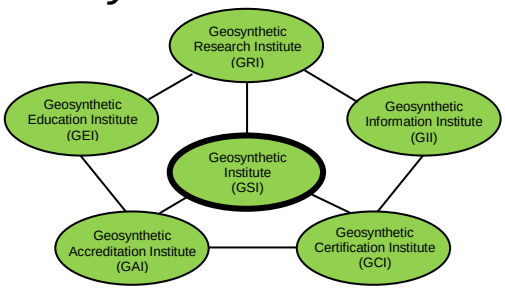
The GSI Newsletter/Report

Geosynthetic Institute



Vol. 32, No. 3 **September, 2018**

This quarterly newsletter, now in its 32nd 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 mvashley@verizon.net.

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

1. At the suggestion of the BOA, we have developed a set of YouTube videos illustrating the various test methods embodied in the GRI-GM13 Specification for High Density Polyethylene Geomembranes. Please look them over and comment accordingly. https://www.youtube.com/channel/UC-YxTQaEXbzMBsdRF9iGwpQ.
2. We regularly receive requests to investigate the in-situ performance of previously installed geosynthetics of all types and ages. Of course, we are eager to do so, but are at a disadvantage without any archived material of the original product for comparison purposes. "Please" make it a standard practice to save 8 ½ × 11-inch samples of the material placed in zip-lock bags along with your original file documents… You never know what the future might require.
3. The summer has been very active with preparing and submitting conference papers; e.g., five for IGS in Korea, four for IFAI in Houston, three for ASCE in Philadelphia and one for GeoInstitute in Hershey – now for the presentations!
4. New storage space at GSI for the staging of proficiency test samples in conjunction with the GAI-LAP program is now complete. Do schedule a visit to GSI when you are in the Philadelphia area… we are only 4-miles from the airport.
5. George Koerner received the L. David Suits Crystal Barrel Vase Award from ASTM committee on Geosynthetics (D35) on behalf of the Institute on June 28, 2018 in San Diego, California. This award is given to an individual or organization that distinguish themselves in the geosynthetics field with contributions that result in an advancement of geosynthetic knowledge in the areas of test methods, guides, practices and specifications. This award was given to the GSI and presented in person by Dave during committee week. The D-35 Committee on Geosynthetics recognized GSI, its staff, member organizations, and the countless number of students that have done geosynthetic research for the on-going pursuit of geosynthetic knowledge, for they greatly contribute to the advancement of geosynthetics standardization. To date, the Geosynthetic Institute has initiated over thirty of the D-35's 154 standards. Its continued involvement is encouraged and appreciated. George and David are pictured below along with other leadership persons within D-35.

IN THIS ISSUE

George Koerner (GSI) – David Suits

Bob Mackey (Awards Chair), James Goddard (D-35 Chair), Geo, David and Katerina Koperna (ASTM D-35 Staff Manager)

6. Your nine-person GSI Board of Advisors (BOA) is as follows:

Term Ends 2018

- John Workman - Waste Management Inc.
  (Owners and Operators)
  e-mail: jworkman@wm.com
- Mark Wayne – Tensar Earth Technology
  (Geotextiles and Geogrids)
  e-mail: mwayne@tensarcorp.com
- Sam Allen – TRI Environmental Inc. (At-Large)
  e-mail: Sallen@tri-env.com

Term Ends 2019

- Kent von Maubeuge - NAUE GmbH & Co. KG
  (International-1)
  e-mail: kvmaubeuge@naue.com
- A. K. Mukhopadhyay – BTRA & GSI-India
  (Agencies)
  e-mail: btra@vsnl.com/btradirector@gmail.com
- Ashish Sukhadia – Chevron Phillips (Resin and Additives)
  e-mail: sukhaam@cpchem.com

Term Ends 2020

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

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) or Bob Koerner (rmk27@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 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, PVC (N.A.) and PVC (Euro.). 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 are not yet complete. Some will take at least 90,000 light hours (~ 12.3 years). GRI Report #44 is available on results to date and a webinar is also available. The information was made available to the public on April 6, 2016 at Orlando and was again presented in Peru on March 30. 2017. It has been republished in the International Geosynthetics Journal. A copy is available.
3. **HDPE Geomembrane Lifetime as a Function of Thickness** - This often encountered question is

