

REMEDICATION OF POLLUTED SEDIMENTS THROUGH UNDERWATER DEEP FREEZING

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ABSTRACT

Artificial ground freezing (AFG) is a well established technique first practised in South Wales in 1862. Since then many different temporary and permanent applications have been developed. AFG is mostly used in tunnels and for stabilising excavations, but there is an increasing interest in using AFG for environmental protection and for using freeze/thaw cycles for remediation of contaminated soil. Freeze dredging is a novel dredging technique developed at Luleå University of Technology in co-operation with industrial partners. The contaminated sediment is first stabilised by freezing, and then the frozen sediment is lifted up above the water with a minimum of disturbance of the surrounding soil. Full-scale field tests have been performed with very good results. It has been hypothesised that underwater freezing can be used also for removal of radioactive material, fragile containers with hazardous content, and ammunition.

This paper describes the basic principles of the technology and lessons learned from the full scale tests. It also deals with considerations necessary for designing a system for underwater freezing of different materials.