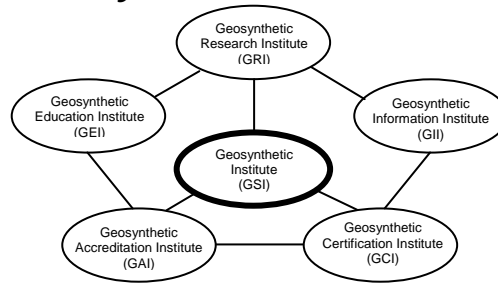


The GSI Newsletter/Report

Geosynthetic Institute



Vol. 24, No. 2

June 2010

This quarterly newsletter, now in its 24th 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 Robert M. Koerner or Marilyn Ashley at phone (610) 522-8440; fax (610) 522-8441 or e-mail at robert.koerner@coe.drexel.edu or mvashley@verizon.net.

Activities of GSI's Directors and Board of Directors

1. Following our first successful ASCE Webinar, we are signed up for two more. One on November 22, 2010 will be on "Waterproofing of Hydraulic Structures" and the other on March 7, 2010 will be a repeat of "Introduction and Overview of Geosynthetics". They are from noon until 1:30 PM and for a single fee as many persons as desired can participate; see www.asce.org for details.
2. The MSE wall failure, remediation and lessons learned reports (GRI Reports 38, 39 and 40) are being actively discussed. Upon discussion of the BoD we will keep GRI Report #40 as a members-only document as with all of the preceding reports. It will be posted on the password-protected portion of the GSI Website by month's end .
3. The GRI-24 Conference on "Optimizing Sustainability Using Geosynthetics" is set for March 16, 2011 in Dallas, Texas. The tentative program has 18-papers/speakers and looks very interesting. We will have our annual and BoD meetings at the same time and location. See our Website under "Meetings" for information.
4. Most of you know that we service GMA's TechLine answering worldwide questions on all geosynthetics topics. It is interesting in that questions are often trivial and sometimes impossible. The Geosynthetics magazine gives a sampling every quarter. We get about forty questions per month. Of course, we answer such questions only after taking care of GSI business, e.g., your questions.

5. During a recent BoD teleconference call we discussed members use of GSI/GRI generated research data and information. GSI feels the information is indeed yours to use but when used in such activities as proposals, regulatory permits, brochures and advertisements we would appreciate seeing a draft copy for possible comments. A note to this effect will be included in all future Newsletter/Reports (in the beginning of the GRI Projects section), as it is in this issue.
6. Your Board of Directors is as follows. Do contact any of them with regard to GSI matters.

Term Ends 2010

- David Jaros - Corps of Engineers (Government Agencies)
e-mail: dave.l.jaros@usace.army.mil
- Paul Oliveira - Firestone bp Inc. (Resin Producers)
e-mail: oliveirapaul@firestonebp.com
- Kent von Maubeuge - NAUE GmbH & Co. KG (International-1)
e-mail: kvmaubeuge@naue.com

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Term Ends 2011

- Dick Stulgis - GeoTesting Express (Consultants and Testing Laboratories)
e-mail: rstulgis@geocomp.com
- Gary Kolbasuk - Raven (Geomembranes and GCLs)
e-mail: gary.kolbasuk@ravenind.com
- Wayne Hsieh - GSI-Taiwan (International-2)
e-mail: cwh@mail.npust.edu.tw

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

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 organizations 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 in this regard.

1. **Stress Cracking of Geomembranes and Geopipe*** - In addition to Grace Hsuan's ongoing evaluations of HDPE geomembranes, she is presently focusing on HDPE drainage and duct pipe mainly for the Florida DOT. The goal for both geomembranes and geopipe is to include technically viable test methods and limiting values for inclusion in generic specifications.
2. **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 14th-year and has resulted in an extremely authoritative set of real-life data.

3. **Bioreactor (aka, Wet) Landfill Behavior and Properties*** - One of the landfill cells mentioned in Item #2 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.

