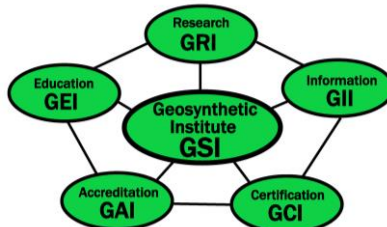


The GSI Newsletter/Report



Geosynthetic Institute

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March, 2021

This quarterly newsletter, now in its 35th 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 gsigeokoerner@gmail.com or jamie@geosynthetic-institute.org.

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

A vote was taken in January to fill the open BOA position for Geomembranes/GCLs. The new BOA representative for Geomembranes/GCL's is Nathan Ivy from Agru America. Our sincere congratulations and appreciation goes out to Nathan.

2021-2023 Board of Advisors

Term Ends 2021

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

Term Ends 2022

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

Term Ends 2023

- Te-Yang Soong (Consultants and Testing Labs)
email: tsong@cticompanies.com
- Nathan Ivy (Geomembranes and GCL's)
Nivy@agruamerica.com
- Mathieu Cornellier (International - 2)
e-mail: 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 addition, an Annual meeting for all GSI members if held very year in December, with the exception of 2019, which was delayed until March 2020 due to the passing of Robert Koerner. This annual meeting is open to all GSI members.

NEW IN THIS ISSUE

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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), Grace Hsuan (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. Improved stress cracking resistance in high density polyethylene (HDPE) geomembranes** has been a quest of our industry for many years. We have been working in this area since the mid

1980's. GRI GM13 standard specification for HDPE geomembranes has moved the stress crack requirement from 200 to 300 and finally to 500 hours over the last thirty years. It is interesting to note that some HDPE geomembrane formulations have a considerable higher value.

Igepal CO 630 is referenced in stress crack test methods as the reagent. Unfortunately, it has now been listed as a priority pollutant under the REACH directive and is no longer available for laboratory use in several countries. Obviously, our industry is searching for an equivalent surfactant. As such, GSI has been tasked with finding a replacement for the surfactant used in several stress cracking tests. We know that there are hundreds of commercially available surfactants to choose from. Unfortunately, all have unique characteristics that will affect stress cracking in HDPE differently.

We solicit your help in finding an alternative. GSI is now taking a proactive approach to finding substitutes to Igepal CO 630. In addition to changing the surfactant, we would also like to increase the bath temperature from 50 to 65 degrees Celsius so that we can shorten the test time. After confirming an alternative group of surfactants, we want to initiate a round robin test program with several geomembranes to verify equivalency. If you would like to participate in this round robin or have an opinion about this work, we greatly appreciate hearing from you.

- 9. **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.
- 9a. **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.
- 9b. **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.
- 9c. **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".

- 9d. **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 co-opted 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.

Progress within GII (Information)

GSI Website

Our GSI Home Page is accessed as follows:

www.geosynthetic-institute.org

In collaboration with International Geosynthetics Society (IGS), Geosynthetica and Geosynthetic News Alerts (GNA), links to their websites are now on GSI's website. These links offer important news and information regarding the latest developments relating to geosynthetics. Check it out!

The website 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. 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 (March 2020) "Relative Sustainability of Road Construction/Repair: Conventional Methods versus Geosynthetic Materials" is available on our website and is our most recent white paper to date.

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

Worldwide Database of Guidelines/Regulations for Applications using Geosynthetic Barriers

This user-friendly database will provide quick access for anyone looking for worldwide geosynthetic barrier guidelines/regulations. On November 25, 2020 we started the database with 12 categories, although we know there are additional 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.

As of March 1, 2020, we have received input from 13 countries. They are: Austria, Australia, China, Europe, France, Germany, Netherlands, New Zealand, Norway, South Africa, Switzerland, United Kingdom and U.S.A. The total number of regulations that have been uploaded so far is 64.

To date, many countries are not represented in this database and our goal is to continue to expand both the number of countries participating and the number of categories.

