gigsa NewsLetter
NOV 2011 EDITION

The South African Chapter of the International Geosynthetics Society
Established in 1994 and Dedicated to the Scientific and Engineering Development of Geosynthetics and Associated Technologies
A newsletter of the Geosynthetics Interest Group of South Africa in Association with the South African Institution of Civil Engineering
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ADVANCES IN FLOATING COVER TECHNOLOGY, PRODUCT AND TECHNIQUE IMPROVEMENT FOR A FAITHFUL CLIENT

Aquatan's ongoing innovative methods and inventive solutions have recently continued to solve and improve one of their long standing client's cooling water problems.

As a national and international authority in reservoir floating cover systems and installation, and capitalising on 45 years of experience with geosynthetic materials and their behaviour, design solutions were found in order to assist the Bamangwato Concessions Ltd (BCL) Mine in Botswana with cost effective solutions.

Historical Information and Original Design

In 1992, following an approach for assistance from the project engineers at BCL, Aquatan designed a special insulated floating cover for their two chilled water storage dams (total combined storage volume of 5,5 Megalitres) at No. 3 Shaft. This was a particular challenge in that, given the high Botswana daily ambient temperature of 27°C (Range from 18°C to 43°C), it was necessary to maintain the 3°C temperature of the chilled water from the refrigerator plant in these above-ground earth dams before being pumped underground to cool the mine workings.

In consultation with BCL, Aquatan's engineers adapted the normal floating cover technology of the day and developed an insulated floating cover using a combination of 1,0mm thick Black HDPE geomembrane (Hi-Driline 1000) heat laminated to 20mm thick SPX33 closed cell expanded polyethylene foam. In order to accommodate the folding flexible areas of the cover (down the central spine and the four diagonal corners), the HDPE was joined to a 1,14 mm thick 5-ply reinforced flexible Hypalon material with Aquatan's patented joint system for otherwise incompatible geomembranes.

Once the chilled water dams were filled, the net result was a 21mm thick floating insulated "blanket" which would rise and fall, depending on the water level of the dam.

The Mine's requirement for a cost effective minimal heat loss structure was met, in fact the net result was that the system operated more efficiently than the BCL Engineers had anticipated in that the temperature gain in the stored chilled water was reduced to only 1°C in 24 hours instead of the anticipated 3°C. This lead to a major improvement in the efficiency of the system and subsequent cost savings.

...continued

Advances in floating cover technology...

Innovation No. 2

In 2001/2002, after approximately 9 years of operation, it was found that the joints of the relatively rigid Butene-based HDPE of the 1990s, heat bonded to the SPX33 closed cell expanded polyethylene, combined with the laminated foam, were stressed by the continual water movement and the expansion and contraction of the HDPE resulted in stress cracking of the HDPE and failure of the joints. BCL Engineers once again approached Aquatan for assistance.

A new design was developed using the latest then "state-of-the-art" floating cover material. A 0,9mm thick laminated Tan/White Reinforced Flexible Polypropylene geomembrane (RFPP) was adhered and mechanically fixed to a 16mm thick SPX33 closed cell expanded polyethylene. This resulted in a drastic improvement to the efficiency of the system by reducing the temperature gain even further as a result of the following design enhancements :

(i) The original HDPE/20mm thick foam was left in place under the new cover and was mechanically fixed to the new cover providing a 38mm thick floating blanket over the chilled water.

(ii) The White surface of the RFPP was installed on the upper face thereby assisting in the reflection of the heat rays of the sun.

The original Hypalon stitch joint was removed and the top cover was tensioned using a series of weight socks down the central spine and four diagonal corners.

The previous problem of the relative stiffness and the jointing of the two different membranes was eliminated and the two blankets worked monolithically together resulting in an efficiently improved cost effective design.

Innovation No. 3

Recently (late 2010) Aquatan was once again approached by the BCL Engineers for assistance. Unfortunately, due to the harsh environment at the Mine with airborne sulphates and other chemicals, the RFPP surface had started to degenerate and delaminate on the "downwind" sloping surfaces of the dams.

