



Welcome to The Moss

Commercial Pools and Spas



2013 - Quite a Year





Agenda

- The founders
- History
- Science behind the products
- The products
- Real world examples
- Compatibilities and incompatibilities
- Water parameters
- Installation and care
- Questions



Founders

Dr. David
Knighton



Vance Fiegel



Founders

- David
 - Retired vascular surgeon and expert in wound care
 - Trained in chemistry
 - Successful inventor and entrepreneur
 - Published author
 - Pilot
 - Fly fisherman and outdoorsman



Founders

- Vance
 - Biochemist, cellular biologist, and microbiologist
 - Expert in applied science
 - Successful inventor and entrepreneur
 - Fly fisherman and outdoorsman

This is Sphagnum Moss

- Made from one of over 250 species of Sphagnum moss
- Green and Sustainable
- Harvested by hand
- Patented



Sphagnum Moss Bog



Sphagnum Moss Leaves

- Leaves are dried, harvested and cleaned
- Leaves are **not** alive
- CWS product is made from compressed moss leaves





PoolNaturally® Plus

- PoolMoss® Pro





Commercial Pool and Spa Products

PoolNaturally® Plus System



SpaNaturally® Plus System





PoolNaturally® Plus System

- PoolNaturally® Plus and SpaNaturally® Plus treated pools and spas have remarkable water clarity, air quality, and swimming comfort
- Swimmers and bathers report fewer breathing issues, burning eyes, skin discomfort, and a more enjoyable swimming experience





PoolNaturally® Plus System Surge Tank Application

- PoolMoss® Pro is exposed to water using a contact chamber (CC)
- Contact chamber is submerged inside the surge/balance tank
- Flow within the tank allows exposure of PoolMoss® Pro leaves to the water



CC-STL/STS Installation





What is an Offline Contact Chamber

- An offline contact chamber (CC) is the apparatus used to expose PoolMoss® Pro to the pool water
- The CC-140 (shown here) allows water to flow over and through PoolMoss® Pro





CC-80/90/140/150

NSF 50 Listed



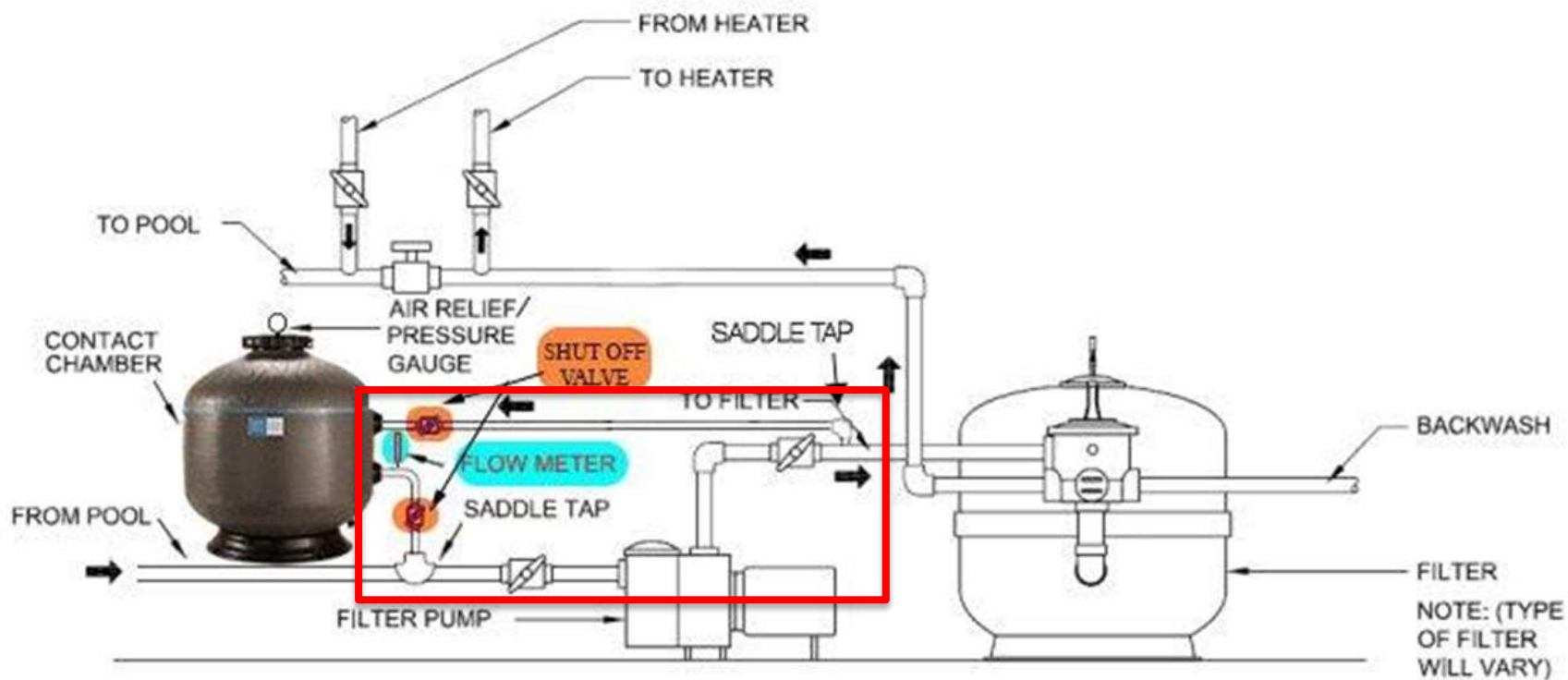
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NSF/ANSI Standard 50



