

# The GSI Newsletter/Report



*Happy Holidays and a Healthy and Prosperous 2021 from All of Us at GSI*

Vol. 34, No. 4

December, 2020

This quarterly newsletter, now in its 34<sup>th</sup> 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](http://www.geosynthetic-institute.org). It also serves as a quarterly report to its member organizations. Details are available by contacting George R. Koerner or Marilyn Ashley at phone (610) 522-8440; fax (610) 522-8441 or e-mail at [gsigeokoerner@gmail.com](mailto:gsigeokoerner@gmail.com) or [marilyn@geosynthetic-institute.org](mailto:marilyn@geosynthetic-institute.org).

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

Results of the most recent voting for three positions on the Board of Advisors (BOA) resulted in Te-Yang Soong to represent the Consultants and Testing Lab members and Mathieu Cornellier to represent the International members, (1 of 2 representatives). David Chiet was elected to represent the Geomembranes and GCL members, however he is no longer with Minerals Technology. A vote will be taken in January and a new BOA for Geomembranes/GCLs will be announced.

### 2021-2023 Board of Advisors

#### Term Ends 2021

- Burrill (Bo) McCoy - Waste Management Inc. (Owners and Operators)  
e-mail: [bmccoy2@wm.com](mailto:bmccoy2@wm.com)
- David Andrews – Propex (Geotextiles and Geogrids)  
e-mail: [David.Andrews@propexglobal.com](mailto:David.Andrews@propexglobal.com)
- Sam Allen – TRI Environmental Inc. (At-Large)  
e-mail: [Sallen@tri-env.com](mailto:Sallen@tri-env.com)

#### Term Ends 2022

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

#### Term Ends 2023

- Te-Yang Soong  
(Consultants and Testing Labs)  
email: [tsoong@cticompanies.com](mailto:tsoong@cticompanies.com)
- OPEN  
(Geomembranes and GCL's)
- Mathieu Cornellier  
(International - 2)  
e-mail: [mcornellier@solmax.com](mailto:mcornellier@solmax.com)

We would sincerely like to thank Tony Eith (of CEC Consultants), Jimmy Youngblood (of Solmax) and Moreno Scotto (of Maccaferri) for their service on the BOA. These gentlemen have served on the BOA for 15, 3 and 6 years respectively. We owe them a debt of gratitude for their guidance and wisdom over the years.

It should be noted that GSI has been having virtual quarterly meetings with the Board of Advisors throughout 2020 via Zoom.

### 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. *Those projects marked with an asterisk have written papers available; please ask and we will send them accordingly.* Contact George Koerner ([gsigeokoerner@gmail.com](mailto:gsigeokoerner@gmail.com)), Grace Hsuan ([hsuanyg@drexel.edu](mailto:hsuanyg@drexel.edu)) for details and/or discussions.

- 1. Field Exposed Lifetime of Geogrids Used at the Facing of Landfill Berms** - The facing of mechanically stabilized earth landfill berms (and other walls and slopes as well) often uses a wrap-around configuration leaving the geogrid exposed to the atmosphere. A project being conducted by George Koerner is presently investigating the behavior of two different geogrids and two erosion control materials at a local landfill over time. These four materials are also being exposed on the roof of the GSI carport. A 50-year time frame is envisioned! The long-term behavior will eventually be compared to our UV laboratory predicted database.
- 2. Laboratory Exposed Lifetime of Geomembranes\*** - GSI is using three UV-fluorescent devices to estimate the projected exposed lifetime of six different types of geomembranes. They are HDPE, LLDPE, fPP, EPDM and PVC (N.A. and European). They are being incubated at 60, 70, and 80°C until half-life of strength and elongation are measured. The goal is lifetime prediction. Incubation times are now over 60,000 light hours (8.2 years) and several are not yet complete. They will probably take as long as 90,000 light hours ( $\approx$  12.3 years). The information up to this point in time was made available to the public on April 6, 2016 at the GeoAmericas Conference in Orlando, Florida. It has been republished in the International Geosynthetics Journal. A copy is available. It is now also being offered as a 90 min. webinar.
- 3. HDPE Geomembrane Lifetime as a Function of Thickness** - This often-encountered question is being evaluated at elevated temperature exposure at in a QUV weathering device per ASTM D7238. Formulations are exactly the same and only the sample thicknesses vary. These thicknesses are 2.76, 2.44, 1.58, 1.08, 0.77 and 0.48 mm. Parameters being evaluated in this decades long study are change in thickness and presence of crazing or cracking. Time will tell!
- 4. Laboratory Exposed Lifetime of PVC (European) Geomembranes** - We have been evaluating five different European formulations for nine years using three dedicated UV-fluorescent devices and the results are very

impressive. The study is being conducted for CARPI Tech, a GSI member organization. The project also allows us to distinguish between PVC geomembranes manufactured in North America versus Europe. The differences are in the type of plasticizers used in the formulations as well as thicknesses. The program will end this year but may be extended with new formulations.

- 5. Direct Shear Testing Under Extreme Conditions** - Weather and climate change have resulted in new boundary conditions for many of our projects employing geosynthetics. Historically, climate change (especially changes in temperature) impacts have not been considered when testing direct shear performance. At the request of four member companies, GSI is now conducting tests and collection data on direct shear testing at extremely cold (below freezing) or hot (85°C) temperatures to see if this is a realistic concern. In addition, over the past decade there has been several landfill sites that have experienced exothermic reactions. Therefore, there is a need to quantifiably assess the performance of landfill liner and cover systems under these conditions. This work might help in mitigating the consequences of extreme temperatures on containment systems. Currently, there is a clear gap in the state of knowledge in terms of assessing the performance, resilience, and risk of such events.
- 6. pH Between Masonry Block Wall Units\*** - George Koerner has been measuring the pH between three types of masonry blocks for over eight years to monitor the values. Concern here is over PET geogrids which are known to be sensitive to very high alkalinity environments. Indeed, the values started high, but over time they are now down to eight and lower. George has published a paper in this regard.
- 7. Slow Pressurization of HDPE Geomembranes in Axi-Symmetric Testing\*** - The ASTM D5716 method of testing geomembranes in a 3-D axis-symmetric mode uses a pressure rate of 6.9 kPa/min (1.0 psi/min). While such a rate is appropriate for most geomembrane types, it is very fast for HDPE which is semi-crystalline and cannot readily stress relax so as to accommodate the applied pressure. To investigate slower rates, we have initiated a project with rates as low as 6.9 kPa/month (1.0 psi/month)! The last test, begun in 2017, is at a rate of 6.9 kPa/six months (1.0 psi/six months) and it will take an estimated five years to conclude. Recently, yield was observed in the deformed geomembrane but air pressure is still sustained. A preliminary paper was presented at Geosynthetics '15 in Portland.
- 8. Generic Standards** - A major continuing effort is ongoing with respect to the development and updating of GRI's generic geosynthetic standards. As customary, "standards" consist of

specifications, guides, practices and test methods. The current status of these standards is as follows.

