



**CREATIVE WATER SOLUTIONS**  
**Plymouth, MN**

[www.cwsnaturally.com](http://www.cwsnaturally.com)



# Founders

## David Knighton

- Retired vascular surgeon and expert in wound care
- Organic chemist
- Entrepreneur

## Vance Fiegel

- Biochemist, cellular biologist, and microbiologist
- Expert in applied science and product development
- Entrepreneur



# History

- Started in 2003
- Commercialization 2004
  - Residential Spas
  - Residential Pools
  - Commercial Spas
  - Commercial Pools
  - Fountains
  - Ponds
  - Aquariums
  - Industrial Water
  - Homes and Potable Water



# Present Sales

- US – distributor network
- Currently conducting trials on 3M facilities in MN, TX, MO and KS
- Canada
- United Kingdom
- India
- Internet – [CWSnaturally.com](http://CWSnaturally.com)



# Why Sphagnum Moss?

## David read Atlantic Monthly article during a flight

Article discussed WWI use of Sphagnum moss and increased survival of soldiers with wounds treated topically with Sphagnum moss

Native Americans used Sphagnum moss in wounds and as a diaper

Vikings used Sphagnum moss to treat drinking water and preserve food

The article attributes the increased survival rate to absorption of fluids by dried moss

David hypothesized that the effect could only be attributed to anti-microbial activity

## Reviewed medical articles

## Vance began laboratory studies

# Moss Bogs in the Upper Midwest USA



- The land of sky blue waters
  - Northern Minnesota
  - Northern Wisconsin
  - Upper Peninsula of Michigan
  - South-eastern Canada
- Associated with Iron rich soil and water

# Sphagnum Moss

- Harvested by hand
- Green
- Sustainable
- Renewable
- Two of over 300 Species have the necessary properties





# First Step in CWS Product Journey

- Select species of Sphagnum moss
- Leaves are separated and cleaned
- CWS products are made from moss leaves





# Second Step in CWS Product Journey

- Cut and compressed
- Leaves are pressed and formed into a board
- Boards are cut into correct shapes
- Moss is sterilized





# Product for Commercial Applications

- Sphagnum moss for commercial and industrial applications
- Select species
- Patented





# ProMoss™ In a Cooling Tower



Note bottom of basin is visible through crystal clear water

Sludge on the floor of the basin starting to loosen



# Known Sphagnum Moss Functions

- Absorbs 20X its dry weight in water
- Absorbs 10X its dry weight in oil
- Absorbs positively charged ions
- Acidifies Water



# Patented and Patent Application Sphagnum Moss Functions

- Inhibits proliferation of Gram + and Gram – bacteria – is not cidal
- Inhibits proliferation of fungus, mold and yeast
- Removes and inhibits biofilm formation
- Removes and prevents scale formation
- Inhibits corrosion
- Clarifies water



# Patented and Patent Application Sphagnum Moss Functions

- Inhibits proliferation of Gram + and Gram – bacteria – is not cidal
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# University Of Maryland

## 1.2 Million Gallons





# University of Maryland Results

- Chemical levels were maintained at state minimums
- Improved air quality with reduction in DBP
- Positive recreation, 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
- Pool water has stable chlorine and pH making it easier to manage





