

# Ultraviolet Technology

## UV in Aquaculture

### How Does Ultraviolet Work?

Ultraviolet energy causes permanent inactivation of microorganisms by disrupting DNA (the reproductive material) so that it is no longer able to maintain metabolism or reproduce.

The maximum effectiveness occurs between 240 and 280 nm, depending on the organism. The Hanovia medium pressure Arc Tube produces these wavelengths in abundance. The most effective wavelength occurs at 265 nm.

UV permanently inactivates all bacteria, spores, viruses and protozoa (including Cryptosporidium and Giardia oocysts).

Stressed animal stock is more vulnerable to infection from a host of pathogenic species. UV can assist with the elimination of these pathogens.

### Application for UV

- ▶ Tank Water
- ▶ Feed Water
- ▶ Process Water
- ▶ Odour Abatement
- ▶ Effluent Disinfection



### Most Efficient

- ▶ Bacteria, viruses, moulds, spores are all inactivated by UV.
- ▶ Treatment is effectively monitored and fully automated
- ▶ Permanent accurate treatment records can be produced, so all treatment can be traced and the applied dose demonstrated
- ▶ UV works instantly: no contact tank is required
- ▶ UV is effective against all fish, seal, penguin and whale pathogens and will de-activate all water borne pathogens
- ▶ Several fish pathogens eg., VHS, IPN, IPA, UDN, PKD, Furunculosis and Vibrio are destroyed at a UV dose of 60-90mJ/cm<sup>2</sup>



### Superior to Alternatives

- ▶ Chlorine and ozone are becoming less acceptable because of harmful by-products and handling problems
- ▶ UV is an environmentally friendly way to eliminate bacteria etc, without chemicals
- ▶ UV is the most cost-effective method of water disinfection, requiring minimal servicing
- ▶ UV is simple and automatic. The only consumable is electricity
- ▶ No contact tanks are needed with UV so space requirement is modest.
- ▶ UV is a simple and inexpensive plant, which fits into existing buildings
- ▶ Low capital, operational and maintenance costs

### No Detrimental Effects

- ▶ UV has no effect on taste, odour or pH
- ▶ UV leaves no residue
- ▶ Overdosing is not possible

### Safety

- ▶ No hazardous chemicals are required
- ▶ No toxic by-products are produced
- ▶ Earth leakage detection as standard

### Experience

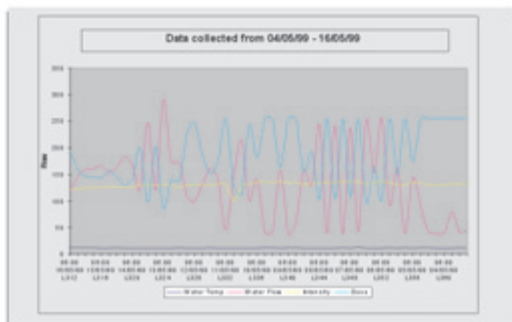
- ▶ Hanovia has over 75 years experience in UV.
- ▶ 40,000 installations worldwide.

### Powerful Arc Tubes-single Arc Tube per Chamber

- ▶ Arc Tubes are specially designed and manufactured by Hanovia
- ▶ Hanovia's Arc Tubes are the most powerful for water treatment
- ▶ One monitor per single Arc Tube is the only concept that can allow effective, meaningful monitoring
- ▶ Up to 400m<sup>3</sup>/hr can be treated with a single Arc Tube
- ▶ Single Arc Tube design requires minimal maintenance
- ▶ Arc Tube replacement is quick and simple
- ▶ Temperature independent
- ▶ Crossflow range treats up to 10,000m<sup>3</sup>/hr per system

### Constant Wattage Power Supplies

- ▶ Designed and built by Hanovia, this type of power supply should not be confused with inferior alternatives
- ▶ Output variation of <1.5% is guaranteed, even when input voltage varies by 15%
- ▶ With inferior power supplies, the necessary minimum UV dose would not be maintained in the event of a power dip, e.g. when an adjacent pump starts
- ▶ Automatic restart on power failure
- ▶ Power supply can be flow paced



### Data Logging

- ▶ Applied UV dose can be demonstrated and adequacy of treatment proved using the data logs
- ▶ National or international standards demonstrated
- ▶ Any fault or event is date and time stamped

### Controls

- ▶ Treatment is achieved by UV dose. This is computed from the UV intensity measured by the monitors, the water flow rate and the on line measured transmittance
- ▶ Power to the Arc Tube can be varied to ensure that the desired dose is obtained at all times, while keeping running costs to a minimum
- ▶ Entire system can be controlled locally or remotely, providing continuous and precise management information to the central control
- ▶ System will automatically switch to standby unit when required
- ▶ UV dose and lamp intensity can be data logged



### Water Quality

- ▶ UV disinfection can be designed for almost any water, and is therefore not restricted to high quality borehole or surface waters
- ▶ Proper design of the UV chamber takes into account the light absorbed or scattered by dissolved and suspended materials: a test of the UV transmittance of the water is always carried out by Hanovia prior to making a proposal
- ▶ An optional automated wiping system is used for keeping the quartz surface free of deposits so that UV effectiveness is maximized
- ▶ An on line Transmittance Monitor can measure changes in water quality and adjust dose accordingly

# Hanovia

WORLD CLASS UV

Hanovia Limited  
145 Farnham Road  
Slough SL1 4XB  
England

+44 (0)1753 515300  
+44 (0)1753 534277  
sales@hanovia.com  
www.hanovia.com



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HALMA GROUP  
COMPANY

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