We are requesting your assistance in this endeavor. Because we need worldwide participation, we ask that you please forward this information to your international contacts so that we can include as many countries as

possible. Your Information should be added onto the form under this link:

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

Progress within GEI (Education)

"GSI Fellowships for Graduate Students"

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 (\$45,000-\$90,000). For this year's fellowships (2021-2022), we will be continuing the fellowship awards at \$5000 per recipient. We are hoping to attract more and better proposals relating to geosynthetic research this year. More emphasis will be placed on International outreach as to attract worldwide participation in the fellowship program. GSI was disappointed last year to have no proposals from International Universities, especially because we know there is important research in the geotechnical fields underway. We intend to rectify this through advertising and reaching out to our International contacts.

Proposals for this year's fellowships are due to us by August 23, 2021 and recipients will be announced in September. More information, including past recipients (starting in 2008) can be found at <https://geosynthetic-institute.org/gsifellows.htm>.

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

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. 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

GSI Webinars (90 minutes long)

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

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 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 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. Therefore, all audits scheduled for 2021 will be done virtually. This was approved by the BOA during the December BOA meeting.

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^A - TRI/Environmental Inc. (155 tests)
Jarrett Nelson -- (512) 263-2101
jnelson@tri-env.com
- 3^A - Golder Associates (43 tests)
Henry Mock -- (770) 492-8280
Henry_Mock@golder.com
- 4^C - Geosynthetic Institute (108 tests)
George Koerner -- (610) 522-8440
gsigeokoerner@gmail.com
- 8^B - Propex Operating Co., Ringgold (17 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.) (84 tests)
Cora Queja -- (714) 520-9631
cqueja@tri-env.com