Tensile tests were performed on the top 16mm SPX foam layer and it was found to have reached 80% of the original strength. It was therefore decided to replace the top RFPP/16mm SPX33 insulation layer while reusing the stainless steel bolts and washers. The original laminated HDPE 20mm thick foam layer was still intact and reused once again.

The third innovation was in the method of installation. The new RFPP/16mm thick foam cover was prefabricated into 124 No. modules in the factory under controlled conditions.

This consisted of laying the RFPP face down, coating with contact adhesive and then adhesing the contact adhesive coated foam panels onto the RFPP. A 60mm wide RFPP free edge was left for later welding of the modules together on site. The sizes of these panels had to be carefully calculated to allow for the central folding area and sufficient "SPX33" lengths for anchoring in the excavated anchor trenches. As additional security, the RFPP/foam materials were bolted together at designed centres.

By carrying out the above prefabrication work, the installation time on site was dramatically reduced, thereby reducing "down" time at the Mine.

Original Dam Containment Lining

As an aside, an interesting observation is that the floor and sloping sides of the dams were originally lined with a 0,75mm thick HDPE (Hi-Driline) in 1989 as the containment lining.

Over 20 years later this material (which is guaranteed for 7,5 years) is still performing its function as a waterproof liner with no visible signs of degradation.

Aquatan would like to extend their appreciation to the client, BCL and their engineers for the confidence in the company and their continued support resulting in the reciprocal provision of workable cost effective solutions to their operation problems.

For more information, please contact Hein Janse van Vuuren on hein@aquatan.co.za or 082 461 5396

AQUATAN
LINING SYSTEMS

Prez Sez

Dear Members,

One the most significant event of the last several months was certainly the 15th African Regional Conference on Soil Mechanics and Geotechnical Engineering held over 18 -21 July in Maputo, Mozambique. GIGSA had a display stand in the conference exhibition hall, as did a number of our benefactor members. It is gratifying to note that geosynthetics formed a large part of the conference programme.

Professor Jorge Zornberg, our current IGS President, gave an erudite keynote lecture on "Advances in the Use of Geosynthetics for Waste Containment" following the opening session of the conference.

Jorge also took part in the closing presentations and panel discussions, which again featured geosynthetics. On the 21st of July, he presented a half day course on geosynthetics in Portuguese, which was attended by over 150 delegates and was very well received.

Professor Junichi Koseki from the University of Tokyo in Japan presented the Mercer lecture entitled "Use of geosynthetics to improve seismic performance of earth structures". An important conclusion he presented was "…As compared to unreinforced earth structures, geosynthetic-reinforced soil retaining walls (GRS RWs) performed well during past large earthquakes in Japan. Their ductile behavior under large earthquake loads was also confirmed by relevant model tests. Thus, reinforced soil structures have been adopted for new construction of important permanent structures as well as their use in damage rehabilitation works…"

An environmental engineering session was featured, with a number of papers presented at this and other technical sessions by GIGSA members.

In addition, a special geosynthetics session was held, which included a lecture by conference sponsor Maccaferri, on "Geosynthetic Solutions", followed by three introductory lectures presented by GIGSA committee members, namely:

- Riva Nortje on "Introduction to Geosynthetic Barriers".
- Kelvin Legge and Peter Davies on "Geotextiles as Filters".
- Garth James on "Geosynthetics in Soil and Ground Stabilisation".

The conference proceedings (ISBN 978-1-60750-777-2 (print) or ISBN 978-1-60750-778-9 (online)) are available from IOS Press BV at order@iospress.nl

Another very important event was the GIGSA short course that was presented by Professor R.K. Rowe and entitled "Geosynthetics in bottom liners and covers for use in lagoons, secondary containment, landfill and mining applications," (with input from Kelvin Legge on the new proposed RSA liner requirements). This was held in Centurion over 6 and 7 September and was a resounding success. I believe this course was of immense value to our local industry and those who could not attend missed a very important event. A shortened form of the course was presented in Windhoek on 12 September, and short reports on both appear elsewhere in this newsletter.

