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2015 Float Conference
August 14, 2015 Manufacturer's Workshop Discussion Summary

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Background:
My name is Jason MacDonald. I am a Certified Public Health Inspector from Alberta, Canada, and I conducted a three-hour *Manufacturer's Workshop* at the 2015 Float Conference in Portland, Oregon on August 14, 2015. The aim was to discuss floatation from the perspective of a health inspector with a unique background in both aquatics and infection control. My goal was to offer helpful advice on dealing with health approval processes in this growing and largely unregulated industry. The workshop participants were primarily facility owners, operators and manufacturers with a few health regulators also sprinkled in.

What I took away from this experience, beside the chance to meet dozens of passionate and driven experts from all over the world, was a better understanding of the common ground that the floatation industry has with public health. At the same time, I also was better able to see where the friction points are. What I offer below is a synthesis between the key thoughts from the workshop session and my own experiences as an environmental public health practitioner with an aquatic background. I hope it has value to both the floatation industry and to my colleagues in environmental public health.

Introduction:
The floatation industry is growing across North America. In many jurisdictions, an approval inspection of the floatation center is required by the local health department. In the absence of a regulatory framework for floatation, new float centers may be miscast as swimming pools, spas or even as beauty salons. The absence of a specific regulatory framework has led to reports of inconsistent or difficult approval processes across North America. With that said, this is not always the case and many examples were discussed whereby health inspectors and operators are working together constructively and successfully.

We described two primary kinds of inspections that health authorities might conduct: "approval" and "routine". Approval inspection seems to be the stumbling block for new operators and this was essentially the focus for the workshop. It seemed to be a common theme that once a facility is open, very few issues tend to be noted during routine inspections. Health authorities also conduct "complaint" inspections, but the workshop discussions did not focus on this type of involvement.

In any relationship it is vital to establish common ground. With floatation, the common ground between the operator and the health authority is that health is good for business. The role of the health official is to proactively protect the public. Health officials do not wait for people to get ill before taking actions and so, either through education or enforcement, they aim to establish protective but fair measures to prevent negative health outcomes. In a floatation centre, health officials want safe water, and so do operators.

There is very little, if any, data to support that floatation (as it is currently practised) causes illness or infection. That is why I encourage my colleagues in health to keep floatation in perspective. Time is precious in public health and we need to balance the energy given to policy development and inspection in floatation with the needs of other program areas – especially considering what the literature is telling (or rather, not telling) us.

Workshop Discussion Summary:
The workshop discussion centered on the following themes, which are summarized in greater detail in the discussion below:

I. Floatation is not Swimming
II. Chemical Disinfection Strategies and Sampling
III. Circulation, Design and Operation
IV. Effective Health Risk Management for Floatation

I. Floatation is not swimming

Health inspectors know swimming pool environments very well and so some may naturally want to utilize both their expertise and local regulatory frameworks to guide their risk assessment of floatation. However, the general consensus from the workshop was that it is important for the floatation industry to advocate that it should not be categorized as a pool or spa. Being able to articulate these differences may help frame the risk assessment that a public health inspector will conduct during an approval inspection.

Non-continuous Circulation

At first glance, one might think that the biggest difference between floatation and swimming is that circulation is disengaged during float sessions, while swimming pools offer continuous circulation of water. However, during most swimming competitions circulation is disengaged, meaning that several dozens of swimmers are in the pool for significant periods of time while water is not being filtered. Similarly, maintenance staff routinely perform backwashes and filter changes while patrons are swimming in the pool. Health authorities need to remember that swimming pools are not always in circulation when patrons are present.

Routes of Entry

From a health perspective, what makes floatation most unique from swimming is the protection of potential routes of entry of water into the body.

a. No Ingestion

It is highly unlikely for float tank water to be ingested. The water is extremely salty and induces an immediate reaction to the poor esthetic taste. In pools, it is very common for swimmers of any age to ingest water - both intentionally and accidently. Swallowing organisms that are released in fecal matter, such as Cryptosporidium, Giardia or E. coli, is of utmost concern in swimming pool environments. Chlorine or bromine residuals are present in pools to prevent the water from becoming a reservoir for these pathogens. Considering the low likelihood of ingestion of water in floatation, the fecal-oral route of transmission should be of significantly lesser concern to health officials.

b. Inherent Protection of Mucous Membranes

In swimming pools, the eyes, nose, mouth and ears are well documented points of contact with aquatic pathogens. Swimmers spend most of their time with their heads near the pool surface which increases the likelihood of contact with floating contaminants. In floatation, one never floats on their side or stomach so the eyes, nose and mouth always remain above the water. If water does accidently contact these sensitive areas, discomfort (stinging) ensues and the patron will very likely need to get out and rinse the area. This would remove any pathogens that might be present. Additionally, facilities offer disposable ear protection to the patrons which will prevent entry of water into the ear canal.

