the leisure review
an independent view for the leisure industry

Splash zones: a manager's guide

A splash zone is an exciting water feature that can add life to outdoor and indoor environments but, as Robbie Phillips explains, like any other water feature it requires knowledge and vigilance to be managed safely.

Splash zones are a relatively new water-based feature introduced to many leisure facilities but their potential to pose a serious microbiological threat is not widely recognised. In particular, the threat of legionella has brought these facilities into the spotlight and it must be understood that the principal elements of a splash zone – heat, nutrient and water – are also the key ingredients for the spread of infections via bacteria.

What is a splash zone? A splash zone is a series of water features located on a rubber-crumb surface pad. Water is delivered from the features and sprayed over children. The water then moves from the pad to a drainage system. From there the water is collected in a balance tank. The water is then passed through the purification system and should pass into a separate collection tank which feeds the features. Many splash zones have been installed outdoors but there are some indoors.

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From a design perspective, there should be two balance tanks: a dirty tank collecting polluted water from the pad and a clean tank holding purified water for delivery to the pad via the feature pump. There should be a one-way link back to the dirty tank to allow for water level control during periods when the features are not operating.

Careful consideration should be given to the material used for the pad surface. While rubber crumb will reduce human impact injuries, these surfaces can hold bacteria and promote infections, particularly if the cellular internal structure is exposed. Earlier designs allowed water to pass through rubber crumb, which provided a network of channels ideal for the proliferation of bacteria and biofilms. Potential hazards should also be designed out to provide a safe zone.

Good housekeeping dictates that it is essential that physical and chemical cleaning is carried out to a high standard to prevent the growth of bacteria to dangerous levels. This should be complemented by constant monitoring and control of disinfectant and water chemistry within the body of splash zone water. It is a fact that if the water has the recommended disinfectant level, and is properly cleaned and diluted, then the risk of contamination is minimal. This in turn will eliminate the harmful legionella, pseudomonas and other infective bacteria. Consideration should be given to a 'rest' period during the day, especially after periods of heavy bathing, to allow the system to recover.

The zone area must be kept meticulously clean. To this end the surface must be resistant to chlorine-based chemicals and common biocides. It should also allow for regular physical cleaning. Chlorine dioxide has recently been shown to be a safe and powerful biocide both on the pad and in the balance tanks, creating a residual protection together with chlorine and/or bromine. The balance tanks need to be checked regularly for signs of contamination and periodic cleaning will be required. Confined space standard operating procedure (SOP) is commonly required.

Generic and site-based training are essential to the delivery of safe, hygienic water. Training starts with the installer, who should provide the first practical and meaningful documented training. This should be supplemented by a generic course to provide a basic knowledge of water treatment for the prospective operator; a pool plant operators course will provide the essential basic information. Site-based procedures can be developed and integrated into normal operating procedures and emergency action plans.

Splash zones do present a number of particular hazards. By virtue of their design, the risk of drowning is commonly limited to the balance tanks, which are often confined spaces for which controlled entry and secure hatches are required. All zones should have suitable filtration and automatic chemical dosing equipment as detailed by the Pool Water Treatment Advisory Group (PWTAG). There should also a clearly defined dilution policy.

Pollution of the system should be addressed, including biological pollution from sea birds, vermin and wastes from users. Bathers should be required to shower thoroughly before use, while chemical pollution from source water, water treatment by products and other sources need to be monitored and controlled as per PWTAG guidelines. Similarly, physical pollution needs to be addressed.

The threat of infection from air droplets and *Legionella pneumophilia* is a very serious risk; splash zones can generate perfect conditions in terms of temperature, nutrient and transmission via water. Other human pathogens can also proliferate in a badly managed zone. In addition, the nature of the chemicals used means that they should be risk-assessed and with safe systems defined and implemented.

All aspects of the splash zone should be risk-assessed with appropriate risk control measures applied and strictly adhered to where necessary.

People who carry out risk assessments and draw up the control measures to minimise the risks should have relative competence, ability, experience, instruction, training and resources available to carry out the tasks meaningfully and safely. They should have knowledge of the potential sources of risks, control measures and remedial action to be adopted for the protection of operators and users. They should also be able to introduce measures to ensure the controls remain effective.

In simple terms, risk assessments must be carried out, monitored and acted upon. It is also a duty of the operator to appoint a person to take day-to-day responsibility for controlling and eliminating any identified risk from legionella.

It should be remembered that managing safely is a legal requirement. Operators have a legal responsibility to ensure splash zone water is safe for both staff and customers. This legislation is further reinforced by legionella legislation. The nature of splash zones, in particular the production of fine spray, renders poorly managed facilities susceptible to the *Legionella neumophilia* bacterium.

