The GSI Newsletter/Report

Geosynthetic Institute

Vol. 34, No. 2 **June, 2020**

This quarterly newsletter, now in its 34th 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 Marilyn Ashley at phone (610) 522-8440; fax (610) 522-8441 or e-mail at gsigeokoerner@gmail.com or marilyn@geosynthetic-institute.org.

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

Companies, including most of our members, have been following lockdown orders effecting non-essential businesses since early March. The Geosynthetic Institute followed COVID-19 guidance and had most employees working from their homes. We are now happy to announce that everyone at GSI is back in the office.

This new "work from home" environment has created many challenges, as well as providing some opportunities. We felt that one such opportunity was to offer on-line learning involving various geosynthetic applications on a weekly basis. We had previously been holding 1-2 webinars per month. The new webinar series is referred to as "Webinar Wednesdays". Every Wednesday, since March 27, Dr. George Koerner has been presenting a live 1 ½ hour webinar. Currently, the webinar series is scheduled through July 8. GSI is pleased with the overall response to Webinar Wednesdays and more information can be found in the GEI section of this newsletter.

2020-2022 Board of Advisors

Term Ends 2020

- Tony Eith - CEC Consultants, Inc.
  (Consultants and Testing Labs)
  email: teith@cecinc.com
- Jimmy Youngblood - GSE Environmental
  (Geomembranes and GCL's)
  e-mail: jyoungblood@solmax.com
- Moreno Scotto - Maccaferri
  (International - 2)
  e-mail: moreno.scotto@gmail.com

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

IN THIS ISSUE

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 halflife 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 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 axi-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. **Residual Stress in GS -** Short term project involving the tensile behavior of textiles, grids and fibers to hysteresis temperature modulation. Temperatures range from -10°C to 50°C.

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.

New Research Project

This summer, GSI has embarked on a new research project: investigating how geosynthetic materials behave when exposed to high winds over extended periods of time. This phenomenon, commonly known as "wind whip", is an important factor for understanding the durability and aging of geosynthetics in harsh climates. In order to simulate wind whip in the laboratory, a benchtop wind tunnel was acquired and modified specifically for geosynthetic testing. A photograph of GSI's wind tunnel appears in Figure 1. This allows for controlled, high-velocity laminar airflow testing in the 4 in. x 4 in. tunnel cross section, with top speeds reaching up to 150 miles per hour.

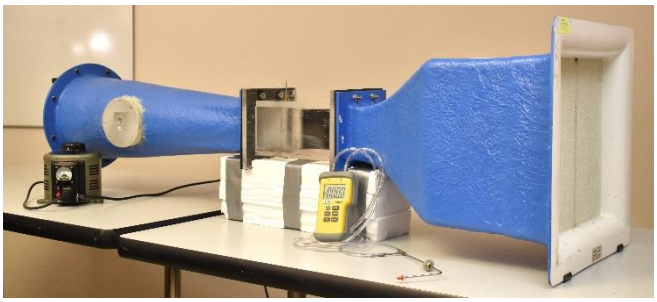

Figure 1

Geosynthetic coupons are mounted along the wind tunnel's direction of flow in either a flag configuration (one fixed end and one free end) or an awning configuration (both ends fixed). After exposure to fixed velocity winds for a set period of time, samples are taken from the coupons and tested per ASTM standards for specimen thickness, mass per unit area, and tensile properties. These "exposed" values are then compared to the "as-received" material properties, and percent retention is calculated as a result. Additionally, qualitative indications of damage to the geosynthetics (fraying, cracking, exposed scrim reinforcement) will be carefully noted throughout each test cycle. A typical test configuration would involve the coupon exposed to wind velocities of 100 miles per hour for a period of 24 hours and can be seen in Figure 2.