Bather Load Considerations

A daily bather load is assigned to a swimming pool to identify the system's capacity for disinfection and filtration. The relative use of a float tank is significantly lower than a pool. Floatation is primarily limited to one floater at a time, so the average number of users in a typical tank might only be 6-8 people per day. Contrast this to a small pool or spa where dozens of bathers or more may enter at any given time and it becomes clear that the capacity-related requirements for a float tank should be less than that of a pool or spa.

It was reported that the vast majority of floatation occurs in the nude, which reduces the level of contamination brought in on bathing suits. Also, float tank water is purposely kept the same as body temperature, and considering that the patron lies still, sweating is not a concern like it is in swimming pools and spas. Sweating is a known source of fouling in pools and increases the demand for disinfectant chemicals.

1:1 Education

Float facilities generally have 1:1 instructional dialogue with every new floater. There are many reasons for this conversation, not the least of which is to capitalize on the opportunity to explain best practises for healthy floating. Among other things, tips for covering cuts, using ear plugs and proper showering are covered. Swimming pools do not have this opportunity and, in fact, a large proportion pools and spas are unguarded or unmonitored.

Coverage of Broken Skin and Cuts

Anyone who has been in floatation tank water will tell you that broken skin need to be covered. The salt will sting an open wound to the point where floatation becomes uncomfortable. Usually a floater will need to get out, rinse the area and apply a barrier to the cut. Cuts are usually covered with a measured application of petroleum jelly to prevent salt entry. This barrier also helps to prevent the entry of water pathogens into the skin.

KEY RECOMMENDATION

Barrier films should be provided to clients to cover cuts and be presented in a manner that allows for sanitary dispensing. Single-use packages are ideal. Clients should never be allowed to place fingers into the bulk supply of products like petroleum jelly.

Showering
Float facilities have higher compliance with showering compared to swimming pools. Floaters are given a 1:1 introduction prior to their session which will usually mention the importance of a cleansing shower. Contrast this with a pool where patrons are passively reminded, often by signage, to take a cleansing shower.

Further, we can be almost certain that after floatation a vigorous shower will be taken. If a floater does not shower, their skin will be covered in a film of salt. The process of showering off the salt significantly decreases the likelihood of a skin pathogen being retained. In public swimming pool and spa settings, showering after being in the water is much less likely to occur.

Undetected Fecal Incidents
Float tanks and rooms are inspected and cleaned after each session. The chance of a fecal accident going undetected is nearly impossible. In a float center, a release of fecal matter into the pool will be spotted immediately and measures would be put into effect right away to prevent exposure of the next patron. In pools, fecal accidents are more likely to go undetected, hence the need for disinfectant residuals.

Maturity of Client
Floatation caters to a more mature clientele than pools and spas. Children and those who are handicapped are often unknowing offenders for the release of fecal material into swimming pools. In the rare circumstance where a handicapped individual, or child, were to float, it would not occur without direct supervision by a guardian. The point here is that the clientele of a float center are more likely to comply with facility rules and far less likely to unknowingly introduce the pathogens that concern health officials in pools and spas.

> ***KEY RECOMMENDATION***
> *Procedures for supervision should be in place for young children or handicapped persons who float.*

II. Chemical Disinfection Strategies & Sampling

Not surprisingly, disinfection strategies came up early and often in our workshop. If one were to describe in one word the primary source of friction between health departments and operators, the word would undoubtedly be “chlorine”. We spoke openly about chlorine use and also about other strategies that could be employed to achieve the desired outcome of safe water.

Importance of Cleaning
We cannot begin to talk about disinfection without acknowledging the importance of cleaning. Routine physical cleaning of the tank is of utmost importance.

Bioflims, which can harbour organisms like pseudomonas, may grow in floatation tank joints and near inlets and outlets. Operators can reduce the likelihood of biofilm formation through routine manual cleaning and maintenance. Operators in the workshop described how they ensure that joints are properly caulked at all times. Joints should be physically cleaned on a routine basis and caulking should

be stripped and replaced when worn. Further, where surface contaminants are get sucked into the filter during circulation, manual skimming of the float water surface after each session was highly recommended.

Pseudomonas

Given its presence in biofilms and opportunistic pathogenicity, workshop participants agreed that *Pseudomonas aeurginosa* is the ideal target organism for sampling in floatation. Initial indications from sampling conducted in Alberta showed that floatation tanks were Pseudomonas free until the moment that floatation begins. In other words, despite showering, this organism arrives once floaters arrive.

