

The logo for HealthySwam, featuring the word "healthyswam" in a sans-serif font. "healthys" is in white and "swam" is in blue. The "sw" is stylized with a wave pattern, and the "am" is in white with a blue water drop icon integrated into the letter "a". A registered trademark symbol (®) is at the end.

healthyswam®

BEHIND THE SCIENCE

Learn about the science behind
the world's leading advanced water
treatment technologies!

AOP
(ADVANCED OXIDATION PROCESS)

RAISING THE BAR

Congratulations on taking the first step in learning about the importance of this advanced water treatment technology and how it can benefit your pool or centre.

HealthySwim, as a leading authoritative body in the Aquatic and Leisure industry which has the purpose of ensuring that families and industry staff are swimming in safe, clean and healthy water - protected from chlorine resistant parasites and chlorine by-products.

We are proud to be able to provide this review for you.

Thank you for investing the time to learn more about this world leading technology. Your investment will be worth it.

Regards,

John Morrison

HEALTHYSWIM

BEHIND THE SCIENCE

Let's discover the science behind this world leading advanced water treatment technology.

TECHNOLOGY

AOP (Advanced Oxidation Process) via Ozone and UV.

CATEGORY

Secondary Sanitation/Disinfectant/Purification Systems.

PURPOSE

Water treatment to reduce combine chlorine (chlorine by-products) and destroy pathogens such as chlorine resistant parasites, Cryptosporidium and Giardia.

INDUSTRIES

Aquatic Centres, Drinking Water, Wastewater Treatment, Cooling Towers.

BY TECHNICAL EXPERT

John Morrison BSc

Bachelor of Science degree, double major; Marine Biology, Sustainable Resource Management.

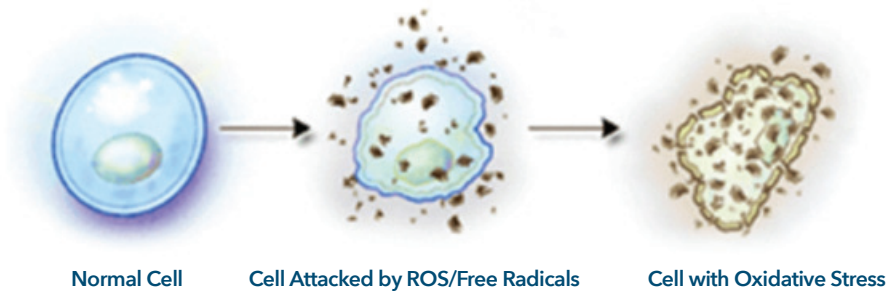
Over 10+ years experience in the aquatic industry, providing advice and training to Councils, Health Departments and professionals in the industry.

Experience working in both the water testing and water treatment industry.

Research experience in the laboratory as well as out in the field, contributing to research with NSW Fisheries that was later published in scientific journals.

What Is Advanced Oxidation Process (AOP)?

Advanced Oxidation Process (AOP) is a chemical reaction process that involves photons in the UV spectrum to convert Ozone (O₃) in the presence of water to oxygen (O₂) and Peroxide (H₂O₂). The peroxide then reacts with ozone to form hydroxyl radicals (OH), the best oxidiser in water chemistry. Hydroxyl radicals reduce organic compounds to harmless end products such as oxygen.



Effectiveness Of Hydroxyl Radicals (OH)

The following table shows the effectiveness of AOP created Hydroxyl Radicals (OH) over other sanitizers.

Ranking	Certified By	Oxidation Potential mV
1	Fluorine (Explosive in water)	3.06
2	Hydroxyl Radical	2.80
3	Nascent Oxygen	2.42
4	Ozone	2.08
5	Hydrogen Peroxide	1.78
6	Perhydroxyl Radical	1.67
7	Hypochlorous Acid	1.49
8	Chlorine	1.36

Adapted from Table 1: Common chemical/physical AOP technologies - Application of Advanced Oxidation Process (AOP) in water treatment. Dr Bill Grote.

AOP vs Other Sanitizer Technologies

The following table shows the common sanitizer technologies used and their effectiveness to combat various universal issues.

Issue	Chlorine Only	UV + Chlorine	Ozone + Chlorine	AOP + Chlorine
Efficiency against bacteria	Not 100%	Very Good	Very Good	Excellent
Destruction cryptosporidium and giardia	Not Effective	Very Effective	Excellent	Excellent
Removal of inorganics	Effective	Good	Very Good	Excellent
Removal of colour, odour, taste	Some	Good	Very Good	Excellent
Turbidity reduction	Not 100%	Not 100%	Very Good	Excellent
COD reduction	None	Slow	Rapid	More Rapid
TOC reduction	Not 100%	Slow	Rapid	Significant
Destruction of urine	Not Effective	Relatively Good	Good	Excellent
Chloramine removal	Very Slow	Good	Very Good	Excellent

AOP Highlights Within The Aquatic Industry

The following are benefits that result from the use of an AOP system.

