

TREATMENT OF ORGANIC-RICH SEDIMENTS THROUGH COMBINED IN SITU AND ON SITE TECHNIQUES – CASE STUDY

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6th International SEDNET Conference, 6-8 Oct. 2009, Hamburg, Germany

Introduction:

Dredging fine organic-rich sediments poses the risk of costly on-site pre-treatment and deposition on land. Beneath the natural organic material deposits organic substances like petroleum hydrocarbons, polycyclic aromatic hydrocarbons etc. can coat both the solid matter and the organic material [1].

Method: Floating Bioreactor

A floating device was developed to treat sediments with organic pollutants by aeration. The objective is to stimulate biodegradation by airlifting contaminated sediments and by resettling the aerated sediments at almost the same location. Volatiles will be stripped and floating barriers will help to avoid dirty clouds during extraction and re-suspension. The objective of the process is not to move dredged sediments to an on shore facility for treatment or disposal; but to recycle them more or less in-situ. In the riser pipe of the airlift pump sediment particles and water are moved upwards by a stream of air bubbles. This enables stripping of volatile compounds as well as an intensive aeration of the water to enhance aerobic biodegradation within the suspension during the resettling process [2].

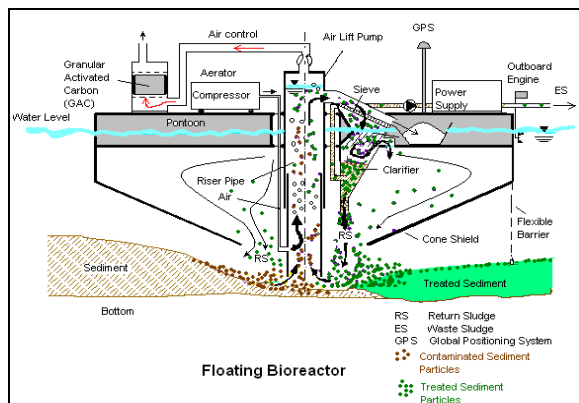


Fig. 1: Principle sketch of the Floating Bioreactor

Furthermore, the lifted and aerated sediment suspension can be treated on-site through conventional separation and dewatering techniques. The acceleration with oxygen rich air not only stimulates microbiological degradation effects but also strengthen precipitation by flocculation. Both

processes enhance the separation and dewatering measures.

Site Conditions

Organic-rich sediments were accumulated in pits of artificial fish ponds. The sheet piled pit covered an area of 1800 m². During the fish production process sediments were mobilized into these pits and had to be removed and treated annually. Due to the high organic content mixed with diffuse spreading contaminants conventional dredging with backhoe and hydraulic pumping resulted in inappropriate environmental stress and sediment handling measures.

Objectives

To demonstrate both the effects of the in-situ biodegradation and the enhanced on-site treatment procedure, sediments were airlifted with the Floating Bioreactor. Aerated sediment suspension was resettled on the bottom of the pit under controlled conditions. Part of the airlifted sediment was dewatered in a modular on-site system using a combination of several techniques.

Results

The results of in situ biodegradation process in the resettled sediment body and on site sediment treatment procedures will be presented.

References: [1] Thomas, J. (2008): Contaminated Sediment Treatment Options–Case Studies. – In: N-E. Abriak, D. Damidot, R. Zentar (Hrsg): Proceedings of the International Symposium on Sediment Management I2SM, Lille, France, 9-11 July 2008, Seiten 15-28, Ecole des Mines de Douai, France. [2] THOMAS, J. & BEITINGER, E. & GROSSKINSKY, H. & KOCH, T., PREUSS, V. (2008): Innovative in-situ Treatment Options for Contaminated Sediments. – In: Proceedings of the 5th International SedNet Conference (Oslo, Norway, May 2008).