It should be noted that splash zones have to be tested and corrective action taken where necessary frequently throughout operational days (every two hours). It is also a requirement to record disinfectant levels and any remedial action taken. It follows that clearly defined parameters must be set to manage these facilities safely. It is also recommended that bacterial testing is carried out monthly, including a legionella test, with all results outside parameters addressed immediately.

The presence of an automatic dosing system is essential for any commercial spa. This allows constant monitoring and necessary dosing of disinfectant and pH balance chemicals. It is also essential that any

automatic system be manually checked at least three times a day to ensure correct operation. Water balance is another series of checks that apply to the spa. Any breakdown of the automatic system must be treated as an emergency because the constant monitoring and dosing is essential in the control of bacteria. Consideration should be given to closure if recommended chemical levels cannot be attained.

Owing to the conditions that prevail within a commercial spa, if chemical levels cannot be maintained then bacteria can multiply very quickly. The organisms will thrive because of the water temperature (which is close to body temperature), organic feed from body debris and the perfect medium – water. Uncleaned surfaces and water with low disinfectant levels provide an ideal harbour for bacteria.

The need for high levels of cleanliness and control are essential in the battle against bacteria. The most important item on your priority list should be good housekeeping.

Recommendations for the use and control of splash zones

There a number of key recommendations we should be aware of which apply to all wet leisure facilities:

- Introduction of fresh water to limit organic and chemical loading is essential. Most busy splash zones will need to replace water on a frequent basis. A good guide is the pool water dilution policy of 30 litres of fresh water per bather per day. This means we must dump water at a controlled rate with direct relation to bather use. Therefore it is essential we know the number of bathers using the zone.
- Bathers shower before use to wash away unwanted debris, such as perspiration, body fats, cosmetics, etc, which can act as feed for bacteria and use up disinfectants. Good showering facilities are essential and can be used as an entrance to the zones.
- Controlling water chemistry, including the disinfectant and pH, total dissolved solids, total alkalinity, temperature and total dissolved solids, ie water balance. It is also valuable to check source water regularly.
- Monitoring and thorough cleaning of splash zone. Incorrect operation and maintenance can promote colonisation of filter units, balance tanks, etc. The two most common types of filter used are mainly pressure sand filters. They require specific maintenance (refer to the suppliers recommendations). A good regime is to superchlorinate regularly. Care should be taken to protect probes of the automatic controller.

As a health check water in splash zones should be tested at least once a month for microbial activity. In busy splash zones it may be necessary to test more frequently. Suitable protocols for detection of blood, vomit and faeces are essential.

Typical daily checklist before opening

- Visually check all equipment for integrity and safety. Items would include splash zone fittings, electrical equipment, personal protective equipment, etc.
- Ensure chemical levels are correct before opening and at prescribed intervals; ensure automatic controls are operating effectively before opening zones.
- Physical and chemical cleaning of spa tank, balance tank, pump strainer pots and baskets, overflow channels and grids.
- Any ‘dead leg’ pipe work to be flushed through.
- Total volume drained and disinfected during backwash process. This

also assists in the prevention of total dissolved solid build up.

General guidelines for pre-opening of seasonal facilities

- Ensure both holding tanks are correctly disinfected before pad is used.
- Ensure pad is fit for purpose, eg remove stones, glass, debris, etc.
- Check fittings are fit for purpose.
- Ensure all controllers are operating correctly; best practice recommends this while open.
- Ensure filters are thoroughly disinfected.
- Backwash regularly and ensure good dilution; the volume of these generally is a fifth of conventional pools (the combined chlorine can hit the roof).
- Consider regular superchlorination with specialised chemicals.
- Keep pad spotlessly clean after use to reduce the attraction of animals (eg rats, gulls, foxes) which can harbour various pathogens or defecate on the pad.
- It is good practice to clean after a day's use with biocides compatible with water and sluice down before use.
- Keep pH at the bottom of the range.
- If using stabilisers ensure elevated free chlorine level.
- Ensure you have a robust standard operating procedure for all predictable events.
- Ensure cryptosporidium protocols are adhered to.
- A major issue is the lack of toilet and shower provision: can you address it?
- If high-rate filters are present check that enough chemicals are available for any suspected runny stool.
- It is essential that staff have robust risk controls in relation to all chemical dosing.

Robbie Phillips is the STA's pool plant expert and will be a regular contributor to the Leisure Review in future issues.

Details of the STA's pool plant management courses can be found online at www.sta.co.uk

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