being evaluated by exposure at 80°C 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. **Exposed Lifetime of Creased Geomembranes** - Stemming from a recent webinar on the effect of backfilled GM waves or wrinkles, we now have seven geomembranes which are purposely creased in double 180° bends being incubated at 80, 65, 55 and 25°C temperatures as of February 10, 2017. They are HDPE, LLDPE, LLDPE-R, fPP, fPP-R, EPDM and PVC. We are focusing on if, when, and where, cracking might occur. To date cracks have occurred in both the HDPE and PVC materials at the 80°C exposure. The cracks occur precisely at the edges of the 180° bends, both exposed to the light and shielded away from it. They have been replaced with new samples to assess repeatability.
5. **Laboratory Exposed Lifetime of PVC (European) Geomembranes** - We have been evaluating five different European formulations for four 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.
6. **Cable Tied Geonet Evaluations** - A study has just been completed on plastic cable ties used to connect the overlapped ends and edges of geonets and geospacers. The draft of a new GRI Test Standard is available as well as the technical paper to be published at the IGS Conference in Seoul, Korea in September, 2018..
7. **Retaining Wall Failure Evaluations* -** We have past GRI Reports 38, 39, and 40 addressing mechanical stabilized earth (MSE) walls using geosynthetic reinforcement which document 82-failures. Our data base has grown to 141, then 171, then 286 and now 322! *Readers, we have a very serious situation in this regard!* The failures are either excessive deformation or actual collapses. We have presented one-day courses on this topic along with inspector training and development insofar as a field inspectors certification program; see the certification section of this Newsletter/Report. A paper was published by the Journal of Geotextiles and Geomembranes in October, 2013 and the publisher (Elsevier) reports that 1400 requests have been made to date. An updated paper on 320 has just been published in the same journal. A GSI webinar is also currently available.
8. **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 a paper in this regard.
9. **Landfill Failure Analysis** - Since our originally reported paper on ten landfill failures in a 2000 publication, we have accumulated ten more. All 20-failures have been analyzed using the ReSSA Code and are now available to members and associate members as GRI Report #41. There are two recent failures in this regard, both in Pennsylvania, and one resulted in a worker's death! A paper published by Dr. Rudy Bonaparte of Geosynthetics Inc./Georgia Tech gives details of two of these failures and more.
10. **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. A preliminary paper was presented at Geosynthetics '15 in Portland.
11. **PVD Strengthening of Soft Foundation Soils*** - A new project, conducted over the past summer, addresses the use of PVDs for drainage (as customary) plus tensile reinforcement (never recognized to date). An experimental device was developed and used to assess three different PVDs. This data was then used with the ReSSA soil stability code on an old foundation soil failure that did not have PVDs. The FS-values increased 4% and could go higher with closer spacing or stronger PVDs. A journal paper is available.
12. **Seams of Reinforced Geomembranes** - There are now five scrim reinforced geomembranes available and the properties are listed in our GRI Specifications. To compliment these sheet products a set of shear and peel tests are have been evaluated. A new specification designated GRI-GM19(b) has been developed… GRI-GM19(a) is presently solely for homogeneous geomembranes.
13. **Direct Shear Strength of Frozen Interfaces** - A project of investigating geomembrane-to-soil interfaces under freezing conditions is now complete. Maxwell Koerner reconfigured a 100 mm square shear box for controlled sub-freezing temperatures. The project stems from a case

failure of a veneer cover and several requests for such information over the TechLine answering service. A paper will be presented in Seoul this month.

14. **Generic Specifications** - A major continuing effort is ongoing with respect to the development and updating of GRI's generic geosynthetic specifications. The current status of these specifications is as follows. Incidentally, all 18 are currently presently copyrighted.

Completed and Available on our Website

GM13 – HDPE Geomembranes
GM17 – LLDPE Geomembranes
GM18 – fPP and fPP-R Geomembranes
GM19a – Geomembrane Seams-Homogeneous
GM19b – Geomembrane Seams-Fabric Reinforced
GM21 – EPDM and EPDM-R Geomembranes
GM22 – Scrim Reinforced PE Barriers
GM25 – LLDPE-R Geomembranes
GM28 – CSPE-R Geomembranes
GM30 – Coated Tape PE Barriers
GCL3 – Geosynthetic Clay Liners
GS15 – Geocells using HDPE Strips
GT10 – Geotextile Tubes
GT12 (a and b) – Geotextile Cushions
GT13 (a and b) – Geotextile Separators
GCL3 – Geosynthetic Clay Liners
GC14 – Turf Reinforcement Mats
GC16 – Prefabricated Vertical Drains

Working; Available Upon Request

GGXX – Bidirectional Geogrids (tabled)
GGXX – Unidirectional Geogrids (tabled)
GNXX – Geonet Drainage Composites (active)

The complete set of formalized specifications are available to everyone (members and nonmembers) on the open section of our Home Page. Please download and use them accordingly. There is a brief tutorial accompanying each specification. Also note that this is where the latest modification will always be available. They are updated/modified on an as-required basis.

15. **Guides and Practices** - GSI also develops standard guides and practices and these are also available free on our website. There are 11 guides and 6 practices. They are modified on a regular basis and the latest version is updated regularly.

16. **Test Methods** - Since 1987 when we published our first test method on geogrid junction strength until the present we have developed 72 test methods which are still current.

10 - geotextile	6 - GCL
5 - geogrid	15 - geocomposite
2 - geonet	12 – geosynthetics
22 - geomembrane	

Additionally, 31 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 just announced that GSI will be given the David Suits Award for our cooperation in sharing GRI standards. Our appreciation is sincerely expressed.

