

## USSSA September 2014 Article

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Welcome back to our “Ask the Expert” feature, designed to assist you with any and all issues related to swimming pool water, mechanical equipment, space conditioning, and code compliance. Ask a question, and we will answer to the best of our ability.

**Q:** We operate a small (1,000 sq. ft.) but busy swim school, and have between 700 and 900 kids a week. We have a very efficient treatment system including chemistry controls, medium pressure UV, and hi-rate sand filters, which we backwash by pressure differential about once a week. The water is always clear and the chemistry (pH and Chlorine) levels are normally very good with very infrequent lapses. Every once in a while we have considerable irritation from students and teachers alike. From reading your previous articles, it seems like we are doing most of what it takes to minimize irritation. What do you suggest?

**A:** Congratulations on your successful school and your diligence in operating the pool. You seem like you are taking most of the steps necessary to maintain irritant-free water, but here are a few suggestions for you to check.

Remove all possible lapses: Infrequent lapses are better than the alternative, but any lapse in water quality can have a lingering effect, so we recommend that you keep track of them, and take steps to assure that they won't be repeated. For example if you have a high pH alarm, because the acid vat ran empty or the chemical feeder malfunctioned, you need to correct it as soon as possible. But, during the high pH time, the oxidation (or ORP) was reduced and organisms that would normally have been “oxidized” are hanging around in the water, and now have to be removed. “Water Quality is Cumulative”, which means that it deteriorates and improves, and removing irritants through improving the water takes a lot longer than deteriorating it during some quick lapses.

Focus on the ORP: You mention that you have good chlorine levels, but did not mention ORP. The most successful swim school operators focus on ORP first, then PPM. It is a small tweak to your thinking, but an important one. The higher you maintain the ORP, the faster the oxidation rate, thus the quicker the “kill and removal” of potential irritants. We would suggest that you hold as high an ORP as possible that results in a Chlorine level of 2-3 PPM (no higher). Since you should NEVER use stabilizer on a heavily used indoor (or even outdoor for that matter) swim school pool, you should be able to generate 750-780 mV of ORP (800+ is even better) with 2-3 PPM of chlorine. If you can't, your water is struggling and needs some corrective action.

Are you overloading your pool? You mention 700-900 kids a week, but did not mention how many kids your pool was designed for. Best practice is to allow one bather per 5 GPM of recirculation flow rate as instantaneous load. So if you have a 100 GPM recirculating system, you really should only have 20 people in the pool at one time. Any more would overrun the circulation system. How can you correct? It is not easy, and you need to speed up the flow by

adding pumps and filters, and having proper pipes in the ground and proper filtration hydraulics. Make sure to consult an expert in the field and observe all local and state laws including engineering, DOH approvals, and permits, etc. Even if you don't overload per your instantaneous bather load, you might be overloading your daily load. One rule of thumb is to take 25-50% of your instantaneous load, and multiply by 12 (assuming you operate your treatment system 24 hours per day) as a maximum daily load. So your 1,000 sq ft pool should have between 60 and 120 bathers a day max.

Get quick help from some inexpensive additives: Some swim schools have experienced significant irritation with high phosphates or metals (mostly copper and iron). These can be removed relatively easily and inexpensively. While there are many types of phosphate removers and metal sequestering agents, we have found that the NSF-certified products (like NGWS or similar) provided the best bang for the buck. You merely test the water parameters and treat per the instructions on the bottle, and you're done. You can also get great assistance in dealing with organics with an NSF-certified enzyme. These are stronger enzymes that help break down the organics before they get a chance to combine with or turn into irritants.

Last but not least, lose enough water: You mention 700-900 bathers a week, and with even a 2-4 hour turnover on your pool, your total backwash water a week would be 300-700 gallons at the most. During our previous articles, we mentioned that disinfection and filtration will not get rid of all the impurities, and some of them cannot be broken down at even the highest ORP levels. It is best practice to drain about 4 gallons per bather on heavily used pools. So, your 700-bather week would require about 2,800 of pool water to be sent to waste, far short of your 300-700 gallon backwash losses. While we are a leading proponents of green technology and highly believe in saving resources and energy wherever possible, there are places that you should not try to save tons of water, and the main one is in your heavily-used swimming pool. Conversely, don't waste water with excessive leaks, etc. but don't use less than 4 gallons per bather if you have a heavily overloaded indoor pool and want to avoid irritation.

Hope that this helps. The suggestions above have proven effective in resolving irritation issues on pools that were operating correctly and diligently. Please feel free to drop us a line if you need any additional information or suggestions.

Please feel free to forward your questions and comments through the USSSA office, or directly to me via email at [amendoza@ceswaterquality.com](mailto:amendoza@ceswaterquality.com).

Best Regards,  
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