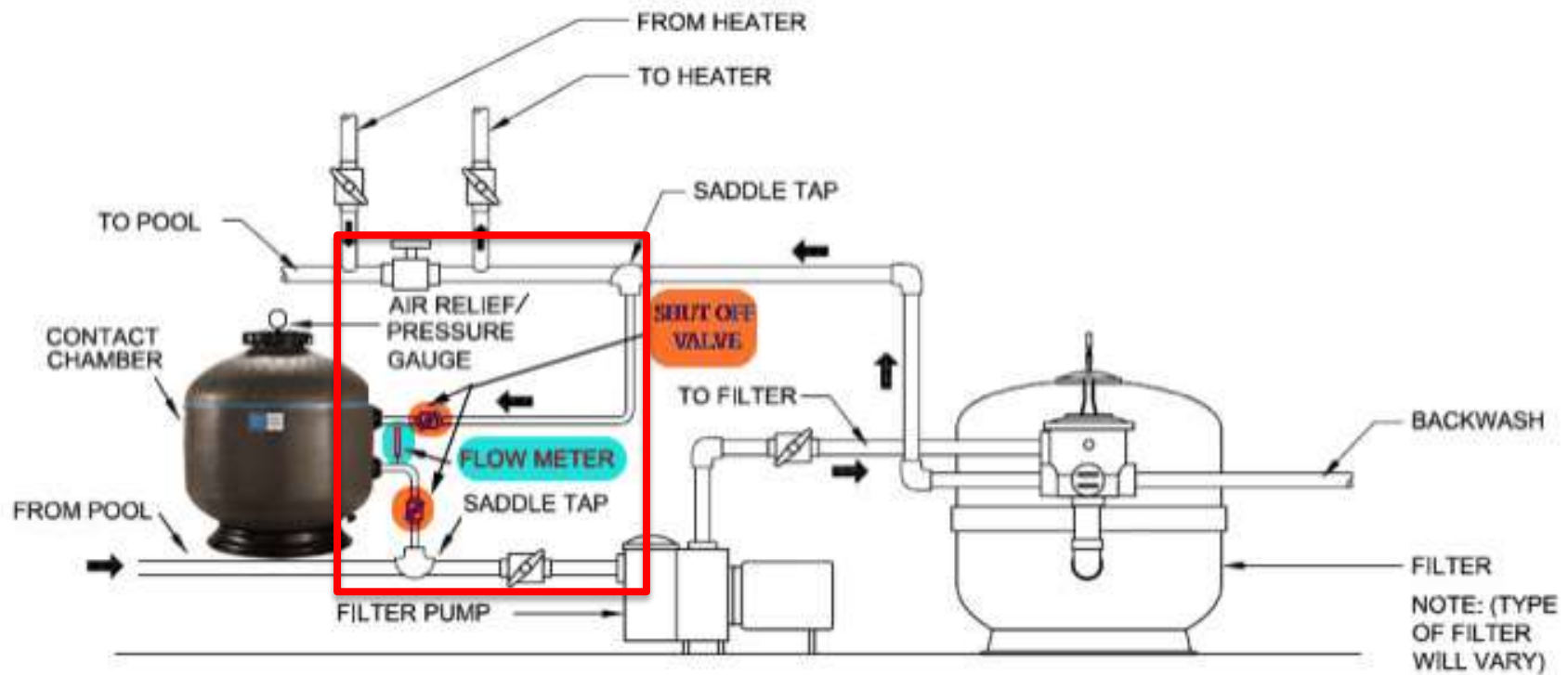
Contact Chambers

Contact Chamber	ProMoss [®] Pro Bags	Chamber Volume/gallons	Chamber Diameter/inches
CC - 80	3	45	19
CC - 90	6	60	24
CC - 140	12	250	36
CC - 150	16	400	40

Installation of CC-80/90/140/150 Contact Chambers – Option 1



Installation of CC-80/90/140/150 Contact Chambers – Option 2





PoolMoss® Pro and SpaMoss® Pro Benefits and Results

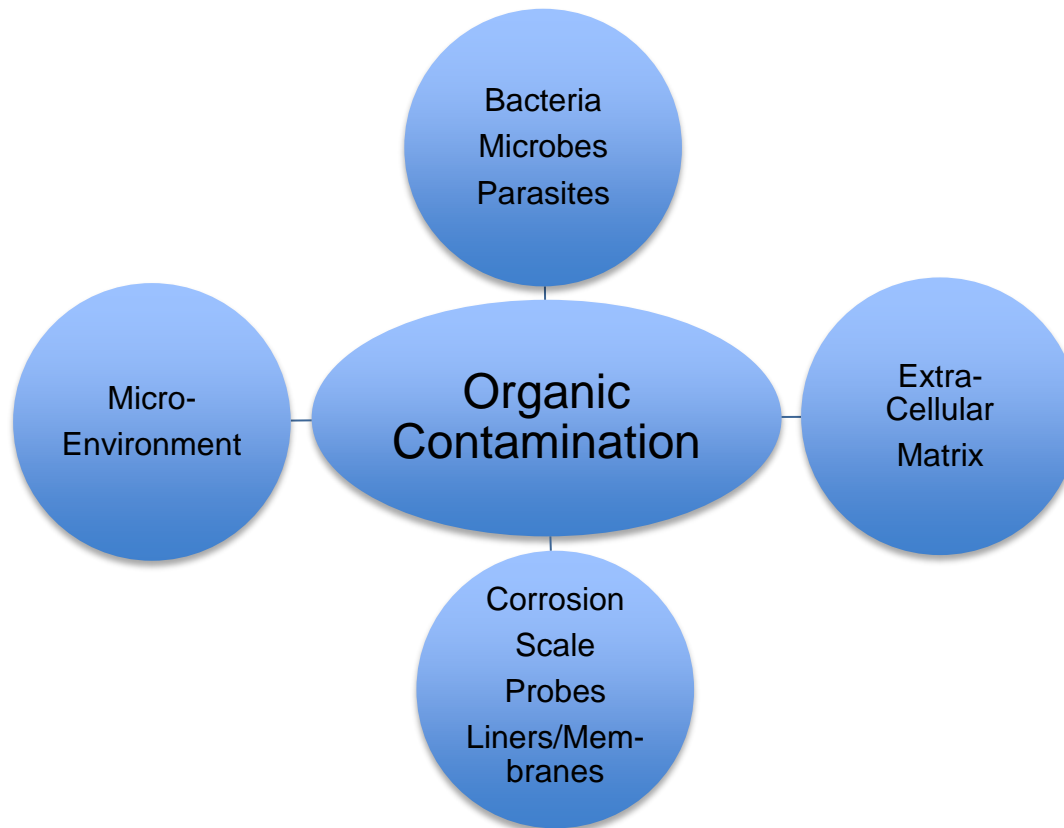
KEY RESULTS

- Improved Water Quality
- Improved Air Quality
- Stabilized pH and Alkalinity
- Reduced Scale and Staining
- Reduced Corrosion