17. **Other GRI Standards** - There are several GRI Standards in various forms of preparation. These include the following:
    - A practice on field seaming inspection emphasizing the electrical leak location system (ELLS).
    - Three standards on GCL joining so as to prevent/monitor panel separation.
    - A standard on GN joining with plastic cable ties… see Item #6.
    - A guide as to recommended testing of drainage geocomposites.
    - A practice explaining the use of MARV for geotextiles
    - A transverse rib bending test for homogeneous geogrids

Progress within GII (Information)

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

To go further one needs a members-only password. Your contact person (see the last section of this Newsletter/Report if you do not know who it is) must obtain a password from Marilyn Ashley. Marilyn can be reached by e-mail at mvashley@verizon.net. When you get into this section, the following information is available. This includes:

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

The Keywords Section contains about 35,000 citations which is the 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.

Important Note: This keyword search is now available to everyone. It is on the open section of our website, however, there is a charge to non-GSI members, (www.geosynthetic-institute.org/keywordpay.html). The duplicate information is in the password protected section and is free for GSI members.

In addition to the information provided in our home page as just mentioned, Jamie Koerner (Special Projects Coordinator) performs various surveys on pertinent topics in geosynthetics. The latest is a survey by Jamie Koerner on the status of geosynthetic use by U.S. State Departments of Transportation. It is available on our website as White Paper #39. Also, if you have topics in need of the current status please advise accordingly.

As a point of interest, we report that construction for the Route 420 (Kedron Avenue) bridge, spanning Stony Creek in Ridley Township, Delaware County, has been going on since June and is just about finished as of the writing of this newsletter. It is part of the Pennsylvania Department of Transportation's (PennDOT) Rapid Bridge Replacement Project. Replacement of this bridge will allow PennDOT to remove it from the list of structurally deficient bridges in Delaware County.

This bridge is referred to as JV-214 and is one out of the 558 bridges being replaced under the Rapid Bridge Replacement Project. JV references the joint-venture partnership between Walsh/Granite, which is leading construction for the entire effort. As you can see by the timeline of photos following there are many geosynthetics used on the project. They include but are not limited to;

- geomembrane dam and waterproofing
- waddles for erosion control
- geogrid fencing
- geotextile filtration and separation
- geotextile tube for sediment control
- geofoam for reducing earth pressures and insulation
- geopipe for diversion and culverts, etc.

Geosynthetics have indeed been making a major impact *even in structural engineering projects*!

(a) Original bridge now 78-years old

(b) Bridge closing by Jamie K!


(c) Creek diversion with (only) two 30" pipes


(d) Flooding due to inadequate diversity (woops)

(e) Prefabricated bridge sections joined together

(f) Geosynthetic protection of soil slopes

(g) New drainage pipe retrofits

(h) Geotextile tube dewatering of contaminated construction water

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 and beginning with Report #25 they are on the password protected section of our home page. Prior to that date only the abstract is available online. All of them, however, are 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

Commentary on Webinars: Never in Bob K's long career has he "reached out" to so many people than when giving these webinars. For the single cost of $250 or $200 a feed is delivered over Adobe Connect to the requested site. This can be transmitted anywhere, e.g., office, conference room, hotel room, auditorium or even sent to additional offices and sites. For example, NY-DEC had the feed going into their Albany auditorium and then into the 13-regions of New York State. Clearly, hundreds of participants were involved! *Dear readers we feel that on-line distance learning, aka, webinars, is the way to communicate information to masses of people in an inexpensive and time efficient manner. Indeed, the future of distance learning is here!* The remaining 2018 schedule of GSI Webinars is as follows:

Date	GSI No.	Title
September 12	W-16	Sand Drains-to-Wick Drains-to-Sand Columns (Including a Major Case History Failure)
October 10	W-17	Geosynthetics in Erosion Control
October 24	W-24	Disposal of Coal Combustion Residuals (CCRs)
November 14	W-25	Soil Consolidation using Wick Drains, aka PVDs
November 28	W-14	Lifetime Predictions of Covered and Exposed Geosynthetics
December 12	W-27	Stability Design of Landfill Cover Soils

Courses

We are now abandoning our in-house, one-day, courses (which have been given for the past 30-years) and 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
   (scheduled for October 16, 17, 28; 2018)
2. Construction Inspection of Mechanically Stabilized Earth (MSE) Walls, Berms and Slopes
   (scheduled for November 6, 7, 8; 2018)

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.

GSI Fellowships

GSI, with the guidance of the GSI Board of Advisors, has made their fellowship award selections for the 2018-'19 academic year. The program recognizes and supports outstanding students from around the world studying geosynthetics. The GSI fellowship program for this year continues to include candidates pursuing a master's degree, as well as a doctoral degree. The amount awarded to each fellowship recipient is $5000. The fourteen recipients for the 2018-'19 GSI Fellowship awards are as follows:

