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Federal Petition to the Consumer Product Safety Commission To Approve Vacuum Diffusion Technology as an "Other System" under the Virginia Graeme Baker Pool and Spa Safety Act

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Federal Petition to the Consumer Product Safety Commission to Approve Vacuum Diffusion Technology as an "Other System" Under the Virginia Graeme Baker Pool and Spa Safety Act (Public Law 110-140; 15 U.S.C. 8001 *et seq.;* codified at 16 C.F.R Part 1450).

I. Preview to the Petition

This is a Petition to the Commissioners of the Consumer Product Safety Commission to reevaluate their position and reconsider including the ProteKtor as an example of "Vacuum Diffusion Technology" (VDT) into the Other Systems Category of the Virginia Graeme Baker Pool and Spa Safety Act (here after referred to as VGBA). The Commission's reconsideration-should be based upon a correct statutory interpretation of the VGBA (specifically what Congress intended when it directed the Commission to approve "other systems" under the Act), as well as ample factual evidence that VDT (and specifically the ProteKtor product as an example of VDT currently on the market) does, in fact prevent a variety of pool entrapments. VDT, like all secondary layers of protection is there to prevent certain types of entrapments when the drain cover is missing or compromised. These entrapments make up the large majority of the recently released CPSC statistics[1]. SVRS's and Vent Pipes, both codified anti-entrapment methods listed in the VGBA do not protect against these types of entrapments. Hair, limb and mechanical entrapments combined equal 82% of the statistics on entrapments released by the CPSC. VDT would have prevented these entrapments that the afore mentioned codified methods would not. SVRS's are tested without the drain cover in place. I was on the ASME and ASTM committees to create National Standards for SVRS technology and none of them test with the drain cover in place. The CPSC staff have heretofore held the position that full body entrapment is the only type of entrapment that authorizes the CPSC to approve anti-entrapment systems or products for commercial pool and spa entrapment prevention. Notable among our evidence in this regard is the thorough evaluation of the ProteKtor product, as an example of VDT technology, produced by Penn State University, a Nationally recognized ARL Testing Facility (Attachment #6).

Following are 2 discoveries that were made while testing the ProteKtor, a VDT a technology.

1. <u>Per the VGBA, unblockable drains do not require secondary backup protection.</u>

When unblockable drains gained acceptance, they were considered safe as a bather couldn't cover the complete drain opening and create a full body entrapment. When this was the general perception, the ONLY type of entrapment protection available at the time was full body protection. However, when VGBA compliant drain covers are removed, break or otherwise rendered ineffective, unblockable drains become the most entrapping drains as the bather can now actually enter the interior of the drain. These

[1] bit.ly/2sjHqYy

usually result in either limb or hair entrapments, which neither SVRS's nor Vent Pipes can prevent in that all too common scenario. For example, the entrapment in 2018 of a bather in South Carolina that resulted in a limb entrapment[2]. This entrapment was in what was thought to be an unblockable drain. The drain cover was not secured, and his limb was sucked into the suction orifice in the interior of the sump. VDT (Vacuum Diffusion Technology), including the ProteKtor product, is the only retrofit anti-entrapment method that would have prevented this and similar tragic incidents from occurring.

2. Assertion: There is no hair entrapment hazard when the drain cover comes off.

Conclusion from Penn State Evaluation: there is actually a very significant risk of hair entrapment when compliant drain covers are removed or otherwise rendered ineffective. This occurs in unblockable drains as well as smaller blockable drains in commercial or residential pools/spas. SVRS's and Vent Lines will do nothing to prevent this very real entrapment hazard. VDT will eliminate this entrapment hazard as shown in the Penn State testing data.

There are many reasons why these various forms of entrapments are abated when the ProteKtor/VDT is in place within the drain sump. While fully explained below, the simplest answer is that neither the bather's limbs nor hair can access the entrapping vacuum port as the ProteKtor/VDT blocks the orifice from bather contact.

Thus, the ProteKtor/VDT effectively eliminates the preponderance of the known entrapments that exist today and that have led and will continue to lead to deaths and serious injuries of children and other bathers. As set forth in greater detail below, there can be no question but that VDT/the ProteKtor is "as good or better" than any full body only anti-entrapment methods currently recognized by the CPSC under the VGBA[3].

II. Introduction

PSD Industries' first petition to the CPSC to approve VDT/the ProteKtor as an "other system" under the VGBA was denied by the commission on March 15, 2016. This current petition to be reevaluated and reconsidered is based on third party testing conducted by Penn State University at their approved ARL (Applied Research Laboratory) facility (see letter, Attachment #6). At this facility Penn State conducts testing and evaluation for the U.S. Department of Defense and other institutions. This is an urgent plea for the Commission to realize that the legal interpretation underlying the staff's position, and resulting recommendation to the Commission, to deny PSD's petition in 2016 was obviously flawed. It is unsupported by ANY reasonable scientific evidence, statutory interpretation, or legislative history of congressional intent. It is, in fact, flatly contrary to the intent and purpose of the VGBA; to save lives.

[2] https://www.poolspanews.com/business/boy-survives-lazy-river-entrapment_o

[3] *See* 15 U.S.C., Ch. 106, § 8003(c)(1)(A)(IV).

In support of our argument is opinion letters from the Association of Pool and Spa Professionals (Pool & Hot Tub Alliance) as well as Stingl Safety Consulting. These letters reject the conclusion of the staff that all anti-entrapment technologies approved under the VGBA must protect against full-body entrapment, and only full-body entrapment, nor does this conclusion promote consumer safety. In fact, such a position, has and will continue to endanger the lives of children and other swimmers/bathers in America, unless and until it is overturned by the Commission itself. VDT demonstrably and unequivocally prevents hair, limb and mechanical entrapments, and as such it should be immediately recognized as an "other system" under the VGBA. A simple review of the CPSC's own data and in-depth investigations of pool and spa entrapments support for our position and for granting this petition.

III. List of Attachments Included in Support of the Present Petition:

1. Attachment #1: Letter from the Association of Pool and Spa Professionals (APSP), the organization designated to write the pool/spa codes and standards in the U.S., asserting that no requirement is present in, or supported by the legislative history underlying enactment of the VGBA for only full body, or any specific type of entrapment as a precondition of approval under the Act.

2. Attachment #2: Shows that the VGBA, although intended by Congress to allow for and recognize new anti-entrapment systems and methods, has in fact not kept pace with industry developments and advancements in this regard. The other systems category has yet to be utilized since the passage of the VGBA. This attachment also demonstrates that VDT/the ProteKtor avoids many of the inadequacies of older anti-entrapment systems and therefore is "as good or better" than those older systems.

3. Attachment #3: Specific responses to staff arguments underlying the agency's denial of PSD's first Petition.

4. Attachment #4: Evaluation report of the ProteKtor from the University of Denver demonstrating improved water flow.

5. Attachment #5: ARL/Penn State University Evaluation Report on the ProteKtor, also demonstrating better fluid flow (as well as resulting energy savings).

6. Attachment #6: ARL/Penn State University testing dated 11/6/2016 demonstrating improved anti-entrapment from use of the ProteKtor in drain sumps.
7. Attachment #7: Letter from Stingl Safety Consulting

8. Attachment #8: Brazilian Legislative Bill (PL)No. 1.162 of 2007

IV. Background Demonstrating VDT Effectiveness at Entrapment Prevention

On 6/8/2018 the CPSC released a study on pool and spa entrapments from 2013 to 2017[4] which showed a total of 11 entrapment which resulted in 9 injuries and 2 deaths over that period. The number of entrapments has decreased due to improved drain cover requirements but drain covers still come off or become damaged. Since this report was posted, at least 2 more entrapments have occurred, one in California and one in South Carolina--both were limb entrapments. SVRS's and Vent Pipes, both VGBA-recognized anti-entrapment systems which are currently available, are not intended to prevent such limb or hair entrapments, only full body entrapments. For example, the entrapment in South Carolina[5] was in a pool with a drain which per the VGBA is considered unblockable and as per code is not in need of a second layer of protection. When a compliant drain cover (whether blockable or unblockable) is not present, is broken or is otherwise rendered ineffective, it is PSD's strongly held view that secondary layers of anti-entrapment protection are essential in order to prevent pool and spa entrapments like those well documented by the CPSC's own in-depth investigations of these incidents.

Of the 11 CPSC-documented entrapments, Safety Vacuum Release systems and Vent Pipes—both currently VGBA-recognized anti-entrapment methods--would have likely protected against only two of these entrapments. By contrast, VDT/the ProteKtor would have likely prevented at least nine of these entrapments. Again, the bar that was set by Congress in order to be included in the VGBA "Other Systems Category" is that a system be "as good or better" than any one of the currently listed methods of entrapment protection. VDT clearly meets this standard, and it is perplexing to PSD as to how it is even conceivable that the CPSC staff would maintain a contrary position.

VDT/the ProteKtor is demonstrably "as good or better" than SVRS's and or Vent Pipes which are systems currently recognized by the CPSC. Specifically:

*VDT is an excellent second layer of protection for when a drain cover comes off due to poor maintenance, degradation of the drain (UV exposure, chemical exposure, etc.) or from ordinary wear and tear. The requirement in the VGBA for multiple layers of protection already includes the use of SVRS's or Vent Pipes.

*By including VDT in the VGBA, this would allow for a retrofit choice that is more cost effective and offers protections against more types of entrapments and even provides energy savings.

*To be clear, PSD is not seeking non-recognition of currently recognized anti-entrapment systems or methods. We only seek approval of a method that we are confident would have prevented and will prevent at least as many entrapments as those currently recognized systems.

*VDT functions in a different manner than most recognized systems under the VGBA. SVRS's and Vent Pipes perform by either shutting off the pump and/or inducing air into

[4] bit.ly/2sjHqYy

[5] https://www.poolspanews.com/business/boy-survives-lazy-river-entrapment_o

the system when an entrapment occurs. Very simply put, SVRS's and Vent Pipes are reactive. The entrapment occurs and then they try and react to remove the bather from the intense vacuum draw.

*VDT is proactive. It diffuses the vacuum from the point of bather contact, literally fractions of an inch away from the potential blockage. The vacuum never increases, and the entrapment is eliminated before it can begin.

By way of example to this last point, when a drain cover is not present and the bather makes contact with the ProteKtor/VDT, VDT immediately organizes and diffuses the water flow to remove the concentrated vacuum draw. Without the concentrated vacuum draw, you (1) eliminate the ability for swimmers to come into contact with the main drain orifice by blocking it; (2) diffuse the intense suction at the source should a swimmer attempt to connect with the intake orifice of the pool/spa. No vacuum draw is felt yet the full flow of water is passing through the VDT device while eliminating the entrapment potential, as shown in our Penn State testing documentation. This makes VDT unlike any previous or CPSC-recognized anti-entrapment method.

*Drain covers break. Drain covers come off. Drains and drain covers are often poorly maintained. This is a well-known and CPSC-recognized reality of drain covers in general, including VGBA-compliant drain covers. VDT/the ProteKtor clearly addresses this frequent scenario and therefore the intent of Congress in allowing for recognition of "other systems" under VGBA. In fact, it is PSD's strong assertion—as supported by various evaluations of VDT/the ProteKtor—that VDT is better at preventing entrapments than some currently recognized VGBA qualified technologies, particularly when a compliant drain cover is missing or is otherwise rendered inoperative/ineffective.

Please note in this regard that while PSD strongly believes in the efficacy of the ProteKtor product, we are not necessarily seeking specific recognition by the CPSC of this or any other specific product, but rather only VDT as an "other system" under the Act, and recognition that the ProteKtor is an effective example of VDT as an approved other system.

Vacuum Diffuser is the term that we chose to submit and was included in the newest Brazilian National Pool Standard – (English Version) Legislative Bill (PC) No. 1.162 of 2007 Page 2 under definitions # IX and Page 5 – Art 8. This standard is included as Attachment #8.

V. Suggested Definition of VDT (Terminology)

PSD suggests the following as definitions that may be utilized by the CPSC in recognizing VDT as an "other system" and related, suggested definitions of key terms.

Vacuum Diffusion Technology Defined (VDT):

"A System that removes the intense vacuum draw from the intake point of a pumping system by occluding the intake orifice in main drains and diffusing the vacuum from a potential blockage immediately and in multiple directions from the blockage. To

be considered Vacuum Diffusion Technology, by blocking 50% of the VDT device, the system should not raise the normal vacuum draw by more than .4" Hg. Vacuum Diffusion Technology devices may not be bypassed without the use of a tool for removal as with drain covers, do not require calibration and contain no electronics or moving parts that may malfunction."

The ProteKtor Defined:

As an exemplar of VDT, the ProteKtor is made of PVC plastic – almost the same formulation that the pool piping is made of, is approximately 1/5th the cost of the least expensive SVRS, has no electronics or moving parts to malfunction, does not require calibration, maintenance or monthly testing. It also automatically adjusts to changing conditions in the pool or spa environment. Once installed, it provides perpetual protection against hair entrapment, mechanical entrapment and limb entrapment, the latter of which is in fact the most common entrapment leading to deaths and other serious entrapment injuries.

VI. Responses to Potential Issues

Recent technological developments within the pool and spa industry impact former protective technologies negatively. "Vacuum Diffusion Technology" adapts to the changing conditions resulting from these technological developments.

One of the most recent advances within the industry is Variable Speed Pumps. These pumps are designed to run at lower RPM's thus saving energy. These pumps are being mandated in some states due to the conservation of energy movement; and it appears that, effective beginning in 2021, the U.S. Department of Energy will require pumps between 1 and 5 horsepower to be variable speed. VDT functions properly with these pumps, as compared with other accepted means of entrapment avoidance.

A simple way to describe the VDT is to compare it to the dual drain technology. The functionality of VDT is much like that of dual drains. Where in practice, dual drains allow for blockage of one drain and then divert the flow from the blocked drain to the second open drain a minimum of 36 inches away. VDT does the same thing except that it instantly diverts the flow or vacuum a fraction of an inch away from the blockage and an associated 360 degrees around the VDT. The flow is not impaired, and the bather can barely feel the flow that has been diverted away from them. Dual or multiple drains are a very good addition to pools if done correctly, but they do have a resulting negative return. With the development of multi drain systems came the resulting discovery of differential hold down force. Such systems can also be prohibitively expensive to install and require much down time to the pool for system installation and maintenance. Dual drains are also frequently not plumbed properly or one of the drains is blocked, effectively resulting in a single drain system. They also require the appropriate space for proper installation that is not always available in spas or small wading pools.

VII. Selected Objections and Recommendations from the 2016 Petition denial in need of clarification

Staff Recommendation: If the Commission determines that VDT is an "other system," a VDT-based product could be installed on a blockable single main drain pool and would meet the requirements of VGB without protecting against body entrapment, which is the leading cause of death associated with pool circulation systems.[6]

PSD Response: This appears to be the basis and most important of staff's recommendation for denial of PSD's 2016 Petition. However, it relies on a clearly flawed and unsupported staff conclusion that VGBA was only intended to recognize systems that always (and possibly only) prevent full body entrapment. Such a conclusion belies the very existence of the "other systems" section of VGBA, as well as a formal recognition of the four other statutorily specified and recognized types of entrapment, notably limb and hair entrapment. **Nowhere in the Congressional record did the sponsors of the VGBA, the relevant committees of jurisdiction or any individual Member of Congress indicate that full body entrapment was the only one of the five specified types of entrapment that deserve CPSC recognition.** Indeed, there is all evidence to the contrary, as is self-evident from the very existence of the "other systems" category within VGBA. And this contrary (and to Petitioner's mind, obvious) position has in fact been supported and borne-out by some of the key stakeholders involved in the original drafting and enactment of the VGBA.

Before the advent of improved compliant drain covers, full body entrapment was slightly higher in number than limb entrapment, but that was many years ago. Per the CPSC release of entrapments since 2013, full body entrapment made up only 2 of the 11 entrapments.

Approved VGBA retrofit technology could only have probably protected against 2 of the 11 entrapments, while VDT could have probably protected against 9 of the 11 entrapments.

Staff Assertion: *"Furthermore, the Act excludes public pools with an unblockable single main drain, and defines unblockable to be a drain of any size and shape that a human body cannot sufficiently block to create a suction entrapment hazard reflecting an emphasis on preventing body entrapment. It is reasonable to conclude, therefore, that an "other system" should also offer protection against body entrapment."*[7]

PSD Response: This naked assertion by staff is fully unsupported by the Congressional history leading up to enactment of VGBA, it represents an unduly narrow and static view of the law, and is simply bad public policy as it effectively precludes the formal recognition of VDT and possibly other systems and technologies that can, in fact, prevent pool and spa entrapments and deaths.

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[6] *See* Staff Briefing Package 03/15/16 Section V., Page 17

[7] *See* Staff Briefing Package 03/15/16 Section III, Page 8

And a contrary view to that of the CPSC staff is in fact asserted by the Association of Pool and Spa Professionals (see letter, Attachment #1). This of course is the premier industry organization and the group that maintains relevant voluntary safety standards, committees of which include CPSC professional staff. As that letter and CSPC incident data clearly demonstrate, many entrapments occur when otherwise compliant drain covers are missing.

It is also important to note that when unblockable drains were recognized under the VGBA, there were effectively no other anti-entrapment technologies for anything except full body entrapment available on the market. But, again, Congress in its wisdom recognized that new and possibly better anti-entrapment systems might well become available and directed that the CPSC likewise recognize these "other systems" so long as they are at least as good or better than any one type of codified method. VDT/the ProteKtor is demonstrably at least as good or better as unblockable drains, at a minimum for the other forms of entrapments when the drain cover is compromised or missing. VDT/the ProteKtor is incredibly effective in these scenarios, it fills the void of protection in unblockable drains that do cause entrapments.

In its report supporting denial of PSD's first Petition, staff cites the "Bee Safe" system as one that should likewise not be approved as an "other system" under VGBA because if it were to be removed from the pool or spa it would obviously be rendered ineffective.

Staff's comments are located in the Staff Briefing Package, Vacuum Diffusion Technology Petition of March 15, 2016 on page 15 – "The Commission denied the Bee Safe petition in part because the subject product contained a part that was removed for servicing the pool, and whose absence created an entrapment hazard should the pool be returned to service without installing the removed part."

However, the Bee Safe differs from VDT in several fundamental ways, notably including the fact that it is a very large drain cover requiring no other back-up technology, once it was removed would therefore expose bathers to all 5 types of entrapment. Bee Safe was attempting to be considered as both the first and second layers of required protection by itself. VDT is not claiming to be both, VDT is solely intended as the required second layer, like SVRS's and Vent Pipes. VDT is intended to fit under a compliant drain cover, which is the first layer of protection and that (presumably) is secured to the pool or spa. However, as we have indicated, when such drain covers are removed or damaged, VDT continues to be effective at preventing entrapments.

Further, some SVRS's as well have requirements to remove or bypass for servicing such as winterizing or in some cases simply to vacuum the pool and will be inoperable unless properly reconnected or the bypass is removed.

In fact, unblockable drains are not a full-proof system of anti-entrapment, as CPSC incident data well demonstrates. Even unblockable drains do nothing to protect against hair, limb and mechanical entrapments once the drain cover is missing or broken. When this occurs, even unblockable drains can pose a serious entrapment hazard, by allowing a child to enter the interior of the drain sump, thereby potentially entrapping and drowning the child. VDT would eliminate all entrapments in this scenario if added to unblockable drains.

Staff Response to PSD Assertion: Staff also refuted PSD's assertion that SVRS devices cannot always be relied upon when used in conjunction with variable speed pumps, stating that this "just isn't true". Staff also stated "A variable speed pump is often used to set a safe flow rate that matches the flow rating on the drain cover".[8]

PSD Response: PSD's statement in this regard is in fact true and we reiterate here. SVRS's have not been required to be tested with variable speed pumps. This is currently under discussion and in the new APSP 17 National Standard Revision Committee for Safety Vacuum Release Systems to correct the standard and bring it up to date.

SVRS's require setting an activation point where the technology determines that an entrapment has occurred and would activate at that point. Example being that when the variable speed pump is running at high speed and high vacuum, the SVRS would have to be set well above that elevated level. When the variable speed pump lowers its speed and vacuum level as is its design, should a full body entrapment occur at that level, it is doubtful that the blockage would ever get close to the preset elevated firing point above the higher speed vacuum level. Staffs statement that variable speed pumps are used to set a safe flow rate to match the drain cover is a complete misunderstanding of variable speed pumps. Users will vary the speed of their pumps either manually or automatically to adjust to turnover needs, peak and off-peak utility costs and even to just quiet the pump motor. Where variable speed pumps are mandated, users are not allowed to maintain their pumps in a locked speed.

Unless and until SVRS's can work properly with variable speed pumps, their usage as an option under the VGBA will become further limited due to the Department of Energy Regulation that is scheduled to become mandatory on July 18, 2021 throughout the United States. This legislation will require all pool/spa pumps between 1HP and 5 HP to conform to a specific energy threshold. Variable speed pumps are the only pumps that currently meet this threshold. Since variable speed pumps are the future of the pool/spa industry and SVRS technology cannot currently be relied upon for usage with variable speed pumps, it is important to allow new technology that can be relied upon and that do function with variable speed pumps.

This means that SVRS devices will be limited to pumps under 1 HP, which is a minuscule sector of the pools and spas in the U.S. that will be protected by this technology. VDT on the other hand functions perfectly with all variable speed pumps.

Staff Response to PSD Assertion: "VDT can at best only mitigate some limb entrapments within the suction outlet but may introduce new types of mechanical and limb entrapments and may introduce hair entrapment issues where none were present before."[9]

[8] *See* Staff Briefing Package 03/15/16 Section III, C, 1, Page 12
[9] *See* Staff Briefing Package 03/15/16 Section III, C, 2, Page 12

PSD Response: This assertion is flatly and demonstrably incorrect. First, per testing at Penn State, testing was done to prove that no new limb or mechanical entrapments were created by adding the VDT to the main drain sump orifice. In fact, quite the contrary, VDT/the ProteKtor was fully and universally effective at preventing these forms of entrapment. Quite simply, VDT prevents these forms of entrapment every single time and in every possible scenario because the water flow is not impeded, ever.

In fact, and regarding hair entrapment in particular, there is a tremendous entrapment hazard created from hair being pulled into an open sump orifice as measured and documented in Attachment #6 - Penn State Test Results #24823 on PGS. 5 – 6.

Apparently, this dangerous entrapment hazard was unknown until we identified and documented the force created, via Penn State testing. Until the advent of a VDT system, there was no retrofit technology to address this form of entrapment risk.

It is also critical to understand that, regardless of the anti-entrapment system being used, if it is not installed properly or if it breaks or otherwise fails it will not be effective.

VDT in general, and the ProteKtor in particular are advantageous in this respect because it is incredibly easy to install and there are no mechanical, springs or electronic component parts that may degrade or fail over time. As it is made of PVC, the formulation is compliant with NSF/ANSI Standard 50.

Finally, systems that are not ever installed are likewise obviously not effective. By making the installation of an anti-entrapment device easy and affordable, VDT/the ProteKtor, in conjunction with a compliant drain cover, encourages commercial (and, it should be noted, residential) pool and spa owners with the incentives necessary to utilize this simple but highly effective technology. Indeed, a ProteKtor is approximately one-fifth the cost of the least expensive SVRS currently available on the market. It is nuisance free. It also improves the flow of water passing through it by developing a laminar flow which takes some workload off the pump. This in turn probably adds life expectancy to the pump, also saving energy and thereby providing further incentive for its installation and use. Less workload will save some amount of energy. Enhanced flow allows for better mixing and therefore functionality of chemicals used in pools and spas.

Collectively, these ancillary benefits of the use of VDT/ProteKtor technology, while not themselves directly related to safety, do impact safety because of the ease, low cost and other benefits of installing this, again as a back-up when compliant drain covers are removed, break or otherwise fail.

VIII. Conclusion:

For all the reasons mentioned above, we believe it should be apparent that Vacuum Diffusion Technology is at least as good as – and we would argue in many ways superior – to some of the currently recognized anti-entrapment systems under the VGBA. Specifically, recognized systems that protect against fewer types of entrapments than does VDT.

The only way to stop an entrapment is to not let the mechanisms of the entrapment to begin in the first place. Reacting to an entrapment scenario is too slow to ensure bather safety. VDT/ProteKtor prevents even the initiation of entrapment and thereby makes it much less likely than currently approved SVRS and vent pipe systems to cause any bather injury at all.

While finishing the fine details of this petition, a young girl was entrapped in Erie, Pennsylvania on July 24, 2019[10]. Her hair was pulled into an open suction pipe where the drain cover had been removed. Her father was able to pull her free. In addition, on August 10, 2019[11] a teenage boy was entrapped at a water park in Crystal Beach Texas due to a drain cover being removed. The boy suffered serious internal injuries and was placed into a medically induced coma. VDT/ProteKtor is the only technology that would have removed either of these threats and prevented these entrapments.

When at Penn State, the examiner stepped up from his test board after we had done 3 of the 10 required hair entrapment tests that showed no entrapment with the VDT/ProteKtor in place versus massive amounts of force to remove hair from an open drain sump orifice. He proclaimed, “What more do they need to see?”

Indeed, what more does the CPSC need to see?

PSD appreciates the opportunity to present this Petition to the Consumer Product Safety Commission and respectfully ask for its full and timely consideration.

Respectfully Submitted:

Paul McKain

[10] https://www.erienewsnow.com/story/40832710/harborcreek-supervisors-close-whitford-park-pool-indefinitely
[11] https://www.nydailynews.com/news/national/ny-texas-teen-sucked-water-park-drain-survive-20190816-6ukf24c5sbbc7fp6ypx2iu23fm-story.html

ATTACHMENT 1

Copy of the APSP Letter Addressing the False Premise that Protecting Against Full Body Entrapment is a Requirement of the VGBA

The Association of Pool & Spa Professionals®
REFLECT SUCCESS

February 13, 2019

U.S. CPSC (E Mail)
Patricia Hanz
General Counsel

Dear Ms. Hanz:

The Association of Pool and Spa Professionals (APSP) submits the following regarding the continuing efforts by the Commission to apply and implement certain provisions in the Virginia Graeme Baker Pool and Spa Safety Act, 15 U.S.C. 800 et. Seq (VGB).

IMPLEMENTATING AND APPLYING THE VGB Act

The APSP supports and applauds the continuing efforts by the Commission to apply and implement the various provisions in the VGBA, including the provisions in Sections 1404(c)(1)(A) (vi) and 1406(d)(1)(f). As the Commission is aware, both 1404(c)(1)(A)(i-v) (as a requirement for public pools) and 1406(d)(1)(a-e) (as part of the minimum state legislation requirements under the grant program) provide for additional devices and systems designed to prevent suction entrapment to be installed on an existing single drain pool.

For example, 1404 c provides:

(ii) each public pool and spa in the United States with a single main drain other than an unblockable drain shall be equipped, at a minimum, with 1 or more of the following devices or systems designed to prevent entrapment by pool or spa drains that meets the requirements of subparagraph (B):

- (I) Safety vacuum release system. A safety vacuum release system which ceases operation of the pump, reverses the circulation flow, or otherwise provides a vacuum release at a suction outlet when a blockage is detected, that has been tested by an independent third party and found to conform to ASME/ANSI standard A112.19.17 or ASTM standard F2387.
- (II) Suction-limiting vent system. A suction-limiting vent system with a tamper-resistant atmospheric opening.
- (III) Gravity drainage system. A gravity drainage system that utilizes a collector tank.
- (IV) Automatic pump shut-off system. An automatic pump shut-off system.
- (V) Drain disablement. A device or system that disables the drain.

(VI) Other systems. Any other system determined by the Commission to be equally effective as, or better than, the systems described in subclauses (I) through (V) of this clause at preventing or eliminating the risk of injury or death associated with pool drainage systems.

Virtually identical language is found in 1406.

It is our understanding that the Commission has been asked to evaluate and consider one or more devices under these respective sub sections, which we applaud and encourage. As the Commission is aware, this aspect of the VGBA was intended to encourage future innovation and ensure that future options would not be limited to pre-existing enumerated systems and devices.

