

Human health risk assessment guidance for dredging and dumping at sea of marine and estuarine sediments

Julie Droit¹, Tristan Bataille², Antoine Delouis³

¹Cerema : institut for risks, environment, mobility and development, 155 rue Pierre Bouguer, BP 5, 29280 Plouzané, France.

Phone: 02 98 05 67 32

E-mail: julie.droit@cerema.fr

²General Commission for Sustainable Development (CGDD)
Ministry of Ecology, Sustainable Development and Energy.92055 La Défense cedex, France.

³Nantes – Saint Nazaire Port Authority Headquarters
18, Quai Ernest Renaud, BP 18609, 44186 Nantes cedex 4, France

Introduction: For sediment dredging or disposal at sea operations, developing an Environmental Impact assessment can be a legal requirement. Human health risk assessment is part of the regulation report.

In order to harmonize practices, and provide a common frame of reference to port authorities, consultancy companies, and administrations, the studies and observation group on dredging and environment (GEODE), decided to produce guidelines.

The purpose of this guide is to adapt the general methodology of health risk assessment to the specific context of dredging and disposal at sea, in conformity with European directives.

Methods: As regards the chemical risk, existing databases (toxicological, physical and chemical data) and methodology to evaluate the exposition dose [1] allow to conduct a quantitative risk assessment.

Indicative values of contaminant concentrations in the sediments have been figured for the only exposure pathway to be considered in these operations : the ingestion of seafood contaminated via the food chain.

Those values constitute decision criteria which conduce port authorities to assess or not the human health risk.

Scientific publications, interviews of specialists and regulatory reports relative to dredging operations and disposal at sea of several French ports have been analysed in order to define these decision criteria.

Moreover, to confer to these values a protective character, inflating hypotheses **have been considered.**

As regards the biological risk (bacteria, virus, protozoans, and harmful micro-algae), the absence of database on toxicity factors and the complexity of exposure pathways only permit to implement a qualitative risk assessment.

Results: Chemical compounds with human health concern have been determined among contaminants listed by OSPAR convention and UE Water Framework Directive, focusing on compounds which

are liable to be found in sediments and biota (hydrophobic, persistent, bioaccumulable substances).

The analysis is based on three main criteria to classify the compounds regarding a human health risk assessment approach:

1. a defined regulation or recommendation on a threshold concentration admissible in seafood for human consumption,
2. existing toxicity factors,
3. human health effects.

In this approach, decision criteria were defined to classify dredging projects. For chemical contamination of sediments, the decision criteria correspond to contaminant's toxic concentrations in sediment. Under those concentrations it is possible to exclude a human health risk.

The equilibrium partitioning method of the European Technical Guidance Document (TGD) was used considering the exposure route "consumption of seafood catch around a disposal site" to estimate the contaminant concentration [2].

Discussion: The assessment of biological risk is less developed than the chemical risk assessment. Therefore, available databases and method of environmental concentration assessment allow to realize a quantitative assessment for chemical risk, whereas the evaluation is only qualitative regarding the biological risk.

References: [1] CE (2003) *Technical guidance document* ; [2] Marchand M. and C. Tissier (2005) *Analyse du risque chimique en milieu marin. L'approche méthodologique européenne. Ed. Ifremer* 126 p.