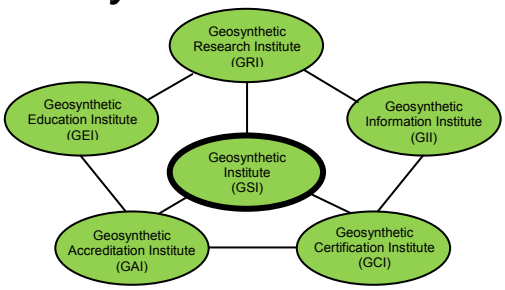
The GSI Newsletter/Report

Geosynthetic Institute



Vol. 27, No. 1 **March, 2013**

This quarterly newsletter, now in its 27th 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 gkoerner@dca.net or mvashley@verizon.net.

Activities of GSI's Directors and Officers

1. The GRI-25 Conference, set for Long Beach on April 1-2, 2013, will have 22-presentations to accompany the authors written papers which will be distributed as a CD. If you are not in attendance but want a copy for your library please advise accordingly.
2. The same event, i.e., Geosynthetics 2013, will host our annual meeting and Board of Directors meeting. See our website for agendas.
3. Boyd Ramsey and Tony Eith will have BoD service plaques presented to them at the annual meeting. We at GSI sincerely appreciate their activities and interactions over the years.
4. The proficiency tests for the accreditation program are out and results will be presented at the June ASTM meeting.
5. One-day in house courses are being presented presently. The next set of offerings will be in November.
6. Webinars, webinars and more webinars are being presented – see the commentary in this Newsletter/Report for the newest set in this regard.
7. The present BoD is as follows, along with their respective term ending year's.

Term Ends 2013

- David Jaros - Corps of Engineers (Government Agencies)
  e-mail: dave.l.jaros@usace.army.mil
- Lili Cui – Chevron Phillips Co. (Resin/Additive)
  e-mail: cuil@cpchem.com
- Kent von Maubeuge - NAUE GmbH & Co. KG (International-1)
  e-mail: kvmaubeuge@naue.com

Term Ends 2014

- Mark Sieracke - Weaver Boos (Consultants and Testing Labs)
  e-mail: msieracke@weaverboos.com
- Tim Rafter - Atlantic Lining (Geomembranes and GCLs)
  email: Timr@atlanticlining.com
- Wayne Hsieh - NPUST and GSI-Taiwan (International-2)
  e-mail: cwh@mail.npust.edu.tw

Term Ends 2015

- 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

In This Issue

Overview of GRI Projects (Research)

Each issue of our Newsletter/Report provides a brief glimpse and update of current GRI research projects. It will be noted that most projects are of a very long duration; one being up to 50-years! (In this regard short projects are given to design firms or testing laboratories that are GSI Members). Details and full briefings are available to member organizations at their request. Dr. Grace Hsuan, Associate Director of GRI can be contacted for additional information as can the other project managers listed in the following write-ups. ***Projects marked with an asterisk have been written up as either short "in-progress" papers or complete papers.*** Grace can be reached by email <grace.hsuan@coe.drexel.edu> or phone at (610) 522-8440.

Important Notice: Use of GSI/GRI generated data and information is for member organization use assuming that the information is not taken out of the context of which it was developed. When used for formal publications such as proposals, regulatory permits, brochures and advertisements we would appreciate seeing a draft copy for possible comments. Thank you for your cooperation in this regard.

1. **In-Situ Temperature Monitoring of Liner and Cover Geomembranes in Dry and Wet Landfills*** - George Koerner is measuring the in-situ temperature behavior of liner and cover geomembranes and has installed 60± thermocouples for long term measurements in both wet and dry municipal solid waste landfills in Pennsylvania. The project has been extended into its 15th-year and has resulted in an extremely authoritative set of real-life data.
2. **Bioreactor (aka, Wet) Landfill Behavior and Properties*** - One of the landfill cells mentioned in Item #1 is at field capacity, hence it is a true anaerobic bioreactor. Dr. George Koerner is in charge of considerable monitoring at this cell which includes the following
   - waste moisture content
   - waste temperature
   - leachate chemical analysis
   - waste gas analysis
   - perched leachate within the waste

