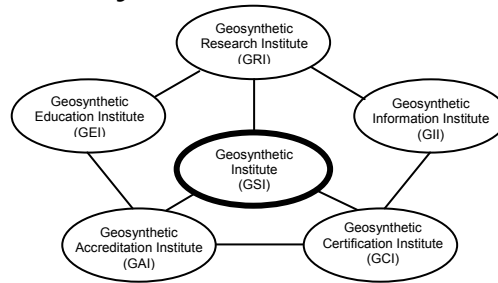


The GSI Newsletter/Report

Geosynthetic Institute



Vol. 18, No. 1

March 2004

This quarterly newsletter/report, now in its 17th year, presents the activities of GSI and its related institutes to all interested. It is available on the institute's home page at www.geosynthetic-institute.org. It also serves as a 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 mashley@dca.net.

Activities of the GSI Board of Directors & Institute Director

1. Boyd Ramsey of GSE was elected to be Chairman of the BoD for 2004. Congratulations go to Boyd in this regard.
2. A repeat of the GSI Annual Meeting was held in Munich, Germany at the EuroGeo 3 Conference. Keen interest was focused on GSI's generic specifications.
3. Approval by ASCE was gained to hold our next conference, GRI-18, with the GeoFrontiers Conference. The date is January 26, 2005 in Austin, Texas. See article on call-for-papers in this newsletter.
4. The current BoD members are as follows. Don't hesitate to contact them directly.

Term Ends 2004

Dave Jaros - Corps of Engineers
Rex Bobsein - Chevron/Phillips Co.
Kent von Maubeuge - Naue Fasertechnik GmbH

Term Ends 2005

Dick Stulgis - GeoTesting Express
Jim Olsta - CETCO
Dave Suits - NY State DOT

Term Ends 2006 (newly elected)

Tony Eith - Waste Management Inc.
Boyd Ramsey (Chairman) -
GSE Lining Technology, Inc.
At Large; Sam Allen - TRI/Environmental, Inc.

NOTICE: This Newsletter/Report is mailed to the contact persons of the GSI member organizations (≈ 100 total). Obviously, we wish you would share it with colleagues and friends. Please recognize, however, that it is always available on our Home Page at www.geosynthetic-institute.org in the open section under the heading "Newsletter/Report".

Overview of GRI Projects (Research)

Each issue of our Newsletter/Report provides a brief glimpse and update of current GRI research projects. 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 write-ups. Grace can be reached at (610) 522-8440 or e-mail at <grace.hsuan@coe.drexel.edu>.

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1. **Stress Cracking of Geomembranes** - Dr. Grace Hsuan is project manager of our ongoing efforts to evaluate stress cracking of geomembrane resins, sheets and seams. In addition to her ongoing evaluations of HDPE geomembranes, Grace is now focusing on HDPE drainage pipe. Her activity is on behalf of the Florida Department of Transportation. The goal for both geomembranes and geopipe is to include technically viable test methods and limiting values in generic specifications. For geomembranes, see GRI-GM13 (and the related GRI-GM10) on the GSI Web Site under *specifications and guides*. There have been recent changes in both. For geopipe, Grace has made recommendations for eventual inclusion in the AASHTO specification on drainage pipe.

2. **Durability and Lifetime Prediction** - This project is based on our previous 8-year long study on the lifetime prediction of HDPE geomembranes. The result of that study being a clearly defined Stage A – antioxidant depletion for HDPE geomembranes. George Koerner has set up 20 replicate columns each of which is subjected to a compressive stress equivalent to a 50-m high landfill. In each of the columns are the following:

- (a) 1.5 mm HDPE geomembrane with no antioxidants (Stage B and C degradation will be evaluated)
- (b) 140 g/m² needle punched nonwoven PP geotextile
- (c) 140 g/m² woven slit film PP geotextile
- (d) 90 kN/m woven multifilament PP geotextile
- (e) 175 kN/m woven multifilament PP geotextile

Temperatures are being maintained at 85, 75, 65 and 55°C and the samples are being removed on approximate 6-mo. intervals. Grace Hsuan and George Koerner are in charge of the project.

3. **Durability of Polypropylene Geotextile Fibers and HDPE Geogrid Ribs** - Incubation at temperatures of 75, 65 and 55°C in forced air ovens is ongoing using PP-woven geotextile fibers and HDPE geogrid ribs. This 5-year study periodically measures changes in density, dimensions, mass, morphology, strength, elongation, modulus, melt index, OIT and carbonyl content. Dr. Hsuan is in charge of the project.

4. **Durability of Polyester Geotextile Fibers and Polyester Geogrid Yarns** - PET geotextile fibers and coated geogrid yarns are being incubated at temperatures of 65°C, 55°C and 45°C while being immersed in deionized water. Additional parameter variations are crystallinity, molecular weight and CEG content. This 5-year study periodically measures changes in mass, diameter, morphology, strength, elongation,

modulus, molecular weight, crystallinity and CEG content. Dr. Hsuan is in charge of the project.

