

INTERACTIVE WATER FOUNTAINS

Introduction

Interactive water fountains, also known as “wet decks,” “splash pads,” “spray pads,” or “spray parks,” are water fountains provided for water recreation that lack standing water. They give children the chance to play in water without the danger of drowning associated with conventional swimming pools. Many are located in nontraditional areas and lack supervision. Some interactive water fountains are designed so the sprayed water lands on the deck for collection in a tank before being sprayed again. These are known as interactive water fountains that “recirculate” water. Others are designed so the sprayed water drains immediately to a sanitary sewer. While some of the same physical hazards must be considered for both kinds, specific requirements for each type are listed below in separate sections.

Recreational water illnesses can be caused by a number of bacteria or viruses, such as *E. coli* 0157:H7, Hepatitis A, *Giardia*, or *Shigella*, and *Cryptosporidium parvum*. The number one waterborne disease is Cryptosporidiosis, caused by the microscopic parasite *Cryptosporidium parvum*. Called “Crypto” for short, it is protected by an outer shell that allows it to survive outside the body for long periods of time. While some people exhibit no symptoms from Cryptosporidiosis, most experience diarrhea, loose or watery stools, stomach cramps, upset stomach, and a slight fever. Young children, pregnant women and those with weakened immune systems, such as those with AIDS, cancer, transplants, and some inherited diseases may develop a more serious illness. Infections can result even at very low concentrations of Crypto in water. Its shell makes Crypto very resistant to chlorine disinfection. Interactive water fountains recirculating water can easily transmit *Cryptosporidium* and other illnesses from one infected patron to other patrons. If a recreational water facility is properly designed to remove or inactivate Crypto, it will easily handle the other types of waterborne pathogens.



A) Interactive Water Fountains that Recirculate Water

If not properly designed or operated, Interactive water fountains recirculating water can easily transmit disease. The sprayed water can rinse dirt, vomit, fecal material, urine, and pathogens from a patron’s body. Then the water will flow back to the collection tank, or “balance tank” to be re-sprayed on other patrons. Children have been observed squatting over spray nozzles, which increases the chance that there will be fecal material in the recirculated water.

It is the intent of 410 IAC 6-2.1 to protect aquatic venue patrons from an unreasonable risk of contracting a disease. Since interactive water fountains are intended primarily for small children and because they are designed to have a high bather load per volume of water, these are considered *increased risk* aquatic venues. A fountain of recirculated water can contact a patron’s mouth, eyes, skin, and mucous membranes. Also, the water is also highly agitated which can help cause rapid disinfectant loss.

Requirements for interactive water fountains recirculating water: the following requirements are based upon the Indiana State Department of Health’s Public Swimming Pool Rule, 410 IAC 6-2.1, interpreted to consider any public/semi-public interactive water fountain which does not drain to waste to be a “pool” since they contain a tank and an artificial body of water used for recreational purposes. Furthermore, these interactive water fountains are treated as “wading pools” given their zero depths as well as their intent to serve a high bather load of primarily small children.

Items 1-10 below apply to all operating interactive fountains that recirculate water provided for public/semi-public use, with no regard for their date of construction. **Items 11 - 17** technically only apply to those built after March 25th, 2011, although they are recommended for all interactive fountains that recirculate water.

