The GSI Newsletter/Report

Geosynthetic Institute

Vol. 35, No. 3 **September, 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)

It is with great sadness that we note the passing of David B. Andrews, PE, MAT (1966-2021). Dave was the transportation market segment manager for Propex Operating Company, LLC and had served on the GSI BOA for the last three years. He held other jobs in the geosynthetics industry with A.D.S. and TenCate, where he gained valuable expertise that he shared with many. David received a BSCE from Auburn University and a MSCE from the University of Georgia. Our thoughts and prayers are with his family. Dave's kindness and guidance will be missed but not forgotten.

2021-2023 Board of Advisors

Term Ends 2021

- Burrill (Bo) McCoy - Waste Management Inc.
  (Owners and Operators)
  e-mail: bmccoy2@wm.com
- David B. Andrews - Propex
  (Geotextiles and Geogrids)
- 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: tsoong@cticompanies.com
- Nathan Ivy
  (Geomembranes and GCL's)
  Nivy@agruamerica.com
- Mathieu Cornellier
  (International - 2)
  e-mail: mcornellier@solmax.com

GSI has been having virtual quarterly meetings with the Board of Advisors throughout 2021 via Zoom. The 3rd quarter meeting was held on Thursday, September 30, 2021.

In addition, an Annual meeting for GSI members will be held in December. This annual meeting is open to all GSI members. The date for the annual 2021 meeting has been finalized and will be held on **December 22 at 11:00** am eastern time USA. All members will receive an invitation prior to the meeting date.

NEW IN THIS ISSUE

Our industry lost two legends over the past month.

We are saddened to report that entrepreneur Dr. Helmut Naue, co-founder of NAUE GmbH & Co. KG in Germany, passed away on September 24, 2021. In 1967 Naue developed a nonwoven textile for use in hydraulic engineering applications which revolutionized filter design throughout the world. The company quickly recognized the potential of polymers used in geotechnics and strongly supported the subsequent development of GCL's, GM and GG. In the early years of creating these new sectors for civil works, Helmut tirelessly pushed new ideas and raised awareness of many geosynthetics innovations. His contributions included highlighting the key benefits of the technology for transportation, geotechnical, and environmental applications. Helmut's efforts have paved the way for gains realized by our industry today. His guidance will be missed. Our thoughts and prayers are with his family during these difficult times.

Captain Robert E. Landreth, retired research director at the U. S. Environmental Protection Agency (EPA), passed away on September 29, 2021 in Cincinnati Ohio surrounded by his wife Mitch and family. Bob's advocacy for funded research made it possible to spearhead efforts in geosynthetics during the 1980's. This research subsequently led to dramatic increases in the use of geosynthetics for waste containment. This pioneering research changed regulations and the way that waste materials were managed throughout the world. It resulted in several groundbreaking publications and technologies that are still used as industry benchmarks. It should be noted that funding from the EPA started the Geosynthetic Institute (GSI), for which we are forever grateful.

Bob Landreth's guidance, determination and hard work are a testimony to the very best of our nation's public servants. He played a critical role in changing the world for the better and everyone in the waste containment industry owes him a sincere depth of gratitude. RIP and thank you for being a mentor to many and for safe guarding the world for future generations.

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) or 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 (~ 12.3 years). The information up to this point in time was made available to the public on April 6, 2016 at the GenAmerica's 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. **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.

6. **Slow Pressurization of HDPE Geomembranes in Multi-Axial Symmetric Testing* - The** ASTM D5716 method of testing geomembranes in a 3-D multi-axial 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.
7. **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. (i.e. greater than 1,000 Hours)
8. **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 are currently evaluating Solvey's Rhodasurf and Dow's Tergitol as alternatives to Igepal CA-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.

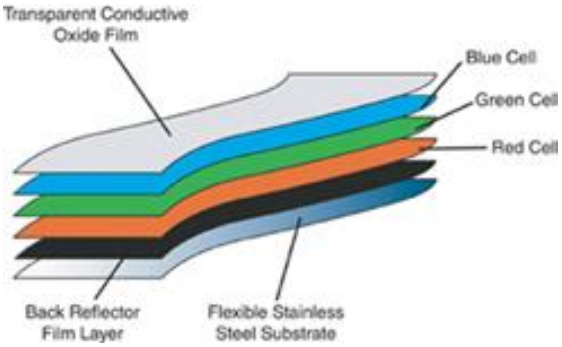
   We have initiated a round robin test program with several geomembranes to verify equivalency. Above are the results to date from 3 participating labs in the round robin program.