5. **In-Situ Temperature Monitoring of Liner and Cover Geomembranes in Dry and Wet Landfills** - Dr. George Koerner is evaluating the in-situ temperature behavior of geomembranes and has installed 20 thermocouples for long term measurements in a municipal solid waste landfill in Pennsylvania. This is a conventional “dry” landfill with no additional liquids added. Eight are on the GM liner, one is in the gravel, four are in the waste, six are on the GM cover and one is measuring ambient temperature at the site. Envisioned are temperature profiles of the entire system for up to 20 years. After 9.5 years of data collection, George has measured the following:

LOCATION	Min. Temp. (°C)	Ave. Temp. (°C)	Max. Temp. (°C)
geomembrane beneath waste	17	27	38
leachate collection stone beneath waste	14	17	22
within the solid waste itself	15	25	36
geomembrane above waste (it is covered by 1 m of soil)	3	21	40

The data is particularly intriguing since temperatures were constant at 20°C for the first 4-years and then abruptly increased to a 30°C average where they have remained to date. The cover temperatures swing seasonally; higher in summer and lower in winter. Members may contact George Koerner for this unpublished set of data.

An additional effort in this regard is the monitoring of the geomembrane liner and cover temperatures in a bioreactor landfill in Pennsylvania. It happens to be at the same landfill as the previously described site which is a dry-landfill. The geomembrane beneath the waste was at an average temperature of 25°C (5°C higher than the dry landfill) from the start. It has gradually risen over the past 2.5-years to an average temperature of 40°C (approximately 10°C higher than the dry landfill). The cover geomembrane has also been instrumented and data is being generated.

6. **Bioreactor (aka, Wet) Landfill Behavior and Properties** – The above temperature monitoring has segued into a major effort under sponsorship of GSI and Waste Management, Inc. The wet cell under investigation is at field capacity, hence it is a true anaerobic bioreactor. Dr. George Koerner is in charge of the GSI monitoring which includes the following:

- waste moisture content
- waste temperature
- leachate analysis
- waste gas analysis
- leachate elevation within the waste

Data is being collected on a quarterly basis. The timeline of the project calls for monitoring for 5 to 10 years. This fascinating project will be updated regularly.

7. Hydrostatic Creep Puncture of Geomembranes

- The effect of sustained long-term hydrostatic and geostatic pressures on the puncture strength of geomembranes is an ongoing project. A series of tests using 600 g/m² protection geotextiles on 1.5 mm thick HDPE geomembranes is ongoing. The 4-test setups use truncated cone simulations of coarse subgrade stones against the geotextile protecting geomembrane. The behavior of the geomembranes under these tests is a combination of creep and stress relaxation. Results are used in a puncture design method that has been published in a 3-part series in the Geosynthetics International Journal, i.e., theory, experiments and worked-out examples. The purpose of these current tests is to better define the creep reduction factors used in the design method.

8. Long-Term Benefits of Geotextile Separators

- A full-scale field database of using geotextile separators on firm soil subgrades is being developed and maintained by Dr. George Koerner. Monitoring is proposed for up to 20-years. The target sites are paved highways, driveways, parking lots, etc., where control sections without geotextiles are also available for comparison purposes. This database will be national and perhaps even international in scope. Included are sites which meet the following criteria:

- sites must have both geotextile and nongeotextile control sections
- known type of geotextile(s)
- known soil conditions
- known traffic conditions
- available hydrologic conditions
- capability of quantifying the original condition of the pavement surface vs. the aged condition... this will be accomplished visually as well as by using falling weight deflectometers.

There are currently 14-sites included in this program. If you have additional sites to add, please contact George at (610) 522-8440. A paper is available which outlines the procedure and field layout.

9. UV Exposure of Geomembranes

- Using the ultraviolet fluorescent exposure method, Dr. Grace Hsuan has a number of HDPE, LLDPE and fPP geomembranes being exposed

according to GRI Test Method GM12. Coupons are being removed periodically and tested. The target property is the oxidative induction time, since its depletion is necessary before property degradation is initiated. Similar data was used in the development of the HDPE and LLDPE geomembrane specifications. The fPP data focuses on OIT and the loss of strength and elongation. The information gained has been incorporated in the GRI geomembrane specifications.

10. NIST Sphere Exposure of Geomembranes

- Dr. Grace Hsuan is on sabbatical from Drexel this academic year at the National Institute of Standards and Technology in Gaithersburg, Maryland. Her project is to work with the NIST Sphere, a simply awesome device, to evaluate the exposed lifetime of geomembranes used in hydraulic applications, e.g., dams, canals, floating covers, tunnels, pipes, etc. She is exposing LLDPE, fPP, PVC and probably others as well... more later.

