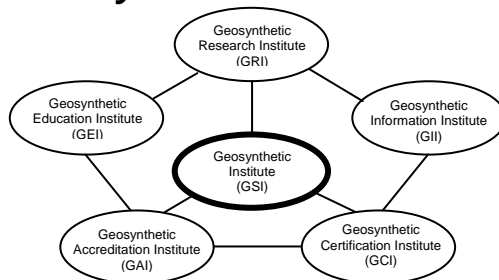


The GSI Newsletter/Report

Geosynthetic Institute



Vol. 26, No. 1

March, 2012

This quarterly newsletter, now in its 26th 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 Board of Directors

On March 16, 2012 the BoD had a teleconference call during which the following items were discussed and acted upon.

1. The laboratory accreditation program was reviewed and details are provided later in this newsletter/report.
2. GSI's two field inspector certification programs were reviewed and details are provided later in this newsletter/report.
3. Cooperative activities with GMA's government liaison group were discussed and approved going forward.
4. Providing webinars for ASCE on selected geosynthetics topics was discussed. Presently six are given each lasting for one hour with 30-minutes Q & A following... see www.asce.org/webinars.
5. Conferences, conferences and more conferences. In this regard we are slated to participate in eight of them at this time.
6. Dr. Rex Bobsein of Chevron Phillips, and the BoD member representing resins and additives, has retired. Rex's impact to the geosynthetic field in general and GSI in particular has been immeasurable. With a doctoral degree in organic chemistry from Texas A & A, he went with Chevron Phillips where he spent his entire career. He helped GSI enormously particularly in crafting our polyethylene specifications. Our sincere congratulations and appreciation for

...serving from 1999 to 2007 and again from 2011 to the present is extended.

7. In light of the above we are proceeding to elect a new BoD member from the resin/additive group to fill Rex's remaining ~ 20 months until the regularly scheduled cycle begins.
8. The present BoD is as follows, along with their respective term ending years.

Term Ends 2012

- Tony Eith (Chairman) - Waste Management Inc. (Owners and Operators)
e-mail: aeith@wm.com
- Boyd Ramsey - GSE Lining Technology, Inc. (Geotextiles and Geogrids)
e-mail: bramsey@gseworld.com
- Sam Allen - TRI/Environmental, Inc. (At-Large)
e-mail: Sallen@tri-env.com

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- GSI's Member Organizations

Term Ends 2013

- David Jaros - Corps of Engineers (Government Agencies)
e-mail: dave.l.jaros@usace.army.mil
- Rex Bobsein - position is open (see Item #7)
- 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 - CETCO (Geomembranes and GCLs)
email: tim.rafter@cetco.com
- Wayne Hsieh - NPUST and GSI-Taiwan (International-2)
e-mail: cwh@mail.npust.edu.tw

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. (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 phone at (610) 522-8440 or e-mail at <grace.hsuan@coe.drexel.edu>.

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 monthly 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 under sponsorship of GSI and Waste Management investigates 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 presently a paper is being prepared for the 2012 Global Waste Conference.
4. **Exposed Lifetime of Facing Geogrids Used at Landfill Berms** - The facing of mechanically stabilized earth landfill berms (and other walls and slopes as well) is often of a wrap-around configuration leaving the geogrid exposed to the atmosphere. A new project being conducted by George Koerner for Waste Management is presently investigating different grid behavior over time. Many years are envisioned. The long-term behavior will eventually be compared to UV laboratory exposed data as noted in Item #7 below.
5. **UV Exposure of Geomembranes*** - GSI is using 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.
6. **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 used in the formulations. In this regard we have been evaluating various European formulations for four years and the

results are very impressive. The study is for CARPI, a GSI member organization.

