

February 2019

Dear Industry Colleague,

Happy New Year! In keeping with tradition, we take this time to offer you best wishes for a successful 2019 and to share news from TRI. We have just completed a successful and adventurous 2018 effort involving internal transitions and associated business growth and development. We give thanks for the many blessings we have received along the way as we continue to adapt and grow for continued service to our clients.

Visit us at www.tri.env.com

ONGOING INTERNAL DEVELOPMENTS

2018 saw the full implementation of new accounting and laboratory information management systems (LIMS). These efforts streamlined sample tracking and customer response times while providing us real-time information regarding project and laboratory status. These efforts will continue in 2019 as newer features of our LIMS system are evaluated and implemented to automate and streamline in-house processes. We are looking forward to further enhancing our customer service and laboratory operations in order to meet and surpass the needs of our growing testing community.

STAFF NEWS

TRI is pleased to announce that **Jeffrey Kuhn, Ph.D., P.E.** has been promoted to Executive Director of TRI Environmental, Inc. In this role, Jeffrey will lead all Austin-based staff and resources to continue TRI's robust growth and assure technical and customer service excellence. Jeffrey continues to provide technical leadership to TRI's geotechnical, interface friction, and interaction services while providing management of TRI's infrastructure and service systems. Jeff has recently been appointed Chair of ASTM International's Subcommittee D18.04 on Hydrologic Properties and Hydraulic Barriers. Jeff also presented on the subject of "Shear Displacement Rate & Supporting Geotech" at the 2018 June ASTM D35.01 workshop on the Performance and Interpretation of Interface/Direct Shear Testing as well as at Geosynthetics 2019 on the subject of "Effective Stress Interface Shear Strength Testing: Drained Testing Protocols and Other Associated Concerns." TRI is excited for Jeffrey and congratulates him on this well earned promotion.



TRI is also pleased to announce the promotion of **Ms. Patricia Zabaleta** to Manager of Project Development. Her multiple years of Project Management and her wealth of experience in geosynthetic procurement and associated material specifications equip her to assist clients who are responding to the various state and federal materials testing requirements. She will assist customers in finalizing testing plans with associated budgets and time implications. Patricia's experience and professionalism have already made her a hit with our clients and we are proud to have her lead our Projects Development staff. Patricia may be reached at PZabaleta@tri-env.com or 512-263-5944, ext. 140.



TRI is very pleased to welcome **Ms. Kendall Villareal** as a Project Manager in our Geosynthetic Conformance Laboratory. Kendall has been a successful Administrative Assistant for TRI working to process data and support Project Management efforts. Her energy and spirit have benefitted TRI as she has consistently delivered the "extra" effort to meet the changing demands and challenges of our business. Kendall has earned this opportunity to directly serve our customer base and we are all very excited to have our clients meet and interact with her as she supports your work.



Jacqueline Dettman, who has been a pillar of the TRI leadership team for many years, will begin her retirement in 2019 with a much reduced schedule. She has graciously accepted the role of Senior Project Adviser and will continue to be available for internal deliberations and strategic project work. 2019 will be a year of celebration of Jacque's countless contributions to TRI's growth and industry relevance. We congratulate her on a spectacular career at TRI!

In other staff news, Sam Allen was re-elected to the International Geosynthetics Society (IGS) Council and the Board of Advisors to the Geosynthetic Institute (GSI). Sam has been a devoted promoter of the geosynthetics industry. His re-election to these posts is testimony to his industry development work as well as TRI's generous support of the geosynthetics industry at-large.



FOCUS ON IN-PLANT SAMPLING

TRI's unique, independent in-plant geosynthetic sampling services are widely recognized throughout the worldwide materials procurement industry. Still, we often encounter questions regarding in-plant sampling procedures, the true independence or non-independence of part-time sampling procedures, and general policies regarding materials access, and safety. These procedures are unique to each geosynthetic manufacturing plant and TRI's in-plant sample management personnel follow strict protocols when granted access in the facility. TRI invests considerable resources to documenting production, sampling materials, processing sampled geosynthetics and shipping in a timely fashion to meet project schedules. New information will be presented in 2019 in order to greater inform clients about these procedures and provide transparency to sampling operations. Look for more information soon in this regard.