   Data is being collected on a quarterly basis. The timeline of the project calls for monitoring up to 10 years. This activity has been extended to an adjacent landfill to see how reproducible the data is with a slightly different waste mass.
3. **Flow Behavior of Fully Degraded Waste*** - A field project is investigating the drainage of highly degraded MSW placed directly on leachate collection systems. The leachate collection materials consist of both natural soils and geosynthetic drains. The experimental setup has been dismantled and a presentation was given at the 2012 Global Waste Conference in Phoenix… a paper will follow.
4. **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) is often using a wrap-around configuration leaving the geogrid exposed to the atmosphere. A new project being conducted by George Koerner is presently investigating two different geogrid's behavior over time. A 50-year time frame is envisioned. The long-term behavior will eventually be compared to UV laboratory exposed data as noted in Item #7 below.
5. **Field Behavior of fPP and fPP-R Geomembranes** - We continue to receive and evaluate field samples of flexible polypropylene geomembranes (mainly scrim reinforced). They are regularly added to our database in this regard. The most recent was for potable water storage and had a service lifetime of 10-years. Using our correlation factor of 1200 light hours in D7238 at 70°C being equivalent to one-year in a hot climate, this is equivalent to a laboratory exposure in the weathering device of 12,000 light hours. Our GRI-GM18 specification calls for 20,000 light hours for an acceptable formulation which is essentially a factor-of-safety of 1.7.
6. **Laboratory Exposed Lifetime of Geomembranes*** - GSI is using three UV-fluorescent devices to estimate the projected exposed lifetime of many different types of geomembranes. Presently being incubated are HDPE, LLDPE, fPP, PVC (N.A.), and EPDM. Exposure times of 50,000 light hours are now realized at 70°C and a replicate set of samples are being incubated at 60°C. Some will take at least 70,000 light hours (≈ ten years). The third sequence at 80°C was started on 1/1/2010. Ongoing data is being reported to manufacturers and resin producers. GRI Report #42 is available on the 70°C data using a correlation coefficient to estimate field lifetime of the various geomembranes.
7. **Laboratory Exposed Lifetime of PVC (European) Geomembranes** - Of late, we have been attempting to distinguish between PVC geomembranes manufactured in North America versus Europe. Of course, the difference is in the type of plasticizers and other additives used in the formulations. In this regard we have been evaluating various 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.

8. **Laboratory Exposed Lifetime of Geogrids** - The UV-fluorescent exposure of two different polypropylene biaxial geogrids which are used at the exposed faces of welded wire mesh MSE structures is ongoing. The various geogrids are now up to 40,000 light hours and data is being generated and sent to the respective manufacturers; Tensar and TenCate. Replicate samples are now being incubated at 60°C for eventual use in Arrhenius Modeling and lifetime prediction. The last set at 80°C has just begun incubation.
9. **Laboratory Exposed Lifetime of TRM Fibers** - We are also using UV-fluorescent exposure of four different turf reinforcement mat fibers to assess their lifetime capabilities. They are presently being incubated at 60°C, 70°C and 80°C. Communication between the manufacturer Propex is ongoing.
10. **Laboratory Exposed Lifetime of Geotextiles** - We have just completed a UV study on a heat-bonded nonwoven PP geotextile used for three dimensional cell structures which are exposed to the atmosphere. The results for the particular geotextile and its specific formulation at 20°C (68°F) average field temperature are 4.9 years for halflife of breaking strength and 4.1 years for halflife of breaking elongation.
11. **Retaining Wall Failure Evaluations* -** We presently have GRI Reports 38, 39, and 40 addressing mechanical stabilized earth (MSE) walls using geosynthetic reinforcement which document 82-failures. Our data base has now increased to 175 failures and continues to grow! The failures are either excessive deformation or 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. We have just recently presented the findings at two geotechnical conferences; one in Williamsburg and the other in Hershey. A paper on the first 141 failures is available.
12. **pH Between Masonry Block Wall Units*** - George Koerner has been measuring the pH between three types of masonry blocks for over six years to monitor the values. Concern here is over PET geogrids which are known to be sensitive to high alkalinity environments. Indeed, the values started high, but over time are now down to eight and lower. George Koerner has a paper in this regard.
13. **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.
14. **Puncture Behavior of Nontraditional Protection GSs** - A member organization asked about the protection afforded to a geomembrane by geonet composites and GCL's. As a result, we have just concluded a laboratory study using three different probes against various GMs protected by geotextiles, GCs and GCLs. The resulting paper has been published by ASTM's Journal of Geotechnical Testing… it's available.
15. **Abrasion Resistance of Geomembranes** - A laboratory study (using the Tabor Abrading device) on the abrasion resistance of various geomembranes has recently been concluded. Both dry and saturated conditions are included. The results are being presented at the Geosynthetics 2013 Conference.
16. **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 reasonable for most geomembrane types, it is questionable for HDPE which is semi-crystalline and cannot stress relax. To investigate slower rates Bob Koerner is performing a new project with rates as low as 6.9 kPa/month (1.0 psi/month)! Initial data is available.
17. **$CaCO_3$ in Bentonites Contained Within GCL's** - It is possible that the amount of calcium carbonate contained within the bentonite of different GCL's is indicative of their hydraulic performance. George Koerner has evaluated 15-bentonites and has a paper in progress.
18. **Generic Specifications** - A major continuing effort is ongoing with respect to the development and maintenance of GRI's generic geosynthetic specifications. The current status of these specifications is as follows:

