

**Topical Scientific Workshop on Risk Assessment for
the Sediment Compartment**
7-8 May 2013, Helsinki, Finland

CASE STUDY – SUMMARY FORM

5

(Number to be filled by the organisers)

The case studies covering concrete examples of sediment risk assessments for particular chemicals and/or conditions are intended to support the breakout group discussions. All submitted case studies will be distributed to the participants as supporting background material for the workshop and will be included in the workshop proceedings. The Scientific Committee will select some case studies or selected areas of the case studies and will invite the authors to present these cases during the workshop, either at the plenary session or during the break-out groups.

NOTE: By submitting this form, the authors confirm that they have the ownership of the information presented in the case study and that they authorise ECHA to distribute the submitted information to the workshop participants and to publish it in paper and/or electronic format as part of the workshop proceedings.

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Case study details

Case study is particularly relevant for the subthemes:

Note: the case study should cover all three areas, but please indicate if it is particularly relevant/informative for one or more subthemes

- Problem definition and conceptual model for sediment risk assessment
 Exposure assessment
 Effect assessment

Authors: Sebastian Buchinger, Evelyn Claus, Sebastian Schmitt, Michael Schlüsener, Peter Heining, Georg Reifferscheid,

Title: Assessment of sediment associated estrogenic effects in the catchment area of the river Elbe

Keywords: estrogenic effect, sediment, river Elbe

Summary:

Estrogenic effects in the aquatic environment which might be caused by steroidal hormones, e.g. 17 β Estradiol or the synthetic 17 α Ethinylestradiol, or xenoestrogens like 4-iso-Nonylphenols are of growing concern. The log KOW-values of the named compounds indicate that they might be adsorbed to particulate matter and thus can be found in river sediments. With the presented study we addressed the question if it is possible to measure sediment associated estrogenic potentials in sediments along the rivers Elbe and Saale. Furthermore, we identified bioactive compounds by means of an effect directed analysis with the aim to prioritize the identified compounds according to their contribution to the measured overall estrogenic effects. The results of the work indicate that beside the natural hormone Estrone especially the 4-iso-Nonylphenols contribute substantially to particle associated estrogenic effects.

Poster exhibition

The case study will be presented also as a poster

- Yes No

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SUGGESTED CONTENT FOR THE CASE STUDY: please try to limit the case study to 5 pages (or a maximum of 10 pages for complex case studies) focussing on the elements relevant for a broad general discussion on concepts, methods and approaches applicable to all chemicals or to specific chemical groups.

1. BACKGROUND AND PROBLEM DEFINITION

The Federal institute of hydrology in Germany is responsible for the quality assessment of dredged material in the context of the maintenance of rivers. Beside chemical analysis ecotoxicology is used as one parameter for an integrated assessment of the sediment quality. In addition to classic ecotoxicological endpoints, specific sub acute effects like endocrine disruption are of growing concern which raised the questions i) are estrogenic potentials associated with sediments ii) which compounds contribute to such an effect and finally iii) do this compounds pose a risk to sediment living organisms?

2. MAIN CASE STUDY DESCRIPTORS

- a. Site-specific: The case study was focused on the river Elbe and one of its main tributaries, the river Saale.
- b. Freshwater
- c. Chemicals addressed: 17b Estradiol (E2), 17a Ethinylestradiol (EE2), Estrone (E1), BPA, 4-iso-Nonylphenols

3. CONCEPTUAL MODEL

- a. The suggested case study is not a prospective risk assessment as it is done for single compounds. It is more a description of the current situation in the German rivers Elbe and Saale with the focus on estrogenic effects and the underlying chemical causes.

4. EXPOSURE ASSESSMENT

- a. **METHODOLOGY:** No exposure assessment by a modelling approach but the chemical identification and quantification of compounds with estrogenic potential. In this sense the generation of monitoring-data for compounds strongly linked to effects.
- b. **RESULTS:** Interestingly, no EE2 was found in any of the samples analyzed. E2 was found in low concentrations. The two compounds E1 and 4-iso-Nonylphenol contributed most to the measured sediment associated estrogenic effect.

5. EFFECT ASSESSMENT

- a. **METHODOLOGY:** The estrogenic effects were measured by the Yeast Estrogen Screen – an in vitro bioassay. An effect assessment

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for the derivation of a PNEC for single compounds was not in the scope of the work.

- b. **RESULTS:** Some hot spots of estrogenic activity could be identified in the investigated water bodies. The correlation of these results with organismic end points like fertilization success or reproduction is the next step to be carried out.

6. RISK CHARACTERISATION & CONCLUSIONS

According to the prioritization of the identified sediment associated compounds with estrogenic activity the Estrone and the isomeric 4-iso-Nonylphenols seems to be the main drivers. A comparison between water phase and solid phase indicate a limited accessibility of these compounds via the water phase. However, ecotoxicological data for Estrone and the 4-iso-Nonylphenols under consideration of direct contact or ingestion is very scarce. From the point of view of the authors this knowledge gap is at the moment a main obstacle for a sound risk assessment of estrogenic compounds for benthic organisms.

7. ATTACHMENTS, REFERENCES AND BACKGROUND MATERIAL

<http://www.ncbi.nlm.nih.gov/pubmed/22421800>

<http://www.ncbi.nlm.nih.gov/pubmed/23280691>