Monday 3/13/2017

9:45–11:15 a.m.

Geosynthetics Research & Modeling 1

Chairs: Jose Clemente, Bechtel NS&E; James McKelvey, Earth Engineering Inc.

A Perfect Manufacturing Data Sheet from the Geomembrane Manufacturer—Does that mean all is well? A Lesson Learned

Anjan K Kundu and Craig Messer, GHD Pty. Ltd.; Symon Jackson, Arrow Energy Pty. Ltd.; Phillip Bennet, Geotest Pty. Ltd.

Manufacturing Data Record (MDR) has traditionally been the basis of compliance assessment and approval of geomembrane material for use in construction works. Acceptance of the MDR data has strong reliance on the quality control management following industry recognized international standards. 250,000 m2 of conductive geomembrane material was approved on the basis of compliant MDR for use in a project in Australia for lining a process water storage dam. The conductive geomembrane material was manufactured with a non-conductive edge to assist with the welding of the material. Frequent seam failures during the installation phase triggered rigorous investigation of the geomembrane material properties. During the process of investigation of the extent of this inconsistency, it was detected that the non-conductive edge of the geomembrane material is under gauge (occasionally 15% or more) and non-compliant with the Technical Specification. Significant investigation and Root Cause Analysis were undertaken by the Designer and the Manufacturer. The investigation detected that the inconsistency is as a result of production anomaly, that has been able to bypass the manufacturer's quality assurance process and possibly applicable to all geomembrane rolls supplied for the project. In order to eliminate the deficiency, all susceptible seams were eliminated.

Soil Survey: Methodology Improvement in Brazil, Adopted by CTR–RIO for Quality Control of Geomembrane Installations

Priscila Zidan and Luiz Frigo, Evolui Consultoria Ambiental; Matthew Kemnitz, LLSI

The soil survey methodology is used for the detection of leaks in geomembranes. Although little known in Brazil, it is well suited to minimize the risk of placing waste on a damaged liner system. A Canadian study indicates that the density of damages on installed geomembranes is on average between 4 and 22 leaks per hectare. Quality Control measures currently used in Brazilian landfills do not include this type of testing. As the existence of lined landfills is relatively new in Brazil, the impact caused by damage in the protective layers cannot be perceived. The Landfill of CTR-RIO, in Rio de Janeiro, Brazil adopted this methodology for quality control. The results after 4 years of operation indicated the amount of leaks found range between 0.5 and 8 leaks per hectare for an inspected area of approximately 310,000 m2. All identified damages could be repaired before the beginning of the waste disposal.

Service Life and Design Implications of HDPE Geomembranes at Elevated Temperature Landfills

Navid Jafari, Louisiana State University; Timothy D. Stark, University of Illinois at Urbana-Champaign

Waste containment facilities can experience elevated temperatures for a variety of reasons such as hydration of combustion ash, aerobic biodegradation, and smoldering combustion. Elevated temperatures can reduce service life or effectiveness of geomembranes by accelerating antioxidant depletion and polymer degradation. A case history is presented to illustrate the potential effects of

elevated temperatures and time-temperature history on a high-density polyethylene geomembrane and the associated reduction in service life or effectiveness. The impact of peak temperature, e.g., 60–80°C, the duration of peak temperatures (time-temperature history), and the time to complete antioxidant depletion were found to significantly reduced by increasing temperatures investigated. The effect of tensile strains, thickness, and leachate characteristics on estimated service life is also discussed.

Temperature Effects on Swelling and Bentonite Extrusion Characteristics of GCLs

James L Hanson and Everett Allen, California Polytechnic State University; Nazli Yesiller, Global Waste Research Institute

This investigation was conducted to evaluate effects of temperature on swelling and bentonite extrusion properties of GCLs. The swelling characteristics were determined using standardized test procedures and extrusion characteristics were determined using a new test method developed by the authors. Tests were conducted on a conventional medium-weight woven/nonwoven GCL. The range of test temperatures was 2 to 98°C (swelling tests) and -5 to 100°C (extrusion tests). The extrusion tests were conducted under stresses between 100 and 400 kPa and moisture contents between 50 and 150%. Temperature had significant effects on both swell and extrusion. The swell index ranged from 21 mL/2g at 2°C to 36.5 mL/2g at 98°C, with the largest increase occurring from 20 to 40°C. The amount of extrusion ranged from nearly 0 to 40.5 g/m2 with generally decreasing extrusion with temperature from 2 to 100°C. At a given temperature, extrusion increased with increasing stress and moisture content.