Translation of the Newsletter of the Cyanobacteria Workgroup : No. 11, May 2010

The Cyanbacteria Workgroup

The "Werkgroep Cyanobacteriën" strives once or twice a year to produce a newsletter on the status of investigations into cyanobacteria (blue-green algae) and their toxins, legislation, practical water management issues and possible news items. The workgroup's remit is the exchange of information, the co-ordination of investigations and the support of policy development in the field of cyanobacteria, especially monitoring of risks. Information by and about the workgroup can be found on the website of STOWA (www.stowa.nl) under the heading "Thema cyanobacteriën". If you have any questions regarding cyanobacteria, then you can contact the workgroup at cyano@stowa.nl.

New Cyanobacteria Protocoll 2010 (excerpt)

Ron van der Oost & Jasper Stroom, Waternet

For the swimming season 2010 the National Water Authorities (NWO) have agreed on a new blue-green algae protocol which was prepared by the Cyanobacteria Workgroup. The agreement was made after an evaluation by the Dutch provinces and water authorities. Since bathing bans have increased significantly in several provinces compared to previous years, the provinces called for an expansion of the standards unless it could be proven that impermissible concentrations of toxins were directly linked to the current limit values. At the same time, the findings of research into the use of fluorescence in cyanobacteria monitoring became available. They showed that biovolume and cyano-chlorophyll are more suited to estimate the amount of blue-green algae than the cell count method used in 2009.
The new protocol has options to monitor cell counts, biovolume or cyano-chlorophyll (fluorescence). Cell density is still included as a parameter since most water authorities have already agreed on it in their monitoring programmes for 2010.

Four risk levels were identified:
Risk level 1: increase awareness, daily visual inspection or doubling of monitoring frequency.
Risk level 2: low health risk; bathing advisory for (part of) the bathing area.
Risk level 3: health risk, bathing warning initiated and issued by the province.
Risk level 4: major health risk, bathing ban initiated and issued by the province.

Cyanobacteria Norms according to the NWO Protocol 2010

Norms and Measures	**scum layer**	**cell density** cells/ml	**biovolume** mm^3/l	**cyano-chlorophyll** µg/l
1. Heightened Alarm State	category 1*			
2: Warning	category 2	50,000	2.5	12.5
3: Bathing Restriction	category 3	300,000	15	75
4: Bathing Ban	category 3 scum layer: extreme cases			

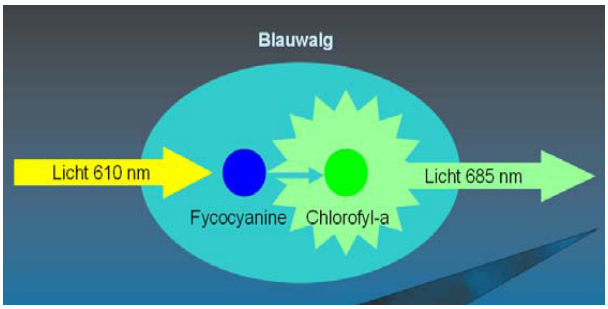
* NB. If no daily inspection of the bathing area takes place , a warning must also be issued for a category 1 scum layer

For other tables and figures, see Dutch original.

Cyanobacteria Monitoring using the Fluorescence Method (excerpt)

In the previous newsletter there was an article on a STOWA investigation carried out in 2008 comparing microscopic analysis (quick scan and counting of toxic algae cells) with chlorophyll analysis of blue-green algae using the fluorescence method. The aim was to investigate the adaptability of fluorescence in the risk analysis of blue-green algae. In 2009, the results of this investigation were processed further and data from water companies (Rijnland, HHNK and Waternet) were also analysed. The final report "Adaptation of fluorescence in the assessment of the risk of blue-green algae" will be published soon. The conclusions of this concept report were adapted together with the experience of the water management companies using cell counting giving rise to the blue-green algae protocol from 2008 (see previous article).

Different sorts of blue-green algae cannot be determined using fluorescence. However, it is possible to differentiate between different groups of phytoplankton (blue-green, green, diatoms and cryptophyta), so since all the groups possess characteristic pigments. Light emitted at specific frequencies is absorbed by these pigments (e.g. phycocyanin in blue-green algae), whereby the energy is transferred via the photosynthesis apparatus to chlorophyll-a. The energy is then transformed into chlorophyll-a fluorescence, which can be completed detected (Figure 2). The chlorophyll of the blue-green algae can thus be analysed using the fluorescence method.



The experiments for the investigation were carried out using the FluoroProbe II by bbe Moldaenke GmbH.
The robustness of the fluorescence analysis (linearity and repeatability) was very good. There was a significant linear relationship with chlorophyll determined by the Dutch NEN 6520 method. This can be used to compare the method with other instruments

Figure 2: principle of fluorescence measurement

Fluorescence Analysis in the Field (excerpt)

Ron van der Oost, Waternet

In 2008, the laboratory at Waterproef carried out a comparative investigation of cyanobacterial chlorophyll measured in the field and in the laboratory using the fluorescence method. The analyses in the lab were carried out using the bbe FluoroProbe II and the field analyses using the bbe AlgaeTorch.

The field measurements with the AlgaeTorch were carried out directly from a boat. At the monitoring site, a bottle was filled from which the fluorescence measurements in the lab were determined. The results of both measurement sets were very similar although the field results were 30% higher. This may partly be due to the algae in the water not being homogeneously distributed. Both fluorescence instruments can be calibrated so that the cyano-chlorophyll levels correspond to chlorophyll-a determined according to the Dutch NEN 6520.

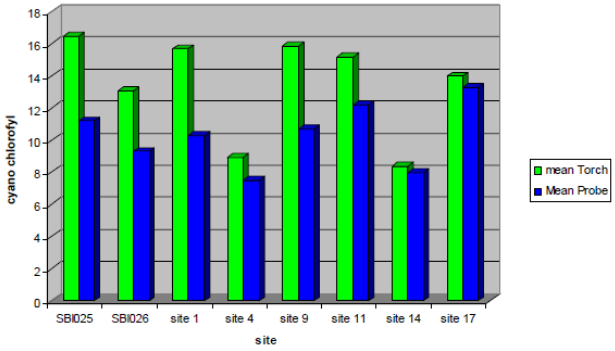


Figure: Comparison of AlgaeTorch in situ and FluoroProbe laboratory anaylsis

The operation of the AlgaeTorch was good. No palmtop/laptop computer was necessary to operate the device; the charged Torch could be used directly. The data are stored in the instrument and can be downloaded to a computer subsequently. At the time of the investigation there was no user-friendly software available for the data analysis, but in the meantime a software package has been developed to connect all bbe instruments A disadvantage of the instrument was the lack of a report when the cyanobacteria chlorophyll measurement was to high for an accurate measurement but this is to be corrected in the next series. The value at which this occurred (> 400 µg/L) lay way above the norm for bathing restriction warning. There are also other instruments made by other manufacturers (e.g. Hydrolab MS5) also capable of field measurements, but they have not been tested at this time.