

Suction Safety

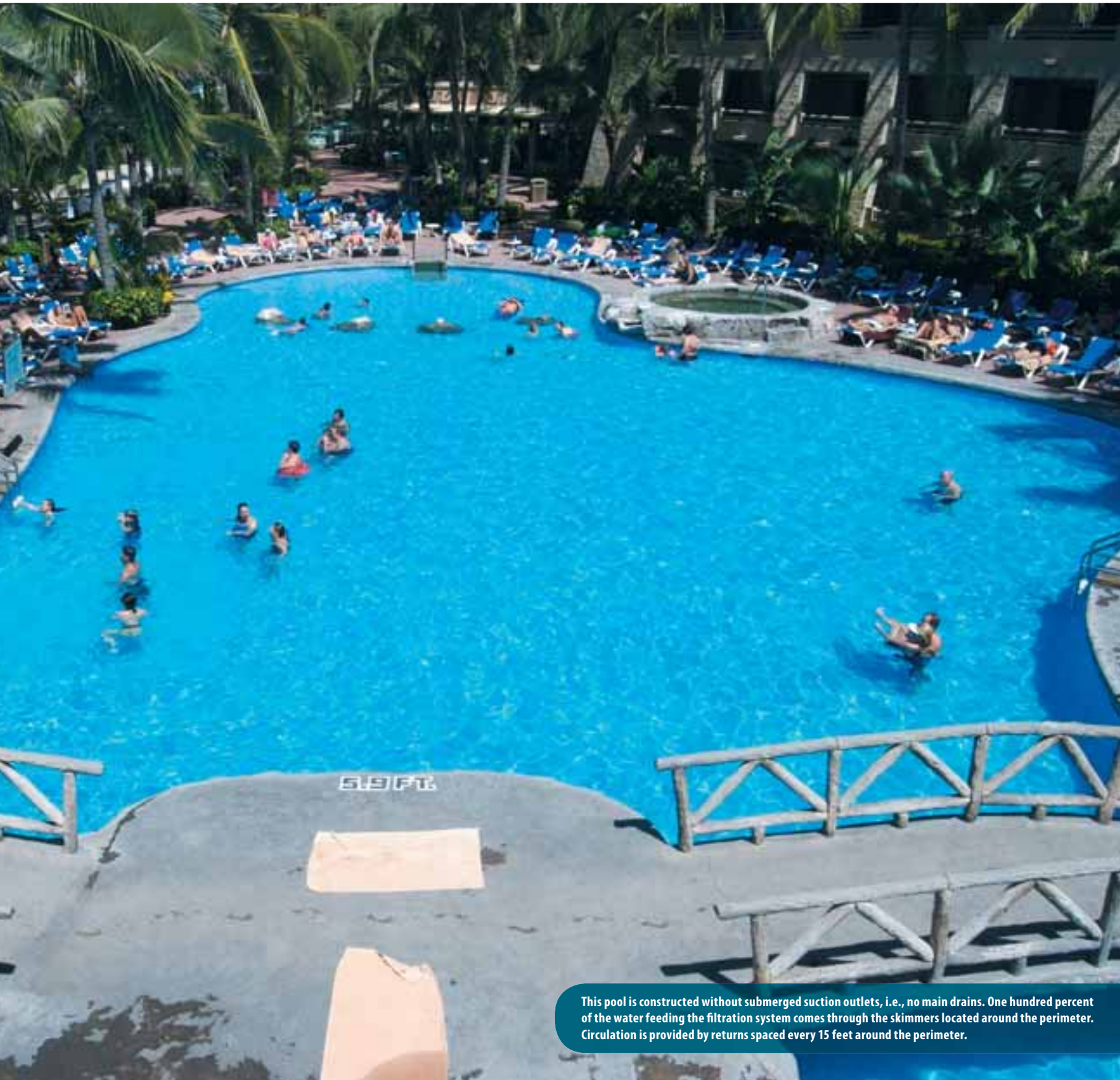
How ANSI/APSP-7 Prevents Tragedy

BY STEVE R. BARNES



TECHNICALLY SPEAKING, times are changing for the pool industry, and this was true before this summer's tragic entrapment incidents put suction entrapment prevention at the top of everyone's priority list. This summer there were two tragic entrapment incidents, one in Connecticut and another in Minnesota. In both cases, a suction outlet cover was missing, exposing young children to direct suction. The result, according to news reports, was a fatal limb entrapment and a life changing evisceration.