4. **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 systems consist of both natural soils and geosynthetic drains. The project is now in its third year and is at a landfill in the Philadelphia area.
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, EPDM, PE-R, fPP-R, and LLDPE-R. Exposure times of 40,000 light hours are now realized at 70°C and a replicate set of samples are now being incubated at 60°C. These will take at least 60,000 light hours (≈ 8-years). The third sequence at 80°C was just started on 1/1/2010. Ongoing data is being reported to manufacturers and resin producers.
6. **UV Exposure of Geogrids** - The UV-fluorescent exposure of four different biaxial geogrids which are used at the exposed surfaces of welded wire mesh retaining walls is ongoing. The various geogrids are now up to 25,000 light hours and data is being generated and sent to the respective manufacturers. As with the geomembranes, replicate samples will now be incubated at 60°C for eventual use in Arrhenius Modeling and lifetime prediction. The last set will be at 80°C.
7. **UV Exposure of TRM Fibers** - We are also using UV-fluorescent exposure of several turf reinforcement mat fibers to assess their lifetime capabilities. They are presently being incubated

at 70°C and 80°C. Communication between manufacturers is ongoing.

8. **UV Exposure of Repair Tape** - We have found that a particular type of polyethylene repair tape has been successfully used to repair an exposed geomembrane at a Delaware landfill. After five-years it appears very durable. Original samples are being evaluated in one of our fluorescent tube decreases per ASTM D7238 at 70°C. However, we have just learned that seagulls like to pull the tape off of the geomembranes. We don't know how to simulate this particular mechanism!
9. **Field Behavior of fPP and fPP-R Geomembranes** - We continue to receive and evaluate field problems of flexible polypropylene geomembranes (mainly scrim reinforced). They are regularly added to our database in this regard. The most recent had service lifetimes of 6, 8 and 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 would require acceptable performance in the weathering device of 12,000 light hours. Our GRI-GM18 specification calls for 20,000 light hours for a acceptable formulation. That said, we hope that it is sufficient in this regard.
10. **Retaining Wall Failure Evaluation** - We currently have GRI Reports 38, 39, and 40 addressing mechanical stabilized earth (MSE) walls using geosynthetic reinforcement which document 82-failures. They are either excessive deformation or collapses. A focus group committee on the topic will probably be reactivated (it has been dormant since 2000), to address what GSI can do to mitigate and improve this very serious situation. Contact Bob Koerner in this regard.
11. **pH Between Masonry Block Wall Units*** - George Koerner has been measuring the pH between three types of masonry blocks over four 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 down to eight and lower. George Koerner has a paper in this regard.
12. **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 Geomembranes
GM21 – EPDM 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 Groups

GCXX – TRMs for Erosion Control
GTXX – High Strength Reinforcement Geotextiles

Delayed or Off in the Distance

GGXX – Bidirectional Geogrids
GGXX – Unidirectional Geogrids
GNXX – Geonet Drainage Composites
GCXX – Other Drainage Geocomposites

The complete 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. Copies of the above listed draft specification tables are available to members and associate members.

13. **Other GRI Standards** - There are several GRI Standards in various forms of preparation. One involves spray-on geomembranes and the other vapor barriers. Contact George Koerner for the status of these efforts.

Activities within GII (Information)

Our GSI Home Page and is accessed as follows:

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

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

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

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

- 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)
- Professional development hours (PDH's) required by the various states for continued licensure.
- Status of state environmental regulators with respect to conformance testing and levels of CQA at landfills and surface impoundments. (A new white paper is being prepared on this topic.)

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 40 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:

- #36 – Inadequate Performance of Geotextile Filters Under Different and Challenging Field Conditions
- #37 – Geosynthetic Supported Base Reinforcement Over Deep Foundations
- #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 (available July, 2010)

Courses

We have scheduled the following sequence of courses:

- Friday, December 3, 2010
MSE Wall Failures and Remediation
- Tuesday, December 7, 2010
Design of Geosynthetics in Waste Containment Systems
- Wednesday, December 8, 2010
Quality Assurance/Quality Control of Geosynthetics Manufacturing and Installation

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:

\$275/person for each one-day course (up to one month prior to course)

\$325/person thereafter

\$175/person – GSI Members

Contact: Marilyn Ashley (mvashley@verizon.net)

GSI Fellowships

We are pleased to announce the second class of GSI Fellows for the academic year 2009-2010. The basic criteria are as follows:

1. Student must have completed his/her doctoral candidacy examinations.
2. Student must be researching an innovative topic involving geosynthetics.
3. Student must express an interest and desire to teach and/or research in the geosynthetic field.

Four of the proposals contained excellent projects which have been awarded. These four plus four second year students (continuing their research projects) have been sent stipend checks accordingly.