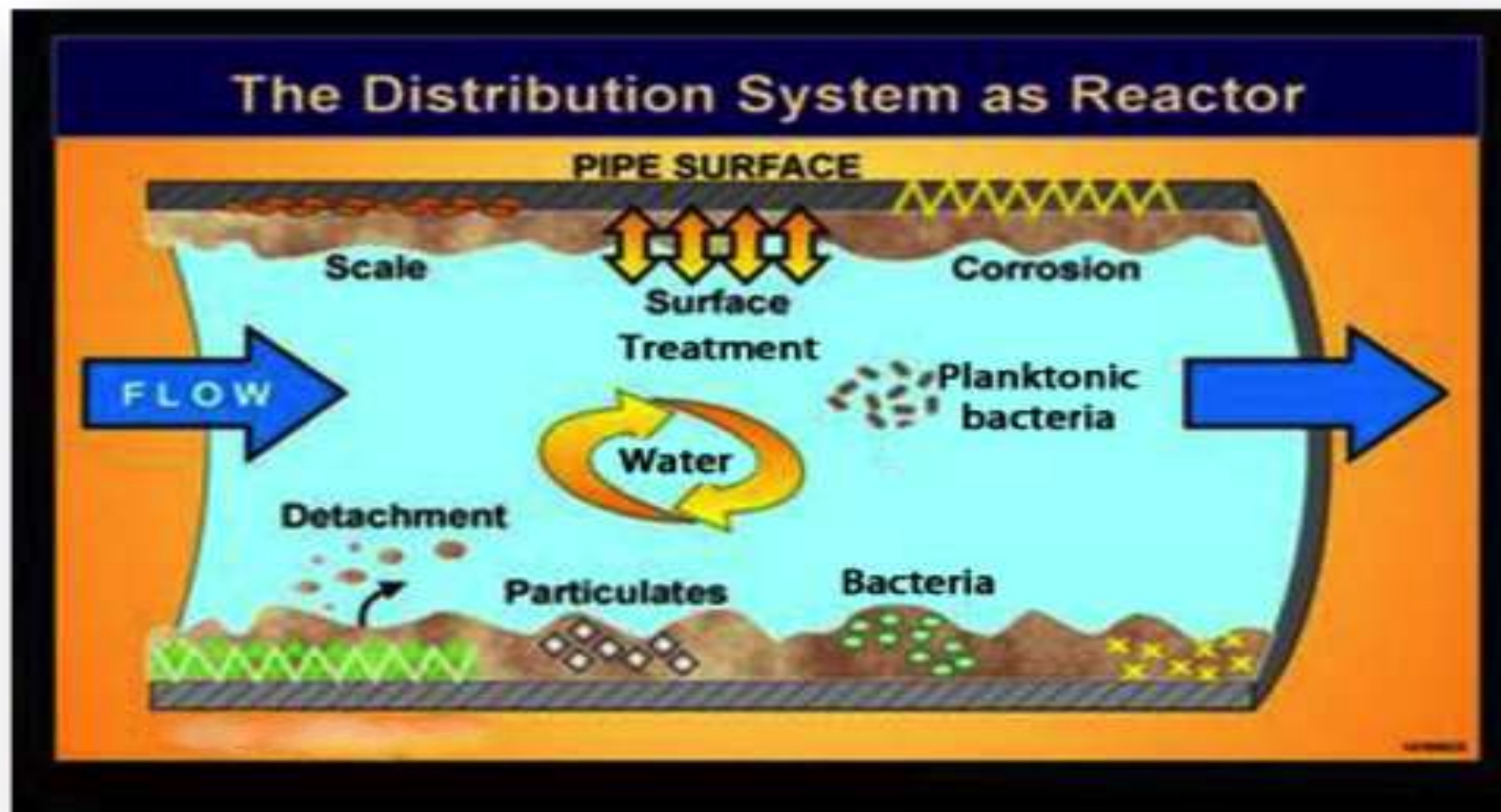
KEY BENEFITS

- Reduced Chemical Usage
- Reduced Water Usage
- Reduced Energy Usage
- Reduced Maintenance
- More Enjoyment

Organic Contamination Science Behind the Products



Surfaces and Organic Contamination Science Behind the Products





Cooling Tower Example

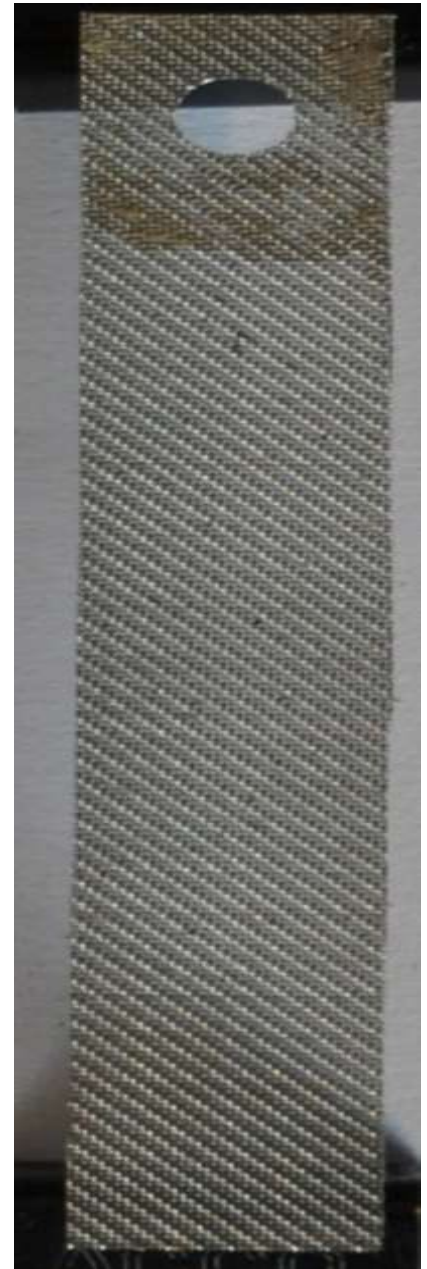
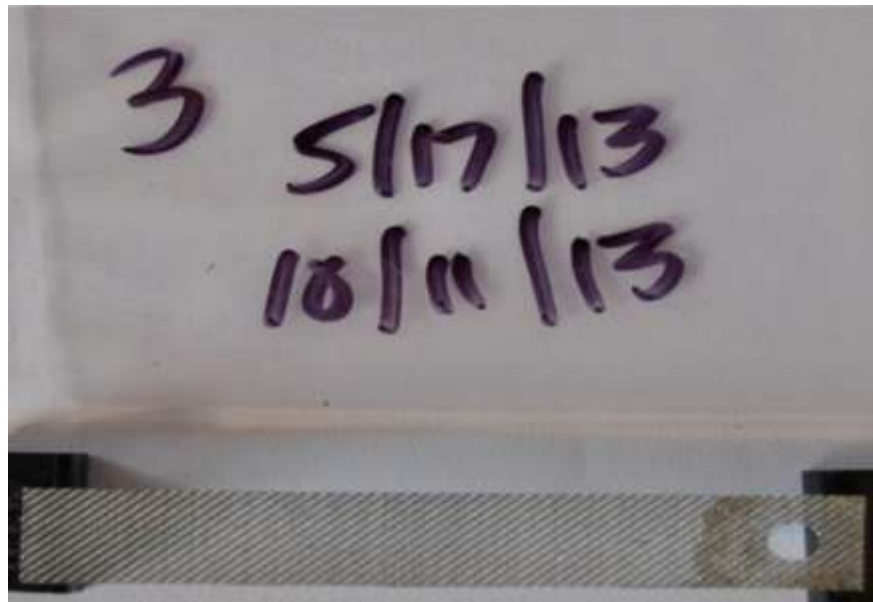
Organic Contamination without Moss





Cooling Tower Example

Organic Contamination with ProMoss™





Effect of Sphagnum Moss on Scale Science Behind the Products

- Demonstrated removal of staining and scale from pool and spa surfaces
- Reduced scaling in heat exchangers and salt generation systems
- Laboratory studies show the ability of moss to inhibit and remove scale