The Kerry Rowe courses would not have been possible without generous sponsorships received from Aquatan, Jones & Wagener and Kaytech, and GIGSA would like to thank these benefactor members for their financial contributions, as well as the substantial input in time by members of their staff.

Another GIGSA event of note was the very successful ½ day workshop on Landfill Stability and lecture on waste facility capping presented by Mr Richard Thiel of Thiel Engineering in California on 20 October. The workshop was presented as part of the programme of the IWMSA KZ-N Branch Landfill Interest Group (LIG) "Landfill 2011" seminar held in Durban over 18 – 20 October. GIGSA sponsored Rick's trip to South Africa as part of our ongoing relationship with the Institute of Waste Management of Southern Africa. Rick Thiel is an internationally respected expert on landfill design who is able to present complex issues in a very clear manner. Short reviews on the course and lecture appear later in this newsletter.

Last, but not least, welcome to Rhino Geosynthetics and Total Terrain Lining Systems who are new GIGSA benefactor members. Thank you for your support, and we hope this is the beginning of a long standing relationship of mutual benefit.

Regards,

Anton

Geosynthetic Greetings,

Anton Bain
President

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"scientia potentia est" (Attrib Sir Francis Bacon)

Obituary

It is with immense sadness that GIGSA has lost a friend, colleague and founder member.

Ms Kim Barnard of Geotextiles Africa cc passed away suddenly on 16 June 2011 aged only 43. Kim was a stalwart who tirelessly served our membership and committee since 1996, often doing the less glamorous but essential tasks required for GIGSA events and management.

Kim, well known for her courage and determination in our industry, will be sorely missed by friends, colleagues and clients across the length and breadth of the country which she so enjoyed serving and sharing geosynthetics options with.

Our deepest sympathy to all who had the privilege of knowing Kim, and especially to her family.

Geosynthetics Interest Group of South Africa
Established 1994

The South African Chapter of the International Geosynthetics Society
In association with the South African Institution of Civil Engineering
NPO Registration Number: 55-653-NPO

President - Anton Bain
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16 August 2011

THE IGS STUDENT AWARD 2012 – CALL FOR ENTRIES

The IGS student award was established to disseminate knowledge and to improve communication and understanding of geotextiles, geomembranes, related products, and associated technologies among young geotechnical and geoenvironmental engineering students. The award is made to one student per chapter (country) around the world. The student must be younger than 36 in the year of the award (i.e. 2012) studying civil engineering in either the geotechnical or geo-environmental fields. The student must be or become a member of GIGSA. The selected student must have been an undergraduate, M.Sc. or Ph.D. student during the period 2009 - 2012.

The award consists of a $1000 that must be used to attend either the GeoAmericas 2012, EuroGeo5 or Geosynthetics Asia2012 conferences on geosynthetics. GIGSA will assist with payment of travel arrangements typically up to an amount of R10 000.

The IGS requires that a written report be submitted on the conference proceedings 30 days after the event.

GIGSA requires that the recipient of the award present a paper at the conference on work he or she has been involved in. The topic of this paper should preferably be related to their studies and be at post graduate level. Publications on work the student has been involved in but do not relate to their studies will however also be considered. The detail requirements for the paper are posted on www.gigsa.org.

In recognition of the award and to maximize benefits to the students, the organizers of the respective conferences will hold a dedicated session in which the student papers will be presented. They must also provide the students with a copy of the proceedings and admission to the sessions and the exhibition. In addition, a comprehensive student program will be organized for each regional conference to maximize their exposure to geosynthetics and the IGS. This includes a recognition ceremony during the conference as well as their participation in corporate receptions, social functions, and activities specific to each conference.

Note, if one considers the IGS and GIGSA sponsorship as well as the waiving of the conference fees the winner will probably not have to pay in to attend the conference. Entries including the completed papers must be sent to my email above by no later than 10 January 2012. The winner will be notified on 30 January 2012.