This pool is constructed without submerged suction outlets, i.e., no main drains. One hundred percent of the water feeding the filtration system comes through the skimmers located around the perimeter. Circulation is provided by returns spaced every 15 feet around the perimeter.

While it will take time for the APSP Technical Committee to get more details from the U.S. Consumer Product Safety Commission (CPSC) and other sources, we know from research that it is extremely unlikely these entrapments would have happened if the suction outlet covers had been properly installed. Early reports suggest the original manufacturer's screws were not installed, allowing the covers to be removed. This exposed the two hazards for which there is no backup.

2006 American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins (ANSI/APSP-7), requires the pool to be closed to bathers until all suction outlet piping is protected by proper covers. The principal safety message is clear: Do not use the pool or spa if the cover for the suction outlet is missing, broken or not securely fastened.

Suction, like electricity, is important for proper filtration; without it pumps can't cir-

tools to identify and fix suction entrapment hazards in existing pools and spas, where there is a greater risk of incidence.

ANSI/APSP-7 is based on a scientific foundation, starting with a thorough understanding of all suction entrapment hazards, not just the hazard of body suction entrapment. Following a page-by-page analysis of reported entrapment cases from the CPSC going back to the early 1980s, members of the APSP Technical Committee identified five unique hazards: hair

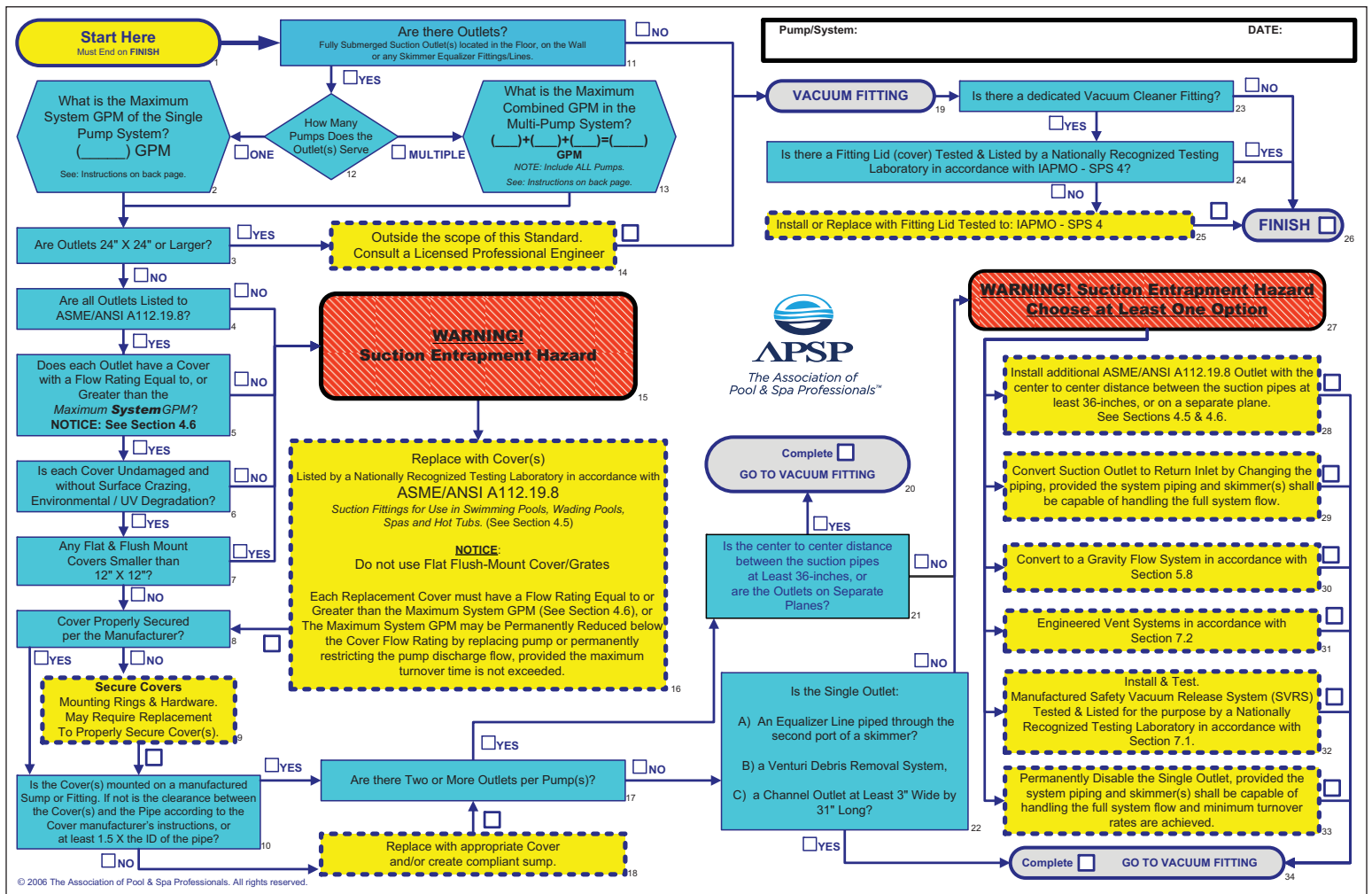
ANSI/APSP-7 also provides detailed tools to identify and fix suction entrapment hazards in existing pools and spas, where there is a greater risk of incidence.

