UNIVERSIDAD DE ORIENTE (UNIVERSITY OF ORIENTE)
Evaluation group – Ecological impact
Gema–uo

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Re: Report regarding the application of the POOLSONIC in the swimming pool, aimed at the elimination of algae, their formation, proliferation and growth.
The research with regard to the device in question was started on the morning of August 3rd last.

The ultrasonic device, Poolsonic, was installed in accordance with the installation instructions in the technical manual. The device was installed at medium depth of the pool and in a corner or at a point where a maximum range of action could be obtained. This way, the ultrasonic waves emitted by the device – which may cover an angle of 180° - immediately cover the broadest possible area.

Visual evaluation of the circumstances in the pool:
There was no doubt that the water was seriously affected by algae: it had a green colour and a limited transparency.
4 samples were taken: 2 in the part reserved for adults, and 2 in the part reserved for children. In both cases, 1 of these samples will be used for the microbiological analysis in the laboratories of the Provincial Microbiology Department of MINSAP.
The two remaining samples will be used for the analysis of phytoplankton in the relevant laboratory of the University of Oriente. The samples were taken on the day and at the time of installation of the device.
New samples were taken in both places after a period of 20 days.

Results:
August 3, 2000
- there is a biological contamination (coli bacilli – x 100 ml) of 2.2 (CT) and 2.2 (CF) in the children's pool, which exceeds the acceptable level as laid down by Cuban standards.
- There is no contamination in the pool for adults.

August 23, 2000
- The situation in the children's pool recurs, but with an even higher level of contamination (now 9.2 (CT) and 9.2 (CF)).
- There is no biological contamination in the area reserved for adults.

These are the results with regard to the concentration of phytoplankton:
August 3, 2000

	Pool reserved for adults	Children's pool
Phytoplankton concentration	1.5×10^4cel/mL	0.9×10^4cel/mL

August 23, 2000

Phytoplankton concentration	0.3 x 10^4cel/mL	0.2 x 10^4cel/mL

Comments:

It became clear right from the start that the water in the pool had changed sufficiently to notice this change with the naked eye. This was confirmed by the results of the analyses carried out in the afore-mentioned specialised laboratories. The microbiological analyses indicate a contamination in the children's pool in both cases. It is significant that the value for contamination caused by Coli bacilli increased after the device had been in operation for 20 days. According to the research team, this can be explained by the fact that a high concentration of micro algae was destroyed thanks to the ultrasonic Poolsonic. These micro algae served as food for the micro-organisms in the children's pool, which were not filtered out by the filter installation. The water that had been used at the start of the test was kept in the pool. The above shows that the purifying system is not entirely appropriate. It is recommended to do a test over a longer period, starting from a recently bombarded sample of water, the biological paramaters of which do not exceed standard values.

As for the concentration of phytoplankton, it has been proved that the presence of the ultrasonic device for the treatment of pool water is effective because it reduces the concentration of micro algae. In the specific case of the swimming pool of Hotel Horizontes San Juan, this concentration was 5x less significant than the concentration that had been measured at the start of the test.
After they had been exposed to the ultrasonic device, the concentrations of algae reached a value that was within the acceptable limits of the standard. Still, we would like to point out that the water remains turbid as a result of the high concentration of micro algae and bearing in mind that the device works on the basis of the destruction of cells. An efficient filtering system could prevent or even totally eliminate this problem. We are of the opinion, however, that this situation will not occur if the swimming pool is filled with fresh water and if the device is constantly in operation, provided that the pool is cleaned and treated in an adequate manner.

Economic analysis

A preliminary economic analysis was made of the profits that might result from the use of an ultrasonic Poolsonic in the swimming pool of Hotel Horizontes.
Costs resulting from the maintenance and use of the swimming pool in the first six months of the year 2000: 2961.91 USD
Total chlorine cost: 1819.19 USD
Average costs per month in the first six months of the year 2000: 493.65 USD.

Results of the use of a Poolsonic device

When an ultrasonic device is used for the destruction of micro algae, the use of chemical substances such as flocculants (?) and algicides and of 2/3 of the amount of chlorine – the antibacterial effect of which will no longer be disturbed by too many micro algae in the water

– can be avoided. The water also becomes significantly more transparent, which makes swimming in a pool such a pleasant experience for the users of the pool.
Thanks to a POOLSONIC device, the following savings can be made within a period of 6 months:

All chemical products with the exception of chlorine	1142.72 USD
About 75% of the amount of chlorine	1364.39 USD
Total	2507.11 USD.

That means that the average monthly cost amounts to 75.80 USD compared to 493.65 USD for chlorine only. The result is a positive economic effect of 651%.
Bearing in mind that the purchase price of the system is 1900.00 USD, there is a return on investment after the device has been in operation for four months. And let's not ignore the other advantages: there is an increase in quality and security for the tourist sector when swimmers are not confronted with considerable amounts of chlorine, which irritates the eyes and which has many more disadvantages.
Thanks to the Poolsonic, bathers swim in clean water to which no chemical products were added as it is no longer necessary to eliminate the formation, proliferation and growth of micro algae.

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