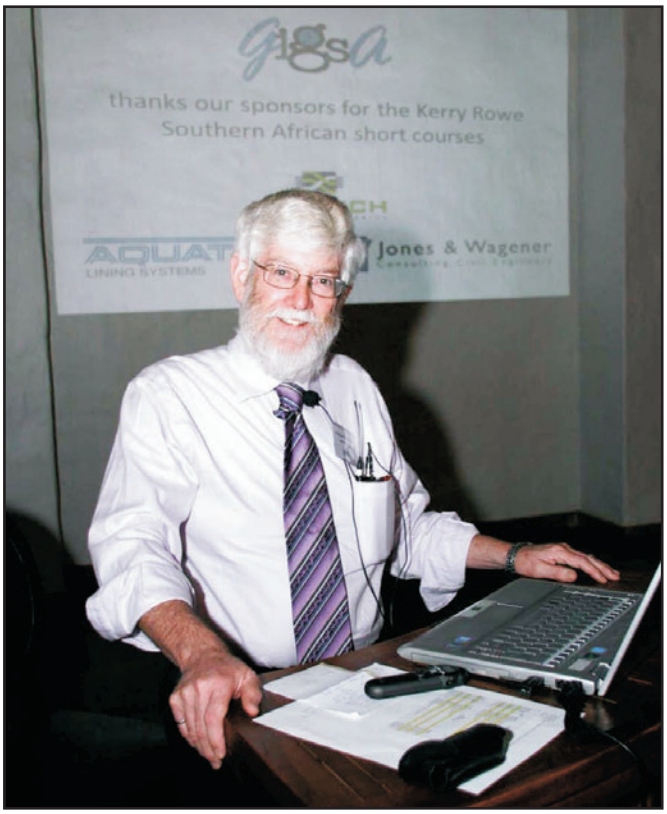
If you want to read more about the respective conferences please visit: http://www.geosyntheticssociety.org/ and browse to the latest newsletter.

Yours faithfully,

Anton Bain

Prof Kerry Rowe 2 Day Course at Stone Cradle, Gauteng

Professor Kerry Rowe of Queen's University, Canada presented a 2 day course on the 6th and 7th September 2011 at Stone Cradle in Gauteng. The course was entitled ***'Geosynthetics in bottom liners and covers for use in lagoons, secondary containment, landfill and mining applications'***. The course material was extensive, covering basic concepts, drainage layers and leachate collection systems, geosynthetic clay liners, geomembranes, composite liners, transport modelling, liner equivalence, material specifications, construction aspects, and conclusions.



Kerry's vast knowledge and expertise made this a master class, with this course receiving the best feedback we've had for a GIGSA course to date. I particularly enjoyed all the research presented, as it really brought home why we design and construct liners and caps the way we do (or should do). The decades of learning, effort and dedication to the field that Professor Rowe's slides represent are truly admirable. Mr Kelvin Legge, Chief Engineer: Integrated Environmental Engineering of the Department of Water Affairs, ended off the course with a presentation on 'Influencing contaminant containment standards' which brought theory into practice for the South African situation.

Seventy five people attended the course, of whom forty one are GIGSA members. It is encouraging to see so many people keen to learn about geosynthetics and how to use them effectively. The venue worked well, although we had a few complaints about concentrating after lunch given the buffet on offer. There were unfortunately some technical glitches during the course that we will work to avoid in future. Our thanks to all those who worked to make this a successful event, not least of all Professor Rowe for all his time spent on preparation and presentation.

Prof. Rowe meets Dr. Broom

Professor Rowe at Sterkfontein Caves

I accompanied Kerry Rowe to the Sterkfontein Caves in the Cradle of Humankind on the last day of his visit to South Africa. The caves are fascinating, especially the open archaeological excavations. At the exit to the cave is a bust of Dr Robert Broom, and our guide informed us that you could rub his nose for luck or his hand for wisdom, but that it was bad luck to do both. I was very amused that Kerry chose to rub his hand!

