

The GSI Newsletter/Report



Geosynthetic Institute

Vol. 36, No. 2

June, 2022

This quarterly newsletter, now in its 36th year, presents the activities of GSI and its related institutes to all who are interested. It is available on the institute's home page at www.geosynthetic-institute.org. It also serves as a quarterly report to its member organizations. Details are available by contacting George R. Koerner or Jamie Koerner at phone (610) 522-8440; or e-mail at gsigeo koerner@gmail.com or Jamie@geosynthetic-institute.org.

Activities of GSI's Officers and Board of Advisors (BOA)

2022-2024 Board of Advisors

Term Ends 2022

- Kent von Maubeuge – NAUE GmbH & Co. KG (International-1)
email: kvmaubeuge@naue.com
- Miranda Rine – C.P. Chemical (Resin and Additives Group)
email: Miranda.rine@cpchem.com
- David Carson – U.S. EPA (Agencies)
email: carson.david@epa.gov

Term Ends 2023

- Te-Yang Soong - CTI Co. (Consultants and Testing Labs)
email: tsoong@cticompanies.com
- Brian Fraser - Layfield Group (Barrier Group)
email: brian.fraser@layfieldgroup.com
- Mathieu Cornellier - Solmax (International - 2)
e-mail: mcornellier@solmax.com

Term Ends 2024

- Burrill (Bo) McCoy - Waste Management Inc. (Owners and Operators)
e-mail: bmccoy2@wm.com
- Rene Laprade - Tencate Geosynthetics (Geotextiles and Geogrids)
e-mail: r.laprade@tencategeo.com
- Sam Allen – TRI Environmental Inc. (At-Large)
e-mail: Sallen@tri-env.com

GSI has continued to have virtual quarterly meetings with the Board of Advisors throughout 2022 via Zoom. The Second Quarter BOA meeting was held on June 25, 2022 at 11:00 am via zoom. A "SWOT" analysis of GSI was presented and discussed. This was long overdue and a follow up will be discussed at the next BOA meeting on September 30. In addition to general business issues, other topics that were discussed during the meeting were: ongoing research projects, geosynthetics and sustainability, upcoming conferences, travel, and the GAI-LAP Program. GSI will be working on a prototype this summer for a new accelerated aging test used for geomembranes in anaerobic digesters, which was presented at the meeting.

Elections for vacating 2022 BOA positions will be held during the 4th quarter.

We thank the BOA for sharing their time and talent to fulfill the GSI mission and hope to see many of our members in person during the year.

IN THIS ISSUE

- Activities of GSI's Officers and BOA
- Overview of GRI (Research) Projects
- Progress within GII (Information)
- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliate Institutes
- GSI's Member Organizations

Overview of GRI Projects (Research)

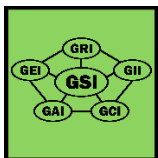
The following projects are all funded by GSI membership dues unless specifically noted. Most are long-term projects for which we are well positioned to accomplish. In an attempt not to repeat information in the quarterly newsletters, we will merely list the ongoing projects that have been written about in previous newsletters and will only provide details of new research. For details and/or discussion of ongoing projects contact:

George Koerner (gsigeokoerner@gmail.com)

Grace Hsuan (hsuanyg@drexel.edu)

1. Durability of Geosynthetics
2. GSI wall, pH and durability of PET GGs
3. Creep axisymmetric behavior of HDPE and LLDPE Geomembranes
4. Long term filtration tests
5. Leakage through holes in geomembranes
6. Anchorage and connection strength of High Performance Turf Reinforcement Mats (HP-TRMS)
7. Stress cracking with respect to strain hardening Modulus

Progress within GII (Information)



GSI has updated it's LinkedIn page...
Check it out!

<https://linkedin.com/company/geosynthetic-institute.org>

Our GSI Home Page is accessed as follows:

www.geosynthetic-institute.org

Everyone (members and nonmembers) can access the open part, which has the following menu:

Newsletter
Prospectus
Specifications
White Papers
Bookstore
Keyword Search
Members Only

Research
Certification
Information
Education
Accreditation
Personnel
Contacts
Upcoming
Webinars

To go further one needs a members-only password. Your contact person (names beneath member company) must obtain a password from Jamie Koerner. Jamie can be reached by e-mail at Jamie@geosynthetic-institute.org. When you get into this section, the following information is then available.

- GRI Test Methods (all)
- GRI Reports
- GRI Technical Papers (419 Citations)
- Notes of GSI Meetings
- Links to the GSs World
- Keyword Search for Generic Papers
- Example Problems
- Frequently Asked Questions (FAQs)

GRI Reports

To date, we have 48 GRI Reports available to members and associate members. These reports vary in length from 30 to 200 pages. They are in the password protected section of our home page at www.geosynthetic-institute.org/member/reports.html.

White papers are available for free to everyone, however GRI reports are only free to members (located in the member's only section of the website). Non-members can purchase the reports from the online GSI bookstore.

Progress within GEI (Education)

Geo-U 2022

The inaugural Geo-U in Austin, Texas was held on the second week in April 2022. The event venue—the Sonata Bee Cave Austin Hotel—did not have any COVID requirements for guests which was refreshing. There was a Meet the Teacher (MTT) event that officially kicked off the Geo-U event on the top floor of the hotel overlooking the rolling terrain of rural Austin on the evening of Tuesday, April 5, 2022. In short, it was a wonderful evening of perfect weather with several hours of refreshments, introductions, and fun! Geo U consisted of four different two-day education events on April 6th and 7th. They were as follows.

QA/QC of Geosynthetics and compacted clay lining systems; taught by Mark Sierake, Sam Allen and Jeff Kuhn. This course focuses on the installation of all geosynthetics and compacted clay liners used in containment systems. The first day focused on installation of geomembranes, geotextiles, geocomposites, geogrids, and geo-appurtenances. It includes discussion of geomembrane seaming and seam peel and shear testing. The second day focused on the installation of compacted clay and geosynthetic clay liners. Special emphasis was given to establishing rationale and standard operating procedures for field inspections, documentation of test and visual observations, and implementation of CQA plans. A broad appreciation for the manufacture and installation of containment facility materials was provided. The course was designed specifically for those who need a detailed understanding of proper CQC and CQA procedures at waste containment facilities. It served as an ideal preparation for the Geosynthetic Certification Institute's Inspectors Certification Program (GCI-ICP) exam.