11. High Pressure Incubation for Lifetime Prediction

- Dr. Grace Hsuan has an ongoing National Science Foundation project on this topic. Five high pressure cells are involved: four are at 2.1, 3.5, 4.9 and 6.3 MPa and one is the control at atmospheric pressure. In the cells are HDPE geogrid, needle punched nonwoven PP geotextile, and woven slit film PP geotextile samples. They will be periodically retrieved and tested for OIT and tensile strength. Comparison will then be made to nonpressure incubation to assess the acceleration factor. A paper is available.

12. Destructive Seam Test Intervals

- A White Paper on interval selection for the taking of geomembrane destructive samples has been written for the International Association of Geosynthetic Installers (IAGI). They are currently reviewing it for publication. If you are interested in receiving it, please advise Bob or George Koerner.

13. Generic Specifications

- A major effort is ongoing with respect to the development of generic geosynthetic specifications. As described at our recent annual meetings the current status of these specifications is as follows:

Completed

- GM13 – HDPE Geomembranes
- GM17 – LLDPE Geomembranes
- GM18 – fPP Geomembranes
- GM21 – EPDM Geomembranes
- GM19 – Geomembrane Seams
- GT10 – Geotextile Tubes
- GT12 – Geotextile Cushions

Working Within Focus Groups

- GTXX – Geotextile Separators
- GCXX – TRMs for Erosion Control

Off in the Distance

GGXX – Biaxial Geogrids

GGXX – Uniaxial Geogrids

GNXX – Biplanar Geonet Drainage Composites

GCXX – Drainage Geocomposites

GCLXX – Geosynthetic Clay Liners

The completed specifications are available to everyone (members and nonmembers) on the open section of our Home Page. Please download and use them accordingly. Also, please note that this is where the latest modification will always be available.

14. **GRI “Generic Specifications” on Compact Disks** - A recent effort has been completed on the development of a CD for all of the approved GRI specifications. Thus, the six completed specifications (recall Item 13) are now available as a single collection. Please note that this is not the full text, which can be downloaded from our Web Site, but is an educational tutorial of each of the specifications. Each specific test in the specifications is illustrated by photographs and bulleted items in the context of a power point presentation. In fact, each specification description is a power point presentation.

Our thought is to give the CDs free to member organizations for their own staff training and, of course, to spread-the-word as they make presentations to clients and customers. There will probably be a nominal charge for nonmembers. Contact Bob Koerner for information in this regard... its really good stuff!

15. **Compact Disk on “Introduction to Geosynthetics”** - We have just completed a 68-screen CD, each with voice-overs, for use by faculty in a one-hour class. It covers the entire area of geosynthetics focusing on applications... plenty of neat photographs and its free to everyone! Approximately 400 have been sent to faculty and each GSI contact member has been sent a copy. If you want copies, or want to copy the CD yourself, please do so.

16. **Selected Lectures on CD's** - The GSI Board of Directors approved the making of a compact disk with selected geosynthetic lectures on it for free distribution to the academic, regulatory, design and manufacturing communities. It includes SRW's, LF Expansions, and Dam Waterproofing. Ask for GRI-CD2 and we will gladly send it to you.

The Geosynthetic Institute Centers

1. The Center for Polymeric Reinforced Structures (CPReS) was formed on Dec. 27, 2002 for the purpose of proper use of geosynthetics in walls, slopes and foundation reinforcement. It involves Dov Leshchinsky of Delaware, Grace Hsuan of

Drexel and George Koerner of GSI as Co-Directors. The mission statement and goals are available on the GSI Web Site at <geosynthetic-institute.org>. Initial projects are the following:

- (a) Dov Leshchinsky is modifying and incorporating two important aspects of reinforced walls into his widely-used computer program “MSEWall”. They are; design to accommodate short reinforcement lengths when full space is unavailable, and the incorporation of drainage geocomposites in accommodating low permeability backfill soils. The first topic was presented at GRI-17 in Las Vegas and a paper is available.
- (b) Grace Hsuan will utilize the Stepped Isothermal Method (SIM) for assessing the long-term behavior of various geosynthetic reinforcements. George Koerner has setup the apparatus and a graduate student San-Sik Yeo, is performing the requisite research.
- (c) George Koerner has supervised the construction of a segmental retaining wall at GSI which has 3-different masonry block types. He is measuring the pH-values directly between block surfaces and will do so for many years into the future... following is the “The GSI Wall”.



2. The Center for Polymers in Hydraulic Structures (CPHyS) was formed on June 20, 2003 for the purpose of proper use of geosynthetics in dams, canals, reservoirs, tunnels, pipes and related hydraulic systems. Jorge Zornberg of the University of Texas at Austin, Grace Hsuan of Drexel and George Koerner of GSI are Co-Directors. The mission statement and goals are available on the GSI Web Site at <<geosynthetic-institute.org>>. Initial projects are being decided upon, but one is certain.

- (a) Grace Hsuan will focus on exposed geomembrane durability and lifetime. (See Item 10 previously). This issue is critically important to gain confidence regarding polymer lifetime in the minds of owners, regulators, designers and specifiers in the focused application areas.
- (b) Jorge Zornberg's activity will focus on drainage behind exposed geomembranes on dams.
- (c) George Koerner's activities are under discussion.

