

**PRE-8ICG YOKOHAMA SPECIAL LECTURES**

***“The Vienna Terzaghi Lecture”***

**and**

***“2005 Rankine Lecture”***

**(hosted by the Japan Chapter of the IGS and the Japanese Geotechnical Society)**

■ Room 501

■ From 5:30 PM until 7:30 PM, 18<sup>th</sup> September 2006

■ Open to and free for all the participants of the 8ICG Yokohama as well as the members of the Japanese Chapter of IGS and the Japanese Geotechnical Society.

**Geosynthetics engineering:  
successes, failures and lessons learned  
(the Vienna Terzaghi Lecture)  
by J.P. Giroud**

*Chairman Emeritus of GeoSyntec Consultants and Past  
President of IGS*

**ABSTRACT:** The lecture presents in detail two cases of failures and two cases of successes related to structures incorporating geosynthetics. Analyses of these cases are presented and lessons learned are discussed. An important lesson learned is that engineering problems, whether they are related to failures or successful applications, can always be solved by following a rational approach, generally including theoretical analyses. In contrast, common sense or “engineering judgment”, used without the support of a rational approach, can be misleading, as illustrated by examples. In other words, this lecture is consistent with the “theory and practice” approach promoted by Terzaghi. Another lesson learned is that geosynthetics engineering is an integral part of both geotechnical and civil engineering, which results in fruitful technology transfer. Also, failures and successes are put into perspective: it is shown that failures represent a very small fraction of the structures incorporating geosynthetics. To illustrate this point, the lecture includes a survey of the most important applications of geosynthetics using spectacular photographs of structures incorporating geosynthetics constructed in various countries. Even though innovative methods are presented, the lecture is presented in a simple and entertaining way and is accessible to all civil engineers.



# Long term performance of contaminant barrier systems

(2005 Rankine Lecture)

by R. Kerry Rowe

*Professor, Vice Principal (Research), Queen's University,  
Kingston, Canada and Past President of IGS*

**ABSTRACT:** This lecture describes the latest findings with respect to the long-term performance of modern municipal solid waste (MSW) landfill barrier systems. Recent data relating to landfill liner temperatures is reviewed. Temperature is shown to have a significant impact on both contaminant migration and the service life of the liner system. Theoretical predictions of leakage are compared with observed field performance. It is shown that composite liners are substantially better than single liners in terms of controlling leakage from landfills. Also the leakage rates with a composite liner are very small and diffusion will dominate as a transport mechanism for contaminants that can readily diffuse through a geomembrane (GM). It is shown that high density polyethylene (HDPE) GMs provide an excellent diffusive barrier to ions. However some organic compounds readily diffuse through HDPE GMs and a combination of GM and an adequate thickness of liner and attenuation layer are required to control impact to negligible levels. The long-term performance of HDPE GMs is discussed together with the effect of landfill temperature on the potential desiccation of clay liners in composite liner systems. The use of numerical models for predicting the service lives of engineered systems and long-term contaminant transport is demonstrated.