Landfill design considerations in the age of sustainable development; taught by George Koerner and Abigail Gilson. This training course was offered up in two parts. The first part was to advise both design engineers and regulators as to the engineering design challenges related to capacity optimization at today's landfills. It is harder than ever to site new green field disposal facilities. As a result, many existing landfill operators seek engineering solutions to help maximize the disposal capacity of their existing landfills. In light of the new emphasis on carbon footprint, this course revisits the sustainable landfill concept. While the concept is not new, it can be viewed in terms of today's focus on sustainability and how it relates to reduction of emissions and reducing environmental impact. This course takes a look at how landfills can achieve the goals of being environmentally friendly and cost-effective at the same time. This course showed how geosynthetics can improve landfill performance, and how they are the key to eventually fulfilling the promise of a sustainable landfill.

The second part was intended for owners, design engineers and construction quality assurance personnel, this portion of the class focused on Electrical Leak Location (ELL) as a tool for ensuring containment facility performance. The class covered every aspect of ELL surveys, including significance of Electrical Leak Location, how the methods work, ASTM standard practices, factors in leak detection sensitivity, how to prepare a site for an ELL survey (Artificial leaks, actual leaks and blind leaks), performance statistics, and method specification.

Geosynthetic Reinforced Soil structure design and construction: slopes, walls, and roads; taught by Mike Bernadi, Erol Tutumluer and Jorge Zornberg. This course focused on the design and construction of geosynthetically reinforced soil systems, including retaining walls, steepened slopes, and roadways. A brief background of the application of each of these technologies was presented including the advantages, economic considerations, and limitations of each type of system as compared to other conventional practices. Details concerning the design, selection of reinforcing materials, specification, and construction of each type of system were covered. Current design codes/standards and software was referenced and summarized. Special issues that have on occasion resulted in undesirable performance were reviewed. An overview of several recent innovations such as the combination of reinforcement with lightweight fill and newly developed alternative design procedures was also presented.

Geosynthetic in stormwater controls and hydraulic engineering; taught by Joel Sprague, Nathalia Castro, Tom Stephens and Drew Loizeaux. Man-made changes to the environment including unrestricted development, overtaxed resources, removal of surface cover, paving, poor stewardship, and climate change impact on water levels and storm severity expose soils to greater erosive forces. These processes substantially accelerate the rate of erosion to everything from construction sites to shorelines. Historically, materials such as straw and rock or hard armor systems of various sizes and designs have been used to resist erosion and retain sediments. However, the overuse of these approaches has revealed limited long-term performance. The incorporation of geosynthetic -enhanced systems is helping achieve greater balance temporary and long-term and applications. This course provided detailed guidance on the relative performance, design, and installation of the full range of geosynthetic-enhanced erosion and sediment control systems. Additionally, geosynthetic-based storm water control measures being used for infiltration and pollutant removal were also discussed. Topics included permanent post-construction stormwater management, steep slope stabilization, shoreline, and coastal erosion protection, geosynthetic-enhanced rolled erosion control products (G-RECPs), sediment retention devices (G-SRDs), use of these materials in pollution prevention plans, porous plastic chambers beneath pavements, geotextile filters and use of geocells, fabric-formed revetments.

All four courses were suited for engineering and design professionals who specify and work with geosynthetics. These courses were relevant to contractors, regulatory and enforcement personnel, public works directors, utility companies, construction managers, foresters, landfill operators, and consultants.

All the course notes were provided in a drop box linked to each course. People downloaded a copy and accessed the notes during the classes on their own laptop real, which was a novel and sustainable idea.

On Wednesday after class, there was a technical tour of TRI Environmental's laboratory facility (compound). Aspects of each course were addressed during the teaching tour, and it was awesome. TRI has expanded their holding and capacity to four different buildings. They have spent several million \$USD to increase their capabilities but more importantly they have added staff to service the industry more efficiently. If you were not there, you missed something special. Also, there was a BBQ hospitality dinner at "County Line" which was epic.

Geo U concluded with a **Marketing in the geosynthetic industry course**; taught by Sam Allen and Tamara Tuttle.

The Geosynthetic industry is uniquely intense with many companies providing services ranging from products, installations, and expertise. Most professionals in the geosynthetics industry have achieved much of their expertise during their professional career with a fortunate few having had geosynthetic related curriculum in school. The geosynthetic industry involves many with disparate Educations ranging from classic geotechnical, civil, and environmental engineering to technical backgrounds in chemistry, polymer engineering and materials science. Still others in our industry are solely trained based on multi-year experience form the school of hard knocks. From a marketing and sales communication perspective, this field poses an especially challenging environment to establish meaningful communication with our collective customers. Indeed, navigating the multiple geosynthetic-related associations and non-profits can also be daunting. This course provided a road map to navigate marketing in this dynamic industry. It was intended to be practical with many take home messages.

Geo U was attended by several hundred people and by all accounts was a tremendous success. Congratulation to all involved and can't wait until the next one!

IGS Symposium 2022

The 6th IGS UK Symposium on Containment Engineering was held at the tunnel Club, Etihad Stadium, Manchester UK on June 28th, 2022. The event was held in a spectacular venue with a geosynthetic expo and hospitality events. The symposium was opened by Patricia Guerra-Escobar – Chair of IGS UK Chapter.

She introduced Pete Bradshaw from the Etihad Stadium to explain how the brownfield site that we were sitting in had been transformed into a sport complex for the commonwealth games. He presented a remediation case history which introduced several geosynthetic applications.



Richard Terry, Patricia Guerra-Escobar and Geo at Etihad Stadium Manchester City UK



The next speaker was Darren Legge from the UK Environment Agency. He presented Environment Agency perspectives & regulatory requirements applying to geosynthetic in containment. Gemmina Di Emidio, Visiting Professor – Ghent University, Belgium gave the morning Keynote address on GCLs & practical implications of current research. Her presentation focused on hyper clays which are a polymer modified clays they remain stable in GCL even under extreme conditions. Richard Terry of Veolia then gave an operator's perspective of landfill covers. He presented two unique case histories that opened the audiences' eyes to new possibilities with geosynthetics.

Finally, Peter Atchinson, of PAG consultants and chair of ISO TC 221 explained the committee's new geomembrane barrier design guidance. He explained how to use the guidance (which is 1 of 10 such documents) and practical implications for following the outline contained within. The design guide allows one to problem solve by matching alternatives to applications and provides a framework instead of specifics on how to design.