- 14^A - Geotechnics (50 tests)
J. P. Kline -- (412) 823-7600
JPkline@geotechnics.net
- 20^A - GeoTesting Express, MA (58 tests)
Joe Tomei -- (978) 635-0424
jdt@geotesting.com
- 22^B - CETCO Hoffman Estates (11 tests)
Minerals Technologies Inc.
Barbara Gebka -- (847) 851-1904
Barbara.gebka@mineralstech.com
- 24^B - CETCO Lovell (10 tests)
Minerals Technologies Inc.
Stuart Yates -- (307) 548-6521
stuart.yates@mineralstech.com
- 25^B - Ten Cate, Pendergrass (12 tests)
Melissa Medlin -- (706) 693-2226
m.medlin@tencategeo.com
- 26^B - Agru America Inc. (27 tests)
Maria Coffey -- (843) 546-0600
mcoffey@AgruAmerica.com
- 29^E - FITI Testing and Research Institute (79 tests)
Hang Won-Cho -- 82-2-3299-8071
hwcho@fitiglobal.com
- 31^D - NYS Dept. of Transportation (7 tests)
Tom Burnett -- (518) 485-5707
tburnett@dot.ny.gov
- 34^B - Solmax Geosynthetics, LLC - Houston, TX (26 tests)
Lana Hickman
Lhickman@solmax.com
- 38^C - CTT Group SAGEOS (123 tests)
Liette Courchesne -- (450) 771-4608
lcourchesne@gcttg.com
- 40^B - Solmax Geosynthetics, LLC - Kingstree, SC (19 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
- 42^C - NPUST (GSI-Taiwan) (71 tests)
Chiwan Wayne Hsieh -- 011-886-8-7740468
CWH@mail.npust.edu.tw
- 43^A - Ardaman & Associates (19 tests)
George DeStefano -- (407) 855-3860
gdestafano@ardaman.com
- 44^B - Berry Global Inc. (9 tests)
Grant Murphy -- (615) 847-7299
grantmurphy@berryglobal.com
- 45^B - Ten Cate Geosynthetics Malaysia SDN Bhd. (24 tests)
Boon Kean Tan -- (603) 519 28576
BK.tan@tencategeo.com
- 46^B - TAG Environmental Inc. (13 tests)
Ryan Ackerman -- (705) 725-1938
ryan_ackerman@tagenv.com
- 49^B - Engepol Geosintéticos (16 tests)
Patricia Ferreira -- (55) 51 3303-3901
patricia@engepol.com
- 50^B - ADS, Inc. Hamilton (7 tests)
Justin Elder -- (513) 896-2065
justin.elder@ads-pipe.com
- 51^B - Solmax International Inc. - Canada (21 tests)
Claude Cormier -- (450) 929-1234
ccormier@solmax.com
- 53^B - Polytex Autofagasta (18 tests)
Mario Contreras Cardenas -- 011 55-288-3308
mcontreras@polytex.cl
- 55^B - Atarfil Geomembranas (21 tests)
Gabriel Martin Sevilla -- 34 958 439 200
gmartin@atarfil.com
- 56^B - Polytex Santiago (13 tests)
Luedy Utria Caicedo -- 011 56-2-677-1000
Lutria@polytex.cl
- 57^B - Ten Cate Cornelia (22 tests)
Randy Johnson -- (706) 778-9794
r.johnson@tencategeo.com
- 58^B - Propex Furnishing Solutions - Hazlehurst (10 tests)
Victoria Shoupe -- (912) 375-6180
Victoria.shoupe@PFSfabrics.com
- 59^B - Firestone (9 Tests)
Janie Simpson -- (864) 439-5641
SimpsonJanie@firestonebp.com
- 60^B - TDM Geosintéticos S.A. (16 tests)
Roberto Diaz -- 051-1-6300330
rdiaz@tdmgeosinteticos.com.pe
- 61^B - Raven Industries (24 tests)
Clint Boerhave -- (605) 335-0288
Clint.Boerhave@ravenind.com
- 62^B - Solmax Geosynthetics Sdn. Bhd. - Malaysia (14 tests)
Pei Ching Teoh -- (450) 929-1234
pcteoh@solmax.com
- 63^A - TRI-SC Labs (12 tests)
Jay Sprague -- (864) 346-3107
Jesprague@tri-env.com
- 64^B - Agru America (NV) (14 tests)
Ryan Steele -- (775) 835-8282
RSteele@AgruAmerica.com
- 65^C - Bombay Textile Research Assoc. (BTRA) (23 tests)
Riyaz Shaikh (0) 022-25003651
btloffice@btraindia.com
- 66^B - Rowad International Geosynthetics Co. Ltd (13 tests)
Saleh Al-Qubaisi -- +966-3-812-1360
s.alqubaisi@rowadplastic.com
- 68^B - Shawmut Corporation (4 tests)
Stacy Chadwell -- (336) 229-5576
schadwell@shawmutcorporation.com
- 69^B - Solmax Geosynthetics Co., Ltd. - Thailand (14 tests)
Siriporn Chayaporenler -- 66-386-36758
siripornc@solmax.com
- 70^A - RSA Geo Lab LLC (48 tests)
Rasheed Ahmed -- (908) 964-0786
geolab13@yahoo.com
- 71^B - Plásticos Agrícolas y Geomembranas S.A.C. (24 tests)
Manuel Constantino Olivares Espinoza -- 073-511814-511829
calidad@pqaperu.com
- 72^B - Tensar Corp. GA (5 tests)
Lynn Cassidy-Potts (770) 968-3255
lcassidy@tensarcorp.com
- 73^B - Gai Loi JSE (10 tests)
Paul Wong 84-650-362-5825
paul905677@gmail.com
- 74^B - Agru America Inc. (9 tests)
Mark Locklear - (843) 221-4121
mlocklear@agruamerica.com
- 75^B - GeoMatrix S.A.S. (32 tests)
Javier Diaz Cipagauta (571) 424-9999
jdiaz@geomatrix.com.co
- 76^B - Tehmco (Chile) (15 tests)
Rodrigo Campoy 56-22-580-2852
rcampoy41@gmail.com
- 78^B - PQA Mexico (16 tests)
Cesar Augusto Arcila (669) 954-8202
directorcalidad@payg.mx
- 79^A - TRI Geosynthetic Testing and Services (32 tests)
Ping Wang 86-512-6283-1396
Pwang@tri-env.com
- 80^B - Texel Technical Materials (11 tests)
Eric Trudel (418) 387-4801
etrudel@lydall.com
- 81^B - Solmax Geosynthetics GmbH - Germany (18 tests)
Evelin Kroeger 49-40-767420
ekroeger@solmax.com
- 83^B - Solmax Geosynthetics S.A.E. (13 tests)
Ahmed Abdel Tawab - 202-2-828-8888
atawab@solmax.com
- 84^B - International Packaging Products (Owens Corning) (18 tests)
Ashutosh Dixit - 1-778-945-2888
Ashutosh.dixit@owenscorning.com