3. In both CPReS and CPHyS, Bob Koerner will act in an advisory manner and as quality assurance! In both centers existing GSI Members and Associate Members are fully entitled to the information that is developed and their interaction is encouraged. No additional funding is anticipated. We will keep the membership advised as to progress in this regard. We sincerely hope that the membership is supportive of these initiatives and your comments/suggestions are always solicited.
4. There is a distinct possibility for additional centers of this type. Please contact Bob Koerner with suggestions and ideas.

Activities within GII (Information)

We are currently supporting 2-Home Pages. The first is the GRI Home Page which is accessed as follows:

<<<http://www.drexel.edu/gri>>>

This home page is available to everyone (member or nonmember) and has the following menu:

- Background (including members whose home pages are linked to this home page)
- Geosynthetic Materials
- Geosynthetic Applications
- Masters Degree in Geosynthetics
- Prospectus

This home page is very introductory as far as geosynthetics knowledgeable people are concerned, and is meant to be promotional (for prospective students and potential institute members). It is probably of only nominal interest to most readers of this Newsletter/Report.

The second home page is the GSI Home Page (which is "terrific") and is accessed as follows:

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

It has been reconfigured 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 | • Fall 2003 Courses |
| • GSI Publications | • Geosynthetics Links |
| • GRI Specifications & Guides | • GSI Member Listings |
| • Laboratory Accreditation | • Next GRI Conference |
| • CPReS | |

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 marilyn.ashley@coe.drexel.edu. When you get into this section, a treasure-trove of information is presented. This includes:

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

The "Links to the Geosynthetics World" is exactly that. The following is the menu in this file and by clicking on any item you will find all organizations involved in that industry segment. Selecting any one of them will give you their respective Web Site.

Regulatory Agencies
Standards Societies
Resin & Additive Producers
Geosynthetics Products
Geosynthetic Installers
Consultants in Geosynthetics
Geosynthetic Test Laboratories
Geosynthetic Organizations; Centers and Institutes
Universities with Geosynthetic Programs

Both GSI members and nonmembers are included, as are organizations on a worldwide basis. It's a super addition... try it out and advise accordingly.

Progress within GEI (Education)

The First-Ever Geosynthetics Courses Over the Internet (aka, the 21st Century is Here!)

The education-arm of the Geosynthetic Institute is delighted to announce five (5) complete courses available anytime and anywhere for prearranged 3-day time periods:

- Course #1 – Geosynthetics in Waste Containment
- Course #2 – QC/QA of Geosynthetics
- Course #3 – Geosynthetics in Transportation Applications
- Course #4 – Geosynthetics in Private Project Development
- Course #5 – Geosynthetics in Hydraulic Engineering Applications

Content – Each course has 500 to 600 screens of information, tables, graphs, photographs, examples, case histories, etc. Furthermore, all have a brief voice-over explaining the graphics in some amount of detail. There is also a hard copy set of notes containing all of the text-screens which will be posted to you prior to going on-line.

Benefits – Each course provides the latest information on design, testing, and installation of geosynthetics in the respective topic area. Please note that these are serious courses meant for those who wish to learn the technology, or wish to enhance their present knowledge.

Targeted Audiences – Everyone, involved in the respective topic areas should be interested in this technical information. This includes regulators, owners, designers, testing laboratory personnel, manufacturers, manufacturers’ representatives, contractors, installers, academics (faculty and students), research and administrative personnel, and (sometimes) even the public at large.

Initial Response – To date, six people have taken one or more of these courses. Responses are quite favorable with little difficulty being reported in navigating the available material. Two new people to the geosynthetics community were “amazed” at how much detail is available and how broad are the applications. Both are now considering taking a graduate level course at the university level.

Costs – Each course is \$300 for 3-consecutive days of access (\$150 for GSI members). This includes a set of pre mailed course notes. You pick the 3-days according to your schedule and we will give you a password for the particular course selected. Contact Marilyn Ashley at GSI for details.

Telephone: (610) 522-8440

Fax: (610) 522-8441

E-mail: mashley@dca.net

New – In cooperation with the Geosynthetics Materials Association (GMA), these five courses will soon be available free-of-charge to everyone! The first one is currently available. Log onto:

<www.gmanow.com>>

and click on “education”. You will be asked to create a User ID and Password and then hit “go”. At the bottom of the next screen is “Course – Geosynthetics in Waste Containment”. It is in seven separate files which must be downloaded to your disk or computer. These are huge files and each takes 30 to 60 minutes to download using a 128k access pipeline. So, please be patient. Once captured you have it all; figures, charts, equations, photos, voice-overs, etc. [The other four courses will be put on subsequently. Stay in touch or contact Danette Fettig of GMA at (651) 225-6959 for the latest information.]

Also, our Spring, 2004 courses at GSI are announced in the Upcoming Events and are posted on our Web Site.