	Recipient	University	Advisor	Topic
1-18	Alsharabaili, Alaa	U. of South Carolina	Charles Pierce	Strain hardening method to evaluate the crack resistance of virgin and aged geomembranes
2-18	Faterna, Nuzhath	Syracuse U.	Shobha Bhatia	Role of geotextiles in dewatering tests
3-18	Goudarzi, Anahita	Texas A&M	Jean-Louis Briaud	Experimental and numerical simulation of geosynthetic reinforcement soil interaction
4-18	Hanumasagar, Sangy	Georgia Tech	David Frost	Experimental and numerical evaluation of lateral confinement of aggregates in geogrid stabilized flexible pavements
5-18	McCafferty, Conor	Drexel U.	Grace Hsuan	Numerical modeling to simulate dewatering process of GT tubes filled with fine-grained slurries
6-18	Norris, Anna	Colorado State U.	Joseph Scalia	Indicator parameter test development for screening the hydraulic compatibility of enhanced bentonites
7-18	Rahmaninezhad, Seyed	U. of Kansas	Jie Han	Bearing capacity and deformation of GS walls with flexible facing subjected to footing loads
8-18	Ryoo, Sung	U. of Maryland	Ahmet Aydilek	Hydraulic compatibility of GT compost systems in landfill covers
9-18	Sheikh, Bahman	Penn State	Tong Qiu	Breakwater design guidelines for GT tube applications
10-18	Thabo, Mosta	National Pingtung U.	Wayne Hsieh	Effects of grass and rolled erosion control products at different growth stages on the Manning's coefficient in channel flow
11-18	Ullah, Saad	George Mason U.	Burak Tanyu	Experimental methodology to evaluate long-term performance of GT to minimize the migration of soft clay into highway base courses
12-18	Wang, Dongfang	U. of Mass Amherst	Guoping Zhang	Improvement of GCLs with super hydrophobic hybrid organic-inorganic polymeric powder
13-18	Wright, Jason	U. of Georgia	Sonny Kim	Utilization of accelerated pavement layers due to use of GS materials
14-18	Xia, Xiaolong	Missouri U.	Xiong Zhang	Photogrammetric method to measure 3D full field displacement of GS during the tensile test

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

As of June, 2018, 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 (16 tests)
Rebecca Kurek -- (770) 869-1187
rkurek@lumiteco.com

13[A] - Precision Geosynthetic Labs (TRI Env.) (87 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 (60 tests)
Gary Torosian -- (978) 635-0424
gtt@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 (13 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 (80 tests)
Dong Whan Kim -- 82-2-3299-8071
dwKim@fitiglobal.com

31[D] - NYS Dept. of Transportation (9 tests)
Tom Burnett -- (518) 485-5707
tburnett@dot.ny.gov

34[B] - Solmax/GSE - Houston (29 tests)
Lana Hickman
Lhickman@solmax.com

38[C] - CTT Group (123 tests)
Eric Blond -- (450) 771-4608
eblond@GCTTG.com

40[B] - Solmax GSE (14 tests)
Thomas Harrelson -- (843) 382-4603
tharrelson@gseworld.com

41[A] - SGI Testing Service, LLC (18 tests)
Zehong Yuan -- (770) 931-8222
ZYuan@sgilab.com

42[C] - NPUST (GSI-Taiwan) (70 tests)
Chiwan Wayne Hsieh -- 011-886-8-7740468
CWH@mail.npust.edu.tw

43[A] - Ardaman & Associates (22 tests)
George DeStafano -- (407) 855-3860
gdestafano@ardaman.com

44[B] - Fiberweb, a Berry Global Inc. Co. (9 tests)
Devin Clem -- (615) 847-7299
devinclem@berryglobal.com

45[B] - Ten Cate Geosynthetics Malaysia SDN Bhd. (24 tests)
Boon Kean Tan -- (603) 519 28576
BK.tan@tencase.com

46[B] - TAG Environmental Inc. (13 tests)
Colin Murphy -- (705) 725-1938
colin_murphy@tagenv.com

49[B] - Engepol Geossinteticos (15 tests)
Patricia Ferreira -- (55) 51 3303-3901
patricia@engepol.com

50[B] - ADS, Inc. Hamilton (7 tests)
Terry McElfresh -- (513) 896-2065
terry.mcelfresh@ads-pipe.com

51[B] - Solmax GSE (22 tests)
Claude Cormier -- (450) 929-1234
ccormier@solmax.com

53[B] - Polytex Autofagasta (19 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 Operating Co.Hazelhurst (10 tests)
Victoria Shoupe -- (912) 375-6180
Victoria.Schoupe@propexglobal.com

59[B] - Firestone (8 Tests)
Janie Simpson -- (864) 439-5641
SimpsonJanie@firestonebp.com

60[B] - TDM Geosintéticos S.A. (17 tests)
Roberto Diaz -- 051-1-6300330
rdiaz@tdmgeosinteticos.com.pe

61[B] - Raven Industries (18 tests)
Clint Boerhave -- (605) 335-0288
Clint.Boerhave@ravenind.com

62[B] - Solmax GSE (14 tests)
Pei Ching Teoh – (450) 929-1234
pcteoh@solmax.com

63[A] - TRI-SE Labs (4 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) 022-25003551
btra@vsnl.com

66[B] - Rowad International Geosynthetics Co. Ltd (13 tests)
Asad Ullah Khan -- +966-3-812-1360
asad@rowadplastic.com

68[B] - Glen Raven Technical Fabrics LLC (4 tests)
Tania Currie -- (336) 229-5576
tcurrie@glenraven.com