- 8a. **GRI Specifications** - Currently we have 21 generic specifications on most of the products generally used. The notable exception is geogrids, which is, and has been for years, very contentious with no obvious accommodations. Incidentally, all are currently copyrighted.
- 8b. **GRI Guides** - Currently we have 12 guides on detailed aspects of geosynthetics, their installation and project performance. Topics vary widely; from statistical sampling-to-constructing test pads. Topics of interest for our development should be communicated to George or Bob Koerner.
- 8c. **GRI Practices** - Currently we have 8 practices on wide ranging topics generally used in design methods. They are very detailed and sometimes are based on our concept of what we perceive to be "best practice".
- 8d. **GRI Test Methods** - Currently we have 29 test methods available on the following geosynthetic types:

- Geotextile Related - 2
- Geogrid Related - 2
- Geomembrane Related - 6
- GCL Related - 2
- Geocomposite Related - 11
- Geosynthetic (multipurpose) Related - 6

Additionally, 31 of our test methods have been adopted by ASTM and we have depreciated our version. Incidentally, our test methods are for members only and are in the password protected portion of our website. We are delighted to report that ASTM has given the David Suits Award to GSI for our cooperation in sharing these GRI standards. We will continue to distribute our test methods in this manner, but specifications, guides and practices are available free as mentioned previously.

## **AeroAggregates Survivability Study**

When geotextile or geogrid design strengths are needed for geosynthetics used in reinforcement applications, one needs to define the Long-Term Design Allowable strength, or LTDA. This value is utilized in design, and is arrived at by first determining the ultimate wide strip tensile strength (by either ASTM D4595 or D6637) and then reducing this value to an allowable one by the applying partial factors of safety as in the following equation:

$$T_{all} = T_{ult} (1/FS_{cr} \times FS_{id} \times FS_{cd})$$

where:

- $T_{all}$  = long term design allowable load (lb./in. or lb./ft.)
- $T_{ult}$  = Ultimate wide strip tensile strength (lb./in. or lb./ft.)
- $FS_{cr}$  = Partial Factor of Safety for creep potential
- $FS_{id}$  = Partial Factor of Safety for installation damage
- $FS_{cd}$  = Partial Factor of Safety for degradation potential

In regards to the Partial Factor of Safety for installation damage, we have a very good handle on how reinforcement geosynthetics behave with conventional soil and aggregate. Installation damage  $FS_{id}$  is the loss of strength properties resulting from the act of installation. In some situations, where aggressive backfill and heavy equipment are used in construction, the resultant loss of strength can be significant. Cases have been reported where only 30% of the original strength properties remain after installation (AASHTO Task Force 27). Although this high loss level is unusual, it points out the need to address installation conditions. It should be clearly pointed out that the range of  $FS_{id}$  = Partial Factor of Safety for installation damage is usually 1.1 to 1.6 for convention materials installed in AASHTO #57 stone with moderate ground pressure equipment.

The design engineer can control a number of variables which impact installation survivability conditions. This includes the choice of backfill and installation equipment. Specifications requiring sand backfill will reduce the installation damage significantly. However, this option does reduce drainability and strength of the fill. Furthermore, light ground pressure equipment and greater lift thickness will reduce installation stresses. Unfortunately, neither is possible when a 90-95% requirement of Standard Proctor (ASTM D698) is desired for the fill.

Relatively new to the USA market are AeroAggregates. These Ultra-Lightweight Foamed Glass Aggregates are produced from 100% post-consumer recycled glass. The aggregates have a highly frictional surface that are combined with low unit weight, inertness, high permeability, and insulating properties. As such these foamed glass aggregates are ideal as lightweight backfill used in conjunction with geosynthetic reinforcing elements.

As you can see by the enclosed pictures, GSI conducted installation survivability tests with AeroAggregates' ultra-light-weight foam glass aggregate recently. Test specimens were cut from geotextile and geogrid samples exposed according to ASTM D5818 "Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics." The exposure and retrieval were conducted at AeroAggregates' plant in Eddystone, PA and then tested back at GSI. The following test

methods were performed on the retrieved and as received materials:

- ASTM D4595 Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
- ASTM D6637 Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method

Installation damage reduction factors were obtained for the following geosynthetics;

- Two NPNW Geotextiles of different mass/unit area
- Woven slit film Geotextile
- UX Geogrid punched and drawn
- BX Geogrid punched and drawn
- BX strap and welded Geogrid

Favorable results were realized compared to AASHTO #57 stone. This can be attributed to the nature of the Ultra-Lightweight Foamed Glass Aggregate and the placement technique of the material. The manufacturer of UL-FGA recommends that one protects it before, during, and after installation. UL-FGA should be placed in the following manner at locations indicated on the plans and drawings;

1. The area to be filled shall not have any standing water (including ice) in it prior to placement of the UL-FGA.
2. Construction equipment, other than for placement and compaction, should avoid operating on the exposed UL-FGA. If construction sequencing necessitates trafficking on the UL-FGA layer, minimize construction traffic to the least extent possible.
3. For compaction using tracked equipment, foamed glass aggregate shall be placed in uncompacted lift thicknesses of 24 inches and compaction shall be performed with a tracked excavator or dozer with ground pressures between 625 - 1,025 psf. Compaction using tracked equipment shall be completed by placing the initial lift thickness, and then raising the blade or bucket and tracking over the layer for a total of four (4) full passes. One (1) full pass is defined as a minimum of 100% coverage of the tracks passing over the top of the lift.
4. For areas not accessible by tracked equipment (e.g., around structures and utilities or within 4 feet of the MSE wall face) or to compact thinner lifts, foamed glass aggregate shall be placed in maximum uncompacted lifts of 12 inches and compacted with a plate compactor weighing between 110 and 220 lbs. Compaction shall be completed by making a minimum of four (4) full passes with the plate compactor.

It is our intention to continue this effort with full-scale test sections in the spring of 2021. We will also investigate geomembrane installation and construction survivability as it relates to UL-FGA as overburden.



AeroAggregates Eddystone Plant



Retrieving GS on Plater after Survivability Test



UX GG looks in Good Shape



ASTM D6637 Testing at GSI

## GSI Work on Grout Filled Mattresses (GFM)

GSI has spent a lot of time and effort during the last quarter of 2020 working on Developmental Specification 531 - Fabric Formed Revetment Systems with FL DOT. They adopted their specification values from the National Highway Institute, Hydraulic Engineering Circular (HEC) No. 23, Publication No. FHWA NHI 09-112 and requested both industry and GSI's input. We have worked extensively with Timothy Holley and Dino Jameson of the DL DOT in concert with the following industry representatives;

- Gerry Kehler, Synthetex
- Kyle Worrell, Armorform
- Markus Wilke, Huesker
- Brady Akers, Fabriform

The fabric formed revetment system should be installed in accordance with this specification and in conformance with the lines, grades, design, and dimensions shown in the plans. Grade the slopes or surfaces to be protected to such an extent that they are normally stable in the absence of erosive forces. Position a double-layer synthetic fabric envelope in a mat configuration over the surface and fill with a pumpable sand/cement grout, in a way that forms a stable mat of suitable weight and configuration. The Fabric Form consists of specifically woven, double layer, open selvage fabric joined in mat configuration. Use fabric consisting of uncoated synthetic yarns with sufficient tensile strength and porosity to withstand the pressure of the grout injection pump without breaking the layers of fabric. Provide fabric form meeting or exceeding property values which appear in the following table;

