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Publication date:
2016

Document Version
Peer reviewed version

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Citation (APA):

Bondgård, M., Melvej, A., Rüegg, K., hvidberg, B., Fredborg, H., Søndergaard, G. L., Bjerg, P. L., & Binning, P. J. (2016). *Assessment of The Most Sustainable “Management Scenario” For An Old Pesticide Dumpsite*. Abstract from 10th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, United States.

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Assessment of The Most Sustainable “Management Scenario” For An Old Pesticide Dumpsite

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Background and objectives

In the 1950'ties and early 60'ties several hundreds tons of chemical waste were deposited in a dumpsite located on the west coast of Denmark. In 1973 and again in 1981 the dumpsite was partly remediated by excavation of contaminated sand. However, more than 100 tons of organophosphorous insecticides (primarily ethyl-parathion) and other chemicals remained in the subsurface and posed a threat to the aquatic environment in the North Sea.

In 2006, the dumpsite was encapsulated to a depth of 14 meters by an iron sheet piling, to stop leaching of chemicals to the North Sea. The environmental authorities in Denmark have since then been working on developing remediation methods that can be used to clean-up the site. The overall objective for a future remediation (or management scenario) is to ensure that there is no risk to the aquatic environment.

Approach

Four remediation methods (management scenarios) were found suitable to fulfill the objective; (1) Excavation of the site followed by thermal soil treatment, (2) In situ alkaline hydrolysis, (3) In situ steam enhanced extraction and (4) Continued encapsulation of the site (no removal of contaminants). The cost varied from 33 mio. EURO (solution 1) to 0.13 mio. EURO/year (solution 4).

One management scenario had to be recommended to the decision-makers (the regional politicians) in the Central Denmark Region – so which one of the four solutions are the most sustainable?

In order to improve decision-making, a multi-criteria assessment method for comparing the sustainability of the remediation alternatives was developed and applied. The model considers cost and effect of remediation, but also time, environmental and societal impacts and involves stakeholders in the derivation of criteria weights.

Results

The use of the multi-criteria method provided insight into how the four management scenarios compare to each other in terms of remedial effect, cost, time use and external impacts to environment and society.

Surprisingly, the sustainability assessment showed that excavation and thermal treatment of the soil was the most sustainable solution, although it was by far more expensive and had the highest secondary effects on the environment. The result of the sustainability assessment played an important part in the decision-making process when the politicians in Central Denmark Region decided on which management scenario to choose for the future.

The presentation will describe the four management scenarios, the sustainability assessment and how it was actually used in the political decision-making process in Denmark.