1. All water quality and water chemistry standards of 410 IAC 6-2.1-30 and 31 apply. Disinfectant concentrations specified for "Wading Pools" in section 30(b) apply. Thus, a minimum 3ppm Chlorine is required.
2. All other requirements of 410 IAC 6-2.1 apply with the exceptions of sections 34, 35, 36(a)(2-4), and 43(3).
3. The circulation system for the filter and chemical feeder treating the water in the balance tank must maintain an absolute minimum of 1 hour turnover time, based on the volume of water in the balance tank and all associated piping. See item 12 below for those constructed after March 25, 2011.
4. Warning signs specified in 410 IAC 6-2.1- 36(b) as well as 36(a)(1) must be provided.
5. Provided that there are no submerged suction outlets accessible to patrons, the Virginia Graeme Baker Pool and Spa Safety Act is not applicable.
6. All grates accessible to patrons must be secured down to prevent patrons from inadvertently accessing suction outlets, mechanical components, and other potential safety hazards. Both the design and operational procedures should assure that trip hazards are prevented.
7. Overhead electrical wires should be located at least 20 feet away from any spray pad, measured horizontally. Also, there can be no unprotected electrical circuits or wiring within 10 feet of any spray pad.
8. To prevent injury to patrons, unless certified by a feature designer and/or manufacturer, the water spray from a feature nozzle shall not exceed a height of 6 feet and not exceed a flow rate of 20 psi.
9. No glass or sharp objects shall be allowed on the spray pad.
10. Garbage and refuse shall be collected, stored, and disposed so that the interactive water fountain as well as any required sanitary facilities are kept clean and litter free.
11. Plans must be submitted to the Indiana Department of Homeland Security, Fire Prevention and Building Safety Commission for a design release prior to the new construction, rehabilitation, or alteration as required per 675 IAC 20-5-2. Plans must be submitted for any interactive water fountain built since March 25th, 2011.
12. A turnover rate of 0.5 hours or less is required in 675 IAC 20-5-14(b) for all interactive water fountains constructed *after* March 25th, 2011.
13. The total water volume of the balance tank plus any associated piping shall either be 1000 gallons OR five (5) times the absolute value of the combined design flow rate of all the attraction pumps, whichever is greater. This is described in 675 IAC 20-5-22(e).
14. Primary disinfection of the recirculated water: Spray pads shall have electronic monitoring equipment that will shut off the feature pump/s to the spray nozzles when the chemical disinfectant residual in the balance tank falls below 3.0 ppm Chlorine or 4.0 ppm Bromine. This is required in 675 IAC 20-5-23(c)(1).

The disinfectant feeder will need to directly measure the free Chlorine concentration to enable this safety shutoff to function properly. Correlations to ORP measurements are not adequate. The control system will need a probe to directly measure the concentration of free Cl.

15. Secondary disinfection of the recirculated water: Ultraviolet light or ozone must be operated and maintained in accordance with 675 IAC 20-5-23(c)(2).

(A) Disinfection equipment shall be tested and listed for use in spray pad disinfection.

(B) Ultraviolet light dosage shall be forty (40) mJ/cm² or greater

(C) Ultraviolet light systems shall have a properly calibrated light intensity meter, automatic water flow shutoff in the event the light intensity decreases below recommended level and an alarm to advise of a malfunction.

- It shall be UV-C unit producing a wavelength of 254 nanometers.
- The standard for testing and listing of the UV unit for secondary disinfection is US EPA Ultraviolet Disinfectant Guidance Manual dated November, 2006, publication number EPA 815-R-06-007. This standard requires a 3 log (99.9%) reduction of *Cryptosporidium* oocysts, based on the theory of reducing to a concentration of 1 oocyst/100 ml (average volume of water swallowed by a swimmers).
- NSF/ANSI 50 listing should be for "Secondary" disinfection. This indicates the 3 log reduction of *Cryptosporidium* after a single pass thru the unit.
- NSF/ANSI 50 listing as "Supplemental" disinfection (only) is not adequate.
"Supplemental" indicates a 3 log reduction of *Pseudomonas aeruginosa* after six passes.

16. Bathrooms, with diaper changing areas, must be provided and be located to assure easy access. The required number of plumbing facilities is listed in 675 IAC 20-5-25 for all spray pads constructed after March 25th, 2011.

17. Drinking fountains must also be provided and be located to assure easy access as required in 675 IAC 20-5-25(e).

B) Interactive Water Fountains that Drain to Waste

Interactive water fountains are often designed so all of the water passing through the fountains or bather activity area immediately drains to a sanitary sewer. This is done to significantly reduce the possibility of transmitting a waterborne illness from one patron to other patrons. By draining 100% of the water immediately to waste without allowing any of the water to pool, even temporarily, many of the requirements associated with interactive fountains that recirculate water are eliminated.