Class 1 - Continued Funding for 2nd Year

Number	Student	Advisor	University	Topic
1-08	Michael McGuire	George Filz	Virginia Tech	Geosynthetic reinforced pile supported embankments
2-08	Connie Wong	Grace Hsuan	Drexel Univ.	Durability specification development for HDPE transmission and drainage pipes
3-08	Axel Ruiken	Martin Ziegler	RWTH Aachen	Geogrid behavior used in walls and slopes
4-08	Eleni Kapogianni	Michael Sakellairou	U. of Athens	Geosynthetic reinforcement of soil slopes under seismic conditions

Class 1 - New Funding this Year

Number	Student	Advisor	University	Topic
1-09	Anil Bhandari	Jie Han	U. of Kansas	Geogrids in pavements under dynamic loading
2-09	Brent Robinson	Mo Gabr	N. C. State	GT/GG behavior in lime stabilized subgrade soils
3-09	Ioanna Tzavara	Yiannis Tsompanakis	U. of Crete	Seismic design for geogrid reinforced walls
4-09	Majid Khabbazian	Victor Kaliakin	U. of Delaware	Geosynthetic Reinforced stone columns and embankment stabilization

The call-for-proposals for the 2010-2011 academic year is available on the GSI website.

Activities within (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 usually ASTM or ISO 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 208 GAI-LAP test methods available for accreditation. Please consult our home page for a current listing.

As of June, 2010, 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)
Ron Belanger -- (714) 520-9631
rbelanger@precisionlabs.net
- 14^A - Geotechnics (61 tests)
J. P. Kline -- (412) 823-7600
JPKline@geotechnics.net
- 19^A - HTS Consultants Inc. (42 tests)
Larry McMichael -- (713) 692-8373
LMcMichael@htshouston.com
- 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 (70 tests)
Hong-Kwan 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 - Vector Engineering (6 tests)
Ken Criley -- (530) 272-2448
criley@vectoreng.com

- 34^B - GSE Richey Road (28 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) (59 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 - BBA Fiber Web, Inc. (9 tests)
Ken McLain -- (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 - Bentofix Technologies (13 tests)
Colin Murphy -- (705) 725-1938
cmurphy@gseworld.com
- 47^A - Precision Laboratories, TX (13 tests)
Mike Bishop -- (866) 522-0843
mbishop@precisionlabs.net
- 48^B - Tenax Corporation (9 tests)
Andrew Barker -- (410) 522-7000
ABarker@tenax.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@propeinc.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
- 65^C - Bombay Textile Rsearch Assoc. (BTRA) (24 tests)
Riyaz Shaikh
(0) 022-25003551
btra@vsnl.com

^AThird Party Independent ^CInstitute
^BManufacturers QC ^DGovernment

If you are interested in this program and would like a copy of the GAI-LAP directory, please advise accordingly. A directory is published annually in December of each year, and is also kept current on GRI's Home page at <http://www.geosynthetic-institute.org>. For additional information on the GAI-LAP program contact:

George R. Koerner, Ph.D., P.E., CQA
Geosynthetic Institute
475 Kedron Avenue
Folsom, PA 19033-1208
Telephone: (610) 522-8440
Fax: (610) 522-8441
E-mail: gkoerner@dca.net

The annual GAI-LAP meeting was held in St. Louis in conjunction with ASTM D35 on June 10, 2010. Eight people attended representing 20% of the 46 GAI-LAP labs. Attendance was off at this meeting and all the ASTM meetings that I attended in St. Louis. It appears that a tough economy and limited travel budgets are partly to blame for the poor showing. I want to thank all that were in attendance for their time and effort.

John Wildman – Ardaman & Associates
Gary Torosian – Geotesting Express
Sam Allen – TRI Environmental
Jim Olsta – CETCO
Eric Blond – Sageos/CTT Group
Pascal Saunier – Afitec Texel
J. P. Kline – Geotechnics
Rebecca Page – Lumite

The results of the meeting were as follows.

1. A brief introduction and background of the GAI-LAP program was discussed.
 - (a) Program started in 1995
 - (b) Accredited 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 $C_v < 5$ for each test

The newest members are:

- TRI DRRF
- Agru America, South Carolina, USA
- BTRA, Mumbai, India

- Rowad, Damman, Saudi Arabia
2. The Demographics of the current GAI-LAP organizations are summarized as follows:

15 independent labs
 22 manufacturer QC labs
 6 centers (research or government)
 48 total

Also:

33 are GSI members
 15 nonmember labs
 (19 are international labs)

This demograph shows an ever increasing interest in the program particularly from international laboratories.