### Results of Testing on GFM Performed at GSI as a Comparison of 5 Different Commercially Available Products

Property	Test Method	Units	FL DOT Spec Value	Product "A"	Product "B"	Product "C"	Product "D"	Product "E"
<b>Chemical</b>								
Polymer Composition	NA	NA	PET or Nylon	Nylon	PET	PET	PET	Nylon
Density	D 792	g/cc	na	-	-	-	-	-
<b>Physical</b>								
Thickness (one ply)	D 5199	mil	13	39	12	34	26	32
Mass per unit Area	D 5261	osy	na	7.7	5.4	6.9	7.2	8.2
<b>Mechanical</b>								
Grab Strength MD	D 4632	lb	na	454	362	353	312	583
Grab Elongation MD	D 4632	%	na	47	20	29	26	48
Grab Strength X-MD	D 4632	lb	na	399	323	247	310	358
Grab Elongation X-MD	D 4632	%	na	38	21	24	21	34
Strip Strength MD	D 5035	lb/in.	na	287	415	324	356	536
Strip Elongation MD	D 5035	%	na	35	18	23	22	41
Strip Strength X-MD	D 5035	lb/in.	na	319	408	272	399	398
Strip Elongation X-MD	D 5035	%	na	30	18	19	20	31
WWT Break Strength MD	D 4595	lb/in.	140	213	366	200	378	434
WWT Break Elongation MD	D 4595	%	20	27	20	19	23	45
WWT Break Strength X-MD	D 4595	lb/in.	110	279	379	225	356	331
WWT Break Elongation X-MD	D 4595	%	30	25	21	19	22	34
Tear Resistance MD	D 4533	lbs	150	305	232	255	279	447
Tear Resistance X-MD	D 4533	lbs	100	250	195	114	248	394
<b>Hydraulic</b>								
Apparent Opening Size	D 4751	US Sieve #	40	30	50	25	30	40
Apparent Opening Size	D 4751	mm	0.42	0.63	0.30	0.75	0.58	0.42
Flow Rate	D 4491	gal/min/ft <sup>2</sup>	90	75	8	107	76	69

The primary functions of geotextiles are; separation, filtration, drainage and reinforcement. The double layered fabric contains a fine aggregate concrete (grout), allowing the grout to harden in place to provide a hard-armored revetment to prevent erosion i.e., a concrete revetment. This end use needs to be the key consideration when designing a fabric to be used as the form. The fabric design should consider the installation process, concrete strength and the long-term performance of the structure.

The fabric serves as a form and filter which results in a reduction of the water/cement ratio of the injected grout. The grout injected into the fabric form has a relatively high-water content. This is necessary to produce a flowable grout that will easily fill the fabric form. The injection pressure along with head pressure will expel the surplus mixing water through the permeable fabric. A fabric designed with proper filtering characteristics produces a cast-in-place grout with higher strength, durability and abrasive resistance. We have discovered over the last fifty+ years in the industry, that the optimum filter effect is obtained through the use of textured yarns. Textured yarns allow the surplus water out while retaining the cement and sand. In addition, textured yarns bond tightly with the grout allowing the cement slurry to coat the fibers. This adhesion of the fabric to the grout along with the fibers being coated with the cement paste improve the fabric form's resistance to UV degradation.

## Data Acquisition Welding Demo

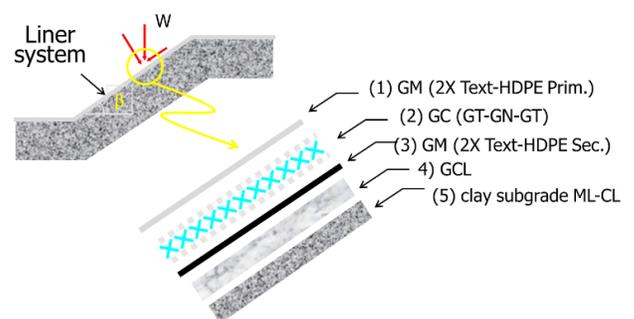
GSI had the great pleasure of working with three GSI members at a field welding demonstration project. This project was small (0.2 acres) surface impoundment but full scale and was used for proof testing the technology in anticipation of larger projects in the future. This was an excellent field test of the data acquisition welder technology, showing its potential to improve on the 1 in 500' destruction seam test paradigm. GSI is very invested in this shift with many documents in the open literature supporting this stance as follows;

- GRI White Paper #3; "Providing Flexibility in Destructive Seam Sampling -Testing", Robert and George Koerner, February 2003
- Changing the 'one per 500 feet' paradigm on geomembrane field seam sampling *Geosynthetic Magazine February 1st, 2019 By George and Robert Koerner: IFAI / GSI News*
- GM14 Guide for Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes

- GM20 Guide for Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using Control Charts
- GM29 Practice for Field Integrity Evaluation of Geomembrane Seams (and Sheet) Using Destructive and/or Nondestructive Testing

The surface impoundment had the following cross section from the bottom up; silty clay (ML-CL) subgrade, GCL, 60 mil microspike textured HDPE geomembrane GM13 with clean Seam, GT-GN-GT geocomposite, 60 mil textured HDPE geomembrane. This is shown in the following cross-sectional schematic and site photos.

Multilined Surface Impoundment cross section



Surface impoundment liner system cross section



Site photo, GM placed over GCL

The geomembrane was installed from high to low gradient with shingled panel to allow for runoff. The liner crew and earthwork contractor demonstrated great teamwork on the project. They avoided the pitfalls of winter weather and provided a clean, safe working environment in spite of COVID.



Production fusion weld with DAQ welder



On board computer displaying speed, temperature and force in real time

AGRU America provided the geosynthetic for the project. The geomembrane was from a cast line with relatively high MFI. This means that it has a relatively large seaming window. The geomembrane (AGRU's HDPE Double Sided Microspike 60 mil black GRI GM13 with Clean Seam) was much more forgiving than anticipated when it came to seaming. This exercise also made it clear that the three welding parameters are interrelated as factors affecting good seam quality.

Three Leister GeoStar welders were used on the project. We were impressed with the welders' performance. While on site, we never saw a malfunction or unexplainable outlier. An issue that was discussed at length was balancing the outlier threshold (sensitivity) and sampling interval (recording frequency.) Again, the stakeholders will need to address these issues prior to starting a project along with sampling window and alarm interval. Reconciling the outliers of the welder with actual location on production seams is going to be a challenge for the CQA team to achieve in a timely fashion. This is a significant traceability issue, particularly if there are multiple welders operating on large sites at the same time. Efforts like this field demonstration will go a long way to validate current joint efforts between GSI, IAGI and ASTM in regard to the existing GRI-GM32 Standard Practice for Geomembrane Seaming Using Data

Acquisition Hot Wedge Welding Devices. Observing the critical parameters during seaming of a geomembrane versus just waiting for a passing destructive test to determine if the seam was adequate is a step in the right direction of improving the overall level of containment and also a means of continuously improving with technologic advances.

## Progress within GII (Information)

### “GSI Fellowships for Graduate Students”

The Geosynthetic Board of Advisors (BOA) have reviewed the 2020-2021 proposals and the recipients for this year's fellowships have been chosen. Our website has details on students who have been selected. This information can be found at:

[www.geosynthetic-institute.org/gsfellows.htm](http://www.geosynthetic-institute.org/gsfellows.htm)

Eleven (11) students were selected for the 2020-2021 GSI Fellowship awards. In the past 5 years of the fellowship awards, the number of new fellowships awarded has ranged from 9 – 18. This year we received no proposals from universities outside the USA. This came as a surprise, since the average number of international proposals has been consistently above 20%. We hope to correct this going forward. The program and institute will focus on international outreach for 2021-2022 fellowships.

The uncertainty caused by COVID-19 as to whether campuses would re-open or switch to distance learning may have been a factor. It would be difficult to continue research if a university decided to cancel all in-person classes, since laboratories and research often fall into this category and would be closed. We anticipate that in 2021 we will see proposals once again from international universities.