GLOBAL SERVICES EXPANSION

In July of 2018, TRI was very pleased to announce the establishment of TRI Africa Environmental Services Pty. Ltd. (TRI Africa) headquartered in Johannesburg, South Africa. This TRI company joins our global independent third-party geosynthetics/geotechnical testing and research centers with operating service centers in the United States, Brazil, China, Australia and India. TRI has successfully supported geosynthetic testing projects for many years throughout the African continent and has looked forward to expanding support to African clients with field services. Sam Allen, Director of TRI's global operations, explains *"TRI has benefitted substantially from our relationships with the African engineering and installation communities. Our mutual growth has taught TRI that there is much to learn from the African experience, and we look forward to contributing directly to the African goals of environmental protection and sustainable development. In this context, it was important to establish TRI Africa in the same culture as all other TRI locations. That is, TRI-Africa is unassociated with any engineering, consulting, manufacturing, or construction company so that we may work in non-competitive concert with all industry participants."* TRI-Africa is led by Ms. Nadia Minnaar. Nadia has performed field construction-related quality assurance for a variety of mining, waste containment, and water management facilities and will bring this experience to clients throughout Africa. Phone: +27 79 875 5691, Email: NMinnaar@tri-env.com.

LABORATORY EQUIPMENT & INFRASTRUCTURE

Segmental Concrete Block Units and Pullout

TRI's geosynthetic-interaction laboratory experienced an exceptional year in 2018. The potential of our large-scale, high-capacity load frame capable of applying normal and shear forces of up to 440 kN (100,000 lbf) aided us in the evaluation of mechanical and friction connections of geosynthetics to large block systems. Operating in parallel, our 130 kN (30,000 lbf) load frame aided in the evaluation of smaller block systems as well as the evaluation of the pullout resistance of geosynthetics and metallic strips amongst other embedded materials. TRI's 6 sustained load connection creep frames continue to serve the industry in the evaluation of the long-term behavior of the interface of geosynthetic reinforcements and CMU blocks.

Interface Friction

TRI realized the product of substantial 2016/2017 investments in the infrastructure and bandwidth of our geosynthetic interface friction laboratory over the course of 2018. With a total of 26 interface shear strength boxes—including five high-load hydraulic load frames and five low-load shear boxes—our bandwidth has allowed us to deliver reduced turnaround times. The high-load frames utilize hydraulics and enable our laboratory to meet the increasing demands for testing under higher normal stresses. The low-load friction test frames are designed to negate the bias associated with test system friction and the need for a bearing correction. TRI has also further expanded our ability to ramp and step load specimens through automated equipment controlling supply pressures to our air-bladder and hydraulic loading systems.



Geotechnical

TRI's AASHTO-accredited geotechnical laboratory continues to serve our clients as an extension of their laboratory services. TRI's rapid turn time for advanced testing is supported by over 55 flexible wall permeability, 25 triaxial, 9 direct shear, 20 incremental consolidation, three CRS, and DSS capabilities. In addition to our traditional geotechnical testing capabilities, TRI supports our client's via our rock mechanics and wet chemistry laboratories.

Geosynthetic Clay Liners

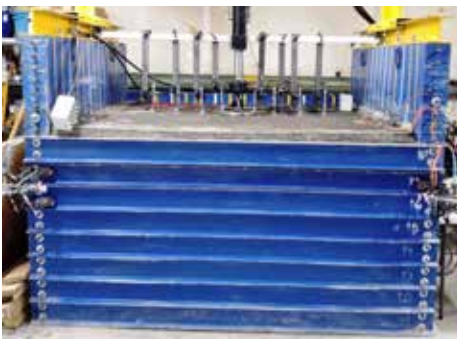
In response to regulatory-driven and industry-specific demands, TRI has increased our capacity to perform hydraulic conductivity testing with potentially incompatible aqueous solutions. In addition to 0.1 M calcium chloride studies, synthetic leachates and site-specific leachate testing lasting more than 30 days or two pore volumes has increased in frequency. TRI is actively participating in commercial testing of polymer-enhanced (i.e. modified, amended, etc.) GCLs and ongoing ASTM International D35.04 discussions regarding these unique products, where manufacturing innovation has outpaced standardization of associated measurements.



TRI's Accelerated Pavement Tester

TRI TRANSPORTATION INSTITUTE (TRITI)

TRI's newly acquired Accelerated Pavement Tester (APT) was put into service in the newly constructed Transportation Systems building in our South Carolina laboratory. The APT rolling wheel load test is very similar to a real roadway, but is built in a more controlled environment and has a controlled and accelerated load application. The roadway structure to be evaluated is constructed full-scale in a concrete-lined pit, and a rolling wheel load is applied via an accelerated testing device. 2018 projects included both newly constructed roadway performance and asphalt overlay durability evaluations.