There are 208 possible tests for accreditation (165 ASTM, 1 FTM, 8 GRI, 34 ISO). The number of accredited tests per lab varies as follows;

5 min., 31 ave. 128 max.

There has been a rapid rise of new test methods, with a near tripling of methods covered in a fifteen year period since the inception of the program. New tests being added appear to be outside the ASTM D35 arena.

3. Proficiency testing is still the hallmark of the GAI-LAP. Of the 1511 proficiency test results submitted this year, only 9 first submittals were outliers representing 0.6% of the total. All outliers were resolved. Results of the proficiency tests were shared at the meeting. Electronic and hardcopy of the 2010 proficiency test results is available upon request.

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

- TenCate, Inc. for geotextiles
- EPI Inc. for geomembranes
- CETCO Inc. for GCLs
- ADS Inc. for Pipe
- GSE Inc. for geonets and geocomposites

4. The GAI-LAP Customer Survey was again sent out to all program participants and the findings were reviewed at the meeting.

39% return; the following are results (5 best to 1 poorest)

- (a) Information exchange = 4.3
- (b) Conflict resolution = 4.6
- (c) Proficiency Testing = 4.7
- (d) Directory and Internet = 3.8

Overall = 4.3

Overall results to date: 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 very good year in 2010!

5. 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 2011 in conjunction with ASTM D-35.
- (b) GAI solicited manufacturers for geosynthetic materials for 2010 proficiency testing.
- (c) GSI requests a volunteer auditor for 2011.
- (d) Note that each lab can add up to seven tests per year.

www.geosynthetic-institute.org

It is a pleasure working with you and thanks for participating in the GAI-LAP program. If you have questions, please contact accordingly.

George Koerner

Activities within GCI (Certification)

Due in part to the active interest by many GSI members and associate members we present a tabular summary of the Inspectors Certification Program. The table gives the pass/fail statistics by year as well as insight as to the impact of taking a course before the written examination. In looking at the data it appears as though the exam is reasonably difficult and at an appropriate level for today's CQA personnel.

Inspector Certification Test Results 2006 – 2010

Year	Geosynthetic Materials		Compacted Clay Liners		Comment ary No. of people failing both exams
	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 (25%)	89	20 (23%)	13 (14%)
2009	36	6 (17%)	36	2 (6%)	2 (6%)
2010	19	6 (31%)	15	0	0
TOTAL (to date)	373	53 (14%)	341	46 (13%)	24 (6%)

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 two very successful conferences to date and has plans for another, followed by a broader conference for Southeast Asia.

Items of Interest

1. **Coal Combustion Residuals (CCR)**

On May 4, 2010 the U. S. EPA proposed rule on CCR's became available. It is presently in the open-commentary stage. It represents considerable opportunities for geosynthetics. Three sources of information are the EPA's Website, GMA's Website and a nifty summary by Geosyntec Consultants.

2. **A Brief History of Building Codes**

Throughout history, disaster has often been the catalyst for the creation of building codes. For example, the Great London Fire of 1666 led to the London Building Act, establishing some of the first fire safety standards and codes.

Similarly, in the United States, building codes often evolved as a response to disaster. The Chicago fire of 1871 bankrupted the insurance industry at the time and resulted in that industry helping to establish building safety and fire standards that became code. The 1906 San Francisco earthquake and subsequent fires resulted in strengthening buildings and creating additional fire safety standards to which the structural and fire codes of today are traceable.

The energy crisis of the 1970s was its own disaster of sorts, resulting in regulations, codes and standards that help conserve fossil fuels, from miles-per-gallon ratings on cars to Energy Guide labels on appliances and even to the first national energy code for buildings in 1975 from the American Society of Heating, Refrigerating and Air Conditioning Engineers.

Hurricane Andrew in 1992 resulted in new codes and standards governing the wind uplift of roofs and protection against wind-borne debris.

More recently, the horrible loss and costly damage of Hurricane Katrina in 2005 led to the first adoption of state-wide building codes in Louisiana and Mississippi. Time will tell what impacts the Gulf Oil Spill will have on codes and regulations.