Please contact Jamie if you have any questions about the fellowship program or would like additional information.

Jamie R. Koerner  
Office Manager  
[jamie@geosynthetic-institute.org](mailto:jamie@geosynthetic-institute.org)

Our GSI Home Page is accessed as follows:

[www.geosynthetic-institute.org](http://www.geosynthetic-institute.org)

It has been revised and is being maintained through the fine efforts of Marilyn Ashley. 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 Marilyn Ashley. Marilyn can be reached by e-mail at [marilyn@geosynthetic-institute.org](mailto:marilyn@geosynthetic-institute.org). When you get into this section, the following information is then available.

- GRI Test Methods
- 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)

The Keywords Section contains about 35,000 citations which is the vast (~ 90%) majority of the geosynthetics literature published in English. It is updated as each published paper is received. Citation retrieval is quite easy provided that you have a specific topic, or area, in mind. This is the section of the website that we (and others we are told) use the most in our daily activities.

White paper #44 "Relative Sustainability of Road Construction/Repair: Conventional Methods versus Geosynthetic Materials" is available on our website for your review. We are interested in any comments you may have.

Also, if you have topics that you feel warrant a survey, please contact us.

## Worldwide Database of Guidelines/Regulations for Applications using Geosynthetic Barriers

In conjunction with the "Technical committee Barrier Systems" of the International Geosynthetic Society (IGS) through GSI we are putting together a database (which will be publicly available) with links to guidelines and regulations for a variety of **geosynthetic barrier applications**. This user-friendly database will provide quick access for anyone looking for worldwide geosynthetic barrier guidelines/regulations. We are starting the database with 12 categories, although we know there are additional applications. If successful, we plan to expand the database to include these other applications. The 12 categories are:

Landfills, Hydraulic Engineering, Mining, Coal Ash, Railways, Road Construction, Groundwater

Protection, Soil Encapsulation, Waterproofing, Tank Farms, Storage Ponds and Storm Water Retention.

We are requesting your assistance in this endeavor. Because we need worldwide participation, we ask that you please forward this information to our international contacts so that we can include as many countries as possible. Your Information should be added into the form under this link:

<https://friedhelm-fischer.de/geosynthetics-used-as-barriers-worldwide-guidance/>

Please add additional rows to the form if you have multiple regulations for any application by clicking on the (+) button on the right side of the entry form.

Your input is critical to the success of this database. We appreciate your time and effort that will be required and thank you in advance. If you have any questions or comments, please feel free to contact [jamie@geosynthetic-institute.org](mailto:jamie@geosynthetic-institute.org)

## Progress within GEI (Education)

### GRI Reports

To date, we have 46 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](http://www.geosynthetic-institute.org/member/reports.html).

Most of them are also available in hard copy. Our most recent report is:

- #46 - Utilizing PVDs to Provide Shear Strength to Saturated Fine-Grained Foundation Soils

### Webinar Wednesdays

Webinar Wednesdays started as a reaction to the COVID-19 pandemic and the necessity to remain in lockdown. With so many employees working remotely and the slower pace due to a downturn in the economy, George and the BOAs felt that it was a good time to reach out to the geosynthetic community through a virtual platform. GSI wasn't alone in this venture, but we recognized the importance of helping engineers get their PDHs while working remotely. After choosing important topics relating to geosynthetics and adding several new hot topic webinars, a schedule was made and Webinar Wednesdays began. The last several webinars have gotten reviews saying they were both informative and entertaining. Below is a recap of webinars that have been offered this year, with Webinar Wednesdays beginning on January 22 thru December 16, 2020.

DATE	TITLE	Registrants # of Companies	# Portals
1/22/20	Geosynthetic Drainage Material	8	12
2/19/20	Pond Liner Design	3	17
3/25/20	Stability Design of Landfill Covers	7	32
4/8/20	GM Puncture	1	8
4/15/20	Wave Management	4	35
4/22/20	Behavior and Analysis of 20 Solid Waste LF Failure	3	33
4/29/20	QA/QC of Geosynthetics	4	27
5/06/20	MSE Wall Inspection	6	34
5/11/20	MSE Wall Inspection – NY DOT	1	15
5/18/20	GS in Paved and Unpaved Roads	1	425
5/13/20	Applications and Design of Geotextile Tubes	4	5
5/20/20	Geotextiles Filters – concerns and issues	4	8
5/27/20	Lifetime Durability of Geosynthetics	7	47
6/03/20	Testing of Geosynthetics	cancelled	NA
6/10/20	Sustainability with Geosynthetics	2	5
6/17/20	Drainage with Geosynthetics	4	6
6/24/20	In Situ Stabilized of slopes using Geosynthetics	3	16
7/8/20	UV Degradation as it Relates to Polymers	1	3
9/9/20	A Data Base and Analysis of 320 Failed MSE Walls With Geosynthetic Reinforcement	3	7
9/16/20	Geomembranes in Hydraulic Applications (dams, canals, reservoirs, tunnels, pipes)	4	9
9/23/20	Geosynthetic Applications Used in Heap Leach Mining	1	3
10/7/20	Landfill Covers: Past-Present-Emerging	9	31
10/14/20	Lifetime Predictions of Covered and Exposed Geosynthetics	6	13
10/21/20	In-Situ Stabilization of Slopes Using Nailed (or Anchored) Geosynthetics	2	3
10/28/20	Soil Consolidation Using Wick Drains, aka PVDs	2	4
11/4/20	QA/QC of Geosynthetics	6	11
11/11/20	Testing of Geosynthetics	4	8
11/18/20	Disposal of Coal Combustion Residuals	2	2
12/2/20	Geosynthetics in Roadways	4	5
12/9/20	Geosynthetics in Erosion Control	3	5
12/16/20	Stability Design of Landfill Cover Soils	3	4

On July 22, 2020, George Koerner gave a presentation to IGS Brazil on the subject “Geosynthetic Properties of Testing”. The “live” webinar was well received and attracted over 300 participants. One goal of the Geosynthetic Institute is to provide education to the geosynthetic industry. This particular webinar was given free to IGS members and accomplished our education goal by providing important information on testing of geosynthetics.

The schedule for 2021 is as follows:

**GSI Webinars (90 minutes long)**

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

**[www.geosynthetic-institute.org/webinar.htm](http://www.geosynthetic-institute.org/webinar.htm)**

**1.5 Professional Development Hours  
GSI and GMA Members Cost - \$200  
Nonmembers Cost - \$250**

Date	GSI No.	Title
1/13/2021	W30	Lifetime Durability of Geosynthetics
2/10/2021	W4	MSE Wall Inspection
3/10/2021	W12	Landfill Covers: Past-Present-Emerging
4/14/2021	W20	Geosynthetic Drainage Materials
5/12/2021	W31	Testing of Geosynthetics
6/9/2021	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 available)
2. Construction Inspection of Mechanically Stabilized Earth (MSE) Walls, Berms and Slopes (recordings 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](http://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 6<sup>th</sup> 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](mailto:jamie@geosynthetic-institute.org) if you want information and details.

## Activities within GAI (Accreditation)

As we all respond to the unprecedented events unfolding related to the coronavirus (COVID-19), we want to take a moment to communicate with our accredited laboratories expecting an audit this year. GSI has been monitoring news surrounding COVID-19 and determined steps that our institute can take to ensure the wellbeing of our customers and staff.