<u>Completed, Available and Regularly Updated</u>
GM13 – HDPE Geomembranes
GM17 – LLDPE Geomembranes
GM18 – fPP and fPP-R Geomembranes
GM21 – EPDM and EPDM-R Geomembranes
GM22 – Exposed Temporary Covers
GM25 – LLDPE-R Geomembranes
GM19 – Geomembrane Seams
GT10 – Geotextile Tubes
GT12 – Geotextile Cushions
GT13 – Geotextile Separators
GCL3 – Geosynthetic Clay Liners

<u>Working Within Focus Group</u>
GTXX – Turf Reinforcement Mats (tabled)
GCXX – Geocells

<u>Delayed or Off in the Distance</u>
GGXX – Bidirectional Geogrids
GGXX – Unidirectional Geogrids
GNXX – Geonet Drainage Composites
GCXX – Other Drainage Geocomposites
GSXX – High Strength Reinforcement Geotextiles

The complete set of specifications are available to everyone (members and nonmembers) on the open section of our Home Page. Please download and use them accordingly. Also note that this is where the latest modification will always be available. There is a brief tutorial accompanying each specification. They will be updated shortly. Copies of the above listed draft specification tables are also available to members and associate members.

19. **Other GRI Standards** - There are several GRI Standards in various forms of preparation. These include the following:
    - Test method for average geomembrane thickness
    - guide for geocell seaming efficiency
    - A group of test methods being prepared for both ThermaGreen and Maccaferri Companies for their respective new products.

Progress within GII (Information)

Our GSI Home Page is accessed as follows:

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

It has been completely 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:

- **Introduction to GSI**
- **Prospectus**
- **Associate Membership (Agencies)**
- **Members by Focus Groups**
- **GSI Publications**
- **GRI Specs, Guides, White Papers**
- **Laboratory Accreditation**
- **Product Certification**
- **Newsletter/Reports**
- **Internet Courses**
- **GSI Members Links**
- **GSI Member Meetings**
- **Courses at GSI**
- **Insp. Cert. Programs**

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 get 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 30,000 citations which is the majority of the geosynthetics literature published in English. It's quite easy to use 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.

In addition to the information provided in our home page as just mentioned, Jamie Koerner (Special Projects Coordinator) is performing various surveys of pertinent topics in geosynthetics.

Most of these have been turned into GRI White Papers; the following being the most recent.

#20 - GS Opportunities with Shale Gas Extraction
#21 - State Regulatory Departments Involved in Shale Gas Permitting
#22 - Selected GS Opportunities with Energy Production and Transmission
#23 - EPA Agencies Regarding Landfill Berms
#24 - Reduction Factor for Holes in GS Reinforcement
#25 - The Separation-in-Plane (SIP) Mode of Failure When Testing GM Seams
#26 - Need for Justification of Quality Management Systems for Successful GS Performance

Jamie's most recent survey is a retrospective review of the 136 faculty which participated in the Educate-the-Educators week-long courses at Auburn University from 1994-1998. Do ask for a copy if interested.

Progress within GEI (Education)

Free CD

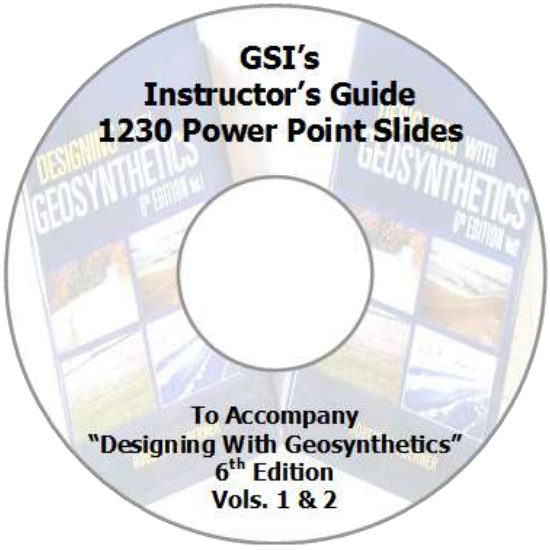
We sent a broadcast e-mail to everyone stating that many power point presentations were available and would be sent upon request. Many persons replied asking for all of them. Therefore, we put all 63 presentations on a CD which was sent to all GSI contact persons. That said, we have many copies still available so do ask and we will mail it to you immediately. Topic areas are all types of geosynthetics, plus walls/slopes, landfills, specifications, and miscellaneous.