One 2012 study conducted through NSF[1] showed a 2.5-log reduction of Pseudomonas after 24 hours in still float tank water without any disinfectant present. This leads one to hypothesize that Pseudomonas may just die off naturally over time. A 2015 NSF study[2] showed greater than 5-log reduction of Pseudomonas after 24 hours. This study also used float water with no disinfectant present, but introduced periodic agitation to more closely mimic the conditions of a float tank. These studies speak to the inhospitable environment to Pseudomonas that is created by the high density epsom salt water.

It can be easy to lose perspective on how ubiquitous Pseudomonas is in our environment. We know that this organism lives in our drinking water systems, which means that we very likely pour Pseudomonas into our bathtubs and drinking glasses. Healthy bodies can tolerate interaction with Pseudomonas in floatation centers. The key is limiting the chance this organism has to survive, proliferate and enter the body.

Health departments and laboratories will have resources for float centre operators who seek to begin a microbiological sampling regimen. It is important never to rely on one sample result. Operators and inspectors alike should always perform enough samples to allow for trend data to be monitored. Operators may even wish to propose testing strategies in partnership with their health department. For example, a float center in Washington State offered to work with the health department on a study that would compare microbiological results from multiple tank systems. Similarly, a health inspector in Philadelphia has offered to take periodic samples of the float tank water to monitor system performance. Alberta has done similar sampling exercises with its many float tank operators.

> ***KEY RECOMMENDATION***
> *If microbiological sampling is going to be done in a float tank system, one sample is not enough. A robust sampling regimen over a reasonable time period must be undertaken before conclusions from microbiological data can be drawn.*

Chlorine & Bromine

Free chlorine residuals in most Canadian drinking water systems range from 0.04 - 2.0ppm. In America, the CDC has set a maximum chlorine residual level of 4.0ppm for drinking water. While chlorine carries a negative stigma in the floatation industry, health officials and operators alike should be mindful that the levels of chlorine typically discussed are universally considered non-toxic.

Operators expressed frustration that health departments will promote chlorine use without consideration for potential air quality concerns. Health officials are encouraged to consider the potential

for exposure to disinfection by-products in the enclosed floatation space. The concern is that health officials may be creating a hazard in the air by trying to mitigate one in the water.

> ***KEY RECOMMENDATION***
> *Research and testing of the air quality inside enclosed floatation environments is needed to generate perspective on the perceived toxicity of airborne halogens and their disinfection by-products.*

Participants in the workshop noted that with an increase in the use of floatation for sport performance and injury recovery, there has been an increase in the demand for floatation to be a chlorine-free service. Given the documented benefits of floatation in many areas of sport performance, and the financial investment made in professional athletes, it was noted that professional and collegiate sport teams could become an important and influential advocate to the floatation industry in terms of both political clout and research funding.

Chlorine and bromine residuals will control microbial growth in float water. In fact, it was reported in our discussions that German float tank regulators have established that a requirement for chlorine disinfection in float tanks is necessary - despite their general reluctance to use that chemical in aquatic settings. However, health authorities insisting on chlorine or bromine residuals should consider allowing lower residuals than those mandated in swimming pool legislation. German regulators require very minute doses of chlorine of 0.5ppm or less. Many North American jurisdictions still require 3-5ppm of chlorine or bromine in their swimming pools, while others (like Alberta and Ontario) have lowered requirements to 0.5ppm.

Given these numbers, it becomes fair to question the rationale behind requiring 3-5ppm chlorine or bromine residuals in float tanks. The rationale for higher residuals in swimming pools and spas tends to be that a safety factor is needed in the event that a large number of bathers enter and pollute the basin. Given the low bather load in a float tank and the other striking differences between floatation and swimming, lower residuals should suffice.

> ***KEY RECOMMENDATION***
> *In jurisdictions where chlorine is mandatory, float operators are encouraged to discuss the ability to utilize very low chlorine residuals while maintaining a pH range within 6.8 - 7.6*

Choosing a Disinfection Strategy Other than Chlorine

Operators are obligated to ensure that their system is capable of maintaining safe water. While dissolved epsom salt and hydrogen peroxide together do not appear to promote the growth of microorganisms, this combination alone is generally not recognized as an effective disinfection strategy. Relying on a lack of outbreak data is not enough. The goal of the industry should be to offer satisfactory microbiological results to what chlorine or bromine can offer.