7. **UV Exposure of Geogrids** - The UV-fluorescent exposure of two different biaxial geogrids which are used at the exposed faces of welded wire mesh MSE structures is ongoing. The various geogrids are now up to 35,000 light hours and data is being generated and sent to the respective manufacturers. 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.
8. **UV Exposure 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.
9. **UV Exposure 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 half-life of breaking strength and 4.1 years for half-life of breaking elongation.
10. **End-of-Life (EOL) Behavior of Geotextiles** - Stemming from a TechLine question, "What happens after 50% reduction in strength or elongation is reached" we have begun investigating exactly that issue. Dr. Connie Wong has four different geotextiles
 - nonwoven needle punched
 - nonwoven heat bonded
 - woven slit film
 - woven monofilamentin UV fluorescent exposure (ASTM D7238) at 80°C. Mechanical properties and micrographs (at 400X) are being generated on an ongoing basis.
11. **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.
12. **Retaining Wall Failure Evaluation** - 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 141 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 an inspectors certification program; see the certification section of this Newsletter/Report.

13. **pH Between Masonry Block Wall Units*** - George Koerner has been measuring the pH between three types of masonry blocks over six years to monitor the values. Concern here is over PET geogrids which can be sensitive to high alkalinity environments. The values started high, but over time are now down to eight and lower. George Koerner has a paper in this regard.*
14. **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 by Dr. Connie Wong using the ReSSA Code and are now available to members and associate members as GRI Report #41.
15. **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 accepted by ASTM's Journal of Geotechnical Testing.
16. **Generic Specifications** - A major effort is ongoing with respect to the development and maintenance of generic geosynthetic specifications. The current status of these specifications is as follows:

Completed 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
GT10 – Geotextile Tubes
GT12 – Geotextile Cushions
GT13 – Geotextile Separators
GCL3 – Geosynthetic Clay Liners

Working Within Focus Group

GTXX – Turf Reinforcement Mats (tabled)

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.

17. **Other GRI Standards** - There are several GRI Standards in various forms of preparation. These include a test method to extract plasticizers from PVC geomembrane formulations, a GCL overlap permeability and a group of test methods being prepared for both Milliken and ThermaGreen Companies for their respective new products.

Progress within GII (Information)

Our GSI Home Page (which has a revised opening format) 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 | • Product Certification |
| • Prospectus | • Newsletter/Reports |
| • Associate Membership (Agencies) | • Internet Courses |
| • Members by Focus Groups | • Geosynthetics Links |
| • GSI Publications | • GSI Member Meetings |
| • GRI Specs, Guides, White Papers | • Courses at GSI |
| • Laboratory Accreditation | • CQA Insp. Cert. (2) |

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. Please note that original passwords have recently been changed. 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 | • Links to the GSs World |
| • GRI Reports | • Keyword Search for Literature |
| • GRI Technical Papers (Citations) | • Example Problems |
| • Notes of GSI Meetings | • Frequently Asked Questions (FAQs) |

The Keywords Section contains about 30,000 citations of 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. To date, she has focused on the following; all of which are available. Note that we are open to suggestions to other survey-related topics. Please advise accordingly.

- State adoption of AASHTO M288 geotextile specification (GRI Report #31)
- State liner and cover regulations for solid waste disposal (GRI Report #32)
- International liner and cover regulations for solid waste disposal (GRI Report #34)
- Allowable leachate head in landfill sumps (White Paper #13)
- Allowable leakage rates for waste ponds (White Paper #15)
- Survey of LLRW and UMT at U. S. Defense establishments so as to assess the potential area for final covers (White Paper #18)
- Status of state environmental regulators with respect to conformance testing and levels of CQA at landfills and surface impoundments.

Jamie's newest survey will be an assessment of each state's regulatory departments to navigate through shale gas drilling and extraction permitting process.

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.