6th Edition of Designing With Geosynthetics

The 6th Edition of Designing With Geosynthetics continues to sell well in all three of its formats; hardback, softback and e-book… the latter is really cheap!

The two volume set can be purchased through GSI, Xlibris, Amazon and Barnes and Noble. A special link in available on the cover page of our website.

Our most recent activity in this regard is to develop a power point presentation for the entire 914-page book. This is what it looks like and it does indeed contain 1230 nonencrypted ppt slides.



Call or e-mail if you want a copy. It is free to all, but we need your postal address.

GRI Reports

To date, we have 42 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. The most recent reports are as follows:

- #39 – Methods of Stabilizing Excessively Deformed MSE Walls
- #40 – On the Prevention of Failures of Geosynthetic Reinforced MSE Walls and Recommendations Going Forward
- #41 – Analysis and Critique of Twenty Large Solid Waste Landfill Failures
- #42 – Lifetime Prediction of Laboratory UV Exposed Geomembranes Based on a Correlation Factor (due January 2, 2012)

Courses

We have scheduled the following courses. The new series will be in November 2013 with the agenda to be posted on our website.

#1 March 20, 2013
Design and Testing of Geosynthetics in Waste Containment Systems

#2 March 21, 2013
QA/QC of Geosynthetics in Waste Containment Systems
(Optional Exam Follows)

Each course carriers with it 8 PDH's. All are held at GSI so demonstrations by George enliven and illustrate the respective lectures. GSI is approximately 4.5 miles from Philadelphia International Airport.

Course Registration and Fee:
$350/person for each one-day course (up to one month prior to course)
$400/person thereafter
$250/person – GSI Members
Contact: Marilyn Ashley (mvashley@verizon.net)

GSI Fellowships

As in the past, GSI has been awarding graduate fellowships for students performing geosynthetics research. There were nine new proposals this academic year. These proposals were then reviewed by the GSI Board of Directors along with Bob and George Koerner.

The presently established criteria are as follows:

- Students must be working on a geosynthetics topic which furthers the technology in a proactive manner.
- Students must have completed their candidacy requirements leading to a doctoral degree. (Comment, we hope that some of them will "go academic" and teach and/or research geosynthetics in their immediate future)
- Students must be recommended by their advisor or department head.

- The fellowships can be renewed for a total of three-years depending upon acceptable annual reports.
- Funding for each student is $10,000 the first year and $5000 for the second and third years.

The following table identifies the successful recipients, their university, advisor and topic. We congratulate the students and wish them success in their endeavors. If any readers wish to add congratulations or to find greater detail as to specific projects and students please contact us accordingly.

GSI Fellowship Status for 2012-'13 Academic Year

Class 4 (a) – 2nd Year Funding at $5,000 per student

No.	Name	University	Advisor	Topic
3-11	Felix Jacobs	RWTU-Aachen, Germany	Martin Ziegler	Geogrid Reinforced Soil in Biaxial Compression Tests
4-11	Mahmound Khachan	Syracuse University	Shobha Bhatia	Dewatering Performance of Geotextile Tubes

Class 5 (a) – 1st Year Funding at $10,000 per student

No.	Name	University	Advisor	Topic
1-12	Chuangi Wang	University of Memphis	David Arellano	Properties of Recycled Expanded Polystyrene
2-12	Xunchang Fei	University of Michigan	Dimitrois Zekkos	Biodegradation of Geotextiles
3-12	Jitendra K. Thakur	Univeristy of Kansas	Jie Han	Recycled Asphalt Used in Geocells

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. In short, this means that the 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 and documentation for specific standard ASTM, ISO or GRI 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 230 GAI-LAP test methods available for accreditation. Please consult our home page for a current listing.

As of December, 2012, 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. (118 tests)
Sam Allen -- (512) 263-2101
Sallen@tri-env.com

3[A] - Golder Associates (45 tests)
David Alexander -- (770) 492-8280
dalexander@golder.com

4[C] - Geosynthetic Institute (116 tests)
George Koerner -- (610) 522-8440
gkoerner@dca.net

8[B] - Propex, Ringgold (19 tests)
Todd Nichols -- (800) 258-3121
todd.nichols@propexinc.com

9[B] - Lumite (10 tests)
Rebecca Kurek -- (770) 869-1700
rpage@lumiteco.com

13[A] - Precision Laboratories, CA (95 tests)
Cora Queja -- (714) 520-9631
cqueja@precisionlabs.net