<u>Ultraviolet light & Hydrogen Peroxide</u>

Ultraviolet light (UV) alone is an effective disinfectant at the correct wavelength. It also interacts with dissolved hydrogen peroxide to create hydroxyl radicals which provide a very powerful method of killing aquatic organisms. Unfortunately, hydroxyl radicals are not measurable so a residual cannot be recorded that tells you how many radicals are present. Also, UV light can be challenging to measure. The

inability to measure UV and hydrogen peroxide presents an obstacle for inspectors and operators who want proof that disinfection is actually happening.

UV lamps are common in floatation disinfection systems, but too often there is no measurement of the actual dose of UV light being delivered. To be able to demonstrate that UV lamps are indeed effective, operators should only purchase systems with sensors capable of measuring the transmittance (dose) of UV. Ensuring that an optimum UV wavelength (254nm) for destruction of pathogens is present is equally important. Costs of such calibrated UV sensors may be high at this moment in time, but if the goal is to use UV to both kill germs and create hydroxyl radicals, then a system to evaluate UV light is necessary.

UV light should always be on during the circulation and filtration phase. As more float water circulates past the UV lamp, more germs will be killed. Operators who currently utilize UV systems need to be aware of the frequency at which UV lamp changes are recommended by the manufacturer. Mechanisms to ensure that a precipitate film does not build up on UV light tubes should also be in place.

> ***KEY RECOMMENDATION***
> *Bringing cost effective UV measuring systems to the float tank industry is something the float community needs to focus on immediately.*

II. Circulation, Design and Operation

Turnovers

Designing float systems that can meet various state or provincial requirements is challenging, especially when systems are required to conform to pool or spa standards. One key challenge identified during the discussion was determining what the turnover requirements should be for a float tank.

A turnover of water is theoretical and basically speaks to how long it takes for a tank's volume of water to pass through the filter. Filtration of water is a good thing and naturally the more times water passes through a filter, the cleaner the water should be. To measure a turnover, one needs to know the volume of the pool and the circulation flow rate. However, many float systems lack a flow meter.

> ***KEY RECOMMENDATION***
> *A flow meter should always be present in circulatory systems to assist in measuring turnover and also to help evaluate filter performance*

Health inspectors are taught that that it takes about four turnover periods for every molecule of water to pass though the filter. This is not exactly true. The Gage-Bidwell Law of Dilution states that every turnover purifies about 67% of the water in a system. So even after four turnovers the purification of the water is not 100%, but rather 98%. What this law tells us is that regardless of the number of turnovers, 100% filtration is really not possible.

In my own experience, I have watched the same piece of hair float around for an entire filtration phase, only to realize that it never entered the circulation system. This does not happen with all float tanks, but it serves to illustrate how a prescribed turnover rate may give the health department a false sense of security.

KEY RECOMMENDATION
It is recommended that some floatation tanks be manually skimmed after each float session to remove floating debris and visible contamination.

I think it is fair to say that float tank systems are continually evolving and that each system will present its own unique filtration strategy. Health departments should evaluate whether requiring a prescribed number of turnovers really tells them what they need to know. I might suggest that each system be individually evaluated rather than having the same number applied to all systems.

Anti-Entrapment / Anti-Entanglement
Measures to prevent entrapment and entanglement should be considered in the design of floatation tanks. Generally, anti-entrapment measures do not apply to skimmers, but any tank that has a completely submerged suction outlet will undoubtedly be of concern to health officials.

Many effective layers exist to protect floaters from entrapment and entanglement hazards. These include:

- Suction outlet covers being in good repair at all times.
- Circulation being off during floatation sessions.
- Feet being located at the suction outlet end, wherever possible, to prevent possible hair entanglement.
- Competent personnel ensure being present who supervise the facility.
- The maturity, competency and age of a floater tends to be higher in floatation.
- Patrons are given 1:1 floatation instruction before their session.
- Floatation is generally done with no clothes on, so the likelihood of a swimming suit being captured in a suction outlet is reduced.
- Call buttons, while not necessary in all float tanks, help to notify staff of issues related to the floatation session.

Methods for Chemical Feeding
Attendees discussed the pros and cons of both automated chemical feeding and manual chemical feeding. Both have advantages and disadvantages. Any dosing of chemicals should be done based on the need of the system. Chemicals should only be added when conditions call for it.

Hand feeding involves more actual handling of chemicals which may pose risks for workers when handling chemicals like 35% hydrogen peroxide. However, there is more potential for chemical to be added when the system does not call for it with auto-feeding. Auto-feeding does allow for some chemical to be added during hours when the floatation facility is closed. This can help to prevent an overnight drop off of chemicals and the potential for germs to grow.

