

MARA and LumiMARA for Whole Effluent Testing

NCIMB



NCIMB's MARA and LumiMARA bioassays can be used as part of a risk based approach (RBA) to testing produced water discharges from offshore installations. OSPAR adopted the recommendation for an RBA in 2012, with full implementation to be achieved by 31 December 2018.

The Department of Energy and Climate Change (DECC) have included the MARA and LumiMARA tests as part of the preferred approach to the UK's implementation of OSPAR's recommendation.

A risk based approach

A risk based approach combines the use of chemical analysis to determine the exposure resulting from produced water discharge, with whole effluent testing (WET) to assess the sensitivity of the environment. While companies have already been undertaking chemical analysis of produced water as part of the biannual testing programme, whole effluent toxicity testing is a new requirement. All substances present in produced water will contribute to the total environmental risk and WET testing measures not only the effects of substances known to be present but also the impact of unknown substances and the combined effects of all components.



MARA and LumiMARA

NCIMB's MARA and LumiMARA bioassays utilise a carefully selected and genetically diverse array of microorganisms to provide a multispecies whole effluent test. We provide a testing and analysis service, and easy to use kits are also available.



Benefits

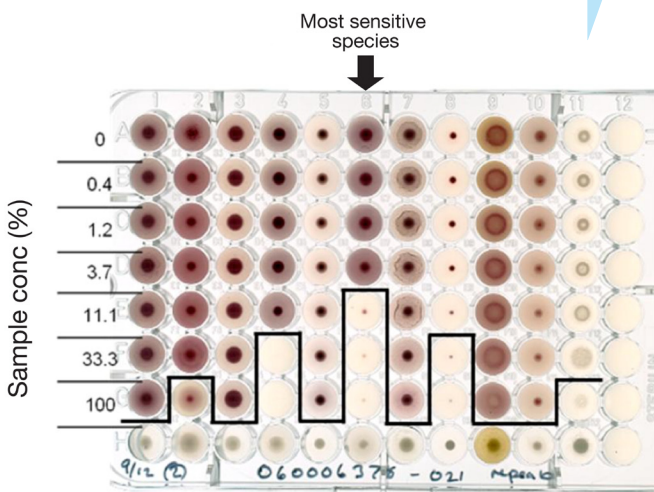
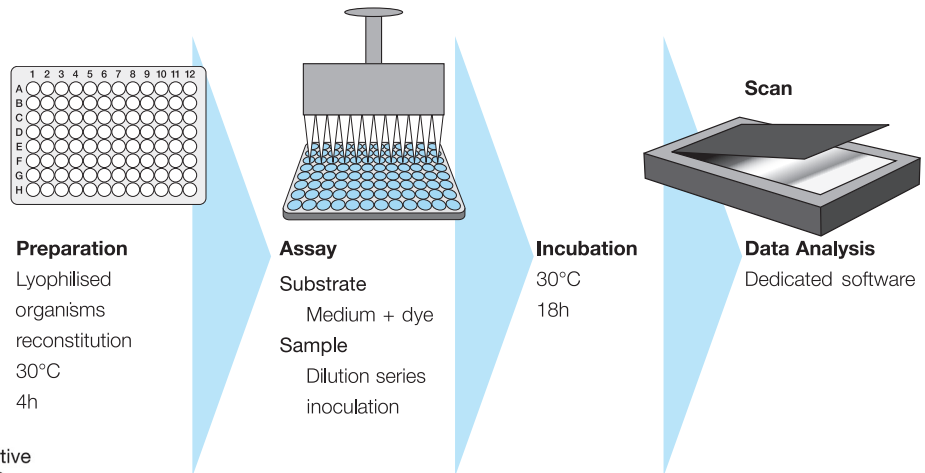
- Cost effective means of increasing the genetic diversity of toxicity testing
- Rapid and reproducible results: MARA and LumiMARA give results within 18 hours and 30 minutes respectively
- Indicative of results obtained with higher order organisms
- Easy comparison of results between locations and time points
- MARA and LumiMARA have been successfully trialled on samples from 15 offshore installations

MARA

The MARA test includes 11 microbial species, including ten prokaryotes and one eukaryote, freeze-dried in a micro-titre plate.

During testing the micro-organisms are exposed to a concentration gradient of the test sample and

MARA Assay Procedure



incubated for 18 hours along with growth media and a redox dye.

Growth of the micro-organisms is then measured by assessing reduction of the redox dye through the use of a scanned image or plate reader and NCIMB's proprietary MARA analysis software.

LumiMARA

LumiMARA uses 11 species of naturally bioluminescent bacteria. When these bacteria are exposed to toxins their luminescence is reduced, and this can be used as a rapid and direct measurement of toxicity.

The bacteria are exposed to a concentration gradient of test sample and incubated for 15 minutes before the plate is read using a luminometer.

Interpretation of results

Plate readings for MARA and LumiMARA are used to calculate the Microbial Toxic Concentration (MTC). MTC is a measure of inhibition equivalent to an EC50 value. It is used for MARA and LumiMARA because it has a number of benefits including elimination of interpolation errors of classic EC50 determination.

The combined integrated evaluation of all the species constitutes a unique toxicity fingerprint for the sample.

Contact us to find out more about MARA and LumiMARA.

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