Introduction to Geosynthetics in Mining

By

Dirk van Zyl, Professor and Chair of Mining and the Environment, University of British Columbia, Canada
Sam Allen, Vice President, TRI Geosynthetics Services, USA
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Course Description

Mining projects utilize geosynthetics in many different applications to optimize cost and schedule. The term “geosynthetics” can have a wide range of meanings, with many different materials available, and the suitability of any geosynthetic should carefully be considered before incorporating and specifying as part of the design.

This one-day course will introduce and discuss the various types of geosynthetics available in mining applications, such as for use as physical barriers (geomembrane and GCL), material separation and filtering (geotextile and geotubes), drainage (geonet), erosion control and soil reinforcement (geogrids). Field and laboratory testing (including quality control and assurance) will also be discussed, along with key specification parameters. The afternoon will primarily focus on case histories and examples of geosynthetics in mining projects, such as in heap leach, tailings facilities and retaining structures.

The course is designed for technical participants who would like to gain a general understanding of the types of geosynthetics that are used in mining applications and factors to be considered in their selection, as well as people who are involved with the management and selection of geosynthetics.
Course Outline

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Welcome and Introductory Statements (8:00 to 8:15am)

Session 1: Designing with Geosynthetics Overview (8:15 to 10:00am)

Introduction to the short course, followed by a discussion on materials available, design considerations and typical applications for mining projects.

- Physical barriers
- Material Separation and Filters
- Drainage
- Erosion control
- Reinforcement

Session 2 Quality Assurance (QA), Quality Control (QC), Lab testing and Specifications (10:30 to 12:00pm)

Present typical field and lab testing methods performed, what test results mean and key items that should be considered in specifications

- Physical barriers
- Material Separation and Filters
- Drainage
- Erosion control
- Reinforcement

The importance and need for QA/QC and specifications will also be discussed.
Session 3: Case histories and examples (1:00 pm to 4:30 pm with a coffee break from 3:00 to 3:30)

Case histories for heap leach and tailings facilities would be discussed, illustrating how synthetic materials (geomembrane, geotextile, geogrid, etc.) are used in mining projects and the need for site specific trade off studies, etc.

Methods of detection and results from Pond leak surveys will also be presented.

Session 4: Questions, Summary and Closeout (4:30 to 5:00 pm)

Instructor’s Bios

Dirk van Zyl, PhD., P.E.

Professor and Chair of Mining and the Environment
Norman B. Keevil Institute of Mining Engineering
University of British Columbia, Canada

Dirk Van Zyl is Professor and Chair of Mining and the Environment at the Norman B. Keevil Institute of Mining Engineering, University of British Columbia, Vancouver, BC. Dirk has more than 35 years' experience in research, teaching and consulting in tailings and mine waste rock disposal and heap leach design. During the last decade much of his attention has been focused on mining and sustainable development and mine life cycle management.

Dirk received a B.Sc. in Civil Engineering in 1972 and a B.Sc. (Honors) Civil Engineering in 1974, both from the University of Pretoria, South Africa. He also received M.S. and Ph.D. degrees in Geotechnical Engineering from Purdue University in 1976 and 1979, respectively. In 1998 he completed an Executive MBA at the University of Colorado. He is a registered professional engineer in 3 States in the US.

Dirk has consulted internationally on many mining projects. These projects covered the whole mining life cycle, from exploration to closure and post-closure, in a large range of climatic and geographic environments. Most of this work has been focused on geotechnical and environmental mining engineering aspects to provide solutions for environmental and human health protection.

Dirk has more than 100 publications to his credit; these include papers and book chapters. He has also presented numerous short courses on heap leach design, mining environmental management and mine closure in the US and abroad. He is the recipient of the three awards from the Society for Mining, Metallurgy and Exploration (SME). These are the Robert Peele Award (1985) and Distinguished Service Award (1992) from the Mining and Exploration Division, and a President's Citation (1998). Dirk became a Distinguished Member of SME in 2003. He received the Bureau of Land Management Sustainable Development award in 2005 and the Adrian Smith International Environmental Mining Award in 2006.
Sam Allen
Vice President
TRI Geosynthetics Services
Austin, USA

Mr. Allen is the Vice President of TRI/Environmental, Inc. (TRI) Geosynthetics Services, an international, independent third party geosynthetics testing and research facility with laboratories and field offices in the USA, China and Australia. TRI provides routine geosynthetics conformance and verification testing services as well as specialized durability and in-application performance investigations. Mr. Allen is an experienced professional with a background in chemical and materials engineering, with specialization in the field of polymer testing and geosynthetics. He began his career in the geotechnical and construction materials testing field and has broadened the scope of his involvement in environmental engineering to include geosynthetics technology with specialization in laboratory testing operations.

Presently he serves as the Past-Chairman of the American Society for Testing and Materials (ASTM) Committee D35 on Geosynthetic Materials. Mr. Allen received the ASTM Award of Merit in 2010 and holds the status of ASTM Fellow. Mr. Allen also serves as the Convener of ISO TC221, Working Group 5 on Geosynthetic Durability. He serves on the Technical Advisory Board of Geosynthetics Magazine, a geosynthetics industry trade journal. In addition, he is on the Board of Directors of the Geosynthetics Institute in Philadelphia, Pennsylvania.

Mr. Allen is also currently serving the IGS Council as the Chair of the Education Committee, with special projects related to Geosynthetics in Sustainable development and comparisons between test procedures and standards.

Terry Mandziak, P.E.
Principal Consultant, Geotechnical Engineering
SRK Consulting (U.S.), Inc.
Lakewood, USA

Terry Mandziak has more than 20 years of diversified professional experience in project management, coordination and project design mainly associated with geotechnical engineering for mining projects. His experience includes the design and construction of heap leach and tailings facilities. His responsibilities typically include site selection, risk assessment, site investigation, laboratory analysis, slope stability assessment, data interpretation, costing analysis, and development of specifications, construction drawings, bid documents and construction programs. His project experience has included conceptual through final design engineering, preparation of construction documents, subcontractor selection, and construction management and supervision. He has also managed multi-disciplinary engineering teams on international mining projects.