

Acid Sulphate Soil Treatment

Background

Acid Sulphate Soil (ASS) is the common name given to soils and sediments containing iron sulfides, the most common being pyrite. When exposed to air due to drainage or disturbance, these soils produce sulphuric acid from reacting with oxygen, often releasing toxic quantities of heavy metals to the wider environment. Excavation of Potential Acid Sulphate Soils (PASS) can lead to the creation of actual Acid Sulphate Soils (AASS).

To reduce the possibility of PASS becoming AASS, there are four main management techniques used to minimise this possibility and its effects:

- ▶ Neutralisation
- ▶ Minimising disturbance
- ▶ Reclaiming land
- ▶ Water cover

In many cases minimising disturbance is not possible especially in relation to construction projects. Reclaiming land and water cover are based on removing the possibility of oxygen coming into contact with the sulphate within the soil, but in many circumstances is not possible. Therefore neutralisation is the only management technique available in many situations where ASS is present.

The way in which ASS is neutralised is relatively simple in that a highly basic material, such as lime, is mixed with the ASS. The amount of lime required to be mixed with the ASS is determined by analysing a sample of soil to calculate actual acidity and relating the amount of lime required to be added to effectively neutralise the soil.

In many cases of ASS treatment, agricultural lime is used to neutralise the soil. However, there are other reagents available, which are effective such as hydrated lime, mixtures of hydrated lime and agricultural lime, and also lime slurries, which are added as a liquid.

The McMahon Services Solution

McMahon Services as a specialist treatment contractor provides the equipment and know-how in treating ASS using a range of products and reagents. We are able to do this by having an understanding of the technical requirements of treating ASS, as well as using state-of-the-art treatment equipment.



Discharge of shallow acid groundwater from acid sulfate soil



Exposed acid sulphate soil

McMahon Services is a specialist treatment contractor providing proven and innovative solutions in the treatment of Acid Sulphate Soils.

Acid Sulphate Soil Treatment

Revolutionary RETERRA

Treatment of ASS centres on the Komatsu Reterra BZ210-1 G-Mode, a specialised soil recycler. The Reterra is specifically designed to handle heavy marine sediments and accurately dose with a range of reagents. Reagents can range from dry hydrated lime, to wet agricultural lime as well as slurried reagents. Dosing hoppers and liquid manifolds are used to add the reagents with the ASS.

The G-Mode model offers a dramatically improved and increased workload capability and soil improvement efficiency.

The ASS and reagents are mixed in a chamber consisting of a soil cutter and three flailing hammers, then discharged via another soil cutter. This ensures there is effective mixing between the neutralising reagent and the sulphur compounds containing within the ASS. The whole process is controlled with an on board computer system, which monitors throughput of reagents and soil to ensure volumes of material processed are accurately known.

McMahon Services has showcased our ability to treat ASS with numerous trials undertaken. This has led to the engagement by the Fulton Hogan McCosker Joint Venture and McConnell Dowell on two large projects as part of the LNG development in Queensland.

Australia Pacific LNG Project - Curtis Island

McMahon Services successfully treated approx. 15,000m³ of ASS, required in preparation for the construction of Bechtel's LNG facility on Curtis Island. It was known that the material was wet/sloppy marine sediment and that the acidity was highly heterogeneous. To treat the material, the project team adopted an innovative method of adding a calculated dose of aglime, providing a more efficient and cost effective method.

The developed treatment system was a modification of the Reterra, in order to dose the material with the neutralising reagent at a relatively high ratio. Instead of using the Reterra's own reagent dosing system, an external feed hopper and conveyor system was developed to dose the aglime.

Narrows Crossing - Gladstone

On the back of the success achieved on Curtis Island, McMahon Services was then engaged to treat 55,000m³ of ASS on the mainland. The team once again utilised the Reterra with the same external feed hopper and conveyor system. The liming rate ranged from 90 - 300 kg/tonne. The project was successfully completed with significant sampling and 'zero rejects' recorded.

In Summary

The traditional 'land farming' method of treatment does not allow for easy or homogeneous mixing and is also problematic when faced with wet weather conditions.

The advantages of our treatment method include; minimal space required, efficiency of using aglime (easily adjustable / computerised), increased volume of production, improves quality of material and has demonstrated a very high success rate.