- 85^B - PAG Tacna (17 tests)
Manuel Constantino Olivares Espinoza –
073-511814-511829
calidad@pqaperu.com
- 86^B - BOSTD China (29 tests)
Zheng Hong - 86-532-8780-6917
zhenghong@bostd.com
- 87^B - Willacoochee Industrial (17 tests)
Miranda Adams - 912-534-5757
miranda@winfabusa.com
- 88^B - Geosynthetic Testing Services Pvt. Ltd. (16 tests)
Ravi Kant - 02717-250019
rkant@gts-pl.com
- 89^B - Megaplast India Pvt. Ltd. (13 tests)
Hermendra Behera - 91-937404-4620
geo.sqc@megaplast.in
- 90^B - Techfab (India) Industries Ltd. - Daman (8 tests)
Anant Kanoi - 91-972-739-6658
anant@techfabindia.com
- 91^B - Techfab (India) Industries Ltd. - Rakholi (3 tests)
Rajendra Chavan - 91-982-593-9922
geogrid.qualitylab@techfabindia.com
- 92^B - Techfab (India) Industries Ltd. - Khadoli (2 tests)
Navir Kumar - 91-22-229-76224
woven.qualitylab@techfabindia.com
- 93^B - Garware Technical Fibres (19 tests)
Rajendra K. Ghadge - 0-932-601-8083
rghadge@garwarefibres.com
- 95^B - Mexichem Colombia (Pavco) (8 tests)
Juan David Lopez Torres - 57-1-782-5100 (ext. 1534)
juan.david.lopez@mexichem.com
- 96^B - Tensar China (6 tests)
Zhu Shaolian - 603-6148-3276
zsl@tensar.com.cn
- 97^A - TUV SUD PSB Singapore (15 tests)
CHA Ming Yang - 65-6885-1514
ming-yang.CHA@tuv-sud.psb.sg
- 98^B - NeoPlastic Filmes e Embalagens Plasticas Ltda. (7 tests)
Daniel Meucci - 55 (11) 4443-1000
daniel.meucci@sapphireoffice.com.br
Nathalia Santos
nathalia.santos@neoplastic.com.br
- 99^B - Atarfil Middle East (16 tests)
Gabriel Martin - 971-564-33-1271
gmartin@atarfil.com
- 100^B - Atarfil Geomembranes USA (12 tests)
Gabriel Martin - 971-564-33-1271
gmartin@atarfil.com
- 101^B - Solmax Geosynthetics LLC - Spearfish (7 tests)
Chuck Taylor - 605-642-8531
ctaylor@solmax.com
- 102^B - SKAPS Industries (11 tests)
Nilay Patel - 706-336-7000
nilay@skaps.com
- 103^B - STRATA Geosystems Pvt. Ltd. (6 tests)
C. V. Kanade - 91-22-4063-5100
cv.kanade@strataindia.com
- 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^B - Auburn University-Erosion & Sediment Control Testing Facility (1 test)
Michael Perez - 334-844-6267
Mike.perez@auburn.edu
- 107^A - TRI Australasia PTY LTD (31 tests)
Warren Hornsey - +617-5535 7227
Whornsey@tri-env.com
- 108^B - Solmax Geosynthetic Co. Ltd. (Suzhou China)
Tony Xia - 86512-66667-6100
Txia@solmax.com