69[B] - GSE Lining Technology Co. (13 tests)
Siriporn Chayaporenlert – 6638-636638
siripornc@solmax.com

70[A] - RSA Geo Lab LLC (47 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 (4 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 Amercica Inc. (9 tests)
Mark Lockliear - (843) 221-4121
mlockliear@agruamerica.com

75[B] - GeoMatrix S.A.S. (29 tests)
Javier Diaz Cipagauta (571) 424-9999
jdiaz@geomatrix.com.co

76[B] - Tehmco (Chile) (15 tests)
Rodrigo Campoy 56-22-580-2852
rcampoy@tehmco.cl

78[B] - PQA Mexico (15 tests)
Cesar Agusto 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 (10 tests)
André Parent (418) 387-4801
andre.parent@lydall.com

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

83[B] - Solmax GSE (13 tests)
Ahmed Abdel Tawab - 202-2-828-8888
atawab@solmax.com

84[B] - Owens Corning (14 tests)
Ashutosh Dixit - 1-778-945-2888
Ashutosh.dixit@owenscorning.com

85[B] - PAG Tacna (15 tests)
Manuel Constantino Olivares Espinoza –
073-511814-511829
calidad@pgaperu.com

86[B] - BOSTD China (29 tests)
Zheng Hong - 86-532-8780-6919
zhenghong@bostd.com

87[B] - Willacoochee Industrial (19 tests)
Jason Booth - 912-534-5757
jason@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 (10 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)
Jagdeesh B.S. - 91-22-229-76224
geotxt.works@techfabindia.com

93[B] - Garware Technical FIbres (18 tests)
Rajendra K.Ghadge - 0-932-601-8083
rghadge@garwareropes.com

94[B] - Al Hoty Stanger Laboratory (2 tests)
K. H. Atiq Ur Rehman - 971-4-347-2201
atiq@alhotystanger.ae

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 (16 tests)
CHA Ming Yang - 65-6885-1514
ming-yang.CHA@tuv-sud.psb.sg

[A]Third Party Independent [C]Institute
[B]Manufacturers QC [D]Government

If anyone desires more information on the GAI-LAP, its test methods, the associated laboratories, etc., a directory is published in December of each year. It is available on GSI's home page at http://www.geosynthetic-institute.org (Accreditation).

The semi-annual GAI-LAP meeting was held in San Diego, California in conjunction with ASTM D35 on Thursday, June 28, 2018 at the Sheraton Marina Hotel. Twelve people attended this meeting which was held at 7:00 AM in the morning before the Task Groups began. We should point out that a virtual repeat meeting was held as a webinar on Wednesday July 19, 2018 and twenty-three sites were invoblved. We are grateful that ASTM allowed us the venue in San Diego. I also want to thank all that were in attendance for their time, interest and effort.

Front row: Joel Sprague (TRI), Melissa Medlin (TenCate), Mauricio Ossa (GSE), Nigel Wrigley (NewGrid Ltd.), J.P. Kline (Geotechnics), Second Row: Sam Allen (TRI), Henry Mock (Golder) Rebecca Kurek (Lumite), Gary Torosian (GTX GeoComp), Nathan Ivy (AGRU America), Clint Borehave (Raven Industries) Not Pictured: George Koerner (GSI)

The discussion at the one-hour meeting was as follows. A brief introduction and background of the GAI-LAP program was discussed. Please note that we are in our 23nd year of operation. The program started in 1995. We accredit only geosynthetic labs and model the program after ISO 17025. On-site audits are conducted every five years and proficiency tests every year with a goal of the coefficient of variation less than five for each test conducted. The demographics of the current GAI-LAP labs are summarized as follows: 20 independent labs, 46 manufacturer QC labs, and 5 centers (research or government) for 71 total. Thirty-eight of these labs are GSI members and 19 are international labs from 17 different countries. It appears that this program is getting traction internationally. There are 244 possible tests for accreditation (190 ASTM, 1 FTM and 53 ISO standards). The number of accredited tests per individual lab varies greatly, e.g., 4 min., 27 average 128 max. There has been a rapid rise of new test methods. New tests added appear to be outside the ASTM D35 arena. The international arm of testing is very strong. We particularly see this in South America and Asia.

Proficiency testing is still the hallmark of GAI-LAP. Of the 4405 proficiency test results submitted this year, only 37 first submittals were outliers representing 0.8% of the total. All outliers were resolved. Results of the proficiency tests were shared at the meeting and also distributed electronically via e-mail and CD. Congratulations to the GAI-LAP members on a job well done. Several other certification and accreditation programs around the world are now requiring proficiency test data per ISO 17025. All GAI-LAP labs easily comply with this requirement. The GAI-LAP proficiency test program would not function without samples to test. In this regard, we would like to thank the following organizations for their generous contribution of geosynthetics to this cause.