Saying there is no backup for missing and broken covers is a strong statement, but it is accurate and based on the fact that limb entrapment can happen in open pipe, even without active suction. Evisceration may happen at the speed of flowing water, long before atmospheric vacuum breakers and pump shut-off devices can react. Because of this, ANSI/APSP-7

culcate water. Like electricity, swimmers must be protected from it. This is the purpose of ANSI/APSP-7. For the first time an approved American National Standard Institute standard is focused exclusively on a systems approach to prevent suction entrapment. Unlike model building codes, which address only new construction, ANSI/APSP-7 also provides detailed

entanglement, limb entrapment, body entrapment, mechanical entrapment and evisceration. These entrapment injuries were caused by flowing water, suction and mechanical binding in open pipes and fittings.

Suction is the force you feel as atmospheric pressure attempts to replace the water being removed by the pump. (Technically, pumps don't



suck, the atmosphere pushes.) This difference in pressure, Delta P, will be stronger or weaker depending on the piping system installed with the pump. Strong suction is what can hold a swimmer, with the strongest being found in single-outlet suction systems that can be completely blocked by a body. This is why dual outlets were invented by the industry more than three decades ago, to split the suction between two outlets, reducing the Delta P. This is also an important feature of ANSI/APSP-7.

Contrary to what some people believe, suction is not the only, or even the greatest, entrapment threat facing our customers. Water flowing through covers and grates is responsible for the most reported entrapments. Swirling water can entangle hair in or behind the suction outlet cover. The higher the flow rate, the more turbulence there is inside the suction outlet. One possible reason for a greater number of hair entrapment cases is a lack of physical warning or feeling of suction, as hair moves with the water into the outlet. ANSI/APSP-7 addresses this by limiting the flow rate or water velocity. The victim may not notice in time because entanglement happens without a spike or increase in suction. This is an important point to understand because atmospheric vacuum-breaking devices can respond only to an increase in suction, which does not occur when there is hair entanglement.