In performing these evaluations, we respectfully submit that the language "equally effective as, or better than, the systems described in subclauses" merely requires that an "other system" be as effective as any one of the enumerated devices in reducing the "risk of injury or death associated with pool drainage systems." The other system need not be as effective as all the enumerated devices. Otherwise, no device or system could ever be approved because, as the Commission has previously stated, no device or system is as effective as drain disablement and therefore no device can ever be as effective as all the enumerated.

In evaluating future devices or systems under the above criteria, it is also essential to recognize the varying application and scope of the enumerated systems with which they will be compared. As the Commission is aware, only a compliant suction outlet fitting assembly (or drain disablement with a secure cover over the disabled opening) can prevent all five forms of entrapment. Each of the other devices listed in the above sections have various assets and limitations while sharing the common purpose of releasing or limiting the suction (differential pressure) associated with a blockable, single drain.

Two of the five systems, SVRS (I) and Automatic Pump Shut-off devices (IV), respond after a single suction outlet is completely blocked, using mechanical or electromechanical devices to "release" the high vacuum.

Two others, gravity drainage systems (III) and suction-limiting vent systems (IV), are similar in that they limit the maximum differential suction potential to the drawn down point where the pump begins to suck air. The suction-limiting vent is intended to draw air almost immediately upon a single drain being blocked. The gravity system employs a larger tank that takes minutes to drain down to the point the pump sucks air. Because these systems are continuously vented to atmosphere, suction is limited even before a pump sucks air.

Of the above examples, only Safety Vacuum Release Systems (II) are listed to a Standard, which is either ASME A112.19.17 or ASTM F2387. [1]Both require testing with a single outlet, and neither

[1] The automatic pump shut-off system provides the same functionality as a SVRS, yet it does not have a dedicated standard. For this reason, the APSP has advocated for testing these systems to the applicable performance requirements of the SVRS standards.

provides a test for four of the five recognized entrapment hazards: limb, hair, finger, or evisceration. At present these hazards can only be addressed with properly sized suction outlet fittings (drain covers) that each have a flow rating higher than the flow potential of the pool.

Therefore, while the secondary devices presently enumerated in the VGBA are all designed to prevent body suction entrapment on a blockable, single drain system, we encourage the development of new technologies that provide secondary protection against any of the five forms of entrapment, including finger, limb, hair and evisceration. New technologies designed to address these hazards can be evaluated using the existing provisions in the ANSI/APSP-16 Standard adopted by the Commission (i.e. section 4 for hair entrapment and the Section 6 for finger and limb entrapment).

Additionally, the body entrapment tests of ANSI/APSP-16 should be considered as a viable alternative to the SVRS body entrapment tests for alternate suction releasing or limiting system used with suction outlet openings larger than the 8-inch diameter sump specified by the SVRS standards.

To ensure continued innovation and improvement in the battle against entrapment, we respectfully urge the Commission to consider other systems that can be shown to as effective in eliminating the overall number of entrapment incidents as any of the enumerated devices, based on the full published CPSC Reported Circulation/Suction Entrapment Associated With Pools, Spas and Whirlpool Bathtubs, which address all five forms of entrapment. We respectfully submit that there is no evidence that Congress intended otherwise or intended to limit analysis of potential secondary devices and systems to any singular form of entrapment.

ABOUT THE APSP The Association of Pool & Spa Professionals (APSP) is the world's oldest and largest association representing swimming pool, hot tub, and spa manufacturers, distributors, manufacturers' agents, designers, builders, installers, suppliers, retailers, and service professionals. Dedicated to the growth and development of its members' businesses and to promoting the enjoyment and safety of pools and spas, APSP offers a range of services, from professional development to advancing key legislation and regulation at the federal and local levels, to consumer outreach and public safety. APSP is the only industry organization recognized by the American National Standards Institute to develop and promote national standards for pools, hot tubs, and spas. For more information, visit **APSP.org**.

Sincerely,

Carvin DiGiovanni
Vice President, Technical and Standards

Cc: Ann Marie Buerkle, Acting Chairman, CPSC
Robert S. Adler, Commissioner
Elliot F. Kaye, Commissioner
Dana Baiocco, Commissioner
Peter Feldman, Commissioner
Andy Stadnik, Director Laboratory Services

ATTACHMENT 2

Deficiencies of Current Technologies and Comparison to VDT

Attachment #2 to the Petition presented by PSD Industries, LLC to the CPSC to approve Vacuum Diffusion Technology under the "Other Systems Category" of the VGBA.

<u>Deficiencies of currently accepted technologies and comparison between those technology deficiencies and VDT/the ProteKtor.</u>

Since the passage of the VGBA over 10 years ago, it has remained stagnant towards new technologies. Technologies that can better keep pace with current technological developments within the pool and spa industry.

The technologies listed in the VGBA attempt to solve the problem of vacuum entrapment and come with a list of what they can protect against and what they cannot protect against. As an inventor of one of the first Safety Vacuum Release Systems (SVRS) that was ultimately sold to a major company within this industry, I have an in-depth understanding of the functions and limitations of these products.

Stand-alone SVRS's were the best of what was coming to the market when the legislation was created. Unfortunately, they could only protect against 1 of the 5 types of entrapments - then and now, have fallen behind currently accepted advancements within the pool/spa industry and technicians have found ways to defeat proper functions of these technologies. The discussion below will explain.

A. When SVRS's were created, the use of variable speed pumps was very limited. These pumps are becoming desirable and even mandated in many states due to their energy saving function by running at low RPM's. In addition, The Pool and Hot Tub Alliance has combined with the National Drowning Prevention Alliance and are pushing to have the International Residential Code incorporated in all 50 states. As of June 1,2019 – 21 states and 181 local jurisdictions have already adopted the code. This would mandate the same layers of protection in residential pools as the Virginia Graeme Baker Pool and Spa Safety Act does currently in commercial pools.

   Technicians must comply with the VGBA on their commercial pools and spas, and increasingly they must comply with the International Residential Code on residential pools. These professionals need a simple, cost effective solution which will allow them to meet these demands. Currently, SVRS's are the most cost-effective way to meet the requirements of the VGBA, however since variable speed pumps create GPM level changes, changes in running vacuum and increases or decreases in the motor/pump RPM's, standalone SVRS's cannot be relied upon to work with these changing conditions. SVRS's can be a nuisance on pools and spas where variable speed pumps have been installed to either meet jurisdictional requirements or to simply save money, and they frequently cannot adjust to the variable speed pumps. A dangerous problem is created in order to be compliant with all legislations. On the other hand, with VDT all of this is done automatically, there is no recalibrating, nuisance trips or resets required.

Problem Created: The technicians have learned to bypass SVRS's. An inspector will see the unit running and assume it is protecting the facility while in effect it is only reading vacuum levels and not protecting against vacuum entrapment. Or they will simply have the SVRS operating to pass inspection - locking their pump in one speed during inspection and then bypassing it after the inspection to be able to properly use their variable speed pump. With most SVRS's it is as simple as moving 2 wires or putting a plastic cap over the air intake. The unit is totally negated.

VDT cannot be bypassed like an SVRS can. There are no nuisances created by the VDT - if it is installed within the sump, it is working.

B. SVRS's are either electro-mechanical, electronic or spring loaded. All of these are susceptible to the harsh corrosive environment in which they are located and are subject to electrical malfunctions or surges and/or moving part failures. None of these are sufficiently durable and are very cost prohibitive, must be constantly reset, recalibrated, or have maintenance done for them to work properly, be tested and all have the potential for a very limited life span.

The ProteKtor VDT is made of PVC plastic – almost the same formulation that the pool piping is made of, is approximately 1/5th the cost of the least expensive SVRS, has no electronics or moving parts to malfunction and automatically adjusts to changing conditions in the pool or spa.

C. Another problem with SVRS's is explained in the hypothetical example to follow. When a pool maintenance company or supplier sells a 2 HP pump to the pool/spa owner who had a system designed for a ¾ HP pump, for the same price as a ¾ HP pump, the pool/spa owner takes the “great deal”. A dangerous situation has just been created by implementing a larger HP pump than the system was designed to have. SVRS's have limitations built in as to the amount of vacuum they will allow a circulation system to create. If the new pump creates such a high vacuum there is no way to calibrate the SVRS to the new pump and vacuum level. The pool operator will then just disable or bypass the SVRS to allow the pump to operate. This is a common occurrence.

No matter what pump is attached to the piping; the VDT will automatically adjust to the change in GPM/vacuum level from any cause, without any user adjustments. This removes the nuisance factor for the end user.

ATTACHMENT 3

Specific Responses to the Objections from the First Petition

Attachment #3 to the petition presented by PSD Industries, LLC to the CPSC to approve Vacuum Diffusion Technology under the "Other Systems Category" of the VGBA:

Petitioners Correct to Answers to Staff's Responses/Assertions from the First Petition.

PSD clarifications to the Staff responses in the Staff Briefing Package from the Consumer Product Safety Commission dated March 15, 2016. There were a multitude of misconceptions stated by the testing facility that the commission felt would eliminate the VDT from inclusion in the Other Systems category of the VGBA. I will list the staff objection and then properly answer the claim using Penn State testing to document my answer, except in the case of questions/objections that should have never been lodged. There I will provide simple common-sense answers.

#1 Staff Assertion: That the VDT is only effective when the drain cover becomes missing.

PSD Response: The VDT, like an SVRS, a vent pipe or other approved devices are all back-up systems. If the approved drain cover is intact and in place, none of these devices will be called into action. When the drain cover becomes missing, unlike SVRS's and vent pipes, only VDT will protect the open sump from limb, hair and mechanical entrapments, which are the preponderance of the CPSC recognized entrapments in their entrapment statistics release of 6-8-2018. SVRS testing is performed without the drain cover in place.

The difference is that while the drain cover is in place, the VDT is improving fluid flow through the system, reducing workload on the pump, providing a better mixing of chemicals within the pool or spa, reducing energy consumption and cannot be bypassed.

#2 Staff Response to PSD Assertion: The ProteKtor does not protect against full body entrapment[1].

PSD Response: Since the ProteKtor sits down inside the sump, we cannot claim to protect against full body entrapment. On some sumps we sit above the rim and probably would stop a full body entrapment, but since we don't know what sump it will be installed into, we don't claim full body entrapment avoidance.

[1] Staff Briefing Package 03/15/16 Section III, Table 2, Page 12

There is nothing in the VGBA that requires full body entrapment protection. Again, I refer to the latest 11 entrapments reported by the CPSC. The vast majority were not full body entrapments. All the retrofit listed devices in the VGBA claim what they can protect against and what they cannot protect against. Most of the devices claim to protect against full body entrapment only. That leaves 4 other types of entrapments that they do not protect against.

I refer to the letter sent to the Commission and Chairman from the Association of Pool and Spa Professionals (APSP) n/k/a Pool & Hot Tub Alliance referencing the misconception of the need for Full Body Entrapment Avoidance. APSP has been sanctioned as the organization to write the codes and National Standards for the pool and spa industry. As such, they are in the best position to decipher the meaning of Codes, Standards and Legislation (VGBA) pertaining to the pool and spa industry.

APSP made it very clear that there is no intent or statement in the VGBA to mandate full body entrapment avoidance over the other 4 types of entrapment avoidance. In addition, we have included a letter from Stingl Safety Consulting. These letters support the conclusion - as does the Congressional record underlying the enactment of VGBA, that all technologies must protect against full body entrapment is NOT a precondition for approval under the Act.

VDT protects against limb, hair, and mechanical entrapment. VDT does not claim full body, which is the only type of entrapment the bather can remove themselves from. Dr. William Rawley made a very good video entrapping himself with a full body entrapment. He simply rolled off the drain.

By sheer numbers of types of entrapments protected against, we are "at least as good and actually better" than some current VGBA approved technologies, which is the benchmark set by Congress to be accepted in the "other systems category".

Furthermore, the ProteKtor was designed to fit in one of the most prolifically sold sumps, and actually sits above the rim of this sump. In this instance, it is probable that all 5 types of entrapments will be eliminated. Our 2nd version which will be only for new pools and major remodels will include an entire sump assembly that is only slightly larger than our current version that will eliminate all 5 types of entrapments. There are millions of pools and spas that are in existence today and need to be protected when the drain cover comes off. Our current version was designed to fulfill this need.

#3 Assertion: Staff assumed that there were no requirements for water passage size and/or shape contained in the design of the ProteKtor (VDT)[2].

[2] Staff Briefing Package 03/15/16 Section III, Page 12

PSD Response: The requirement built into any VDT is that it complies with basic pool/spa codes. The ProteKtor contains relief holes that are slightly smaller than the 3/8" holes allowed by code. It also is comprised of code certified anti-entrapment mesh on the lateral aspects of the device, making it fully code compliant to basic pool/spa codes.

#4 Staff Analysis: The Commission in its letter stated that it appeared that the ProteKtor could be removed without the use of a tool[3].

PSD Response: The original design was for the ProteKtor to require a tool to be removed from the adapter, however the adapter was originally designed to be removable. Per CPSC staff suggestion this has since been changed, see below:

The ProteKtor has always required a tool to be removed from the adapter. Originally, we did not have the adapter permanently glued into the pipe coming into the sump. Based on advice from the CPSC we have changed this to mandating the adapter be permanently glued into the pipe with the ProteKtor then inserted on the tract of the adapter and fastened with a 316 stainless screw, requiring a tool to install and remove. This allows us to now comply with pool safety standards. By gluing the adapter into the intake pipe of the sump, we do not interfere with routine maintenance of pools and spas and now comply with pool/spa codes.

#5 Staff Comment: Staff made the comment that "if the ProteKtor were removed from the pool for winterizing and not replaced, then it would not be effective.[4]" They used the BEE SAFE device as an example where this thought process was used for denial in their past petition.

PSD Response: Any device can be removed from the pool or spa, and if so, will not stop an entrapment on that pool or spa. A relatively common-sense statement. The more important statement is "What if the device is by-passed?" If it is not there, no one expects it to function. If it is by-passed, everyone expects it to function, but it won't. **This is the true danger.**

Drain covers are removed for winterization with or without the ProteKtor installed. If removing the ProteKtor is necessary for winterization, you must also remove the first layer of protection which is the drain cover. To use the assumption that the ProteKtor is not reinstalled, you could also assume that the drain cover is not reinstalled or not properly reinstalled either by neglecting to use all the screws or use of improper screws. This has been widely known to happen and is one of the many reasons drain covers are known to become dislodged. Any pool

[3] Staff Briefing Package 03/15/16 Section III, Page 9
[4] Staff Briefing Package 03/15/16 Section III, Page 15

that requires winterization whether it has dual main drains, a vent line, an SVRS or VDT will require the drain covers be removed for winterization. SVRS's themselves require winterization procedures that make them inoperable. The SVRS would also not be effective if not properly reversing any winterization procedures. Vent pipes can easily be by-passed rendering them inoperable.

The big difference between all these other devices and the BEESAFE technology was that BEESAFE was presenting itself as a first AND second layer of protection. It was a great drain cover and would have stopped all entrapments as do compliant drain covers of today and so-called "unblockable drains" if the drain cover is in place. The problem exists that IF the drain cover, including Bee Safe, were removed, there would have been no back up system, as with compliant drain covers today.

We all agree that a device not installed or removed or by-passed will not prevent an entrapment, but since all devices can be removed, should they all be outlawed? Of course not. If devices can present with the false sense of protecting due to their ability to be by-passed, now that bears looking into. VDT cannot be by-passed.

In addition to by-passing, certain SVRS's require monthly testing to ensure they are operating properly. Giving the benefit of the doubt that all pool operators are diligent in their testing, if it is not operating, parts may need to be replaced. Who is to say how long those parts have been bad? IF it is tested monthly, it could have not been operating properly for up to 30 days. Residential pool owners will never run monthly checks.

#6 Staff Assertion: *"The Act excludes public pools with an unblockable single main drain and defines unblockable to be a drain of any size and shape that a human body cannot sufficiently block to create a suction entrapment hazard reflecting an emphasis on preventing body entrapment. It is reasonable to conclude, therefore, that an "other system" should also offer protection against body entrapment.[5]"*

PSD Response: This is the crutch of the issue on body entrapment. Nothing in the Congressional record underlying the enactment of the VGBA indicates that Congress ever intended for one death or injury to be more important than another, as supported by the letters submitted by the Association of Pool and Spa Professionals on February 13, 2019 and the letter included as an attachment from Stingl Safety Consulting.

[5] Staff Briefing Package 03/15/16 Section III, Page 8

Today with compliant drain covers full body entrapments are all but a thing of the past (as per the CPSC statistics released on June 8, 2018), if the drain covers are in place. The bulk of entrapments occur when the drain covers are missing. Full body entrapments per the release = 2 incidents or 18% of the total.

The other entrapments = 9 incidents or 82% of the total. VDT would have protected against the 82% of the remaining entrapments when the drain cover was missing or removed.

* An important point to remember is that when unblockable drains were code approved as such, there was no available protection that could be implemented in the VGBA that protected against anything except full body entrapment.

This is also why the Other Systems category was inserted into the legislation in hopes that better protection would eventually be discovered (as supported by the letter from Stingl Safety Consulting). VDT is this better protection.

One last comment on staff's large, unblockable drain example as they seem to have overlooked the obvious. When the unblockable drain cover comes off, and they do, there is no back-up measure as with the BEESAFE design. The larger, open, unprotected drain now makes it easier for a child to put a limb into the unprotected pipe. Being that limb entrapments are more common than full body entrapments today, should large unblockable drains require back up protection? Legitimately, when the unblockable drain cover comes off, a full body entrapment could occur "inside" the drain sump! VDT could provide that back-up protection!

In staff's decision to eliminate Bee Safe from consideration, they overlooked the obvious outcome of their own example. There have been many entrapments on "unblockable drains" when the drain cover either came off or was damaged, as evidenced by the entrapment on March 20, 2018 in N. Myrtle Beach South Carolina (limb entrapment). Even "unblockable drains" do nothing to protect against hair, limb and mechanical entrapments once the drain cover is missing or broken. As explained above, it is questionable whether a drain of that size, 3 ft X 3 ft would even stop a full body entrapment on a small child if the cover were missing or compromised.

#7 Staff Response to PSD Assertion: Staff objected to the claim made by the petitioner that SVRS devices cannot be relied upon when used in conjunction with variable speed pumps stating that this "just isn't true"[6].

PSD Response: This statement made by the petitioner is true, SVRS's have not been required to be tested with variable speed pumps. This is currently under discussion and in the

[6] Staff Briefing Package 03/15/16 Section III, Page 12

new APSP 17 National Standard Revision Committee for Safety Vacuum Release Systems, to correct the standard and bring it up to date.

#8 Staff Response to PSD Assertion: Staff made the comment that VDT may at best mitigate some limb entrapments and may initiate new forms of limb and mechanical entrapments and may introduce hair entrapments that did not exist before[7].

PSD Response: First, per testing at Penn State, testing was done to prove that no new limb or mechanical entrapments were created by adding the VDT to the sump orifice. Secondly, also shown is that ALL limb entrapments are eliminated since the limb cannot access the intake orifice.

No other VGBA device can make this claim. Thirdly, per Penn State testing no new hair entrapment risk was created using the VDT, but just as important per Penn State testing, a tremendous hair entrapment risk does occur when the drain cover goes missing if the VDT is not in place.

The absence of a hair entrapment risk in an open intake within the sump is referred to by staff multiple times. To the contrary, there is a tremendous entrapment hazard created from hair being pulled into an open sump orifice as measured and documented in Penn State Test Results #24823 on PGS. 5 – 6. Apparently, this dangerous entrapment hazard was unknown until we identified and documented the force created, via Penn State testing. Until the advent of a VDT system, there was no retrofit technology to address this form of entrapment risk.

#9 Staff Response to PSD Assertion: An objection was lodged that in some instances, the ProteKtor sits slightly above the rim of the sump and could interfere with the placement of the drain cover[8].

PSD Response: As shown in our demonstration to the Commission and Staff, long after petition denial, by sitting slightly above the rim, the VDT device potentially protects against all 5 types of entrapments, making it desirable not prohibitive. It is possible there is a certified dome drain cover that may not fit with a ProteKtor under them. However, as our demonstration shows, the ProteKtor fits perfectly under one of the most common drain covers on the market.

[7] Staff Briefing Package 03/15/16 Section III, Page 12
[8] Staff Briefing Package 03/15/16 Section III, Page 13

All approved categories in the VGBA have some type of limitations, especially retrofitting existing pools. For example: most pools, spas and wading pools simply do not have the room to add gravity feed systems and they are cost prohibitive especially as a retrofit. SVRS's have limitations on allowable vacuum levels, for instance most if not all do not allow for a pool, spa or wading pool to operate over 20 inches of vacuum, yet many pools do. As discussed, there are issues with SVRS's and variable speed pumps as well as some SVRS's have issues with elevated solar systems, in floor pools cleaners and automated cleaners.

Retrofitting pools with dual main drains is not only cost prohibitive for many, but there are also many existing wading pools, spas and pools that simply do not have the room to properly add dual drains.

It is important to understand that the VDT (ProteKtor version) was designed to fit within the most prolifically sold drain sump on the market at that time. The design incorporated the slight lift over the sump rim to allow for better protection against the 5 types of entrapments. Knowing that the ProteKtor version was made to retrofit most existing pool/spas and may sit below the rim of a specific sump, we are unable to make the claims on all 5 types of entrapments.

#10 Staff Response to PSD Assertion: Staff objected to the statement that if the VDT is in place, it is working[9].

PSD Response: Since the VDT has no moving parts, no electrical components to malfunction, no springs to malfunction or develop a memory, automatically adapts to all running vacuum or RPM levels, does not require resetting in the event of activation and cannot be bypassed – if the VDT is installed under the drain cover it is working!

#11 Staff Response to PSD Assertion: Essentially, all of the codified methods do, to some degree, make a bad drain cover better, because they provide entrapment protections that were not present when the SOFA was installed. VDT does not[10].

PSD Response: The only improvement by the other codified methods provided to a bad drain cover would be a full body entrapment that could occur on an old flat drain cover that does not meet code and are supposed to have been removed from the field years ago. These other methods do nothing for hair, limb or mechanical entrapment when the drain cover goes missing.

[9] Staff Briefing Package 03/15/16 Section III, Page 13
[10] Staff Briefing Package 03/15/16 Section III, Page 13

VDT, per the Penn State Fluid Flow testing, does in fact remove much of the chaos that exists under all drain covers due to the intake design of the sump. By removing much of the turbulence under a drain cover, this results in less potential to draw and tangle hair or mechanical objects under or on the drain cover.

Under no circumstances would we or any of the codified methods make the claim that we make bad drain covers better. As a matter of fact, the requirements when installing or retrofitting a pool/spa with a codified method include installing an Approved VGBA drain cover. Therefore, none of the other codified methods are claiming to improve functions of the drain cover. In addition, no anti-entrapment technology is tested with the drain cover in place.

#12 Staff Response to PSD Assertion: There was an objection that we made the statement that we could mitigate an evisceration[11].

PSD Response: Although we are not claiming this in our evaluation for acceptance into the VGBA, since we do claim 3 of the 5 types of entrapments, I felt it should be addressed since it was in the original Petition. We clearly state in our manual we do not protect against evisceration.

Although not specifically tested to, the VDT would block the intestinal material from entering and traveling the piping system by creating a blockage to the intake from the sump. This would allow for less intestinal removal since it had nowhere to go. If it were high enough above the sump rim the ability to make a complete seal would be eliminated and no evisceration would occur in the first place. If the VDT sat somewhat above the rim (the retrofit in question), the anal orifice would necessarily have to come into contact with it to make a complete seal to cause the actions that create an evisceration. Once the event began, the intestinal material would initially come into contact with the VDT and not allow it to proceed any further, more likely creating a prolapse which is much less devastating and much more repairable.

[11] Staff Briefing Package 03/15/16 Section III, Page 13

ATTACHMENT 4

University of Denver Testing

Peggy
Continuum of Colorado
303-434-9091

DEVICE PERFORMANCE STUDY OF A MODIFIED SUCTION OULTET IN POOLS AND SPAS.

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15 MARCH 2013

Rosner Tuesday 7th 8am

Abstract

Swimmers can become stuck to a drain or suction outlet in a swimming pool, spa, or hot tub. The force of the circulation system can be tremendous resulting in fatalities from entrapment by suction. In an effort to minimize this danger, we have conducted a theoretical study to model the fluid flow field in a commercial suction outlet filter, and imposed additional design improvements. The theoretical study was made by solving the relevant Navier-Stokes equations numerically using ANSYS Fluent as the solver. Different design geometry of the suction outlet filter was used to study any resulting changes in the flow field. It was found that the idea of a laminarizing funnel has some merit as we observe a slight drop in the maximum turbulent kinetic energy (TKE) immediately downstream of the funnel. In the cases we studied, the maximum decrease in TKE is about 14% at a location immediately downstream of the funnel.

Nomenclature

D	pipe diameter [m]
f	relative roughness
g	gravitational acceleration [$m \cdot s^{-2}$]
h	height [m]
K	loss coefficient
L	characteristic length [m]
P	pressure [Pa]
Q	flow rate [Pa]
Re	Reynolds number
T	temperature [K]
u,v	velocity components [$m \cdot s^{-1}$]
V	velocity [$m \cdot s^{-1}$]
x,y	Cartesian coordinates

Greek symbols

ε	turbulent kinetic energy dissipation rate [$m^2 \cdot s^{-3}$]
μ	dynamic viscosity [$kg \cdot m^{-1} \cdot s^{-1}$]
ν	kinematic viscosity [$m^2 \cdot s^{-1}$]
ρ	fluid density [$kg \cdot m^{-3}$]

1. Introduction

When a swimmer becomes stuck to a drain or suction outlet in a swimming pool, spa, or hot tub, the force of the circulation system can be tremendous. This suction force will not allow a person to free themselves, no matter how strong a swimmer they may be. The Consumer Product Safety Commission (CPSC) initiated investigations on filters in swimming pools and spas in an effort to exclude hazardous products from the consumer market[1]. Specifically, the CPSC was looking into reported events in which these filters were converted into entrapment devices. In 2007 results from a study conducted by the CPSC brought light to the fact that this subject still deserved further investigation[2]. It was found that there still existed a high occurrence of entrapment by these filters, especially in the age group of five to nine year olds (74 incidences for this age group)[3]. Five years prior to this study, the granddaughter of the former secretary of state, James Baker III, had fallen victim to drowning after being unable to break the suction that had been created with a spa filter[4]. This prompted the Virginia Graeme Baker Pool and Spa Safety Act (VGBA) to be founded. The establishment of this act paved a path for the use and development of safer filter devices. Currently, devices in the market with the most success are Safety Vacuum Release Systems (SVRS) [5]. Consequent to sensing blockage, the majority of these devices relieve suction by either letting air into the pump, or shutting off the pump by means of an automated function. However, regulatory laws on the pumps used to drive these devices have increased the cost of pool and spa suction systems which have been passed on to the consumer, decreasing the incentive to purchase. Thus, it is in the best interest of SVRS companies to develop devices that will reduce the pumping power necessary to drive the system, and also trim down costs. These are the very interests and motives behind the development of PSD Industries 'laminarizing funnel' device. This laminarizing funnel has been proposed as a possible device that could reduce turbulence in a suction pipe upstream of a pump and hence a reduction in pumping power.

It is the purpose of this report to explore PSD Industries claims of the laminarizing funnel by solving the flow field through a pool suction pipe with and without the device. In effort to acquire a sufficient level of accuracy, the aforementioned flow will be solved computationally with Gambit as the preprocessor and Fluent as the solver. Upon successful development of an optimally meshed geometry, and correct parameter selections in the solver, a simulated depiction of the fluid flow can be developed. In addition to modeling the geometry with the dimensions provided by PSD Industries[6,7], we will also explore alternate dimensions for the laminarizing funnel in effort to improve the design by studying flow behavior. In Section 2, the governing equations and numerical method are described. In Section 3, the grid is validated by demonstrating convergence and matching flow behavior. Results are presented in Section 4 and conclusions in Section 5.

2. Numerical approach

2.1 Geometrical model and fluid properties

A computational analysis of a fluid flowing through a reservoir into a pipe, depicted in Figure 1, is considered in order to evaluate its fluid-dynamic behavior. Water (liquid) is used as the working fluid. The fluid properties are given in Table 1. The total height of the geometry is 32 inches. Water in the reservoir flows through a 9-inch diameter suction outlet and a 2-inch diameter suction pipe.

