

Mineral based sustainable dewatering solution

Sustainable use of resources by way of example of the dewatering of sediment from the River Elbe

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Introduction: Presentation of results achieved using INVOQUE^T®, a unique mineral- based performance-dewatering system.

Within the marine and civil engineering sectors, excavated and extracted materials may include fine materials, drilling muds and other hard-to-dewater materials that need to be selectively separated for economic disposal and/or reuse.

INVOQUE^T® is an innovative, high-performance system and an exceptional fit for dewatering hard-to-treat and fine sediments in a variety of industrial settings, across a wide pH, salinity and particle size range, contributing to improved economic, environmental and sustainability benefits for users.

The METHA II plant at Hamburg Port Authority AöR (HPA), has qualified a zero CMR, zero SHVC, environmentally-friendly conditioning solution for harbour silt dewatering for the first time. The results from various large-scale experiments, performed in conjunction with CUTEC Institut GmbH, Clausthal-Zellerfeld, showed several advantages compared to other treatment concepts, which can improve both technical operations and the circularity of the recovered resources.



Fig. 1: CUTEC pilot plant at the METHA II plant

Methods:

(2015) Preliminary experiments with a mobile test system to optimise the dosage, and planning in preparation for a large-scale experiment.

(2016) Large-scale experiment using a 3-component mineral-based process:

→ Omyased / Promoter + Starch KCG 750

Results:

In a large-scale experiment conducted in the METHA II plant during spring 2016 around 1,000 t of dewatered harbour silt was generated over a period of around 2 weeks, using a mineral-based, acrylamide-free flocculation process for conditioning and thickening. After thickening, a membrane chamber filter press (MCFP) was used for dewatering, achieving the following results:

- Good pre-thickening of the harbour silt
- 15 - 20% higher solids
- Approx. 20% higher shear strength

A number of improvements were noted in relation to the operation of the MCFP:

- Batch throughput up to 25% higher
- Shorter cycle time
- Longer cleaning intervals of the filter cloths
- Increased plant availability
- Low staffing requirements at the plant

Discussion:

Based on improvements in the physical properties of the soil (e.g. residual humidity, coefficient of permeability (cf value) for the sealing materials (<5.0 x 10⁻¹⁰ m/s)), the INVOQUET® technology allows the fine material to be re-used, increasing the circularity of the material and reducing the need for land-build disposal. Options and various applications for the reuse of the material needs to be assessed and discussed with operators.

References: [1] Sievers, M., Niedermeiser, M., Döring, U., Lehmann, K., Bonde, L.-S. (2016) : Entwässerung von Elbsedimenten – ein Beispiel für nachhaltigen Ressourceneinsatz. Wasser und Abfall, Heft 12/2016.

[2] Trubkat, M. (2016) *Bachelorarbeit Hochschule für Angewandte Wissenschaften Hamburg: Einsatz acryl-amidfreier Flockungshilfsmittel bei der Entwässerung mineralischer Elbsedimente in Hamburg*