(ref. ASTM, May, June, 2010)

3. **Dubai-Underground Waste Disposal System**

(Menafn – Khaleej Times) Garbage trolleys and waste collection trucks will disappear from Shaikh Zayed Road, home to Dubais' iconic highrises, as all towers on the highway will be connected to a high-tech underground waste disposal project being planned by Dubai Municipality.

The multimillion-dollar project involves an automated vacuum waste disposal system that transports waste at high speed through an underground tube network. The network will carry refuse, from the skyscrapers, many of which house Dubais luxury hotels, to a transfer station located outside the Central Business District from where it will be directed to a landfill.

It is a system that eliminates waste-handling stages from collection to transportation by connecting certain establishments around the city to a centralized underground network, Director of Waste Management Department Hassan Mohammed Makki told Khaleej Times.

(ref. from Te-Yang Soong, CTI)

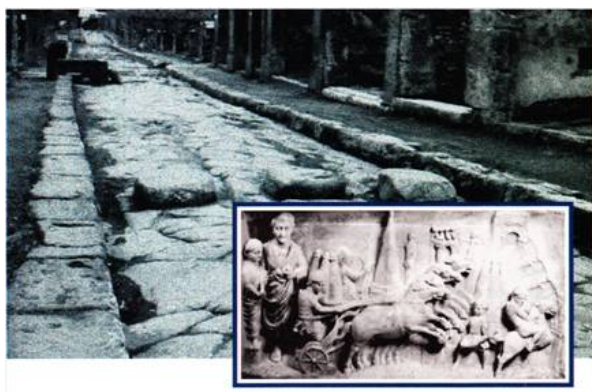
4. Vision for CE's in 2025

In June, a diverse group of civil engineering and other leaders gathered in Lansdowne, Virginia, to participate in the Summit on the Future of Civil Engineering. Their purpose was to articulate a global vision for the future of civil engineering, addressing all levels and facets of the civil engineering community. Their report, prepared by the ASCE Steering Committee to Plan a Summit on the Future of the Civil Engineering Profession in 2025, was published in June.

(ref. Civil Engineering, August, 2010)

Purging the Geosynthetics System of Depreciated Test Methods and Specifications

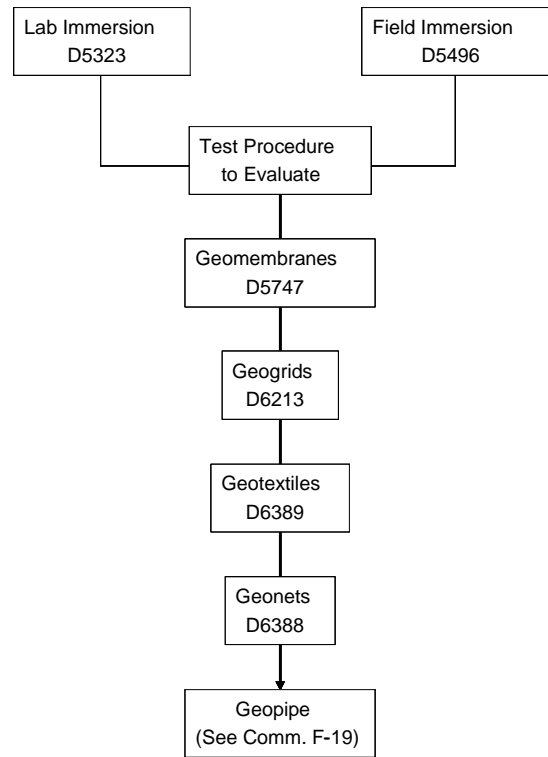
In May 1998, Maryann Gorman wrote a commentary in ASTM Standardization News entitled "How Specifications Live Forever". She began the article by explaining how standard gauge railroad track spacing in North America is 4 feet-8.5 inches (1.4351 m). It seems that this precise dimension dates from Roman times because "the Imperial chariots were made to be just wide enough to accommodate the back-ends of two war horses". For those of you that have been to Pompeii, the following photos from her article seem to corroborate this hypothesis!



From a geosynthetics perspective, lets go between agencies in that there is presently a series of ASTM standards which are intended to replace the EPA 9090 method for determining chemical compatibility of geomembranes to various candidate liquids. In fact, over fifteen years ago Bob Landreth (long retired from EPA) requested that we develop an alternative standard since EPA was not in the standards setting and distribution business. The present series of

incubation practices and subsequent test methods is as follows. It is very comprehensive and much moreso than the original approach. Let us all use this sequence of ASTM standards and please stop requesting EPA 9090.