Kudos for Kelvin Legge

Both Kerry Rowe and Richard Thiel remarked on Kelvin Legge's containment expertise and passion for preserving the environment during their visits to South Africa. It seems that we have one of, if not, the best authority right here on South African soil. Keep up the good work Kelvin!

Report by Riva Nortje
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Kerry Rowe takes GIGSA to Namibia for the first time

OK – that should read "GIGSA Takes Kerry Rowe to Namibia for the First Time", but I felt the way it was written would attract some attention, as this was the first official presence GIGSA has shown in Namibia.

As part of its ongoing promotion of geosynthetics in Southern Africa (see report on the 15 ARC held in Maputo elsewhere in this newsletter) and acting on a suggestion by Kelvin Legge over a year ago, GIGSA organised a one-day workshop on geosynthetic lining systems, to be given by Prof Kerry Rowe in Namibia. The workshop was organised under the auspices of the Engineering Professions Association (EPA) of Namibia, and held at the centrally located Arrebusch Conference Centre in Windhoek on Monday 12 September this year.

The comprehensive full-day workshop was entitled "Geosynthetics in bottom liners and covers with emphasis on use in mining applications" and was attended by twenty six delegates, including engineers from Namwater, City of Windhoek, Rössing Uranium, the Polytechnic of Namibia, and a number of consulting engineers. Those who were there came away with a good understanding on the use of all geosynthetics used in lining systems.

Kerry presenting the linings workshop in Windhoek

The topics presented followed the format of the material presented in South Africa at Stone Cradle as reported on by Riva Nortje elsewhere in this newsletter, but in a compressed version to fit into one day.

A fitting conclusion to the day's business was provided by Kelvin Legge, Chief Engineer: Integrated Environmental Engineering at the South African Department of Water Affairs. Kelvin presented the proposed new waste management facility lining systems (which are likely to be promulgated before the end of 2011) and that will appear as part of 'Version 3' of the revised minimum requirements.

Time off for Kerry

To thank Kerry for his substantial effort made in coming out to Southern Africa, GIGSA gave him a weekend off preceding the Windhoek workshop in the Namib Naukluft Park. The trip included a visit to Sossusvlei (where Kerry and Kelvin climbed Dune 45 in the heat of the day (rather them than me!), Dead Vlei, the Sesriem Canyon, a balloon ride over the 'Red Desert', and finally a visit to the Windhoek Municipality's Kupferberg landfill, where a new cell lined with GCL was under construction.

The new GCL-lined cell at Kupferberg under construction

The intrepid desert travellers (hearing, seeing and saying no evil)

In closing, it must be mentioned one of the pleasures of being in Windhoek is being able to sample the excellent 'Camelthorn' microbrewery beer. Kerry, Kelvin and I did full justice to this refreshment (it was hot!)

Report by Peter Davies peter@kaytech.co.za

Richard Thiel Presents ½ Day Landfill Stability Workshop at Landfill 2011 Seminar in Durban

GIGSA and the IWMSA Landfill Interest Group (LIG) have co-operated for years in presenting state of the art information on the use of geosynthetics in waste management facilities at the LIG's bi-ennial low-cost landfill seminars. Examples of this cooperation include the 6th **(Landfill 2005)** seminar at the Camelot conference centre in Durban when we facilitated Jean-Pierre Giroud's Mercer Lecture ("*Contribution of Geosynthetics to the Geotechnical Aspects of Waste Containment"*), and the 7th **(Landfill 2007)** at the Misty Hills conference centre in Muldersdrift, when we brought out Dr. Abdelmalek Bouazza from Monash University in Australia, to deliver the Keynote Address (*"Recent Advances in GCL Research and Relevance to Landfill Liners Design"*). The input by these internationally recognised geosynthetic experts contributed substantially to the success of those events.

LANDFILL 2011, the 9th in the series, held at the Dockside Hotel in Durban over 18 – 20 October this year was no different. GIGSA brought out Richard Thiel of Thiel Engineering of California, to talk on designing for landfill stability at a ½ day workshop which was entitled *"Slope Stability of Liners and Covers"* and formed part of the programme.

