



RAND WATER

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EVALUATION OF LAZUR M-10 ULTRAVIOLET LIGHT UNIT

This is to certify that the Lazur M-10 unit, incorporating the hydrodynamic cavitation chamber and ultrasonic irradiation device, was evaluated for its efficiency in destroying the micro-organisms exposed to the effects of the unit.

Date of evaluation: 4 - 7 January 2010
Flow rate through the equipment: 10 m³ per hour
Water temperature: 20 - 22°C

Ultra violet light transmission of water at 254 nm (1 cm path length) 76-80% transmission.

Neither the ultra violet light intensity or dosage nor the energy dissipated by the ultrasonic irradiation device were measured.

Micro-organisms exposed to the treatment unit:

Laboratory culture of *Escherichia coli*
Attenuated suspension of *Cryptosporidium* oocysts.

The effect of the treatment was examined under the following conditions:

1. Cavitational flow, ultra violet light, without ultrasonic treatment (Condition 1).
2. Cavitational flow, ultra violet light with ultrasonic treatment (Condition 2).

Effect on bacteria

The bacteria were enumerated making use of accredited laboratory procedures for the determination of *E. coli* and a total heterotrophic bacterial count (Standard Plate Count).

Results

	<i>E. coli/cm³</i>	% Reduction	SPC/cm ³	% Reduction
Before exposure	$1,25 \times 10^6$		$1,21 \times 10^6$	
After exposure to Condition 1	27	99,997	175	99,98
After exposure to Condition 2	4	99,9996	88	99,9927

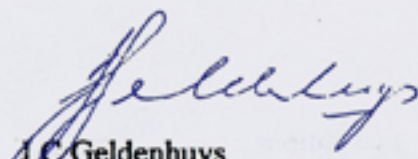
Effect on *Cryptosporidium* oocysts

The exposure to Condition 1 had definitive observable effects on the surface of the oocysts and the oocysts had a damaged appearance. After exposure to treatment Condition 2 the damaged caused to the surface of the oocysts was more apparent and microscopic examination revealed ruptured oocysts.

This method of examination does not give an indication of the viability or infectivity of the oocysts but it is probable that enough damage was caused to the structures to render them non-infective.

Conclusion

The Lazar M-10 device as tested was highly effective in destroying the micro-organisms present in the water.



J.C. Geldenhuys
MANAGER PROCESS DEVELOPMENT



**Rand Water
Scientific Services
Microbiology Section**

TO: MPD
FROM: M Grundlingh
COPY TO: Hmic
DATE: 05/07/2010
RE: **Disinfection experiment with spiked Cryptosporidium oocyst water Sample**

LAZUR 3MUV/ULTRASOUND UNIT OF SVAROG COMPANY was used in the experiment.

A. 15000 oocysts were introduced into 100L of tap water. Giving a spike dosage of 150 oocysts/10l. Overall it seems as if the spike dosage was too low.

1. Sample 1 (control)

6 Oocysts were recovered. The fluorescence and shape of the oocysts were in perfect condition. No damage to the cysts walls were observed.

2. Sample 2 (UV)

14 Oocysts were recovered. 50% of these damaged oocysts had damaged cyst walls. The other cysts were in perfect condition.

3. Sample 3 (UV and sonification)

This sample was very turbid and the membrane clogged very easily. A total oocysts were recovered. 3 oocysts were undamaged. The shape and fluorescence were in perfect condition. 2 oocysts had damaged cyst walls. 7 cysts were completely disintegrated. It still resembled the shape of an oocyst, but the whole structure appeared to be granulated.

All results were verified and confirmed by M. Padyashee.

B. In test conditions 100L of tap water was spiked with effluent from a sewerage works with plate count of fecal coliform E. coli surpassing 4000 mFC per 100 ml of feed water.

1. Sample 1 (UV)

Removal of E. coli from the tested water reached 99,99%

2. Sample 2 (UV and sonification)

Removal of E. coli from the tested water reached 99,9999%

All results were verified and confirmed by M. Padyashee.

M Grundlingh
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