

# Hydrogeology for Rock Engineers

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Gunnar Gustafson



STIFTELSEN BERGTEKNISK FORSKNING  
ROCK ENGINEERING RESEARCH FOUNDATION



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# Hydrogeology for Rock Engineers

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Groundwater has become a problem in construction of tunnels and other underground facilities in a way it has never been before. Tighter environmental regulations mean that documentation of a completely different calibre is now required when applying for permission to construct an underground facility. Greater requirements for a dry environment in road and railway tunnels have increased demands on sealing and drainage. Existing tunnels in metropolitan areas largely drain the rock of the available groundwater, and new underground constructions and tunnels can exacerbate the situation. Naturally, the traditional problems relating to groundwater remain, making construction difficult in water-conducting zones in poor-quality rock, and involving the risk of settlement if clay layers overlying the rock are drained.

This book provides a review of our current knowledge about the hydrogeology of the crystalline basement, and explains how this can be applied in practical methods for use in site investigations, layout and design, as well as in the operation of tunnels and underground facilities. The work is based on research and practical experience of hydrogeological problems and phenomena. Much of the knowledge base comes from the SKB research and pre-investigation studies relating to final disposal for spent nuclear fuel. However, the aim is not to describe the research front as such, but rather to explain what is important and useful for the rock construction community in general.

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**Gunnar Gustafson** (1945–2011), Professor Emeritus of Geology at Chalmers University of Technology, Gothenburg, was a successful hydrogeologist and civil engineer. He was active as a researcher, lecturer and consultant. In the last twenty years of his career, Gunnar Gustafson worked with hydrogeological issues relating to underground constructions in infrastructure projects, as well as research projects relating to disposal of nuclear waste.

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