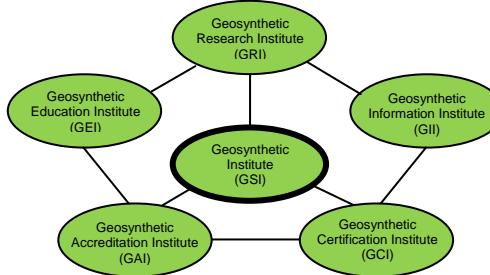


The GSI Newsletter/Report

Geosynthetic Institute



Vol. 27, No. 3

September, 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. Webinars were the key activity over the summer months. We present twelve a year for ASCE who switched their delivery platform from Microsoft Office Live Meeting to Adobe, which is a voice-over-internet protocol (VOIP). In economics-speak this avoids all long-distance telephone calls... see www.ASCE.org/webinars.
2. GSI has also begun to host its own webinars and we also give twelve per year. Ours are on the 2nd Wednesday of every month from 11:30 AM to 1:00 PM (Eastern Time Zone). We too are switching to the Adobe platform and have discounted our price for GSI Members... see www.geosynthetic-institute.org/webinar.
3. Both organizations, ASCE and GSI, offer 1.5 professional development hours (PDH's) and we are now certified in all states (including Florida and New York) as well as in South Africa...wow!
4. George Koerner's laboratory accreditation program is more active than ever. He recently made trips to Vietnam, Venezuela, Mexico and (next) to South Africa plus several labs within the USA.
5. The GSI Fellowship program went smooth thanks to the student proposal reviews by the Board of Directors. Five students received a total of 35,000 USD so as to forward their geosynthetics research activities.
6. The present BoD is as follows, along with their respective term ending years. Don't hesitate to contact any them or the GSI officers.

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
- Boyd Ramsey - GSE (Geomembranes and GCLs)
email: bramsey@gseworld.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

- Activities of GSI's Directors and Officers
- Overview of GRI Projects (Research)
- Progress within GII (Information)
- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliated Institutes
- Items of Interest
- The Four W's of GSI White Papers: Why, What, When and Where
- Upcoming GSI Events
- GSI's Member Organizations

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, Professor of Civil Engineering at Drexel University 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 $60 \pm$ thermocouples for long term measurements in both wet and dry municipal solid waste landfills in Pennsylvania. The project has been extended into its 16th-year and has resulted in an extremely authoritative set of real-life data which is being used by many in their lifetime predictions.
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 wasteData is being collected on an annual basis. The project will be concluded shortly and a paper is being prepared.
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 #8 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. This same durability criterion is embedded in the new CSPE-R geomembrane specification as well.
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, 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 (\approx 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. (Note that the exposure and lifetime prediction of North American produced PVC GMs has been concluded).
- 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 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. This study of exposed geotextile lifetime has been extended to include a lightweight needle-punched nonwoven. Its lifetime, as expected, is much shorter. The third geotextile is a woven slit film and it is almost finished. Two woven monofilament GTs will conclude the series. Results will appear in about six months in a GSI Report.
- 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 grew to 141, then 171, and now (thanks to Rick Valentine) 224. *Readers we have a very serious situation in this regard!* 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 and one 171 failures has been accepted for publication.
- 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. The latest failure in this regard is in Easton, Pennsylvania. It is under investigation presently.
- 14. 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 readily stress relax. To investigate slower rates we have initiated a new project with rates as low as 6.9 kPa/month (1.0 psi/month)! A draft paper has just been submitted. The last test, just now begun, is at a rate of 6.9 kPa/six months (1.0 psi/six months) and it will take about five years to conclude.
- 15. CaCO₃ 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.
- 16. Shrinkage of GCLs Under Wet/Dry Cycling -** George Koerner has been evaluating shrinkage of various GCLs in boxes on the overhead roof of GSI. The study is on behalf of one of our members.
- 17. Temperature Behavior Under Different Geosynthetic Layers -** Since exposed lifetime of geosynthetics is influenced by sunlight the lifetime of layers directly beneath the uppermost one (heat only, but no sunlight) is of interest. George Koerner has set up such a scenario on behalf of one of our members.
- 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:
- Completed, Available and Regularly Updated
- 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
 - GM28 – CSPE-R Geomembranes (in review)

- GT10 – Geotextile Tubes
- GT12 – Geotextile Cushions
- GT13 – Geotextile Separators
- GCL3 – Geosynthetic Clay Liners
- GS15 – Geocells

Working Within Focus Group

- GTXX – Turf Reinforcement Mats (tabled)
- GMXX – Coated Slit Film Geotextiles

Delayed or Off in the Distance

- 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:

- A group of test methods being prepared for both ThermaGreen and Maccaferri Companies for their respective new products.
- Another group of test methods on polymer coated slit film geotextiles – these are being used in agriculture and heap leach mining.