- TenCate Inc. for both geotextiles and erosion control materials
- Solmax GSE for geomembranes
- Naue for geogrids
- CETCO for GCLs
- ADS for plastic pipe
- Maccaferri for geocomposites

However, like most things in life, the proficiency program is not without problems. We have been having issues with retesting or "Mulligans." In short, there is a time crunch with the retesting and in the past, root cause sometimes was not identified or only casually addressed. We find delisting difficult as a result of noncompliance and therefore a change was needed in how we conduct the proficiency testing and specifically how we treat outliers. As of 2018, It should be clearly noted, that any result beyond two standard deviations of the reproducibility database average will be treated as an outlier. There are no more "Mulligans" as in the past. As such, the test in question is subject to corrective action on the part of the laboratory and root cause identification is necessary prior to relisting of the method in one's repertoire of accredited tests. This change has resulted in a few hurt feelings but, as an overall, was the right move and will result in better communication and responsiveness on the part of GAI-LAP.

The GAI-LAP Customer Survey was again sent out to all program participants and the findings were reviewed at the meeting via a 34% return, which is pretty good

due to Jamie's pestering. The following are the results (5 best to 1 poorest); (a) Information exchange = 4.5; (b) Conflict resolution = 4.1; (c) Proficiency testing = 4.6; (d) Directory and internet = 4.4; Overall = 4.5 which, as you can see by the tabulation below, is the best result we have ever received; we must be doing something right!. Overall results to date: 2017 (4.2), 2016 (4.2), 2015 (4.3), 2014 (4.2), 2013 (4.2), 2012 (4.1), 2011 (4.1) 2010 (4.3), 2009 (4.4), 2008 (4.4), 2007 (3.9), 2006 (4.0), 2005 (4.0), 2004 (4.1), 2003 (4.1), 2002 (4.2). A total of eleven on-site audits were conducted in 2017. We would like to thank TRI Environmental for their assistance with six audits.

As usual at these annual meetings we had a lively discussion regarding the conflict resolution cases addressed by the GAI-LAP this year. They are summarized below;

1. For ASTM D4595-17, 1% is the preload
2. For ASTM D638 vs D6693, the standard calls for an extensometer to measure elongation. For ASTM D6693, cross head movement is used to calculate elongation. The results for elongation will not match-up for a variety of reasons. The biggest one being the gauge length for D638 is one inch (25mm) throughout the test.
3. For ASTM D1004 vs D5884, we are finding that several owners are trying to determine the extent of anisotropy in PE geomembranes. They are now calling out ASTM D5885 "trouser tear" over ASTM D1004 "Graves tear." Unfortunately, these tests are not interchangeable and do not give the same results due to sample size and geometry differences.
4. For ASTM D1204, unfortunately specimen size matters when testing for dimensional stability. One lab insisted that a 100 mm by 100 mm specimen gives the same result as a 250 mm by 250 mm. After much review and comparison testing it was concluded that all labs should stick with the required 250 mm by 250 mm specimen size.
5. At the request of a long time GSI and GAI-LAP member we wrote the following letter of opinion in regard to testing ASTM D5397 for textured HDPE;

"As per your e-mail request of April 13, 2018. The Geosynthetic Institute (GSI) is pleased to offer its opinion on specimen preparation protocol for ASTM D5397 "Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test" through the Geosynthetic Accreditation Institute's-Laboratory Accreditation Program (GAI-LAP).

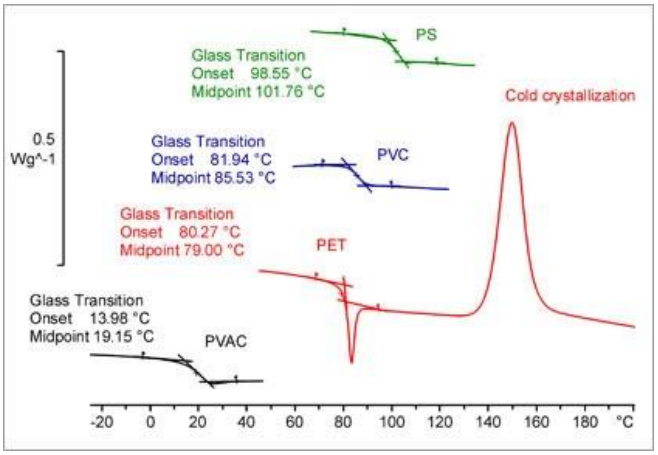
You requested advice regarding the testing of ESCR on single textured geomembrane, without smooth edge. You asked us about the validity of a single textured geomembrane notched on the smooth side. GSI does not think that this is an appropriate approach. We do not recommend this procedure due to the following;

- texture irregularity,
- large range of yield stress in single sided textured geomembrane, and
- difficulty with notching consistently.

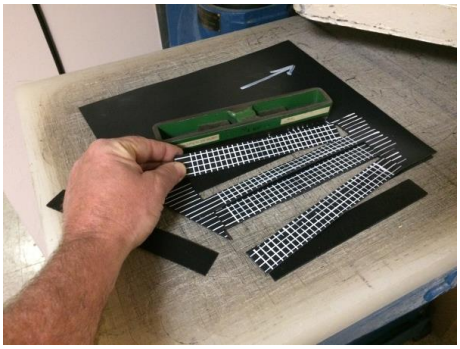
In addition, please note that contained within the standard it states that: APPENDIX NOTE X1.3—This procedure is not appropriate for testing geomembrane with textured or irregular rough surfaces. The irregular surface makes the determination of the ligament thickness, and subsequent applied stress unreliable.