14[A] - Geotechnics (57 tests)
J. P. Kline -- (412) 823-7600
JPkline@geotechnics.net

20[A] - GeoTesting Express, MA (46 tests)
Gary Torosian -- (978) 635-0424
gtt@geotesting.com

22[B] - CETCO Hoffman Estates (13 tests)
Jim Olsta -- (847) 392-5800
jim.olsta@cetco.com

23[B] - CETCO Cartersville (10 tests)
Chris Cunningham -- (706) 337-5316
christopher.cunningham@cetco.com

24[B] - CETCO Lovell (10 tests)
Roger Wilkerson -- (307) 548-6521
roger.wilkerson@cetco.com

25[B] - Ten Cate, Pendergrass (11 tests)
Beth Wilbanks -- (706) 693-2226
b.wilbanks@tencate.com

26[B] - Agru America Inc. (17 tests)
Grant Palmer -- (843) 546-0600
gp@agruamerica.com

29[e] - FITI Testing and Research Institute (86 tests)
Hong-Kwan Kim -- 82-2-3299-8071
hoganKim@fiti.re.kr

31[D] - NYS Dept. of Transportation (9 tests)
John Remmers -- (518) 457-4104
Jremmers@dot.state.ny.us

32[A] - Geo-Logic Inc. (6 tests)
Ken Criley -- (530) 272-2448
criley@geologic.com

34[B] - GSE Richey Road (34 tests)
Jane Allen -- (281) 230-6726
Jallen@gseworld.com

37[B] - GSE Chile (21 tests)
Mauricio Ossa -- 56-2 6010153
Mossa@gseworld.com

38[C] - Sageos/CTT Group (91 tests)
Eric Blond -- (450) 771-4608
eblond@groupecttgroup.com

40[B] - GSE Lining Technology Inc. (17 tests)
Vicki Parrott -- (843) 382-4603
Vparrott@gseworld.com

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

42[C] - NPUST (GSI-Taiwan) (69 tests)
Chiwan Wayne Hsieh -- 011-886-8-7740468
CWH@mail.npust.edu.tw

43[A] - Ardaman & Associates (18 tests)
George DeStafano -- (407) 855-3860
gdestafano@ardaman.com

44[B] - Fiber Web, Inc. (9 tests)
Adam Lyons -- (615) 847-7575
adam.lyons@fiberweb.com

45[B] - Ten Cate Malaysia SDN Bhd. (23 tests)
C. P. Ng -- (603) 519 28568
cp.ng@tencate.com

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

47[B] - Syntec LLC (9 tests)
Jeffrey Hicks – (410) 327-1070
jhicks@synteccorp.com

49[B] - Engepol Geossinteticos (19 tests)
Carolina Polomino -- (55) 11-4166 3001
carolina@engepol.com

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

51[B] - Solmax International Inc. (20 tests)
Simon Gilbert St. Pierre -- (450) 929-1234
simonGSP@solmax.com

53[B] - Polytex Inquique (13 tests)
Cristian Valdebenito -- 011 56 57 42 90 00
cvaldebenito@polytex.cl

54[B] - ADS, Inc. Finley (9 tests)
David Gonso -- (419) 424-8377
davegonso@ads-pipe.com

55[B] - Atarfil Geomembranes (20 tests)
Iganacio Garcia Arroyo -- 34 958 439 278
ngarcia@atarfil.com

56[B] - Polytex Santiago (11 tests)
Jamie Morales -- 56-2-627-2054
Jmorales@polytex.cl

57[B] - Ten Cate Cornelia (15 tests)
Melissa Medlin -- (706) 778-9794
m.medlin@tencate.com

58[B] - Propex Nashville (9 tests)
Tim Smith -- (229) 686-5511
Timothy.Stark@propexglobal.com

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

60[B] - Polytex Lima (11 tests)
Elias Jurufe -- 51 16169393
Ejarufe@polytex.cl

61[B] - Raven Industries (17 tests)
Justin Norberg -- (605) 335-0288
Justin.Norberg@ravenind.com

62[B] - Solmax International Asia (14 tests)
Marie Andre Fortin – (450) 929-1234
mafortin@solmax.com

63[A] - TRI Environmental, Inc.; DDRF (4 tests)
Joel Sprague -- (864) 242-2220
JSprague@tri-env.com

64[B] - Agru America (NV) (14 tests)
Chris Adams -- (775) 835-8282
ca@agruamerica.com

65[C] - Bombay Textile Rsearch Assoc. (BTRA) (24 tests)
Riyaz Shaikh
(0) 022-25003551
btra@vsnl.com