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:

- #38 – A Data Base and Analysis of Geosynthetic Reinforced Wall Failures
- #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)

- 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 2011-'12 Academic Year

Class 2 (c) – 3rd year funding

No.	Name	University	Advisor	Topic
4-09	Majid Khabbazian	U. of Delaware	Victor Kaliakin	GS basal reinforcement

Class 3 (b) – 2nd year funding

No.	Name	University	Advisor	Topic
1-10	Tanay Karademir	Georgia Tech	David Frost	Temperature effects on shear strength
2-10	Jing Ni	U. of Wollongong, Australia	Buddhima Indraratna	PVD's in railroad stabilization
3-10	Carmen Franks	U. of Maryland	Ahmet Aydilek	GT filters for stormwater runoff

Class 4 (a) – 1st year funding

No.	Name	University	Advisor	Topic
1-11	Ryan Corey	U. of Kansas	Jie Han	GS protection of buried pipelines
2-11	G. Hossein Roodi	U. of Texas at Austin	Jorge Zornberg	Pavement lifetime using field data
3-11	Felix Jacobs	RWTH-Aachen, Germany	Martin Ziegler	Geogrid reinforced soil behavior
4-11	Mahmound Khachan	Syracuse University	Shobha Bhatia	Deflocculants for geotextile tubes

It is important to note that Jamie has just sent our requests-for-proposals for GSI Fellowships for the 2012-2013 academic year to various magazines and newsletters. Do "talk-it-up" in this regard with your favorite university and academic colleagues.

Courses

We have just scheduled the following set of courses: (Please disregard other announcements).

- #1 Construction Inspection of MSE Walls, Berms and Slopes
June 6, 2012 (Optional Exam Follows)
- #2 Quality Assurance/Quality Control of Geosynthetics Installation
June 7, 2012 (Optional Exam Follows)

The above will be held at:
Geosynthetic Institute
475 Kedron Avenue
Folsom, PA 19033
(approx. 4.5 miles from Phila. 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 the future)
- Students must be recommended by their advisor or department head.
- The fellowships can be renewed for total of three-years depending upon acceptable annual reports

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 test methods ASTM, ISO or GRI standards. 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 213 GAI-LAP test methods available for accreditation. Please consult our home page for a current listing.

As of March, 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)
Jonathan Ellingson -- (770) 492-8280
Jellingson@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 Page -- (770) 869-1700
rpage@lumite.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
gtorosian@geotest.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
chris.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
beth_wilbanks@rtcusa.net
- 26^B - Agru America Inc. (17 tests)
Grant Palmer -- (843) 546-0600
gpalmer@agruamerica.com
- 29^E - FITI Testing and Research Institute (86 tests)
Dong-Whan Kim -- 82-2-3299-8071
HKKim@fiti.com.re.kr
- 31^D - NYS Dept. of Transportation (9 tests)
John Remmers -- (518) 457-4104
Jremmers@dot.state.ny.us
- 32^A - Ausenco/Vector Engineering (6 tests)
Ken Criley -- (530) 272-2448
criley@vectoreng.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
eblood@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)
Kim Cox -- (615) 847-7575
k.mclain@fiberweb.com
- 45^B - Ten Cate Malaysia SDN Bhd. (23 tests)
C. P. Ng -- (603) 519 28568
cpng@tencate.com
- 46^B - TAG Environmental Inc. (13 tests)
Colin Murphy -- (705) 725-1938
cmurphy@gseworld.com
- 49^B - Engepol Geossinteticos (19 tests)
Carolina Polomino -- (55) 11-4166 3001
Carolina@nortene.com.br
- 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
larroyo@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
mmedlin@tencase.com
- 58^B - Propex Nashville (9 tests)
Tim Smith -- (229) 686-5511
TimSmith@propexinc.com

- 59^B - Firestone (9 Tests)
Janie Simpson -- (864) 439-5641
SimpsonJanie@firestonebp.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
MarieAF@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
cadams@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
steveferry@microbac.com
- 68^B - Glen Raven Technical Fabrics LLC (3 tests)
Edmund Gant -- (336) 229-5576
dseagraves@glenraven.com
- 69^B - GSE Lining Technology Co. Ltd. (12 tests)
Siriporn Chayaporenlert -- 6638-636638
siripornc@gseworld.com
- 70^A - RSA Geo Lab LLC (48 tests)
Raza Ahmed -- (908) 964-0786
www.rsaglobal.com
- 71^B - Plasticos Agricolas y Geomembranas S.A.C. (14 tests)
Cesar Augusto -- 6370 (20 110811)
asistentecalidad1@pqa.com.co

^AThird Party Independent ^CInstitute
^BManufacturers QC ^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).