In the absence of a smooth edge to test ESCR, we would recommend molding a plaque as per ASTM D4703 and then testing per ASTM D5397 Appendix "A". We would not recommend grinding the asperities and then testing for ESCR. This process has shown to have considerable variability and induces physical, mechanical and environmental stresses into the geomembrane."

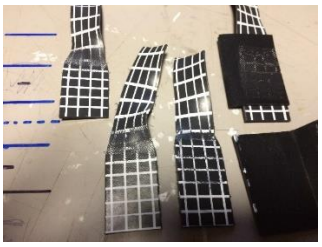
6. We uncovered a problem with ASTM D6693. One lab was experiencing low elongation at break as a result from a nick in the die. This was rectified with replacing the die with a new one and putting all dies on a regular operation and maintenance schedule.
7. There was an inquiry about discrepancy with ASTM D4632 and D4533 results as they apply to light weight NPNW (4-6 osy, i.e., 100 to 150 g/m2 mass) geotextile variability. It was determined that there is large variable in these materials. Specimen preparation is critical and there might be benefit to recording the mass of grab and tear specimens to justify outliers.
8. It was pointed out to us that there is a disconnect in testing PP versus PET geotextiles and geogrids in ASTM D7238 vs D4355. PET geotextiles have a glass transition temperature (Tg) between 65 and 75 deg C. As such, if they are exposed to these temperatures and above during weathering tests, the polymer could be in either the glassy or rubbery stage. See the following graph. Therefore, the question arises of the logic specifying accelerated testing at temperatures above 65 deg C for geosynthetics made of polyester. Furthermore, it is felt by doing so, one favors PP over PET. Unfortunately, we had to admit that this current situation is a bit of a compromise in the name of expediency. This issue needs to be discussed prior to commissioning any accelerated testing with PET products.

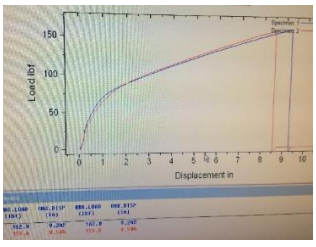


9. There was a major issue with ASTM D 882 as it relates to variability of grip faces as the key factor affecting strain response. It appears that clamp face and pressure matters when testing strip type specimens. To try and demonstrate this phenomenon we prepared specimens with X-Y white marking on the PVC surface that were ductile as follows;



As indicated by the pictures below, the specimen end tabs with the serrated steel grip faces had more slippage within the grip faces than the specimens with the PVC padding. They also had less elongation at break response as a result of this phenomenon.





It was acknowledged that grip face material influences stain in the ASTM D882 strip tensile results. In addition, grip pressure influences stain results, however, it is interesting to note that we still had some slippage even with PVC padding and the back half (3/4") of specimen clamped area in grips is not slipping with SS or PVC padding. Slippage in front half of the specimen clamped area is a result of material thinning as it is strained. As a recommendation we suggest transitioning away from 1" strip tensile test specimens to dog bone specimens to avoid this issue going forward.

The next GAI-LAP annual meeting will be held in January 2019 in conjunction with ASTM D-35 in Houston, Texas. It is a pleasure working with you. We appreciate your participation and please contact accordingly with questions and concerns.

George R. Koerner
Director

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 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 twelfth 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 as follows. The examination has been gradually revised attesting to the changes occurring over the past years.

Inspector Certification Test Results for
Waste Containment Inspectors
2006 – 2018

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	41	4 (10%)	39	1 (3%)	0
TOTAL (to date)	**789**	**94(12%)**	**724**	**78(11%)**	**36 (5%)**

The 5-year renewal periods for those having taken the exam before 2010 is ongoing and about 60% have renewed accordingly. This is felt to be encouraging from our perspective. The next on-line course is October, 16, 17, 18; 2018.

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 next being November 6, 7, 8; 2018. Contact Jamie Koerner at jrkoerner@verizon.net for details and arrangements.

The status of the program is shown in the following table.

Inspector Certification Test Results for
MSE Walls and Berms Inspectors
(2011-2017)

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	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 numerical 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.

Bob Koerner rmk27@drexel.edu
Marilyn Ashley mvashley@verizon.net
Jamie Koerner jrkoerner@verizon.net

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 in the transition of being 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 an 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 10students 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 new direction of Dr. A. K. Mukhopadhyay (who succeeds Dr. A. N. Desai) 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. We are delighted in this regard and, as a side-note, Dr. Mukhopadhyay has replaced Dr. Desai on GSI's Board of Directors to fill out his term.

Geotextile Highway Separation Field Opportunity

One of the original uses of a geosynthetic material has been that of a geotextile placed between the soil subgrade and the stone base course in a highway application. The purpose is clearly that of "separation" such that the base course does not become contaminated with the soil over time. The application was pioneered by the South Carolina Highway Department in the Mid-1920's *and it worked!* One would think that 100-years later every highway (both unpaved and paved) would be underlain accordingly. Unfortunately, this is far from the situation.

