

CEFIC Long-range Research Initiative

Request for Proposal (RfP)

LRI Project code: LRI-ECO17

Title: Evaluation of test methods for measuring toxicity to sediment organisms

Deadline: 31 August 2010

Background

There are several internationally agreed tests available for investigating the potential long-term effects of substances, metabolites (or transformation products) and non-extractable residues on sediment-dwelling organisms. These standardised test methods focus on benthic invertebrates (e.g. *Chironomus*, *Lumbriculus*). However, there is a lack of methods for assessing potential effects on microorganisms, plants and animals from different taxonomic groups. The European Commission guidance for REACH (registration, evaluation and authorisation of chemicals; EC, 2008) identifies that specific effects of chemicals on plants and microorganisms are not covered by the available test methods. The guidance also states “as these organisms also play an important role in the benthic community, there is the necessity to further develop standard test methods and to revise the sediment assessment concept accordingly in the future”.

Development of acute and chronic sediment tests covering different trophic levels and exposure pathways are needed to better define the potential environmental risks posed by chemicals in sediments. In selecting key species for assessing toxicity it is necessary to also consider exposure pathways (e.g. via pore water or ingesting sediment particles). Indeed, the exposure route is strongly influenced by species-specific feeding mechanisms and the behaviour of the organisms in, or on, the sediment (e.g. surface deposit versus burrowing sub-surface feeders). Such factors influence toxicity and the outcome of test results, however, scientific knowledge and guidance on the selection of appropriate test species and test designs are also lacking.

Consideration of toxicity data from a wider range of species/exposure routes can be expected to help improve guidance on species selection and increase confidence in deriving no-effect concentrations for sediment communities.

Objective

The objective of this proposal is to improve our scientific understanding of sediment toxicity and incorporate this knowledge in a pragmatic way into regulatory guidance and risk assessment schemes.

Scope

Sediment toxicity assessment is complicated, and our current level of understanding limits the probability of an accurate ERA for sediment-associated contaminants. CEFIC seeks project proposals that meet the objective of this project, that could include focused experimental work and consider the following:

- A review the availability of sediment test methods for microorganisms, plants and animals from different taxonomic groups. A major challenge in sediment effects analyses is identifying and quantifying the relevant route of exposure to a test chemical, which may differ widely across benthic taxa. Given the proposed use of long-term sediment toxicity data in ERA, the review should consider the importance of different exposure pathways and the influence of species-specific behaviour and feeding mechanisms. Identify gaps in knowledge and propose fundamental research, if needed.
- A review the applicability of test methods for evaluating toxicity of organic chemicals,. The difficulty in identifying hazard lies in choosing appropriately sensitive organisms when experimental evidence indicates that species within the same genus can have very different sensitivities to different toxicants. Consequently, sediment toxicity data from a battery of organisms with varying sensitivities (i.e. different trophic levels) may be the best solution for comprehensive assessments. Toxicity tests also require a reproducible test endpoint that can be accurately, predictably and reliably measured, hence standardisation of test methods is important. Fundamental research is needed to support extrapolation of toxicity endpoints to population endpoints.
- Whether it is possible to 'read across' from freshwater to marine sediment tests, or is there a specific need to undertake sediment tests with marine organisms?
- Development of guidance to assist regulators in selecting ecologically relevant endpoints to reflect the appropriate routes of exposure. Develop a risk assessment framework for prospective testing and show how sediment ecotoxicity data should be used within the context of ERA to support management decisions.

LRI funding and timing

Budget in the order of 500,000 Euros, duration up to 3 years.

References

European Chemicals Agency (2008). Guidance for the implementation of REACH. Guidance on information requirements and chemical safety assessment, Chapter R.7b: Endpoint specific guidance.