66[B] - Rowad International Geosynthetics Co. Ltd (14 tests)
Asad Ullah Khan -- +966-3-812-1360
usad@rowadplastic.com

67[A] - MicroBac Hauser Division (8 tests)
Steve Ferry – (720) 406-4806
steve.ferry@microbac.com

68[B] - Glen Raven Technical Fabrics LLC (3 tests)
Edmund Gant -- (336) 229-5576
egant@glenraven.com

69[B] - GSE Lining Technology Co. Ltd. (12 tests)
Siriporn Chayaporenlert – 6638-636638
siriporna@gseworld.com

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

71[B] - Plasticos Agricolas y Geomembranas S.A.C. (14 tests)
Jhoana Carolina Diaz Martinez – 6370 (20 110811)
calidad@pgaperu.com

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

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

The growth of geosynthetic materials in Transportation, Geotechnical and Environmental related applications has been dramatic. Total use and sales of these materials are regularly increasing at rates of greater than 10% per year. In this climate of rapid growth it is important to assure quality. To this end, NTPEP has formed AASHTO's NTPEP Audit Program for Geotextiles which began on March 1st, 2012. The program was developed by both industry and state DOT members to establish a list of manufacturing plants, private label companies, and their associated geotextile products that conform to the quality control and product testing requirements of AASHTO M288.

This program provides state DOTs with much needed conformance information and data. Included in this program is the requirement for source manufacturer marking of each product. This will help the state DOT's to confidently identify geotextile products arriving at their job sites and associate them with a NTPEP evaluated source manufacturer QC/QA program.

For manufacturers, the audit program consists of a desktop review of the manufacturer's Quality Management System (QMS) once every three years and a yearly on-site audit of each plant that has products tested through NTPEP. The testing will have to be conducted by an accredited laboratory. It is conducted as a split sample testing program, in that the NTPEP test results can be directly compared to the manufacturer's QC test results to evaluate consistency of the manufacturer.

A Technical Committee convenes at least annually to discuss matters of prequalifying construction materials. The chairman and vice chairman are as follows:

Tony Allen (Chairman)
Washington DOT
Phone: (360) 709-5450
E-Mail: allent@wsdot.wa.gov

Jim Curtis (Vice Chairman)
New York DOT
Phone: (518) 457-4735
E-Mail: jcurtis@dot.state.ny.us

State DOT's are benefiting from this program and it is great to see that they are using an accreditation program like the GAI-LAP to assure data quality. On the horizon NTPEP are looking to put programs in place for geogrids, geocomposites and already have one for plastic pipe. We see great opportunities in the future for working together.

George R. Koerner

Activities within GCI (Certification)

GSI presently has two 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 other (begun on Dec. 1, 2011) is focused on MSE Wall, Berm and Slope field inspection. See our website at www.geosynthetic-institute.org under "certification" for a description and information on both of them. They are both 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 CQA activities with either geosynthetic liner or cover systems or MSE walls, berms, or slopes using geosynthetic reinforcement.
- 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.
- 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.

Program #1 - Inspection of Liner Systems for Waste Containment Facilities

This program now in its sixth year has been recommended, and in some cases required, by solid waste owners, state regulators, and design consultants for proper QCA in field installation of both geosynthetic materials and compacted clay liners. The statistics to date are as follows.

Inspector Certification Test Results
2006 – 2012

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 (1.5%)
2007	82	11 (13%)	73	12 (16%)	7 (8.5%)
2008	95	25 (26%)	89	20 (22%)	13 (14%)
2009	36	7 (19%)	36	2 (5%)	2 (6%)
2010	59	12 (20%)	54	7 (13%)	5 (8%)
2011	54	6 (11%)	53	3 (6%)	1 (2%)
2012	34	5 (15%)	28	3 (11%)	3 (9%)
TOTAL (to date)	**501**	**72 (15%)**	**461**	**59 (13%)**	**33 (7%)**

The 5-year renewal period for those having taken the exam in 2006 is at present and about 60% have renewed accordingly. This is felt to be encouraging from our perspective.

Program #2 - Inspection of MSE Walls, Berms and Slopes

The official launch of the program was on December 1, 2011 with a course and the examination afterward. More recently a somewhat revised course on November 29, 2012 was presented. There are now fourteen persons certified by GCI for the inspection of MSE Walls, Berms and Slopes.