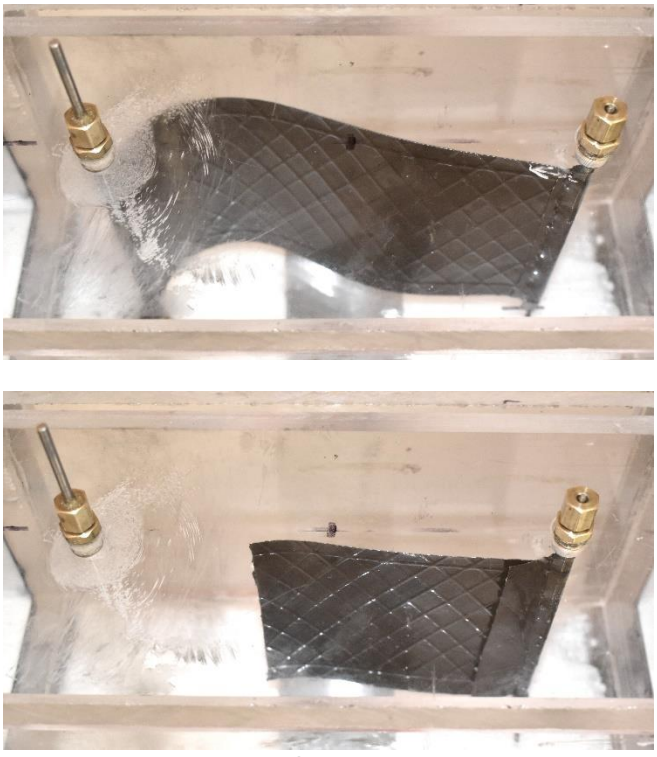

Figure 2

This ongoing project at GSI will result in the publication of two documents. First, a GRI standard practice will

detail the procedure for wind tunnel configuration, sample preparation, exposure, and testing associated with the wind whip study. Then, a paper (projected Q4 2020) will summarize the collected data, attempt to characterize the wind whip resistance of different materials, and provide recommendations to engineers on how to select geosynthetics that help mitigate the effects of wind when geosynthetics are exposed to extreme conditions.

Progress within GII (Information)

"GSI Fellowships for Graduate Students"

Eighteen (18) fellowships at $5000 each were awarded this year 2019-2020. For details please go to our website. www.geosynthetic-institute.org/gsifellows.htm.

REQUEST-FOR-PROPOSALS 5/18/2020

The Geosynthetic Institute (GSI) has announced a worldwide call for requests-for-proposals (RFPs) focusing on innovative geosynthetics research and development projects. Recipients must be pursuing a masters or doctoral degree in an accredited college or university. There will be several awards given, each for $5,000. Emphasis will be placed on relevant topics of interest and/or concern to the geosynthetics community. The proposals must be submitted in the following four-page format:

Page 1 – Letter of recommendation from student's department head or advisor
Page 2 – Title and detailed abstract of proposed project
Page 3 – Student's Resume
Page 4 – Relevancy of topic to the geosynthetics community

The RFPs for the 2020-2021 academic year must be submitted to the undersigned by e-mail. The deadline for submittal is **Monday, August 17, 2020.** Awards will be announced by end of September. Review of the proposals is by the nine-person Board of Advisors (BOA) of GSI. For information on the Geosynthetic Institute and past recipients, visit us at the following website:

www.geosynthetic-institute.org/gsifellows.htm

Jamie R. Koerner
Office Manager
jamie@geosynthetic-institute.org

Our GSI Home Page is accessed as follows:

<<http://www.geosynthetic-institute.org>>

It has been revised and is being maintained through the fine efforts of Marilyn Ashley. Everyone (members and nonmembers) can access the open part, which has the following menu:

Newsletter
Prospectus
Specifications
White Papers
Bookstore
Keyword Search (new)
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 "Relative Sustainability of Road Construction/Repair: Conventional Methods versus Geosynthetic Materials" is available on our website for your review. We are interested in any comments you may have.

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

Progress within GEI (Education)

GRI Reports

To date, we have 46 GRI Reports available to members and associate members. These reports vary in length from 30 to 200 pages. They are in the password protected section of our home page at www.geosynthetic-institute.org/member/reports.html. 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
Nonmembers Cost - $250;
GSI and GMA Member Cost - $200

