

On the behaviour of dredged material at a disposal site in the German Bight, North Sea

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Introduction: Since 2005, the Hamburg Port Authority is disposing of sediment from the Elbe in the Hamburg harbour area at a site located in the Inner German Bight eight nautical miles SSE of the island of Helgoland. In order to estimate the ecological impact on the marine environment, an intensive monitoring program was established according to the German Directive for Dredged Material Management in Federal Coastal Waterways (HABAK-WSV 1999). This takes into consideration requests from the Ministry of Agriculture, Environment and Rural Areas of the State of Schleswig-Holstein. Meanwhile eight monitoring campaigns provided data to assess the ecological impact. Furthermore the presentation will illustrate results on the stability of the sediment body at the disposal site and a comparison of the sediment and contaminant transport processes in the North Sea.

Methods: In order to assess the impact of the disposal on the marine environment, monitoring includes chemical, biological, ecotoxicological and sedimentological investigations.

Numerical modeling procedures on dispersion processes [2] and sediment echosounding respectively multibeam sounding surveys were applied for estimating the stability of the sedimentary body. ADCP investigations [1] confirmed the results and provided further detailed information.

The results of the chemical analyses of dredged material were assessed according to the German HABAK-WSV guidelines [3], and in the nearby areas of the disposal site assessment criteria (EAC, ERL) proposed by OSPAR were used [4].

Results: Since late 2005 to early 2008 about 5.5 Mio. m³ dredged material from the Hamburg waterways were dumped at the disposal site. Despite of the loss of considerable amounts of the fine-grained fraction the impact on the marine environment is mainly limited to the center of the dumping site. The impact is mainly characterized by an alteration of the grain-size composition, a variation in macrobenthic organisms and an accumulation of trace metals and organic contaminants at the center of the disposal site. An

increase of contaminant concentrations only could be observed at the disposal site where chlorinated organic compounds exceed the OSPAR assessment criteria. In the surrounding of the disposal site, an accumulation of pollutants cannot be observed.

Depending on the tidal dynamics, an impact on the water column occurs in a limited region and short-term scale. Within a few hours the turbidity cloud generated by the dumping process declines completely and cannot be distinguished from the background suspended particulate matter concentrations.

Discussion: Regarding an assessment of possible impacts on the marine environment, the stability of the disposal site is a main topic in the discussion. The disposal has to meet strict constraints in order to avoid negative effects on the adjacent Wadden Sea National Park and conservation areas by pollutant transport. If negative effects are observed in the marine environment or the obligations outlined by Ministry of Agriculture, Environment and Rural Areas are not met, the disposal has to be terminated.

References: [1] DRL (2005): Measurement of Sediment Transport at the Buoy E3 Dredged Material Disposal Site, German Bight, North Sea, pp 36. unpublished. expertise of Dredging Research Ltd., Land, J., in charge of Hamburg Port Authority, Report 348.EU.0905.1., December 2005, [2] BAW (2007): Kurzfristiges Sedimentmanagement Tideelbe – Abschlussbericht: Umlagerung an der Tonne E3 im Herbst 2005 - Voruntersuchung Umlagerung Frühjahr 2006, Karlsruhe, Mai 2007, [3] HABAK-WSV (1999): Directive for Dredged Material Management in Federal Coastal Waterways. 2. revised edition 1999, BfG-No. 1100, pp. 49; [4] OSPAR (2008): OSPAR meeting of the working group of monitoring (MON), MON 08/1/6 Rev.2 Add. 1-E, Copenhagen (ICES): 24-28 November 2008.