Wherever possible, chemicals should be injected after the filter, not before. Operators may waste disinfectant by injecting it prior to the filter. Also, plastic tubing for chemical feed lines should be of sufficient capacity to prevent precipitate and clogging. It was reported that precipitate formation may be of particular concern for systems that use chlorine or bromine. Routine attention to this issue should be given by the operator.

Dilution

When I describe floatation to people who are unfamiliar with it, a common question that often arises is "how often is the water changed?" Because floatation water is rarely fully drained and refilled, there can be a negative perception about either the cleanliness of the water as it is used by multiple clients. Sanitary measures such as circulation and disinfection are in place to keep the water safe, but we often leave out the fact that floatation has a significant element of dilution occurring that also helps to maintain water quality.

When floaters exit the tank, they carry out salt and water with them. This water loss adds up and eventually operators need to add more water to their tank. Operators can account for this water loss by keeping track of how much water is added per day (or per week) back into their tanks. If, for example, 50 gallons of fresh salt water is added to a 1000 Gallon tank per week, then theoretically the water is changed roughly every 20 weeks (5 months). Dilution is a recognized safety measure for public health officials, so explaining this procedure might enhance the perception of the quality of floatation tank water to both inspectors and patrons.

IV. Effective Health Risk Management for Floatation

The shared outcome that health departments, tank designers and operators all desire is safe floating. In the absence of a provincial or state regulatory framework for floatation, health authorities will naturally gravitate toward the same risk reduction measures required for swimming pools or personal service settings. It is equally natural for the floatation industry to challenge the appropriateness of applying these regulatory frameworks.

Health Service

Floatation is not a personal service and not an esthetic procedure. Floatation is a service that offers mental and physical health benefits and is designed to protect, promote or maintain health.

States and provinces tend to define what health services are, but not all health services need require regulation. Typically, only the most dangerous health services are regulated or restricted. Controls are only placed over certain services when risks to the clients are high.

Classification as a health service may be advantageous for the float industry. The speakers at the 2015 Float Conference demonstrated that the body of literature pertaining to the mental and physical benefits of floatation is both vast and expanding. Weighing these benefits against the likelihood of few adverse outcomes should be an important consideration for health officials.

> ***KEY RECOMMENDATION***
> *Floatation should not be classified as swimming or as a personal service. Floatation may be most suited to be classified as a health service. The benefits of floatation, not just the potential for adverse outcomes, should be considered when deciding on whether to regulate the industry.*

Sharing an Interest in Health

The float industry has its own standard (*US Float Tank Standard*) and there is great value in that. While research and study will continue to inform future changes to this Standard, at this time it can be argued that those who follow the requirements set out in the *US Float Tank Standard* are successfully

preventing injury and illness. In the absence of state or provincial public health laws for floatation, local health departments should be encouraged to consider this Standard as a means to mitigate the potential risks of floatation.

Health is good for business and business owners do not want to create or maintain unhealthy environments. Having a relationship with the health authority, be it a health inspector or otherwise, is important for owners. In jurisdictions where the US Float Tank Standard is not seen as sufficient, the floatation industry should continue to work alongside state, provincial and federal regulating agencies to discuss best practises in floatation. This will ensure that fair, informed and sensible policy is created in jurisdictions that choose to regulate floatation.

Conclusion

Some of the friction that exists today between health authorities and operators arises from a lack of a regulatory framework, or universally accepted set of standards. However, despite the rapid growth of floatation, there should not be a rush to regulate the industry just to fill that void. This moment in time is special. It should be used to cultivate as many good policies and best practises as possible by finding out what is fact and what is fiction in floatation.

There is value in coming together as a community of interested stakeholders to set best practises or standards using reliable data and information. The current literature seems to indicate that there are far more good outcomes than bad with floatation. However, there is a need to formalize this intuition with facts. The way to achieve this is grow the body of scientific evidence on water quality through routine sampling and analysis of trend data to prove that water and air quality can be maintained in a safe and sanitary state.

Respectfully submitted,

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1. “Organism Time Kill in Float Lab Water” NSF: Report Date: 30-Nov-2012. Job Number: J-00114729. Project Number: 9130808 (ML01). Shared by Float Lab, 801 Ocean Front Walk #3, Venice Beach, CA, 90291

2. “Organism Viability Testing in Epsom Salt and Control Solution” NSF: Report Date: 02-Oct-2015. Job Number: J-00183734. Project Number: W0216797 Shared by Mr. Graham Talley, Float On, 4530 SE Hawthorne Blvd Portland, OR, 97215 Phone:805-657-0461