GSI Webinars

GSI 1 – "A Data Base and Analysis of 320 Failed MSE Walls With Geosynthetic Reinforcement"
GSI 2 – "MSE Wall Back Drainage Design"
GSI 3 – "MSE Wall Remediation and Monitoring"
GSI 4 – "MSE Wall Inspection"
GSI 5 – "Geosynthetics in Hydraulic Applications"
GSI 6 – "Geosynthetic Applications Used in Heap Leach Mining"
GSI 7 – "Geosynthetics in Agriculture and Aquaculture"
GSI 8 – "Geosynthetics Applications in the Private Sector"
GSI 9 – "Behavior and Analysis of Twenty Solid Waste (Landfill) Failures"
GSI 10 – "Wet (Bioreactor) Landfills for Rapid Degradation of MSW Organics"
GSI 11 – "Lateral and Vertical Expansions Over Old and Existing Landfills"
GSI 12 – "Landfill Covers: Past, Present, Emerging"
GSI 13 – "Beneficial Uses of Abandoned and/or Closed Landfills"
GSI 14 – "Lifetime Predictions of Covered and Exposed Geosynthetics"
GSI 15 – "In-Situ Stabilization of Soil Slopes Using Nailed (or Anchored) Geosynthetics"
GSI 16 – "Sand Drains-to-Wick Drains-to-Sand Columns (Including a Major Failure Case History)"
GSI 17 – "Geosynthetics in Erosion Control"
GSI 18 – "Pond Liner Design and Performance"
GSI 19 – "Wave (or Wrinkle) Management [For Proper Deployment of Geomembranes]"
GSI 20 – "Geosynthetic Drainage Materials: Applications, Design, Installation and Performance"
GSI 21 – "A Brief Overview of Geosynthetics and Their Major Applications"
GSI 22 – "Geosynthetic Reinforced MSE Walls; Overview, Failures and Items for Improvement"
GSI-23 – "Geosynthetic Filters: Concerns and Issues
GSI-24 – "Disposal of Coal Combustion Residuals"
GSI-25 – "Soil Consolidation by Wick Drains, aka PVDs"
GSI-26 – "Applications and Design of Geotextile Tubes"
GSI-27 – "Stability Design of Landfill Cover Soils"
GSI 28 – "Geomembrane Puncture"
GSI 29 – "QA/QC of Geosynthetics"
GSI 30 – "Durability and Aging of Geosynthetics"
GSI 31 – "Laboratory Testing of Geosynthetics'
GSI 32 – "Sustainability with Geosynthetics"
GSI 33 – "UV Degradation as it Relates to Polymers"

WEBINAR WEDNESDAYS

Webinar Wednesdays started as a reaction to the COVID-19 pandemic and the necessity to remain in lockdown. With so many employees working remotely and the slower pace due to a downturn in the economy, George and the BOAs felt that it was a good time to reach out to the geosynthetic community through a virtual platform. GSI wasn't alone in this venture, but we recognized the importance of helping engineers get their PDHs while working remotely. After choosing important topics relating to geosynthetics and adding several new hot topic webinars, a schedule was made and Webinar Wednesdays began. The last several webinars have gotten reviews saying they were both informative and entertaining. Below is a recap of webinars that have been offered this year, with Webinar Wednesdays beginning on March 25.

DATE	TITLE	Registrants # of Companies	# Portals
1/22/20	Geosynthetic Drainage Material	8	12
2/19/20	Pond Liner Design	3	17
3/25/20	Stability Design of Landfill Covers	7	32
4/8/20	GM Puncture	1	8
4/15/20	Wave Management	4	35
4/22/20	Behavior and Analysis of 20 Solid Waste LF Failure	3	33
4/29/20	QA/QC of Geosynthetics	4	27
5/06/20	MSE Wall Inspection	6	34
5/11/20	MSE Wall Inspection – NY DOT	1	15
5/18/20	GS in Paved and Unpaved Roads	1	425
5/13/20	Applications and Design of Geotextile Tubes	4	5
5/20/20	Geotextiles Filters – concerns and issues	4	8
5/27/20	Lifetime Durability of Geosynthetics	7	47
6/03/20	Testing of Geosynthetics	cancelled	NA
6/10/20	Sustainability with Geosynthetics	2	5
6/17/20	Drainage with Geosynthetics	4	6
6/24/20	In Situ Stabilized of slopes using Geosynthetics	3	16

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 http://www.geosynthetic-institute.org/courses.htm and scroll down to Course #3. Here you will see the requisite details. The course itself is completely synchronized with the 6th Edition of the DwG textbook. It consists of 1540 slides with ~ 18 hours of voice over; about one minute for each slide.