First and foremost, our thoughts are with those directly and indirectly impacted by the global pandemic. We understand you may need to take time away from your business and your customers. If you find your organization in a unique situation, please let us know how we can assist.

GSI and GAI-LAP are committed to maintaining the highest level of customer service. Please reach out to us via phone or e-mail. The Institute remains open to staff only at this time. Circumstances continue to change rapidly as more news becomes available, but GSI remains committed to you. We appreciate your continued support and look forward to better times ahead.

The Geosynthetic Accreditation Institute's (GAI) current mission is focused on a Laboratory Accreditation Program (LAP) for geosynthetic test methods. George Koerner is in charge of the program. The GAI-LAP was developed for accrediting geosynthetic testing laboratories on a test-by-test basis. GAI-LAP suggests that laboratories use ISO 17025 as their quality system model. In addition, the program uses the GSI lab as the reference test lab and operates as an ISO 17011 enterprise. *It should be emphasized that our GSI lab does not conduct outside commercial testing.*

It should also be made clear that GAI-LAP does not profess to offer ISO certification, nor does it "certify" laboratory results. GAI-LAP provides accreditation to laboratories showing compliance with equipment training and documentation for specific standard ASTM or ISO test methods. In addition, GAI-LAP verifies that an effective quality system exists at accredited laboratories by way of proficiency testing.

There have been significant additions to the number of GAI-LAP tests. Presently, there are 257 GAI-LAP test methods available for accreditation. Please consult our home page for a current listing.

As of December, 2020, 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<sup>A</sup> - TRI/Environmental Inc. (155 tests)  
Jarrett Nelson -- (512) 263-2101  
[jnelson@tri-env.com](mailto:jnelson@tri-env.com)
- 3<sup>A</sup> - Golder Associates (43 tests)  
Henry Mock -- (770) 492-8280  
[Henry\\_Mock@golder.com](mailto:Henry_Mock@golder.com)
- 4<sup>C</sup> - Geosynthetic Institute (108 tests)  
George Koerner -- (610) 522-8440  
[gsigeokoerner@gmail.com](mailto:gsigeokoerner@gmail.com)
- 8<sup>B</sup> - Propex Operating Co., Ringgold (17 tests)  
Todd Nichols -- 438-553-3757  
[todd.nichols@propexglobal.com](mailto:todd.nichols@propexglobal.com)
- 9<sup>B</sup> - Lumitec (17 tests)  
Rebecca Kurek -- (770) 869-1787  
[rkurek@lumiteco.com](mailto:rkurek@lumiteco.com)
- 13<sup>A</sup> - Precision Geosynthetic Labs (TRI Env.) (84 tests)  
Cora Queja -- (714) 520-9631  
[cqueja@tri-env.com](mailto:cqueja@tri-env.com)
- 14<sup>A</sup> - Geotechnics (50 tests)  
J. P. Kline -- (412) 823-7600  
[JPKline@geotechnics.net](mailto:JPKline@geotechnics.net)
- 20<sup>A</sup> - GeoTesting Express, MA (58 tests)  
Joe Tomei -- (978) 635-0424  
[jdt@geotesting.com](mailto:jdt@geotesting.com)
- 22<sup>B</sup> - CETCO Hoffman Estates (11 tests)  
Minerals Technologies Inc.  
Barbara Gebka -- (847) 851-1904  
[Barbara.gebka@mineralstech.com](mailto:Barbara.gebka@mineralstech.com)
- 24<sup>B</sup> - CETCO Lovell (10 tests)  
Minerals Technologies Inc.  
Stuart Yates -- (307) 548-6521  
[stuart.yates@mineralstech.com](mailto:stuart.yates@mineralstech.com)
- 25<sup>B</sup> - Ten Cate, Pendergrass (12 tests)  
Darrell Scoggins -- (706) 693-2226  
[d.scoggins@tencategeo.com](mailto:d.scoggins@tencategeo.com)
- 26<sup>B</sup> - Agru America Inc. (27 tests)  
Maria Coffey -- (843) 546-0600  
[mcoffey@AgruAmerica.com](mailto:mcoffey@AgruAmerica.com)
- 29<sup>e</sup> - FITI Testing and Research Institute (79 tests)  
Hang Won-Cho -- 82-2-3299-8071  
[hwcho@fitiglobal.com](mailto:hwcho@fitiglobal.com)
- 31<sup>D</sup> - NYS Dept. of Transportation (7 tests)  
Tom Burnett -- (518) 485-5707  
[tburnett@dot.ny.gov](mailto:tburnett@dot.ny.gov)
- 34<sup>B</sup> - Solmax (GSE) - Houston, TX USA (26 tests)  
Lana Hickman  
[Lhickman@solmax.com](mailto:Lhickman@solmax.com)
- 38<sup>C</sup> - CTT Group SAGEOS (123 tests)  
Oliver Vermeersch -- (450) 771-4608  
[overmeersch@gcttg.com](mailto:overmeersch@gcttg.com)
- 40<sup>B</sup> - Solmax (GSE) - Kingstree, SC USA (19 tests)  
Thomas Harrelson -- (843) 382-4603  
[tharrelson@solmax.com](mailto:tharrelson@solmax.com)
- 41<sup>A</sup> - SGI Testing Service, LLC (19 tests)  
Zehong Yuan -- (770) 931-8222  
[ZYuan@sgilab.com](mailto:ZYuan@sgilab.com)
- 42<sup>C</sup> - NPUST (GSI-Taiwan) (71 tests)  
Chiwan Wayne Hsieh -- 011-886-8-7740468  
[CWH@mail.npust.edu.tw](mailto:CWH@mail.npust.edu.tw)
- 43<sup>A</sup> - Ardaman & Associates (19 tests)  
George DeStefano -- (407) 855-3860  
[gdestafano@ardaman.com](mailto:gdestafano@ardaman.com)
- 44<sup>B</sup> - Berry Global Inc. (9 tests)  
Julie Solarz -- (615) 847-7299  
[juliesolarz@berryglobal.com](mailto:juliesolarz@berryglobal.com)
- 45<sup>B</sup> - Ten Cate Geosynthetics Malaysia SDN Bhd. (24 tests)  
Boon Kean Tan -- (603) 519 28576  
[BK.tan@tencategeo.com](mailto:BK.tan@tencategeo.com)
- 46<sup>B</sup> - TAG Environmental Inc. (13 tests)  
Ryan Ackerman -- (705) 725-1938  
[ryan\\_ackerman@tagenv.com](mailto:ryan_ackerman@tagenv.com)
- 49<sup>B</sup> - Engepol Geossinteticos (16 tests)  
Patricia Ferreira -- (55) 51 3303-3901  
[patricia@engepol.com](mailto:patricia@engepol.com)