The origin of the 2-D coordinate system is located at the suction pipe outlet as shown in Figure 2. The coordinate system, position of each of the vertices that make up the geometry of the system and the reference pressure location are also shown. The x-coordinate is parallel to the suction pipe. These dimensions are taken from the specifications defined by PSD Industries[6,7].

Table 1: Material properties: water-liquid (fluid)

Property	Units	Method	Values
Density	kg/m^3	constant	998.2
Viscosity	kg/m·s	constant	1.003e-03
Reference Temperature	K	constant	298

Figure 1: Sketch of the base geometric model (dimensions are in inches).

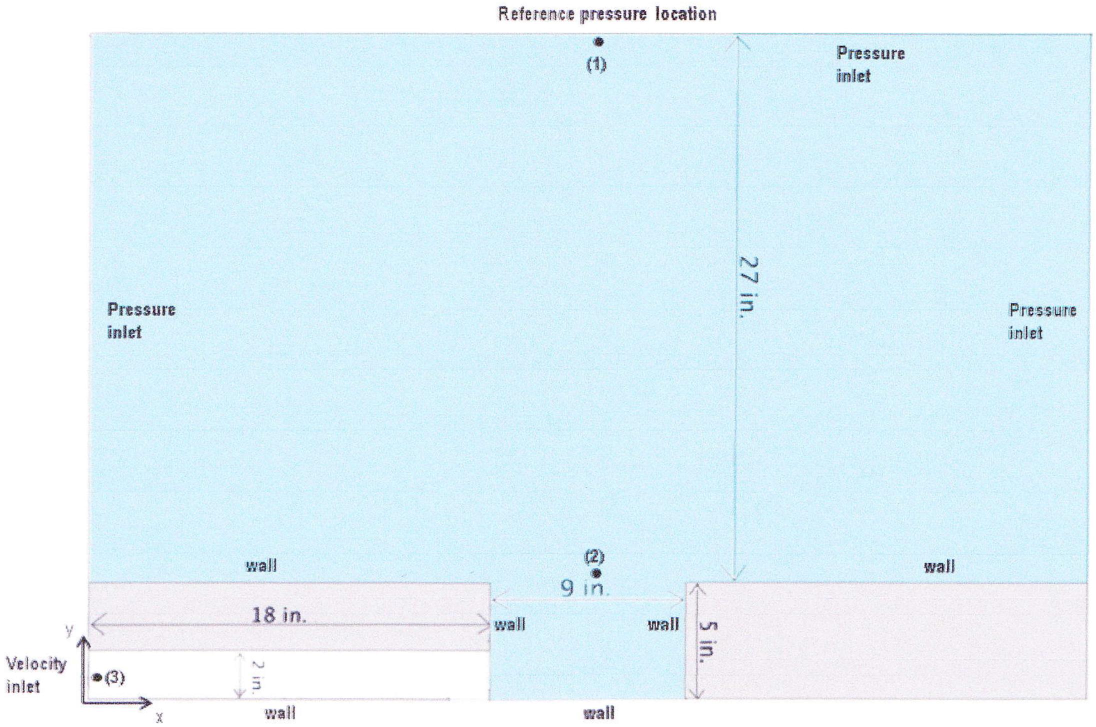


Figure 2: Sketch of the geometric model, coordinate system, reference pressure location and boundary conditions (dimensions are in inches).

2.2 Governing equations

The flow velocities are in turbulent regime, and the fluid properties were considered constant with temperature. The governing equations of continuity and momentum are solved for a steady-state turbulent flow in rectangular coordinates, under the hypotheses of two-dimensional, incompressible, temperature-constant flow conditions. The numerical solution of the time-averaged Navier-Stokes equations was supplemented by the k-ε turbulence viscosity model which adds equations to bring closure to the numerical solution.

Continuity:

Momentum:

2.3 Mathematical calculations

In order to set the velocity at the velocity inlet, the fluid velocity through the pump is calculated from the flow rate given the power of the pump.

(1)

The pressure at the pump can be calculated using hydrostatic pressure. Considering a pool depth of 1.5 m and a suction outlet depth of 0.13m the total depth of the pump below water level is 1.63 m. This pressure is equal to the absolute pressure at a height of 1.63 m.

(2)

psi, & GPM very high

Substituting the density of water, gravitational acceleration and a height of 1.63 m in equation (2) the absolute pressure equals 117270 Pa (or 17.0 psi). Using equation (1) and a pump input horsepower of 1 HP, the flow rate would then equal to 100.8 gpm (or 0.00636 m^3s^{-1}). Since the cross-sectional area of the suction pipe is 0.002 m^3 the velocity at the suction pipe can be calculated as 3.1 m/s.

In order to perform a grid validation we calculate the change in pressure between the top of the reservoir and the suction pump outlet (diameter of 0.05 m). With the introduction of bends and pipe contraction, the flow pattern is disturbed, resulting in increased turbulence and frictional losses. Part of the pressure change to validate is due to the elevation change and part is due to the head loss associated with frictional effects. The change in pressure can be calculated by the energy equation as follows:

(3)

where suffix 1, 2 and 3 correspond to the top of the reservoir, the entrance region of the suction outlet (diameter of 0.23 m) and the suction pump outlet (diameter of 0.05 m) respectively, as shown in Figure 2. K_4 corresponds to the loss coefficient associated with a 90° bend which is equal to 1.1. The loss coefficient for segments 1 and 2 are calculated by determining the friction factor as a function of Reynolds number and relative roughness for round pipes in a Moody chart.

Reynolds number is calculated as follows:

(4)

and the loss coefficient K

(5)

Table 2: Values used in calculations for pressure drop

Parameter	Section 1 (reservoir)	Section 2 (suction outlet)	Section 3 (pump outlet)	Section 4 (bend)
A	1	0.041	0.002	-
V	0.006	0.15	3.14	0.15
Re	6977	34564	154258	-
f	0.035	0.032	0.049	-
K	0.02	0.01	0.45	1.1
Head loss (gh_L)	0.0004	0.11	2158	12

The relative roughness f is calculated by interpreting the Moody chart using a roughness of 0.001m for concrete. The velocity V is calculated by assuming the flow is constant everywhere (i.e. $V_1A_1= V_2A_2= V_3A_3$). After substituting each value of K, the change in pressure between the top of the reservoir and the suction pump outlet computes to 10094 Pa. The values used in equation (3) are listed in Table 2.

2.4 Boundary conditions and critical parameters

In FLUENT the flow is initiated at the suction pipe (velocity inlet) by specifying a uniform negative velocity.

The assigned boundary conditions in FLUENT are as follows:

a) suction pipe: uniform velocity and temperature profile at the suction pipe. The velocity was set at -3.1 m/s (negative to indicate flow in the direction of the suction pump);
b) water reservoir: pressure inlet is set at each of the water inlet sides in the reservoir in order to define the static pressure at flow inlet;
c) walls: stationary walls with a no slip shear condition i.e. velocity components equal to zero at all walls;

2.5 Solution technique in FLUENT

As mentioned earlier, the flow is initiated at the inlet by specifying a uniform velocity of -3.1 m/s at the velocity inlet. The model settings are as specified in Table 3.

Table 3: Model settings

Model	Settings

Space	2D
Time	Steady
Viscous	RNG k-epsilon turbulence model
Wall treatment	Standard wall functions
RNG Differential Viscosity Model	Disabled
RNG Swirl Dominated Flow Option	Disabled

FLUENT is used in 2D mode to simulate the experimental setup. The laminar flow pressure-based solver is used with the SIMPLE pressure-velocity coupling. The Green-Gauss cell based spatial discretization scheme with implicit formulation is used to solve the finite-difference equations. Since the pressure-based solver is used, all equations are, by default, solved using the first-order upwind discretization for convection. The pressure-correction and momentum-correction under-relaxation factors are set to default at 0.3 and 0.7 respectively. The numerical solution is assumed to converge when scaled residuals criteria are satisfied. This is further discussed in the following section.

2.6 Variations to base geometry

The base geometry was varied as shown in Figure 3. A Fluent simulation was run for each of the funnel dimensions shown and the results presented in Section 4.

Figure 3: Sketch of the geometric model with modifications to the suction pipe by introducing a funnel of different dimensions (dimensions are in inches).

3. Grid validation

3.1 Grid geometry and optimization of nodes

A non-uniform grid is used throughout the numerical solution of this work. The grid is created in GAMBIT by drawing the geometry as in Figure 2. The specifications of the grid are detailed in Appendix B. While keeping efficiency in mind, our group developed an optimal mesh, capable of accurately solving the fluid flow through the system established by PSD Industries. In order to ensure that our meshed geometries could in fact produce true results, we fulfilled multiple grid validation criteria using the base geometry. For comparison, two meshes were generated in Gambit (Mesh 1 and Mesh 2). Mesh 1 with 20,148 cells (Figure 4), was generated using a start size of 0.05 and a max size of 0.5 with a grow rate of 1.05. Mesh 2 with 164,611 cells (Figure 5), was generated using a start size of 0.005 and a maximum size of 0.5 with a grow rate of 1.05. For both cases we designed the meshes so that large concentrations of nodes were present in locations we expected flow anomalies.

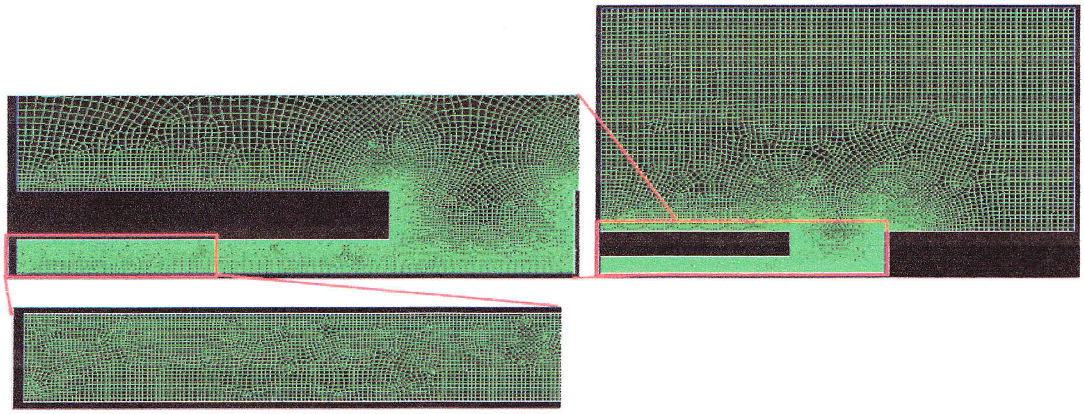


Figure 4: Mesh 1, with high node concentration in/surrounding the pipe.

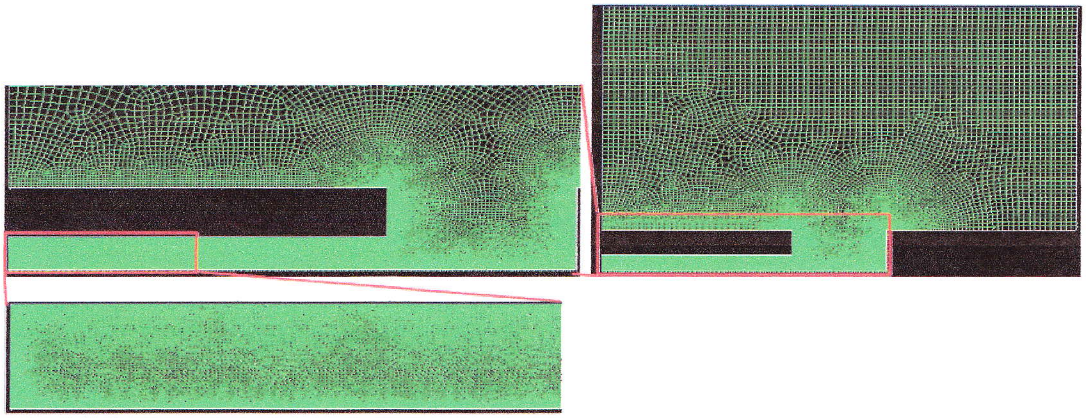
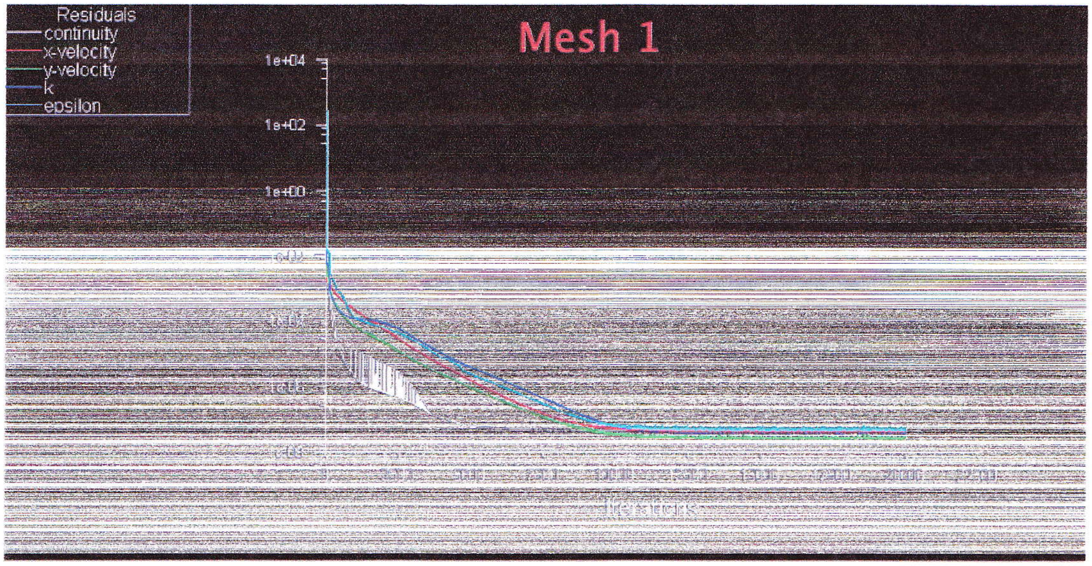


Figure 5: Mesh 2, with node concentration in/surrounding the pipe further increased.

After having proven convergence in Fluent (Figure 6), we examined the contours of velocity vortices for both meshes. We found no change in the location of the recirculation zones for Mesh 1 and Mesh 2 (Figure 7), thus indicating our standard for the mesh generation is sufficient for solving the flow through the geometry dimensions provided to us. Having validated our mesh standard, we decided to proceed with the finer Mesh 2, as it was capable of solving the flow field with greater accuracy. The corresponding maximum aspect ratio and cell squish for Mesh 2 were 2.45817 and 0.161117 respectively.



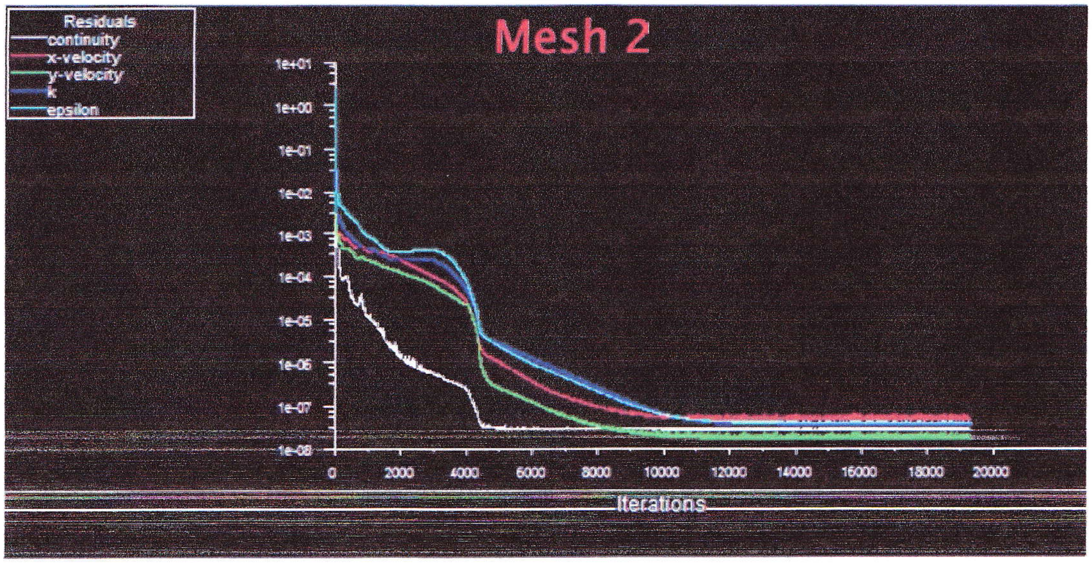
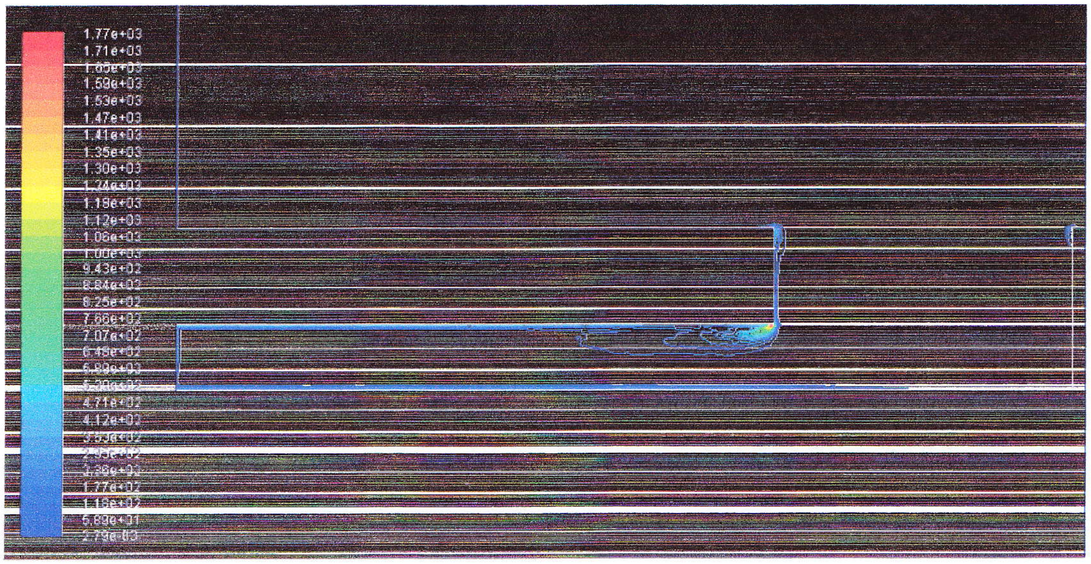


Figure 6: For Mesh 1 (top), convergence is proven through flat lining of residuals; For Mesh 2 (bottom), convergence is proven through flat lining of residuals



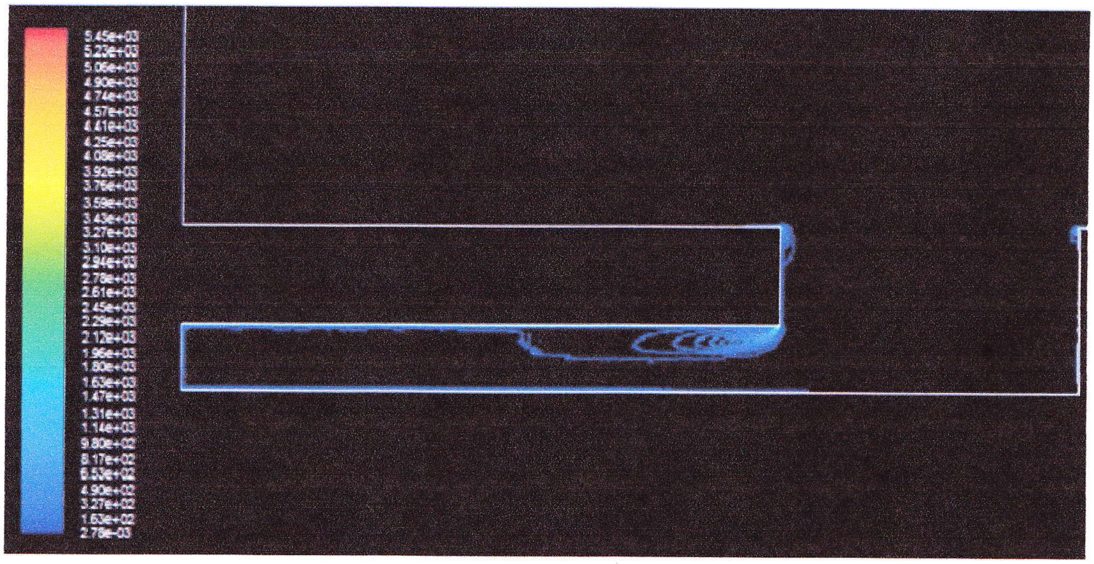


Figure 7: The locations of recirculation zones are maintain between Meshes 1 (top) and 2 (bottom).

In an effort to validate our grid with a final quantitative measure, we compared analytically head losses due to the turbulence and friction losses introduced in bends and pipe contraction, to values computed in Fluent. To effectively include all the bends/changes in diameter, we use the coordinates (22.5 in, 32 in), (22.5 in, 5 in), and (0, 1 in). The calculated pressure drop was equal to 10094 Pa, while we found the change in pressure in Fluent to be 7800 Pa. Thus, having successfully compared our calculated and modeled values to be within 30% of one another, our mesh met all our required criteria for grid validation.

4. Results

To investigate the effect of a funnel in 'laminarizing' the flow at the suction pipe, the base geometry was varied as shown in Figure 3. Four different funnels were placed immediately at the suction pipe inlet (at x=0.457 m). A Fluent simulation was run by each group member for one of the funnel dimensions shown and the results presented in Appendix A (these results are not edited and are simply presented as received). Surface lines were placed at various locations on the suction pipe: (i) at the inlet to the suction pipe (x=0.457 m), (ii) immediately downstream of the funnel (x=0.279 m), (iii) midway between the funnel exit and the pump (x=0.15 m) and (iv) near the pump (x=0).

Figure 8: Surface lines place at various locations on the suction pipe

The objective is to investigate the flow behavior at each of these locations. Figure 9 shows a plot for all funnels at the inlet to the suction pipe (x=0.457 m) and immediately downstream of the funnel (x=0.279 m). It is apparent that the velocity maximum is close to the upper side of the pipe at the inlet. This velocity maximum shifts to the lower side of the pipe. This shift in velocity is indicative of a large head loss in this region due to a change in pipe diameter from the suction outlet to the suction pipe. Recirculation zones are present in this region which increases the turbulence intensity. The velocity profile immediately downstream of the funnel exit is quite consistent for all 4 funnels and very minor differences are observed when these profiles are compared to the 'no funnel' case. It can be observed that funnel 3 has a velocity maximum shifted towards the center of the pipe and also reaches a higher maximum velocity.

The turbulent kinetic energy (TKE) can be observed in Figure 10. TKE at the inlet is uniform between all funnels, as expected. Immediately downstream of the funnel (x=0.279 m) the TKE profile changes and differences in the turbulence profile can be observed. However, the magnitude of TKE does not change significantly between each of the funnels when compared to the 'no funnel' case. Funnel 3 has higher TKE at the lower wall of the pipe and a lower TKE maximum. When compared to the 'no funnel' case, it can be observed that the TKE maximum reaches 0.57 m^2/s^2 in the 'no funnel' case, 0.55 m^2/s^2 in the funnel 2 case, 0.54 m^2/s^2 in the funnel 4 case, 0.53 m^2/s^2 in the funnel 1 case and 0.49 m^2/s^2 in the funnel 3 case. It can be observed that the funnel does reduce the maximum TKE reached by a small amount. In the cases we studied, the maximum decrease in TKE is about 14% at a location immediately downstream of the funnel. Figure 11 shows TKE at x=0.15 m, which is closer to the pump. At this location the TKE maxima decrease to around 0.3 m^2/s^2 and the difference between the best performing funnel, funnel 3, and the 'no funnel' case is less apparent. In fact funnel 1 seems to perform better as a laminarizing device.

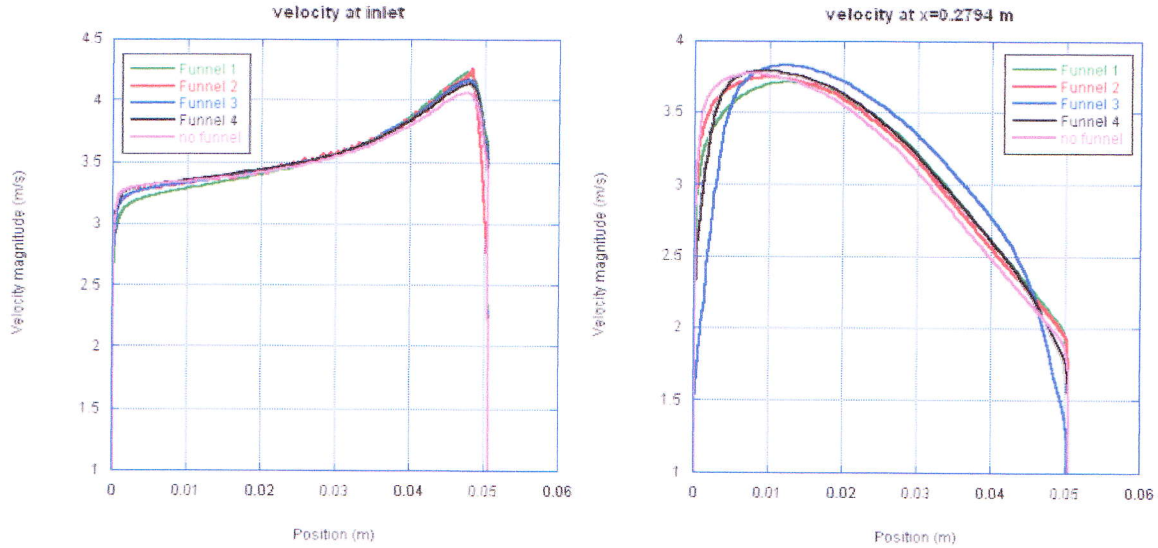


Figure 9: Velocity magnitude for all funnels at inlet (left) and at x=0.279 m (right)

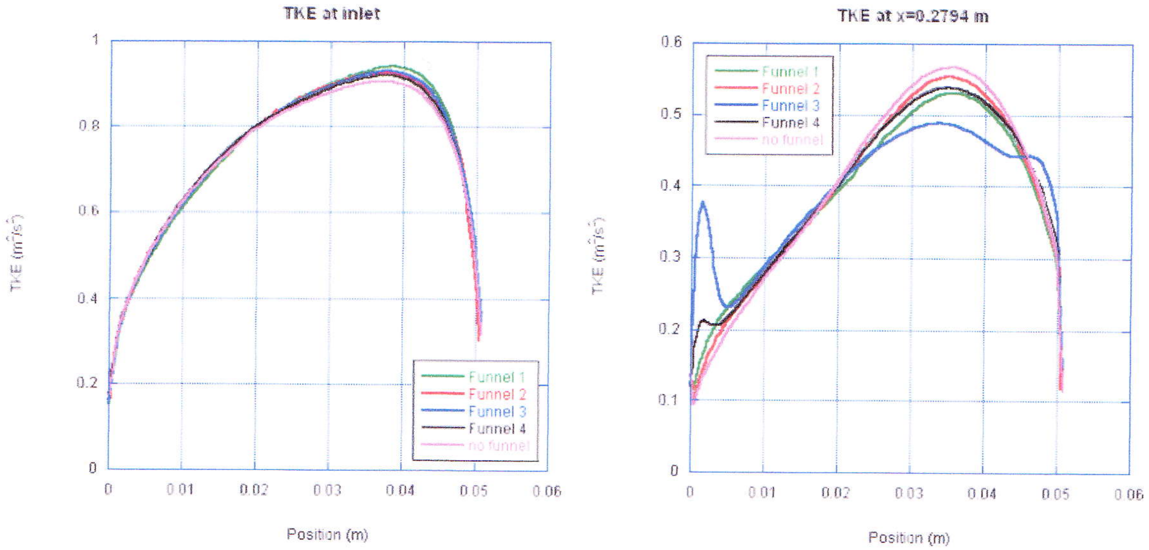


Figure 10: TKE for all funnels at inlet (left) and at x=0.279 m (right)

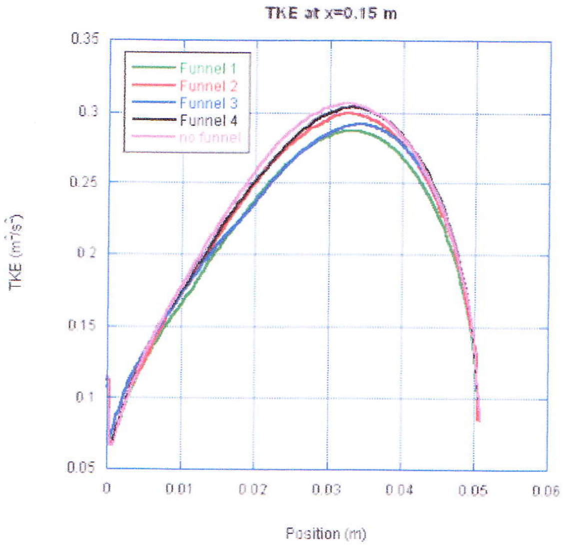


Figure 11: TKE at x=0.15 m

In conclusion, the idea of a laminarizing funnel has some merit as we observe a slight drop in the maximum TKE immediately downstream of the funnel. In the cases we studied, the maximum decrease in TKE is about 14% at a location immediately downstream of the funnel. The TKE decrease further downstream of the funnel exit location. The laminarizing effect of the funnel seems to be a function of distance away from the funnel exit.