GM	Lab 1	Lab 2	Lab 3	Lab 1	Lab 2	Lab 3	Lab 1	Lab 2	Lab 3
#	Igepal	Igepal	Igepal	Rhod.	Rhod.	Rhod.	Tergitol	Tergitol	Tergitol
71	1	2	2	2	5	-	2	3	1
72	141	192	144	>310	410	-	508	315	278
73	>800	>1000	>1000	>328	>1000	-	>800	>500	372
74	554	525	565	>329	487	-	>800	267	400
75	>800	>1000	492	>328	>500	-	>800	230	241

9. **Anchored Geosynthetics**

   GSI is working on new anchorage and connection strength tests applicable to geosynthetics. This new test method has applicability to exposed geomembrane covers, closure turf, HP-TRMs, GCLs, Wind Defender, GCCM's etc. We now have two test rigs:
   (1. field anchor and 2. lab connections) at the institute and are experimenting with several products. We currently have seven (7) different anchor systems and five different geosynthetics being tested. As you can see from the photos below, we have both the field and lab testing systems up and operational. It is heavy work, but yielding very practical results that have direct field applicability which are needed for design with exposed geosynthetics.

10. **Durability of Multi Component Geomembranes**
    Gone are the days when geomembranes were only constructed as one thick monolithic layer. They currently can be made of different colors, conductivity, diffusion characteristics etc. Testing the performance of said multicomponent geomembranes are more involved than conventional materials. Geomembranes with layers need to be separated or the composite need to be challenged as a single unit after homogenization. GSI is actively testing the performance of such multicomponent geomembranes after oven or UV exposure. In addition, we are developing new fingerprinting tests for their analysis before and after exposure.



11. Seepage Induced Geogrids

We have been asked if a geosynthetic reinforced levee, slope or embankment will induce a seepage path (adjacent to and around the geosynthetic layer(s)). Geosynthetics such as geogrids, high performance turf reinforcement mats and geotextiles are increasingly being used in this application to fortify such structures which are experiencing increased pressure from extreme weather events. GSI is currently conducting multiple transmissivity tests to specifically challenge such scenarios and back up this laboratory testing with a handful of project case histories. Long term ASTM D4716 transmissivity tests are being conducted at the institute with a multitude of geosynthetic and different soils. We are running the experiment firstly with a silty clay with variable gradients normal pressures. Stay tuned for future developments

Progress within GII (Information)

GSI Website

Our GSI Home Page is accessed as follows:
www.geosynthetic-institute.org

In collaboration with the International Geosynthetics Society (IGS), Geosynthetica, Geosynthetic Magazine, Geosynthetic Materials Association (IFAI) 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 with the help of GSI staff. Everyone (members and nonmembers) can access the open part, which has the following menu:

Newsletter
Prospectus
Specifications
White Papers
Bookstore
Keyword Search
Members Only
Research
Certification
Information
Education
Accreditation
Personnel Contacts
Upcoming Webinars

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

- **GRI Test Methods**
- **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)**

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)

Testing Innovation Fellowship Program

We are pleased to announce the launch of a new student fellowship program aimed at transitioning geosynthetic-related research to ASTM standards and increasing student engagement in our professional organizations. The fellowship program will be jointly supported by the Geosynthetic Institute (GSI), the

North American Chapter of the International Geosynthetic Society (IGS), and ASTM International. This Testing Innovation Consortium will be giving awards of $500 per student. The intention is to support five (5) students annually. The ASTM D35 committee on geosynthetics task group will initiate and guide the students on their research and development of new standards.

"GSI Fellowships for Graduate Students"

Proposals for this year's fellowships were due to us by August 23, 2021. The GSI Board of Advisors (BOA) has finished reviewing the 27 submissions for fellowship awards and we have decided to grant twenty (20) awards this year. Last year we had 0 international proposals, so we are pleased that for the 2021-2022 fellowship year, 55% are from USA Universities and 45% are from international universities. The international universities were located in the following 5 counties (in order by number of proposals received): Canada, Germany, Ireland, Brazil and Taiwan. An announcement for the 2021-2022 fellowship awards has been sent to all members and will be announced to the general public in October.

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
General Manager
jamie@geosynthetic-institute.org.