Effect of Sphagnum Moss on Scale Removal

Science Behind the Products

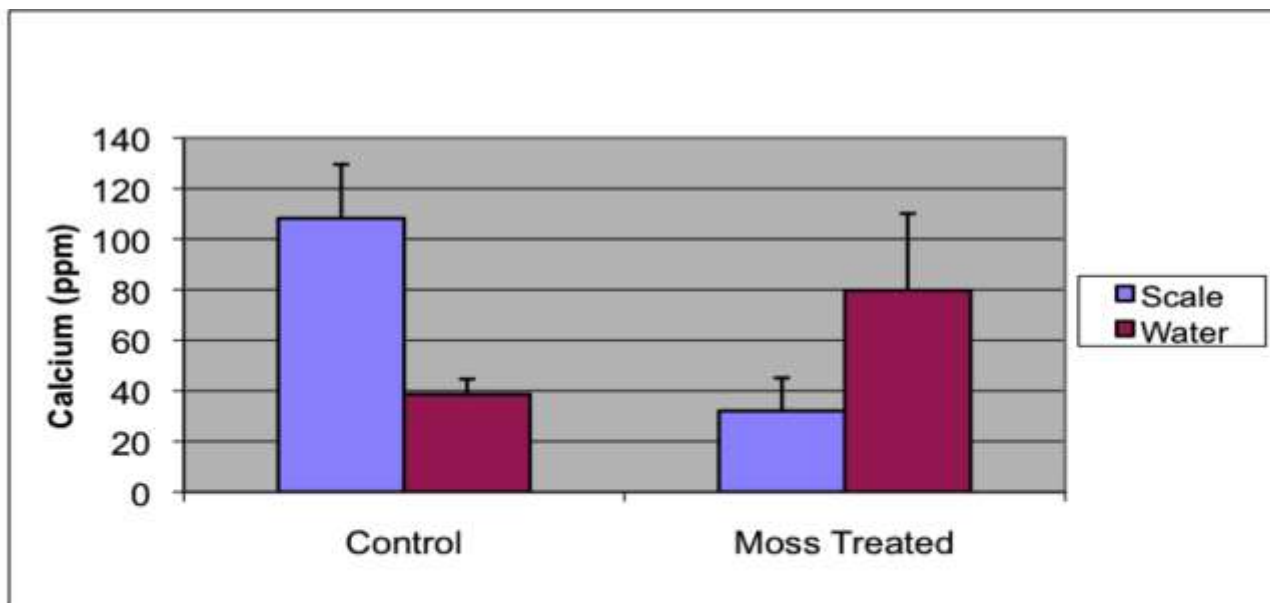


Figure 2. Effect of Sphagnum moss on scale removal. Blue bars represent the amount of scale remaining (as calcium, after solubilisation with HCL in 500mls distilled water) in beakers after 7 days of treatment. Control vs Moss Treated, $p < 0.001$. Red bars represent the amount of calcium in the water portion of the system prior to the addition of distilled water and solubilisation of the scale portion. Control vs Moss Treated, $p < 0.05$. The pH of the water in both control and moss treated beakers was periodically monitored during the course of the studies and remained within 0.1-0.2 units of each other.



PoolNaturally® Plus and SpaNaturally® Plus System

Science Behind the Products

Scale Reduction

- PoolNaturally® Plus and SpaNaturally® Plus system treated pools and spas have less scaling and staining throughout the entire system; including the pool surface, heat exchangers, etc.

