

# UV FOR AQUATIC APPLICATIONS

## TECHNICAL FACTS



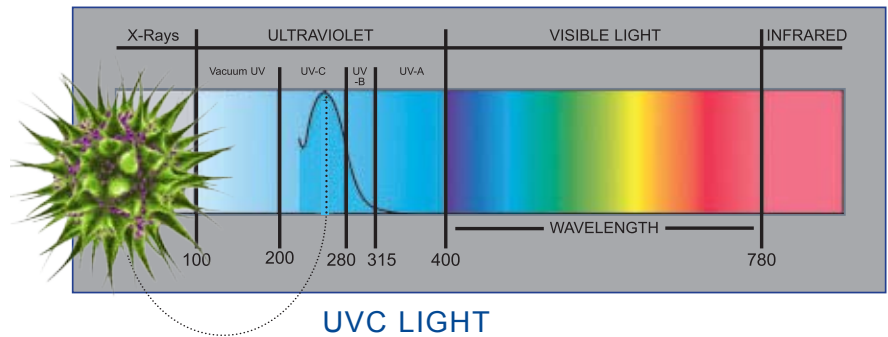
swimming pools, water parks, municipal aquatic facilities, spas, splash pads & therapy pools



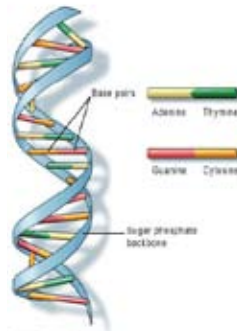
# UV for Disinfection ➡ Keeping people safe

**ULTRAVIOLET LIGHT** | UV light is electromagnetic radiation found between the visible spectrum and X rays. It is not visible to the naked eye.

UV light is split into four main categories : UV-A, UV-B, UV-C and Vacuum UV. The wavelengths between 240nm and 290nm are in the UV-C range and have germicidal properties. UV light at 265nm causes the most damage to the DNA, effectively preventing replication of the organism, and rendering it non viable. Unlike chemical disinfectants, no organism can develop any resistance to UV light.



**VALIDATION** | Where Ultraviolet technology is used for disinfection, systems are validated to demonstrate they can deliver the correct performance. ETS UV systems are validated in accordance with the USEPA UV Guidance Manual (Nov 2006) disinfection guidelines .ETS UV swimming pool units are validated to this standard, providing users with the confidence that the equipment will always perform.



ORGANISM	UV Dose m J cm-2 1 log	UV Dose m J cm-2 3 log
Salmonella typhi - ATCC 19430	1.8	6.4
E-coli 0157:H7 - ATCC 43894	1.5	4.1
Shigella dysenteriae - ATCC 29027	0.5	2.0
Vibrio cholerae - ATCC 25872	0.8	2.2
Giardia lamblia	2.0	4.0
Legionella pneumophila - ATCC 33152	1.9	5.8
Norovirus	11.2	25.0
Cryptosporidium parvum	2.4	5.2

## THREATS TO POOL USERS



E Coli (x 10,000)

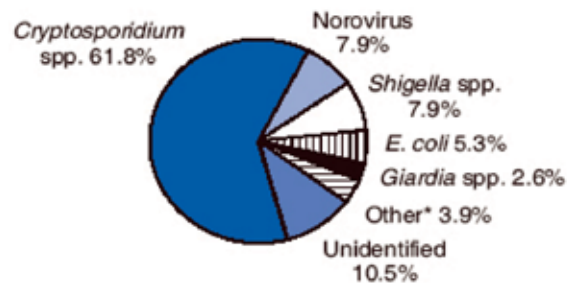


Giardia Lamblia (x200)



Cryptosporidium Parvum (x300)

## INCIDENCE OF INFECTION



# UV for Photolysis ⇒ Improving the Swimming Environment



**UV FOR PHOTOLYSIS** | Bathers introduce a variety of organic compounds into the pool environment; Creatinine (C<sub>4</sub>H<sub>7</sub>N<sub>3</sub>O), Urea (NH<sub>2</sub>)<sub>2</sub>CO, Fats and Amino Acids are compounds of sweat that combine with chlorine to produce combined chlorine. Combined chlorine is an irritant that produces an offensive odor (linked as a probable cause of asthma), itchy skin, red burning eyes and corrosive condensation. Treatment with Ultraviolet light with enhanced outputs effectively eliminate combined chlorine..

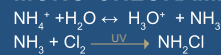
**LAMP TECHNOLOGY** | ETS uses medium pressure lamps with a polychromatic output, specifically enhanced to remove the nuisance mono-, di- and tri- chlorine species. Low pressure lamps are monochromatic, and only emit a single UV wavelength at 254nm. They are not recommended in pool environments to maximize effectiveness.