The afternoon session was moderated by Patrick Flood – Technical Director **UK** · Juta and Company (Pty) LTD he introduced George Koerner Geosynthetic Institute GSI for the afternoon Keynote on Innovation and Learning from Experience. Geo's lecture was broken down into three parts; recommended updates to GRI GM13 HDPE Geomembrane Specification, improving stability at landfills (liners, waste mass and covers) and finally reducing leakage rates at waste containment facilities. Eugene Gallagher of Coffey was next up and discussed a cap membrane case history after 30 years of service. He summarized many lessons learnt and provided field data to back it up. Andy Belton of Wardell Armstrong stool the show in the afternoon with a case history of mercury waste containment. He shared his experience with disassemble one of the world largest mercury refining plants. Most in the audience were astonished at the scale of the containment operation. Fortunately, the owner of the facility had a landfill on site with the capacity to hold the entire extent of the demolition. Darren Bland of CQA International ended the afternoon session with Challenges in Containment Engineering. He presented years of field CQA experience for making jobs run smoothly and without surprises. The Afternoon was again concluded with a workshop and many questions from the audience. The best of which surrounded the idea of sustainability and how to get young engineers interested in geosynthetic. The symposium closed with much networking and refreshments. I think I can speak for everyone in attendance that it was a very worthwhile and productive day.

This IGS technical seminar explored how containment engineering principles, applied to a variety of applications, can be new and novel. Teachings from these presentations informed the audience and allowed them to learn from experience outside of the UK to promote better design practices and innovation.

Over the past 40 years, the advantages in utilizing geosynthetic barriers versus traditional barrier materials have been well documented. Achievements such as conserving water resources and enabling beneficial site reuse to have even given geosynthetic engineering a level of social importance. As such, the use of geosynthetic barriers has increasingly been required. This is especially true in modern waste

management cell design, a barrier application that has been so successful, and it has influenced the design and specification of geosynthetics into mining, water and wastewater, and industrial applications. However, there are regions and applications in which the use of these barrier technologies should be more widely adopted. The conference focused on these applications and highlighted issues that may arise from their unconventional use.

Overall the intent of the symposium was to encourage appropriate selection of materials and design methods to suit particular applications, rather than to redesign projects to suit predetermined materials. The symposium was heavily practice focused, while covering what is emerging from recent research, which was of interest to designers and practitioners in the field. Actual case histories from different countries were presented, including best practice cases, where challenges have been encountered and nonstandard design approaches explored.

Applications in mining and extreme environmental settings were also discussed during the symposium, as a lens to seek and possibly challenge standard engineering design practices. Each session was concluded with a facilitated workshop discussion led by a moderator. It emphasized audience participation, questioning the speakers to think outside the box and project forward. What a fantastic event to attend and be a participant!

IFAI's GS23 Kansas City, MO USA Conference

GSI's proposal for a Special Session at the Geosynthetic Conference 2023 "Exposed Geosynthetic Performance" has been accepted. It will be an action-packed session with George Koerner moderating the following five speakers:

David Beaumier, Eng., M. A. Sc.
Director of Technological Innovation
Polymer CTT Group SAGEOS
"Laboratory Predicted Performance of Exposed Geosynthetics"

Eric Blond, Eng., M. A. Sc.
CEO of EB Consultants
"Service Life Prediction of Exposed Geomembranes"

George A. Reinhart, III, PhD, PE
Senior Engineer / Vice President
Jones Edmunds Consultants Inc.
"Exposed Geomembrane Cover Performance at Polk County Landfill in Florida"

Stephan Fourmont, Eng., M. A. Sc.
Business Development Manager
Afitex-Textel Geosynthetics inc.

“Exposed NPNW GT performance at a large surface impoundment for over one year”

Bryan Scholl, Ph. D., P.E.
Director of Engineering
Watershed Geo Inc.

“Closuresurf - a ten-year retrospective of UV performance”

GSI will support the last three efforts in earnest for this special session. Some preliminary information below may spark interest as well as invite commentary prior to the conference in 2023. **Please note that the GSI Annual meeting will be held at this event in-person.**

“GSI Fellowships for Graduate Students” – Submit by August 22

Every year GSI awards several fellowships to support research in various fields, all involving geosynthetics. The program recognizes and supports outstanding students from around the world who are studying geosynthetics. Proposals for the upcoming 2022-2023 fellowship year must be submitted to GSI by August 22, 2022 latest. jamie@geosynthetic-institute.org

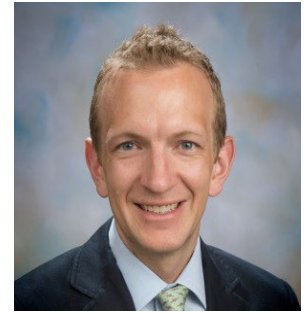
GSI’s Annual Landreth “Steward of the Environment” Award

The Robert and Mitchell Landreth “Steward of the Environment” award was established in 2021. It is in honor of Robert Landreth (1939-2021) and his wife Mitchell. The award is bestowed by the Geosynthetic Institute (GSI) in recognition of “distinguished engineering achievement related to the environment” by a young faculty member, graduate student, or post doctorate working with Geosynthetics. Only one such award is given annually by GSI.

Robert E. Landreth rose to the rank of Captain in the US Department of Public Health. As the research director at the U. S. Environmental Protection Agency (EPA) he advocated for research funding which made it possible to spearhead efforts in geosynthetics during the 1980 and 90’s. The pioneering research which transpired, changed regulations and the way that waste is managed throughout the world. Landreth’s guidance, determination and hard work are a testament to the very best of our nation’s public servants.



Mitchell & Robert Landreth



Joseph Scalia IV, Ph.D. P.E.

Eligibly Criteria for this award is as follows:

- Applicants must be matriculated graduate student, post doctorate or young assistant professor in good standing and registered full-time during the award period at an accredited U.S. University.
- This \$10K award is open to U.S. citizens and only for engineering or science majors.
- Applicants must be working on original environmental research projects. Those related to geosynthetics are preferred.

The first award recipient was Dr. Joseph Scalia IV. He is an Assistant Professor in the Department of Civil and Environmental Engineering Department in the Walter Scott, Jr. College of Engineering at Colorado State University. Joe specializes in geoenvironmental and geotechnical engineering. His research and teaching centers on the convergences of soil mechanics with contaminant hydrology, geology, environmental engineering, hydrology, mechanical engineering, and hydraulics. Prior to joining CSU, Scalia was a Senior Associate at Exponent (formerly Failure Analysis Associates) in the Environmental and Earth Sciences Practice in Bellevue, Washington, and Natick, Massachusetts. Scalia received his BS in Civil and Environmental Engineering from Bucknell University, and his MS and PhD in Geological Engineering from the University of Wisconsin-Madison.

We are pleased to announce that **Theresa Andrejack Loux, Ph.D., P.E.** is the 2022 Landreth award winner. She is Chief Technical Officer of Aero Aggregates of North America, LLC in Eddystone, Pennsylvania, and an adjunct professor of Civil and Environmental Engineering at Rowan University in Glassboro, New Jersey.

2022 Landreth “Steward of the Environment”



Theresa Andrejack Loux, Ph.D., P.E.