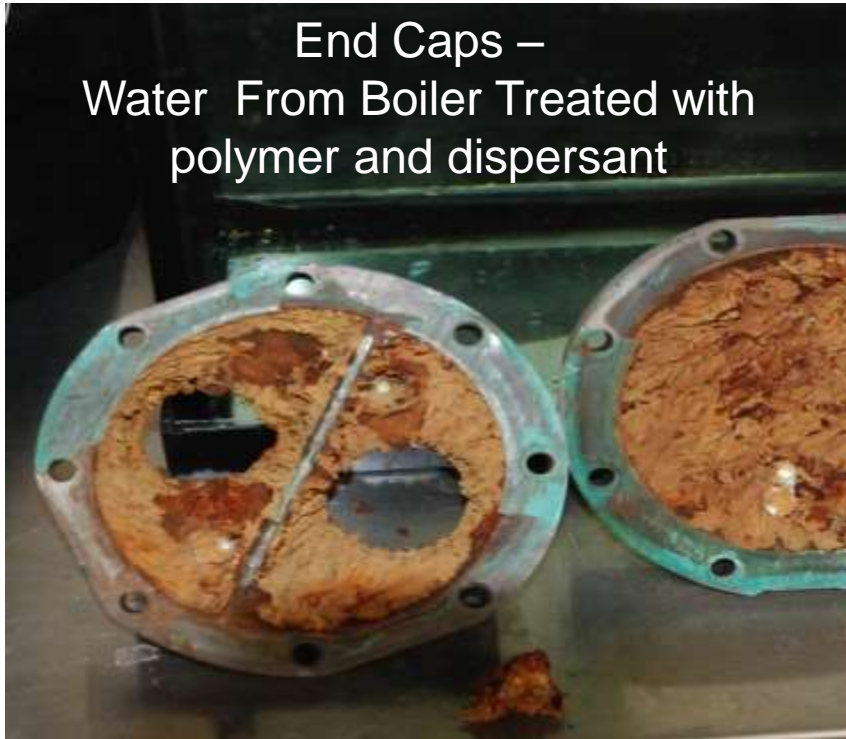




PoolNaturally® Plus and SpaNaturally® Plus System Benefits

Heat Exchanger from Indoor Pool

End Caps –
Water From Boiler Treated with
polymer and dispersant

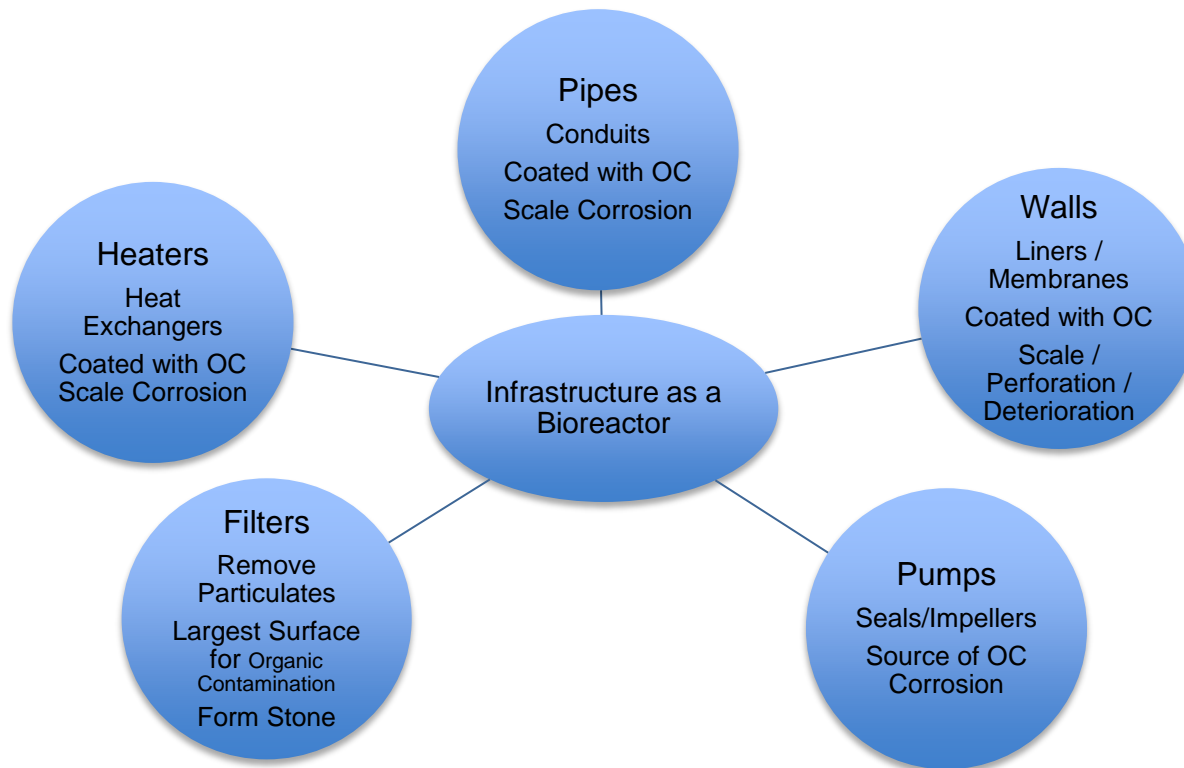


Pool Side Treated with
PoolNaturally® Plus and no polymer
or dispersant



Filters and Surfaces

Science Behind the Products

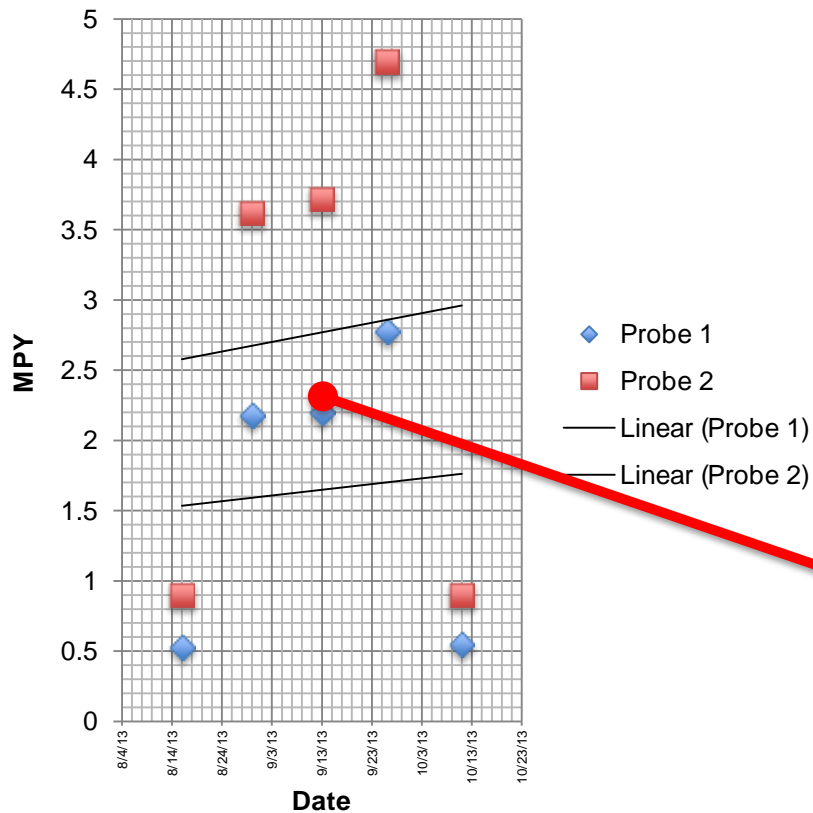




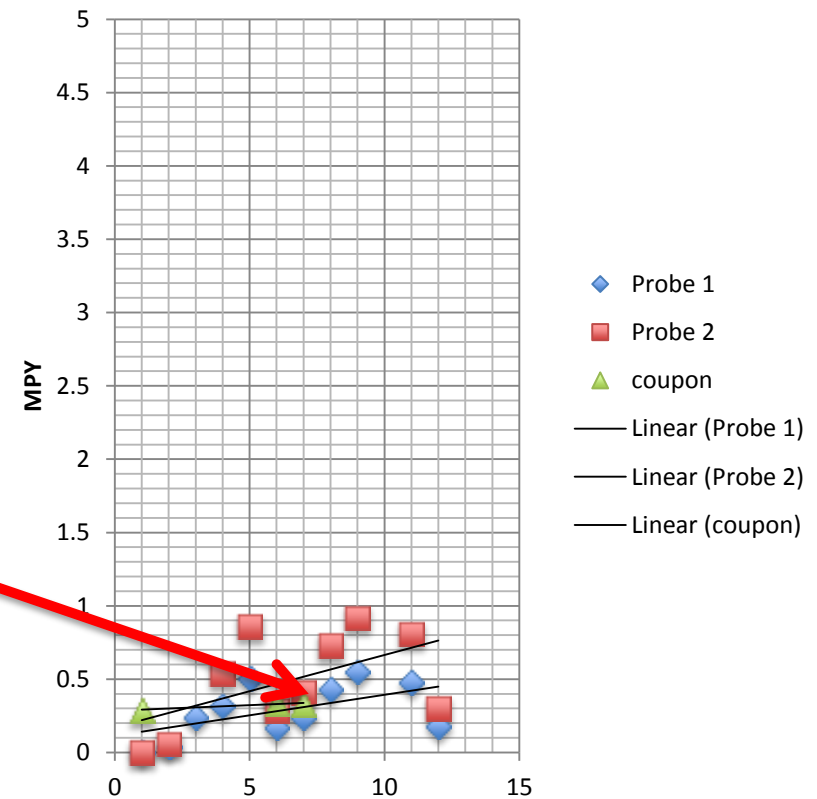
Cooling Tower Example