- 50<sup>B</sup> - ADS, Inc. Hamilton (7 tests)  
Justin Elder -- (513) 896-2065  
[justin.elder@ads-pipe.com](mailto:justin.elder@ads-pipe.com)
- 51<sup>B</sup> - SOLMAX - Canada (21 tests)  
Claude Cormier -- (450) 929-1234  
[ccormier@solmax.com](mailto:ccormier@solmax.com)
- 53<sup>B</sup> - Polytex Autofagasta (18 tests)  
Mario Contreras Cardenas -- 011 55-288-3308  
[mcontreras@polytex.cl](mailto:mcontreras@polytex.cl)
- 55<sup>B</sup> - Atarfil Geomembranes (21 tests)  
Gabriel Martin Sevilla -- 34 958 439 200  
[gmartin@atarfil.com](mailto:gmartin@atarfil.com)
- 56<sup>B</sup> - Polytex Santiago (13 tests)  
Luedy Utria Caicedo -- 011 56-2-677-1000  
[Lutria@polytex.cl](mailto:Lutria@polytex.cl)
- 57<sup>B</sup> - Ten Cate Cornelia (22 tests)  
Melissa Medlin -- (706) 778-9794  
[m.medlin@tencategeo.com](mailto:m.medlin@tencategeo.com)
- 58<sup>B</sup> - Propex Furnishing Solutions - Hazlehurst (10 tests)  
Victoria Shoupe -- (912) 375-6180  
[Victoria.Shoupe@propexglobal.com](mailto:Victoria.Shoupe@propexglobal.com)
- 59<sup>B</sup> - Firestone (9 Tests)  
Janie Simpson -- (864) 439-5641  
[SimpsonJanie@firestonebp.com](mailto:SimpsonJanie@firestonebp.com)
- 60<sup>B</sup> - TDM Geosintéticos S.A. (16 tests)  
Roberto Diaz -- 051-1-6300330  
[rdiaz@tdmgeosinteticos.com.pe](mailto:rdiaz@tdmgeosinteticos.com.pe)
- 61<sup>B</sup> - Raven Industries (24 tests)  
Clint Boerhave -- (605) 335-0288  
[Clint.Boerhave@ravenind.com](mailto:Clint.Boerhave@ravenind.com)
- 62<sup>B</sup> - SOLMAX - Selangor - Malaysia (14 tests)  
Pei Ching Teoh -- (450) 929-1234  
[pcteoh@solmax.com](mailto:pcteoh@solmax.com)
- 63<sup>A</sup> - TRI-SC Labs (12 tests)  
Jay Sprague -- (864) 346-3107  
[Jesprague@tri-env.com](mailto:Jesprague@tri-env.com)
- 64<sup>B</sup> - Agru America (NV) (14 tests)  
Ryan Steele -- (775) 835-8282  
[RSteele@AgruAmerica.com](mailto:RSteele@AgruAmerica.com)
- 65<sup>C</sup> - Bombay Textile Research Assoc. (BTRA) (23 tests)  
Riyaz Shaikh (0) 022-25003651  
[btra@vsnl.com](mailto:btra@vsnl.com)
- 66<sup>B</sup> - Rowad International Geosynthetics Co. Ltd (13 tests)  
Abdullah Zahrani -- +966-3-812-1360  
[A.alzahrani@rowadplastic.com](mailto:A.alzahrani@rowadplastic.com)
- 68<sup>B</sup> - Shawmut Corporation (4 tests)  
Stacy Chadwell -- (336) 229-5576  
[schadwell@shawmutcorporation.com](mailto:schadwell@shawmutcorporation.com)
- 69<sup>B</sup> - Solmax (GSE) - Rayong - Thailand (14 tests)  
Siriporn Chayaporenler -- 66-386-36758  
[siripornc@solmax.com](mailto:siripornc@solmax.com)
- 70<sup>A</sup> - RSA Geo Lab LLC (48 tests)  
Rasheed Ahmed -- (908) 964-0786  
[geolab13@yahoo.com](mailto:geolab13@yahoo.com)
- 71<sup>B</sup> - Plasticos Agrícolas y Geomembranas S.A.C. (24 tests)  
Manuel Constantino Olivares Espinoza -- 073-511814-511829  
[calidad@pqaperu.com](mailto:calidad@pqaperu.com)
- 72<sup>B</sup> - Tensar Corp. GA (5 tests)  
Lynn Cassidy-Potts (770) 968-3255  
[lcassidy@tensarcorp.com](mailto:lcassidy@tensarcorp.com)
- 73<sup>B</sup> - Gai Loi JSE (10 tests)  
Paul Wong 84-650-362-5825  
[paul905677@gmail.com](mailto:paul905677@gmail.com)
- 74<sup>B</sup> - Agru America Inc. (9 tests)  
Mark Locklear - (843) 221-4121  
[mlocklear@agruamerica.com](mailto:mlocklear@agruamerica.com)
- 75<sup>B</sup> - GeoMatrix S.A.S. (32 tests)  
Javier Diaz Cipagauta (571) 424-9999  
[jdiaz@geomatrix.com.co](mailto:jdiaz@geomatrix.com.co)
- 76<sup>B</sup> - Tehmco (Chile) (15 tests)  
Rodrigo Campoy 56-22-580-2852  
[rcampoym41@gmail.com](mailto:rcampoym41@gmail.com)
- 78<sup>B</sup> - PQA Mexico (16 tests)  
Cesar Augusto Arcila (669) 954-8202  
[directorcalidad@payg.mx](mailto:directorcalidad@payg.mx)
- 79<sup>A</sup> - TRI Geosynthetic Testing and Services (32 tests)  
Ping Wang 86-512-6283-1396  
[Pwang@tri-env.com](mailto:Pwang@tri-env.com)
- 80<sup>B</sup> - Texel Technical Materials (11 tests)  
André Parent (418) 387-4801  
[andre.parent@lydall.com](mailto:andre.parent@lydall.com)
- 81<sup>B</sup> - Solmax (GSE) - Rechlin - Germany (18 tests)  
Evelyn Kroeger 49-40-767420  
[ekroeger@solmax.com](mailto:ekroeger@solmax.com)
- 83<sup>B</sup> - Solmax Geosynthetics S.A.E. (13 tests)  
Ahmed Abdel Tawab - 202-2-828-8888  
[atawab@solmax.com](mailto:atawab@solmax.com)
- 84<sup>B</sup> - Owens Corning (18 tests)  
Ashutosh Dixit - 1-778-945-2888  
[Ashutosh.dixit@owenscorning.com](mailto:Ashutosh.dixit@owenscorning.com)
- 85<sup>B</sup> - PAG Tacna (17 tests)  
Manuel Constantino Olivares Espinoza -- 073-511814-511829  
[calidad@pqaperu.com](mailto:calidad@pqaperu.com)
- 86<sup>B</sup> - BOSTD China (29 tests)  
Zheng Hong - 86-532-8780-6917  
[zhenghong@bostd.com](mailto:zhenghong@bostd.com)
- 87<sup>B</sup> - Willacochee Industrial (17 tests)  
Miranda Adams - 912-534-5757  
[miranda@winfabusa.com](mailto:miranda@winfabusa.com)
- 88<sup>B</sup> - Geosynthetic Testing Services Pvt. Ltd. (16 tests)  
Ravi Kant - 02717-250019  
[rkant@gts-pl.com](mailto:rkant@gts-pl.com)
- 89<sup>B</sup> - Megaplast India Pvt. Ltd. (13 tests)  
Hermendra Behera - 91-937404-4620  
[geo.sqc@megaplast.in](mailto:geo.sqc@megaplast.in)
- 90<sup>B</sup> - Techfab (India) Industries Ltd. - Daman (8 tests)  
Jagdish Chandra Joshi - 91-22-2287-6224  
[nonwoven.qualitylab@techfabindia.com](mailto:nonwoven.qualitylab@techfabindia.com)  
Anant Kandi - [anant@techfabindia.com](mailto:anant@techfabindia.com)
- 91<sup>B</sup> - Techfab (India) Industries Ltd. - Rakholi (3 tests)  
Rajendra Chavan - 91-982-593-9922  
[geogrid.qualitylab@techfabindia.com](mailto:geogrid.qualitylab@techfabindia.com)
- 92<sup>B</sup> - Techfab (India) Industries Ltd. - Khadoli (2 tests)  
Navir Kumar - 91-22-229-76224  
[woven.qualitylab@techfabindia.com](mailto:woven.qualitylab@techfabindia.com)
- 93<sup>B</sup> - Garware Technical Fibres (19 tests)  
Rajendra K. Ghadge - 0-932-601-8083  
[rghadge@garwarefibres.com](mailto:rghadge@garwarefibres.com)
- 95<sup>B</sup> - Mexichem Colombia (Pavco) (8 tests)  
Juan David Lopez Torres - 57-1-782-5100 (ext. 1534)  
[juan.david.lopez@mexichem.com](mailto:juan.david.lopez@mexichem.com)
- 96<sup>B</sup> - Tensar China (6 tests)  
Zhu Shaolian - 603-6148-3276  
[zsl@tensar.com.cn](mailto:zsl@tensar.com.cn)
- 97<sup>A</sup> - TUV SUD PSB Singapore (15 tests)  
CHA Ming Yang - 65-6885-1514  
[ming-yang.CHA@tuv-sud.psb.sg](mailto:ming-yang.CHA@tuv-sud.psb.sg)
- 98<sup>B</sup> - NeoPlastic Filmes e Embalagens Plasticas Ltda. (7 tests)  
Daniel Meucci - 55 (11) 4443-1000  
[daniel.meucci@sapphireoffice.com.br](mailto:daniel.meucci@sapphireoffice.com.br)  
Nathalia Santos  
[nathalia.santos@neoplastic.com.br](mailto:nathalia.santos@neoplastic.com.br)
- 99<sup>B</sup> - Atarfil Middle East (16 tests)  
Mohammad Hneine - 971-564-33-1271  
[mhneine@atarfil.com](mailto:mhneine@atarfil.com)
- 100<sup>B</sup> - Atarfil Geomembranes USA (12 tests)  
Alejandro Carreras - 757-263-4057  
[acarreras@atarfil.com](mailto:acarreras@atarfil.com)
- 101<sup>B</sup> - Solmax (GSE) - Spearfish, SD USA (7 tests)  
Chuck Taylor - 605-642-8531  
[ctaylor@solmax.com](mailto:ctaylor@solmax.com)
- 102<sup>B</sup> - SKAPS Industries (11 tests)  
Nilay Patel - 706-336-7000  
[Nilay@skaps.com](mailto:nilay@skaps.com)
- 103<sup>B</sup> - STRATA Geosystems Pvt. Ltd. (6 tests)  
C. V. Kanade - 91-22-4063-5100  
[cv.kanade@strataindia.com](mailto:cv.kanade@strataindia.com)
- 104 - Advanced Terra Testing (32 tests)  
William Raush - 303-232-8308  
[wraush@terratesting.com](mailto:wraush@terratesting.com)