ASTM Sequence of Standards to Evaluate Chemical Compatibility of Geosynthetics to Liquids (i.e., the alternative to EPA 9090)



In a somewhat similar vein of between agency test methods, the Federal Test Method 101C for evaluating puncture resistance of geomembranes is another antiquated test method. The closest ASTM replacement is D4833 which uses a beveled 5/16 inch (7.94 mm) probe instead of a tapered point. This was intentionally done since the tapered FTM point underestimates scrim reinforced geomembranes by having the probe simply sliding between sets of adjacent yarns. To our knowledge, current geomembrane specifications all use ASTM D4833. Let's stop with the FTM 101C requirement.

Completely within ASTM Committee D35 on Geosynthetics, there are many meaningful test method changes which the industry either does not know about, or is reluctant to adopt. Some of them are as follows:

- The old geomembrane ply adhesion tests (D413 and F904) have been upgraded and replaced by D7005.
- The old geomembrane dogbone tension test (D638) has been upgraded and replaced by D6693.

- The very old HDPE geomembrane stress crack test of D1693 has been completely replaced by D5397.
- The old shear and peel tests of geomembrane seams (D4437 and D4545) have been replaced by D6214 (for PVC) and D6392 (for olefins).
- The coated fabric test methods embodied in D751 are completely passé as is D3088 for PVC.
- Regarding laboratory weathering devices for geosynthetics, the industry's current choice is either the Xenon Arc (ASTM D4355) or the Ultraviolet Fluorescent (ASTM D7238). Following is a comparison table of approximate initial and maintenance costs of these contrasting incubation devices. In determining end-of-life testing, the choice is obvious to us. That said, the entrenched status of the Xenon Arc method is difficult to purge from user specifications.

Cost Comparison Between Laboratory Weathering Devices

Item	Xenon Arc	UV-Fluorescent
initial cost	\$70-80,000	\$10-15,000
tubes/bulbs	\$15,000/year	\$300/year
power cost	\$5000/year	\$400/year
water cost	\$3000/year	none
sewer cost	\$500/year	none

Picking on specifications rather than test methods, we can not neglect commentary on NSF #54. This series of specifications for sixteen different geomembranes began in ca. 1980 and was last published in 1995 by the National Sanitation Foundation, now NSF International. Shortly thereafter they simply stopped all geomembrane specification activity, including distribution of the document itself. Even further, some of the geomembranes addressed in NSF #54 are not available and, on the other hand, many others have been developed and are commercially available. Yet, we continue to see reference made to NSF #54 Specifications. It really is time to stop using NSF #54 since there are viable generic specification available for use for the majority of commercially available geomembranes.

We are sure you have some "golden oldies" of your own, but thought we would get these several items off of our chests. Thanks for listening in this regard.

Bob and George Koerner

Upcoming Events

- August 1-4, 2010
Earth Retention Conference
Seattle, WA
Contact: www.asce.org
- August 16-18, 2010
Wastecon, 2010
Boston, MA
Contact: www.swana.org
- September 15-16, 2010
GCL Conference Wurzburg, Germany
Contact : hzaninger@skz.de
- October 3-6, 2010
Global Waste Mgmt. Symp.
San Antonio, TX
Contact: www.wastesymposium.com
- November 16-18, 2010
GSI-Asia
Taiwan
Contact: cwh@mail.npust.edu.tw
- November 22, 2010
ASCE Webinar on Veneer Reinforcement of Slopes
Contact: www.asce.org (webinars)
- March 13-16, 2011
GeoFrontiers II
Dallas, TX
Contact: tvindemann@ifai.com
- March 16, 2010
GRI-24 Conference
Geosynthetics in Sustainability
Dallas, TX
Contact: mvashley@verizon.net

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. Recent member organizations are; Afitex-Textel with Pascal Saunier as contact person; EVAL Americas (Kararay) with Robert Armstrong as contact person, and In-Line Plastics with Mark Williams as contact person. The newest associate member is Oak Ridge National Lab with Dr. Amit Shyan as contact person. Thanks to all and welcome to GSI.

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(c/o Savannah River Remediation LLC)

Amit Shyan

IN THE NEXT ISSUE

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- The GSI Centers-of-Excellence
- Items of Interest
- Geosynthetics vis-à-vis Sustainability and a Preview of GRI-24 Conference
- GSI's Member Organizations