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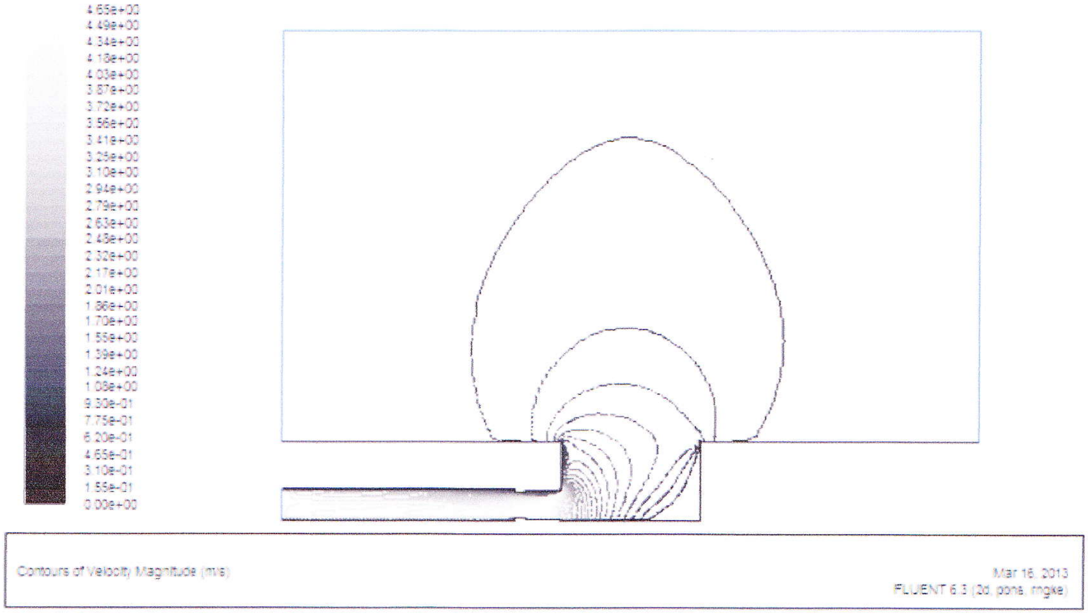
Appendix A: Solver flow with different geometries (as received by group member with no edits)

Harsh Singh - Project 4 – Scenerio -1
Case: nozzle
Outlet diameter : 1.7inch
Inlet diameter : 2 inch
Length : 3inch


4.65e+00
4.49e+00
4.34e+00
4.18e+00
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3.72e+00
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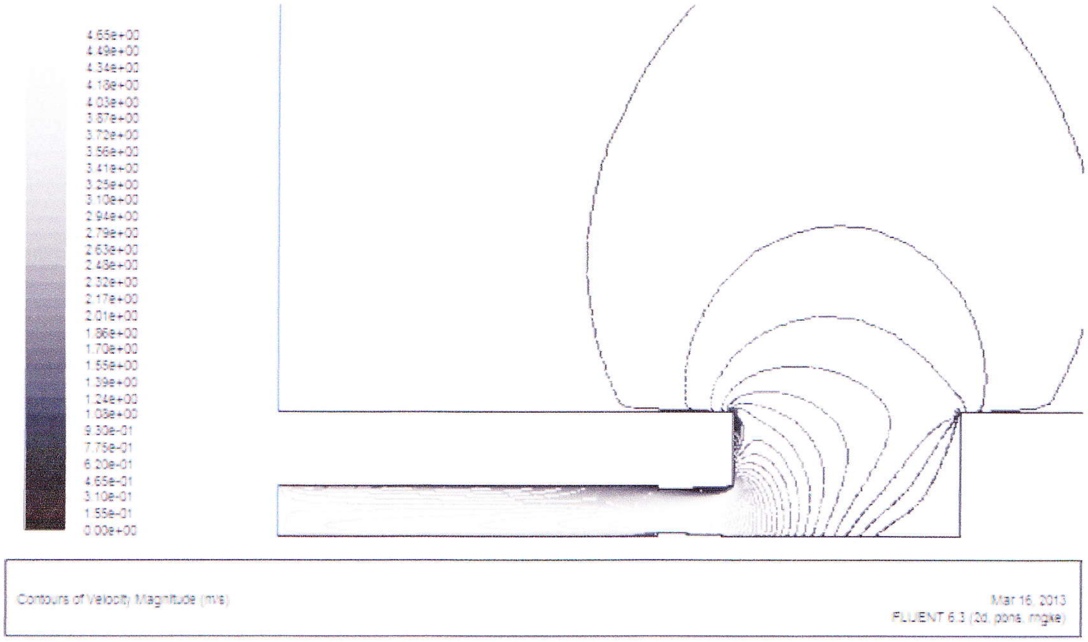
3.41e+00
3.25e+00
3.10e+00
2.94e+00
2.79e+00
2.63e+00
2.48e+00
2.32e+00
2.17e+00
2.01e+00
1.86e+00
1.70e+00
1.55e+00
1.39e+00
1.24e+00
1.08e+00
9.30e-01
7.75e-01
6.20e-01
4.65e-01
3.10e-01
1.55e-01
0.00e+00
Contours of Velocity Magnitude (m/s)
Mar 16, 2013
FLUENT 6.3 (2d, pbns, rngke)


4.65e+00
4.49e+00
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3.87e+00
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3.41e+00
3.25e+00
3.10e+00
2.94e+00
2.79e+00
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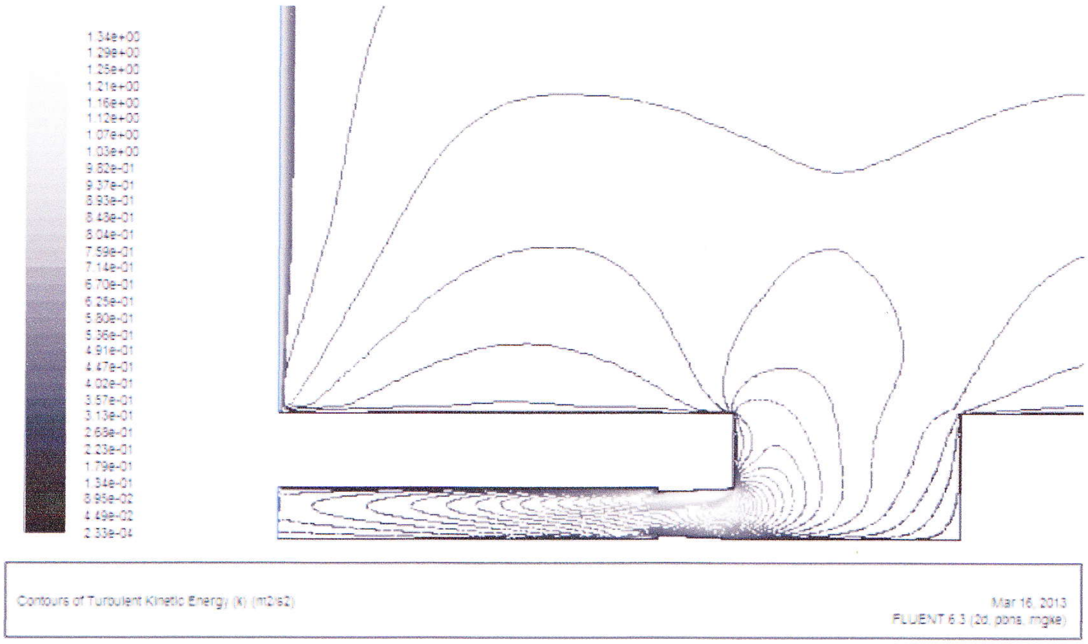
Contours of Velocity Magnitude (m/s)
Mar 16, 2013
FLUENT 6.3 (2d, pbns, rngke)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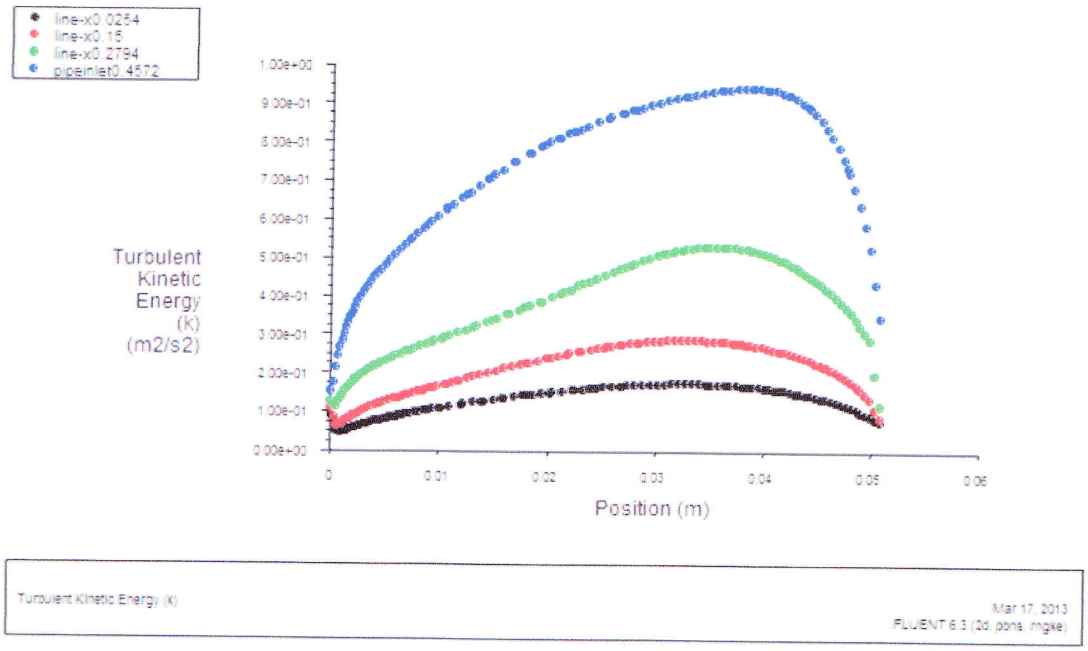
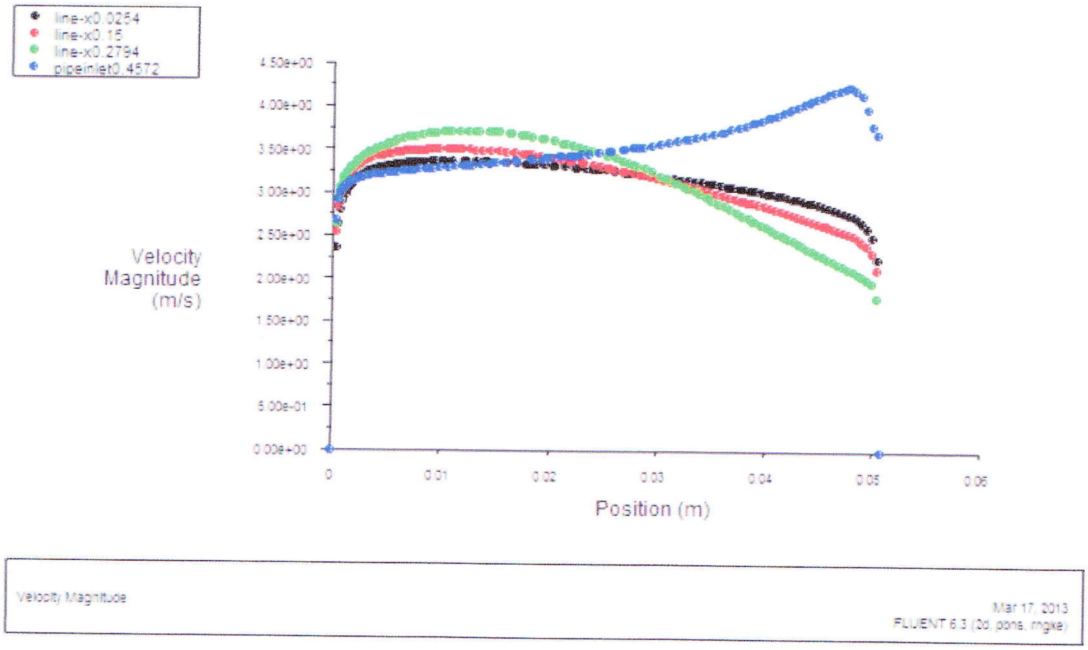
7.14e-01
6.70e-01
6.25e-01
5.80e-01
5.36e-01
4.91e-01
4.47e-01
4.02e-01
3.57e-01
3.13e-01
2.68e-01
2.23e-01
1.79e-01
1.34e-01
8.95e-02
4.49e-02
2.33e-04
Contours of Turbulent Kinetic Energy (k) (m2/s2)
Mar 16, 2013
FLUENT 6.3 (2d, pbns, rngke)


line-x0.0254
line-x0.15
line-x0.2794
pipeinlet0.4572
Turbulent Kinetic Energy (k) (m2/s2)
Position (m)
Turbulent Kinetic Energy (k)
Mar 17, 2013
FLUENT 6.3 (2d, pbns, rngke)


line-x0.0254
line-x0.15
line-x0.2794
pipeinlet0.4572
Velocity Magnitude (m/s)
Position (m)
Velocity Magnitude
Mar 17, 2013
FLUENT 6.3 (2d, pbns, rngke)

Name: Mohammed Barakat

The modifications compared to the base geometry is that a funnel is placed at the pipe outlet. The funnel at the pipe inlet is 1.854 inches at the exit diameter with a length of 3 inches.

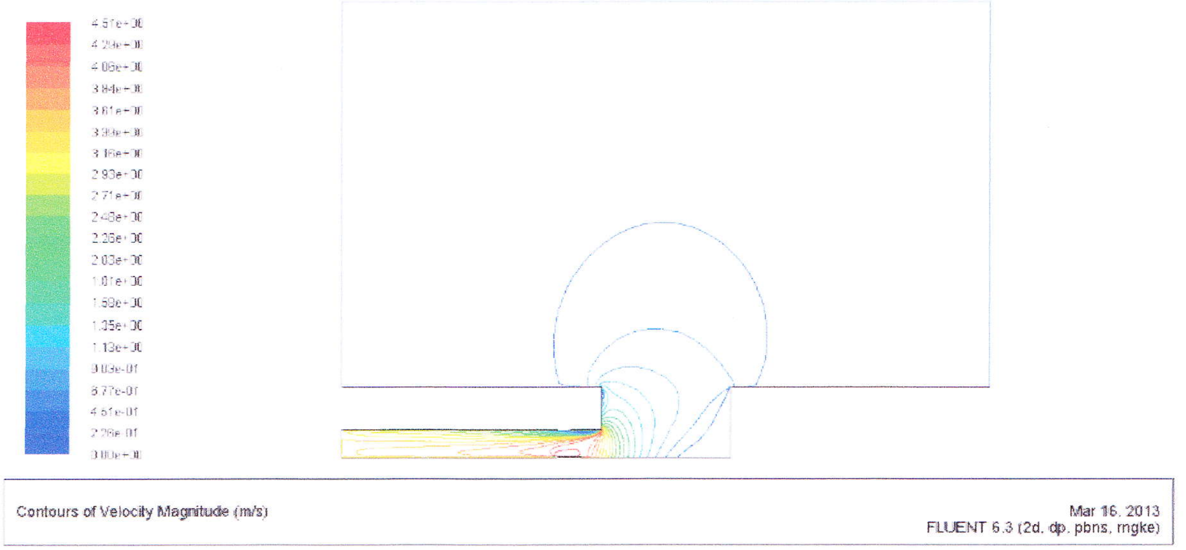


Figure 1 - Velocity Magnitude Contour of nozzle with dimensions 3 by 1.854 inches

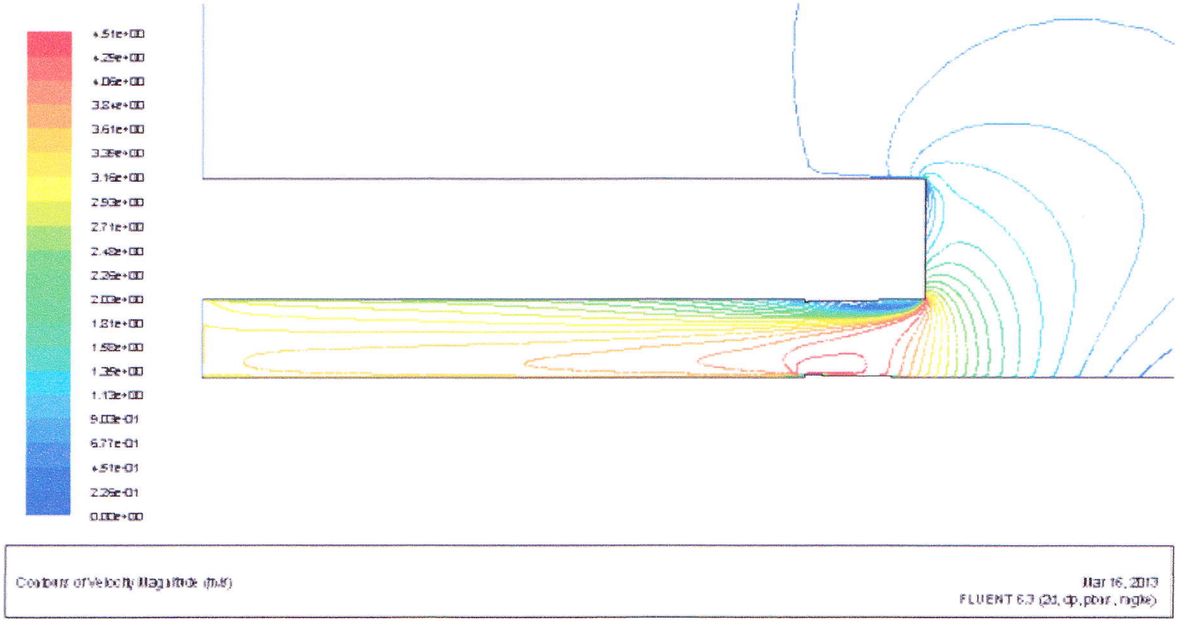


Figure 2 - Velocity Magnitude Contour of nozzle with dimensions 3 by 1.854 inches with emphasis on pipe inlet

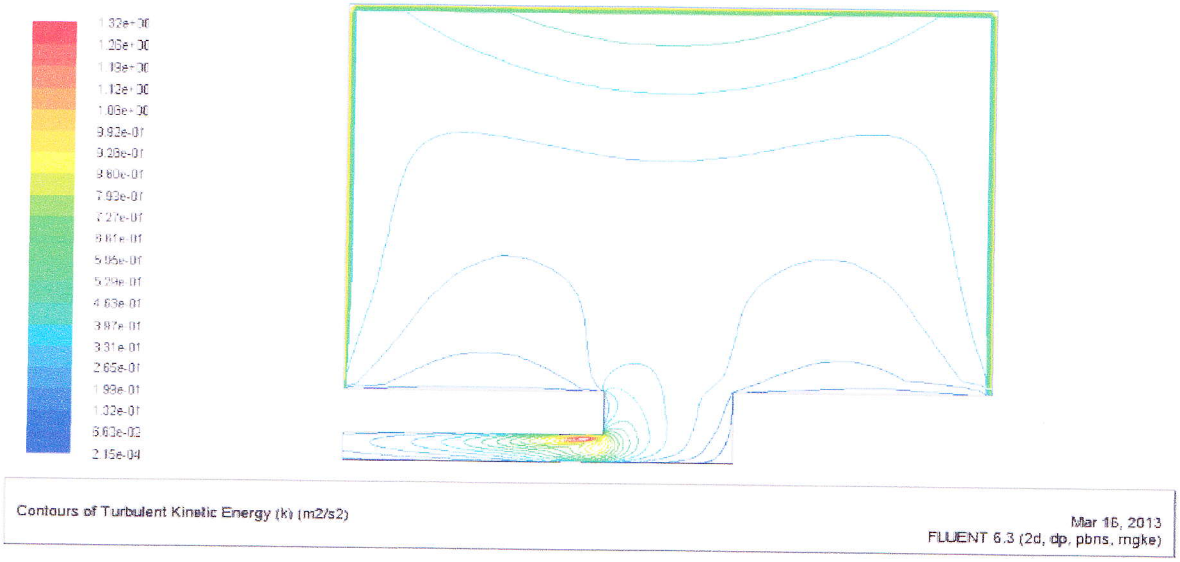


Figure 3 - Turbulent Kinetic Energy Contour of nozzle with dimensions 3 by 1.854 inches (whole)

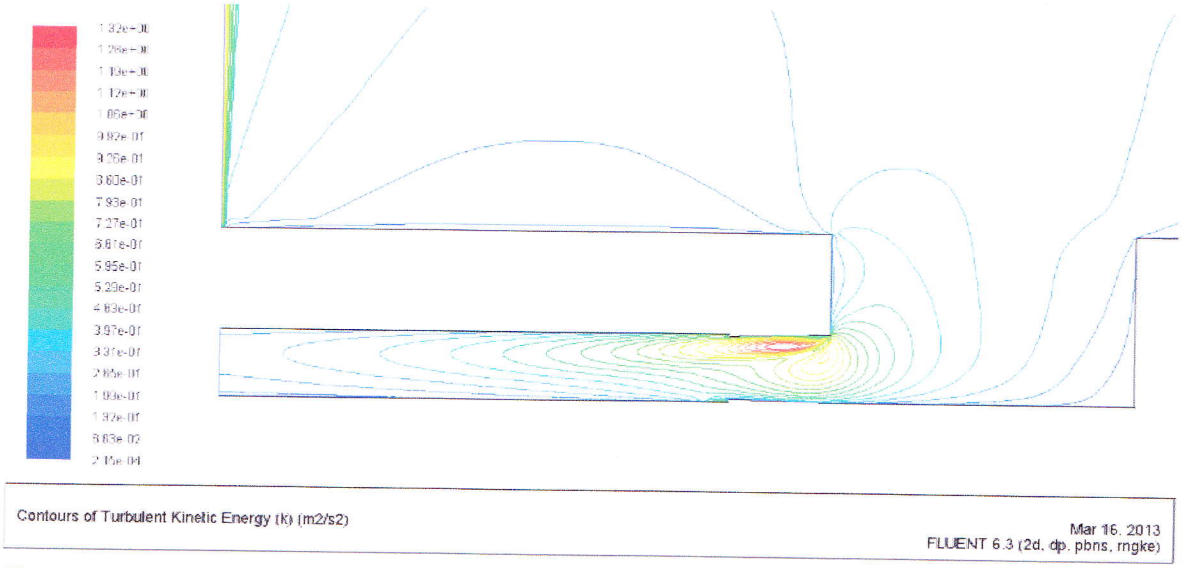


Figure 4 - Turbulent Kinetic Energy Contour of nozzle with dimensions 3 by 1.854 inches with emphasis on pipe inlet

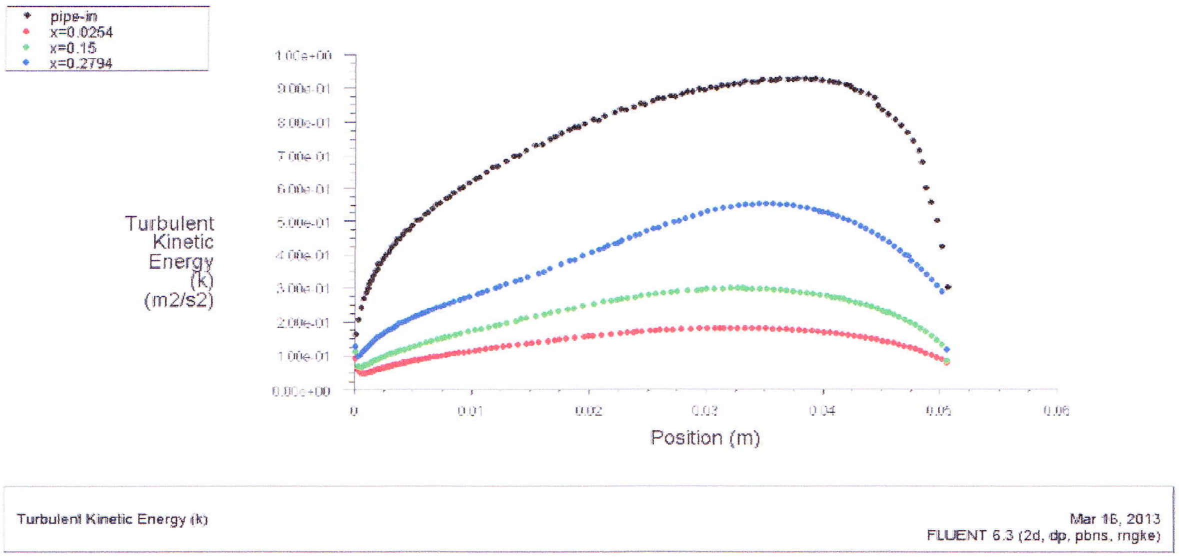


Figure 5 - Turbulent Kinetic Energy for Nozzle at 1.854 inch funnel exit diameter with length of 3 inche

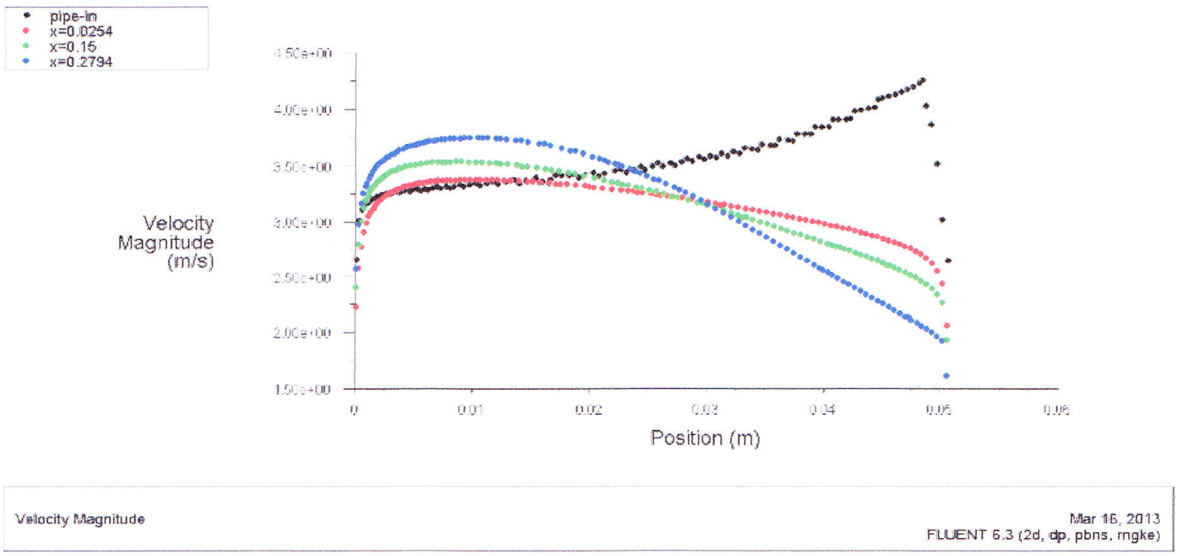


Figure 6 - Velocity Magnitude for Nozzle at 1.854 inch funnel exit diameter with length of 6 inches