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:

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Introduction to GSI • Prospectus • Associate Membership (Agencies) • Members by Focus Groups • GSI Publications • GRI Specs, Guides, White Papers • Laboratory Accreditation | <ul style="list-style-type: none"> • 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 mwashley@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 (for the concept please read the writeup on pg. 11-12 in this Newsletter/Report) ; the following being the most recent.

- #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
- #27 - The Intimate Contact Issues of Field Placed Geomembranes With Respect to Wave (or Wrinkle) Management
- #28 - Cold Temperature and Freeze-Thaw Cycling of Geomembranes and Their Seams

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; i.e., \$3.50 for each volume! The two volume set can be purchased through GSI, Xlibris, Amazon and Barnes and Noble. A special link is available on the cover page of our website. To date and after six quarters (1.5 years) since publication we have sold the following units. All proceeds go to GSI.

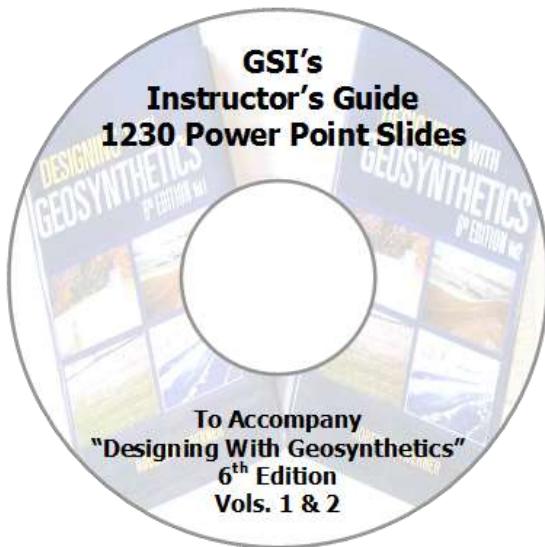
Volume 1 (GS, GT, GG and GN)

hardback	417
softback	423
e-book	259

Volume 2 (GM, GCL, GF and GC)

hardback	392
softback	436
e-book	237

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 two courses here at GSI. They are as follows with the agenda to be posted on our website.

- #1 December 4, 2013
Construction Inspection of MSE Walls, Berms and Slopes
(Optional Exam Follows)
- #2 December 5, 2013
QA/QC of Geosynthetics in Waste Containment Systems
(Optional Exam Follows)

Each course carries 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)

Webinars

(Second Wednesday of Every Month)

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

Registration at www.geosynthetic-institute.org/webinar.htm

1.5 Professional Development Hours; Cost \$250

GSI 1 – June 11, 2014 “MSE Wall Failures Data Base”

2 – July 9, 2014 “MSE Wall Back Drainage Design”

3 – August 13, 2014 “MSE Wall Remediation”

4 – September 11, 2013 “MSE Wall Inspection”

5 – October 9, 2013 “GSs in Hydraulic Applications”

6 – November 13, 2013 “GSs in Heap Leach Mining”

7 – December 11, 2013 “GSs in Agriculture”

8 – January 8, 2014 “GSs in Private Development”

9 – February 12, 2014 “Landfill Failures”

- 10 – March 12, 2014 “Landfill Bioreactors”
- 11 – April 9, 2014 “Lateral and Vertical Expansions”
- 12 – May 14, 2014 “Beneficial Uses of Closed Landfills”

