

# Assessing the leachate toxicity of materials based on sediments in road sector

Mohammad ALMOKDAD<sup>1,2</sup>, Rachid ZENTAR<sup>1,2</sup>

<sup>1</sup> IMT Nord Europe, Institut Mines Télécom, Center of Materials and Processes, Lille, France

<sup>2</sup> Univ. Lille, Institut Mines-Télécom, Univ. Artois, Junia, ULR - LGCgE – Laboratoire de Génie Civil et géo-Environnement, F-59000 Lille, France

Keywords: Sediments, Environmental Assessment, USEtox, Road-material.

Presenting author email: mohammad.almokdad@imt-nord-europe.fr

Marine works require to dredge the sediments out of their place. Thus they become categorized as wastes (Directive 2008/98/EC), and they should be handled accordingly. Sediments have shown several beneficial uses in the road sector as they provided the required technical properties. But their environmental characteristics are evaluated with respect to their pollutants content. Where dredged sediments are mainly contaminated with different trace elements, salts, and organic pollutants. Then in this study, a comparative toxicity assessment between the different applications that are based on sediments and intended to be used in the road sector will be addressed. Where the leachate effects of these materials will be quantified for the pollutants concentrations.

The results will correspond to the freshwater ecotoxicity and human health toxicity beyond the leachate impacts of these materials. The life cycle assessment tool will calculate the quantification of toxicity. Utilizing the USEtox model (Bijster et al., 2018) as an assessment method to assess the threats of the materials.

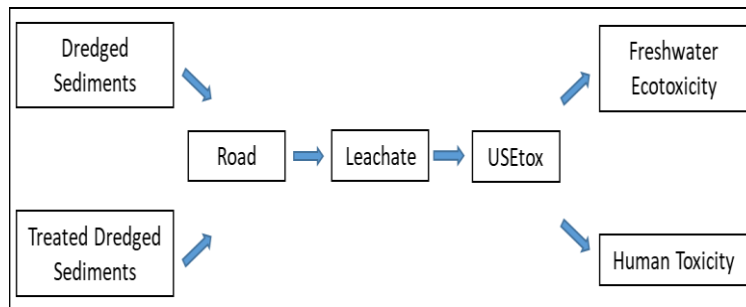


Figure 1. Sketch showing the assessment system.

## Materials and methods

The main objective of the study is to show the leachate toxicity impacts dredged sediments used in road-material, providing a comparative view of the different possible applications of usage.

The materials characteristics are obtained from previous research that concerns the valorisation of unauthorized sea disposal dredged sediments as a road foundation material (Achour et al., 2014).

In this study, and according to the environmental regulations, the sediments and treated dredged sediments were accepted as road materials (SETRA, 2011). Raw-sediments can be used as a backfill material (SETRA and LCPC, 2000). And treated sediments can be used as a road foundation material (Achour et al., 2014).

Then both materials were evaluated with respect to their functionality as road-materials. USEtox method was used to assess the different toxicity impacts on human health and freshwater toxicity.

## Results and discussion

The main results show the impacts of these different scenarios of modelling for road materials (road backfill or road foundation). Where the USEtox model provides the toxicity values for the different leaching behaviour which were taken into account in the previous study and show how representing real site conditions could affect the toxicity and how much it could affect it.

## Conclusions and perspectives

Based on the studied scenarios of the selected leaching behaviour for treated and raw sediments, the toxicity impacts show the importance of these scenarios in affecting toxicity results. The toxicity impacts were highly affected by the way of representing the material in real-life site conditions and thus it is essential to go further into this topic to address and assess these impacts clearly and properly.

## **Acknowledgements**

This study is funded by the Haute de France region of France, I-SITE foundation (INITIATIVE SCIENCE - INNOVATION - TERRITOIRES ECONOMIE, UNIVERSITE LILLE NORD EUROPE), and IMT NORD EUROPE.

## **References**

- Achour, R., Abriak, N.-E., Zentar, R., Rivard, P., Gregoire, P., 2014. Valorization of unauthorized sea disposal dredged sediments as a road foundation material. *Environ. Technol.* 35, 1997–2007.  
<https://doi.org/10.1080/09593330.2014.889758>
- Bijster, M., Hauschild, M.Z., Huijbregts, M., Jolliet, O., Kounina, A., Magaud, V., Margni, M., McKone, T.E., Rosenbaum, R.K., Van De Meent, D., Van Zelm, R., 2018. USEtox® 2.0 Documentation (Version 1.1).  
<https://doi.org/10.11581/DTU:00000011>
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance), 2008.
- SETRA, 2011. Acceptability of alternative materials in road construction.
- SETRA, LCPC, 2000. Réalisation des remblais et des couches de forme (GTR) - Fascicule 1 - principes généraux.