

Benefits of Monitoring Acid Sulfate Potential of Coffee Rock (Indurated Sand) across Entire Dredge Cycle in South East Queensland

Authors : S. Albert, R. Cossu, A. Grinham, C. Heatherington, C. Wilson

Abstract : Shipping trends suggest increasing vessel size and draught visiting Australian ports highlighting potential challenges to port infrastructure and requiring optimization of shipping channels to ensure safe passage for vessels. The Port of Brisbane in Queensland, Australia has an 80 km long access shipping channel which vessels must transit 15 km of relatively shallow coffee rock (generic class of indurated sands where sand grains are bound within an organic clay matrix) outcrops towards the northern passage in Moreton Bay. This represents a risk to shipping channel deepening and maintenance programs as the dredgeability of this material is more challenging due to its high cohesive strength compared with the surrounding marine sands and potential higher acid sulfate risk. In situ assessment of acid sulfate sediment for dredge spoil control is an important tool in mitigating ecological harm. The coffee rock in an anoxic undisturbed state does not pose any acid sulfate risk, however when disturbed via dredging it's vital to ensure that any present iron sulfides are either insignificant or neutralized. To better understand the potential risk we examined the reduction potential of coffee rock across the entire dredge cycle in order to accurately portray the true outcome of disturbed acid sulfate sediment in dredging operations in Moreton Bay. In December 2014 a dredge trial was undertaken with a trailing suction hopper dredger. In situ samples were collected prior to dredging revealed acid sulfate potential above threshold guidelines which could lead to expensive dredge spoil management. However, potential acid sulfate risk was then monitored in the hopper and subsequent discharge, both showing a significant reduction in acid sulfate potential had occurred. Additionally, the acid neutralizing capacity significantly increased due to the inclusion of shell fragments (calcium carbonate) from the dredge target areas. This clearly demonstrates the importance of assessing potential acid sulfate risk across the entire dredging cycle and highlights the need to carefully evaluate sources of acidity.

Keywords : acid sulfate, coffee rock, indurated sand, dredging, maintenance dredging

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