90% Reduction in Copper Corrosion

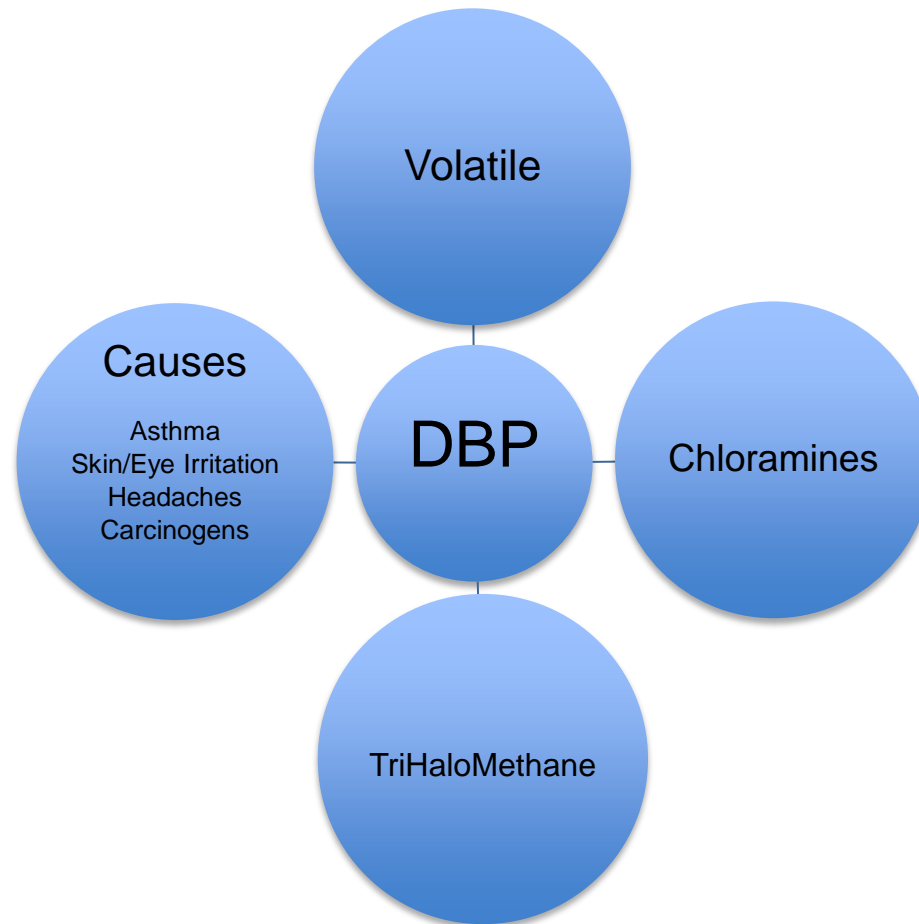
Cooling Tower without Moss



Cooling Tower with Moss



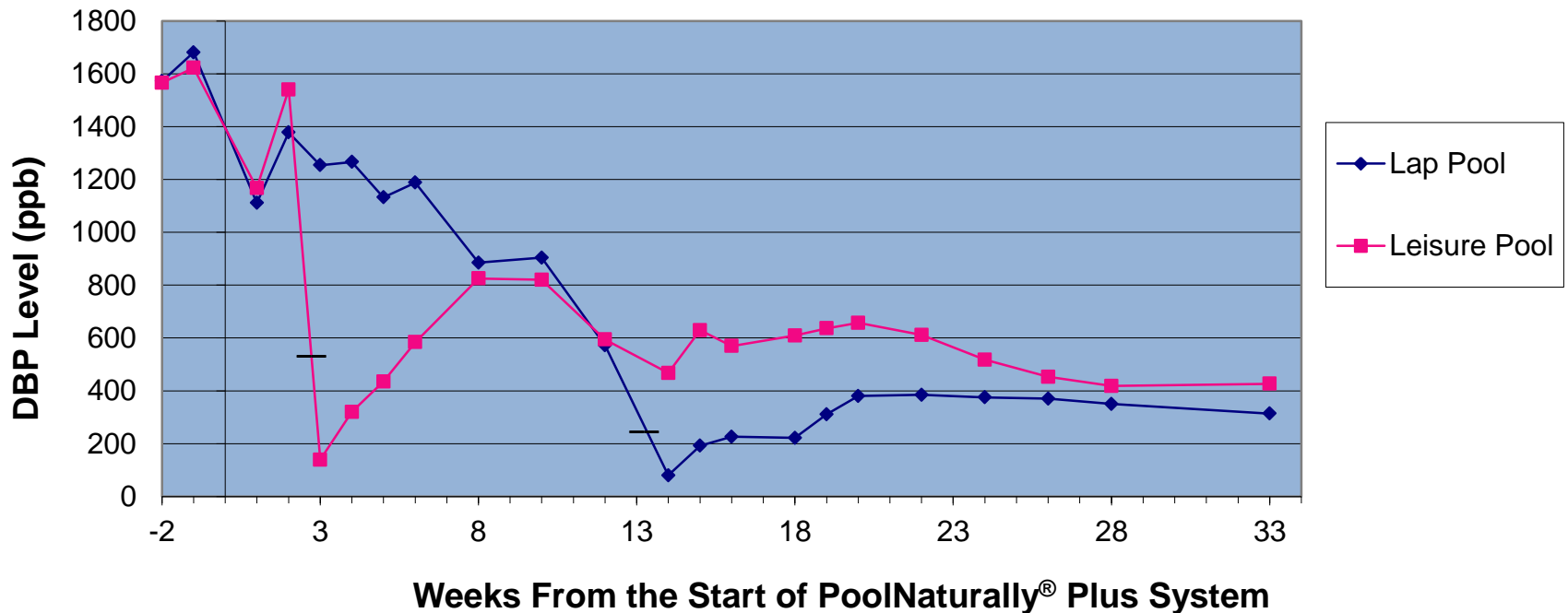
Disinfection By Products (DBP) Science Behind the Products





Disinfection By Products (DBP) Measurements in Two Commercial Pools

Effect of PoolNaturally® Plus System on DBP Levels in Pool Water



___ Pool was drained/refilled



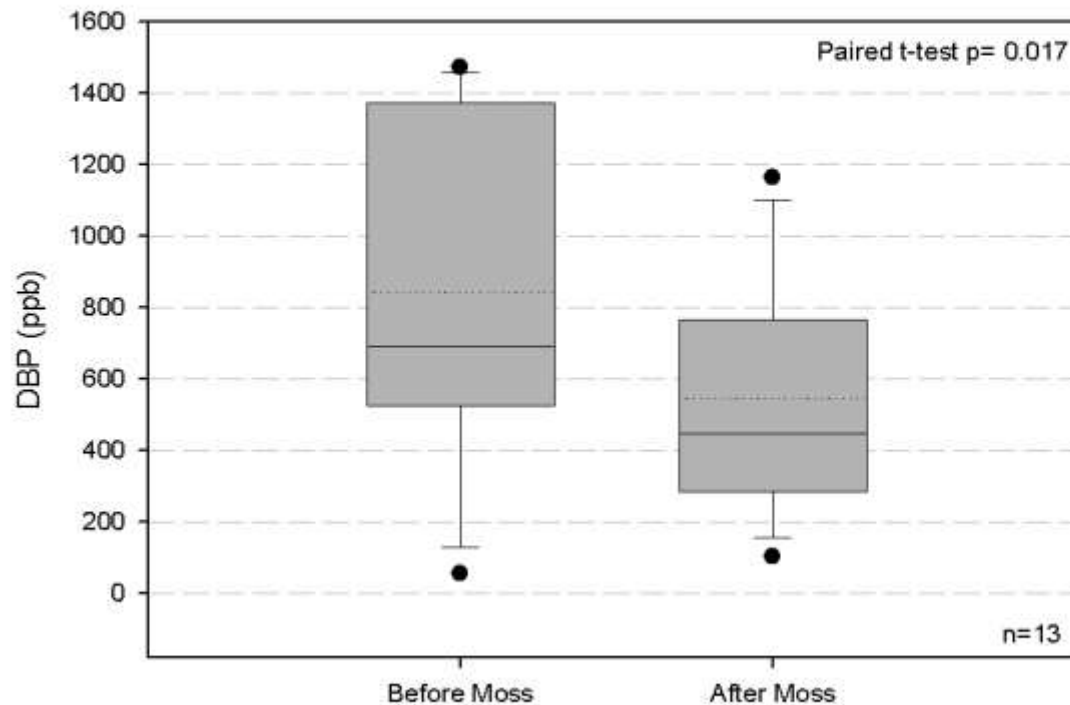
Chloroform (DBP)