We have recently been reminded that in order to do in business as well as in life, one need not be afraid to ask what you want. On three occasions we have now been asked what specific language would you like to see to assure that a "good lab" be used for geosynthetic related projects.

The language we would like to see for specifying accredited labs in regards to conformance testing is as follows:

"All laboratory testing must be conducted by a GAI-LAP accredited laboratory. Their certificate of accreditation must be current. In addition, the laboratory must hold accreditation for the specific test method or procedure in question."

I apologize for writing this in advance. We know that this will offend some but have had the request enough

to know that the need is real. In the day of cut and paste we hope the language serves the industry well.

Thank you for considering this restrictive language. We appreciate your support of the program.

George R. Koerner

Activities within GCI (Certification)

GSI now 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 received, 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	4	0	4	0	0
TOTAL (to date)	471	66 (14%)	437	55 (12.5%)	30 (6%)

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 second course on March 13, 2012 was well received. As a result there are now twelve persons certified by GCI for the inspection of MSE Walls, Berms and Slopes.

This one-day course and an 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).

FITI is a 30-year old testing organization located in Seoul focusing on interlaboratory proficiency; environmental protection; safety and flammability; hazardous substances; in-house quality control; consumer protection; complaint analysis; quality marking; procurement; household and industrial applications; and materials approval. The geosynthetics testing group within FITI has twelve people (two with doctoral degrees) and 10 engineers. The geosynthetic laboratory is GAI-LAP accredited for 70 geosynthetic test methods. Dr. Jeonghyo Kim is the general manager within FITI's geosynthetics activities.

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.

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. California Plans up to \$17 Billion on Flood Protection Improvements

The recently released draft of a plan developed by the California Department of Water Resources calls for spending as much as \$17 billion over the next two decades or more to increase flood protection throughout the state's flood-prone Central Valley. Released in late December, the 2012 Central Valley Flood Protection Plan envisions expanding the region's existing levee system; creating new flood bypass systems, enlarging existing ones, and improving major flood structures.

(ref. Civil Engineering, March, 2012)

2. Resin Costs vis-à-vis Shale Gas Availability

Technological advances in horizontal drilling and hydraulic fracturing of shale rock formation have led to significant increases in the supply of natural gas in North America, thus creating some of the lowest natural gas prices relative to crude oil prices in decades.

Natural gas pricing fell from \$8/MM BTU to \$4/MM BTU (50% decline), allowing natural gas to gain a significant cost advantage over crude oil both as an energy commodity and as a raw material for chemical and plastic products.

This supply imbalance has created a cost advantage and preference for North American ethylene processors to run natural gas--derived feedstock (ethane) through their steam crackers rather than crude oil-based feedstocks (naphtha). Because ethane cracking produces less propylene than naphtha cracking, significantly more ethylene is being produced relative to propylene in the North American market than has historically been the case. Less propylene production by these facilities has led to shortages and higher costs for propylene relative to ethylene monomers. The current situation provides a cost advantage to producers of polyethylene (PE), who use ethylene feedstock for primary manufacturing, versus PP producers.

(ref. Plastics Engineering, Nov./Dec., 2011)

3. Mobile Technology Trends

Which is your primary oral communication tool for work?

<u>Response</u>	<u>2009</u>	<u>2011</u>
Land-line phone	65.6%	54.8%
Cell phone (without advanced capabilities)	15.3%	6.3%
Smartphone	19.2%	28.8%

Which is your primary Internet/Web Communication tool for work?

<u>Response</u>	<u>2009</u>	<u>2011</u>
Laptop computer	35.3%	44.7%
Desktop computer	64.1%	52.4%
Tablet computer	--	1.9%
Smartphone	0.5%	1.0%

What percentage of your work time do you spend answering/sending e-mail?