Theresa has been involved in and managed a variety of civil, geotechnical, and geo- environmental projects. She is also very active in our “GEO” community outreach which includes ASCE, DVGI, GETT, ASTM, IGS and Engineers without borders. She is an engaging instructor with a central goal of communicating course material in a clear, engaging, and challenging manner particularly to young STEM students. She is an ASCE 2010 ExCEEEd Teaching Fellow and received her Ph.D. from Drexel University, Philadelphia, PA. with a thesis topic of “Multi-axial Tension Testing of Geosynthetics.” Her latest paper is: Loux, T., McInnes, S., Crawford, R., and Filshill, A. (2022). “Design and Construction of a Geosynthetic Reinforced MSE Structure with Foamed Glass Aggregate Lightweight Backfill.” 7th European Geosynthetics Conference, 4-7 September 2022, Warsaw, Poland. In press.

Webinar Wednesday schedule for 2022

11:30 AM – 1:00 PM (Eastern Time Zone)

Register at:

www.geosynthetic-institute.org/webinar.htm

1.5 Professional Development Hours available upon completion of a short quiz

GSI Members Cost - \$200
(unlimited number of attendees for GSI Members)
Nonmembers Cost - \$25

The schedule is as follows:

Date	GSI #	Title	# Portals
1/12/2022	W5	Geosynthetics in Hydraulic Applications	12
2/09/2022	W6	Geosynthetics in Heap Leach Mining	21
3/16/2022	W7	Geosynthetics in Agriculture/Aquaculture	9
4/20/2022	W9	Behavior of 20 Landfill Failures	7
5/11/2022	W12	Landfill Covers: Past-Present-Emerging	17
6/08/2022	W14	Lifetime Predictions of Geosynthetics	4
7/20/2022	W17	Geosynthetics in Erosion Control	
8/10/2022	W20	Geosynthetic Drainage Materials	
9/07/2022	W26	Applications and Design of Geotextile Tubes	
10/12/2022	W27	Stability Design of Landfill Cover Soils	
11/09/2022	W29	QA/QC of Geosynthetics	
12/07/2022	W34	Geosynthetics in Roadways	

Courses

We have abandoned our in-house, one-day, courses (which have been given for the past 30-years) and are presently delivering two of them in six segments over three consecutive days, one each morning and then afternoon. They are the following:

1. Quality Assurance/Quality Control of Geosynthetic in Waste Containment Facilities
(Recordings are available)
2. Construction Inspection of Mechanically Stabilized Earth (MSE) Walls, Berms and Slopes
(Recordings are available)

The third and newest of GSI courses is an On-Line “Designing with Geosynthetics (DwG)” course. Please go to www.geosynthetic-institute.org/courses.htm and scroll down to Course #3. Here you will see the requisite details. The course itself is completely synchronized with the 6th Edition of the DwG textbook. It consists of 1540 slides with \approx 18 hours of voice over; about one minute for each slide.

Contact Jamie Koerner at jamie@geosynthetic-institute.org if you want additional information and details.

Activities within GAI (Accreditation)

The Geosynthetic Accreditation Institute's (GAI) current mission is focused on a Laboratory Accreditation Program (LAP) for geosynthetic test methods. The GAI-LAP semiannual meeting was held in Seattle Washington USA, in conjunction with ASTM D35 on June 16, 2022. Fourteen people attended in person at the 7 AM meeting (see photo) and another 14 were online virtually via Webex. We thank those for their participation and ASTM for hosting the event at such a nice venue.



John Paulson JP Consultants, Nathan Ivy Concrete Canvas, Nigel Wrigley New Grid, Gary Torosian Geotesting Express Geo Comp, Carol Hall Propex Solmax, J.P. Kline Geotechnics, David Beamier Sageos/CTT Group, Jeff Kuhn TRI Environmental, Travis Murdock ASTM, Sam Allen TRI Environmental, Eli Carlo TRI Environmental, Joel Sprague TRI Environmental, John Lostumbo TenCate Solmax, Lance Reed Cooley and George Koerner GSI (taking picture)

A summary of the meeting follows.

1. A brief introduction and background of the GAI-LAP Program was discussed. Please note that we are in our 27th year of operation.

- (a) Program started in 1995
- (b) Accredited only geosynthetic labs
- (c) ISO 17025 is our model
- (d) On-site audits (Years 1, 5, 10 etc...)
- (e) Proficiency tests every year
- (f) Our Goal is $C_v < 5$ for each test. Let's all work towards obtaining precise test results.

2. The Demographics of the current GAI-LAP Organizations are summarized as follows:

25	independent labs
55	manufacturer QC labs
5	centers (research or government)
7	proficiencies only (PT) labs
92	Active Total (of 119 labs that have participated since inception)

- 612 audits to date
- 47 international- 24 countries
- 247 possible (191 ASTM and 56 ISO) "consensus" methods all covered in the PTP

This demographic shows an ever-increasing interest in the program particularly from international laboratories. The newest members are Hock Teck China, GeoFabrics Australia, Huesker USA, MIT Brazil, Minas Pack Brazil and Lonax Brazil.

There has been a rapid rise of new test methods, with a near tripling of methods covered in the twenty-seven year period since the program began. Most new tests being added appear to be outside the ASTM D35 arena, particularly from ISO methods that are being derived from CEN standards.

3. Proficiency testing is still the hallmark of the GAI-LAP. Of the 5842 proficiency test results submitted this year, only 67 first submittals were outliers. This represents a little more than one percent of the total. All outliers were resolved and root causes of the issues identified. It appears that the corrective action process is aided immensely by everyone's familiarity with the Zoom and MS Teams platforms. Results of the proficiency tests were shared at the meeting and distributed to all GAI-LAP participants via email. Congratulations on a job well done. All accreditation programs around the world are now requiring proficiency test data per ISO 17025 for the purposes of uncertainty calculation. All GAI-LAP labs easily comply with this requirement. Your hard work over the years is exemplary and has paved the way for our industry wide improvement which can be quantified with results.

4. The GAI-LAP proficiency test program would not function without samples to test. GAI-LAP would like to thank the following organizations for their generous contribution of geosynthetics to this cause:

Solmax, AGRU, Mineral Technology CETCO, Macaferri, AWD, Propex, Tencate, Lumite, Tensar, CP Chemical Company and Owens Corning.

It should be noted that shipping has become a challenge. We are shipping most items by FEDEX or DHL for international labs. This means that we need to have Longer Lead Times and Smaller sample sizes. In turn, shipping and handling expenses have increased dramatically and we are passing this expense alone to the participating laboratories. In addition, we have had custom issues particularly with India, China and Mexico. On three occasions samples never made it to the destination on multiple attempts. All three were manufacturers. This invokes side by side testing with GSI which is possible, but a lot more work for all parties involved. Also when this option is invoked, the lab in question has not participated in the PTP, therefore they are without a database for uncertainty calculations.