Kia Kermani

Figure 1 - Velocity Magnitude Contour of nozzle with dimensions 3 by 1.7 inches

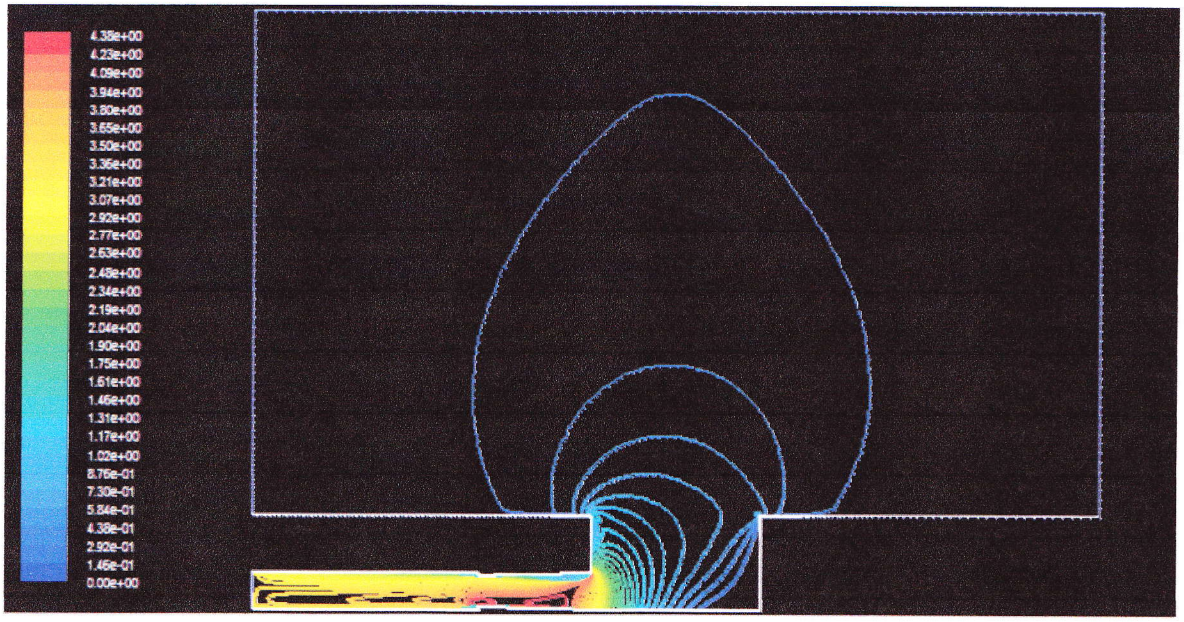


Figure 2 - Velocity Magnitude Contour of nozzle with dimensions 6 by 1.7 inches with zoom

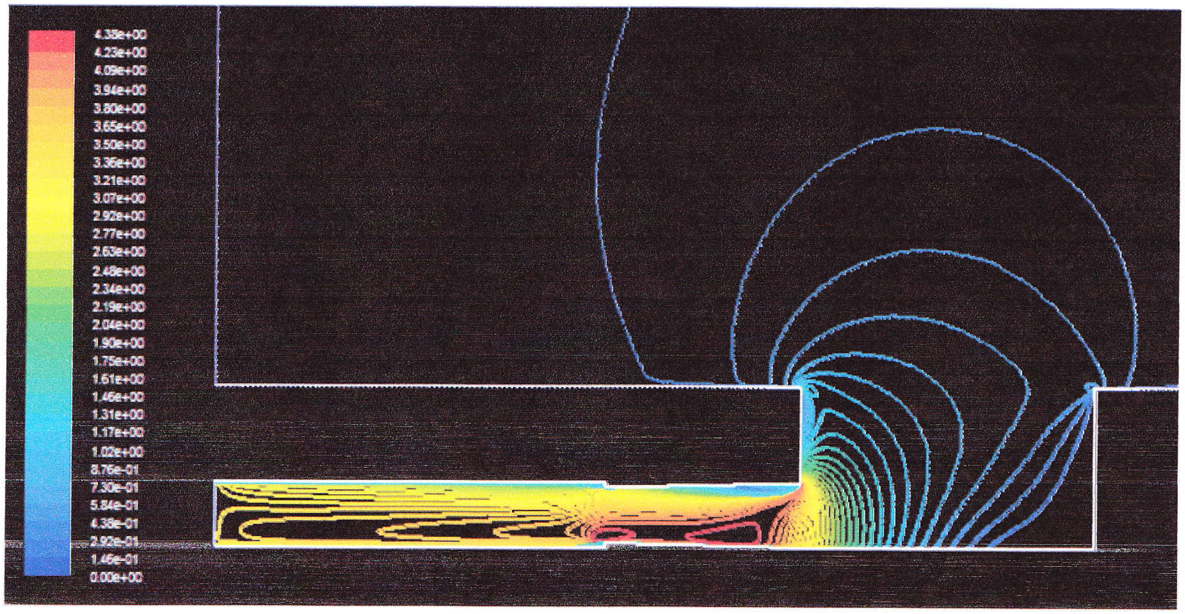


Figure 3 - Turbulent Kinetic Energy Contour of nozzle with dimensions 6 by 1.7 inches

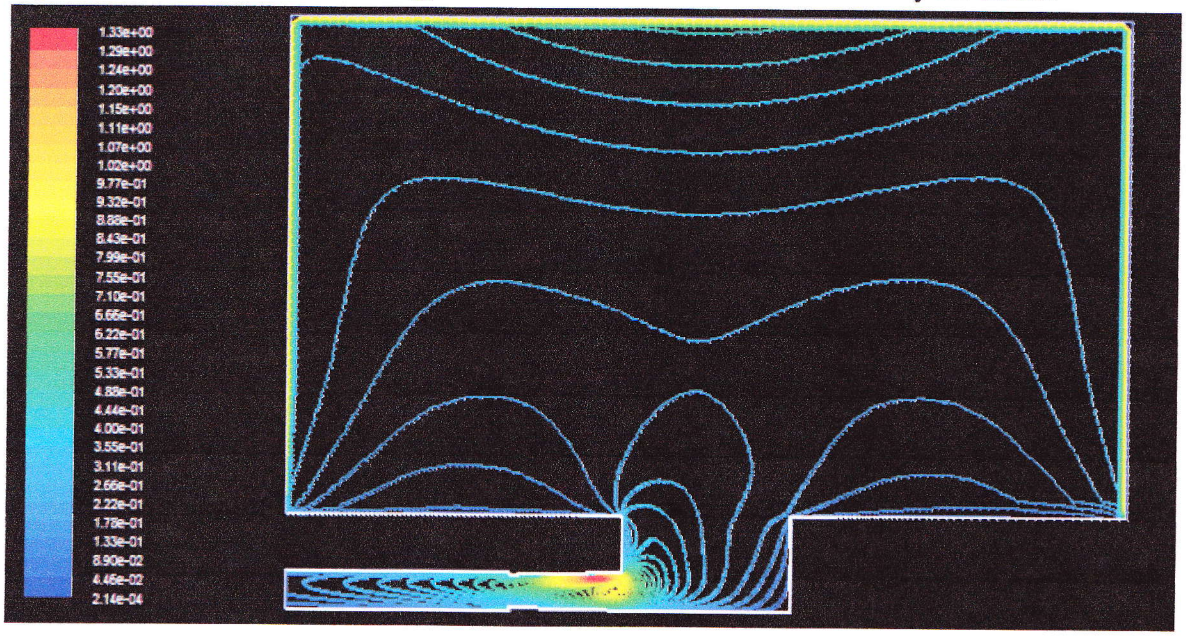


Figure 4 - Turbulent Kinetic Energy Contour of nozzle with dimensions 6 by 1.7 inches zoom

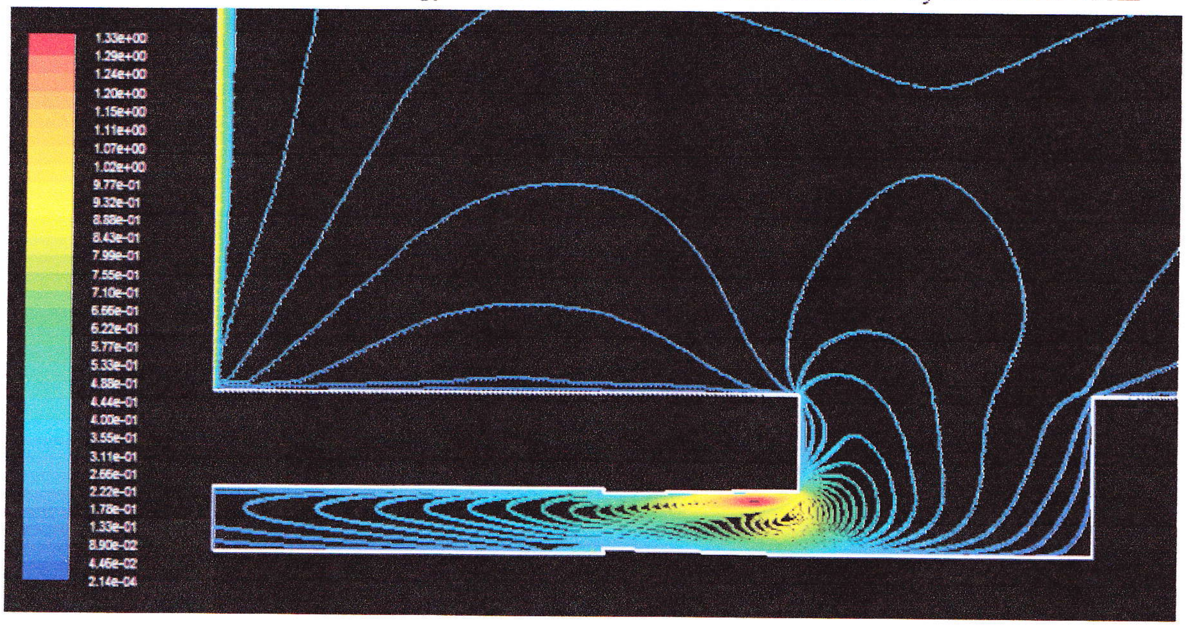


Figure 5 - Turbulent Kinetic Energy for Nozzle at 1.7 inch funnel exit diameter with length of 6 inche

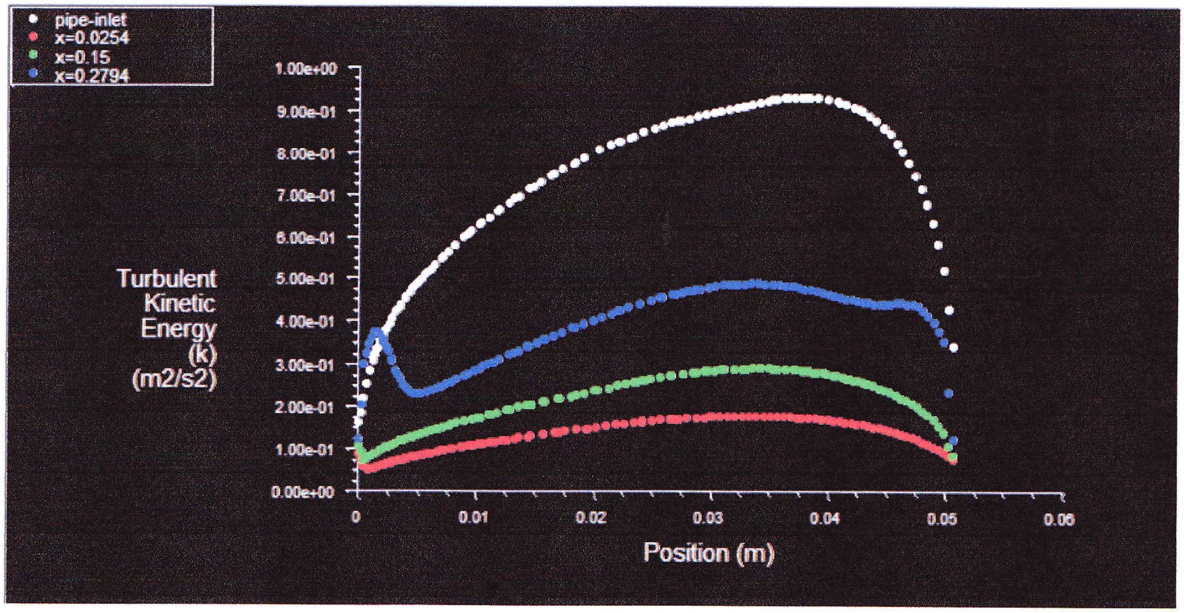
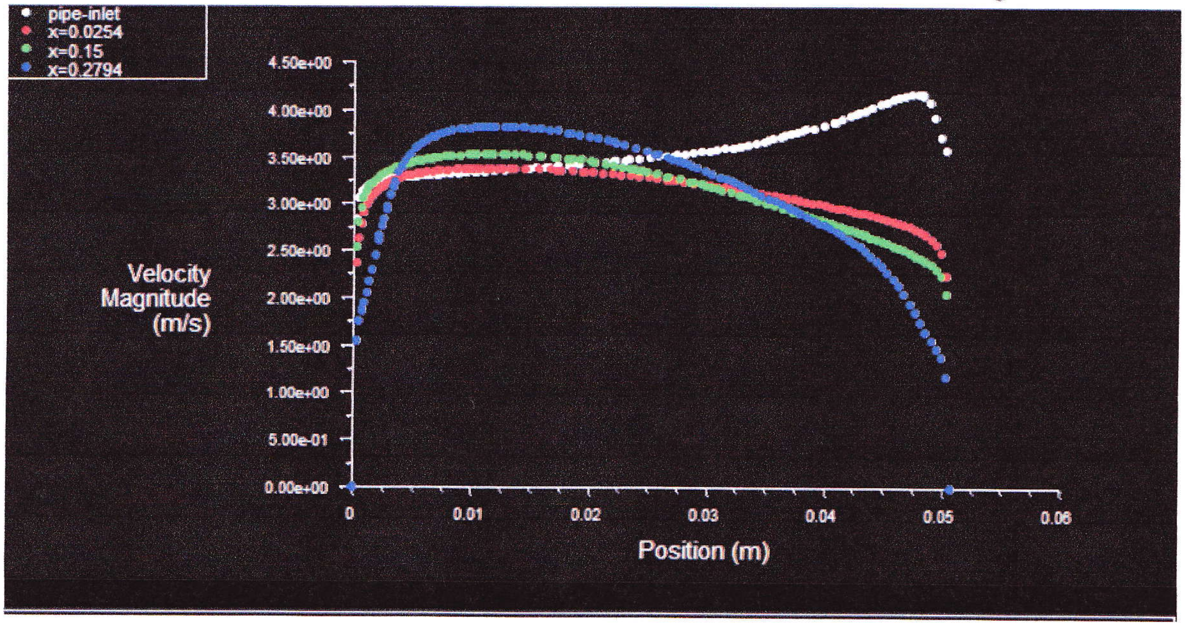


Figure 6 - Velocity Magnitude for Nozzle at 1.7 inch funnel exit diameter with length of 6 inches



ATTACHMENT 5

Penn State PSD Flow Adapter Flow III Final Report

Preliminary Draft

PSD Flow Adapter Flow Studies

Timothy J. Eden, Ph.D.

Mark Turner

Robert Uhlig

Rich Peters

Applied Research Laboratory

The Pennsylvania State University

March 14, 2015

Executive Summary

Flow tests were conducted to evaluate the performance of the PS adapter in a piping system that is representative of a spa/pool configuration. Base line tests were performed to determine a baseline and verify that the instrumentation was operating correctly. The power consumed by the motor, flowrate, inlet and outlet pressures, and the outlet temperature were measured and recorded. The system configuration with an adapter/collector and protector in a simulated sump increased the flowrate by one gallon per minute (GPM) and resulted in a reduction in the sound level of the pumps. An adapter/collector placed in the discharge pipe resulted in smaller increases in the flowrate. The flow and noise performance of the adapter/collector/protector system could be improved through modeling and additional experimentation.

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List of Tables

Introduction

The report contains the results from the second series of tests conducted at the Applied Research Laboratory on October 2, 2014. Two different pumps were tested with different configurations of the test loop or piping system. The pumps were a SPL Pool Pump Model 62201-xx, ¾ HP 3450 RPM and a Hayward PowerFlo LX Model 1580X15, 1.5 HP 3450 RPM. The pumps, piping and test configuration were provided by PSD. ARL provided the instrumentation for measuring power usage, flowrate, inlet and outlet pump pressures, and temperature. The tests are listed in Table 1. The names contain a description of the test configuration. Test configuration and details are shown in Figures 1-4. The piping was 1.5 in white PVC and the unions or connectors are rubber with hose clamps. The coupler is a rubber union with an adapter in side, the collector is fixture with the adapter inside that is connected to the piping inside the 55 gallon barrel were the protector and other plumbing that represents the plumbing in a spa or pool.

Table 1 Tests Conducted at ARL

Test #	Test File Name	Description
1	SPL Pool Pump Model 62201-xx, ¾ HP 3450 RPM	
2	Shake_Down_2OCT_PSD _02	Test to verify that the instrumentation was working
3	BASELINE_01_2OCT_PSD	No modifications to plumbing
4	INSERT_Coupler_01_2OCT_PSD	Coupler inserted ahead of the flow meter in the discharge pipe (Figure 3)
5	ADAPTER_In_BASKET_01_2OCT_PSD	Added adapter in basked at the inlet of the pump (Figure 2)
6	COLLECTOR_01_2OCT_PSD	Collector added in the 55 gallon drum (Figure 4)
7	Collector_Protector_01_2OCT_PSD	Protector added
8	Collector_Protector_02_2OCT_PSD_NoCoupler	Coupler removed
9	COLLECTOR_Protector_ONLY_2OCT_PSD	Adapter in pump basket removed
10	COLLECTOR_Protector_ONLY_2OCT_PSD_02	Test repeated
11	SUMP_ADAPTER_Protector	Sump fixture added to 55 gallon drum
12	SUMP_COLLECTOR_ADAPTER_PROTEC_BLOCKELEMENT_2OCT	Plastic was used to block half of the holes in the protector
12	SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET	Adapter added to pump basket
	Hayward PowerFlo LX Model 1580X15, 1.5 HP 3450 RPM	
13	BASELINE_PUMP2_2OCT_PSD	No modifications to plumbing
14	ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_Pump2	See above
15	SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_PUMP2	See above
16	SUMP_ADAPT_COLLER_PROTEC_ADAPTER_INBASKET_P2_Back_Pressure	Ball valve used to change back pressure
17	P2_Back_Pressure	No couplers or adapters

OCTOBER 2, 2014 Testing

Figure 1 Test Configuration

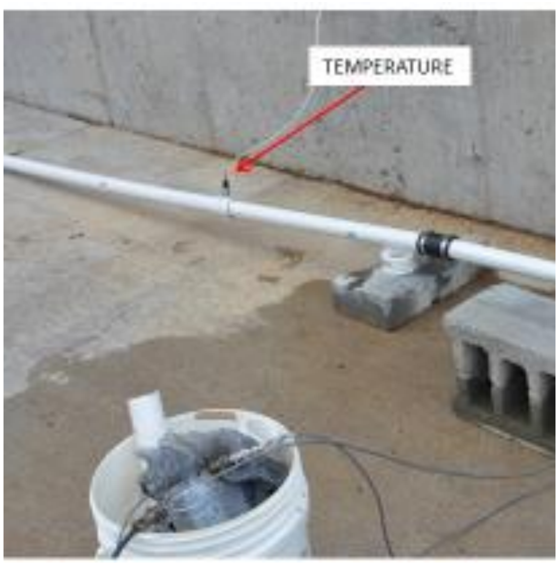

Figure 2 Location of Pump, Pressure Transducers and Thermocouple

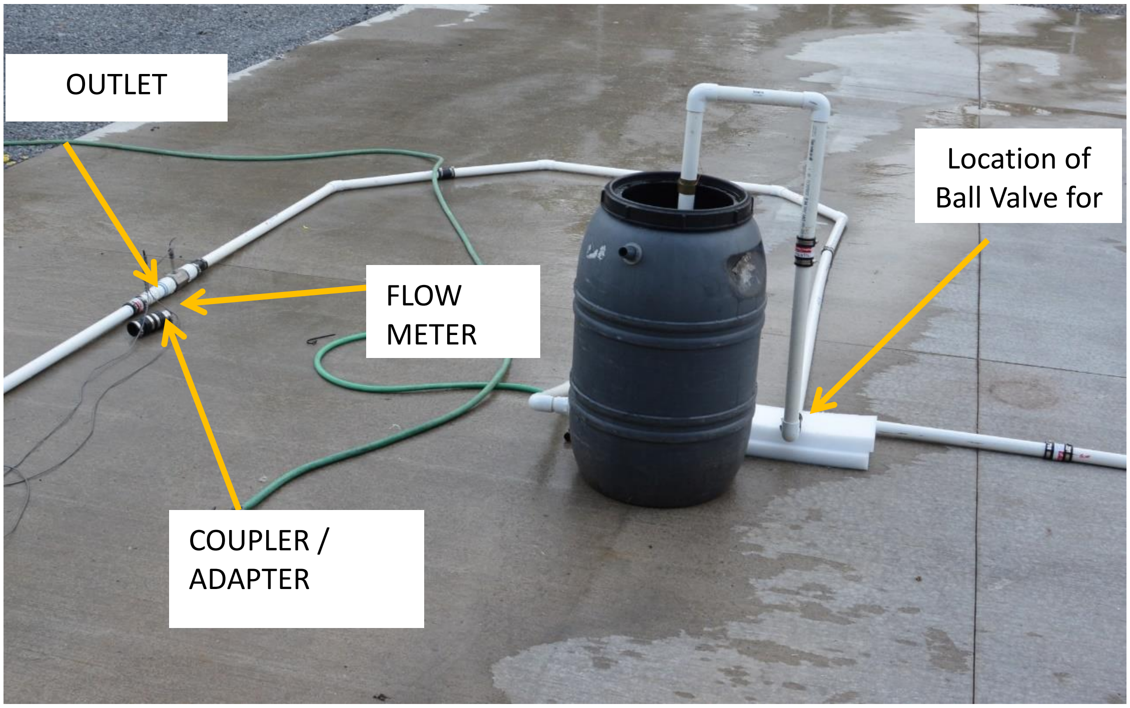

Figure 3 Location of Coupler/Adapter and Flow Meter

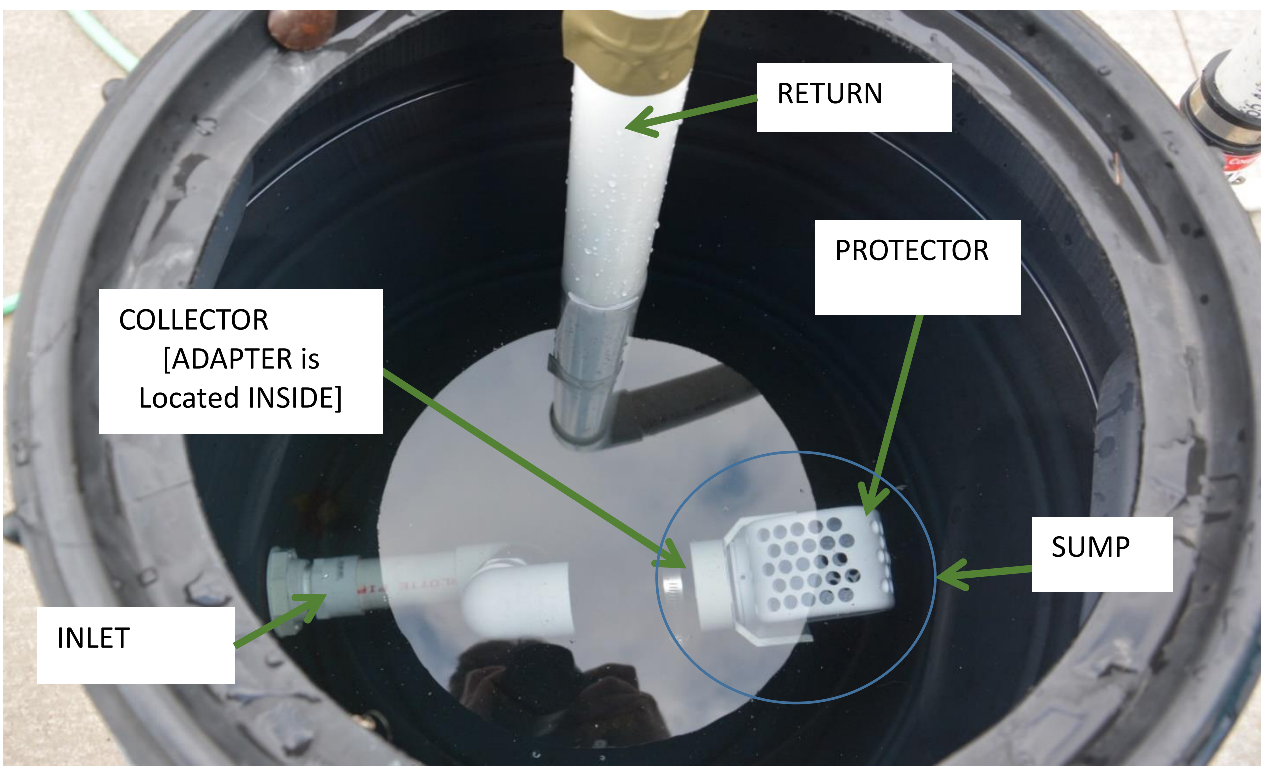

Figure 4 Configuration of the collector and protector

Test Results

Test results for the SPL Pump are shown in Table 2. The water temperature was 69 +/- 1°F for all tests and will not be included in the Table 2.

Table 2 Results from SPL Pool Pump Model 62201

Test ID	Power (watts)	Flowrate (GPM)	Inlet Pressure (psia)	Outlet Pressure (psia)	Pressure Increase (psia)
SPL Pool Pump Model 62201-xx, ¾ HP 3450 RPM					
Shake_Down_2OCT_PSD _02	982.4	50.0	6.9	19.5	12.7
BASELINE_01_2OCT_PSD	973.5	49.9	6.9	19.6	12.7
INSERT_Coupler_01_2OCT_PSD	972.9	50.0	6.9	19.6	12.6
ADAPTER_In_BASKET_01_2OCT_PSD	972.1	50.7	6.9	19.6	12.7
COLLECTOR_01_2OCT_PSD	972.9	50.3	7.2	19.6	12.3
Collector_Protector_01_2OCT_PSD	970.7	50.7	7.4	19.5	12.2
Collector_Protector_02_2OCT_PSD_NoCoupler	970.4	50.9	7.6	19.6	12.0
COLLECTOR_Protector_ONLY_2OCT_PSD	969.3	50.7	7.8	19.5	11.8
COLLECTOR_Protector_ONLY_2OCT_PSD_02	969.9	50.6	8.1	19.5	11.4
SUMP_ADAPTER_Protector	976.7	50.7	8.0	19.5	11.5
SUMP_COLLECTOR_ADAPTER_PROTEC_BLOCKELEMENT_2OCT	977.8	50.7	7.9	19.4	11.6
SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET	990.9	51.0	7.7	19.5	11.8
Mean	974.9	50.5	7.4	19.5	12.1
Standard Deviation	6.3	0.4	0.5	0.0	0.5

The baseline flow rate was 49.9 gpm. The maximum flowrate 0f 51 gpm occurred in test SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET. Inserting the coupler did not have an effect on the performance of the system. Different configurations of the collector, protector and sump increased the flowrate 0.6 to 1.0 gpm. The increases in flowrate are due to the modifications on inlet side of the pump. The adapter/collector changes the flow conditions in the inlet. This most likely puts the flow conditions in an area where the pump is more efficient. These improvements could be system dependent. A system is defined as the pump, plumbing, and sump. Additional testing would be needed to optimize improvements and to determine how system configuration effects performance.