More Webinars

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

Registration at www.asce.org/webinars

1.5 Professional Development Hours; Cost \$400

- ASCE
- 1 – September 24, 2013 “MSE Walls Using Geosynthetics”
 - 2 – October 1, 2013 “Design of Veneer Cover Soils
 - 3 – October 31, 2013 “Geotextile Tubes”
 - 4 – January 14, 2014 “Geomembranes for Surface Impoundments”
 - 5 – February 26, 2014 “Geosynthetic in Paved and Unpaved Roads”
 - 6 – March 19, 2014 “Geosynthetic Reinforced MSE Walls”

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	Mahmoud 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	Dimitrios Zekkos	Biodegradation of Geotextiles
3-12	Jitendra K. Thakur	University of Kansas	Jie Han	Recycled Asphalt Used in Geocells

Note that proposals for the new class (our sixth year of the program) for the A.Y. 2013-'14 are presently being reviewed by the GSI Board of Directors.

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

As of September, 2013, 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. (135 tests) Jarrett Nalson -- (512) 263-2101 Sallen@tri-env.com	45 ^B	- Ten Cate Geosynthetics Malaysia SDN Bhd. (23 tests) Gan Wee Hunn -- (603) 519 28576 wh.gan@tencate.com
3 ^A	- Golder Associates (45 tests) David Alexander -- (770) 492-8280 dalexander@golder.com	46 ^B	- TAG Environmental Inc. (13 tests) Colin Murphy -- (705) 725-1938 colin_murphy@tagenv.com
4 ^C	- Geosynthetic Institute (116 tests) George Koerner -- (610) 522-8440 gkoerner@dca.net	47 ^B	- GSE Syntec (10 tests) Andrew Barker -- (410) 327-1070 abarker@synteccorp.com
8 ^B	- Propex Operating Co., Ringgold (18 tests) Todd Nichols -- (800) 258-3121 todd.nichols@propexglobal.com	49 ^B	- Engepol Geossinteticos (14 tests) Carolina Polomino -- (55) 51 3303-3916 carolina@engepol.com
9 ^B	- Lumite (16 tests) Rebecca Kurek -- (770) 869-1700 rpage@lumiteco.com	50 ^B	- ADS, Inc. Hamilton (7 tests) Terry McElfresh -- (513) 896-2065 terry.mcelfresh@ads-pipe.com
13 ^A	- TRI Env. Inc. (97 tests) Cora Queja -- (714) 520-9631 cqueja@tri-env.com	51 ^B	- Solmax International Inc. (22 tests) Simon Gilbert St. Pierre -- (450) 929-1234 simonGSP@solmax.com
14 ^A	- Geotechnics (49 tests) J. P. Kline -- (412) 823-7600 JPKline@geotechnics.net	53 ^B	- Polytex Inquie (19 tests) Christian Valdebenito -- 011 56 57 42 90 00 cvaldebenito@polytex.cl
20 ^A	- GeoTesting Express, MA (47 tests) Gary Torosian -- (978) 635-0424 gtt@geotesting.com	54 ^B	- ADS, Inc. Finley (10 tests) David Gonso -- (419) 424-8377 davegonso@ads-pipe.com
22 ^B	- CETCO Hoffman Estates (13 tests) Barbara Gebka -- (847) 851-1500 jim.olsta@cetco.com	55 ^B	- Atarfil Geomembranes (19 tests) Gabriel Martin Sevilla -- 34 958 439 200 gmartin@atarfil.com
24 ^B	- CETCO Lovell (10 tests) Roger Wilkerson -- (307) 548-6521 roger.wilkerson@cetco.com	56 ^B	- Polytex Santiago (13 tests) Christian Valdebenito -- 56-2-627-2054 cvaldebenito@polytex.cl
25 ^B	- Ten Cate, Pendergrass (12 tests) Beth Wilbanks -- (706) 693-2226 b.wilbanks@tencate.com	57 ^B	- Ten Cate Cornelia (13 tests) Melissa Medlin -- (706) 778-9794 m.medlin@tencate.com
26 ^B	- Agru America Inc. (20 tests) Grant Palmer -- (843) 546-0600 gp@agrumerica.com	58 ^B	- Propex Operating Co. Nashville (16 tests) Tim Smith -- (229) 686-5511 Tim.Smith@propexglobal.com SimpsonJanie@firestone.com
29 ^e	- FITI Testing and Research Institute (68 tests) Hong-Kwan Kim -- 82-2-3299-8071 hogankKim@fiti.re.kr	60 ^B	- Polytex Lima (12 tests) Elias Jurufe -- 51 16169393 Ejarufe@polytex.cl
31 ^D	- NYS Dept. of Transportation (9 tests) Tom Burnett -- (518) 457-4704 tburnett@dot.state.ny.us	61 ^B	- Raven Industries (17 tests) Justin Norberg -- (605) 335-0288 Justin.Norberg@ravenind.com
32 ^A	- Geo-Logic Inc. (6 tests) Ken Criley -- (530) 272-2448 criley@geologic.com	62 ^B	- Solmax International Asia (14 tests) Teoh Pei Ching -- (450) 929-1234 pcteo@solmax.com
34 ^B	- GSE Environmental Richey Road (36 tests) Rich Schaefer -- (281) 230-6890 r.schaefer@gseworld.com	63 ^A	- TRI Environmental, Inc.; DDRF (5 tests) Joel Sprague -- (864) 242-2220 JSprague@tri-env.com
37 ^B	- GSE Environmental Chile (19 tests) Mauricio Ossa -- 56-2 6010153 Mossa@gseworld.com	64 ^B	- Agru America (NV) (14 tests) Chris Adams -- (775) 835-8282 ca@agrumerica.com
38 ^C	- Sageos/CTT Group (103 tests) Eric Blond -- (450) 771-4608 eblond@GCTTG.com	65 ^C	- Bombay Textile Research Assoc. (BTRA) (24 tests) Riyaz Shaikh (0) 022-25003551 btra@vsnl.com
40 ^B	- GSE Environmental (14 tests) Bruce Pressley -- (843) 382-4603 bpressley@gseworld.com	66 ^B	- Rowad International Geosynthetics Co. Ltd (14 tests) Asad Ullah Khan -- +966-3-812-1360 asad@rowadplastic.com
41 ^A	- SGI Testing Service, LLC (19 tests) Zehong Yuan -- (770) 931-8222 ZYuan@interactionspecialists.com	67 ^A	- MicroBac Hauser Division (10 tests) Heather Smalley -- (720) 406-4806 heather.smalley@microbac.com
42 ^C	- NPUST (GSI-Taiwan) (61 tests) Chiwan Wayne Hsieh -- 011-886-8-7740468 CWH@mail.npust.edu.tw	68 ^B	- Glen Raven Technical Fabrics LLC (4 tests) Richard Greeson -- (336) 229-5576 rgreson@glenraven.com
43 ^A	- Ardaman & Associates (22 tests) George DeStafano -- (407) 855-3860 gdestafano@ardaman.com	69 ^B	- GSE Environmental (12 tests) Siriporn Chayaporenert -- 6638-636638 SiripornC@gseworld.com
44 ^B	- Fiber Web, Inc. (9 tests) Kim Thomas -- (615) 847-7155 Kim.Thomas@fiberweb.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. (15 tests) Jhoana Carolina Diaz Martinez -- 073-511814-511829 calidad@pqa.peru.com