Contact Jamie Koerner at jrkoerner@verizon.net 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 our institute can take to ensure the wellbeing of our customers and staff.

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

For labs expecting an on-site audit this year, we will not be conducting any more on-side audits for the remainder of 2020. They are being postponed until 2021. All GAI-LAP Accreditations in good standing and with passing proficiency results will be granted extensions for next year. We are taking these steps in the best interest of everyone's health and safety.

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 June, 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)
Darrell Scoggins -- (706) 693-2226
d.scoggins@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 (GSE) - Houston, TX USA (26 tests)
Lana Hickman
Lhickman@solmax.com

38[C] - CTT Group SAGEOS (123 tests)
Oliver Vermeersch -- (450) 771-4608
overmeersch@gcttg.com

40[B] - Solmax (GSE) - Kingstree, SC USA (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)
Julie Solarz -- (615) 847-7299
juliesolarz@berryglobal.com 0

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 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 - 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 Geomembranes (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)
Melissa Medlin -- (706) 778-9794
m.medlin@tencategeo.com

58[B] - Propex Furnishing Solutions - Hazlehurst (10 tests)
Victoria Shoupe -- (912) 375-6180
Victoria.Schoupe@propexglobal.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 - Selangor - 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
btra@vsnl.com

66[B] - Rowad International Geosynthetics Co. Ltd (13 tests)
Abdullah Zahrani -- +966-3-812-1360
A.alzahrani@rowadplastic.com

68[B] - Shawmut Corporation (4 tests)
Stacy Chadwell -- (336) 229-5576
schadwell@shawmutcorporation.com

69[B] - Solmax (GSE) - Rayong - Thailand (14 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 (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 Lockliear - (843) 221-4121
mlockliear@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
rcampoym41@gmail.com

78[B] - PQA Mexico (16 tests)
Cesar Agusto Arcila (669) 954-8202
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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)
André Parent (418) 387-4801
andre.parent@lydall.com

81[B] - Solmax (GSE) - Rechlin - Germany (18 tests)
Evelyn Kroeger 49-40-767420
ekroeger@solmax.com

83[B] - Solmax (GSE) - 6th of October City - Egypt (13 tests)
Ahmed Abdel Tawab - 202-2-828-8888
atawab@solmax.com

84[B] - Owens Corning (18 tests)
Ashutosh Dixit - 1-778-945-2888
Ashutosh.dixit@owenscorning.com

85[B] - PAG Tacna (17 tests)
Manuel Constantino Olivares Espinoza –
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calidad@pgaperu.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)
Jagdish Chandra Joshi - 91-22-2287-6224
nonwoven.qualitylab@techfabindia.com
Anant Kandi - 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)
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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)
Alejandro Carreras - 757-263-4057
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101[B] - Solmax (GSE) - Spearfish, SD USA (7 tests)
Chuck Taylor - 605-642-8531
ctaylor@solmax.com

102[B] - SKAPS Industries (11 tests)
Nilay Patel - 706-336-7000
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103[B] - STRATA Geosystems Pvt. Ltd. (6 tests)
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[A]Third Party Independent [C]Institute
[B]Manufacturers QC [D]Government

It needs to be mentioned that there is a huge continued interest in the GAI-LAP, which speaks volumes of the past and present participants in the program. In short, our community of labs are making a difference in quantifiable quality in the Geosynthetic Industry. Unfortunately, there is now a backlog of laboratories around the world that have applied for a first-year on-site audit. Due to travel restrictions, we have not been able to fulfill these requests but plan to service these labs as soon as things open up. Currently the labs that are on our short list for first year on-site audit are as follows:

1. Advanced Terra Testing, Boulder CO USA
2. Pavco Wavin, Peru
3. TRI, Brisbane Australia
4. Lonax, Brazil
5. TenCate, Seremban Malaysia
6. Saphire, Spain
7. Geofabrics, Molendinar Queenland Australia

We would like to thank all of these companies for their patience during these unprecedented times and would like to assure them that we will answer the call ASAP.