^AThird Party Independent ^CInstitute
^BManufacturers QC ^DGovernment

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 (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 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
TOTAL (to date)	1015	129 (13%)	947	103 (11%)	54 (5%)

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

Please contact Jamie Koerner if you are in need of a proctor to administer the GCI-ICP exams.
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 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 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
 Marilyn Ashley marilyn@geosynthetic-institute.org

2021 Engineers Week in Delaware Valley

2021 Engineers Week in the Delaware Valley kicked off with the Opening Ceremony on Thursday February 18th. Given current restrictions on gatherings, the Opening Ceremony was limited to a virtual event this year. However, “networking” was facilitated at the start of the event, followed by the formal program and awards citations. Recipients of various Engineers Week awards where available during the networking session to showcase their honors. The 2021 Delaware Valley Engineer of the Year is Bill Thomsen and the Young Engineer of the Year is Kevin Brown (who gave an outstanding talk on inclusion and mentoring.) In addition, Robert M. Koerner was proudly inducted into the Delaware Valley Engineering Hall of Fame. Cited for his many achievements and contributions to geotechnical and geosynthetic engineering, his family received this award posthumously.

Thank you to all that contributed to the March/April edition of GeoStrata on Geosynthetics in particular James L. Withiam, Ph.D., P.E., DGE, editor. It is filled with excitement and optimism about our industry and dedicated to Dr. Robert M. Koerner. It is a must read for ways that geosynthetics are enabling a more sustainable future by providing more efficient means of construction. People are realizing that geosynthetics are solving challenges and meeting the needs of the “Built world”

“Happy Retirement Celebration”



Marilyn started working at Drexel University in 1973, first in the Environmental Engineering Department and then in the Civil Engineering Department where she met Dr. Robert Koerner. Dr. Koerner started the Geosynthetic Research Institute at Drexel University in 1986 and asked her to join him in his new endeavor. Mrs. Ashley says “working with Dr. Koerner was one of the best decisions I ever made”! Marilyn ended up working throughout the years with not only Bob, but with most of the Koerner family. They included Paula (his wife), George (his son) and Jamie (his daughter-in-law). Marilyn has enjoyed working at Drexel and GSI and has fond memories of interacting with many students, professors and GSI members.

Marilyn grew up in a close-knit, hardworking and loving family in Southwest Philadelphia, PA. Singing and church have always been a big part of her life. She started singing in church at the age of four with her father and siblings (in a group named the Macklin Singers). She sang with the Excelsior Choir and the Companions of Christ choir. Marilyn has attended many gospel music workshops over the years which she enjoyed. She was a member of the R & B group “Sisters” for over 15 years (which included her sister Ann) and sang at local clubs in Philadelphia and New Jersey. Marilyn loves to travel with family and friends and especially enjoys cruising, which she plans on doing after she retires.

In 1971, Marilyn graduated from John Bartram High School in Philadelphia. Shortly thereafter she began working at Drexel University where she earned several service awards. In 1987, Marilyn married William Ashley, who died in 2015.

Known for her organization and typing skills Marilyn has been an invaluable asset to Drexel and the Geosynthetic Institute (GSI) over her forty-eight (48) year career. Marilyn facilitates communications at GSI through the website and acted as the focal point for the myriad activities at the institute.

We have thoroughly enjoyed Marilyn’s tenure with us and are sad to see her retire. We will never forget her many years of outstanding service to our industry. It has been an honor to work with her and may God keep her safe in the years to come. All of us are made better because of her talents and kindness.

Congratulations!