<u>Response</u>	<u>2009</u>	<u>2011</u>
Less than 25% of time	45.2%	52.4%
25% of time	39.6%	33.0%
50% of time	13.7%	13.6%
75% of time	1.4%	1.0%
90% of time or more	0.1%	0%

What percentage of your work time do you spend on the Web?

<u>Response</u>	<u>2009</u>	<u>2011</u>
Less than 25% of time	74.0%	79.5%
25% of time	21.5%	14.6%
50% of time	3.7%	3.9%
75% of time	0.4%	1.9%
90% of time or more	0.3%	0%

(ref. CE News, February 2012)

4. U.S. Surface Transportation Program Funding

Voting 74-22, the Senate on Wednesday passed a bill (S 1813) to authorize federal road, bridge, transit, and highway-safety programs through September 2013 on a budget of \$109 billion that would maintain present funding levels. All but \$10 billion of the bill's cost would be funded by the Highway Trust Fund, which draws its revenue from the 18.4-cent per-gallon federal gasoline tax and the 24.4-cent-per-gallon federal diesel tax.

(ref. Phila. Inquirer 3/18/12)

Wall Inspectors Certification Program is “Off-and-Running”

In light of the number of mechanically stabilized earth (MSE) wall failures with geosynthetic reinforcement (our data base is presently at 141 of which 34 have excessively deformed and 107 have partially collapsed) we began a field inspectors certification program in January of this year. We feel that a qualified field inspector can possibly improve the situation by providing at least two vital services. They are the following;

- (i) provide feedback to the design engineer about questionable plan and specification details, e.g., existence of site water, lack of back drainage design, etc., and
- (ii) provide control of the contractor during wall construction for items or practices which are improper and/or unsatisfactory, e.g., poor soil backfill, lack of compaction control, etc.

This new certification program parallels our existing one on Geosynthetic Quality Assurance and Quality Control in that a successful candidate must have six months of appropriate field experience, be recommended by his/her immediate supervisor, and pass a multiple choice examination. Details are on our website at www.geosynthetic-institute.org/icpintro2.htm. As examples of the examination, see the following:

- Q1. The acronym “MSE” refers to layers of reinforcement in the...
- A. surcharge fill
 - B. facing system
 - C. retained soil zone
 - D. reinforced soil zone
- Q2. How are “walls and berms” distinguished from “slopes”?
- A. By the angle of the surcharge slope
 - B. By the angle of the facing
 - C. By the type of facing
 - D. By the type of soil backfill being used
- Q3. The most common types of MSE wall or berm facing are...
- A. masonry block and precast panel concrete
 - B. masonry block and welded wire
 - C. cast-in-place concrete and precast panel concrete
 - D. welded wire and timber faced
- Q4. The most common type of geosynthetic reinforcement for MSE structures is...
- A. geotextiles
 - B. geogrids
 - C. geomembranes
 - D. geocomposites

- Q5. The leveling course for a low or moderately high MSE structure is usually...
- A. reinforced concrete footing
 - B. precast concrete slabs
 - C. layer of coarse aggregate
 - D. layer of fine grained silt or clay
- Q6. Concern over the stability of drainage pipes and other utilities in the reinforced soil zone is heightened when using...
- A. well compacted granular soil
 - B. well compacted fine grained soil
 - C. poorly compacted granular soil
 - D. poorly compacted fine grained soil
- Q7. A typical compaction specification for compacted soil in the reinforced soil zone is...
- A. 95% standard Proctor
 - B. 95% modified Proctor
 - C. 50% standard Proctor
 - D. 50% modified Proctor

We currently have twelve MSE Wall, Berm and Slope Certified Inspectors in the program and the interest level is strong. It appears as though the landfill berm area is the most interested in the program due to the criticality and longevity of such structures and the owner/regulatory community’s acceptance is appreciated. Federal, state and public transportation agencies have been informed of the program’s existence as well. Perhaps the area most in need of the program is that of private owners and developers which is where the vast majority of failures have occurred. This area is very broad ranging from major shopping centers to individual home owners. We are indeed reaching-out to as many related companies, trade organizations, building societies, etc., as possible but help and contacts from readers of this newsletter/report is always appreciated. Thank you in this regard.