Please note that the next GAI-LAP semiannual meeting will be held virtually through Adobe Connect. It will be held on Thursday July 2nd, 2020 at 11:30AM EDT. All are invited to attend. The link to this meeting is **http://geosynthetic.adobeconnect.com/gailap2020/.** This virtual meeting is in lieu of our canceled in person meeting that was to be held in Boston, MA USA in conjunction with ASTM committee D35 on Geosynthetics.

If anyone desires more information on the GAI-LAP program, its test methods, the associated laboratories, etc., please go to our website https://geosynthetic-institute.org/gai/lab.htm.

George R. 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 thirteenth 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. As you can clearly see, it was a very good year for the GCI-ICP program. 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 and Mark Sieracke for teaching the course.

Inspector Certification Test Results
2006 – 2020

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%)	11
2020	32	3 (9%)	32	7 (22%)	3
TOTAL (to date)	947	113 (12%)	887	100 (11%)	50 (5%)

There are currently 454 practicing certified inspectors, 369 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. The QA/QC course that was originally scheduled for April 8-10 in Austin, Texas was cancelled due to travel restrictions. It has been rescheduled for November 16-19, 2020 (TBD). In the meantime, reacting to the need for QA/QC training, TRI Environmental held a 4 ½-day online course on June 1-4, which was highly successful. The QA/QC exams were given online on Friday, June 5, and are included in the test result chart (above).

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 do have one positive announcement regarding the program. We have received our first renewal for inspector certification in March 2020.

Inspector Certification Test Results for
MSE Walls and Berms Inspectors
2011 – 2019

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
2017-19	GSI On-Line Course	0	0
TOTAL		24	0

Program #3 - Geosynthetic Designer Certification

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

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

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Marilyn Ashley marilyn@geosynthetic-institute.org

The GSI Affiliated Institutes

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

GSI-Korea was formed on February 9, 1998 as a collaborative effort between FITI Testing and Research Institute (a quasi-government organization) and INHA University (through its Geosynthetics Research Laboratory). It is presently held entirely within INHA University.

INHA University is located in Incheon and the geosynthetics laboratory is led by Professor Han-Yong Jeon. Dr. Jeon has 10-students working on geosynthetic-related projects and is extremely active both nationally and internationally. His active participation at conferences worldwide is very admirable. He has provided research and development in many geosynthetic subjects including geotextiles, geomembranes, geocells, additives for GCLs, recycled plastics for improved formulations, etc.

GSI-Taiwan was formed on August 18, 2000 and is wholly contained within the National Pingtung University of Science and Technology in Nei Pu, Pingtung (southern Taiwan). It completely parallels GSI in that it has specific units for research, education, information, accreditation and certification. The Director is Dr. Chiwan Wayne Hsieh who is a Professor in the Department of Civil Engineering and Dean of the R & D Office. GSI-Taiwan has a Taiwanese consortium of geogrid/geotextile manufacturers who work toward producing quality products according to the draft GRI geogrid specifications and the associated test methods. As such, GSI-Taiwan is a GAI-LAP accredited laboratory for 59 geosynthetic test methods. Dr. Hsieh has 10 students working on geosynthetic-related projects and is extremely active nationally and internationally. GSI Taiwan has hosted three very successful internal conferences to date and has also held a much broader one, namely, GSI-Asia in Taichung, Taiwan.

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.

GSI Member Organizations

We sincerely thank all of our sponsoring organizations for their continued support. Without them, GSI could not exist. The current GSI member organizations and their contact members are listed below. **Our newest member is Engepol Geossinteticos Ltda., located in Brasil. We welcome you to GSI.**

