



CWS White Paper

PoolMoss[®] and Water Management
Swimming Pool Membranes and Liners

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Introduction

Pool membranes and liners are like our skin. They provide a surface barrier between the complex chemistry and biology of the pool water and the supporting structure of the pool. Like our skin, there is a constantly changing biology, often microscopic, that depends on the suspended ions, chemicals, molecules, bacteria, cells, organic contamination, temperature, UV and physical damage that impact the barrier. If you step on a rusty nail that penetrates the skin on the bottom of your foot, the thick skin barrier of your foot is broken, bacteria that live on your skin invade the supporting tissue beneath your skin, and a complex reaction of cells, chemicals and tissue reactions occur to seal the hole, kill the bacteria, get you to not step on the wound by creating pain, allowing the skin and tissue to heal.

The membrane or liner of a pool provides a similar barrier. Unfortunately it is not alive and cannot heal itself. We can help minimize the damage to the barrier by controlling the chemicals and damage that opens the membrane to the same organic contamination and its destructive forces that can destroy the barrier function of the skin. In this discussion, we will look at the interaction between physical damage, pool chemicals, organic contamination, and the effect of PoolMoss[®] - on pool water and liner/membrane barrier function.

Physical Damage and Liner/Membrane Barrier Function

During my previous life as a vascular surgeon and specialist in wounds, I spent years in the clinic and my research lab trying to understand the process of physical wounding and wound healing. For the Wound Healing Society I was part of a group that standardized how we look at (and describe) wounds and wound healing. We defined a wound as a disruption in tissue function. Most of us think of wounds as cuts, scrapes and severe burns caused by trauma. Sunburn and a rash from poison ivy are also wounds that require healing. Anything that disrupts the normal barrier function on the skin is a wound.

Physical trauma and UV rays from the sun also damage a pool membrane or liner. Compared to the skin, a pool liner is a lot tougher, but repeated pressure, shear, and punctures from pool accessories, result in perforations. UV energy also changes the chemical strength of the liner making it even more susceptible to physical damage.

Just like our skin, once the barrier function is breached the destructive forces of physical shear and pressure, chemicals, and organic contamination invade the underlying structure and start to degrade the support. In skin, it is the subcutaneous tissue and muscle; in a pool it is the steel, cement, or fiberglass. Fortunately for all of us, our wounds usually heal quickly, skin grows back over the wound and we usually go on to regain or pre-wounding function. Unfortunately for pools, the membranes and liners don't heal and the process of destruction continues until the problem is fixed by repair or replacement of the membrane or liner.



Pool Chemicals and Liner/Membrane Function

Pool membranes and liners are made from polymers that are damaged by high concentrations of oxidizers (like hypochlorous acid). As the polymers are oxidized, they become brittle and more susceptible to physical damage. Once the physical damage causes a perforation in the membrane or liner, the oxidation process then attacks the underside of the membrane and the supporting structure.

It is important to deliver enough hypochlorous acid to the pool to maintain oxidation in the range needed to kill microorganisms. This usually results in an Oxidative Reductive Potential of around 750. Driving it higher doesn't kill more microorganisms; it just increases the oxidative potential in the water and destroys everything it touches.

Many chemicals sold by pool supply companies in their local markets may contain unlisted ingredients that can cause severe damage especially if added directly to the pool in concentrated form.

Organic Contamination and Liner/Membrane Function

Organic contamination on pool surfaces is now proven to contribute to chlorine consumption, pH instability, corrosion, scale formation and membrane destruction. It is a complex biologic – chemical interaction that results in very low pH at the membrane – organic contamination interface; a small current in the interface; absorption of pool chemicals at the water – organic contamination interface and production of disinfection by products. Removing this organic contamination is very difficult. To completely remove it requires boiling in acid at a pH below 2. That not only destroys the organic contamination, it destroys the pool and its components as well. Many pool water treatment products, such as enzyme cocktails, claim to reduce or remove organic contamination. We have tested many of these in our laboratory and found that some actually increase organic contamination while others reduce it by 30-50%.

If the pool membrane or liner is perforated, the organic contamination of the surface now has access to the underside of the membrane and the supporting structures of the pool. The low pH and other properties of organic contamination can then separate the liner from its supporting structure and attack the membrane from two sides. This process can spread from a single perforation site to affect large areas of the pool surface. Once this occurs, repairing the membrane or liner is very difficult, often resulting in total replacement of the membrane or liner.

Perforation is a two way street. Once the barrier function is compromised water, chemicals and organics from the pool structure and eventually the ground around the pool structure gain access to the membrane water surface, adding another source for contamination and formation of even more aggressive organic contamination.

PoolMoss[®] Pro and Liner/Membrane Function

PoolMoss[®] pro is a totally natural and renewable pool water treatment product that contains a specific species of Sphagnum moss. An NSF-approved commercial pool product, PoolNaturally[®] Plus is sold by Creative Water Solutions LLC and its distributors and dealers in the US and Canada, and used in over 450 commercial pools and spas.

PoolNaturally® Plus works in conjunction with all approved sanitizers (except Biguanides). It has six major functions that significantly affect pool water treatment and as a result the functionality of pool membranes and liners.

- 1) *Stabilizes pH*
- 2) *Absorbs Metal Ions*
- 3) *Inhibits Organic Contamination Formation*
- 4) *Inhibits Scale*
- 5) *Inhibits Corrosion*
- 6) *Reduces Chemical Consumption*

Customers with pool membranes and liners report that (over time) the organic contamination on their pool surfaces is totally gone, while membranes and liners become less brittle and discolored. Because it is easier to keep free available chlorine at stable levels (no matter the bather load), there is far less need to hyper-chlorinate in order to maintain adequate disinfectant levels. It also reduces the need for high cyanuric acid levels to maintain FAC in outdoor pools. Delivery of cyanuric acid directly to pools can result in very low local pH levels as the acid dissolves, resulting in acidic damage to membranes and liners.

By inhibiting the formation and facilitating the removal of organic contamination for pool surfaces, PoolNaturally® Plus naturally affects the destructive forces associated with its presence.

Conclusion

Pool membranes and liners are an integral component of all pools that are susceptible to physical, chemical, and organic contamination damage. Once perforated, the invasion of organic contamination beneath the membrane causes significant destruction of the underside of the membrane and the supporting pool structure. Using PoolNaturally® Plus with approved disinfectants results in stable pool chemical levels and reduced organic contamination formation. As a result, pool membranes and liners maintain their barrier function far longer, and more dependably. This protects the pool, systems, swimmers, and need for membrane and liner repair or replacement.

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