ANSI/APSP-7 provides many compliant safety systems for new construction, but our existing pools and spas are just as important and ANSI/APSP-7 provides answers for these as well.

The focus of ANSI/APSP-7 is prevention, and this is why the first option you will find in the standard is for no submerged suction. The idea is simple: You can't get stuck on a suction outlet if it isn't there. These circulation systems receive water exclusively from skimmers or gutters. While it is not known how many pumps receive water exclusively from overflow systems, we do know the number is huge when you consider the thousands of vinyl lined and fiberglass pools installed without submerged suction outlets.

The idea of building without submerged suction is foreign to many because of the misconception that proper circulation throughout the pool requires floor outlets. The science of fluid dynamics teaches that water can only be pushed, not pulled. Perhaps this is why public health codes require additional return inlets as pool size increases while the number of submerged suction outlets remains the same.

The resort pool pictured on page 20 is an example of great circulation without the help of submerged suction outlets. This outstanding water quality is supported by returns every 15 feet and skimmers placed around the perimeter of the pools. This inviting swimming pool receives daily maintenance to keep it clean, but removing debris does not substitute for proper circulation; without it, you won't get these results.

Chances are good you have more experience with overflow circulation than you think because this exact circulation method is installed regularly, only on a small scale. The most common example of suction-free circulation can be found in pool and spa combinations where spas

overflow into swimming pools. This is a design found in many APSP Awards of Excellence design award projects, where pristine spa water is maintained with overflow circulation alone. We have large examples and small examples; perhaps it is time to consider medium examples—called swimming pools.

Don't misunderstand. Submerged suction outlets have their place in our projects, but only when installed and maintained properly. ANSI/APSP-7 provides multiple methods for doing this, beginning with safety suction covers. You know you have one when it or its packaging states that the cover has been tested and certified by a Nationally Recognized Testing Laboratory to comply with ASME/ANSI A112.19.8 2007 *Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs*. This is an American National Standard designed to test products for protection against all forms of suction entrapment.

Certified safety outlet covers are tested for hair entrapment, and this is the test that gives suction fittings their maximum flow rating. There is also a body block test that will confirm it is not possible to form a seal with a proper cover even when operating as a single outlet.

This requirement is found for the first time in the 2007 version of the ASME cover standard and it will change the look of suction outlet fittings dramatically as manufacturers come up with new designs to meet it.

ANSI/APSP-7 provides many compliant safety systems for new construction, but our existing pools and spas are just as important and ANSI/APSP-7 provides answers for these as well. It includes a complete evaluation process to identify and fix problems that we know can cause entrapment injuries. All critical components must be reviewed, and if the flow chart looks complicated, it is because the variety of existing installations can be complicated. A professional evaluation requires answering many questions, such as: how many suction outlets are connected to a particular pump, what is the flow rate, what is the flow rating of the suction outlet cover or grate, is it secure, is it cracked or degraded?

These questions are just the beginning. Ultimately safe solutions must be implemented, and that takes time and education. The good news is that we know pools and spas built and maintained according to APSP (NSPI) standards are not the ones in the news. The ones in the news are always installations that

were not built to standard, not maintained to standard or modified to no longer comply with the standards. Even with this outstanding track record, the improvements provided by ANSI/APSP-7 make it even less likely we will ever see an entrapment in a pool or a spa; certainly that is what the current science tells us. ANSI/APSP-7 combines best practices to prevent all forms of entrapment, based on the best science to protect our customers without restricting the water features they have come to expect in a modern backyard.

Projects built according to ANSI/APSP-7 will allow our customers to go back into the water without needing to know the first thing about suction entrapment avoidance, and isn't that the way we want it? **AQ**

Steve R. Barnes entered the pool industry in 1984 and now works for Pentair Water Pool and Spa. He has invented and designed suction safety fittings and systems. Barnes is the incoming chair of APSP's Technical Committee and is a member of ASME, ASTM and APSP suction safety standards writing committees. He is also a professional pyrotechnical operator producing two televised fireworks displays each year in Tempe, Arizona.