Benefits	Benefits
Effectively destroys chloramines	Ensure bather comfort
Destroys Cryptosporidium & Giardia	Reduction of combined chlorine
Reduces Chlorine demand	Improve air quality
Enhance water clarity	Energy efficient

Research Into AOP (Advanced Oxidation Process)

The following are a selection of research papers that show the effectiveness of AOP in the treatment of water.

TITLE

Inactivation of Cryptosporidium by Advanced Oxidaton Process

PAPER BY

Abidelfatah M. Nasser



Read technical paper by scanning QR Code

TITLE

Measurement of OH Radical for Inactivating Cryptosporidium Parvam using Photo/Ferrioxalate and Photo/TiO2 Systems

PAPER BY

M. Cho and J. Yoon



Read technical paper by scanning QR Code



"The science comprehensively shows that a correctly sized AOP system is highly efficient in oxidising polluted water though the generation of hydroxyl radicals."

John Morrison - BSc, HealthySwim

TITLE

Recent Advances in Ozone-Based Advanced Oxidation process for Treatment of Wastewater - A Review

PAPER BY

Chhaya V Rekhate and J K Srivastava



Read technical paper by scanning QR Code

TITLE

Wastewater Treatment by Advanced Oxidation Process and Their Worldwide Research Trends

PAPER BY

M. Muruganandham, R. P. S. Suri, Sh. Jafari, M. Sillanpää, Gang-Juan Lee, J. J. Wu and M. Swaminathan



Read technical paper by scanning QR Code

TITLE

Application of Advanced Oxidation Process (AOP) in Water Treatment

PAPER BY

Dr Bill Grote



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TITLE

Recent Developments in Homogenous Advanced Oxidation Process for Water and Wastewater Treatment

PAPER BY

M. Muruganandham, R. P. S. Suri, Sh. Jafari, M. Sillanpää, Gang-Juan Lee, J. J. Wu and M. Swaminathan



Read technical paper by scanning QR Code

5 Major Benefits

1) THREE LEVELS OF WATER TREATMENT IN ONE TECHNOLOGY

Water will be treated with the benefits of Ozone, UV light and hydroxyl radicals to deactivate, destroy and remove chlorine resistant parasites such as Cryptosporidium and Giardia. Combining methods increases the reaction times by 100-1000 times compared to that of using either ozone or UV treatment alone.

2) NO TASTES OR ODOUR!

This method of water treatment results in the removal of Chloramine smells in the air and taste in the water by breaking down all three chloramines (Monochloramines, Dichloramines and Trichloramines (gas)).

3) NATURAL FLOCCULANT!

During this water treatment process, smaller particles bind together and are more easily captured in your filter media, leaving your pool water crystal clear.

4) SOFTENS THE WATER!

Water returning the pool is purified water that is silky smooth to swim in.

5) PREVENTS CORROSION!

Nasty chlorine by-products, that are highly corrosive are removed during this process of water treatment, which assists in extending the life of your plant equipment as well as the structure of your pool.

Commonly Asked Questions

DOES ADVANCED OXIDATION PROCESS (AOP) VIA OZONE & UV RESULT IN ANY RESIDUAL OZONE REACHING THE BODY OF THE POOL?

No. Ozone, which is drawn into the pipe work via a negative pressure venturi manifold, is converted to hydroxyl radicals once it passes through the UV chamber.

CAN THE ADVANCED OXIDATION PROCESS (AOP) SYSTEM BE RETROFITTED TO MY EXISTING PLANT ROOM?

Yes. The system can be an addition to your existing plant room and mounted to the wall, floor or even a custom-built skid for plug and play installations.

WHAT RESULTS CAN I EXPECT TO ACHIEVE IN WATER QUALITY?

A correctly sized and installed AOP system will result in Combined Chlorine levels being consistently maintained under 0.5ppm and typically as low as 0.1ppm resulting in improved clarity/turbidity and reduced chloramine odours.

IS THE AOP SYSTEM EXPENSIVE COMPARED TO OTHER TYPES OF SECONDARY SANITATION?

No. Typically the costs can be less than a commercial grade UV only system. Furthermore, an AOP system can use less energy than a UV only systems.

WHAT IS THE LIFESPAN OF AN AOP SYSTEM?

An expected lifespan of up to 15 years.

AOP In The Field

Secondary sanitation is recommended for **all medium and high-risk** public aquatic facilities to comply with regulations and reduce liability.

Medium Risk Facilities	High-Risk Facilities
Residential apartment pools	Spas
Diving pools	Interactive water features
Lap Pools*	Wading pools
Gym pools*	Learn to Swim pools
Resort pools*	Program pools
Holiday park pools*	Hydrotherapy pools
Motel pools*	School pools
Theme park wave pools*	Water slides
	Shallow depth interactive play pools
	Pools used by incontinent people
	Aged care facilities
	Retirement village pools
	Artificial lagoons

Adapted from NSW Department of Health 2013 - Public swimming pool & spa advisory document.