Rick is an internationally recognised expert in the design of mining and waste management facilities, and many of his publications may be downloaded from his website at www.rthiel.com/id11.html

Rick has a wonderful ability to present complex issues in a clear and concise manner, and the feedback we have received is that the delegates found the workshop to be truly useful. This comment was made by several engineers who have a wealth of experience in the design of waste management facilities. Comments included including this statement by Richard Emery: *"Great to see you and the other lads at Landfill 2011. I think the seminar was of great value and the audience was a good spread of industry."*

To cap it all, Rick's comment to me in a subsequent e-mail was *"Well, thank you for being the driving force for having me in South Africa. I must say that the whole trip exceeded my expectations for being an interesting and enjoyable experience."*

Report by Peter Davies

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A small number of the delegates to Rick Thiel's Workshop

Waste Facility Capping Lecture by Rick Thiel

Rick at the Midrand Protea Lecture

GIGSA, in collaboration with the Institute of Waste Management of South Africa (IWMSA) Central Branch, hosted a lecture by Richard Thiel of Thiel Engineering in California (www.rthiel.com) on waste facility capping at the Midrand Protea Hotel on the morning of the 21st October 2011. This talk followed on the ½ day course presented at the Landfill 2011 seminar reported on by Peter Davies elsewhere in this newsletter.

The topic was 'Evaluation of Appropriate Landfill Final Cover Parameters'.

The lecture focused on covers in use, goals and social questions, environmental protection afforded by hazardous waste landfill covers, evapotranspiration (ET) covers and allowable infiltration, as well as lateral drainage and slope stability. The focus topics were cleverly pulled together in the lecture conclusions.

With more than 26 years of experience in geotechnical and solid waste engineering, Richard Thiel is a seasoned practitioner, and his 'big picture' thinking as well as attention to detail were clearly evident in his presentation. He gave considered responses to numerous questions, and his expertise has certainly added to the current debates regarding the proposed new landfill caps. There were 41 lecture attendees, and again, it is encouraging to see that these events are attracting new faces. A big thank you is due to the IWMSA staff for their administrative assistance for this event.

Pilanesberg visit

I was extremely fortunate to have hosted Richard Thiel on a trip to the Pilanesberg Game Reserve, in consideration of the time he spent preparing for and giving his presentations in Durban and Midrand. We were accompanied by my own expert game spotter, in the form of my husband Richard. We saw a lot of game (nine lions, a brown hyena, numerous white rhino, elephant, a variety of buck, and so on), survived the first heat wave of summer, ate too much, and enjoyed each other's company.

Rick was a very easy-going guest and was willing to try just about anything – so we fed him impala, gemsbok, biltong, pap and dried mango, as well as other delicacies from the buffet at the Bakubung Bush Lodge. I hope that this is the start of an association with Rick in the years to come.

Report by Riva Nortje – GIGSA Vice President
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A Quotable Quote for Governments to Remember

"You cannot legislate the poor into freedom by legislating the industrious out of it. You don't multiply wealth by dividing it. Government cannot give anything to anybody that it doesn't first take from somebody else.

Whenever somebody receives something without working for it, somebody else has to work for it without receiving. The worst thing that can happen to a nation is for half of the people to get the idea they don't have to work because somebody else will work for them, and the other half to get the idea that it does no good to work because they don't get to enjoy the fruits of their labor." Pastor Adrian Rogers, 1984

(Thanks to Dr. Mud for reminding us about this – Ed.)

"Whoever said the pen is mightier than the sword never encountered automatic weapons".
General Douglas MacArthur (1880 - 1964)

The Editor

Peter Davies
GIGSA Newsletter Editor

The GIGSA Newsletter is published on a sort-of-quarterly basis. Contributions and compliments eagerly received. Criticism may take some time to respond to…

Send your contributions, comments and suggestions for the GIGSA newsletter to the Editor at: peter@kaytech.co.za

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