



**Working Group of the Federal States on Water Problems (LAWA)
Recommendation on the Deployment of Continuous Biomonitors for the Monitoring of
Surface Waters**

Compiled by the LAWA 'Biomonitoring' Committee 1996

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Map 'Water quality control stations with continuous biotests'

1. COMMISSION

The LAWA "Biomonitoring" committee was commissioned by the LAWA Working Group "Surface Waters" (LAWA-AG "O") to draw up national recommendations for the deployment of continuous biotesting methods for the monitoring of water courses. The recommendations were to be based on both the results of the joint federal/states project "Effects tests Rhine" ("Wirkungstests Rhein", WIR) and the experience gathered in the individual federal states. The brief was to set out the limitations and possibilities for their employment.

Continuous biotests are defined by the Committee as those employing living organisms including bacteria. Biosensors, in which tissue, cells, organelles, membranes or biomolecules are used for detection of pollutants, are not included in this definition.

2. AIMS OF THE EMPLOYMENT OF CONTINUOUS BIOTESTS

Biotest methods have been used for several decades in a number of areas for the monitoring of water courses. They assess the effect of biologically harmful or biologically stimulating substances on selected test organisms. The aim of biological effect monitoring is to determine the effects of as many pollutants as possible. Because of the multitude of specificities of action of pollutants, test methods with various kinds of organisms must therefore be deployed.

In the biotests, a distinction is made between static (laboratory) biotests and dynamic biotests, which are deployed in various fields of application.

Static biotests with aquatic organisms play a significant role in the Federal Republic of Germany both for the implementation of the Water Resources Management Act (Sections 7a and 19g WHG) and the Waste Water Charges Act (AbwAG), and in the approval of chemicals in compliance with the Chemicals Act (ChemG) and the Plant Protection Act (PflSchG). Generally, in static biotests the effects on the test organisms exposed to a test medium (e.g. waste water, surface water) or a chemical for a certain test period (e.g. 24 h or 48 h) are determined. In these acute tests no exchange of the test medium generally occur in the course of the test.

In contrast, in continuous (dynamic) biotests the test organisms are exposed to the test medium, e.g. river water, continuously or in semi-continuous systems in cycles of a few minutes. Changes in metabolism or of behavioural/physiological parameters induced by sublethal effects are measured using automatic detection systems. The designation "biomonitor" characterises the main function of the system as a monitoring and warning system for the identification of combined pollutant effects. The employment of continuous biotests for the monitoring of immissions and emissions offers the possibility of monitoring waters continuously in relations to time. In the monitoring of immissions they are primarily deployed as warning systems which, for instance, indicate elevated concentrations caused by accidental discharges above the usual background concentration of the water course. In conjunction with chemical analysis and more detailed biological examinations, they assist in securing evidence of illegal discharges and accidents. Applied to the monitoring of emissions they can supplement the monitoring with standardised static biotests, as a means of continuous quality assessment.

The various applications of continuous biotests for the monitoring of emissions will be discussed in more detail in another recommendation report to be published by the committee.