# University Of Maryland Results on PoolMoss®Pro

## First year

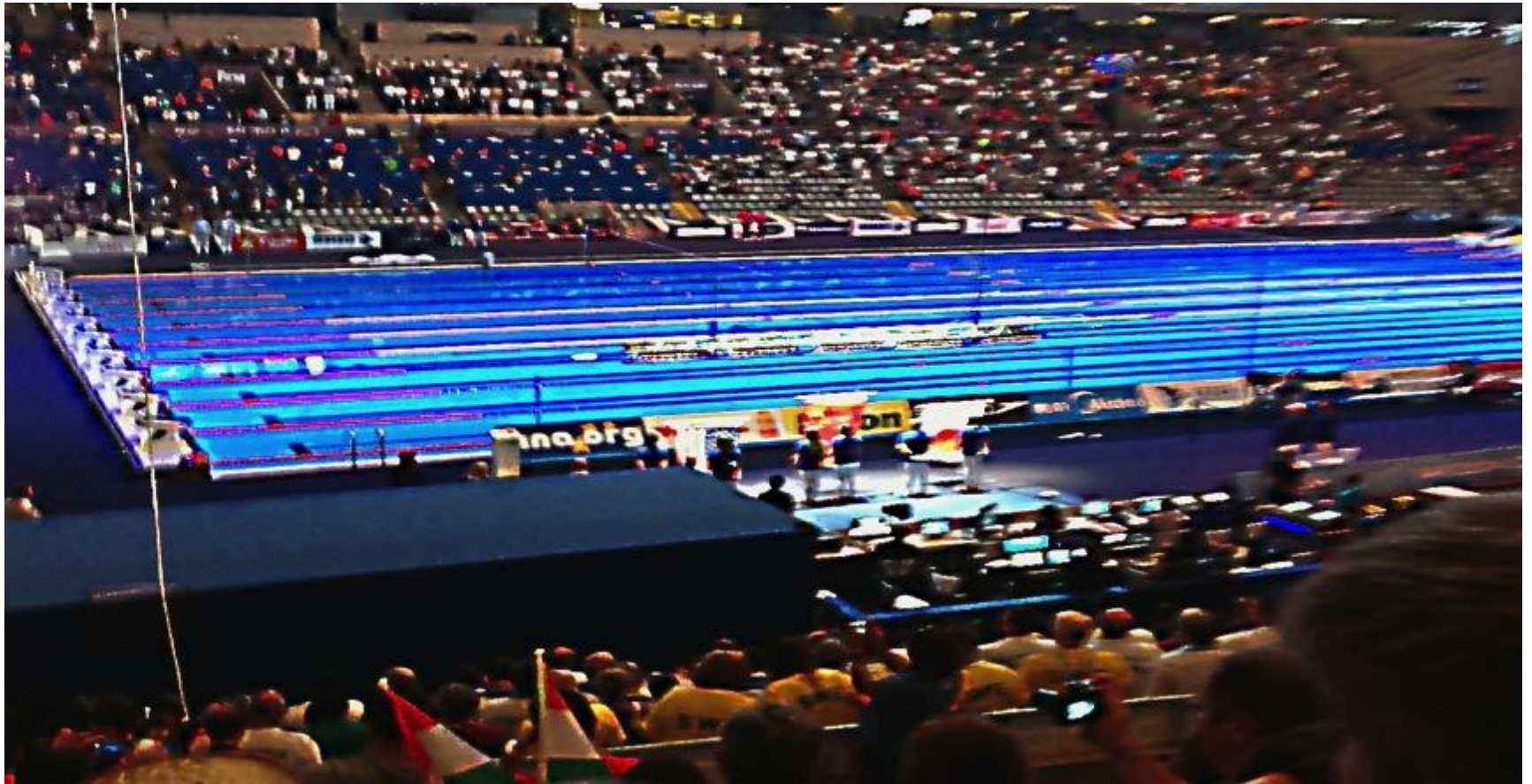
- Saved 750,000 gallons of water due to less frequent backwashing
- Saved \$44,000 in chemical and water expenses – paid for the ProMoss®
- Increased memberships by 15%

## Second year

- Increased water savings to 850,000 gallons
- Increased chemical savings by \$2,200