Webinars

GSI's mission statement begins with the goal to "develop and transfer knowledge". The primary way we accomplish this is through research, that leads to publishing papers, reports, standards and articles for industry journals. Courses and webinars are an integral part of promoting our mission statement. That said, the number of online Courses and especially webinars have grown in popularity over the past 1 ½ years due to limitations placed on holding in-person courses and conferences. The popularity of free webinars and the plethora of webinar topics available on Geosynthetics influenced our decision to scale back GSI Webinar Wednesdays from weekly in 2020 to monthly or by-monthly in 2021. Below is a recap of webinars to date for 2021.

#	DATE	TITLE	# Portals
1	1/13/21	Durability and Aging of Geosynthetics	17
2	2/10/21	MSE Wall Inspection	14
3	3/2 - 3/4	(ASCE) Reinforced MSE Walls	57
4	3/10/21	Landfill Covers – Past, Present and Emerging	15
5	4/14/21	Geosynthetic Drainage Material	16
6	5/4/21	Geosynthetics in Roads & Transportation – Propex Mexico	25
7	5/12/21	Testing of Geosynthetics	14
8	6/9/21	Geosynthetics in Roadways	7
9	6/15/21	Geosynthetics Durability ACIGS	270
10	6/21/21	(IGS) CQA Uncertainty in GS Testing	340
11	7/14/21	Geosynthetics in Hydraulic Applications	7
12	8/11/21	Geosynthetics used in Heap Leach Mining	15
13	9/8/21	Lifetime Predictions of Geosynthetics	12
14	9/15/21	(ASCE) Embankments and slopes	35
15	10/13/21	Geosynthetics in Erosion Control	
16	11/10/21	Geotextile Filters	
17	12/8/21	Coal Combustion Residuals	
	TOTAL		**844**

Activities within GAI (Accreditation)

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 263 GAI-LAP test methods available for accreditation. Please consult our home page for a current listing.

As of September 2021, 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 (18 tests)
Todd Nichols -- 438-553-3757
todd.nichols@propexglobal.com

9[B] - Lumite (17 tests)
Rebecca Kurek -- (770) 869-1787
rkurek@lumiteco.com

13[A] - TRI Environmental (84 tests)
Chad Blackwell -- (714) 520-9631
cblackwell@tri-env.com

14[A] - Geotechnics (55 tests)
J. P. Kline -- (412) 823-7600
JPkline@geotechnics.net

20[A] - GeoTesting Express, MA (59 tests)
Barbara Sanchez -- (978) 635-0424
bsanchez@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 (12 tests)
Minerals Technologies Inc.
Stuart Yates -- (307) 548-6521
stuart.yates@mineralstech.com

25[B] - Ten Cate, Pendergrass (13 tests)
Melissa Medlin -- (706) 693-2226
m.medlin@tencategeo.com

26[B] - AGRU America Inc. (24 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@fiti.re.ke

31[D] - NYS Dept. of Transportation (7 tests)
Tom Burnett -- (518) 485-5707
tburnett@dot.ny.gov

34[B] - Solmax Geosynthetics, LLC - Houston, TX (28 tests)
Daniel Vasquez
Dvasquez@solmax.com

38[C] - CTT Group SAGEOS (120 tests)
Liette Courchesne -- (450) 771-4608
lcourchesne@gcttg.com

40[B] - Solmax Geosynthetics, LLC - Kingstree, SC (20 tests)
Thomas Harrelson -- (843) 382-4603
tharrelson@solmax.com

41[A] - SGI Testing Service, LLC (19 tests)
Zehong Yuan -- (770) 931-8222
ZYuan@sgilab.com

42[C] - NPUST (GSI-Taiwan) (71 tests)
Chiwan Wayne Hsieh -- 011-886-8-7740468
CWH@mail.npust.edu.tw

43[A] - Ardaman & Associates (22 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. (29 tests)
Razak Matoor -- (603) 519 8576
ar.matoor@tencategeo.com

46[B] - TAG Environmental Inc. (13 tests)
Ryan Ackerman -- (705) 725-1938
ryan_ackerman@tagenv.com

49[B] - Engepol Geossinteticos (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 (17 tests)
Mario Contreras Cardenas -- 011 55-288-3308
mcontreras@polytex.cl

55[B] - Atarfil Geomembranes (21 tests)
Gabriel Martin Sevilla -- 34 958 439 200
gmartin@atarfil.com

56[B] - Polytex Santiago (14 tests)
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)
Nicholas Miller -- (912) 375-6180
Nicholas Miller@PFSfabrics.com