Two Commercial Fitness Club Pools

- Chloroform Levels in the Air Reduced by 55%
 - Before: 0.15 +/- 0.020 mg/m³
 - After: 0.067 +/- 0.008 mg/m³; $p < 0.001$

Disinfection By Products (DBP) Science Behind the Products

Disinfection By-Products (DBP)
in Pools Before and After Moss Treatment





Breakaway® Flush

The Products

- Breakaway® Flush was developed to remove organic contamination from pool and spa surfaces, pipes and filter media
- It removes 70-90% of the organic contamination in one hour
- It “breaks” organic contamination “away” from the surface





Breakaway® Flush For Spas

The Products

- Use CWS Breakaway® Flush to remove organic contamination from spa surfaces
- Helps prepare spas for treatment with SpaMoss® Pro
- Is an integral component of the CWS treatment system



Organic Contamination Removed From a New Spa





Air Scouring Kit

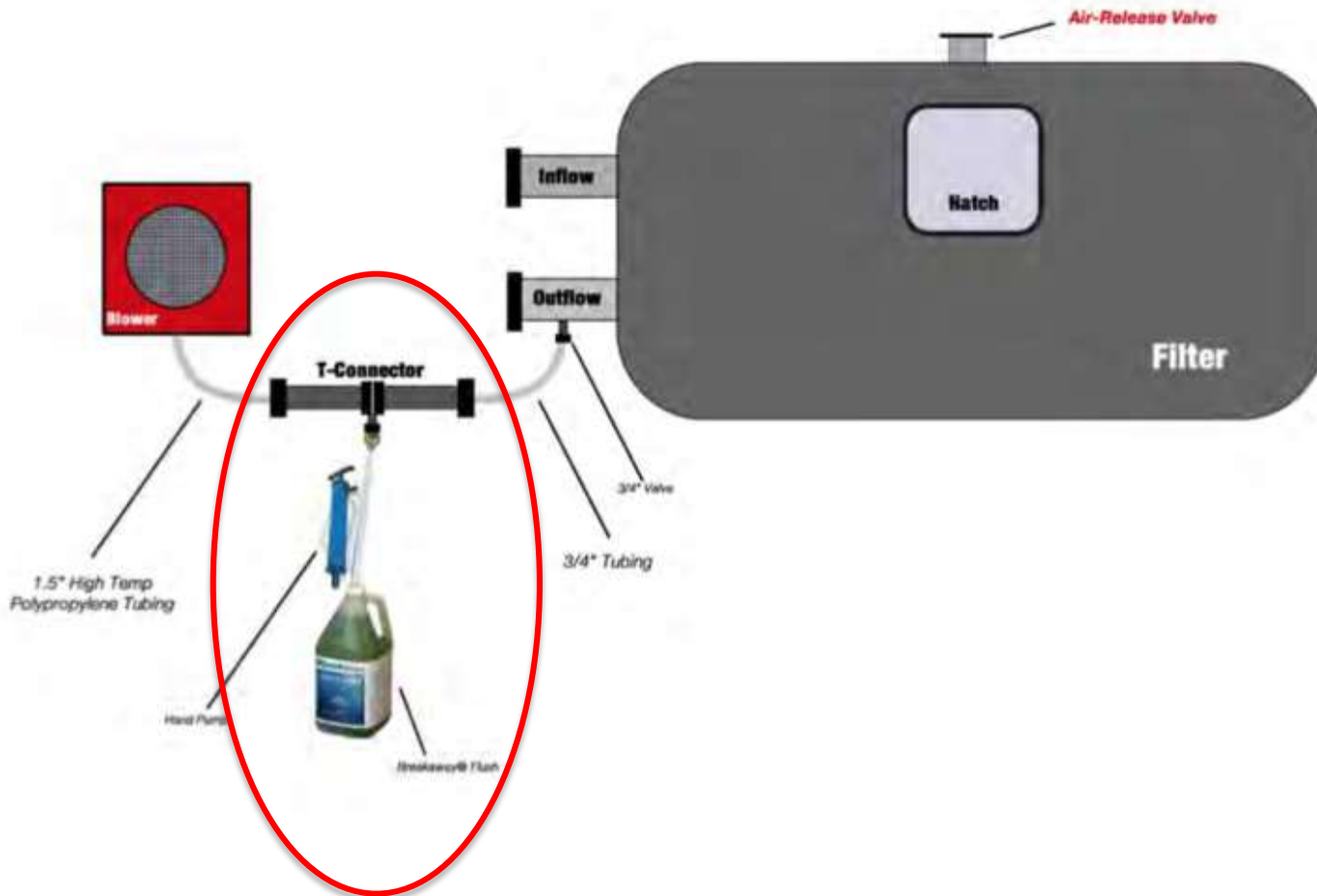
The Products

- Attaches air blower to outflow pipe of the filter
- Allows Breakaway® Flush to be effectively delivered to the filter media
- Quick connect remains in place for future treatments
- Installs and attaches quickly





Air Scouring/Breakaway® Flush Setup for Media Filters





PoolMoss® Pro and SpaMoss® Pro are Compatible with:

- Biocides
 - Chlorine
 - Liquid
 - Calcium hypochlorite
 - Dichlor
 - Trichlor
 - Gas
 - Salt generation
 - Bromine
 - Ozone
 - Silver ions
 - Copper ions
- Monopersulfate used intermittently as a shock
- pH control chemicals
 - Hydrochloric acid
 - Sulphuric acid
 - Bicarb
- Clarifiers
- Chlorine stabilizers
- Cyanuric acid up to 25 ppm



PoolMoss® Pro and SpaMoss® Pro are Compatible with:

- Filters
 - Paper cartridge filters
 - Media filter
 - Glass
 - Sand
 - Diatomaceous earth
 - Synthetic media for regenerative filters



PoolMoss® Pro and SpaMoss® Pro are Incompatible with:

- Biocides
 - Biguanides like Baquacil
 - Monopersulfate fed continuously
 - Free available chlorine levels above 5 ppm
 - Combined chlorine levels above 2 ppm
 - Direct contact with solid cyanuric acid
 - Direct contact with concentrated acid of any kind
 - Direct contact with most cleaning solutions
 - Concentrated ammonia
- Filter media over 3 years old unless Breakaway®
Flush media cleaning performed