Bob & George Koerner

Upcoming GSI Events

- GSI Courses at GSI
Construction Inspection of MSE Walls, Berms and Slopes
June 6, 2012 (Optional exam follows)
Quality Assurance/Quality Control of Geosynthetics Installation
June 7, 2012 (Optional exam follows)
Contact: mvashley@verizon.net
- GeoVirginia 2012
Lessons Learned in Geotech Engr.
May 1-2, 2012
Williamsburg, Virginia
Contact: www.viriniageoinstitute.org

- NY Federation of Solid Wastes
May 21-23, 2012
Sagamore, New York
Contact: www.nyfederation.org
- ASCE Webinars
Veneer Stability of Slopes
May 14, 2012

MSE Walls, Berms and Slopes
June 25, 2012

Overview of Geosynthetics
July 17, 2012
Contact: www.asce.org/webinars
- 26th Central PA Geotech Conf.
October 24-26, 2012
Hershey, Pennsylvania
Contact: cbeenenga@gfnet.com

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, Inc.

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.

John L. Guglielmetti/David W. Timmons

Federal Highway Administration

Silas Nichols/Daniel Alzamora

Golder Associates Inc.

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Geosyntec Consultants

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Syntec Corp.

Aigen Zhao

LyondellBasell Industries

Fabio Ceccarani/Melissa Koryabina

TenCate Geosynthetics

John Henderson/Chris Lawson

CETCO

James T. Olsta/Chris Athanassopoulos/

Tim Rafter [BoD]

Huesker, Inc.

Steven Lothspeich/Dimiter Alexiew

NAUE GmbH & Co. KG

Kent von Maubeuge [BoD]

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Envirosource Technologies, Inc.

Douglas E. Roberts

CARPI, Inc.

Alberto M. Scuero/John A. Wilkes

Civil & Environmental Consultants, Inc.

Daniel Tolmer/Daniel P. Duffy

Agru America, Inc.

Paul W. Barker/Peter Riegl/Dee Strong

Firestone Specialty Products

Paul E. Oliveira/Christa K. Petzke

FITI (GSI-Korea)

Jeonhyo Kim/H.-Y. Jeon

Waste Management Inc.

Anthony W. Eith [BOD]/Greg Cekander

NPUST (GSI-Taiwan)

Chiwan Wayne Hsieh [BoD]

GeoTesting Express

W. Allen Marr/Richard P. Stulgis

GEI Consultants

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GSE Chile, S.A.

Mauricio Ossa

Atarfil, S. L.

Mario Garcia Girones/Emilio Carreras Torres

Republic Services Inc.

Joe Benco/Tony Walker

GSE Europe

Stefan Baldauf/Catrin Tarnowski

InterGEO Services Co.

Archie Filshill

Raven Industries, Inc.

Gary M. Kolbasuk

CTI and Associates, Inc.

Te-Yang Soong/Kevin Foye

Advanced Earth Sciences, Inc.

Kris Khilnani/Suji Somasundaram

Carlisle Syntec, Inc.

Randy Ober/Krista Gonzalez/Julie Sitch

EPI, The Liner Co.

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Geo-Logic Associates

Monte Christie

Weaver Boos Consultants, Inc.

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The Mannik & Smith Group, Inc.

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Amit Shyam

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Robert J. Phaneuf

Maine Department of Environmental Protection

David E. Burns

New York State Department of Transportation

Robert Burnett/James Curtis

California Water Resource Control Board

Leslie Graves/Ed Wosika

IN THE NEXT ISSUE

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- Overview of GRI (Research) Projects
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- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliate Institutes
- The GSI Centers-of-Excellence
- Items of Interest
- "The Status of Rolled Erosion Control Materials Generic Specifications"
- GSI's Member Organizations