59[B] - Firestone (9 Tests)
Janie Simpson -- (864) 439-5641
SimpsonJanie@firestonebp.com

60[B] - TDM Geosintéticos S.A. (20 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 (18 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) (13 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 (16 tests)
Siriporn Chayaporenlert – 66-386-36758
siripornc@solmax.com

70[A] - RSA Geo Lab LLC (48 tests)
Rasheed Ahmed – (908) 964-0786
geolab13@yahoo.com

71[B] - Plasticos Agricolas y Geomembranas S.A.C. (24 tests)
Manuel Constantino Olivares Espinoza –
073-511814-511829
calidad@pgaperu.com

72[B] - Tensar Corp. GA (8 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 Lockliear - (843) 221-4121
mlockliear@agruamerica.com

75[B] - GeoMatrix S.A.S. (42 tests)
Javier Diaz Cipagauta (571) 424-9999
jdiaz@geomatrix.com.co

76[B] - TEHMCO (Chile) (15 tests)
Rodrigo Campoy 56-22-580-2852
rcampoym41@gmail.com

78[B] - PQA Mexico (16 tests)
Cesar Agusto Arcila (669) 954-8202
directorcalidad@payg.mx

79[A] - TRI Geosynthetic Testing and Services (32 tests)
Chad Blackwell 86-512-6283-1396
cblackwell@tri-env.com

80[B] - Texel Technical Materials (101 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)
(14 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@pgaperu.com

86[B] - BOSTD China (29 tests)
Zheng Hong - 86-532-8780-6917
zhenghong@bostd.com

87[B] - Willacoochee Industrial (18 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)
Tatwadarsi Tripathy - 91-937404-4620
geo.sqc@megaplast.in

90[B] - Techfab (India) Industries Ltd. - Daman (10 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 (21 tests)
Rajendra K. Ghadge - 0-932-601-8083
rghadge@garwarefibres.com

95[B] - Mexichem Colombia (Pavco) (8 tests)
Jenny Colmenares Chavez - 57-1-782-5100 (ext. 1534)
jenny.colmenares@wavin.com

96[B] - Tensar China (8 tests)
Zhu Shaolian - 603-6148-3276
zsl@tensar.com.cn

97[A] - TUV SUD PSB Singapore (17 tests)
CHA Ming Yang - 65-6885-1514
ming-yang.CHA@tuv-sud.psb.sg

98[B] - NeoPlastic Filmes e Embalagens Plasticas Ltda. (7 tests)
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Nathalia Santos
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99[B] - Atarfil Middle East (16 tests)
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100[B] - Atarfil Geomembranes USA (12 tests)
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101[B] - Solmax Geosynthetics LLC - Spearfish (7 tests)
Chuck Taylor - 605-642-8531
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102[B] - SKAPS Industries (11 tests)
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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
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107[A] - TRI Australasia PTY LTD (38 tests)
Warren Hornsey - +617-5535 7227
Whornsey@tri-env.com.au

108[B] - Solmax Geosynthetic Co. Ltd. Suzhou (13 Tests)
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[A]Third Party Independent [C]Institute
[B]Manufacturers QC [D]Government

Activities within GCI (Certification)

GSI presently has three separate inspector certification programs. One (began in 2006) is focused on QA/QC of field inspection of waste containment geosynthetics and compacted clay liners. The second (began in 2011) is focused on MSE Wall, Berm and Slope field inspection. The third is focused on Geosynthetic Designer Certification and it 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.

Throughout 2020-2021, TRI has hosted several virtual QA/QC in field installation courses, which have kept the program running throughout the COVID pandemic. The next on-line courses given by TRI Environmental will be held December 6-9, 2021, with the GCI-ICP exams given on Friday, December 10.

Special thanks to Sam Allen, Jeffrey Kuhn, Abigail Beck and Mark Sieracke for teaching the course.

Inspector Certification Test Results
2006 – 2021

Year	Geosynthetic Materials		Compacted Clay Liners		Commentary
	No. of people taking exam	No. of people failing exam	No. of people taking exam	No. of people failing exam	No. of people failing both exams
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%)	9
2020	100	14 (14%)	92	10 (11%)	7
2021	39	11 (28%)	34	5 (15%)	5
TOTAL	**1054**	**140 (13%)**	**981**	**108 (11%)**	**61 (5%)**

There are currently 488 practicing certified inspectors, 384 inspectors (2017-2021) and 104 inspectors (2006-2016) who have renewed to keep certification current.