However, improperly designed or maintained interactive fountains draining to waste can still pose public health threats and/or safety hazards. Safety hazards can be associated with the force of the spraying water, with physical trips/falls/cuts, as well as with electrical components located in close proximity. When these fountains are not maintained in a general sanitary condition, there is still some potential for pathogens to contact patrons. Biofilms can grow in ill-maintained wet areas, potentially harboring pathogens. It is critical the water being sprayed meet basic bacteriological drinking water standards to ensure that that water itself is free of pathogens (must be potable). Spray nozzles must be kept free of animal wastes, bodily fluids, garbage, etc. to ensure that such contaminants are not projected at patrons' mouths, eyes, etc. by the force of the spraying water.

Interactive water fountains draining 100% of the water passing through the bather activity area immediately to waste without capturing any standing water, even temporarily, in the bather activity area are not considered "pools" under the Indiana State Department of Health's "Public and Semi-Public Swimming Pools Rule 410 IAC 6-2.1."

All Interactive water fountains constructed after March 25th, 2011, whether they recirculate or drain to waste, have to meet the requirements of the Department of Homeland Security, Fire Prevention and Building Safety Commission's, "Indiana Swimming Pool, Spa and Water Attraction Construction Code 675 IAC 20," filed March 25, 2011. A copy of which can be obtained at: <http://www.in.gov/isdh/23281.htm>.

Requirements for Interactive water fountains that drain to waste: the following criteria are for all interactive fountains draining to waste and are open for public/semi-public use.

1. Plans must be submitted to the Indiana Department of Homeland Security, Fire Prevention and Building Safety Commission for a design release prior to the new construction, rehabilitation, or alteration as required per 675 IAC 20-5-2. Plans must be submitted for any interactive water fountain built since March 25th, 2011.
2. Only potable water that meets the provisions of 327 IAC 8-2 can be used.
3. All drainage from public interactive water fountains that drain to waste shall drain immediately into a public sanitary sewer utility, if available within a reasonable distance. Any discharge of such drainage must be managed in compliance with 327 IAC 1. Any discharge to surface waters must be approved/permitted by the Indiana Department of Environmental Management (IDEM). On-site sewage systems may not be utilized to dispose of such drainage.
4. Any grates on the deck pad must be kept secured and in good repair. Accessible grates must be secured to prevent patrons from inadvertently accessing potential safety hazards and/or creating trip/fall/cut hazards. Both the design and operational procedures should assure that trip hazards are prevented.
5. The design and construction of the interactive fountain's deck, drainage grate, and other components must ensure that no water stands, ponds, or pools.
6. Overhead electrical wires must be located at least 20 feet away from any spray pad, measured horizontally. Also, there should be no unprotected electrical circuits or wiring within 10 feet of any spray pad.
7. To prevent injury to patrons, unless certified by a feature designer and/or manufacturer, the water spray from a feature nozzle shall not exceed a height of 6 feet and not exceed a flow rate of 20 psi.¹
8. All surfaces must be kept clean of debris, organic materials, and slime/biofilm. Materials and contaminants must be flushed off the surface of the spray pad daily prior to opening and more thoroughly as needed.¹
9. Bathrooms must be provided in accordance with 675 IAC 20-5-25. Bathroom facilities should be provided within at least 300 feet of the interactive water fountain. At the very least, one unisex restroom is required for each splash pad per 675 IAC 20-5-25(c).
10. At least one drinking fountain shall be provided and available to bathers at the water attraction site per 675 IAC 20-5-25(e).
11. A sign stating "no glass or sharp objects are allowed on the spray pad" should be provided.¹
12. Garbage and refuse shall be collected, stored, and disposed so that the interactive water fountain that drains to waste as well as any required sanitary facilities are kept clean and litter free.¹

¹ These items are health and safety recommendations.