- 72^B - Tensar Corp. GA (5 tests)
Mignon Kittler (770) 968-3255
mkittler@tensarcorp.com
- 73^B - Gai Loi JSE (9 tests)
Paul Wong 84-650-362-5825
paul905677@gmail.com
- 74^B - Agru Americca Inc.
Mark Locklear (843) 221-4412
ml@agruamerica.com

^AThird Party Independent
^BManufacturers QC

^CInstitute
^DGovernment

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 annual GAI-LAP meeting was held in Indianapolis, Indiana, in conjunction with ASTM D35 on June 12, 2013. Twenty four people attended representing 31% of the active GAI-LAP labs. Attendance was fantastic and much thanks to those at ASTM for letting us piggyback onto their meeting. We would also like to thank all that were in attendance for their time and effort. As you can see by the picture below we had a very nice group.



The results of the meeting were as follows.

1. A brief introduction and background of the GAI-LAP program was discussed. Please note that we are in our 18th year of operation.
 - a. Program started in 1995
 - b. Accredit only geosynthetic labs
 - c. ISO 17025 is our model
 - d. On-site audits (Years, 1, 5, 10, etc...)
 - e. Proficiency tests every year
 - f. Our goal is Cv < 5 for each test
2. The Demographics of the current GAI-LAP organizations are summarized as follows.