Test results for the Hayward PowerFLo Pump are shown in Table 3. The results showed that the pump was too large for the plumping and test loop configuration. The pump was operating outside of the design envelope. No meaningful data was obtained. The complete results from each test are listed in Appendix A.

Table 3 Hayward PowerFlo LX

Test ID	Power (watts)	Flowrate (GPM)	Inlet Pressure (psia)	Outlet Pressure (psia)	Pressure Increase (psia)
Hayward PowerFlo LX Model 1580X15, 1.5 HP 3450 RPM					
BASELINE_PUMP2_2OCT_PSD	1253.8	52.5	7.2	19.8	12.6
ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_Pump2	1248.3	52.7	7.2	19.8	12.6
SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_PUMP2	1236.1	52.9	7.2	19.8	12.6
SUMP_ADAPT_COLLER_PROTEC_ADAPTER_INBASKET_P2_Back_Pressure	1096.1	32.3	-0.2	27.9	28.1
P2_Back_Pressure	1111.8	33.1	-0.2	27.8	28.1
Mean	1189.2	44.7	4.2	23.0	18.8
Standard Deviation	78.3	11.0	4.1	4.4	8.5

The level of sound produced by the pump for the different test configurations was measured using an acoustic microphone. A plot of the sound measurement for the Hayward pump without an adapter/collector/protector in the system is shown in Figure 5. A plot of the sound measurement for the Hayward pump with the adapter/collector/protector configuration in the system is shown in Figure 6. There is small decrease in the sound level with the adapter/collector/protector in the system.

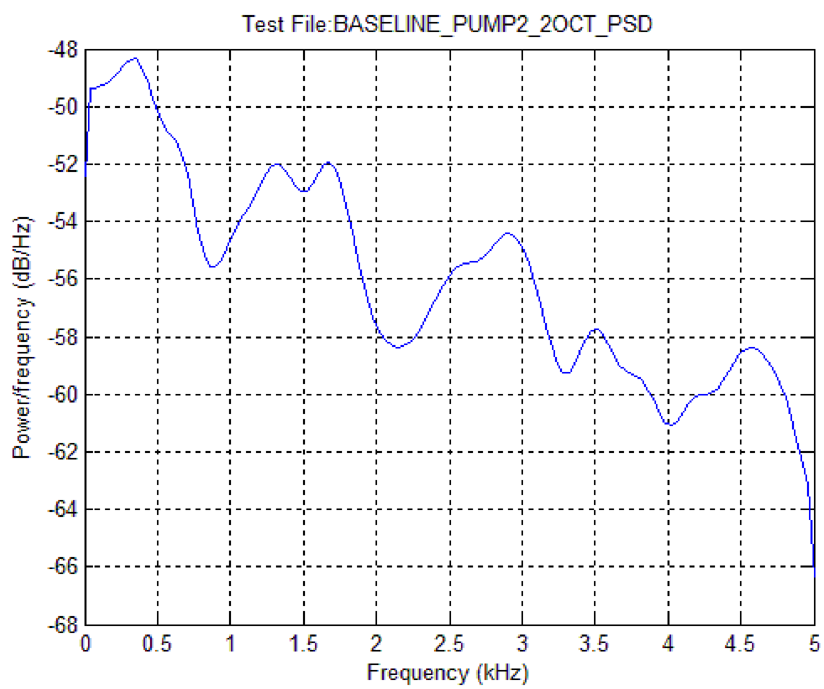

Figure 5 Sound level measurements for the Haywood pump in the baseline configuration.

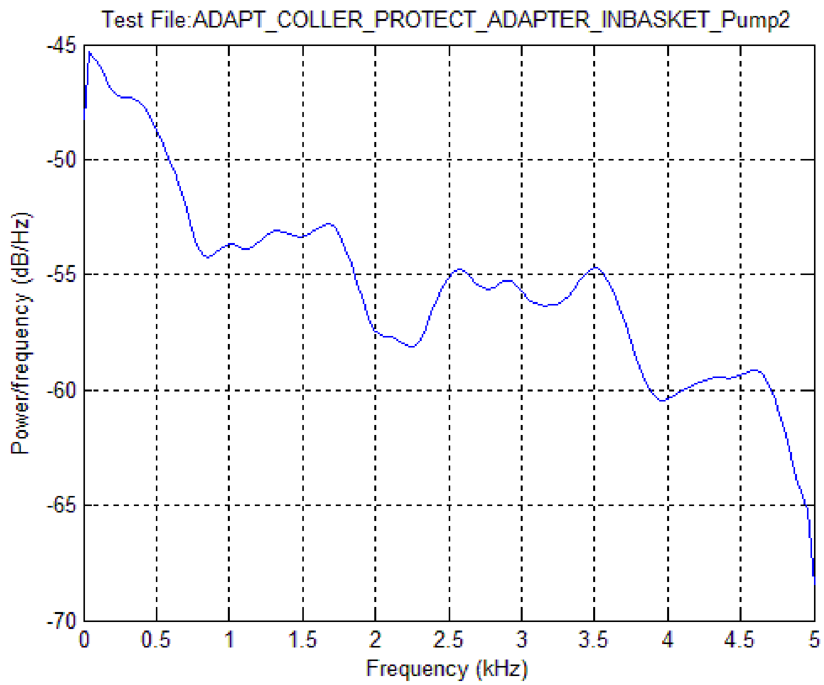

Figure 6 Sound level measurements for the Haywood pump in the adapter/collector/protector in the pipe system.

Conclusions

The goal of the flow testing was to evaluate the performance of the adapter on a piping system that is representative of a piping system found in a spa or swimming pool. Based on the results of the tests the following conclusions were determined:

- The use of the adapter/collector/protector in different configurations on the inlet side of the pump increased the flow rate up to one gallon per minute (1 gpm).
- The flow configuration with the adapter/collector, protector on the suction line and an adapter in the basket showed the largest increase.
- Including the adapter in the plumbing line away from the inlet has little effect on system performance.
- The adapter/collector changes the flow characteristics in the inlet and allows the pump to operate more efficiently.
- There is a slight decrease in the noise level with the adapter/collector/protector in the flow system.

Recommendations

Recommendations for additional development and evaluation of the adapter are:

- Perform additional tests to determine the relationship between the increases in flow performance and the configuration of the system.
- Perform a CFD (computational fluid dynamic) analysis to optimize adapter design.

Appendix A Complete Test Results

Test Date: October 2,2014

Test conditions: Pump 1 : (SPL Pool Pump Model 62201-xx, ¾ HP 3450 RPM)

Pump 2 : (Hayward PowerFlo LX Model 1580X15, 1.5 HP 3450 RPM)

Head in Tank 30 inches

RPM data was not taken for this testing

All other instrumentation was the same as the September 3RD & 4TH

Pump 1 tests; File Name:

- ***Shake_Down_2OCT_PSD _02***….. verify all instrumentation functional, no additional hardware just pump / piping and tank.
- ***Baseline_01_2OCT_PSD*** ….
- ***Insert_Coupler_01_2OCT_PSD*** ….. Coupler/Adapter inserted ahead of flow meter in the discharge pipe.
- ***Adapter_in_Basket_01_2OCT_PSD*** ….. Added a n Adapter in Basket , Coupler/Adapter still in Place.
- ***Collector_01_2OCT_PSD*** …… Added a Collector to suction line in Tank; Adapter still in Basket, Coupler / Adapter still in place.
- ***Collector_Protector_01_2OCT_PSD …..*** Added Protector to suction in Tank; Collector still in, Adapter still in Basket, Coupler / Adapter still in place.
- ***Collector_Protector_02_2OCT_PSD_Nocoupler ….*** Removed the Coupler / Adapter from the discharge line.
- ***Collector_Protector_ONLY_02_2OCT_PSD….*** Removed the Adapter from the Basket. Note: a support of the piping fell (re ran the test xxxxx_02) and Mic was off.
- ***Collector_Protector_ONLY_02_2OCT_PSD_02…….***
- ***SUMP_ADAPTER_Protector*** …… all attached to the suction in barrel, **Note :** *ADAPTER* in file name refers to Collector in the test.
- ***SUMP_COLLECTOR_ADAPTER_PROTEC_BLOCKELEMENT_2OCT….*** Covered part of the Protector in the tank***.***
- ***SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET….***

PUMP 1 Results (SPL Pool Pump Model 62201-xx, ¾ HP 3450 RPM)

==

Test File : SHAKE_DOWN_2OCT14_PSD_02

Test Mean Power (Watts): 982.3574

Test Mean Power (HP): 1.3168

Test Mean Flowrate: 49.9584

Test Mean P Inlet (psia): 6.8895

Test Mean P Outlet (psia): 19.5499

Test Mean Delta_P (psia): 12.6603

Test Mean Temperature (C): 20.0145

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Test File : BASELINE_01_2OCT_PSD

Test Mean Power (Watts): 973.5364

Test Mean Power (HP): 1.305

Test Mean Flowrate: 49.8755

Test Mean P Inlet (psia): 6.8896

Test Mean P Outlet (psia): 19.5751

Test Mean Delta_P (psia): 12.6855

Test Mean Temperature (C): 20.1785

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Test File : INSERT_Coupler_01_2OCT_PSD

Test Mean Power (Watts): 972.9209

Test Mean Power (HP): 1.3042

Test Mean Flowrate: 49.9652

Test Mean P Inlet (psia): 6.9354

Test Mean P Outlet (psia): 19.5511

Test Mean Delta_P (psia): 12.6156

Test Mean Temperature (C): 20.3987

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Test File : ADAPTER_In_BASKET_01_2OCT_PSD

Test Mean Power (Watts): 972.1032

Test Mean Power (HP): 1.3031

Test Mean Flowrate: 50.6563

Test Mean P Inlet (psia): 6.8503

Test Mean P Outlet (psia): 19.5603

Test Mean Delta_P (psia): 12.71

Test Mean Temperature (C): 20.5226

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Test File : COLLECTOR_01_2OCT_PSD

Test Mean Power (Watts): 972.8605

Test Mean Power (HP): 1.3041

Test Mean Flowrate: 50.3217

Test Mean P Inlet (psia): 7.2461

Test Mean P Outlet (psia): 19.5635

Test Mean Delta_P (psia): 12.3175

Test Mean Temperature (C): 20.6719

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===

Test File : Collector_Protector_01_2OCT_PSD

Test Mean Power (Watts): 970.667

Test Mean Power (HP): 1.3012

Test Mean Flowrate: 50.7344

Test Mean P Inlet (psia): 7.3589

Test Mean P Outlet (psia): 19.5441

Test Mean Delta_P (psia): 12.1852

Test Mean Temperature (C): 20.8205

==

==

Test File : Collector_Protector_02_2OCT_PSD_NoCoupler

Test Mean Power (Watts): 970.3547

Test Mean Power (HP): 1.3007

Test Mean Flowrate: 50.9455

Test Mean P Inlet (psia): 7.5941

Test Mean P Outlet (psia): 19.5615

Test Mean Delta_P (psia): 11.9674

Test Mean Temperature (C): 20.859

==

==

Test File : COLLECTOR_Protector_ONLY_2OCT_PSD

Test Mean Power (Watts): 969.3284

Test Mean Power (HP): 1.2994

Test Mean Flowrate: 50.6919

Test Mean P Inlet (psia): 7.7627

Test Mean P Outlet (psia): 19.5295

Test Mean Delta_P (psia): 11.7668

Test Mean Temperature (C): 20.9007

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Test File : COLLECTOR_Protector_ONLY_2OCT_PSD_02

Test Mean Power (Watts): 969.8587

Test Mean Power (HP): 1.3001

Test Mean Flowrate: 50.5504

Test Mean P Inlet (psia): 8.0906

Test Mean P Outlet (psia): 19.5057

Test Mean Delta_P (psia): 11.4151

Test Mean Temperature (C): 20.9987

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Test File : SUMP_ADAPTER_Protector

Test Mean Power (Watts): 976.7285

Test Mean Power (HP): 1.3093

Test Mean Flowrate: 50.6984

Test Mean P Inlet (psia): 8.0023

Test Mean P Outlet (psia): 19.494

Test Mean Delta_P (psia): 11.4917

Test Mean Temperature (C): 21.0823

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Test File : SUMP_COLLECTOR_ADAPTER_PROTEC_BLOCKELEMENT_2OCT

Test Mean Power (Watts): 977.7915

Test Mean Power (HP): 1.3107

Test Mean Flowrate: 50.6615

Test Mean P Inlet (psia): 7.8569

Test Mean P Outlet (psia): 19.4158

Test Mean Delta_P (psia): 11.5589

Test Mean Temperature (C): 21.1825

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===

Test File : SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET

Test Mean Power (Watts): 990.8558

Test Mean Power (HP): 1.3282

Test Mean Flowrate: 51.0004

Test Mean P Inlet (psia): 7.7062

Test Mean P Outlet (psia): 19.4613

Test Mean Delta_P (psia): 11.755

Test Mean Temperature (C): 21.0977

===

Pump 2 Tests; File Name:

- ***BASELINE_PUMP2_2OCT_PSD……***

- ***ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_Pump2……***

- ***SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_PUMP2…..***

- ***SUMP_ADAPT_COLLER_PROTEC_ADAPTER_INBASKET_P2_Back_Pressure…..***
  Added a ball valve in the discharge line near tank to make the pump work.

- ***P2_Back_Pressure…*** removed all additional to record baseline with just the ball valve creating Back pressure.

PUMP 2 Results (Hayward PowerFlo LX , Model 1580X15, 1.5 HP 3450 RPM)

===

Test File : BASELINE_PUMP2_2OCT_PSD

Test Mean Power (Watts): 1253.7556

Test Mean Power (HP): 1.6806

Test Mean Flowrate: 52.5247

Test Mean P Inlet (psia): 7.2217

Test Mean P Outlet (psia): 19.8306

Test Mean Delta_P (psia): 12.609

Test Mean Temperature (C): 20.0689

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Test File : ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_Pump2

Test Mean Power (Watts): 1248.2673

Test Mean Power (HP): 1.6733

Test Mean Flowrate: 52.6742

Test Mean P Inlet (psia): 7.1928

Test Mean P Outlet (psia): 19.8042

Test Mean Delta_P (psia): 12.6114

Test Mean Temperature (C): 20.1151

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==

Test File : SUMP_ADAPT_COLLER_PROTECT_ADAPTER_INBASKET_PUMP2

Test Mean Power (Watts): 1236.0608

Test Mean Power (HP): 1.6569

Test Mean Flowrate: 52.8609

Test Mean P Inlet (psia): 7.1748

Test Mean P Outlet (psia): 19.7863

Test Mean Delta_P (psia): 12.6115

Test Mean Temperature (C): 20.1667

==

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Test File : SUMP_ADAPT_COLLER_PROTEC_ADAPTER_INBASKET_P2_Back_Pressure

Test Mean Power (Watts): 1096.0681

Test Mean Power (HP): 1.4693

Test Mean Flowrate: 32.3216

Test Mean P Inlet (psia): -0.24458

Test Mean P Outlet (psia): 27.8573

Test Mean Delta_P (psia): 28.1019

Test Mean Temperature (C): 19.9853

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Test File : P2_Back_Pressure

Test Mean Power (Watts): 1111.7738

Test Mean Power (HP): 1.4903

Test Mean Flowrate: 33.0692

Test Mean P Inlet (psia): -0.24409

Test Mean P Outlet (psia): 27.8102

Test Mean Delta_P (psia): 28.0543

Test Mean Temperature (C): 20.006

===

ATTACHMENT 6

ARL Penn State Test Report-24823 ProteKtor

PennState
Applied Research Laboratory

P.O. Box 30
State College, PA 16804-0030
(814) 865-6531

Test Report: ProteKtor Test Recording and Documentation

Submitted to:

Mr. Paul McKain
PSD Industries, LLC
21010 Southbank Street
PMB #925
Sterling, VA 20165

Submitted by:

Mr. Richard A. Peters
rap11@arl.psu.edu
814-863-9058

Agreement No.: 24823
Period of Performance: 20 Oct – 19 Nov 6

14-November-2016

This test report is submitted by ARL Penn State to PSD industries, LLC, in fulfillment of Agreement No. 24823. The testing described herein was conducted on the grounds of the Energy Science Power System's Division High Energy Test Site during the period of 3-4 November 2016.

Test Objectives

1. Demonstrate that the ProteKtor will prevent limb entrapment and mechanical or hair entanglement.
2. Demonstrate the force required to overcome the suction on mechanical and hair adjuncts in an open sump.
3. Demonstrate that the ProteKtor does not create a secondary hazard with and without the sump cover in place.
4. Demonstrate that the ProteKtor does not negatively impact the flow of water through the system.
5. Demonstrate that the ProteKtor will fit under the sump cover.

Test Description

The baseline testing consisted of:

1. Measuring the flow rate and pump suction pressure for the three pumps used in testing.
2. Measuring the pull force of the flotation devices used to pull the mechanical and hair entrapment simulation devices from the sump.
3. Measuring the force required to remove the simulated entrapment devices from the sump with and without the ProteKtor in the sump.
4. Observing that a necklace chain and an elastic band will easily slide off of the ProteKtor whenever the sump cover is missing and each has wrapped around it.

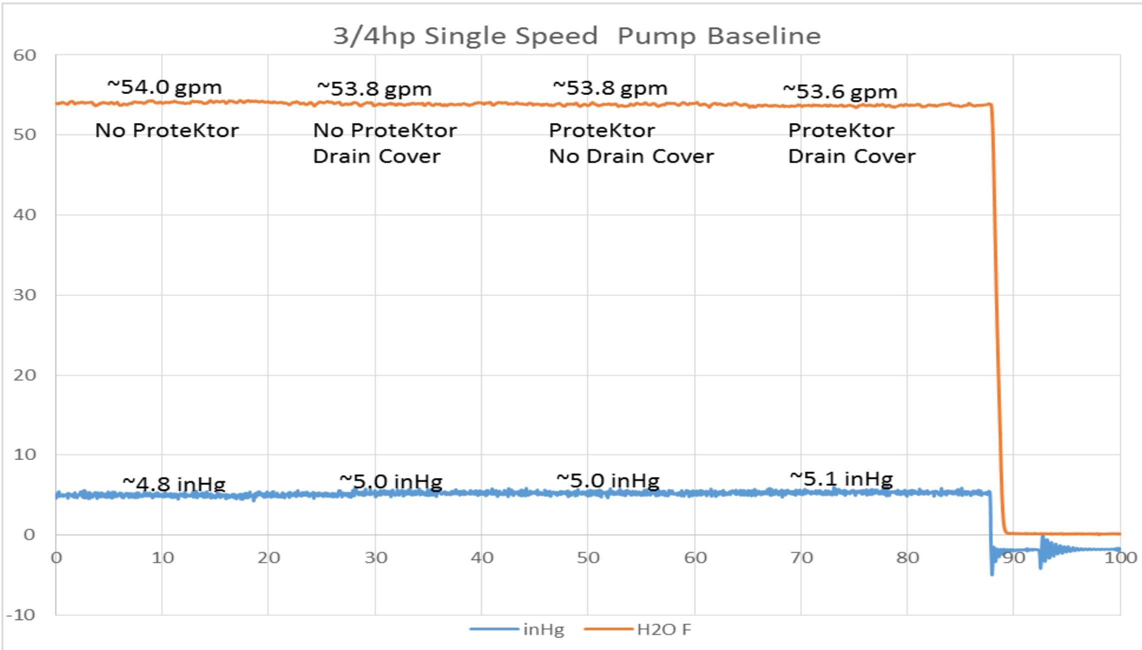
Entrapment tests

1. These tests were completed using the flotation devices to lift the entrapment devices from the ProteKtor with and without the sump cover in place. The four testing series are listed below and were observed using each of the three pumps.
    a. Mechanical entrapment with the ProteKtor and sump cover in place.
    b. Mechanical entrapment with the ProteKtor in place and sump cover removed.
    c. Hair entrapment with the ProteKtor and sump cover in place.
    d. Hair entrapment with the ProteKtor in place and sump cover removed.

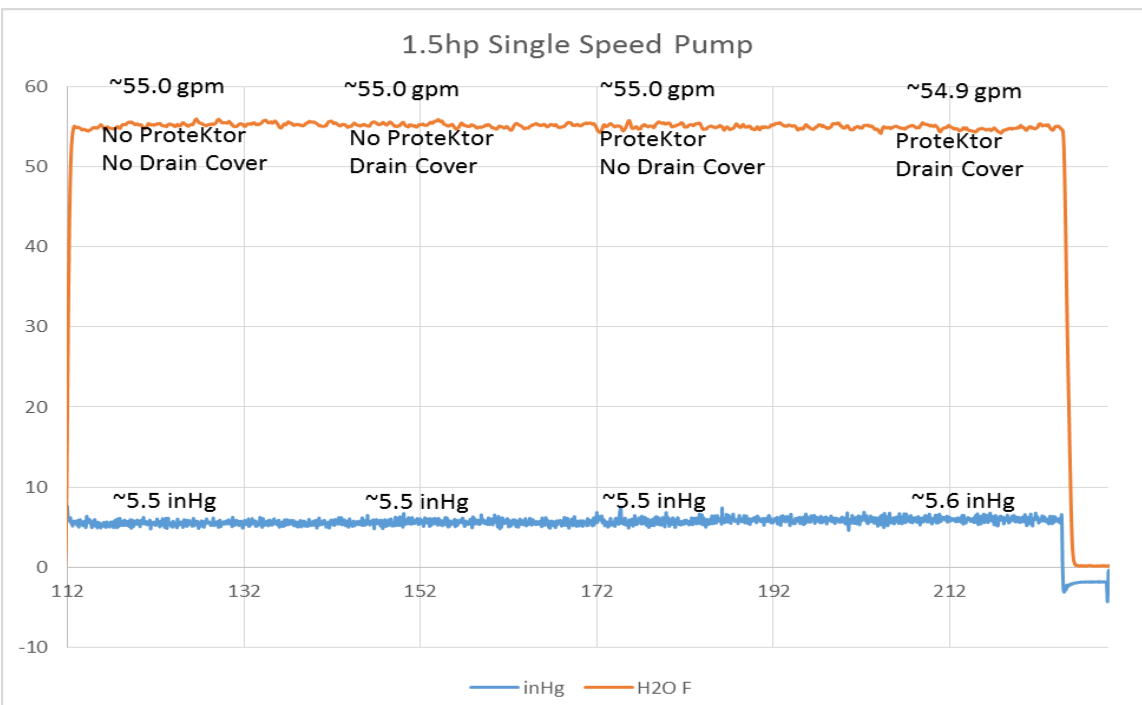
The two single-speed pumps were run at the rated speed, and each entrapment device was lowered to the sump using a sideways motion and held in place for five to ten seconds and then released to observe whether the device would float free from the sump. The two-speed pump was started at high speed, and the entrapment device lowered into place in the same manner as for the single-speed pump tests and held for ten seconds. The pump was then switched to low speed and the entrapment device held for ten additional seconds and released to observe whether the device would float free from the sump. This was done with each pump ten times in succession for each testing series.

Measuring the Flow Rate and Suction Pressure For all Pumps

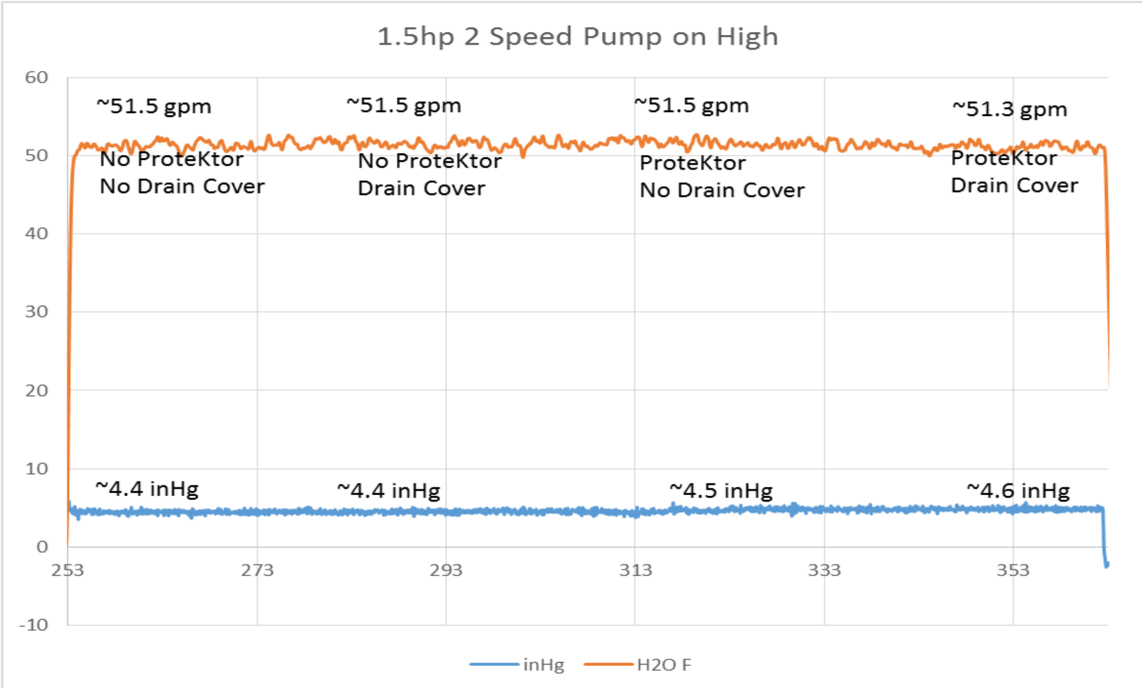
Baseline Test on ¾ hp Single Speed Pump.



