Cleanup of the Lower Fox River in Wisconsin, USA: The world's largest sediment remediation project

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The successful involvement in the Miami River remediation project (2005 – 2008) inspired Boskalis Dolman to further strengthen its market position in the USA. Before final completion of phase 2 of the project in Miami, agreement was reached about the world's largest sediment remediation project: Cleanup of the Lower Fox River Operable Units 2-5. This is a multi-year project involving the processing of almost 3 million m³ of contaminated dredged material. One of the major advantages of the Boskalis Dolman approach: the volume of the sediment is reduced to the minimum, and a large part of the dredged material can be re-used.

The bed of the Lower Fox River is seriously contaminated with PCBs over a distance of almost 19 miles. PCBs were mostly used in the 1970s and 1980s by local paper factories. The waste flows with PCB were discharged straight into the river. The Lower Fox River flows into Lake Michigan, one of the Great Lakes in the United States. Immediately after the discovery of massive fish deaths in the late 1990s, the paper factories were asked to remove the contaminated material. After a period of investigations, the paper factories launched a 'Request for Proposal' in the autumn of 2007. To prepare a proposal, Boskalis Dolman teamed up with two US-based companies.

'Clean-up' team

The successful 'Fox River Clean-up Team' consists of Tetra Tech, a large engineering contractor with world-wide operations and a strong position in contract management as main contractor; J.F. Brennan, a local dredging company, responsible for the dredging operations and Boskalis Dolman, responsible for processing the contaminated dredged material. Dredging and processing will be performed during a period of 7 years. After that the work will continue for another three years, cleaning up and capping the less severely contaminated sections of the river.

The Fox River looks big but large sections upstream are used mainly by recreational shipping. However, the section to be dredged is still used on occasion for ship transportation. Even so, traffic volumes are so small that the work can be done almost without any interruption using two 8-inch and one 12-inch cutter suction dredgers.

Enormous project

The clean-up operation is the largest of its type in the world so far. It will involve dredging and processing of almost 3 million m³ of contaminated material. The processing consists of separating the sand and sludge, and dewatering it. It is expected that approximately 30% in weight of clean sand will be produced from the sediment. Most of this can be re-used on the processing site, behind a sheet piling structure. The rest will be used in local projects as filling material.

Exceptional achievement

A completely new sediment processing plant was designed and built in a period of approximately one year. A plant like this has never been built before on this scale and in such a short period. So Boskalis Dolman is clearly leading the way in the world of waterbed remediation. In June 2008, immediately after the project was awarded, Boskalis Dolman established a project team in Green Bay, Wisconsin, approximately 350 km to the north of Chicago. During the summer and autumn of 2008, Tetra Tech built a large hall on the project site, to protect the processing plant against the extremely severe winters in the Great Lakes area. Temperatures can get so low that the river is generally not navigable between November and April. A typical dredging season lasts only 28 weeks and operations have to shut down in winter. The construction of the plant has recently been completed and dredging and processing operations have been started end of April.

Boskalis Dolman designed the processing plant entirely in-house and most equipment was built in Europe. Shipping to and installation on site was performed in approximately six months. During four months, in addition to Dolman's own workforce, almost 300 people from subcontractors were at work in order to complete the project on time.

Sludge processing

During the process, all course material is screened from the sediment, which then goes through a hydrocycloning, classifying and washing process to produce clean sand. Coagulant and flocculants are added to the remaining sludge / water mixture, to prepare it for dewatering using four large settlement tanks and eight gigantic membrane presses. Resulting in large pieces of filter cake, with a solids content above 50%. The cutter suction dredgers will pump almost 3 million m³ of material to the processing site in Green Bay, which together with transport water will add up to a flow of approximately 1,500 m³ per hour. During a part of the project, ten booster stations will be used to cover the distance between the dredging and the processing operations. The dewatering plant has been designed to process more than 1000 tons dry matter of sludge every 24 hours. The plan is to work 24 hours a day, five days a week.