**SYSTEM SIZING** | Sizing Parameters include; pool usage and loading, mineral and organics, turnover and water transmittance.

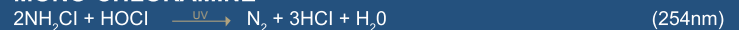
## Benefits

- Improved water clarity
- Improved air quality
- Oxidation of organics
- Cannot be overdosed, fully automatic and programmable
- Reduces the need for 'Shock Treatments' to reduce combined chlorine levels
- Significantly improves water quality

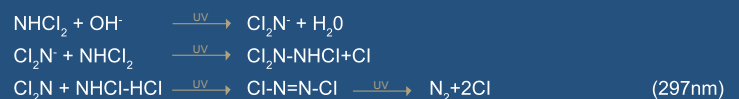
## MONO-CHLORAMINE FORMATION



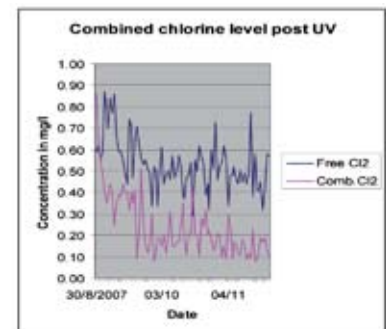
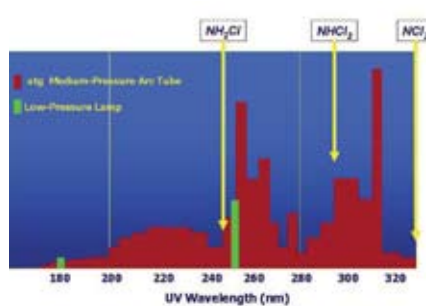
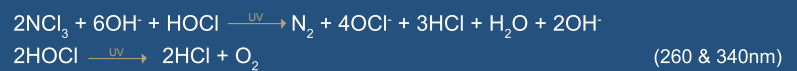
## MONO-CHLORAMINE



## DI-CHLORAMINE



## TRI-CHLORAMINE



# WHY CHOOSE ETS UV TECHNOLOGY

- . Nationwide distributor & service network
- . Largest installed base of aquatic UV systems in the USA
- . ISO9001 Certified
- . Built with pride in Beaver Dam, WI, USA
- . Validated system performance
- . Experienced water treatment history
- . Industry Exclusive 5 year Warranty
- . Cutting edge design
- . Leading UV technology
- . Embedded pulse technology wiping

“Largest installed base of aquatic UV systems in the USA”

**ECP UV SYSTEMS** | Small, compact and economical, single unit flow range 50-176 gpm, 1.0kW-1.3kW medium pressure lamp, ANSI flange size 2-1/2"-3", 316L SS chamber. Simple, easy to read display. Includes temperature probe UV monitor, automatic wiper system & half power operation.



**ECF UV SYSTEMS** | State-of-the-art design offering vertical or horizontal installation, single unit flow range 560-4500 gpm. Multiple lamp medium pressure 1.5kW-3.3kW lamps, ANSI flange size 6"-14" (larger custom models are available). Simple easy to read display. Includes temperature probe, UV monitor & automatic wiper system. Significantly reduced installation and service area.



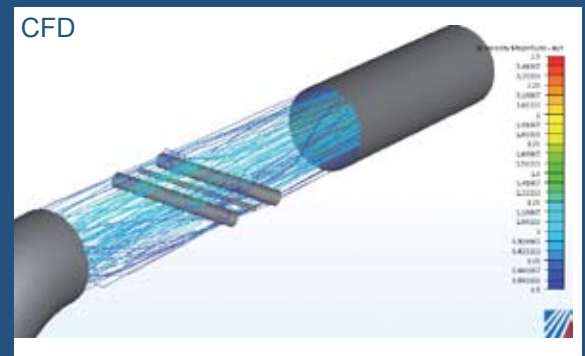
**SP UV SYSTEMS** | Traditional look with inlet and outlet branches, single unit flow range 100-4500 gpm, ANSI flange size 2"-16", 1.3kW-7.3kW medium pressure lamps, Includes temperature probe, UV monitor, automatic wiper system.



**LEADING CONTROL SYSTEM** | Using microprocessor technology, SPECTRA combines many innovative features such as fully automatic start-up and shut down, multiple lamp monitoring, process interlocks and automatic quartz cleaning. SPECTRA's on board data logger easily allows performance data to be downloaded to a PC or Laptop for review. MODBUS and PROFIBUS compatible.



**DESIGN** | Advanced 3D CAD is used to develop new products and to support CFD model production.



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