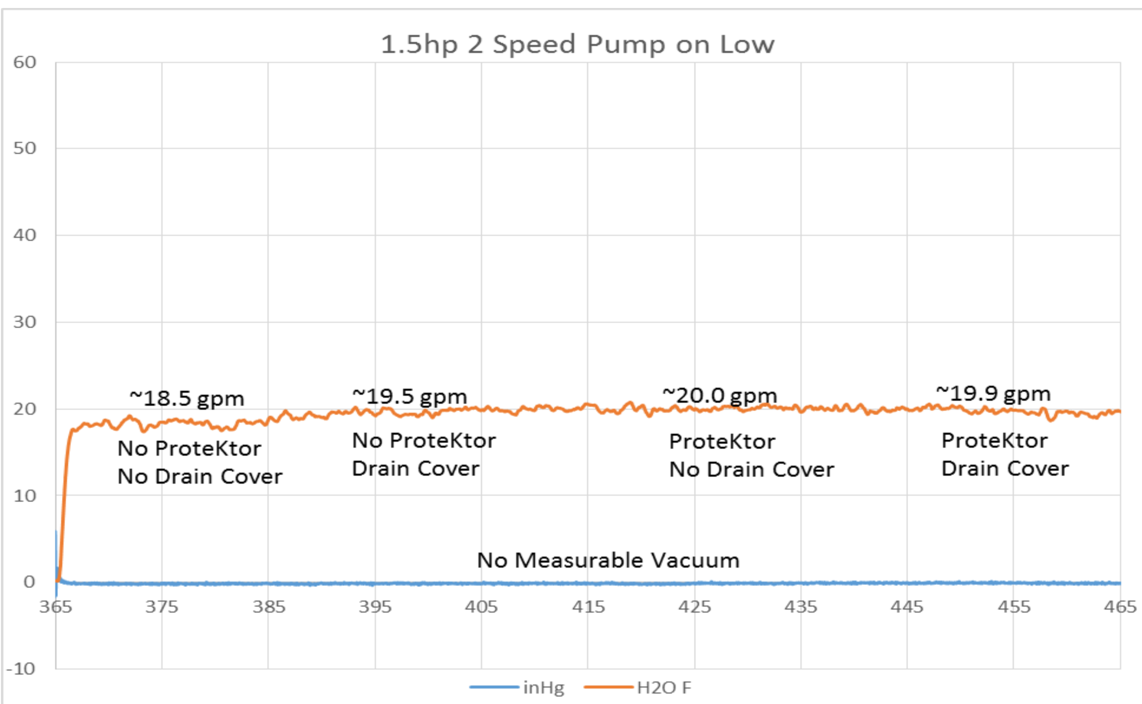
Baseline Test on 1.5hp Single Speed Pump



Baseline Test on 1.5hp Two Speed Pump- High Speed



Baseline Test on 1.5hp Two Speed Pump-Low Speed



Baseline Measurements of Hair and Mechanical Entrapment Devices

Inherent Lifting Force for each Entrapment Device	
Entrapment Device	Lifting Force
Flotation Hair #1	2lb
Flotation Hair #2	2lb
Flotation Mechanical	2lb
Hair on Rod	0lb
Mechanical on Rod	0lb

Lifting Force Measurements for Each Pump with ProteKtor in Place

¾hp Single Speed Pump 53.5gpm and 5.0inHg		
Device	lbs	Comments
Flotation Hair	2	No change in flow was observed, device floated free
Flotation Mechanical	2	No change in flow was observed, device floated free
Hair on Rod	0	No change in flow was observed, no measurable force to lift device
Mechanical on Rod	0	No change in flow was observed, no measurable force to lift device

1.5hp Single Speed Pump 55gpm and 5.5inHg		
Device	lbs	Comments
Flotation Hair	2	No change in flow was observed, device floated free
Flotation Mechanical	2	No change in flow was observed, device floated free
Hair on Rod	0	No change in flow was observed, no measurable force to lift device
Mechanical on Rod	0	No change in flow was observed, no measurable force to lift device

1.5hp Two Speed Pump on High 51.5gpm and 4.6inHg		
Device	lbs	Comments
Flotation Hair	2	No change in flow was observed, device floated free
Flotation Mechanical	2	No change in flow was observed, device floated free
Hair on Rod	0	No change in flow was observed, no measurable force to lift device
Mechanical on Rod	0	No change in flow was observed, no measurable force to lift device

1.5hp Two Speed Pump on Low 20gpm and 0inHg		
Device	lbs	Comments
Flotation Hair	2	No change in flow was observed, device floated free
Flotation Mechanical	2	No change in flow was observed, device floated free
Hair on Rod	0	No change in flow was observed, no measurable force to lift device
Mechanical on Rod	0	No change in flow was observed, no measurable force to lift device

Lifting Force Measurements for Each Pump with ProteKtor NOT in Place (open sump)

¾hp Single Speed Pump 53.5gpm and 5.0inHg		
Device	lbs	Comments
Flotation Hair	11	9lbs on lifting scale plus 2lbs buoyancy to free hair from sump
Flotation Mechanical	2	No change in flow was observed, device floated free
Hair on Rod	15	15lbs on lifting scale to free hair from sump
Mechanical on Rod	3	3lbs on lifting scale to free mechanical from sump

1.5hp Single Speed Pump 55gpm and 5.0inHg		
Device	lbs	Comments
Flotation Hair	14	12lbs on lifting scale plus 2lbs buoyancy to free hair from sump
Flotation Mechanical	3	1lbs on lifting scale plus 2lbs buoyancy to free mechanical from sump
Hair on Rod	14	14lbs on lifting scale to free hair from sump
Mechanical on Rod	4	4lbs on lifting scale to free mechanical from sump

Note: flowmeter stopped working, but it was decided to continue with the last two tests without it. It was later discovered that a few pieces of hair had become entangled in the flowmeter rotor and stopped it from working. We cleaned it and returned it to service.

1.5hp Two Speed Pump on High and 4.6inHg		
Device	lbs	Comments
Flotation Hair	14	12lbs on lifting scale plus 2lbs buoyancy to free hair from sump
Flotation Mechanical	2	device floated free
Hair on Rod	13	13lbs on lifting scale to free hair from sump
Mechanical on Rod	3	3lbs on lifting scale to free mechanical from sump

1.5hp Two Speed Pump on Low and 0inHg		
Device	lbs	Comments
Flotation Hair	7	5lbs on lifting scale plus 2lbs buoyancy to free hair from sump
Flotation Mechanical	0	device floated free
Hair on Rod	7	7lbs on lifting scale to free hair from sump
Mechanical on Rod	0	0lbs on lifting scale to free mechanical from sump

Observation that a chain necklace and an elastic band will easily slide off of the ProteKtor

1. The elastic band was placed around the ProteKtor with the 1.5hp pump running on high and it pulled free with little effort.
2. The chain necklace was placed around the ProteKtor with the 1.5hp pump running on high and it pulled free with little effort.

<u>Entrapment Tests</u>

Mechanical entrapment with the ProteKtor and sump cover in place.

1. With the ProteKtor and the sump cover in place and the 3/4hp single speed pump running, we observed a flow rate of 53.4gpm and suction pressure of 5.0inHg. The flotation mechanical entrapment device was lowered to the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation mechanical entrapment device floated to the surface under its own buoyancy.
2. With the ProteKtor and the sump cover in place and the 1.5hp single speed pump running, we observed a flow rate of 54.5gpm and suction pressure of 5.7inHg. The flotation mechanical entrapment device was lowered to the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation mechanical entrapment device floated to the surface under its own buoyancy.
3. With the ProteKtor and the sump cover in place and the 1.5hp two speed pump running on high, we observed a flow rate of 51.0gpm and suction pressure of 4.6inHg. The flotation mechanical entrapment device was lowered to the sump and held there for 10 seconds then the pump was changed to low speed and the device held for an additional 10 seconds. The flotation mechanical entrapment device was then released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the mechanical flotation entrapment device floated to the surface under its own buoyancy.

Mechanical entrapment with the ProteKtor in place and sump cover removed.

1. With the ProteKtor in place and the sump cover removed and the 3/4hp single speed pump running, we observed a flow rate of 54gpm and suction pressure of 5.0inHg. The flotation mechanical entrapment device was lowered to the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation mechanical entrapment device floated to the surface under its own buoyancy.
2. With the ProteKtor in place and the sump cover removed and the 1.5hp single speed pump running, we observed a flow rate of 55gpm and suction pressure of 5.6inHg. The flotation mechanical entrapment device was lowered to the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation mechanical entrapment device floated to the surface under its own buoyancy.
3. With the ProteKtor in place and the sump cover removed and the 1.5hp two speed pump running on high, we observed a flow rate of 51.0gpm and suction pressure of 4.6inHg. The flotation mechanical entrapment device was lowered to the sump and held there for 10 seconds then the pump was changed to low speed and the device held for an additional 10 seconds. The flotation mechanical entrapment device was then released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation mechanical entrapment device floated to the surface under its own buoyancy.

Hair entrapment with the ProteKtor in place and sump cover removed.

Note: We removed the flowmeter at this point to keep it from getting hair tangled in its rotor and the possibility of damaging the flowmeter bearings.

1. With the ProteKtor in place, the sump cover removed, and the 3/4hp single speed pump running, we observed a suction pressure of 5.0inHg. The flotation hair entrapment device was lowered into the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation hair entrapment device floated to the surface under its own buoyancy.
2. With the ProteKtor in place, the sump cover removed, and the 1.5hp single speed pump running, we observed a suction pressure of 6.0inHg. The flotation hair entrapment device was lowered into the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation hair entrapment device floated to the surface under its own buoyancy.
3. With the ProteKtor in place, the sump cover removed, and the 1.5hp two speed pump running on high, we observed a suction pressure of 4.8inHg. The flotation hair entrapment device was lowered into the sump and held there for 10 seconds then the pump was changed to low speed and the device held for an additional 10 seconds. The flotation hair entrapment device was then released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation hair entrapment device floated to the surface under its own buoyancy.

Hair entrapment with the ProteKtor in place and sump cover in place.

Note: The flowmeter was not in at this point to keep it from getting hair tangled in its rotor and the possibility of damaging the flowmeter bearings.

1. With the ProteKtor and the sump cover in place and the 3/4hp single speed pump running, we observed a suction pressure of 5.3inHg. The flotation hair entrapment device was lowered into the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation hair entrapment device floated to the surface under its own buoyancy.
2. With the ProteKtor and the sump cover in place and the 1.5hp single speed pump running, we observed a suction pressure of 6.0inHg. The flotation hair entrapment device was lowered into the sump and held there for five seconds and released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation hair entrapment device floated to the surface under its own buoyancy.
3. With the ProteKtor and the sump cover in place and the 1.5hp two speed pump running on high, we observed a suction pressure of 4.8inHg. The flotation hair entrapment device was lowered into the sump and held there for 10 seconds then the pump was changed to low speed and the device held for an additional 10 seconds. The flotation hair entrapment device was then released. This was repeated for a total of 10 cycles. It was observed that, for each cycle, the flotation hair entrapment device floated to the surface under its own buoyancy.

ATTACHMENT 7

Letter from Stingl Safety Consulting

STINGL SAFETY CONSULTING
1127 Amanda Drive
GREAT FALLS, VIRGINIA 22066
571-758-7456

PSD Industries LLC
8781 Old Lloyd Road #217
Lloyd, Florida
32317-9998

Mr. McKain,

It was a pleasure speaking with you again after all these years. Our recent phone call restarted me thinking again about future anti-entrapment solutions.

As I mentioned I am aware of your product and did extensive testing on it a few years back. Mr. Robert Rung, an engineer with Hayward (retired) did extensive work designing sumps (SOFAs) to include technology similar to yours. I believe his main focus was limb entrapment. This followed a discussion that shallow pools and all spas must have the drain covers removed for winterization.

We were working on the drain cover standard writing committee at the time and he was wondering why the drain covers kept coming off. I explained that pool mechanics must take them off for the in the fall to prevent the pipes from freezing. This leads to: covers and screws getting damaged and/or lost and sump screw receptacles becoming damaged. I made an attempt to get all sump screws standardized to three sizes. This was voted down by a close margin, mainly by manufactures who did not want to pay the cost of retooling (making new molds).

Your product/technology not only prevents limb entrapment in situations where the cover is missing, but also prevents hair entrapment. It is my opinion that all new SOFAs should be manufactured with this technology. My suspision is that this was decided in the accounting departments of the manufactures.

I have a couple suggestions for your edification:

First, you should contact Mr. Robert Rung to discuss his work in redesigning sumps to prevent limb entrapment. He is extremely intelligent and a wealth of knowledge. His only focus was new design. In my view, the beauty of your product is that it is retrofittable in all existing sumps.

Second, I would contact Mr. Perry Sharpless at the CPSC. We are working together on finalizing a standard for gravity feed systems for swimming pools. Gravity Systems are currently listed in the VGB Pool Safety Act and there is no standard for the proper design and installation of them. We know of many instances where these systems are being designed and installed in a hazardous manner, but that's another (long) story.

When I was assisting Representative Wesserman-Schultz's and Senator Allen's staffs draft the VGB, we included a section for "other systems". In entrapment prevention, myself and others have been preaching the "Layers of Protection" method. (Dual Drains, Safety Covers, Gravity Systems, SVRSs, Vent Lines, etc.) Most people are solely focused on body entrapment, which your product clearly does not prevent, and neglect the other documented types of entrapment. Since there has never been a "layer of protection" that could prevent limb, mechanical, and hair entrapment, it would seem that the "other systems" section of the VGB Act would be the perfect niche for your product. That's why we included that section, it was for future technology. Mr. Sharpless is a super nice guy and should be of great assistance to you.

I wish you the best of luck with your current product and suggest that you work on incorporating it into new sump designs.

Respectfully,

David Stingl

ATTACHMENT 8

Brazil_CSSF-Pool Safety Bill (English Version)

SOCIAL WELFARE AND FAMILY COMMITTEE

Legislative Bill (PL) No. 1.162 of 2007

Joined Bills

(PL 1752/2007, PL 3927/2008, PL 6502/2009, PL 7414/2010, PL 2537/2011 AND PL 2614/2011)

Orders the prevention of accidents in pools and other measures.

Author: Representative Mario Heringer

Rapporteur: Rep. Darcísio Perondi

I – Report

Bill PL1.162/2007 is designed to create and regulate accident prevention measures in pools. In the beginning, in its Article 2, it provides definitions of various terms that are employed throughout the rest of the text in addition to the classification of private, collective and public pools.

It defines the responsibilities regarding users of collective and public pools; those responsible for collective and public pool establishments and owners of private pools. Then, it lists the safety equipment required to be installed and the diverse informational required to be made available on signs in the pool area. It requires pool providers to make known the inherent risks associated with the product and establishes penalties for violators. According to the bill, the Municipal Executive is responsible for regulating the law and a grace period of 180 days to get into compliance. Lastly, it modifies the text of clause I of Article 27 of Law 9.394 (December 20, 1996) that establishes guidelines and foundations for national education, to include the importance of personal and collective safety.

The author justifies his proposal with the need to prevent diving accidents caused when a bather, diving into shallow water, can hit his/her head on the pool bottom and suffers injury and frequent spinal trauma with serious consequences.

The following additional bills were enjoined to this legislative bill:

- Bill PL 1.752 of 2007, originating from the Participatory Legislative Committee, that orders the oversight of public use pools. It requires the presence of at least three trained life-guards, requires a series of mandatory equipment and safety signs.

- Bill PL 3.927 of 2008, by Rep. Augusto Carvalho, to set rules for the functioning of collective and public use pools. Classifies swimming pools according to their location and utilization, and defines which are subject to the terms of the law. Defines standards for life-guards, their training, certification, and mandatory equipment. Establishes detailed standards for pool construction, operational equipment, including diving pools, diving platforms, spring boards, sundecks, mechanical room, electrical installations, locker rooms and water quality requirements. Requires those responsible for swimming pools to maintain trained pool operators in accordance with the State Secretary of Health which will maintain a list of requirements. Lastly, it defines the requirement and frequency of health exams, and includes general rules for pool use and general orientation to be provided to pool users. It calls for the regulation to be established by the Executive 60 days after official publication of the law.

- Bill PL 6.502 of 2009, by Rep. Edmar Moreira, that calls for the placement of warning signs in common use pools. It provides the information required to be placed on the signs and establishes penalties for non-compliance.

- Bill PL 7.414 of 2010, by Rep. Dr. Rosinha, that orders safety standards for pool construction. The bill requires that swimming pool hydraulic systems conform to ABNT (Brazilian Association of Technical Standards) technical standards. Requires that water circulation flow rate through drains and grates does not exceed a maximum of 0.6m/s. Requires the installation of at least two floor drains/grates per pool pump connected at a minimum distance of 1.5m from each other. Requires the use of drain covers that prevent the formation of vortexes or hair entanglement.

- Bill 2.537 of 2011, by Rep. Miriquinho Batista calls for standards for safety standards and accident prevention in public and collective use pools. Makes rules for the operation of public and collective pool use, including the availability of life-guards. Establishes rules for fencing around pools as well as necessary safety equipment, and establishes diverse penalties.

- Bill 2.614 of 2011, by Rep. Sr. Jefferson Campos requires the installation of protective fencing around public and private pools in the country. It defines pools and establishes non-compliance penalties.

The proposition was committed to the ordinary rules regime to the Social Welfare and Family Committee (CSSF), Urban Development Committee (CDU) and thte Constitution, Justice and Citizenship Committe (CCJC), for conclusive deliberation by the Committees. Amendments were not presented during the regimental period.

II – VOTE OF THE COMMITTEE REPORTER (RAPPORTEUR)

The principal merit, albiet not the only, of Bill PL 1.162/2007 is to concentrate efforts on accident prevention and safety of pool users (bathers). For either the social, human or economic aspects, prevetion is always preferible to paliative or corrective measures.

Having a principal focus on diving accidents, the bill establishes diverse standards for the use of pools. According to the SARAH Network of Rehabilitation Hospitals, cited by the bill author, 16.9% of these accidents take place in pools. The remainder, 83.1% of these accidents occur in open waters, rivers and lakes, which are impossibly resistant to control or regulation through any legal instrument. It's prevention depends upon public awareness and dissemination of information and should be the object of a permanent educational campaigns.

This partial impact should not detract from the objective and virtues of the initiative which will increase safety measures in pools, producing a cumulative effect of reducing drownings, traumas and other less serious injuries. The only issue, if only to note, is that some actions do not need to be included in the text of the law.

We refer specifically to the Sections IV, V and VI of Art. 4, that requires the placement of warning signs alerting actions and behaviors whose prevention is previously covered in Section II of Art. 3, such as the respective responsibilities of pool owners, administrators and technicians of pool establishments. Signage use is one of the measures that, predictably, the aforementioned responsible parties should utilize to achieve their objective to prevent accidents.

The bill calls for the regulation of the law by the municipal Executive, however, in order to provide greater safety for the public, with clear and dependable rules, it is important that the federal law provides rules for the construction, operation and maintenance of swimming pools in the whole country.

All the other bills presented and herein joined are also deserving of praise, however, after a careful analysis, I conclude with the adoption of an altered substitute clean bill based upon that presented by Rep. Dr. Rosinha.

Brazil leads in the ranking of drownings around the world. In 2000, approximately 5,963 cases of drowning were recorded, a rate of 3.5 deaths per 100,000 inhabitants. In 2008, according to the World Health Organization (WHO), this number increased to 6,800 cases. Approximately 1,800 drowning deaths occurred only in children between the ages of 0 to 14. Many of these cases occurred in swimming pools, caused principally by suction drain entrapments.

In Brazil, drownings is the second leading cause of death in children less than 4 years of age. In order to reverse this sad statistic, it is necessary to enact legislation that specifically deals with this issue.

In 2012, I received in my office a group of experts and parents of suction entrapment victims. On that occasion, a lot of important information was exchanged with suggested amendments for the creation of this substitute clean bill.

The group was comprised of Odele Souza, mother of Flavia who has lived in a coma for the past 16 years; Antônio Carlos Santos, father of Luiza, who died in February 2011; Lawrence Doherty, representative of an American pool safety equipment company; and Augusto César Araújo, of the National Association of Swimming Pool Manufacturers (Anapp). The substitute/clean bill that I am presenting for your consideration, specifically regarding the safety devices, is similar to that approved in 2009 in the United States, which proposed the installation of safety devices in pools and gave a grace period for pool companies to become compliant. The text suggests some device alternatives to prevent suction accidents, such as anti-entrapment drain covers that cover the floor drain, emergency stop button to turn-off the pump manually, atmospheric vent line; gravity feed tank and protective barriers to prevent access by small children to pools. One of the devices mentioned in the market is a Safety Vacuum Release System (SVRS) that operates by sensor and automatically shuts-off the pool pump and disables water suction if an obstruction or blockage is detected on the pool drain.

I propose, in addition, that all private, collective and public pools, existing and in construction in the national territory, are adapted with and required to have install anti-entrapment or non-blockable drain covers to avoid suction vortexes and entanglement of hair or the suction of other body parts or objects such as clothing, jewelry or accessories. The accidents caused by the suction systems of pools can be prevented but for this to happen it is necessary to invest in safety. According to Odele Souza, who created a blog about her daughter's accident, which has become a Brazilian and global point of reference on the necessity of enacting a Law that regulates pool construction and accident prevention. "It is fundamental that swimming pools stop being silent, submerged deathtraps. We shouldn't be held hostage to our pain/loss. What we have to do is work to convert our suffering into something more useful. The Law will not serve my daughter, who is in an irreversible coma, but it will bring me some peace. It will save lives and I am going see a little of my daughter in every healthy child safely playing in a pool", Odele said.

On January 1, 2014, Kauã Davi de Jesus Santos, a seven-year old boy drowned on that Wednesday when his arm was sucked into a pool drain in Caldas Novas. The little boy was rescued by the Fire Department and taken to the city emergency room (UPA). On January 14, 2014, at the same condominium, another accident occurred with a 43 year-old man that had his leg broken after becoming entrapped on the same pool drain.

For all reasons herein provided, we are in favor of approval of Bill PL1.162 of 2007 and all enjoined bills in the form of the presented substitute bill.

Committee Chamber, March 28, 2014

DEPUTADO DARCÍSIO PERONDI
(Representative Darcisio Perondi)

SOCIAL WELFARE AND FAMILY COMMITTEE

Legislative Bill (PL) No. 1.162 of 2007

Joined Bills

(PL 1752/2007, PL 3927/2008, PL 6502/2009, PL 7414/2010, PL 2537/2011 AND PL 2614/2011)

SUBSTITUTIVO DO RELATOR

Orders the prevention of accidents in pools and other measures.

The National Congress decrees:

Art. 1°. This law regulates the prevention of pool accidents in the national territory.

Art. 2º. For the purpose of this law:

I. The term POOL refers to the all installations for the purpose of aquatic activities, being the tank and all components related to its use and operation;

II. The term TANK refers to the reservoir of water for the purpose of aquatic activities

III. The term EQUIPMENT refers to the features used for diving and recreation associated with the Tank, understood as starting blocks, diving platforms, diving boards, and waterslides

IV. Waters with a depth less than 2 meters (6.56 feet) are considered water depths insufficient for headfirst diving and jumping, except for those exemptions to be defined in regulations;

V. The term DRAIN or FLOOR SUMP refers to the feature/device located in the pool floor to permit the catchment of water by the water pump for the circulation and/or drainage of the pool. VI – The term ANTI-ENTRAPMENT DRAIN COVER refers to the safety device that covers the floor sump / drain, permitting the flow of water however prevents the suction of hair or people from the suction force. The anti-entrapment drain cover has to be of a convex form with openings no larger than 10mm, permitting a flow rate of water no greater than 0.6m/s without formation of vortexes and must indicate its product life-span and material composition.

VI. The term UNBLOCKABLE DRAIN COVER refers to a supersized safety floor drain cover with dimensions larger than 46 cm x 58 cm or a diagonal measurement larger than 75 cm that prevents any part of the body from fully blocking the floor drain cover, permitting the water to flow around the body and drain through the cover, thus preventing the entrapment of a person.

VII. The term SAFETY VACUUM RELEASE SYSTEM (SVRS) refers to a safety device that automatically monitors the suction of the water recirculation system and automatically shuts-off the pool/tank pump in less than 3 seconds upon detection of blockage in the pool floor drain.

VIII. The term ATMOSPHERIC VENT LINE refers to a pipe connected to the suction line between the floor drain and the circulation pump, which should be kept open to the atmosphere at a height greater than the pool water level, that alleviates the suction force of the floor drain in case of a blockage.

IX. The term **SUCTION DIFFUSER** refers to a safety devise installed in the floor drain or other suction inlet that permits the flow of water and prevents the formation of vortexes and suction vacuum responsible for entrapment.

X. The term GRAVITY FEED TANK refers to a water supply system comprised of a collector tank in close proximity to the pool from which the pool pump will suck the water for recirculation and which is sealed from bather access. This method of water recirculation, filtration or heating draws water from the collector tank and eliminates direct suction from the floor drain.

XI. The term EMERGENCY STOP BOTTON refers to a safety device that is activated manually and immediately shuts-off the pool pump after activation.

XII. Pools are classified as:

a) Private: those dedicated for restricted residential use;

b) Collective: located clubs, hotels, motels, academies, schools, buildings, residential condominiums, hospitals, rehabilitation centers, or other entities of a private or public nature dedicated to collective use and selection of members by criteria such as association, registration, accommodation, residency or internment;

c) Public: those dedicated to the general public.

Art. 3º. The care for the physical integrity of swimming pool users is a shared responsibility, respectively applicable to:

I. The users of collective or public pools:

a) To manage and maintain responsible and orderly behavior in pools;

b) To respect and make respected the warning signs and pool use rules, including the specific standards for use of the tank and its equipment;

II. The owners, administrators and responsible technicians of collective and public use establishments:

a) To comply with the sanitary and safety standards in the construction and maintenance of pools as further defined in regulation, taking into mandatory consideration, (except for that exempted by regulation), the requirement to isolate the tank from the transit area for spectators and bathers and the necessity to place non-slip surfaces in the pool area;

b) To provide lifeguards that conform to the regulation, to be identifiably dressed, trained and certified by the competent body on life-saving rescue techniques including mandatory, victim rescue, first aid and CPR (except for that which is exempted by regulation);

c) To provide, conforming to regulations, adequate labor conditions for lifeguards aforementioned Art. 3, Section II, clause b, including observation chairs, easily accessible telephone with list of emergency telephone numbers, first aid equipment and station;

d) To provide safety information, in conformance with the terms of this Law, (except for that exempted by regulation);

e) To prohibit access to the tank and its equipment by users that are under the influence of alcohol or drugs;

f) To restrict jumping, flips and diving from areas that do not provide sufficient water depth as prescribed in the terms of Article 2, Section IV, of this law.

§1º Teachers and instructors of swimming, water aerobics, water polo, synchronized swimming, performance diving, and all other physical water activities in pools, being duly trained and exclusively responsible for their students, groups or participating competition athletes, are considered lifeguards for the purpose of this law as per the aforementioned Art. 3, Section II, clause b.

§2º The certification license of life-guards must be easily accessible and available for inspection.

III. The owners of private pools, must comply with the sanitary and safety standards in the construction and maintenance of pools defined in regulation, in addition to the required obligation to maintain a safety device to prevent drowning from falling into the water.

§3º For the purpose of Art. 3, Section III of this law, such safety device includes (among others established in regulation) the following:

I. Fencing and similar barriers that isolate the tank from the transitory area for circulation of bathers and spectators, and they must be equipped with a safety gate with self-closing and self-latching devices whose opening mechanism is a minimum of 1.5m from the ground;
II. Nets, protective covers and similar devices that restrain a foreign body or impede total immersion in the tank;
III. Sensors, alarms, detection systems and similar devices that alert the presence of a foreign body in the internal area of the tank.
IV. Emergency Stop Button, atmospheric vent-line, safety vacuum release system, non-blockable drain cover, anti-entrapment drain cover, that avert suction entrapment.

§4º During the leasing of a pool, the responsibilities prescribed in clauses II and III of this article, automatically convey to the lessee.

Art. 4º. The safety information contained in Art. 3, Section II, Clause (d) of this law consists of:

I. Regular marking of water depth on the pool border and tank walls, at a minimum every 5 meters, that indicates the respective distinct depth contained therein;
II. Warning signage, of a legible size and visible location, indicating regular water depth changes and accident risks contained therein;
III. Warning signage, of a legible size and visible location, recommending the avoidance of diving headfirst in locations of shallow depth as prescribed in Art. 2, Sections IV, of this law;
IV. Warning signage, of a legible size and visible location, indicating the prohibition of entry to the tank and its equipment to those under the influence of alcohol or drugs;
V. Warning signage, of a legible size and visible location, indicating that in the following cases: diving headfirst from the border or equipment into the pool, use of the pool or its equipment under the influence of alcohol or drugs, use of the equipment without technical knowledge/instruction, use of the pool without knowledge of how to swim or swimming instruction, exposes the user to the following risks and can result in:

a) Cervical fracture;
b) Bone injury and paralysis;
c) Near drowning;
d) Death by drowning;
e) Death by entrapment drowning

VI. Warning Signage, of a legible size and location, indicates, at a minimum, the following safety measures to prevent accidents:
a) No running or pushing people in the area surrounding the pool area;
b) Do not use the pool without basic swimming training or knowledge of how to swim;
c) No jumping, flipping or diving headfirst from the pool border or its equipment without prior instruction and training or in shallow depths as per the terms of Art. 2, Section IV of this law;
d) In case of an accident, immediately call for trained personnel and avoid moving the head or neck of the victim

§1º The safety information of this law, contained herein, must be made accessible to all users, including those unable to read.

§2º Folders and other educational materials will be used to complement the required warning information and signage.

§3º As per Law 8.078 of 1990, Article 8 (and single subparagraph), and Article 9, providers/suppliers of pools are required to inform consumers of the risks associated with pool use without the required safety precautions.

Art. 5° It is mandatory for all private, collective and public pools, those existing and under construction, in the national territory to be equipped with anti-entrapment or unblockable drain covers to prevent suction vortexes and the entanglement of hair, and/or suction of other body parts or objects like clothing or jewelry.