19 independent labs
30 manufacturer QC labs
5 centers (research or government)
54 total

Also
33 are GSI members
21 nonmember labs
(19 are international labs)

The newest members are:

- Tensar Corporation
- GAI-LOI Jse
- Agru America (nonwovens division)

This demographics show an ever increasing interest in the program particularly from international laboratories. There are 240 possible tests for accreditation (178 ASTM, 1 FTM, 8 GRI, 53 ISO). The number of accredited tests per lab varies as follows; 4 min., 27 ave. 128 max. There has been a rapid rise of new test methods, with a near tripling of methods covered in a eighteen year period since the inception of program. New tests added appear to be outside the ASTM D35 arena. The international arm of testing is very strong. We particularly see this in Europe and Asia.

3. Proficiency testing is still the hallmark of GAI-LAP.

Of the 1521 proficiency test results submitted this year, only 6 first submittals were outliers representing 0.3% of the total. All outliers were resolved. Results of the proficiency tests were shared at the meeting and also distributed electronic via e-mail and CD. Congratulations on a job well done. It should be noted that there are three labs just participating in proficiency testing. 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. Your hard work over the years is exemplary.

The GAI-LAP proficiency test program would not function without samples to test. In this regard we like to thank the following organizations for their generous contribution of geosynthetics to this cause.

- TenCate Inc. for geotextiles
 - GSE Lining Technology Inc. for geomembranes
 - CETCO Inc. for GCLs
 - ADS Inc. for pipe
 - GSE Inc. for geonets and geocomposites
 - Tensar Corp. for geogrids
4. The GAI-LAP Customer Survey was again sent out to all program participants and the findings were reviewed at the meeting. 32% return; the following are results (5 best to 1 poorest)

- (a) Information exchange = 4.1
- (b) Conflict resolution = 4.3
- (c) Proficiency testing = 4.7
- (d) Directory and internet = 3.4

Overall = 4.1

Overall results to date: 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)

We feel that the program has had a good year in 2013. However, we have had traceability issues brought to our attention with labeling of the proficiency samples. The corrective action on our part will concentrate on better record keeping. This will entail sample, photos and files being kept at the GSI on all proficiency samples going forward. These records will be kept indefinitely by the office staff in a secure filing cabinet with limited access.

5. In addition to the above items we had a frank discussion about outsourcing auditing service at the meeting. Again TRI Environmental has done a very nice job as a subcontractor internationally and domestically. This practice will continue in 2014.
6. 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. ASTM D6693, Dogbone Tensile (yield elongation)
 2. ASTM D4491, Permittivity (3 party tie breaker)
 3. ASTM D1004, 90 degree tear, (spec. prep.)
 4. ASTM D792, density, (alcohol specific gravity)
 5. ASTM D1238, MFI, (cleaning & dimensions)
 6. ASTM D4595, Wide Width Tensile, (grips)
 7. 2 x ASTM D5994, Core thick, (search & points)
 8. ASTM D7466, Asperity ht., (report maximum)
 9. ASTM D6637, GG Tensile (data interpretation)
 10. ASTM D4491, Permittivity (constant versus falling head)
 11. ASTM D5262, Creep (Elastic vs. plastic deformation)
 12. ASTM D4595, WWT GT (estimating modulus)
7. The open discussion portion of the meeting was highlighted by the following housekeeping items:
 - a. The next GAI-LAP annual meeting will be held in June 2013 in conjunction with ASTM D-35.
 - b. GAI has solicited manufacturers for geosynthetic materials for 2014 proficiency testing.
 - c. Note that each lab can add up to seven tests per year.

It is a pleasure working with you. We appreciate your participation and congratulate you on your success!

If you have questions, please contact me accordingly.

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	
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%)
2013	22	3 (13%)	20	1 (5%)	1
TOTAL (to date)	523	74 (14%)	481	60 (13%)	34 (5%)

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.

Note that a GSI course on this topic will be offered on December 5, 2013 with the exam following directly.

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 sixteen 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.

Note that a GSI course on this topic will be offered on December 4, 2013 with the exam following directly.

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. End of Compacted Clay Liners in Landfill Covers

The following e-mail from Kelvin Legge of South Africa is pivotal to the waste containment industry...Ed.