PREVENTING ENTRAPMENT TRAGEDIES



BY STEVEN GETZOFF

ENTRAPMENT DEATHS OR injuries in pools and hot tubs are always tragic events. In the past few months, we've seen the disembowelment of a six-year old girl in a public wading pool in Minnesota and the death of a six-year old boy in a residential pool in Connecticut. Pool and spa drain entrapment has now made its way onto the U.S. Consumer Product Safety Commission's list of the top five household hazards.

Sensing a need to act, both houses of Congress are in the process of enacting pool and spa safety-related legislation that will impose certain safety regulations and offer incentives to states to strengthen existing legislation in connection with drowning as well as entrapment. APSP and the industry support these efforts and are committed to promoting the safe and sensible use of pools and hot tubs.

Very significantly, in 2006, ANSI/APSP-7 *American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs and Catch Basins* was approved by ANSI. This standard addresses all forms of entrapment injury, including suction entrapment, body or limb entrapment, hair entanglement, and evisceration. The standard provides several forms of

protection, including multiple or unblockable outlets, drain covers that conform to ASME/ANSI 119.12.8, reduced flow rate and other devices such as an SVRS or a vent line. Available information strongly indicates that several provisions in the ANSI/APSP-7 standard were not followed in each of the above tragedies. In each instance, there was reportedly a single drain, a broken, missing and/or non-compliant cover and, most likely, a flow rate that exceeded the new ANSI/APSP-7 standard. Through the efforts of APSP, the proposed federal legislation is consistent with the new ANSI standard.

Preventing further tragedies of this type is a major priority for the industry and particularly the service sector, which has the most frequent and direct contact with pool owners, many of whom may not be aware of the risk in the first place. Here are several steps service providers can take to help prevent entrapment injuries and to protect themselves from negligent owners.

If you see something, say something. The recent incidents in both Minnesota and Connecticut reportedly involved drain covers that were not in place. There is no such thing as a "back-up" for this condition and ANSI/APSP-7

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insists that when a cover is missing or broken the pool or spa must not be used. While no one can force owners to close their pools, you should advise them accordingly, in the strongest of terms. Other potential hazards include single outlets without an SVRS, gravity system, vent line, or comparable device. Damaged pool covers, fences, latches or gates, non-functioning alarms and non-compliant slides or diving boards also represent potential hazards. While a pool service provider cannot generally inspect for all of the above, any visible hazard should be reported to the owner.

Know the law. Beginning one year after passage of the federal legislation, all drain covers sold in the United States will have to comply with ASME/ANSI 119.12.8. The Senate bill also would require existing public pools to install outlet covers in compliance with this standard. The fact is, all pools and spas must have proper outlet covers in place. As the trusted pool professional, you should make your customers aware of this opportunity to further protect their families and guests. The bills will provide incentives to states to adopt laws requiring that all new pools and spas be built with multiple outlets, unblockable outlets or no outlets. Existing single outlet installations can also be retrofitted with multiple outlets or other devices that can help prevent certain forms of entrapment.

Put it in writing. There is no safe way to operate or use a pool or spa that has a missing or broken outlet cover. These and other potentially non-compliant conditions should be brought to the attention of the owner. Regrettably, not every owner will follow your advice and, in the event of a tragedy and resultant lawsuit, they may even deny the conversation. It is therefore important to follow up your advice in writing, by email, certified letter or both. The writing should confirm the conversation, identify the hazard, suggest a course of action (even if it is to contact “your dealer”) and remind them that failure to take action may expose their family and guests to risk of severe injury. Any writing or email should be retained permanently with the customer file or records. This will place you in the best possible position and may also increase the likelihood that a reluctant owner might take appropriate action. **AQ**

Steven Getzoff is a senior litigation partner with the law firm of Lester Schwab Katz and Dwyer in New York and specializes in product liability and business litigation. He has been representing members of the pool and hot tub industry in liability and other matters for more than 20 years.