Activities within GAI (Accreditation)

The Geosynthetic Accreditation Institute’s (GAI) current mission is focused on a Laboratory Accreditation Program (LAP) for specific 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 model for conducting business.

It should be made clear, however, 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. GAI-LAP verifies that an effective quality system exists at accredited laboratories by way of proficiency testing.

As of December 2003, the following laboratories are accredited by the GAI-LAP for the number of test methods listed in parenthesis. Contact personnel and telephone numbers are also listed.

- 1^A - TRI/Environmental Inc. (96 tests)
Sam Allen -- (512) 263-2101
- 3^A - Golder Associates (45 tests)
Henry Mock -- (770) 496-1893
- 4^C - Geosynthetic Institute (106 tests)
George Koerner -- (610) 522-8440
- 5^A - NTH Consultants, Ltd. (52 tests)
Debra Klinger -- (610) 524-2300
- 6^A - GeoSystems Consultants (27)
Craig Calabria -- (215) 654-9600
- 7^B - Synthetic Industries Inc., Chickamauga (10 tests)
Steve Thaxton -- (800) 258-3121
- 8^B - Synthetic Industries Inc., Ringgold (11 tests)
Toni Ruppert -- (706) 965-6300
- 9^B - Synthetic Industries, Inc., Alto (10 tests)
Melvin Wallace -- (770) 532-9756
- 10^A - GeoTesting Express, TX (63)
Jesse Coleman -- (817) 861-9090
- 11^A - STS Consultants Ltd. (13 tests)
Bill Quinn -- (847) 279-2500
- 13^A - Precision Laboratories (78 tests)
Ron Belanger -- (714) 520-9631
- 14^A - Geotechnics (61 tests)
Rick Lacey -- (412) 823-7600
- 18^A - EMCON/OWT (51 tests)
Rasheed Ahmed -- (845) 351-5100
- 19^A - HTS Inc. (42 tests)
Larry McMichael -- (713) 692-8373
- 20^A - GeoTesting Express, MA (32 tests)
Gary Torosian -- (978) 635-0424
- 22^B - CETCO Arlington Heights (13 tests)
Jim Olsta -- (847) 392-5800
- 23^B - CETCO Fairmount (8 tests)
Derek Reece -- (706) 337-5316
- 24^B - CETCO Lovell (8 tests)
Noe Garcia (307) 548-6521
- 25^B - TC Nicolon (10 tests)
Melissa Medlin -- (706) 693-2226
- 26^B - Agru America Inc. (16 tests)
Grant Palmer -- (843) 546-0600

- 27^B - Amoco Fabrics and Fibers Co. (14 tests)
Tom Baker -- (770) 944-4718
- 29^C - FITI Testing & Research Institute (70 tests)
Moon-Hyun Jeong (011-82-2-960-8034)
- 31^D - NYS Dept. of Transportation (9 tests)
Dave Suits -- (518) 457-4704
- 32^A - Vector Engineering (6 tests)
Ken Criley (530) 272-2448
- 33^D - Arizona DOT (5 tests)
Oscar Mousai (602) 712-8200
- 34^B - GSE Richey Road (16 tests)
Jane Allen (281) 230-6726
- 35^B - GSE Hardy St. (12 tests)
Nathan Ivy (281) 230-6726
- 36^A - H. C. Nutting (15 tests)
James Fleck (513) 321-5816
- 37^B - SL Limitada (16 tests)
Mauricio Ossa 56-2 6010153
- 38^C - Sageos/CTT Group (54 tests)
Eric Blond (450) 771-4608
- 40^B - GSE Nonwovens Technology Inc. (14 tests)
Charles Miller (843) 382-4603
- 41^A - SGI Testing Service, LLC (18 tests)
Robert Swan, Jr. (770) 931-8222
- 42^C - NPUST (GSI-Taiwan) (31 tests)
Chiwan Wayne Hsieh 011-886-8-7740468
- 43^A - Ardaman & Associates (18 tests)
George DeStafano (407) 855-3860
- 44^B - BBA Reemay, Inc. (9 tests)
Mike Zenker (615) 847-7575
- 45^B - Polyfelt Geosynthetics SDN Bhd. (23 tests)
C. P. Ng (603) 519 28568
- 46^B - Bentofix Technologies (13 tests)
Pat Thiffault (705) 725-1938

^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, 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:

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E-mail: gkoerner@dca.net

GAI-LAP Announcements

GAI-LAP annual meeting will be held in Kansas City, MO on June 16, 2004 (Wednesday) from 7:00 to 9:00 PM in conjunction with the ASTM D-35 meeting.

The following test method has been added to the list of GAI-LAP test methods.

ASTM D7005 Ply Adhesion of Geocomposites

2004a GAI-LAP Annual Meeting Minutes

The annual GAI-LAP meeting was held in Tampa, FL in conjunction with ASTM D35. It was held from 7:30 to 9:00 PM on Thursday January 15, 2004. Twenty-two people attended representing 19 of 37 GAI-LAP labs (51%). This was good attendance for a meeting of this nature and we thank those who made the effort to attend. In addition, two representatives from new labs elected to sit in on the open meeting.