*** Important medium risk facilities that may require increased monitoring consistent with high-risk facilities during peak seasonal use.**

AOP In The Field

MANUFACTURER

Brauer Swim

FACILITY

Gullivera Coomera

EQUIPMENT

Brauer Swim AOP (Secondary Sanitation/Purification)



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MANUFACTURER

Brauer Swim

FACILITY

Discovery Holiday Park

EQUIPMENT

Brauer Swim AOP (Secondary Sanitation/Purification)



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MANUFACTURER

Brauer Swim

FACILITY

Paul Sadler Swimland

EQUIPMENT

Brauer Swim AOP (Secondary Sanitation/Purification)



Watch the video by scanning QR Code

MANUFACTURER

Brauer Swim

FACILITY

Rackley Swimming

EQUIPMENT

Brauer Swim AOP (Secondary Sanitation/Purification)



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GOLD (CERTIFIED)



CERTIFIED PRODUCT

Brauer Swim B-Pure Secondary Purification System via AOP

MANUFACTURER

Brauer Swim

APPROVED MODELS

X1, X2, X3, X4, W4, W6, W8, W10, Z1

WARRANTY PERIOD

Minimum 24 months warranty

CONDITIONS

AOP System must be sized by Manufacturer or a HealthySwim Certified Professional.

Brauer Swim are the pioneers of the AOP technology commencing manufacturing in 2004.

Brauer Swim's patented technology enhances water quality second to none to ensure bather comfort, regulatory compliance and peace of mind.

Their advanced oxidation process utilising Brauer's patented technology which is the most effective and efficient means of secondary purification within the aquatic industry.



PHONE: 1300 696 631



For more information scan QR Code

HealthSwim has Certified this product based on systems (units) meeting the following specifications.

PERFORMANCE AND RELIABILITY

Provide units that achieve adequate oxidation based on expected peak bather load in the respective pool. The units must utilize both ozone and UV in unison, and be designed so as to prevent the unintended release of ozone from the system.

UV DOSAGE RATE

The UV dose rate must be sized correctly to ensure complete destruction of any undissolved ozone through the cell whilst the lamps are at the end of their life.

UNIT CONSTRUCTION

Provide units ready to be installed with integrated UV unit including all required lamps, booster pumps, flow switches, and controllers.

LAMP LIFE

Provide units with minimum 8,000 hours life on the UV lamp.

OPERATING RANGE

Provide units capable of operating in ambient air temperatures of 5°C to 40°C. Provide the unit as minimum IP54.

OZONE INTAKE

Provide units utilizing a vacuum venturi to draw ozone into the water stream to reduce the potential for an ozone leak. Ozone modules are energized only when UV lamps are active. Ozone modules are deactivated if a UV lamp fails or at end of lamp life due to run time.

MONITORING

Provide units that monitor and regulate the generation of UV, flagging a fault if the UV level is outside of the intended range.

GLASS STRAINER

Provide a glass strainer downstream of the UV reactor to catch any glass in the event of a lamp breakage.

SERVICE AND SPARE PARTS

Provide by Manufacturer or a HealthySwim Certified Professional.



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MISSION

Our mission is to be the leading in water quality education and certification support for high risk pools.

PURPOSE

Our purpose is to ensure families and industry staff swim in safe, clean and healthy water - protected from chlorine-resistant parasites.

SOCIAL RESPONSIBILITY

Our social responsibility is to provide support to individuals and organisations connected to the Aquatic Industry that are enriching our core values.

CORE VALUES

Our core values are:

- Pursue environmental sustainability.
- Support inclusion and diversity.
- Create safe environments.
- Provide industry leadership.
- Promote innovation.



“We need to work together as an Industry to ensure that our customers and staff are swimming in safe, clean, healthy water. This is why I am an Advocate for HealthySwim.”

Laurie Lawrence, Advocate

BOARD OF ADVISORS

Our board of advisors are:

PUBLIC HEALTH

John Morrison

Technical Expert

LEARN TO SWIM

Laurie Lawrence

Learn to swim & water safety

LEISURE

Cath Bellchambers

Industry Consultant

INCLUSION

Melissa Rickwood

Industry Specialist

ADVOCATE

Ross Gage

All things swimming

ENVIRONMENTAL

Daniel Saw

Environmental Advisor

PARTNERS

BRAUER SWIM

Brauer Swim is committed to providing the industry with access to informed quality education in connection to water management. Brauer Swim is an industry leading in water quality research and development with various patented technologies and new innovative advancements.

Call 1300 696 631

AUSTRALIAN SWIM SCHOOLS ASSOCIATION

Australian Swim Schools Association is driving and evolving the Swim School industry towards a uniform standard of World’s best practice - resulting in an ever-increasing number of Australians enjoying first-class educational and enriching experiences, and a nation of safer, lifelong swimmers.



“The Brauer Swim AOP can provide you with the peace of mind that comes with knowing that you have the best sanitation protection for your customers and staff.”

David Brauer, Brauer Swim



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