"Dear Bob and George,

Please accept my most sincere thanks for all the support and encouragement you have given me personally over decades in the hard slog towards upgrading our standards for containment barriers. Thus I am delighted to inform you that clay only barriers (used in all but hazardous facilities) came to an end with the draft standards that I have punted for 3 years being signed into law on Friday 23 August 2013. You certainly deserve to share in the excitement and pride of this achievement and containment of future pollution in this part of the world.

I am especially pleased that this law was passed prior to your visit George as geosynthetic alternatives to all natural materials are allowed on condition of equivalent performance!

With very best wishes and looking forward to seeing you

Yours sincerely – Kelvin"

2. ASCE Comments on Hydraulic Fracking Rules of the Bureau of Land Management Proposed Regulation

"ASCE supports the exploration and production of oil and natural gas energy resources by means of hydraulic fracturing when based upon sound engineering and industry practices. ASCE strongly recommends that federal regulations mandate full public disclosure of all chemicals and other propping agents in the fracturing fluid; control of handling, use, and disposal of chemicals in the hydraulic fracturing process; establish well construction and decommissioning standards to protect underground sources of drinking water and to prevent methane loss; establish site closure and restoration standards; and reduce the freshwater footprint for each fracturing operation by reuse of the flowback fluid."

3. Good news for geosynthetics

The road to growth for geosynthetic textile market goes straight through developing countries, according to Textiles Intelligence report, "Markets for geosynthetic products and profiles of five leading manufacturers." Large-scale construction of infrastructure (roads, railways and landfills, for example) will drive growth in the market, which has

seen robust growth even during times of economic uncertainty. China, India and Russia will be building big in the near future, and the boom will likely hasten environmental regulations and building codes to protect health and safety. Those changes increase use of geosynthetics that prevent runoff, contain leachate and stabilize roads. The report is available at www.textilesintelligence.com.

The Four W's of GSI White Papers: Why, What, When and Where?

by

Bob Koerner

According to Wikipedia (my favorite source for all kinds of information), a White Paper is "an authoritative report to understand an issue, solve a problem or make a decision. White papers are used in two main spheres: government and business-to-business marketing".

From my title, I suggest that the "why" of our white papers is that they provide a message to potential readers somewhere between a newsletter and a magazine article. Since they are usually not reviewed (ours are but only internally) they are certainly not publications at the level of conference proceedings or journal articles, but they are freely available to all and provide some degree of insight as to the topic being addressed.

Of course, the topic is the "what" in the title. For us at GSI/GRI, the various topics selected have been suggested by others insofar as concerns and direct questions. We have responded to about 3000 TechLine questions to date and countless more by member and associate member organizations over the years. When the same, or similar, question is asked repeatedly, it prompts us to act and a white paper is frequently the result.

The "when" is very subjective. For example White Paper #20 "Geosynthetic Opportunities with Shale Gas Extraction" came upon us rapidly, whereas White Paper #27 "The Intimate Contact Issue of Field Placed Geomembranes with Respect to Waves (or Wrinkle) Management" has been with us for decades. In this latter regard, old questions have been raised anew, revisited and revisions made based upon current information.

The “where” in our title is initially answered via publication in our quarterly GSI Newsletter/Reports, and subsequently put on our website at <<http://www.geosynthetic-institute.org/whitepapers.htm>> for anyone to read or download. That said, it is a bit disconcerting when one of our white papers is referenced in a technical article or for that matter copied into a manuscript. This is quite acceptable since none have a copyright and everything is available to the general public.

In the context of the above mentioned “four-W’s” in our title, we will continue to write and publish white papers as a need becomes apparent. They do seem to be a somewhat popular vehicle for us to provide information and education which is critical to GSI. That said, it also can make the reader curious and provide a starting point for searching out other more-detailed content on the topic. To date, the 29 available GSI White Papers can be placed in the following categories:

- Geosynthetic Technical Issues = 14
- Geosynthetic Editorial Issues = 7
- Geosynthetic Related Surveys = 5
- General Commentary Items = 3

Do comment, critique, agree, disagree or even suggest other topics as you see fit. In the end, one hopes that this effort provides a meaningful service to all.