We are back to on-site audits after a two-year hiatus due to travel restriction due to the COVID-19 pandemic has restricted travel. GSI's BOA did approved virtual audits as a temporary measure. However, I am glad that this is over and that we are again verifying equipment and fitness of use in person.

5. Both GSI's BOD and BOA want to be proactive about GAI-LAP going forward. They want the program to continue and grow because they think it is of value and important to our industry. We were asked to reach out to A2LA to see if a cooperative effort could be realized between these two nonprofit public service membership society 501 (C) (3) organizations. Please note that A2LA was established in 1978 (44 years old). It is the largest U.S. multi-discipline Conformity Assessment Body (CAB) Accreditation system with over four thousand accredited laboratories. This is the fifth largest such system in the world and recognized by both ILAC & MRAL. On February 28, 2022, we met with Rob Miller – General Manager and Joe Appolonia – Program Manager at A2LA Headquartered in Fredrick, MD. We had a very nice hour plus meeting and outlined the following three action items.

- Train a set (10?) of Geosynthetic Assessors. Training will be hybrid and free of charge by A2LA with a test administered after the course. Upon completing the course and passing the test, attendees will be registered as official assessors by both A2LA and GAI-LAP.
- Allow GAI-LAP labs the opportunity to obtain A2LA accreditation through simultaneous audits. However, there will be added cost paid directly to A2LA for this added international recognized accreditation.
- Permit GSI to become an official A2LA proficiency test program (**PTP**) provider for A2LA after gaining privilege through biannual on-site audits of GSI. The added cost of these audits will be passed on to the GAI-LAP labs in the form of increased annual fees.

The response to this inquiry was split down the middle by our participating GAI-LAP laboratories. We will pursue cautiously both of these initiatives with A2LA going forward.

6. The **GAI-LAP 2022 Customer Survey** was sent out to all program participants and the findings were reviewed at the meeting. The overall average grade on a scale of 5-1 (with 5 being excellent and 1 being poor) was **4.6**.

The breakdown by category was as follows:

- (a) Information exchange = 4.5
- (b) Conflict resolution = 4.4
- (c) Proficiency Testing = 4.8
- (d) Directory = 4.5
- (e) Internet = 4.3
- (f) Service timeliness = 4.8
- (g) Shipping and handling = 4.5
- (h) Accuracy = 4.6
- (i) Impartiality = 4.8
- (j) Confidentiality = 4.8
- (k) Benefit vs Cost = 4.3
- (l) Virtual Audits = 4.4
- (m) GAI-LAP Overall = 4.8

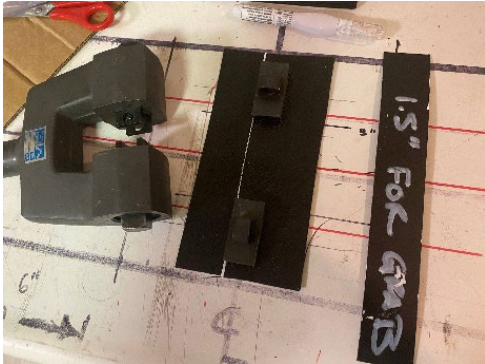
We feel that overall, the program has had a very good year despite the challenges from COVID.

7. At the request of several laboratories GAI-LAP now has a **Laboratory Technician Certification Program (LTCP)**. Several requests for proposals (RFPs) related to sponsored federal research have required "certified" laboratory technicians. It appears that GSI's Geosynthetic Testing YouTube videos have made us a magnet for such training and certification. As a result, GSI has established an in-house training course addressing our health and safety/insurance plans. After a two-day training course, we will give an exam with PDHs. If the technician passes the exam after the completion of the course, they enter into a two-way proficiency test at the end of process. This is conducted first on GSI equipment at the institute and then at the technician's home laboratory. Upon closure of the PTP program, the technician obtains LTCP certification for a five-year period.

8. As usual, we had a lively discussion regard the ten (10) conflict resolution cases addressed by the GAI-LAP over the past six months. They are summarized below.

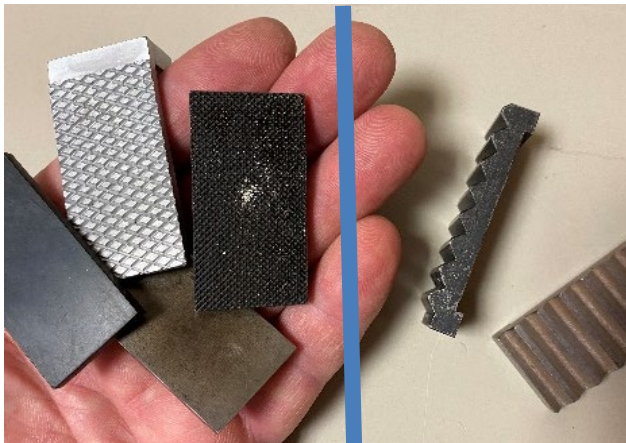
1. ASTM D5199, thickness of film
2. ASTM D5199, definition of smooth 0.125 mm (5 mil)
3. ASTM D5199, thickness of smooth edge of textured sheet
4. ASTM D5199 and 5994, thickness of single sided textured GM
5. ASTM D4595, 2,5,10% modulus calculation
6. ASTM D5397, NCTL Stress Crack IGEPAL CO-630 substitute
7. ASTM D5321, high normal pressure (>300 psi)

8. ASTM D1603 or D4218, CB & ash content of white/black conductive GM
9. ASTM D3895, D5885 & D8117, Standard and HP OIT Specimen preparation (cross-section, skin or homogenization and plaque)
10. ASTM D4632, Grab Tensile grip faces



It is extremely troubling that one can get a 20% difference in grab tensile strength based on the grip surface type (smooth steel, serrated steel, rubber etc.)

It should also be mentioned that tongue & groove style grips, like those shown in the picture below, are not allowed for grab tensile testing.



Acceptable grip faces

Tongue & Groove
Unacceptable grip faces

9. The open discussion portion of the meeting was highlighted by housekeeping items and well wishes from the group at large. GAI did solicit manufacturers for geosynthetic materials for 2023 proficiency testing. The next GAI-LAP annual meeting will be held on February 2, 2023 in conjunction with ASTM D-35 in San Antonio Texas USA. Also note that each lab can add up to seven tests per year. It is a pleasure working with you. We appreciate your participation and congratulate you on your success! If you have questions, please contact accordingly.