# FINA World Championships Barcelona, Spain 2013





# FINA World Championships Barcelona, Spain 2013

1.4 Million Gallons of Water

- 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

# 7000 Ton Cooling Tower



Towers 3 – 3A – 4  
Treated with ProMoss™

Towers 5 - 6 – 6E  
Control towers

# Coupon Pictures

**Tower 3  
Treated with ProMoss™**



**Aug 1, 2014**



**Tower 5  
Control Tower**



**Aug 1, 2014**





# Results from the ProMoss™ Treated Tower



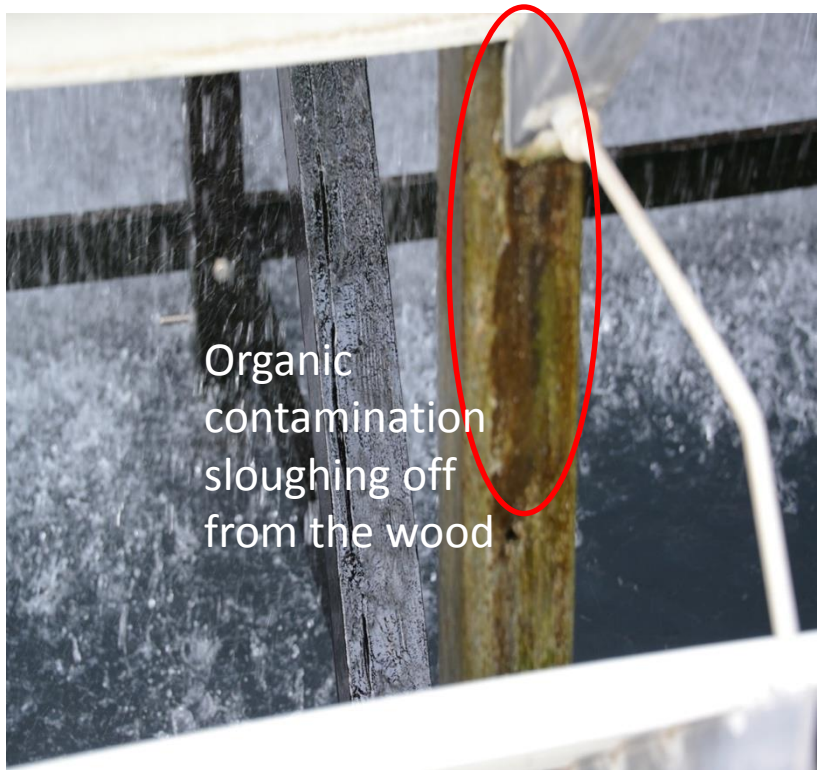
**Tower 3 - Aug 8, 2015**



**Sloughed off  
organic  
contamination  
film from the  
wood**

**Tower 3 - Sept 12, 2014**

# Results from the Treated Tower

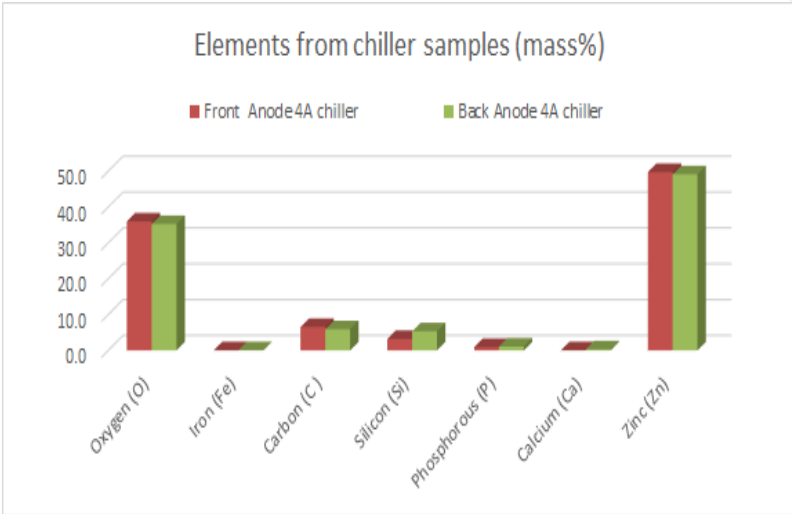


Tower 3  
ProMoss™  
Treated



Tower 5 Control

# Chiller from Treated Tower



Zinc  
Anodes



Inside Chiller  
tubes

Mass percent [%]		
Element	Front Anode 4A chiller	Back Anode 4A chiller
Oxygen (O)	36.0	35.3
Iron (Fe)	0.047	0.079
Carbon (C)	6.55	5.91
Silicon (Si)	3.20	5.34
Phosphorous (P)	0.946	1.09
Calcium (Ca)	0.046	0.287
Zinc (Zn)	49.8	49.1





# Conclusions

- ProMoss™
  - Renewable/Green/Sustainable
  - Complements existing water treatment systems
  - Saves water
  - Reduces chemical usage and dumping
  - Inhibits corrosion and scale resulting in less maintenance and longer equipment life
  - Clarifies water
  - Reduces DBP in the air and water
  - Is very plentiful in Northern Minnesota