

Risk assessment of dioxin-contaminated sediments

Human health risks

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Introduction: For nautical reasons, the brackish Noordzeekanaal between Amsterdam and IJmuiden has to be dredged. Part of the area is contaminated by dioxins due to an accident more than 40 years ago. To assess the human health risk of the sediments, remaining after the dredging is completed, an intensive field study was carried out.

Methods: In the main channel, sediment samples were taken with a tube corer in order to obtain samples from the bed sediment beneath the layer that has to be dredged. In the harbour areas next to the main channel, sediment samples were taken from the sediment surface-layer, as these harbours do not have to be dredged for nautical reasons. The area is used for recreational, as well as professional fishery and is locally also used for recreational purposes.

The DR-CALUX assay was used to assess the concentration of dioxins and dioxin-like compounds in the sediment samples. The DR-CALUX response is expressed as 2,3,7,8-TCDD equivalents (TCDD TEQ) in ng/kg dry sediment [1].

In all sediment samples the fast desorbing concentration of organic compounds was analyzed using an XAD-extraction. All concentrations are expressed on a dry weight basis.

The model SEDISOIL was used to calculate human health risks for the compounds analyzed. The TCDD-TEQ obtained by the DR-CALUX assay was entered as 2,3,7,8-TCDD in the model.

Eel (*Anguilla anguilla*) was caught at six locations in the area and analyzed for dioxins, furans and PCB (77, 126, 169, 105, 118 and 156). The concentration of each analyzed compound is entered in SEDISOIL. Also, the concentrations are summarized according to the WHO TEF for fish [2]. These concentrations are compared with the European consumption standard for dioxins and furans in fish (4 pg TEQ/g fish).

Results: When the average concentrations of the fast desorbing organic compounds are used in the SEDI-SOIL model, the human health risk can be calculated. Further results will be reported within one month.

The measured concentrations of the separate dioxins, furans and PCB (77, 126, 169, 105, 118 and 156) in

fish are used in SEDISOIL. The total (added) exposure caused by these compounds is compared to the MTR-value (Dutch maximum permissible risk level). The most important contribution to the exposure are from the dioxine-like PCB. Further results will be reported within one month.

The summarized concentrations according to the WHO-TEF for fish is compared with the European consumption standard. It shows the dioxine-like PCB as the most important contributor.

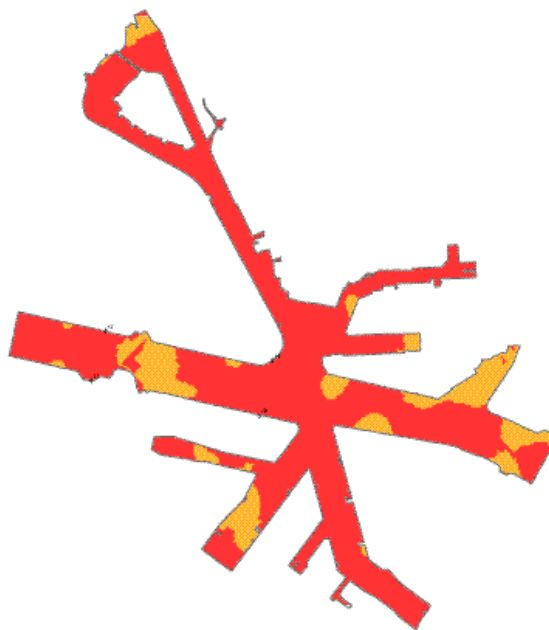


Fig. 1: Human risk based on DR-Calux values

Discussion: Although dioxin-like PCB are not often analyzed in projects like this, these compounds have an important role in the risk assessment of human health risks.

References: [1] Stronkhorst et al. (2002) *Environ. Toxicol. Chem.* **21**:2552-2561; [2] Van den Berg et al. (1998) *Environ. Health Perspect.* **106**:775-792.