- 105 - Pavco Wavin - Peru (6 tests)  
Nestor Sifuentes Boggio - 51 990 277 136  
[nestor.sifuentes@wavin.com](mailto:nestor.sifuentes@wavin.com)
- 106 - Auburn University-Erosion & Sediment Control Testing  
Facility (1 test)  
Michael Perez - 334-844-6267  
[Mike.perez@auburn.edu](mailto:Mike.perez@auburn.edu)
- 107 - TRI Australasia PTY LTD (31 tests)  
Warren Hornsey - +617-5535 7227  
[Whornsey@tri-env.com](mailto:Whornsey@tri-env.com)

<sup>A</sup>Third Party Independent    <sup>C</sup>Institute  
<sup>B</sup>Manufacturers QC            <sup>D</sup>Government

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](http://www.geosynthetic-institute.org/gai/lab.htm) or contact George Koerner.

## GRI Standards - Española

With the cooperation of IGS Chile, GRI standards are in the process of being translated into Spanish. Several translated standards will be available on our website in the near future, and we will continue to update the GSI website as translations become available. There is a need for this project due to the continuing growth of Spanish speaking individuals in both the U.S.A. and worldwide.

We would like to thank all the members of the “IGS Chile Technical Committee of Barriers” for their efforts in this regard. They include, but are not limited to, Fernando Castillo, Andres Leon Saavedra, Bladimir Santacruz and Carlos Bone. We would also like to thank our long time member Mauricio Ossa from Solmax for his expertise and assistance with the translation of the GRI standards.

## Activities within GCI (Certification)

GSI presently has three separate inspector certification programs. One (begun in 2006) is focused on QA/QC of field inspection of waste containment geosynthetics and compacted clay liners. The second (begun 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](http://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

This program, now in its Fifteenth (15) year, has been recommended, and in some cases required, by solid waste owners, state regulators, and design consultants for proper QA/QC in field installation of both geosynthetic materials and compacted clay liners. The statistics to date are listed below. We would like to thank TRI Environmental Inc. for their significant contribution to the success of this certification program. Their promotional strategies and in-house QA/QC course have generated renewed interest in the program. Special thanks to Sam Allen, Jeffrey Kuhn, Abigail Beck and Mark Sieracke for teaching the course.

#### Inspector Certification Test Results 2006 – 2020

Year	Geosynthetic Materials		Compacted Clay Liners		Commentary No. of people failing both exams
	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%)	2
2007	82	11 (13%)	73	12 (16%)	7
2008	95	25 (26%)	89	20 (22%)	13
2009	36	7 (19%)	36	2 (5%)	2
2010	59	12 (20%)	54	7 (13%)	5
2011	54	6 (11%)	53	3 (6%)	1
2012	34	5 (15%)	28	3 (11%)	3
2013	32	4 (12%)	30	1 (3%)	1
2014	45	1 (3%)	42	3 (7%)	0
2015	56	6 (11%)	51	6 (12%)	1
2016	36	3 (10%)	35	5 (18%)	0
2017	78	5 (6%)	66	3 (4%)	1
2018	53	5 (10%)	51	1 (3%)	0
2019	114	20 (18%)	119	15 (13%)	11
2020	100	14 (14%)	92	10 (11%)	7
<b>TOTAL (to date)</b>	<b>1015</b>	<b>129 (13%)</b>	<b>947</b>	<b>103 (11%)</b>	<b>54 (5%)</b>

There are currently 522 practicing certified inspectors, 437 inspectors (2015-2020) and 85 inspectors (2006-2014) who have renewed to keep certification current.

The GCI-ICP Program had a 53% increase in participants from 2018-2019 and projections for 2020 were originally forecasted at 60 new inspectors. We are happy to announce that we surpassed our projection due to the December virtual class given by TRI

Environmental, with 40 plus people sitting for the inspector certification exams.

In addition, 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](http://www.geosynthetic-institute.org/courses.htm)

Please contact Jamie Koerner if you are in need of a proctor to administer the GCI-ICP exams.

[jamie@geosynthetic-institute.org](mailto:jamie@geosynthetic-institute.org)

### 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 over a consecutive three-day period. The live on-line course has not been scheduled, however, recordings are available. Contact Jamie Koerner at [jamie@geosynthetic-institute.org](mailto:jamie@geosynthetic-institute.org) for details and arrangements.