Geosynthetics 2021

Congratulations to Barbara Connett and her team at IFAI on “Geosynthetics 2021. This was the best virtual event that Dr. George Koerner has ever been involved with. GSI’s participation with the event was significant. It involved the following three tasks;

1. Technical session on High-Performance Turf Reinforcement Mats (HPTRMs). We had three speakers in the session that was attended by over 80 people and was tailor made for the event. Drew Loizeaux, PE, Engineering Services Manager at Propex GeoSolutions started us off with a discussion of “HPTRM Case Histories comparing HPTRMs to conventional materials for several extreme applications.” He was followed by George Koerner talking about “HPTRMs FOR EROSION CONTROL: Lab testing, Specification and Functional Longevity Guide.” The session was aptly closed out by Joel Sprague, PE Technical Director - South Carolina Labs, TRI Environmental, Inc. in Greenville, SC speaking on “Performance Testing as it relates to Slope and Channel Design.” There was plenty of Q & A and all seemed to enjoy the session which was co-located with IECA.
2. Technical session on Geosynthetic Specifications organized by David Suits chairman of ASTM D35.06. The session had the following five speakers Robert Mackey S2Li, Joel Sprague, TRI Environmental Inc., David Suits, LDS GS Consulting Services, John Lostumbo, TenCate Geosynthetics and myself. It emphasized that specifications should provide clear instructions on the intent and required performance of materials. Each speaker focused on a specific application and made recommendations for going forward.
3. The third event was the Koerner Award Lecture on Geosynthetic Reinforced Column-Supported Embankments: Bridging Theory and Practice” by Prof. Jie Han, Ph.D. & PE from the University of Kansas. We wish Bob was alive to see this one. Dr. Han made all of us very proud. If you missed it, please take a look at the recording. It is an awesome lecture and a pleasure to witness. Everything from Prof. Chungsik Yoo, Ph.D. IGS president’s introduction to Jie’s antidotes about interacting with Bob Koerner were noteworthy. The lecture itself was a beautifully sequenced lesson on the technology of Geosynthetic Reinforced Column-Supported Embankments, past, present and future. As an added highlight, the success of this lecture was celebrated on a virtual cruise ship in the evening sponsored by GMA. Fun had by all!

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 - Dr. Hsieh was recently elected President of the Chinese Geosynthetics Association. Our congratulations for this achievement. In addition, we joyfully inform you that the 7th Asian Regional Conference on Geosynthetics (GeoAsia7) will be held on November 22-26, 2021 at the Taipei International Conference Center (TICC), Taipei, Taiwan. The main theme of GeoAsia7 is **Hazard’s Risk Management, Innovation, and Sustainability**. GeoAsia7 is organized by the Chinese Taipei Chapter of the International Geosynthetics Society. Dr. Hsieh is Chairman of the GeoAsia7 Organizing Committee. He invites you to participate in the event. Please visit the conference website (<http://www.geoasia7.org/>) for more details.

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.

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. Without members, GSI could not exist. GSI welcomes its newest member, Concrete Canvas Ltd. Concrete Canvas was incorporated in 2005 and had its start by developing the Shelter concept, then in 2015 they launched CCHydro. We are pleased to have them as a member. 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/Stacy Byrd

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 [BOA]/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/Joe Tomei

ATARFIL

Emilio Carreras Torres/Gabriel Martin/Jorge Fernandez

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.

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Advanced Earth Sciences, Inc.

Kris Khilnani/Suji Somasundaram

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Paul Markel/Brinda Mehta

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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

Eval Americas (Kuraray)

Edgar Chow

BTRA (GSI-India)

T. V. Sreekumar

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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
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Chesapeake Containment Systems (CCS)
Ryan Kamp
Layfield Group
Deepaksh Gulati/Mark Simpson
Engopol Geossintéticos Ltda
Patricia Ferreira/Andréia Machado/Ildo Oliveira
Concrete Canvas Ltd.
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Delaware Solid Waste Authority
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Nebraska Department of Environmental Quality
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Maine Department of Environmental Protection
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New York Department of Transportation
Steve Heiser
California Water Resource Control Board
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New Jersey Department of Environmental Protection
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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

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- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliate Institutes
- GSI's Member Organizations