The GAI Customer Survey was discussed. We had an 81% return and thank those who participated. GAI-LAP overall grade was 4.2 out of 5 this year. That compares with a 3.8 in 2000, a 4.3 in 2001 and a 4.2 last year. In conjunction with the survey we had a request to identify uncertainty for all 147 GAI-LAP tests. An attempt at this was made and has been distributed.

The proficiency program is still going strong. Of the 1361 test results this year, 37 were outliers (2.7 % of total). Root cause for all outliers was identified in each case. In general, it was substantiated that testing geotextile slit film (tape) geotextiles is not for amateurs. Thank you AMOCO Fabrics & Fibers Inc. for supplying the geotextile.

The conflict resolution service was used ten times the past year in the following manner/situations;

- ASTM D5397, stress crack (notching problem),
- ASTM E96, WVT (seal on a thick geomembrane beyond limit of test error)
- ASTM D5994, Core Thickness (asperity height point per GRI-GM12 was being used as a substitute incorrectly)
- Two times for ASTM D 4595, WWT geotextile (**a**-wedge grips testing a 1,000 ppi geotextile and damaging it at the grip geotextile interface, and **b**-100 ppi HBNW geotextile being tested with roller grips with an 8" rather than 4" gauge separation. This resulted in a premature rupture of the geotextile)
- ASTM D4632, GT Grab Tensile (grips were not padded and serrations on steel faces were knifing through geotextile yarns prematurely)
- ASTM D4491, Permittivity (valve on equipment was left open and the water was short circuiting the specimen resulting in an extremely high and erroneous value)
- Three times for ASTM D 5321, direct shear (**a**-clamping/gripping problem, **b**-incomplete hydration and **c**-sampling specimens in low strength direction versus high asperity and strength orientation)

It should be noted that the conflict resolution service is free of charge to GSI and GAI-LAP members. You are encouraged to use the service.

As a result of the three conflict resolutions with Direct Shear as well as a need to reduce the coefficient of variation with this test, Ron Belanger of Precision Geosynthetic Labs was asked to present an experimental design for direct shear testing that he had conducted internally. It was well received by those in attendance and he showed that the gripping/clamping technique is a major source of error with the test. His effort had immediate consequences. Action was taken the next day in the ASTM Task Group to try and reduce the variability in direct shear testing by standardizing the gripping/clamping technique used in the test. A gripping/clamping-testing program is currently underway to see if we can identify the best method to hold the specimen in-place while testing.

It was announced that the next GAI-LAP annual meeting will be held in June, 2004, in conjunction with ASTM D35. This meeting will be in Kansas City. This move was made so that reporting of proficiency results could be more timely and that we can avoid a conflict with GeoFrontiers next January. The meeting is set for Wednesday, June 16, 2004 from 7:00 to 9:00 PM. Hotel room will be announced on the ASTM Bulletin Board.

by George Koerner, Ph.D., PE, CQA

Activities within GCI (Certification)

We have an ongoing product certification program for all geosynthetics which have a generic specification. The program has as its target, conformance to a specific GRI specification such as GRI-GM13 for HDPE geomembranes. This specification has been in use for approximately 3 years with generally good reviews and considerable exposure. The specification is seen referenced in many project plans, specifications and quality assurance documents around the world. Most recently it has been adopted by Waste Management Inc. for all of their many projects. The certification program is based on ISO 9000 audits conducted on a 6-month cycle wherein the manufacturer's quality control plan and statistical data base are evaluated, along with sampling of the product. Upon testing by an accredited laboratory, the results are assessed and certification is granted, postponed or rejected. Certification carries with it the right to identify products as "GRI- Certified"; in this case "GRI-GM13 Certified".

We are delighted to report that SL Limitada of Chile is now approved to mark its HDPE geomembrane.

GRI-GM13 Certified

Our sincere congratulations go to the following people who are the principals involved:

Enrique Saavedra - General Manager
Mauricio Ossa - Technical Manager
Michael Mathieson - N.A. Representative
(WASEW Technologies Inc.)

Items of Interest

1. SRW Certificate of Achievement

The NCMA SRW Installer Education Program is a complimentary addition to existing training programs. The program is designed around two important principles; wall performance and minimum installation guidelines. At the end of a member's training program, installers can elect to take a national, standardized exam that evaluates their understanding of basic wall performance and minimum installation requirements. Those successfully passing the exam obtain third-party recognition from NCMA as a recognized NCMA SRW Installer.

(contact: <lcarter@ncma.org>)

2. Senate Votes to Reauthorize TEA-21

The Senate on February 12 overwhelmingly approved its version of legislation to reauthorize the Transportation Equity Act for the 21st Century (TEA-21), the 1998 law that funds the USA surface transportation program. Passed by a vote of 76 to 21, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act (S. 1072) would provide \$318 billion for highway, mass transit, and safety programs over six years. Now that the Senate has voted, the debate over transportation funding levels shifts to the House.