This one-day course and subsequent examination were developed by GSI and reviewed by a steering committee consisting of the following individuals:

- Kent von Maubeuge – NAUE Group
- Mohammed Karim – Virginia DEQ
- Bob Sabanas – NTH Consultants
- John Conturo and Maria Tanase – AECOM, Inc.
- John Lostumbo – TenCate Geosynthetics
- Mike Yako – GEI Consultants
- Steve Poirier – Geosyntec Consultants
- Willie Liew – Tensar International
- Doug Clark – CEC Consultants
- Dick Stulgis – Geocomp, Inc.
- Frank Adams, Paul Whitty, Rafael Ospina – Golder Associates
- Daniel Alzamora - FHWA
- Sam Allen – TRI Environmental Inc.
- Greg Cekander – Waste Management Inc.
- Greg Fedak – CETCO Contracting Services

Our thanks go to them in this regard.

While a field inspector cannot require proper design or instruct a contractor how to build the 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. Please contact George Koerner at gkoerner@dca.net or Jamie Koerner at jrkoerner@verizon.net for questions or additional information.

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 two countries (Korea and Taiwan), 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 formulations, etc.

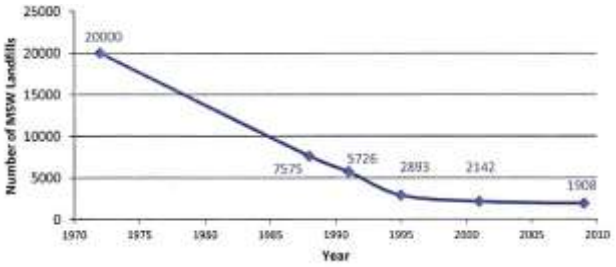
GSI-Taiwan was formed on August 18, 2000 and is wholly contained within the National Pingtung University of Science and Technology in Nei Pu, Pingtung (southern Taiwan). It completely parallels GSI in that it has specific units for research, education, information, accreditation and certification. The 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 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.

Items of Interest

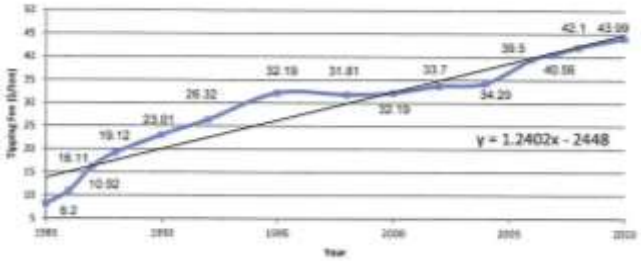
1. **Shale Gas "Push-Back" in Europe**
   European shale gas plays are in a greatly varying status in Europe according to The Economist of 2/2/2013. The following map shows the variation that exists.

European Shale Gas Plays (International Energy Agency; KPMG; press reports)

2. **Landfilling Remains the Most Common Disposal Method for Municipal Solid Waste**
   (ref. NSWMA)
   According to the U.S. Environmental Protection Agency, of the 249 million tons of MSW generated in 2010, 135 million tons (54%) were landfilled. Landfills have received approximately the same amount of MSW since 1980 despite a steady decline in landfill numbers. In the 1970s, some 20,000 landfills existed and most were unlined dumps. As a result of stringent federal and state regulations, there are now slightly more than 1,900 MSW landfills.



3. **Trend of Landfill Tipping Fees**
   (ref. NSWMA)
   The cost of waste disposal at an MSW facility is referred to as the tipping fee. Many tipping fees exist at a facility, but the most commonly referenced tipping fee is the spot market tip fee (i.e., the drive-up cost to dispose of a single ton of MSW). A regression analysis (R^2=0.9293) of the data showed a statistically significant correlation between tipping fees and time; i.e., tipping fees have increased on average by $1.24 per year.



4. **England's Largest Nude Land Sculpture Unveiled**
   (ref. ABC News – England's Largest Nude Land Sculpture Unveiled)

   Northumberlandia, which is being called the world's largest human landform, is currently officially open. Also known as "The Lady of the North," the land sculpture of a reclining lady was recently unveiled by Princess Anne. The sculpture is part of a 46-acre park with four miles of footpaths open to the public. Northumberlandia is a unique sculpture that was made from the land in the park. Made of 1.5 million tons of rock, clay and soil, The Lady of the North is 100 ft. high and a quarter of a mile long. She is the masterpiece of

Charles Jenks, an American-born architect who has come to fame in England. The project cost 3 million euro and will be maintained by independent charity The Land Trust.

Webinars, Webinars and More Webinars

As many of you know, we are and have been presenting webinars on behalf of the American Society of Civil Engineers (ASCE) for several years. There are seven topics at present (see the next section on "Upcoming GSI Events" for topics) and they have been well received with from 10 to 45 access portals for each of them. That said, they appear to us to miss large sections of potential audiences. For example, the solid waste groups, non-engineering groups and international groups are generally not participating.

