

## **Ground chemistry: Implications for construction.**

B. Hawkins (ed.). Balkema, Rotterdam, 1997. Hfl 195 hardback; xii + 658pp  
ISBN 90-5410-866-5.

This compilation of papers from a conference in 1992 should be compulsory reading for all engineering geologists engaged in characterising ground conditions for engineering purposes. The ground is alive, well and changing - occasionally very fast. This is not a book for the faint hearted - it is full of case studies of ground that precipitated, swelled, shrunk, degassed, moved or generally did not do as it should.

There are 49 papers arranged in 5 sections. Three introductory papers provide a review of the 'pure' aspect of the subject. Ottewill discusses the physico-chemical behaviour of clay beds in waters of different chemistry. Shaw reviews the petrology of mudrocks - which are after all the most abundant sedimentary rocks. But it is Campbell's paper on the microbiology of soils that brings the book to life. As he points out, biological activity can be an asset in breaking down organic contaminants or a liability when construction materials or buried services are the target.

Ten papers focus on the effect of chemistry on foundations. Many discuss the mechanisms whereby soil volumes change - for instance by sulphate generation or water gain/ loss. Three discuss gaseous contaminants - methane and hydrogen sulphide. In one case the methane was generated from void formers used to accommodate shrink/ swell soils in London.

The eleven papers discussing the effects of chemistry on road construction have a truly international flavour - with contributions from sites in Taiwan, USA, India, Japan and the UK. Bright's paper on microbial attack of the low molecular weight additives in geosynthetics should add fuel to the debate on the life expectancy of containment cells and passive barriers used in the management of waste and contamination as well as the engineering integrity of earthworks.

Marine and estuarine environments are known to be chemically active. Seven papers tackle the problem of chemical degradation of engineering structures or the exploitation of chemical changes to enhance engineering properties of poor soils.

By far the largest section, with eighteen papers, deals with environmental issues (aren't they all?). Quigley found that clay liners at two sites showed no adverse effects after prolonged contact with the leachate. Yong et al. showed that high carbonate clay additives help fix heavy metals, mainly through precipitation and cation exchange. Cullimore and Nilson's paper on the risks to putting greens from biologically induced 'black plug layering' neatly demonstrates geological understanding serving society - and should result in plenty of discussion at the '19th'.

This book contains a wealth of empirical experiences and theoretical exposition. The material is interesting and concise. For the non-chemist it will foster a deeper understanding of the contribution professional chemists can make to ground characterisation. I suggest that no major consultant or contractor can afford to be without a copy and most engineering geologists would benefit from reading this book.

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