The status of the program is shown in the following table. Here it can be seen that this particular GSI certification has been less than anticipated even though we have 340 similar MSE wall failures. We only received one renewal during 2020 and have had no new inspectors. There are several factors that are impacting the MSE Wall Inspector Certification Program. The biggest impact is that there are other organizations who offer wall inspection services and have been doing so for many years. In addition, there are apps available for structural inspection of retaining walls. Lastly, the National Concrete Masonry Association provides inspection guidelines for retaining walls. All these factors are impacting the success of the MSE Wall Inspectors Certification Program.

### Inspector Certification Test Results for MSE Walls and Berms Inspectors 2011 – 2020

Year	Course Location	MSE Wall And Berms	
		No. of People Taking the Exam	No. of People Failing the Exam
2011	GSI Course	7	0
2012	GSI Course	6	0
2013	GSI Course	2	0
2014	GSI Course	3	0
2015	GSI Course	4	0
2016	GSI On-Line Course	2	2
2017-20	GSI On-Line Course	0	0
TOTAL		24	0

### Program #3 - Geosynthetic Designer Certification

The “Geosynthetic Designer Certification Program (GDGP)” is also now available. Please go to [www.geosynthetic-institute.org/gdcpintro.pdf](http://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 *examination* itself is subdivided into 15-sections, each consisting of five questions. A candidate must answer any 3 questions in each section, making a total of 45 questions to be answered. Most of the questions are numeric, as is geosynthetic design practice in general. Unlike our other certification examination questions, however, this examination is of an open-book, open-notes format and does require a calculator so as to “crunch the numbers”.

Lastly, please spread-the-word within your organization and to others as well. We sincerely hope that one, or all three, of the above programs will be beneficial in upgrading the technical base of geosynthetic design and installation so as to properly utilize all of our geosynthetic materials in all of their many applications. All three programs are on-going and if you have questions and/or comments please contact us accordingly.

Jamie Koerner [jamie@geosynthetic-institute.org](mailto:jamie@geosynthetic-institute.org)  
 Marilyn Ashley [marilyn@geosynthetic-institute.org](mailto:marilyn@geosynthetic-institute.org)

## 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). It completely parallels GSI in that it has specific units for research, education, information, accreditation and certification. The Director is Dr. Chiwan Wayne Hsieh who is a Professor in the Department of Civil Engineering and Dean of the R & D Office. GSI-Taiwan has a Taiwanese consortium of geogrid/geotextile manufacturers who work toward producing quality products according to the draft GRI geogrid specifications and the associated test methods. As such, GSI-Taiwan is a GAI-LAP accredited laboratory for 59 geosynthetic test methods. Dr. Hsieh has 10 students working on geosynthetic-related projects and is extremely active nationally and internationally. Dr. Hsieh was recently elected President of the Chinese Geosynthetics Association. Our congratulations for this achievement. In addition, Dr. Hsieh has been selected as Conference Chairman for GeoAsia7 which will be held in Taipei in November, 2021.

**GSI-India** under the direction of Dr. A. K. Mukhopadhyay was formed in 2015. The hosting organization is the Bombay Textile Research Association (BTRA) which is world known for its excellence in textile R & D and is currently branching out into all forms of geosynthetics with a fantastic R & D laboratory. After many years at the helm, Dr. A. K. Mukhopadhyay is retiring and will be succeeded by Dr.

T. V. Sreekumar as BTRA Director. We are going to miss working with Dr. Mukhopadhyay. GSI would like to wish him a well-deserved rest and a very happy retirement. We can't thank him enough for all the support and kindness he has shown us over the past years. As this chapter in his life closes, a new one starts. May the coming years for Dr. Mukhopadhyay be filled with good health and happiness.

## GSI Member Organizations

We sincerely thank all of our sponsoring organizations for their continued support, especially during this economic slowdown brought on by COVID-19. Without members, GSI could not exist. We regret the loss of a few sponsors, but are optimistic about the future. The current GSI member organizations and their contact members are listed below.

### **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/Chris Lawson*

### **CETCO**

*Michael Donovan/Jim Olsta*

### **Huesker, Inc.**

*Flavio Montez/Andreas Elsing/Lilma Schimmel*

### **NAUE GmbH & Co. KG**

*Kent von Maubeuge [BOA]*

### **Propex Operating Company LLC**

*Drew Loizeaux/David Andrews [BOA]*

### **Berry Global Inc.**

*Keith Misukanis*

### **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/Vergil Rhodes [BOA]*

### **CARPI, Inc.**

*Alberto M. Scuero/John A. Wilkes*

### **Civil & Environmental Consultants, Inc.**

*Tony Eith*

### **Agru America, Inc.**

*Nathan Ivy/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/Tamara Jurado Corrasco*

### **Republic Services Inc.**

*Joe Benco/ Mike Beaudoin/Dave Vladic*

### **GSE Europe**

*Catrin Tarnowski*

### **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 Markel/Brinda Mehta*

### **EPI, The Liner Co.**

*Daniel S. Rohe/Ryan Whalen*

### **Weaver Consultants Group, Inc.**

*Mark Sieracke*

### **Aquatán (Pty) Ltd.**

*Piet Meyer/ Sanet van der Merwe*

### **Jones Edmunds, Inc.**

*George Reinhart/Tobin McKnight*

### **Afitex-Textel**

*Pascal Saunier/Stephan Fourmont/Jocelyne Grenier*

### **EVAL Americas (Kuraray)**

*Edgar Chow*

### **BTRA (GSI-India)**

*T. V.Sreekumar*

### **Watershed Geosynthetics LLC**

*Michael Ayers/Paul O'Malley*

### **Maccafferri**

*Moreno Scotto/Sachin Mandavkar/Pietro Rimoldi*

### **Jones & Wagener (Pty) Ltd.**

*Riva Nortje*

### **Ardaman & Assoc.**

*Thomas S. Ingra/Deborah Scott/Ernie Cox/*

*Mark Mongeau*

### **American Wick Drain**

*Scott Morris/Craig Phelps/Seth Marlow*

### **INOVA Geosynthetics/AERO Aggregates**

*Archie Filshill/Theresa Loux*

### **Kaytech Fabrics Group Ltd.**

*Paul Pratt*

### **Owens Corning Science & Technology LLC**

*Steve Thaxton/Clive Mills/Jason Woodall*

### **SKAPS Industries**

*Nilay Patel/Anurag Shah*

### **Duke Energy**

*Evan Andrews/Ken Karably*

### **Chesapeake Containment Systems (CCS)**

*Ryan Kamp*

### **Layfield Group**

*Deepaksh Gulati/Mark Simpson*

### **Engepol Geossineticos Ltda**

*Patricia Ferreira/Andréia Machado/Ildo Oliveira*

## Associate Members

### **Delaware Solid Waste Authority**

*Robin Roddy/Jason Munyan*

### **Nebraska Department of Environmental Quality**

*Michael Behrens*

### **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**

*Cory Dilmore*

### **U.S. Bureau of Reclamation**

*Brian Baumgarten/Peter Irey*

### **Michigan Dept. of Environmental Quality**

*Margie Ring/Xuede (Dan) Qian*

### **Environment Agency of U. K.**

*Darren Legge*

### **Florida Department of Transportation**

*David Horhota*

### **Virginia Department of Environmental Quality**

*Donald Brunson*

### **Massachusetts Department of Environmental Protection**

*Tom Adamczyk*

### **Dept. of Water Affairs of South Africa**

*Kelvin Legge*

### **Pennsylvania Department of Transportation**

*Beverly Miller*

## IN THE NEXT ISSUE

- Activities of the GSI Directors and Board
- 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