History

Boskalis Dolman started processing contaminated dredged material as far back as 1988 in the Jan van Riebeeck harbor in Amsterdam, The Netherlands and it has been processing all types of heavily contaminated material from the Amsterdam canals for many years.

In Germany, Boskalis Dolman spent four years processing sediments from the river Elbe, before the City of Hamburg constructed its own large processing plant 'Metha 3'. Since the early nineties, Boskalis Dolman performed numerous sediment cleanup projects in The Netherlands, Germany, Switzerland, the UK, US and even Gabon.

Growing market

Until a few years ago, Amsterdam and Hamburg seemed to be the only cities in the world who thought that volume reduction and re-use were more important than simply dumping the material. Dumping looks cheaper in the short term, but requires large scale storage capacity. The Flemish government recently also opted to process dredged material from Antwerp rather than dump the material in a depot. Boskalis Dolman has kept faith with its processing approach and it has now

broken into an important market in addition to soil washing. Its experience and its successful approach to the large-scale processing of dredged material have led to involvement with a large number of new projects.

Celebrations in Iran Mark the Conclusion of the "Nitrate Removal from Drinking Water in Mashhad" Research Project

For over three years, various high-performance processes for the removal of nitrates from drinking water, including two in-house developments from **WABAG** (Austria), were tested in Mashhad, which with 2.6 million inhabitants is Iran's second largest city. The successful completion of this international research project was marked by a celebration in Mashhad on January 15th, 2009, attended by over 300 guests. Representatives from the Iranian water authorities and all of the country's most important municipal authorities gathered on the spot information and participated in the celebrations.

Mashhad is located in an arid zone of north-eastern Iran. The city is known as a national, religious centre and every year is the destination for millions of pilgrims, who like the inhabitants also need a secure supply of drinking water. This is largely obtained from groundwater reserves, which especially in summer can be in short supply. In addition, probably as a result of inadequate wastewater treatment, increased inputs of nitrogen have led to a rise in the level of nitrates in the water from numerous wells. These nitrates cannot be dealt with using standard drinking water treatment and therefore more far-reaching processes are needed in order to reduce the nitrate content to the WHO stipulated value of 50 mg/l and below.

The related research project was initiated and realised within the scope of German/Iranian co-operation with the ministries, research companies and WABAG. As the technology leader, together with German research institutes, WABAG selected four suitable processes, designed and delivered all pilot plants, put them into operation on site and also provided operational management support.

The following processes have been tested in continuous operation: Biological denitrification (the WABAG BIODEN® process), Reverse osmosis, Ion exchange, and Electrodialysis process (the WABAG ENR® process).

Although nitrate removal plants have been in operation in Europe for a number of years, the project in Mashhad represented a special challenge due to the changed environmental conditions, e.g. higher groundwater salinity. Various parameters such as efficiency and process stability, investment and operating costs, technology and personnel efforts, drinking water quality and environmental effects were evaluated and rated in the final report.

The results showed that all four processes could meet the desired requirements, the nitrate content was reduced from approx. 120 mg/l cut to 40 mg/l and below. The best overall ratings were achieved by the BIODEN® and reverse osmosis processes. Moreover, the test series also demonstrated that WABAG's proven, in-house developed BIODEN® and ENR® technologies for nitrate removal are capable of safely turning groundwater with a high saline content into clean drinking water. And, that the reverse osmosis and ion exchange desalination processes are also able to furnish safe nitrate removal.

The BIODEN® process stands out due to its ability to provide selective nitrate removal and special environmental friendliness, owing to the fact that it does not produce any saline concentrates and that practically full water recovery can be achieved.

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H2O Celebrates Jubilee with Record Turnover

Founded as a Management-Buy-Out on February 16th, 1999, **H2O** GmbH experienced rapid growth in the past ten years. The managing partners Frank Schlegel and Matthias Fickenscher focuses on new technologies and expects further growth in the nearer future.

Despite the difficult market situation H2O GmbH could increase turnover in the past financial year, ending on February 28th, to more than 10.000.000 € which is 30 % more compared to the last period.

H2O develops and sells vacuum distillation plants for the treatment of industrial waste water.

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