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
Dave Chiet/Michael Donovan/Jim Olsta
Huesker, Inc.
Flavio Montez/Andreas Elsing/Lilma Schimmel
NAUE GmbH & Co. KG
Kent von Maubeuge [BOA]
Propex Operating Company LLC
Drew Loizeaux/David Andrews [BOA]
Berry Global Inc.
Keith Misukanis
TRI/Environmental Inc.
Sam R. Allen [BoA]/C. Joel Sprague
U. S. Army Corps of Engineers
Kevin Pavlik/Richard DePasquale
Chevron Phillips Chemical Co.
Ashish Sukhadia/Vergil Rhodes [BOA]
AECOM (formerly URS Corp.)
John Volk/John Bove/Michael Stepic
Solmax Géosynthétiques
Jacques Cote/Simon Gilbert St-Pierre/
Jimmy Youngblood [BOA]
CARPI, Inc.
Alberto M. Scuero/John A. Wilkes
Civil & Environmental Consultants, Inc.
Tony Eith [BOA]
Agru America, Inc.
Nathan Ivy/Markus Haager
INHA (GSI-Korea)
H.-Y. Jeon
Waste Management Inc.
Greg Cekander/Burrill (Bo) McCoy [BOA]
NPUST (GSI-Taiwan)
Chiwan Wayne Hsieh
GeoComp/GeoTesting Express
W. Allen Marr/Gary T. Torosian
GEI Consultants
Michael A. Yako/Michael Ruetten/
Helen Robinson/John Trast
ATARFIL
Emilio Carreras Torres/Tamara Jurado Corrasco
Republic Services Inc.
Joe Benco/ Mike Beaudoin/Dave Vladic

GSE Europe
Catrin Tarnowski
InterGEO Services Co.
Şükrü Akçay/Archie Filshill
Raven Industries, Inc.
Clint Boerhave/Stacy Coffin/Greg Anderson
CTI and Associates, Inc.
Te-Yang Soong/Kevin Foye
Advanced Earth Sciences, Inc.
Kris Khilnani/Suji Somasundaram
Carlisle Syntec, Inc.
Paul Markel/Brinda Mehta
EPI, The Liner Co.
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Weaver Consultants Group, Inc.
Mark Sieracke
Aquatan (Pty) Ltd.
Piet Meyer/ Sanet van der Merwe
Jones Edmunds, Inc.
George Reinhart/Tobin McKnight
Afitex-Texel
Pascal Saunier/Stephan Fourmont/Jocelyne Grenier
EVAL Americas (Kuraray)
Edgar Chow
BTRA (GSI-India)
Anjan K. Mukhopadhyay
Watershed Geosynthetics LLC
Michael Ayers/Paul O'Malley
Maccaferri
Moreno Scotto [BoA]/Sachin Mandavkar/Pietro Rimoldi
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Riva Nortje
Ardaman & Assoc.
Thomas S. Ingra/Deborah Scott/Ernie Cox/
Mark Mongeau
American Wick Drain
Scott Morris/Craig Phelps/Seth Marlow
INOVA Geosynthetics/AERO Aggregates
Archie Filshill/Theresa Loux
Sotrafa S. A.
Jose Miguel Munoz Gomez/Rosa Ruiz
Kaytech Fabrics Group Ltd.
Paul Pratt
Owens Corning Science & Technology LLC
Steve Thaxton/Clive Mills/Jason Woodall
SKAPS Industries
Nilay Patel/Anurag Shah
Duke Energy
Evan Andrews/Ken Karably
Chesapeake Containment Systems (CCS)
Ryan Kamp
Layfield Group
Deepaksh Gulati/Mark Simpson
Engepol Geossineticos Ltda
Patricia Ferreira/Andréia Machado/Ildo Oliveira

Associate Members

Delaware Solid Waste Authority
Robin Roddy/Jason Munyan
Nebraska Department of Environmental Quality
Michael Behrens
Maine Department of Environmental Protection
Victoria Eleftheriou
New York Department of Transportation
Steve Heiser
California Water Resource Control Board
Scott Couch/ Brianna St. Pierre/Joshua Munn
New Jersey Department of Environmental Protection
Mary Anne Goldman
Pennsylvania Department of Environmental Protection
Jason Dunham
Florida Department of Environmental Protection
Cory Dilmore
U.S. Bureau of Reclamation
Brian Baumgarten/Peter Irey
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Margie Ring/Xuede (Dan) Qian
Environment Agency of U. K.
Darren Legge
Florida Department of Transportation
David Horhota
Virginia Department of Environmental Quality
Donald Brunson
Massachusetts Department of Environmental Protection
Tom Adamczyk
Dept. of Water Affairs of South Africa
Kelvin Legge
Pennsylvania Department of Transportation
Beverly Miller

In The Next Issue

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