TRI's Cyclic Plate Load (CPL) Tester

As a complement to APT testing, cyclic plate load (CPL) testing capability as adopted by AASHTO's Committee E4 was added to TRI's testing capability in 2018. The CPL test is designed to provide a cost-effective approach to developing a Traffic Benefit Ratio (TBR) associated with geosynthetic-enhanced road structures. Eli Cuelho, TRI's Director of Transportation Research Services, leads the transportation systems research initiative at TRI. Eli may be reached at ECuelho@tri-env.com or 406-600-3947.

EVALUATION OF STORM WATER QUALITY DEVICES

For a number of years, TRI has been evaluating the short- and long-term structural integrity of buried stormwater quality units. In 2018, we initiated full-scale hydraulic evaluations of manufactured treatment devices (MTDs) and nutrient removal products. MTD testing is based on ASTM standards (C1745 and C1746), while nutrient removal testing evolves from collaboration with product manufacturers to establish the appropriate simulation of runoff quantities and nutrient concentrations. Joel Sprague, TRI South Carolina's Technical Director, is leading the hydraulic systems evaluation initiative. Joel may be reached at JSprague@tri-env.com or 864-346-3107.



TRI MTD Testing



TRI Nutrient Removal Testing

ROCKFALL PRODUCT TESTING

The geohazard of rockfall affecting road networks is of considerable interest to highway engineers working in mountainous terrain. Some of the principal measures to protect against rockfall involve rockfall checkfences, barrier fences, heavy-duty mesh netting, rockfall catch areas, sprayed fibre concrete (fibrecrete), and modifications to drainage systems including channel training works. TRI is very active in testing these unique products and has worked specifically with the Association of Geohazard Professionals (AGHP) to refine testing procedures. Punch or puncture testing helps to index the restraining capacity of mesh products. Tensile and punch testing assist in indexing these important class of rockfall prevention materials.



TRI rockfall mesh "Punch" puncture resistance test with 1 meter diameter probe

The following presents our Spring 2019 Course Schedule. All spring courses will be held in Austin, Texas at TRI headquarters.

Register online at www.tri-env.com

APRIL 7, 2019

Liner Integrity Surveys / Assessments (LISA)

w/Abigail Beck Gilson, P.E. and Jeffrey Blum

APRIL 8 – 9, 2019

Slope Stability of Containment Systems

w/Dr. Jeffrey Kuhn, P.E. and guest

April 10, 2019

CQA/CQC for Geosynthetic Installations

w/Sam Allen and Mark Sieracke

April 11, 2019

CQA/CQC for CCL and GCL Lining Systems

w/Dr. Jeffrey Kuhn, P.E.

April 12, 2019

GSI GCI-ICP CQA Exams

LEAK LOCATION SERVICES

In 2018, the Liner Integrity Survey and Assessment Division of TRI performed a record number of electrical leak location (ELL) surveys encompassing over 10 million square feet. TRI's Australasia, China, and Brazil offices also continued to offer this service. TRI's new Africa office is now also performing this service in South Africa, where it is now a regulatory requirement.

TRI's in-house manufacturing process of the LISA 3000 Series ELL equipment is now complete. The multifunctional kit that TRI produces can perform dipole surveys using GPS-based data acquisition as well as the water puddle and water lance methods. In 2018, a new ASTM standard practice for ELL methods was authored, which requires mapping technology perfected by the 3000 series equipment. TRI expects this new important standard to be published in 2019.

TRI SHORT COURSES AND 2019 TECHNICAL TRAINING SCHEDULE

TRI's 2018 geosynthetic related education events took place in Austin, Texas and Gold Coast, Australia. Mark Sieracke, P.E. joined Sam Allen for two days of Geosynthetic CQA courses and Dr. Jeffrey Kuhn and Dr. Ranjiv Gupta taught a 2-day course in the spring of 2018 on Slope Stability of Containment Systems. Jeff and Ranjiv addressed issues related to slope stability design and interface friction testing – both performance and interpretation of test results. **Register online at www.tri-env.com.**

CONCLUSION

TRI appreciates your support and business. You motivate us to continually improve our unequalled services for geosynthetic testing and research. We are committed to assisting your drive for success with your geosynthetic and geotechnical projects by bringing you the highest quality and most responsive service in independent, third-party support.

Please contact us if you have any questions, suggestions, or comments. We look forward to working with you in 2019.

– Sam Allen | sallen@tri-env.com | 512-615-4415



Mark Sieracke with TRI CQA Class Welding Demo