Upcoming GSI Events

GSI Webinars

(2nd Wednesday of Every Month – see following website)

Contact: www.geosynthetic-institute.org/webinar.htm

ASCE Webinars

(see following website)

Contact: www.asce.org/webinars

GSI Courses in Folsom, PA

#1 December 4, 2013

Construction Inspection of MSE Walls, Berms and Slopes
(Optional Exam Follows)

#2 December 5, 2013

QA/QC of Geosynthetics in Waste Containment Systems
(Optional Exam Follows)

Contact: mvashley@verizon.net

• January 28-30, 2014

ASTM Committee D35 on Geosynthetics
Hyatt Regency Houston
Contact: www.astm.org

- April 23-25, 2014
Central PA-ASCE
Hershey, PA
Contact: robert.koerner@coe.drexel.edu
- July 2014
ASCE Shale Conference
Pittsburgh, PA
Contact: www.asce.org/conferences
- September 21-25, 2014
10th Intl. Geosynthetics Conf.
Berlin, Germany
Contact: www.geosyntheticsociety.org

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, Maccaferri with Massimo Ciarla and Pietro Rimoldi, and Jones and Wagener (Pty) Ltd. with Anton Bain, and Tecnologia de Materiales (TDM) with José Ferreyros as contact persons. Thanks to all and welcome to GSI.

GSE Environmental

*Boyd Ramsey [BoD]/Aigen Zhao
AECOM*

*Kevin McKeon/Ken Bergschultz/John Trast
U.S. Environmental Protection Agency*

David A. Carson

E. I. DuPont de Nemours & Co., Inc.

*John L. Guglielmetti/David W. Timmons
Federal Highway Administration*

*Silas Nichols/Daniel Alzamora
Golder Associates Inc.*

Mark E. Case/Tim Bauters

Tensar International Corporation

*Mark H. Wayne [BoD]/Joseph Cavanaugh
Colbond Geosynthetics*

Richard Goodrum

Geosyntec Consultants

Steve Poirier

LyondellBasell Industries

Fabio Ceccarani/Rob Olivero

TenCate Geosynthetics

John Henderson/Chris Lawson

CETCO

*Chris Athanassopoulos/James T. Olsta
Huesker, Inc.*

Steven Lothspeich/Dimitter Alexiew

NAUE GmbH & Co. KG

Kent von Maubeuge [BoD]

Propex

*Steve Thaxton/Judith Mulcay
Fiberweb, Inc.*

Brian H. Whitaker

NTH Consultants, Ltd.

Rick Burns

TRI/Environmental Inc.

Sam R. Allen [BoD]/Joel Sprague

U. S. Army Corps of Engineers
David L. Jaros [BoD]
Chevron Phillips Co.
Lili Cui [BoD]
Solmax Géosynthétiques
Robert Denis/Guy Elie
Envirosource Technologies, Inc.
Douglas E. Roberts
CARPI, Inc.
Alberto M. Scuero/John A. Wilkes
Civil & Environmental Consultants, Inc.
Daniel Tolmer/Tony Eith
Agru America, Inc.
Paul W. Barker/Markus Haager/Dee Strong
Firestone Specialty Products
Bill Tippins/Christa K. Petzke
FITI (GSI-Korea)
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Waste Management Inc.
Greg Cekander/John Workman [BoD]
NPUST (GSI-Taiwan)
Chiwan Wayne Hsieh [BoD]
GeoComp/GeoTesting Express
W. Allen Marr/Richard P. Stulgis
GEI Consultants
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Kris Khilnani/Suji Somasundaram
Carlisle Syntec, Inc.
Randy Ober/Krista Gonzalez/Julie Sitch/
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EPI, The Liner Co.
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Monte Christie
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Afitex-Texel
Pascal Saurnier
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Bombay Textile Research Institute
A. N. Desai
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Tim Walter/Blu Alexander/Ken vander Velden
Maccaferri
Massimo Ciari/PIetro Rimoldi
Jones & Wagener (Pty) Ltd.
Anton Bain
Tecnologia de Materials (TDM)
José Ferreyros

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

IN THE NEXT ISSUE

- Activities of the GSI Directors and Board
- Overview of GRI (Research) Projects
- 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
- "Commentary on Geosynthetics Performance Testing"
- GSI's Member Organizations