As of July 2022, the following laboratories are accredited by the GAI-LAP for the number of test methods listed in parenthesis. Contact personnel, telephone numbers and e-mails are also listed.

- 1^A - TRI/Environmental Inc. (155 tests)
Jarrett Nelson -- (512) 263-2101
jnelson@tri-env.com
- 3^A - Golder Associates (43 tests)
Henry Mock -- (770) 492-1893
Henry_Mock@golder.com
- 4^C - Geosynthetic Institute (108 tests)
George Koerner -- (610) 522-8440
gsigeokoerner@gmail.com
- 8^B - Propex Operating Co., Ringgold (18 tests)
Todd Nichols -- 438-553-3757
todd.nichols@propexglobal.com
- 9^B - Lumite (17 tests)
Rebecca Kurek -- (770) 869-1787
rkurek@lumiteco.com
- 13^A - Precision Geosynthetic Labs (TRI Env.) (77 tests)
Chad Blackwell -- (714) 520-9631
cblackwell@tri-env.com
- 14^A - Geotechnics (55 tests)
J. P. Kline -- (412) 823-7600
JPKline@geotechnics.net
- 20^A - GeoTesting Express, MA (62 tests)
Barbara Sanchez-- (978) 635-0424
bsanchez@geotesting.com
- 22^B - CETCO Hoffman Estates (11 tests)
Minerals Technologies Inc.
Dennis Wind -- (847) 851-1904
Dennis.wind@mineralstech.com
- 24^B - CETCO Lovell (11 tests)
Minerals Technologies Inc.
Stuart Yates -- (307) 548-6521
stuart.yates@mineralstech.com
- 25^B - Ten Cate, Pendergrass (13 tests)
Melissa Medlin -- (706) 693-2226
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- 26^B - Agru America Inc. (27 tests)
Maria Coffey -- (843) 546-0600
mcoffey@AgruAmerica.com
- 29^E - FITI Testing and Research Institute (80 tests)
Hang Won-Cho -- 82-2-3299-8071
hwcho@fitiglobal.com
- 31^D - NYS Dept. of Transportation (8 tests)
Tom Burnett -- (518) 485-5707
tburnett@dot.ny.gov
- 34^B - Solmax (GSE) - Houston, TX USA (29 tests)
Jeremy Stephenson
jstephenson@solmax.com
- 38^C - CTT Group SAGEOS (120 tests)
Oliver Vermeersch -- (450) 771-4608
overmeersch@gcttg.com
- 40^B - Solmax (GSE) - Kingstree, SC USA (20 tests)
Thomas Harrelson -- (843) 382-4603
tharrelson@solmax.com
- 41^A - SGI Testing Service, LLC (19 tests)
Zehong Yuan -- (770) 931-8222
ZYuan@sgilab.com
- 43^A - Ardaman & Associates (22 tests)
George DeStefano -- (407) 855-3860
gdestafano@ardaman.com
- 44^B - Berry Global Inc. (9 tests)
Julie Solarz -- (615) 847-7299
juliesolarz@berryglobal.com
- 45^B - Ten Cate Geosynthetics Malaysia SDN Bhd. (24 tests)
Boon Kean Tan -- (603) 519 28576
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- 46^B - TAG Environmental Inc. (13 tests)
Ryan Ackerman -- (705) 725-1938
ryan_ackerman@tagenv.com

- 49^B - Engepol Geosintéticos (16 tests)
Patricia Natali -- (55) 51 3303-3901
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- 50^B - ADS, Inc. Hamilton (7 tests)
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justin.elder@ads-pipe.com
- 51^B - SOLMAX - Canada (22 tests)
Claude Cormier -- (450) 929-1234
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- 53^B - Polytex Autofagasta (18 tests)
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mcontreras@polytex.cl
- 55^B - Atarfil Geomembranes (21 tests)
Gabriel Martin Sevilla -- 34 958 439 200
gmartin@atarfil.com
- 56^B - Polytex Santiago (14 tests)
Sebastian Iturrita Monroe-- 011 56-2-677-1000
Siturrita@polytex.cl
- 57^B - Ten Cate Cornelia (22 tests)
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- 58^B - Propex Furnishing Solutions - Hazlehurst (10 tests)
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- 59^B - Firestone (9 Tests)
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- 60^B - TDM Geosintéticos S.A. (19 tests)
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- 61^B - Raven Industries (24 tests)
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- 62^B - SOLMAX - Selangor - Malaysia (16 tests)
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- 63^A - TRI-SC Labs (12 tests)
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- 64^B - Agru America (NV) (14 tests)
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- 65^C - Bombay Textile Research Assoc. (BTRA) (23 tests)
PK Panda (0) 022-25003651
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- 66^B - Rowad International Geosynthetics Co. Ltd (13 tests)
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- 69^B - Solmax (GSE) - Rayong - Thailand (18 tests)
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- 70^A - RSA Geo Lab LLC (48 tests)
Rasheed Ahmed -- (908) 964-0786
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- 71^B - Plásticos Agrícolas y Geomembranas S.A.C. (24 tests)
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lcassidy@tensarcorp.com
- 73^B - Gai Loi JSE (10 tests)
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paul905677@gmail.com
- 74^B - Agru America Inc. (9 tests)
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- 75^B - GeoMatrix S.A.S. (42 tests)
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jdiaz@geomatrix.com.co
- 76^B - Tehmco (Chile) (15 tests)
Rodrigo Campoy 56-22-580-2852
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- 78^B - PQA Mexico (16 tests)
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- 79^A - TRI Geosynthetic Testing and Services (32 tests)
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- 80^B - Texel Technical Materials (10 tests)
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Etrudel@alkegen.com
- 81^B - Solmax (GSE) - Rechlin - Germany (18 tests)
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- 83^B - Solmax Geosynthetics S.A.E. (13 tests)
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- 85^B - PAG Tacna (17 tests)
Manuel Constantino Olivares Espinoza --
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- 87^B - Willacochee Industrial (19 tests)
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- 88^B - Geosynthetic Testing Services Pvt. Ltd. (16 tests)
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rkant@gts-pl.com
- 89^B - Megaplast India Pvt. Ltd. (13 tests)
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geo_sqc@megaplast.in
- 90^B - Techfab (India) Industries Ltd. - Daman (10 tests)
Anant Kanoi - 91-22-2287-6224
anant@techfabindia.com
- 91^B - Techfab (India) Industries Ltd. - Rakholi (3 tests)
Rajendra Chavan - 91-982-593-9922
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- 92^B - Techfab (India) Industries Ltd. - Khadoli (2 tests)
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woven.qualitylab@techfabindia.com
- 93^B - Garware Technical Fibres (19 tests)
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rghadge@garwarefibres.com
- 95^B - Mexichem Colombia (Pavco) (8 tests)
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- 96^B - Tensar China (6 tests)
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- 97^A - TUV SUD PSB Singapore (17 tests)
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- 99^B - Atarfil Middle East (16 tests)
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- 102^B - SKAPS Industries (12 tests)
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- 103^B - STRATA Geosystems Pvt. Ltd. (6 tests)
C. V. Kanade - 91-22-4063-5100
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- 104^A - Advanced Terra Testing (32 tests)
William Raush - 303-232-8308
wraush@terratesting.com

