



TECHNICAL NOTE

13 – Interactive water features

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The last few years have seen a swift rise in the popularity of interactive water features – outdoor jets, sprays etc designed for children and in some respects taking the place of paddling pools. Their design and use is very different from the more traditional, decorative water features like fountains that are not designed for interaction (though they may be used that way). Unless interactive water features are planned and designed properly, they can represent (and have) an infection risk, partly because of the way they are used.

Definitions

It is important to distinguish between interactive water features and decorative water features. Different guidelines apply. (Paddling pools are different again: they are dealt with below.)

Interactive water features are primarily about interaction:

children playing in water sprayed or pumped through a variety of devices. These features include geysers, rooster tails, mushrooms, water cannons, spiral sprays and ground gushers. Interactive water features are sometimes installed as alternatives to traditional paddling pools, and their water quality must be safeguarded to at least the same extent. Users, typically children, are positively encouraged to enter and interact with the various features. Most features can be activated by push buttons. Within such an environment, it is likely that some water will be swallowed (although this is not intended and should be discouraged).

Decorative water features can be simply a traditional fountain surrounded by a pond, or ground-based jets across which the public may walk freely. It is not realistic to restrict access to such features, although their use as play areas should not be encouraged. There should be warnings if they contain disinfectant, that they may harm clothes.

Guidelines for decorative water features

There are some safeguards that can reasonably be applied to decorative water features.

- Signs, and where possible design, should attempt to bar access by animals, warn people not to drink from the feature, and advise that children be supervised.
- The minimum water treatment is disinfection to maintain a residual in the water, and attention to the possible formation of algae.
- A risk assessment should be done (see below) – particularly for Legionella.

Guidelines for paddling pools

Paddling pools may be highly polluted relative to their volume, because they may be used by toddlers in nappies; also, children may urinate in them, and introduce pollution from around the pool. So filtration and disinfection should be maintained, although filtration can be relaxed a little compared to swimming pools as clarity is not so critical in a uniformly very shallow pool. Maintaining safe water in outdoor paddling pools means changing the water regularly, daily if practicable. If for any reason circumstances make proper hygiene standards impossible to maintain, paddling pool managers should consider closing the pool altogether. In any case, dogs must be strictly excluded from paddling pools and their surrounds. There is further guidance about this in *Swimming Pool Water*.

How interactive water features work

These play features vary from the very basic to the more sophisticated. The sprays etc are installed in a surround which may be hard (e.g. stone) or softer (e.g. rubber). The water usually drains through the surround into a holding tank. From there the water is pumped to the sprays etc (sometimes via another holding tank). Disinfectant is introduced at some stage in this. If the water volume is inadequate, and the water is not properly filtered and

disinfected, microorganisms introduced on feet, for example, may get to users via the water features. As a result, they could be a source of a number of bacterial and viral microorganisms. This can be a particular problem as people are likely to swallow water from the features.

To counter such risks, their water management should really be in line with that recommended by PWTAG for swimming and paddling pools. And it is equally important that each installation should be subject to a risk assessment. That should take into account the operating water temperatures.

Risk assessment

A risk assessment is required by health and safety legislation. It should take into account intended and non-intended use. All features (including decorative features like fountains) should be formally assessed for microbiological risks. The principal risks are cryptosporidiosis (from diarrhoea in the feature) if filtration is inadequate, and legionellosis and other bacteriological and viral infections resulting from inadequate disinfection. The risk assessment should be reviewed at least every two years.

It is worth bearing in mind that at least the risk of drowning – present even with a paddling pool – is generally absent with interactive water features.

Design guidelines for interactive water features

There are a number of design guidelines that should be followed. They all follow the principles of water treatment described in the PWTAG book, *Swimming Pool Water treatment and quality standards*.

- The maximum number of users possible at any one time is a matter between the designer and operator, but a figure of one bather per 1m² of surface area should be considered (as for paddling pools). Deciding what constitutes the surface area can be problematical given the varied designs, but defining it by a 1.5m band round all features is sensible.
- Water treatment should be based on the anticipated number of users, not the volume of water in the system. A circulation rate of 0.5m³ per user per hour should be adequate.
- Then the holding tank volume should be enough to give a turnover period of about 20 minutes. This calculation may call for a holding tank volume larger than that supplied by manufacturers.
- Ideally, there should be one tank for the returning play water to drain to and another tank which supplies the sprays etc with treated water. It should be possible for the former to run to waste (rather than the second tank) in the event of fouling. And when the feature is out of use, water should also be diverted to drain. One model system has filtration and chemical disinfection applied as the water passes from the collecting tank to the spray feeding tank. Circulation should be continuous 24 hours a day. If there is not complete separation of drain and supply waters, there is an infection risk that has to be taken into account in the risk assessment.
- Disinfectant residuals levels may need to be higher than in swimming pools – perhaps 3-5mg/l of chlorine, for example (4-6mg/l bromine).

- Trained staff may need to be alert to the need to react to poor microbiological test results with higher disinfectant levels. An audible alarm for low disinfectant values could be useful.
- Chemical values (including pH value) should be checked every two hours (in use; also one hour before use) and bacteriological quality at least once a month. Water samples should be taken from a jet. Water quality should be as detailed in *Swimming Pool Water*.
- Medium-rate sand filtration (with coagulation) and good, continuous (preferably automated) disinfection and pH control should be fitted.
- Backwashing frequency should reflect the varying levels of use of such features.
- Realistic access to the plant room is important. Underground plant rooms with access through a trap door are unlikely to be satisfactory. In any case, the plant room must have adequate ventilation and proper provision for chemical storage. Operators must make the room secure when the feature is not in use, and must be aware of the Confined Spaces regulation.
- There should be proper procedures in place for closing down in winter and starting up in spring.

Operational guidelines for interactive water features

Not all of these will be practicable for every facility. Their application should be tempered by a realistic appreciation of the particular circumstances.

- Interactive water features can be extremely popular, so the users may need to be supervised in their use and the number entering controlled.
- Animals and their contamination must be excluded; directly and through warning notices for pet owners.
- Footwear should be removed before entering and there should be a system that allows legs and feet to be washed (running directly to drain). Lowlevel foot showers would be ideal. Toilets should be available nearby and their prior use encouraged.
- The surfaces around the features must be anti-slip and resistant to the chemicals used.
- There should be signs warning against bringing in any breakable bottles, cups or mugs, and against drinking the water from features.
- There should be a written procedure to ensure staff know what to do if there is fouling with diarrhoea or vomit.
- The whole area inside the fence must be kept clean and disinfected if there is any fouling.