(ref. *Civil Engineering*, March 2004)

3. Polyester Turns "50"

Wilmington, Del.-based Dupont Textiles & Interiors celebrated the 50th anniversary of the launch of polyester with an exhibit at the company's New York Office. The exhibit, which ran June 17-18, detailed the material's history and future. Polyester has penetrated virtually every aspect of life and is used in all kinds of fabrics and plastics. Dupont sums up the material's impact with the phrase, "Polyester, It's Everywhere."

(*Review Magazine*, IFAI, Aug. 2003)

4. Statistics for MSW (Municipal Solid Waste) Disposal Methods as Percent of total (mid-1990s)

Country	Landfill	Incineration	Recycling/Composting
Japan	27	69	4
Korea	72	4	24
Denmark	22	54	24
Sweden	39	42	19
UK	84	9	7
Switzerland	14	46	40
United States	57	16	27
Mexico	99	0	1
Canada	75	6	19
Greece	93	0	7
France	59	32	9

[Data from Organization for Economic Cooperation and Development (OECD)]

5. Billions Required to Repair Dams

In response to concerns ASCE has raised about America's crumbling infrastructure, the Association of State Dam Safety Officials (ASDSO) has compiled state and national estimates of the cost of dam rehabilitation. ASDSO will ask Congress this year to establish a national program for financing the dam work. A nine-member task committee of ASDSO members has concluded that the cost of upgrading or repairing all of the nation's nonfederal dams would exceed \$36 billion. The committee's report, *The Cost of Rehabilitating Our Nation's Dams: A Methodology, Estimate, and Proposed Funding Mechanisms*, states that almost one-third of this amount--\$10.1 billion--is needed for those dams whose failure would cause significant loss of human life. In the past two years, at least 21 dam failures have occurred in the United States.

(Association of State Dam Safety Officials)

Call-for-(in Progress) Papers for GRI-18 at Geo-Frontiers

After seventeen annual stand-alone conferences we are breaking with tradition by incorporating GRI-18 into the upcoming Geo-Frontiers Conference in Austin, Texas. As we hope you are aware Geo-Frontiers is a joint Geo-Institute/Geosynthetic Materials Association (G-I/GMA) activity set for January 24-26, 2005. Our activity in this regard is to embed GRI-18 into the last day of the main conference, i.e., on Wednesday, January 26, 2005. We plan for something quite new and admittedly bold; let us explain...

The main conference is currently soliciting customary complete papers from the geotechnical and related communities, including those on geosynthetics. For work that is at a completion stage, please proceed

accordingly and submit an abstract to the conference technical committee. What GRI-18 hopes to accomplish is to provide a platform for geosynthetics R & D that is "in-progress". Thus, geosynthetics work that is anywhere from 15% to 85% complete is hereby solicited. We would like to daylight these ongoing efforts via short papers of 2, 4 or 6 pages in length. There will be two separate tracks:

1. Geosynthetics in Transportation and Geotechnical Engineering (morning)
2. Geosynthetics in Geoenvironmental and Hydraulics Engineering (afternoon)

We anticipate at least 50 papers in each of these above categories. They will be reviewed by the GRI-team and published in the conference proceedings. Approximately 15 in each group will be selected for short oral presentations. We also will assemble two panels of experts to tell us, "Where are the Unfulfilled Voids in Geosynthetics R & D?" Thus, the structure of what we will provide for GRI-18 is as follows:

R & D "In Progress" Morning Session:
January 26, 2005

Geosynthetics in Transportation & Geotechnical Engineering

(Dr. George Koerner - Moderator)

- (a) fifteen 7-minute presentations
- (b) 60-minute panel discussion on "Future Needs"

R & D "In Progress" Afternoon Session:
January 26, 2005

Geosynthetics in Geoenvironmental & Hydraulics Engineering

(Dr. Robert Koerner - Moderator)

- (a) fifteen 7-minute presentations
- (b) 60-minute panel discussion on "Future Needs"

We plan to tape-record the "panel sessions" and provide the results on several Web Sites, including G-I's, GMA's, GSI's, NAGS' and others. This latter effort should set-the-tone for future R & D in geosynthetics. We think it will be extremely valuable as the road-map for future activities for academics, manufacturers and practitioners alike.

If this "in-progress" activity interests you please e-mail us at <mashley@dca.net> and we will supply you with required information on writing format and style. Please send draft papers (as many as you like) for review no later than June 30, 2004. We will select the papers for oral presentations after viewing the entire set of submittals with the goal of giving the audience an accurate picture of "in-progress" geosynthetics research and development.

We ask everyone involved in geosynthetics, whatever your position or association, to participate in this activity. Thank you in advance and if you have questions or comments let us hear from you... the

GRI-18 activity promises to be a unique and extremely worthwhile experience.