- 105^B - Pavco Wavin - Peru (6 tests)
Nestor Sifuentes Boggio - 51 990 277 136
nestor.sifuentes@wavin.com
- 106^C - Auburn University-Erosion & Sediment Control Testing Facility (1 test)
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- 107^A - TRI Australasia PTY LTD (38 tests)
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- 109^B - Hock Technology Co. Ltd. (17 tests)
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- 110^C - Geofabrics Australia Pty. Ltd. - GRID (53 tests)
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- 111^B - Huesker Inc. - Shelby (9 tests)
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- 112^C - Instituto Mauá Tecnologia Brazil (7 tests)
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- 113^B - Minas Pack Filmes - Studio Tech (7 tests)
Camila Nicoletti Brito
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- 114^B - Lonax Industria Brasileira DeLonas Ltda. (12 tests)
Felipe Diniz
qualidade@lonax.com.br

^AThird Party Independent ^CInstitute
^BManufacturers QC ^DGovernment

We already have added 3 new laboratories this year. If anyone desires more information on the GAI-LAP program, its test methods, the associated laboratories, etc., please go to our website www.geosynthetic-institute.org/gai/lab.htm or contact George Koerner.

Activities within GCI (Certification)

GSI presently has three separate inspector certification programs. One (began in 2006) is focused on QA/QC of field inspection of waste containment geosynthetics and compacted clay liners. The second (began in 2011) is focused on MSE Wall, Berm and Slope field inspection. The third, on Geosynthetic Designer Certification began on September 1, 2016. See our website at www.geosynthetic-institute.org under “certification” for a description and information on all three of them. They are similar in that a perspective candidate must...

- Be recommended by a superior or professional engineer who knows, and can attest to, at least six months of acceptable experience performing professional services within the specific application area.
- Submit a completed application and be approved by the Geosynthetic Certification Institute to take the exam.

- Must successfully pass a written examination (70% of the questions is the passing grade) proctored by GCI or a GCI designated organization and graded by the Geosynthetic Certification Institute to become a certified inspector or engineer.
- Must pay a one-time fee which covers a five-year period upon completion of the above items. The fee is \$500 for five-years of certification. It is renewable if so desired.

Program #1 - Inspection of Liner Systems for Waste Containment Facilities

Inspector Certification Test Results 2006-2022

Year	Geosynthetic Materials		Compacted Clay Liners	
	No. of people taking exam	No. of people failing exam	No. of people taking exam	No. of people failing exam
2006	141	5 (3%)	128	12 (9%)
2007	82	11 (13%)	73	12 (16%)
2008	95	25 (26%)	89	20 (22%)
2009	36	7 (19%)	36	2 (5%)
2010	59	12 (20%)	54	7 (13%)
2011	54	6 (11%)	53	3 (6%)
2012	34	5 (15%)	28	3 (11%)
2013	32	4 (12%)	30	1 (3%)
2014	45	1 (3%)	42	3 (7%)
2015	56	6 (11%)	51	6 (12%)
2016	36	3 (10%)	35	5 (18%)
2017	78	5 (6%)	66	3 (4%)
2018	53	5 (10%)	51	1 (3%)
2019	114	20 (18%)	119	15 (13%)
2020	100	14 (14%)	92	10 (11%)
2021	70	14 (20%)	61	8 (13%)
2022	33	1 (3%)	29	1 (3%)
Total	1118	144 (10%)	1037	112 (11%)

There are currently 498 practicing certified inspectors, 370 inspectors (2018-2022) and 128 inspectors (2006-2017) who have renewed to keep certification current. A recap of the Inspector Certification Program is below:

GSI has a pre-recorded “QA/QC of geosynthetics in waste containment facilities” course that can be purchased by anyone wanting to take the course online (accommodates your schedule) in preparation for the GCI-ICP certification exams. More information can be found at:

www.geosynthetic-institute.org/courses.htm

Please contact Jamie Koerner if you are in need of a proctor to administer the GCI-ICP exams or have any questions regarding the program.

Program #2 - Inspection of MSE Walls, Berms and Slopes

While a field inspector cannot require proper design or direct a contractor how to build a wall, flaws can be identified for possible design modification or mitigation action. Furthermore, and at minimum, construction practices can be observed and corrected if inadequate or improper.

The official launch of this inspection program was on December 1, 2011 with a course and the examination afterward. A somewhat revised course on November 29, 2012 was presented. Presently, the corresponding course for this certification program has been transferred into a series of six presentations that have been recorded and can be viewed at your leisure. Contact Jamie Koerner at jamie@geosynthetic-institute.org for more information.

Program #3 - Geosynthetic Designer Certification

The “Geosynthetic Designer Certification Program (GDGP)” is also now available. Please go to www.geosynthetic-institute.org/gdcpintro.pdf for the requisite details. Included are introduction (rationale behind the program was given in a recent GSI Column called “We’re Losing the Battle”), disclaimer, requirements, application, reference material, sample questions, proctor manual and proctor application. In the *requirements section* you will see that the applicant must;

- be a graduate of an accredited engineering program,
- have six-months geosynthetic designer experience,
- complete the application form,
- pay the \$500 fee for 5-years certification, and
- take a 45-question examination with $\geq 70\%$ passing.

The GSI Affiliated Institutes

It has long been realized that the information generated within the GSI group should have a timely outlet to all countries, and in all languages. To this end, GSI has created affiliated institutes in three countries (Korea, Taiwan and India), and potentially others in the future. These affiliated institutes are full members of GSI and are empowered to translate and use all available information so as to create similar institutes and activities in their respective countries.

GSI-Korea was formed on February 9, 1998 as a collaborative effort between FITI Testing and Research Institute (a quasi-government organization) and INHA University (through its Geosynthetics Research Laboratory). It is presently held entirely within INHA University. **INHA University** is located in Incheon and the geosynthetics laboratory is led by Professor Han-Yong Jeon. Dr. Jeon has 10-students working on

geosynthetic-related projects and is extremely active both nationally and internationally. His active participation at conferences worldwide is very admirable. He has provided research and development in many geosynthetic subjects including geotextiles, geomembranes, geocells, additives for GCLs, recycled plastics for improved formulations, etc.