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 for additional details:
jamie@geosynthetic-institute.org

Inspector Certification Test Results for
MSE Walls and Berms Inspectors
2011 – 2021

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
2017-2021	GSI On-Line Course	0	0
TOTAL		24	0

Program #3 - Geosynthetic Designer Certification

The "Geosynthetic Designer Certification Program (GDCP)" is also available. Please go to www.geosynthetic-institute.org/gdcpintro.pdf for the requisite details.

Included on the website is an introduction (rationale behind the program was given in a 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 meet the following:

- 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 ≥ 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

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 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 rescheduled for some time in 2022 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 GRI geogrid specifications and the associated test methods.

GSI-India was formed in 2015. Under the current leadership of the director, Dr. T.V. Sreekumar, GSI-India provides a much-needed service to the geosynthetic industry in India. The hosting organization is the Bombay Textile Research Association (BTRA), and is world known for its excellence in textile R & D. It is currently branching out into all forms of geosynthetics with a fantastic R & D laboratory.

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 CC Hydro. We are pleased to have them as a member. The current GSI member organizations and their contact members are listed below:

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/Willie Liew
TenCate Geosynthetics
John Henderson/John Lostumbo/Chris Lawson
CETCO
Stacy Byrd/Michael Donovan
Huesker, Inc.
Flavio Montez/Andreas Elsing/Lilma Schimmel
NAUE GmbH & Co. KG
Kent von Maubeuge [BOA]
Propex Operating Company LLC
Drew Loizeaux
Berry Global Inc.
Keith Misukanis
TRI/Environmental Inc.
Sam R. Allen [BOA] /C. Joel Sprague/Richard Thomas
U. S. Army Corps of Engineers
Kevin Pavlik/Richard DePasquale
Chevron Phillips Chemical Co.
Ashish Sukhadia/Vergil Rhodes [BOA]
Solmax Géosynthétiques
Jacques Cote/Simon Gilbert St-Pierre/Dominic Berube Jimmy Youngblood/Catrin Tarnowski/Matthieu Cornellier [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
ATARFIL
Emilio Carreras Torres/Tamara Jurado Corrasco/ Gabriel Martin
Republic Services Inc.
Joe Benco/ Mike Beaudoin/Dave Vladic
InterGEO Services Co.
Şükrü Akçay/Archie Filshill
Raven Industries, Inc.
Clint Boerhave/Stacy Coffin/Greg Anderson
CTI and Associates, Inc.
Te-Yang Soong [BOA] /Kevin Foye
Advanced Earth Sciences, Inc.
Kris Khilnani/Suji Somasundaram
Carlisle Syntec, Inc.
Paul Markel/Brinda Mehta/Vivian Zhang
EPI, The Liner Co.
Daniel S. Rohe/Paul Livingston
Weaver Consultants Group, Inc.
Mark Sieracke/ Jeff Blum
Aquatan (Pty) Ltd.
Piet Meyer/ Sanet van der Merwe
Jones Edmunds, Inc.
George Reinhart/Tobin McKnight
Afitex-Texel
Pascal Saunier/Stephan Fourmont/Jocelyne Grenier
BTRA (GSI-India)
T.V. Sreekumar
Watershed Geosynthetics LLC
Michael Ayers/Ming Zhu
Maccaferri
Moreno Scotto /Sachin Mandavkar
Jones & Wagener (Pty) Ltd.
Riva Nortje
Ardaman & Assoc.
Mohamad Al-Hawaree/Thomas S. Ingra
American Wick Drain
Scott Morris/Craig Phelps/Seth Marlow
INOVA Geosynthetics/AERO Aggregates
Archie Filshill/Theresa Loux
Owens Corning Science & Technology LLC
Steve Thaxton/Clive Mills/Jason Woodall
SKAPS Industries
Nilay Patel/Anurag Shah
Duke Energy
Asha Sree/Ken Karably
Chesapeake Containment Systems (CCS)
Ryan Kamp
Layfield Group
Deepaksh Gulati/Mark Simpson
Engepol Geossineticos Ltda
Patricia Ferreira/Andréia Machado/Ildo Oliveira
Concrete Canvas Ltd.
Lee Church/Enrique Saavedra

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 Environmental Quality
Jaime Lang
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
Tom Mellott
Florida Department of Environmental Protection
Cory Dilmore
U.S. Bureau of Reclamation
Brian Baumgarten/Peter Irey
Michigan Dept. of Environmental Quality
Margie Ring/Kevin Lund
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

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