With this missing audience in mind, GSI will begin hosting its own monthly webinars this coming June with the following monthly topics on each 2nd Wednesday.

GSI Webinars

GSI 1 – June 12, 2013 "MSE Wall Failure Data Base of 171 Cases"
GSI 2 – July 10, 2013 "MSE Wall Back Drainage Design"
GSI 3 – August 14, 2013 "MSE Wall Remediations for Walls with Excessive Deformation"
GSI 4 – September 11, 2013 "MSE Wall Field Inspection Practices"
GSI 5 – October 9, 2013 "Geosynthetics in Hydraulic Applications"
GSI 6 – November 13, 2013 "Geosynthetics in Heap Leach Mining"
GSI 7 – December 11, 2013 "Geosynthetics in Agriculture"
GSI 8 – January 8, 2014 "Geosynthetics in Private Development Applications"
GSI 9 – February 12, 2014 "Landfill Failures"
GSI 10 – March 12, 2014 "Landfill Bioreactors"
GSI 11 – April 9, 2014 "Landfill Expansions"
GSI 12 – May 14, 2014 "Landfill Final Covers"

Each webinar will all be held for 90 minutes from 11:30 AM to 1:00 PM (Eastern Time Zone) and will be on the 2nd Wednesday of each month. Each webinar will carry Professional Development Hours (PDH's) for those interested but will require completion of a short multiple choice test at the end of the webinar. Each webinar will carry 1.5 PHD's granted by the Geosynthetic Certification Institute (GCI).

Registration will be via the Internet and we are presently configuring our website at www.geosynthetic-institute.org for this activity. Please contact us for questions in this regard.

Bob Koerner

Upcoming GSI Events

- ASCE Webinars (all 11:30 – 1:00 PM)
  - April 22, 2013 – Analysis and Design of Veneer Cover Soils for Landfills and Related Waste Containment Systems
  - June 4, 2013 – Geosynthetic Applications Accompanying Shale Gas Drilling Operations
  - July 25, 2013 – An Overview of Geosynthetics and Their Major Applications
  - August 13, 2013 – Design of Geomembranes for Surface Impoundments (Ponds, Reservoirs, etc.)
  - August 29, 2013 – Geosynthetic Applications Associated with Coal Mining Soils and Coal Combustion Residuals – NEW
  - September 9, 2013 – Geosynthetics Used in Unpaved and Paved Roads – NEW
  - September 24, 2013 – Geosynthetic Reinforced Mechanically Stabilized Earth Walls

  Contact: www.asce.org/webinars
- GSI Courses in Folsom, PA
  - Waste Containment Liner and Cover Design March 20, 2013
  - QA/QC of Geosynthetics March 21, 2013 (Optional exam follows)

  Contact: mvashley@verizon.net
- March 3-6, 2013
  GeoCongress 2013
  San Diego, CA
  Contact: www.asce.org/conferences
- April 1-4, 2013
  Geosynthetics 2013 and GRI-25
  Long Beach, CA
  Contact: www.ifai.com/conferences

- April 1, 2013
  GSI Annual Meeting after GRI-25
  5:30 to 7:00 PM
- April 1, 2012
  GSI Board of Directors Meeting after GRI-25
  7:00 to 8:00 PM
- May 5-8, 2013
  Strive for Sustainability
  Sagamore, NY
  www.nyfederation.org/Sagamore

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 are ThermaGreen with Tim Walter/Blu Alexander/Ken vander Velden, Milliken & Co. with Randy Kohlman, Maccaferri with Massimo Ciarla and Pietro Rimoldi, and Jones and Wagener (Pty) Ltd. with Anton Bain as contact persons. Thanks to all and welcome to GSI.**

GSE Lining Technology LLC
Boyd Ramsey [BoD]
AECOM
Kevin McKeon/Ken Bergschultz/John Trast
U.S. Environmental Protection Agency
David A. Carson
E. I. DuPont de Nemours & Co., Inc.
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Federal Highway Administration
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TenCate Geosynthetics
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In-Line Plastics/GeoProducts
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A. N. Desai
BASF Corporation
Joseph J. Fay/Ralph Maier

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ThermaGreen
Tim Walter/Blu Alexander/Ken vander Velden
Maccferri
Massimo Ciarla/Pietro Rimoldi
Jones & Wagener (Pty) Ltd.
Anton Bain

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Oak Ridge National Laboratory
(c/o Savannah River Remediation LLC)
Amit Shyam

IN THE NEXT ISSUE

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- Activities within GII (Information)
- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliate Institutes
- The GSI Centers-of-Excellence
- Items of Interest
- “Geosynthetics and Coal Combustion Residuals”
- GSI’s Member Organizations