GSI-Taiwan was formed on August 18, 2000 and is wholly contained within the National Pingtung University of Science and Technology in Nei Pu, Pingtung (southern Taiwan). The Director is Dr. Chiwan Wayne Hsieh who is a Professor in the Department of Civil Engineering and Dean of the R & D Office. The **7th Asian Regional Conference on Geosynthetics (GeoAsia7) & IGS First Young Engineers Conference** will be held on October 31- November 4, 2022 at the Taipei International Conference Center (TICC), Taipei, Taiwan. GeoAsia7 is organized by the Chinese Taipei Chapter of the International Geosynthetics Society and Dr. Hsieh is Chairman of the GeoAsia7 Organizing Committee. Information about the conference can be found at <http://www.geoasia7.org>

GSI-India under the direction of Dr. T.V. Sreekumar was formed in 2015. The hosting organization is the Bombay Textile Research Association (BTRA) which is a premier textile research institute providing testing, research, training and consultancy services. BTRA is located in Mumbai, India and is accredited as per ISO 17025. The Geosynthetic test lab is also GAI-LAP accredited. Testing at BTRA is performed as per the latest EDANA, ASTM, INDA, AATCC, ISO, EN and AASHTO international standards. BTRA is known for its excellence in textile R & D and is currently branching out into all forms of geosynthetics with a fantastic R & D laboratory. BTRA has a quarterly publication called “BTRA scan” and is worth checking out if you haven’t seen it. The latest news report was issued January 2022 and can be found at www.btraIndia.com/btrascan.html

GSI Member Organizations

We sincerely thank all of our sponsoring organizations for their continued support. Without members, GSI could not exist. The current GSI member organizations and their contact members are listed below. We welcome Jet Filter Systems as our newest GSI member.

Solmax

Mark Harris/Jacques Cote/Simon Gilbert St-Pierre/
Jimmy Youngblood/Mathieu Cornellier [BOA]

U.S. Environmental Protection Agency

David A. Carson (BOA)

Federal Highway Administration

Silas Nichols/Daniel Alzamora

Golder Associates Inc.

Frank Adams/Paul Whitty/Linda Grover

Tensar International Corporation

Mark H. Wayne/Joseph Cavanaugh/Doug Brown

TenCate Geosynthetics

John Henderson/John Lostumbo/Rene Laprade [BOA]

Minerals Technology/CETCO

Reza Gorakhki/Stacy Byrd/Michael Donovan/Hilary Walker

Huesker, Inc.

Flavio Montez/Andreas Elsing

NAUE GmbH & Co. KG

Alexander Naue/Kent von Maubeuge [BOA]

Propex Operating Company LLC

Drew Loizeaux/Noah Nichols

Berry Global Inc.

Keith Misukanis/Monica Baker

TRI Environmental Inc.

Sam R. Allen [BOA]/C. Joel Sprague

U. S. Army Corps of Engineers

Kevin Pavlik/Richard DePasquale

Chevron Phillips Chemical Co.

Ashish Sukhadia/Lawrence Szmuto/Miranda Rine[BOA]

CARPI, Inc.

Alberto M. Scuero/Massimo Bugliosi/John A. Wilkes

Civil & Environmental Consultants, Inc.

Tony Eith

AGRU America, Inc.

Tom Nichols/Markus Haager

INHA (GSI-Korea)

H.-Y. Jeon

Waste Management Inc.

Greg Cekander/Burrill (Bo) McCoy [BOA]

NPUST (GSI-Taiwan)

Chiwan Wayne Hsieh

GeoComp/GeoTesting Express

W. Allen Marr/Gary T. Torosian

ATARFIL

Emilio Carreras Torres/Jorge Fernandez Lopez/

Gabriel Martin/Alejandro Carreras Torres

Republic Services Inc.

Joe Benco/ Mike Beaudoin/Dave Vladic

InterGEO Services Co.

Şükrü Akçay/Archie Filshill

Raven Industries, Inc.

Clint Boerhave/Stacy Coffin/Greg Anderson

CTI and Associates, Inc.

Te-Yang Soong [BOA] / Kevin Foye

Advanced Earth Sciences, Inc.

Kris Khilnani/Suji Somasundaram

Carlisle Syntec, Inc.

Paul Merkel/Vivian Zhang

EPI, The Liner Co.

Daniel S. Rohe/Paul Livingston

Weaver Consultants Group, Inc.

Mark Sieracke

Aquatana (Pty) Ltd.

Piet Meyer/ Sanet van der Merwe

Jones Edmunds, Inc.

George Reinhart/Tobin McKnight

Afitex-Textel

Pascal Saunier/Stephan Fourmont/Jocelyne Grenier

BTRA (GSI-India)

T. V. Sreekumar

Watershed Geosynthetics LLC

Michael Ayers/Steve Mayes/ Bryan Scholl

Maccaferri

Moreno Scotto/Sachin Mandavkar/Pietro Rimoldi

Jones & Wagoner (Pty) Ltd.

Jabulile Msiza/Angelique Grieve

Ardaman & Assoc.

Mohamad Al-hawaree/Thomas S. Ingra/Deborah Scott

American Wick Drain

Scott Morris/Craig Phelps/Seth Marlow

INOVA Geosynthetics/AERO Aggregates

Archie Filshill/Theresa Loux

Owens Corning Science & Technology LLC

Katie Hill/Jason Woodall

SKAPS Industries

Nilay Patel/Anurag Shah

Duke Energy

Asha Sree/Ken Karably

Chesapeake Containment Systems (CCS)

Ryan Kamp

Layfield Group

Deepaksh Gulati/Mark Simpson/Brian Fraser [BOA]

Engopol Geosintéticos Ltda

Patricia Ferreira/Andréia Machado/Ildo Oliveira

Concrete Canvas

Lee Church/Melanie Fuhrman/Nathan Ivy

Jet Filter System

Doug Stoutin/Greg Heilman

Associate Members

Delaware Solid Waste Authority

Robin Roddy/Jason Munyan

Nebraska Department of Environmental Quality

Michael Behrens

New York Department of Environmental Conservation

Jaime Lang

Maine Department of Environmental Protection

Victoria Eleftheriou

New York Department of Transportation

Steve Heiser

California Water Resource Control Board

Scott Couch/ Brianna St. Pierre/Joshua Munn

New Jersey Department of Environmental Protection

Mary Anne Goldman

Pennsylvania Department of Environmental Protection

Jason Dunham

Florida Department of Environmental Protection

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Margie Ring/Xuede (Dan) Qian

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