or installed makes it unsafe or a risk to health at any such time as it is used, set, cleaned or maintained by a person at work. All installations or installation inspections are to be carried out by a competent National Inspection Council for Electrical Installation Contracting (NICEIC), Electrical Contractors Association (ECA) or a similar approved scheme registered electrical contractor who will issue an installation or minor works certificate to the safe installation and the fitting of the correctly rated Residual Current Device (RCD) to BS767136.

1.6.5 Summary

98. Designers, manufacturers, importers and suppliers of spa pools under current legislation should ensure that the spa pool is designed, constructed and installed so that it will be safe and without risks to health when used and provide adequate information for the user about the risks of the product. Importantly, this should be updated in the light of any new information about significant risks to health and safety that becomes available. Suppliers of spa pools and services, including consultancy and water treatment services, should so far as reasonably practicable ensure that measures intended to control the risk of exposure to infectious agents are so designed and implemented that they will be safe and without risks to health.