PoolMoss® Pro and SpaMoss® Pro Target Water Values

- ORP and CHLORINE
 - Clean ORP probe
 - Change ORP by 10 mV increments to achieve 1-2 ppm FAC
 - Stop when 1-2ppm FAC is achieved
- Set FAC probe to state minimum
- pH
 - Recommended pH 7.2- 7.4
- Alkalinity
 - May fluctuate-keep at state minimum
- Calcium Hardness
 - May fluctuate – do not adjust



PoolMoss® Pro and SpaMoss® Pro Target Filter Values

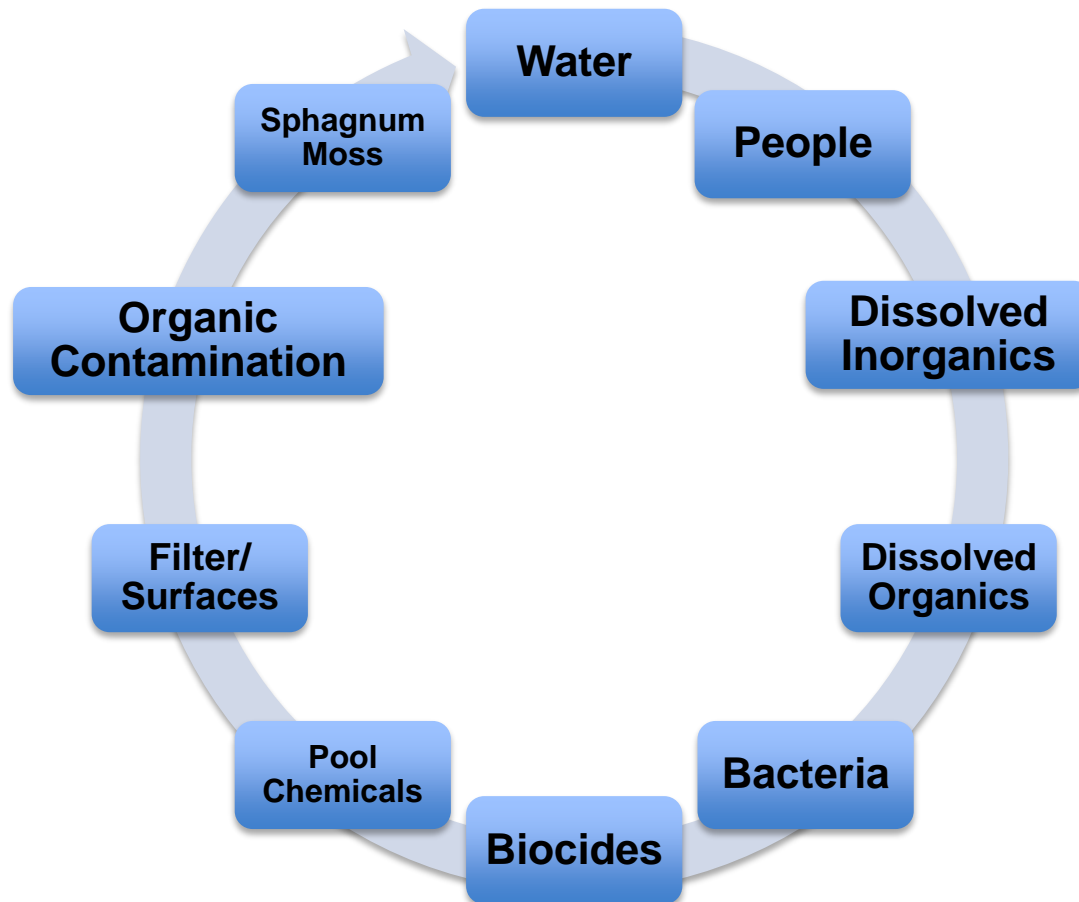
- Backwashing
 - Only when differential is greater than 10 psi
 - Record differential when finished
 - Record flow when finished
- Air Scour and clean filter with Breakaway® flush when backwashing is required more than twice a week or flow drops more than 10 gpm



PoolMoss® Pro and Cyanuric Acid

- We recommend using cyanuric acid after the outdoor pool is filled with fresh untreated water
- Maintain cyanuric acid concentration below 25 ppm for two weeks after filling
- Discontinue cyanuric acid after two weeks
- Cyanuric acid is denser than water
- Deep end of the pool has 2-3 X surface level
- High cyanuric acid levels inhibit formation of hypochlorous acid

The Recreational Aquatic Ecosystem





Spring Valley YMCA Spa

- Spa 3,800 gallons
- Dump and fill:
 - WAS once a week (15,200 gallons per/month)
 - NOW once a month (3,800 gallons per/month)
- **SAVINGS 11,400 gallons per/month**



Spring Valley YMCA Pool

- Pool 174,000 gallons
- Backwashing:
 - WAS three times a week (12,000 gallons per/month)
 - NOW once a week (4,000 gallons per/month)
- **SAVINGS 8,000 gallons per/month**



University of MD/ERC Natatorium

1.2 Million Gallons





University of MD/ERC Natatorium Student Sustainability Project

- CWS/UMD aquatic facilities personnel worked together – submitting a proposal for the 1.2 million gallon aquatic center
- Funded by: UMD Students and Office of Sustainability Campus Green Fund
- PoolNaturally® Plus system installed on September 1, 2011
- Water managed by students and UMD staff – according to state guidelines and CWS recommendations



University of MD/ERC Natatorium Student Sustainability Project

- Chemical levels are maintained at state required minimums
- Improved air quality with reduction in DBP
- Positive recreational swimmer, polo and swim team feedback regarding smell, taste, clarity, and performance
- Reduction in reports of skin and eye irritation, swim suit fading, and other user complaints
- Moss as an attraction
- Increased paying membership by 15%



University of MD/ERC Natatorium Student Sustainability Project

First Year Results – improvement over prior year

- SAVED 750,000 gallons of water
- SAVED \$44,000 in chemicals, water and heat
- INCREASED memberships by 15%

Second Year Results – improvement over Year 1

- Saved an additional \$2,505 in chemicals
- Saved an additional 48,000 gallons of water

Fina World Championships 2013





Fina World Championships 2013

- 1.4 million gallons
- New Myrtha pool
- Used 25% of budgeted chlorine and acid
- Clear water throughout the competition in the main and practice pools
- No DBP smell in the arena
- Set 8 world records



PoolMoss® Pro and SpaMoss® Pro Benefits and Results

KEY RESULTS

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- Improved Air Quality
- Stabilized pH and Alkalinity
- Reduced Scale and Staining
- Reduced Corrosion

KEY BENEFITS

- Reduced Chemical Usage
- Reduced Water Usage
- Reduced Energy Usage
- Reduced Maintenance
- More Enjoyment



THANK YOU!

(763) 398-0141

www.cwsnaturally.com