Art. 6° It is mandatory for all private, collective and public pools, those existing and under construction, in the national territory, to install in the pool hydraulic system, one of the following alternatives to prevent suction accidents:

I. more than one floor drain, hydraulically balanced with anti-entrapment or unblockable drain covers on the floor drains of the pool;
II. in the case of a single drain pool, install a safety vacuum release system (SVRS) for each pool pump with anti-entrapment and/or unblockable drain cover;
III. an atmospheric vent-line connected to the suction intake line between the pool drain and the circulation pump which should be open to the atmosphere at a height greater than the water level of the pool;

§1º In those cases described in Art. 6, Section I, the floor drains have to be interconnected with a "T" fitting at a distance of a minimum of 0.90m to a maximum of 1.8m center-to-center between the drains;

§ 2º do not have a floor or side-wall drain in the pool hydraulic system, assuring that the suction flow of the hydraulic system draws only from skimmer(s) or channel drain(s) sufficiently to maintain hygienic water conditions conforming to the regulatory sanitary standards.

Art. 7° It is mandatory to install a manual emergency stop button on all systems that use an automatic pool pump to recirculate water.

Single paragraph: the emergency stop button must be installed in a visible location of the pool area and be well marked with easy free access.

Art. 8° All safety products and devices described and defined in this law, anti-entrapment drain covers, safety vacuum release system, **suction diffuser**, and emergency stop button, must be approved by INMETRO.

Art. 9° All manufacturers and importers of equipment and devices used in the pool water recirculation system are required to correctly identify in highly visible, simple and understandable language, the correct relationship that should exist between the strength of the pool pump/filter and the cubic water volume of the pool, including flow and turnover rates, the material composition and durability of all equipment utilized in the water recirculation and treatment systems, such as drains, drain covers, skimmers and related equipment.

Art.10° Those responsible for the construction, operation or maintenance for a pool that does not comply with the clauses of this law and regulations will be subject to the penalties prescribed in civil and criminal legislation.

Art.11° Singular or cumulative non-compliance with the requirements of this Law will subject those responsible for the violations to the following penalties:

I. Warning;
II. Minimum pecuniary fine of 10 day-fine (TBD – 5 to 15 minimum salaries p/day);
III. Temporary interdiction-closure of the pool until the original non-compliant issue is satisfactorily corrected.
IV. Cancelation of the operating permit of the pool, or in the case of recurrence the provider establishment operating license when appropriate. .

§1º Administrative penalties for infractions does not exempt the offender from civil and criminal penalties warranted in each case.

§2º The concession of the operating permit or establishment charter for a facility has a pool is conditional on compliance with the requirements of this Law.

Art.12 The municipal Executive will regulate the requirements of this Law, defining the responsible inspection body and the application of relevant sanctions for infractions.

Art.13 Establishments that maintain public or collective pools will have a period of 1 (one) year from the date of publication of this regulation, to enact the necessary changes to become complaint with this Law. Private pools will have a period of 2 (two) years from the date of publication of this regulation, to enact the necessary changes to become compliant with this Law.

Single paragraph. Pool maintenance companies will also be held responsible for non-compliance with the law.

Committee Chambers, March 28, 2014.

DEPUTADO DARCÍSIO PERONDI
(Representative Darcisio Perondi)

ATTACHMENT 8

Brazil_CSSF-Pool Safety Bill (Portuguese Version)

COMISSÃO DE SEGURIDADE SOCIAL E FAMÍLIA

PROJETO DE LEI N.º 1.162, DE 2007.

Apensados

(PL 1752/2007, PL 3927/2008, PL 6502/ 2009, PL 7414/2010, PL 2537/2011 e PL 2614/2011)

Disciplina a prevenção de acidentes em piscinas, e dá outras providências.

Autor: Deputado Mário Heringer

Relator: Deputado Darcísio Perondi

I - RELATÓRIO

O PL nº 1.162/2007 destina-se a criar e regular medidas de prevenção de acidentes em piscinas. Logo em seu início, em seu art. 2o, aporta definições de vários termos que são empregados no restante do texto, além de uma classificação das piscinas em privativas, coletivas e públicas.

Delimita as responsabilidades concernentes aos usuários de piscinas coletivas e públicas, aos responsáveis pelos estabelecimentos com piscinas coletivas ou públicas e aos proprietários de piscinas privativas. Em seguida, enumera os equipamentos de segurança de instalação obrigatória e diversas informações a serem disponibilizadas por sinalização nas imediações das piscinas. Obriga os fornecedores de piscinas a informar os riscos inerentes ao produto, e estabelece penalidades para os infratores. Segundo o projeto, caberá ao Executivo municipal a regulamentação da lei, com prazo de cento e oitenta dias para adequação. Por último, altera a redação do inciso I do art. 27 da Lei nº 9.394, de 20 de dezembro de 1996, que estabelece as diretrizes e bases da educação nacional, para introduzir como diretriz nos currículos escolares a valorização da segurança pessoal e coletiva.

O autor justifica a proposição pela necessidade de prevenir os acidentes por mergulho, nos quais o banhista, ao mergulhar em água rasa, choca a cabeça contra o fundo e sofre trauma e frequentemente lesão medular, com sérias consequências.

O projeto recebeu os seguintes apensos:

- Projeto de Lei nº 1.752, de 2007, oriundo da Comissão de Legislação Participativa, que dispõe sobre a vigilância das piscinas de uso público. Obriga a presença de no mínimo três guarda-vidas habilitados, estabelece um rol de equipamentos indispensáveis e a sinalização de segurança.

- Projeto de Lei nº 3.927, de 2008, do Sr. Augusto Carvalho, que dispõe sobre o funcionamento de piscinas coletivas e públicas. Traz classificação das piscinas conforme a sua localização e utilização, e define quais estarão sujeitas à lei. Define normas para presença de salva-vidas, para o seu treinamento e habilitação e para equipamentos que deverá ter à disposição. Normatiza em detalhe a construção das piscinas, os equipamentos dos quais são dotadas, os tanques de salto, trampolins e plataformas, solário, casa de máquinas, instalações elétricas, vestiários e exigências de qualidade da água. Estabelece que os responsáveis pelas piscinas manterão operadores habilitados perante a Secretaria de Estado de Saúde que terão um rol de obrigações. Por fim, dispõe sobre a obrigatoriedade e periodicidade dos exames de saúde, e acrescenta disposições gerais sobre o uso de piscinas e as orientações a serem ministradas a banhistas em geral. Prevê regulamentação pelo executivo em sessenta dias da publicação da lei.

- Projeto de Lei n.º 6.502, de 2.009, do Sr. Edmar Moreira, que dispõe sobre a afixação de placa de advertência em piscinas de uso comum. Traz as informações que deverão constar nas placas. Fixa multa pelo descumprimento da Lei.

- Projeto de Lei n.º 7.414, de 2.010, do Dr. Rosinha, que dispõe sobre normas de segurança para a construção de piscinas. O projeto exige que o sistema hidráulico de piscina deve estar de acordo com o disposto em norma técnica da Associação Brasileira de Normas Técnicas – ABNT. Dispõe que a velocidade de passagem da água pelos drenos e grades de fundo do sistema hidráulico da piscina deve ser de no máximo 0,6m/s Obriga a instalação no sistema hidráulico de piscina de no mínimo dois drenos ou grades de fundo por moto bomba, interligados numa distância mínima de um metro e meio entre eles. Obriga a utilização de tampas de dreno que previnam o turbilhonamento e o enlace de cabelos.

- Projeto de Lei n.º 2.537, de 2011, do Sr. Miriquinho Batista que dispõe sobre normas de segurança e prevenção de acidentes em piscinas de uso público e coletivo. Dispõe sobre o funcionamento de piscinas de uso público e coletivo, inclusive com as regras para a disponibilização de salva-vidas. Estabelece as regras para o uso de grades em torno das piscinas, bem como os equipamentos de seguranças necessários. Estabelece diversas penalidades.

- Projeto de Lei n.º 2.614, de 2011, do Sr. Jefferson Campos que torna obrigatória a instalação de grade de proteção em volta de piscinas publicas e privadas no país. Define piscina e estabelece penalidades.

A proposição foi encaminhada em regime de tramitação ordinária às Comissões de Seguridade Social e Família (CSSF), de Desenvolvimento Urbano (CDU) e de Constituição e Justiça e Cidadania (CCJC), com apreciação conclusiva pelas Comissões. Não foram apresentadas emendas no prazo regimental.

II - VOTO DO RELATOR

O mérito principal, mas não o único, do PL nº 1.162/2007, está em concentrar esforços na segurança e prevenção de acidentes de banhistas. Seja pelos aspectos humanos sociais ou econômicos, a prevenção é sempre preferível às medidas corretivas ou paliativas.

Tendo seu foco principal nos acidentes em mergulho, o projeto estabelece diversas normas para uso de piscinas. Nestas, segundo a pesquisa da Rede Sarah de Hospitais de Reabilitação, citada pelo próprio autor, ocorrem não mais de 16,9% dos acidentes desse tipo. Os restantes 83,1%, que ocorrem em praias, rios e lagos, são, malfadadamente, refratários a qualquer tentativa de prevenção por instrumento legal, dada a impossibilidade de exercer o necessário controle. Sua prevenção depende de informação e conscientização, e deveria ser objeto de campanhas educativas permanentes.

O impacto parcial em nada diminui as virtudes da iniciativa que, ao ampliar as medidas de segurança em piscinas, teria o efeito cumulativo de reduzir também a ocorrência de afogamentos e outros traumatismos menos graves. O único senão a apontar seriam algumas disposições que não necessitariam constar em texto de lei.

Referimo-nos especificamente aos incisos IV, V e VI do art. 4o, que obrigam a colocação de sinalização de alerta contra atitudes e situações cuja prevenção já se encontra no inciso II do art. 3o, como de responsabilidade dos proprietários, administradores e responsáveis técnicos pelos estabelecimentos com piscinas. A sinalização é uma das medidas de que, previsivelmente, aqueles agentes deverão valer-se para alcançar sua finalidade de evitar acidentes.

O projeto prevê a regulamentação da lei pelo Executivo municipal, entretanto, para que possamos dar uma segurança maior à população, com regras claras e seguras, é importante que a lei federal traga o regramento para a construção, funcionamento e manutenção das piscinas em todo o país.

Todos os demais projetos apresentados e que se encontram apensados são extremamente meritórios, entretanto, após uma análise mais apurada, conclui pela adoção de um substitutivo a partir do projeto apresentado pelo Deputado Dr. Rosinha.

O Brasil lidera o ranking de afogamentos no mundo. Em 2000 aconteceram 5.963 casos, com um índice de 3,5 mortes por cada 100 mil habitantes. Em 2008, segundo a Organização Mundial de Saúde (OMS), esse número subiu para 6.800 casos. Só entre crianças de 0 a 14 anos, aconteceram mais de 1.800 mortes no País. Muitos desses casos aconteceram dentro de piscinas, provocados principalmente pela sucção de ralos.

No Brasil, o afogamento é a segunda maior causa de mortes entre crianças de até 3 anos de idade. Para tentar reverter essa triste estatística é preciso uma legislação específica que trate a matéria.

Em 2012 recebi em meu gabinete um grupo de técnicos e pais de vítimas da sucção de ralos de piscinas. Na ocasião, foram repassadas informações importantes e sugestões de Emendas para a elaboração desse Substitutivo.

Integravam o grupo, Odele Souza, mãe de Flávia, que há 16 anos vive em coma; Antônio Carlos Santos, pai de Luiza, falecida em fevereiro de 2011; Lawrence Doherty, representante de uma empresa americana de equipamentos de segurança; e Augusto César Araújo, da Associação Nacional de Fabricantes de Piscinas (Anapp). O substitutivo que estou apresentando para apreciação de Vossas Excelências, no que diz respeito aos dispositivos de segurança, é semelhante ao aprovado em 2009 pelos Estados Unidos, que propõe a instalação de dispositivos de segurança nas piscinas e dá prazo para que as empresas fabricantes se adequem. O texto sugere algumas opções de dispositivos para evitar acidentes por sucção, como tampa antiaprisionamento, que cobre o ralo de fundo, botão de emergência para desligamento da bomba, respiro atmosférico, tanque de gravidade e barreiras de proteção para impedir o acesso de crianças pequenas à piscina. Um dos dispositivos no mercado é o Sistema de Segurança de Liberação de Vácuo (SSLV), que funciona por sensor e automaticamente desliga a bomba da piscina ao mesmo tempo em que desativa a sucção da água se for detectada a obstrução ou bloqueio no ralo da piscina.

Proponho, ainda, que todas as piscinas privativas, coletivas e públicas, existentes e em construção no território nacional, se adequem e passe a ser obrigatória a instalação de tampas antiaprisionamento ou tampas não bloqueáveis para evitar o turbilhonamento e o enlace de cabelos, bem como a sucção de outros membros do corpo humano ou objetos como roupas e acessórios. Os acidentes causados pelos sistemas de sucção das piscinas podem ser evitados, mas para isso é preciso que se invista em segurança. Segundo Odele Souza, que criou um blog sobre o acidente de sua filha e que virou referência no Brasil e no mundo, sobre a necessidade da aprovação de uma Lei que regule a construção a prevenção de acidentes em piscinas. "É fundamental para que as piscinas deixem de ser armadilhas silenciosas e submersas. Não devemos ser reféns de nossa dor. Temos é que trabalhar essa dor de maneira que ela seja útil. A Lei não vai servir para minha filha, que está em coma irreversível, mas ela vai me trazer um pouco de paz. Ela vai salvar vidas e eu vou ver em cada criança saudável brincando na piscina, um pouco da minha filha", afirmou Odele.

No dia 1º de janeiro de 2.014 o garoto Kauã Davi de Jesus Santos, de 7 anos, se afogou nesta quarta-feira após ter o braço sugado pelo ralo de uma piscina, em Caldas Novas. O menino foi resgatado pelo Corpo de Bombeiros e levado para a Unidade de Pronto Atendimento (UPA) da cidade. No dia 14 de janeiro no mesmo condomínio um novo acidente ocorreu e um senhor de 43 anos teve a perna quebrada após ficar preso em ralo na mesma piscina.

Por todo o exposto, somos favoráveis pela aprovação do Projeto de Lei 1162, de 2007 e dos demais apensados, na forma do substitutivo apresentado.

Sala das sessões,   de março de 2014.

DEPUTADO DARCÍSIO PERONDI

COMISSÃO DE SEGURIDADE SOCIAL E FAMÍLIA

PROJETO DE LEI N.º 1.162, DE 2007.

Apensados

(PL 1752/2007, PL 3927/2008, PL 6502/ 2009, PL 7414/2010, PL 2537/2011 e PL 2614/2011)

SUBSTITUTIVO DO RELATOR

Disciplina a prevenção de acidentes em piscinas, e dá outras providências.

O Congresso Nacional decreta:

Art. 1°. Esta lei disciplina a prevenção de acidentes em piscinas no território nacional.

Art. 2º. Para efeito do disposto nesta Lei:
I – O termo PISCINA designa o conjunto de instalações destinadas às atividades aquáticas, compreendendo o tanque e demais componentes relacionados com seu uso e funcionamento;
II – O termo TANQUE designa o reservatório destinado à prática de atividades aquáticas;
III – O termo EQUIPAMENTOS designa os equipamentos de salto e lazer associados ao tanque, compreendendo, blocos de saída, plataformas de salto, trampolins, escorregadores e toboáguas;
IV – Águas com profundidade inferior a 2m são consideradas com profundidade insuficiente para mergulhos e saltos de ponta, salvo as exceções definidas em regulamento;
V. O termo DRENO OU RALO DE FUNDO designa dispositivo colocado no fundo da piscina para permitir a captação da água pela motobomba para a recirculação e/ou escoamento da mesma.

VI. O termo TAMPA ANTI-APRISIONAMENTO designa o dispositivo de segurança que cobre o ralo de fundo, permitindo o escoamento de água, porém impedindo a sucção de cabelos ou mesmo de pessoas pela força da sucção. A tampa anti-aprisionamento tem que estar num formato abaulado com aberturas de no máximo 10mm, permitindo o fluxo de água na velocidade máxima de 0,6m/s sem provocar a formação de vórtices e deve obrigatoriamente constar seu tempo de vida e características do material.

VII. O termo TAMPA NÃO BLOQUEÁVEL designa o dispositivo de segurança que cobre o dreno de fundo com a tampa superdimensionada, com dimensões maiores de 46 x 58 cm ou com diagonal maior de 75 cm e evita que qualquer parte do corpo bloqueie toda a tampa do ralo de fundo, permitindo que a água possa passar ao redor do corpo e escoe pela tampa, evitando assim que a pessoa fique presa.

VIII. O termo SISTEMA DE SEGURANÇA DE LIBERAÇÃO DE VÁCUO (SSLV) designa o dispositivo de segurança que automaticamente monitora a sucção (vácuo) do sistema de recirculação de água da piscina e automaticamente desliga a motobomba da piscina ou tanque em menos de três segundos após detectar uma obstrução no ralo de fundo.

IX. O termo RESPIRO ATMOSFÉRICO designa um tubo conectado à linha de sucção entre o ralo de fundo e a motobomba e deve ser aberto para a atmosfera com altura superior ao nível de água da piscina, que alivia a sucção do ralo de fundo no caso de seu bloqueio.

X. O termo DIFUSOR DE SUCÇÃO designa um dispositivo de segurança instalado dentro do ralo de fundo ou outra boca de sucção que permite o escoamento da água e previne a formação de vórtices e o vácuo de sucção, responsável pelo risco de aprisionamento.

XI. O termo TANQUE DE GRAVIDADE designa um sistema de alimentação de água composto por um tanque coletor paralelo próximo à piscina, por onde a água será sugada pela moto bomba e onde não há acesso de banhistas. Este método de recircular, filtrar e/ou aquecer elimina a sucção direta do dreno de fundo e retira a água do tanque de coletor.

XII. O termo BOTÃO DE PARADA DE EMERGÊNCIA designa o dispositivo de segurança que manualmente acionado, desliga a moto bomba da piscina imediatamente após ser ativado.

XIII – As piscinas são classificadas em:

a) Privativas: destinadas ao uso doméstico restrito;
b) Coletivas: localizadas em clubes, hotéis, motéis, academias, escolas, edifícios, condomínios residenciais, hospitais, centros de reabilitação ou outras entidades de natureza privada ou pública em que haja uso coletivo e seleção dos usuários

por critérios tais como de associação, matrícula, hospedagem, moradia ou internação;
c) Públicas: destinadas ao público em geral.

Art. 3º. O cuidado com a integridade física dos usuários de piscinas é de responsabilidade compartida, cabendo, respectivamente:
I – Aos usuários de piscinas coletivas ou públicas:
a) manter e zelar para a manutenção de comportamento responsável e defensivo na piscina;
b) respeitar e fazer respeitar a sinalização de advertência e as normas de utilização da piscina, incluindo normas específicas para utilização do tanque e dos equipamentos;
II – Aos proprietários, administradores e responsáveis técnicos dos estabelecimentos que possuem piscina coletiva ou pública:
a) Respeitar, na construção e manutenção das piscinas, as normas sanitárias e de segurança definidas em regulamento, considerando, obrigatoriamente, salvo nos casos excepcionados pelo regulamento, a necessidade de isolamento do tanque em relação à área de trânsito dos espectadores e banhistas e a necessidade de colocação de piso anti-derrapante na área da piscina;
b) Disponibilizar salva-vidas, conforme regulamento, que sejam identificavelmente trajados, treinados e credenciados por órgão competente sobre as técnicas de salvamento, incluindo, obrigatoriamente, resgate da vítima, primeiros socorros e respiração artificial, salvo nos casos excepcionados pelo regulamento;
c) Disponibilizar, conforme regulamento, condições de trabalho adequadas aos salva-vidas de que trata a alínea "b", incluindo, cadeiras de observação, telefone de fácil acesso com lista dos números para emergência, instalações e equipamentos de pronto-atendimento;
d) Disponibilizar informações de segurança, nos termos desta Lei, salvo nos casos excepcionados pelo regulamento;
e) Proibir o acesso ao tanque e aos equipamentos de usuários sob efeito de álcool ou drogas;
f) Coibir saltos, acrobacias e mergulhos de ponta em locais cuja profundidade da água seja considerada insuficiente nos termos do inciso IV, artigo 2º, desta Lei.

§1º Os professores ou instrutores de natação, hidroginástica, pólo aquático, nado sincronizado, saltos ornamentais e demais atividades físicas realizadas em piscina, desde que devidamente treinados e exclusivamente responsabilizados por suas próprias turmas de alunos ou pelos atletas participantes de competições, são considerados salva-vidas, para os fins do disposto na alínea "b" deste inciso.

§2º O Certificado de Habilitação do salva-vidas deverá ficar em local de fácil acesso à fiscalização.

III - Aos proprietários de piscinas privativas, respeitar, na construção e manutenção das piscinas, as normas sanitárias e de segurança definidas em regulamento, considerando, obrigatoriamente, a manutenção de dispositivo de segurança para prevenção de afogamento por queda na água.

§3º Para os efeitos do disposto no inciso III deste artigo, consideram-se dispositivos de segurança, dentre outros estabelecidos em regulamento:
I – Grades, cercas e similares que assegurem o isolamento do tanque em relação à área de circulação dos banhistas e espectadores, e, deverão estar equipadas com portão de segurança com dispositivo de fechamento automático e trinco auto-travante com mecanismo de abertura com altura mínima de 1.5m do piso;
II – Redes, capas e similares que assegurem contenção de corpo estranho, impedindo a imersão total no tanque;
III – Sensores, alarmes, sistemas de detecção e similares que informem a presença de corpo estranho na área interna do tanque.
IV - Botão de parada de emergência, respiro atmosférico, sistema de segurança de liberação de vácuo, tampa não bloqueável, tampa anti-aprisionamento, que evitem o aprisionamento por sucção.

§4º Durante o arrendamento da piscina, as responsabilidades dispostas nos incisos II e III deste artigo são automaticamente transferidas para o arrendatário.

Art. 4º. As informações de segurança de que trata a alínea “d”, inciso II, art. 2º desta Lei consistem em:
I – Sinalização da profundidade regular da água nas bordas e nas paredes do tanque, a cada cinco metros, no mínimo, com indicação de distintas profundidades, quando couber;
II – Sinalização de alerta, em lugar visível e tamanho legível, indicando alteração da profundidade regular da água e risco de acidentes, quando couber;
III – Sinalização de alerta, em lugar visível e tamanho legível, recomendando a que se evite o mergulho de ponta em locais cuja profundidade da água seja considerada insuficiente nos termos do disposto no inciso IV, artigo 2º, desta Lei;
IV – Sinalização de alerta, em lugar visível e tamanho legível, indicando proibição de acesso ao tanque e aos equipamentos sob efeito de álcool ou drogas;
V – Sinalização, em lugar visível e tamanho legível, indicando, para os casos de mergulhos de ponta a partir da borda e dos equipamentos, uso do tanque sob efeito de álcool ou drogas, uso dos equipamentos sem domínio técnico de salto em água, uso do tanque sem treinamento em natação ou natação instrumental, a exposição a, pelo menos, os seguintes riscos:
a) Fratura cervical;
b) Lesão medular de tipo tetraplegia;

c) Anoxia;
d) Morte por afogamento;
e) Morte por sucção.
VI – Sinalização, em lugar visível e tamanho legível, indicando, no mínimo, as seguintes medidas de prevenção contra acidentes:
a) Não correr ou empurrar pessoas na área circundante ao tanque;
b) Não utilizar o tanque sem treinamento mínimo em natação ou natação instrumental;
c) Não saltar, realizar acrobacia ou mergulhar de ponta a partir da borda e dos equipamentos sem domínio técnico de salto em água ou em área com profundidade insuficiente, nos termos do inciso IV, art. 2º desta Lei;
d) Em caso de acidente, chamar imediatamente por socorro especializado e evitar mover a cabeça ou o pescoço da vítima.

§1º As informações de segurança de que trata o *caput* deverão ser acessíveis, inclusive, aos usuários sem alfabetização.

§2º Folders e outros instrumentos educativos serão utilizados a título de complementação das sinalizações obrigatórias de informação.

§3º Ficam os fornecedores de piscinas obrigados, nos termos do art. 8º, *caput* e parágrafo único, e do art. 9º da Lei nº 8.078, de 11 de setembro de 1990, a informar os riscos que seu produto oferece aos consumidores se utilizado sem as devidas precauções de segurança.

Art. 5° É obrigatório para todas as piscinas privativas, coletivas e públicas, existentes e em construção no território nacional, estarem equipadas com tampas anti-aprisionamento ou tampas não bloqueáveis para evitar o turbilhonamento e o enlace de cabelos, e/ou a sucção de outros membros do corpo humano ou objetos como roupas e/ou jóias.

Art. 6° Torna obrigatório em todas as piscinas privativas, coletivas e públicas, existentes e em construção no território nacional, instalar no sistema hidráulico da piscina, uma das seguintes alternativas para evitar acidentes de sucção:

I - mais que um dreno de fundo, hidraulicamente balanceados com tampas anti-prisionamento e ou tampas não bloqueáveis nos ralos de fundo de piscina;
II - sistema de liberação de vácuo (SSLV) por moto bomba de piscina com tampas anti-prisionamento e ou tampas não bloqueáveis no ralo de fundo, no caso das piscinas com um único ralo de fundo;
III – um tubo de respiro atmosférico conectado à linha de sucção entre o dreno de fundo e a motobomba aberto para a atmosfera com altura superior ao nível de água da piscina;

§1º Nos casos previstos no inciso I, os drenos de fundo têm que ser interligados com união “T”, numa distancia mínima de 0.90m e máxima à 1.80m, centro à centro entre drenos;
§ 2º não ter um dreno de fundo ou um dreno colocado na parede no sistema hidráulico da piscina, assegurando que a sucção do sistema hidráulico somente passe por coadeiras e/ou canaletas suficientes para o saneamento total da água de piscina conforme as normas sanitárias em regulamento.

Art. 7°– Torna obrigatória a instalação de um botão manual de parada de emergência em todos os sistemas que utilizem a moto bomba automática para recircular a água.
Parágrafo único: o botão de parada de emergência deverá estar em local visível na área da piscina, bem sinalizado e de livre acesso.

Art. 8° Todos os produtos e ou dispositivos de segurança para piscina descritos e definidos nesta lei, quer sejam tampas anti-aprisionamento, sistema de segurança de liberação de vácuo, difusor de sucção, e botão de parada de emergência, deverão ser homologados pelo INMETRO.

Art. 9°Torna obrigatória por parte dos fabricantes e importadores de equipamentos e dispositivos destinados à recirculação de água para piscinas a correta identificação nos manuais e embalagens de seus produtos, em letras destacadas e em linguagem simples, a correta relação que deve existir entre a potência do motobomba/filtro e a metragem cúbica de água da piscina, assim como informações técnicas como vazão, material utilizado e durabilidade de todos os equipamentos utilizados no sistema de recirculação e tratamento da água, como drenos, tampas, coadeiras, e demais equipamentos.

Art.10° O responsável pela construção, operação ou manutenção de piscina em desacordo com o disposto nesta Lei e em regulamento estará sujeito às penalidades previstas na legislação civil e penal.

Art.11° As infrações ao disposto nesta Lei sujeitam os infratores, isolada ou cumulativamente, às seguintes penalidades:
I – Advertência;
II – Multa pecuniária mínima de 10 dias-multa;
III – Interdição da piscina, quando couber, até sanado o problema que originou a respectiva penalidade;
IV – Cassação da autorização para funcionamento da piscina ou do estabelecimento fornecedor, em caso de reincidência, quando couber.

§1º As penalidades administrativas não isentam os infratores das responsabilidades cíveis e penais cabíveis em cada caso.

§2º A concessão do “habite-se” ou do alvará para funcionamento de edificação ou estabelecimento com piscina fica condicionada ao atendimento do disposto nesta Lei.

Art.12. O Executivo municipal regulamentará o disposto nesta Lei, definindo os órgãos responsáveis pela fiscalização e pela aplicação das sanções cabíveis nos casos de infração.

Art. 13 Os estabelecimentos que mantenham piscinas públicas ou coletivas terão um prazo de um ano a partir da publicação do regulamento, para promoverem as adaptações necessárias ao cumprimento desta Lei. As piscinas privativas terão um prazo de dois anos a partir da publicação do regulamento para promoverem as adaptações necessárias ao cumprimento desta Lei.

Parágrafo único. As empresas de manutenção de piscinas responderão solidariamente pelo descumprimento da lei.

Sala das sessões,   de março de 2014.

DEPUTADO DARCÍSIO PERONDI