Indeed, there have been efforts over the years by many (including GSI) to justify the fabric's use in both laboratory and field studies, but nothing seems to have created a universal acceptance among either public or private highway engineers or specifiers. That said, the situation is not for lack of written publications. Our database of existing papers on this topic show individual papers on design (8 papers), field performance (16 papers), paved roads (13 papers) and unpaved roads (11 papers). In general, all favor the use of geotextile separators!

One major field effort that many do not know about is the installation (facilitated by George Koerner) of 13 full scale field projects in eight states between 1992 and 2001, see the following table.

GSI's Long-Term Benefit/Cost Separation Sites*

No.	Designation/Location	Installation	Contact	Owner/ Agency	Monitoring
1 a-f	CSAH35/Winona, MN	June, 1992	Tilseth	MN DOT	Visual
2 a-f	SR 507/Bucada Road, WA	August, 1993	Tsai	WA DOT	FWD
3 a-c	Pt 363, Greenville, SC	May, 1993	Sprague	TRI	Visual
4 a-b	Driveway/Springfield, PA	June, 1994	Koerner	GSI	Rut Depth
5 a-d	LCS Bedford/VA	September, 1995	Smith	VA DOT	FWD
6 a-d	I-79/Cannonsburg, PA	July, 1997	Clark	PA DOT	Visual
7 a-d	Vorce Road/Lewis, NY	August, 1997	Suits	NYS DOT	FWD
8 a-h	Route 522/Orbisonia, PA	June, 1998	Marks	PA DOT	Visual
9 a-d	Landfill Haul Road, Strasburg/PA	April, 1999	Sabanas	NTH	NIS
10 a-c	I-79/Washington, PA	July, 1998	Clark	PA DOT	Visual
11 a-c	Route 30/York, PA	July, 1999	Petrasic	PA DOT	Visual
12 a-d	Route 9/Aurora, ME	July, 2000	Haden	ME DOT	Visual
13 a-d	US 63/Moberly, MO	May, 2001	Donahue	MO DOT	Tipping Buckets

*Update on GSI's Geotextile Highway Separation Study" by George R. Koerner (2004) in Proc. GRI-18 Conference, GSI Publ., Folsom, PA, 6 pgs.

Each of the above field sites consist of a nearly straight 200 m (600 ft.) long section of highway being constructed. Such a section is shown in the following photo. Several different geotextile panels spanning the lane width are placed between the soil subgrade and base material of the cross section. Two control sections without geotextiles are prepared at both longitudinal ends of the geotextile panel placement.

A major point in this regard is that none of the sites (to our knowledge) have every been evaluated for pavement performance or trafficability. Also, none of them have ever been exhumed to examine the geotextile, stone base course or soil subgrade condition. In this regard, we feel that the time for such investigations is upon us. Highway performances from 17 to 26 years should be adequate to provide some substantive and verifiable answers in this regard.

GSI's dilemma, currently unanswered, is "who is available to do the work". It is simply too much for GSI from both manpower and cost perspectives. As an alternative, we are considering trying to network with each of the state DOTs involved to have them do falling weight deflectometer (FWD) measurements and perhaps geotextile sample retrieval as well. We at GSI would do the requisite laboratory testing. That said, we are somewhat doubtful if such an effort will come into being since state DOTs have their own projects and preferences, and are generally strapped for available funds and personnel. Thus, we will now try for unsolicited proposals by agencies or organizations, but this is also considered somewhat of a "long shot" since funding agencies have their own priorities. As such, we are in a quandary having thirteen valuable field sites without the where-with-all or manpower to perform the requisite work. Any feedback from readers of this column would be appreciated.

George and Bob Koerner

GSI's Member Organizations

We sincerely thank all of our sponsoring organizations. Without them, GSI simply could neither happen nor exist. The current GSI member organizations and their contact members are listed below. **Our newest members INOVA Geosynthetics/AERO Aggregates with Archie Filshill; Sotrafa Agrualura y Geosinteticos of Spain with Jose Miguel Munoz Gomez; Kaytech Fabrics Co. of South Africa with Garth James; Interwrap Inc. with Clive Mills/Martin Vido; Borouge Pte. Ltd. of Singapore with *Mohamed Ali Jaber/Peter Malmros/Rick Cui,* and Thrace Group with Steven Lothspeich/Stella Karavasili. Thanks to all and welcome to GSI!!!**

GSE Environmental
Jimmy Youngblood [BoA]/Mark Harris
U.S. Environmental Protection Agency
David A. Carson
Federal Highway Administration
Silas Nichols/Daniel Alzamora
Golder Associates Inc.
Frank Adams/Paul Whitty
Tensar International Corporation
Mark H. Wayne [BoA]/Joseph Cavanaugh/Doug Brown
TenCate Geosynthetics
John Henderson/Chris Lawson
CETCO
Davie Chiet/Michael Donovan/Rob Valorio
Huesker, Inc.
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