*George R. Koerner - Assoc. Director - GSI
Y. (Grace) Hsuan - Assoc. Professor - Drexel
Robert M. Koerner - Director & Professor*

Upcoming Events

- March 29-31, 2004 - U. S. Army Corps of Engineers Workshop, Ft. Lauderdale, Florida
Contact: David Jaros
<david.l.jaros@usace.army.mil>
- April 5, 2004
Selected Topics in Geosynthetics
Toronto, Canada
Contact: Bruno Herlin <bherlin@terrafixgeo.com>
- One-Day Courses at GSI
April 8, 2004; Geosynthetic Reinforced Walls and Slopes
April 9, 2004; Geosynthetics in Transportation/Geotechnical Engineering
April 15, 2004; Geosynthetics in Waste Containment
April 16, 2004; QC/QA of Geosynthetics
Contact: Geosynthetic Institute, 475 Kedron Ave., Folsom, PA 19033; (610) 522-8440, fax (610) 522-8441, e-mail: <mashley@dca.net> or <geosynthetic-institute.org>.
- GAI-LAP Annual Meeting - June 16 2004, Kansas City, MO (with ASTM)
Contact: Geo Koerner <gkoerner@dca.net>
- ASTM D35 on Geosynthetics - June 17-19, 2004
Kansas City MO
Contact: Christi Sierk <csierk@astm.org>
- July 27-31, 2004 – Geo-Trans 2004, UCLA Campus, Los Angeles, CA
Contact: Geo-Institute of ASCE (703) 295-6350, fax (703) 295-6351.
- January 24-26, 2005 – GeoInstitute's GeoFrontiers '05 Conference in Austin, Texas
Contact:
<www.asce.org/conferences/geofrontiers05>

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. The newest member organizations are *STS Consultants* (Mark Sieracke), *GSE Europe* (Stefan Baldauf/Mike Everest), *Precision Geosynthetics Laboratory* (Ron Belanger), *Geotechnics Inc.* (Rich Lacey), and *InterGeo Geosynehtics* (Archie Filshill). We welcome each of them to our growing family of geosynthetic-interested organizations.

GSE Lining Technology, Inc.
Boyd Ramsey [BoD]
Earth Tech Consultants, Inc.
Kevin McKeon/Te-Yang Soong
U.S. Environmental Protection Agency
David A. Carson
Polyfelt, GmbH

Gernot Mannsbart/Philippe Delmas
E. I. DuPont de Nemours & Co., Inc.
John L. Guglielmetti/David W. Timmons

Federal Highway Administration
Albert F. DiMillio/Jerry A. DiMaggio

Golder Associates Inc.

Daniel E. Ponder/Mark E. Case

Tensor Earth Technology, Inc.

Donald G. Bright/Steve Valero

Poly-Flex, Inc.

James Nobert/George Yazdani

Colbond Geosynthetics

Wim Voskamp/Joseph Luna/Dennis Wedding

NOVA Chemicals Ltd.

Judy Webb-Barrett

Tenax, S.p.A.

Aigen Zhao/Caesar Baretta

Basell USA, Inc.

Robert G. Butala

TC Nicolon USA

John Henderson/Chris Lawson

CETCO

James T. Olsta [BoD]

Huesker, Inc.

Thomas G. Collins/Dimiter Alexiew/Steven Lothspeich

BP Solvay Polyethylene N.A.

J. (Mike) Killough/Wayne Dickson

Nauw Fasertechnik GmbH

Georg Heerten/Kent von Maubeuge [BoD]

SI Geosolutions, Inc.

Deron N. Austin

STS Consultants

Mark Sieracke

BBA Nonwovens

William M. Hawkins/William Walmsley

NTH Consultants, Ltd.

Jerome C. Neyer/Robert Sabanas

TRI/Environmental Inc.

Sam R. Allen [BoD]

U. S. Army Corps of Engineers

David L. Jaros [BoD]

Chevron Phillips Co.

Rex L. Bobsein [BoD]

Haley & Aldrich Consultants

Marvin D. Oosterbaan

URS Corp.

Pedro C. Repetto/John C. Volk

S. D. Enterprise Co., Ltd.

Bill Collier/Nick Tsui

Solmax Géosynthétiques

Robert Denis

Envirosource Technologies, Inc.

Douglas E. Roberts

CARPI, Inc.

Alberto M. Scuero/John A. Wilkes

Rumpke Waste Service, Inc.

Jay Roberts

Civil & Environmental Consultants, Inc.

Richard J. Kenter

Agru America, Inc.

Paul W. Barker/Peter Riegl

Firestone Building Products Inc.

H. Joseph Kalbas/John Heathcote

FITI (GSI-Korea)

H.-Y. Jeon

Waste Management Inc.

Anthony W. Eith [BOD]/Greg Cekander/

Charles P. Ballod

NPUST (GSI-Taiwan)

Chiwan Wayne Hsieh

GeoTesting Express

W. Allen Marr/Richard P. Stulgis [BoD]

GEI Consultants

Michael A. Yako

SL Chile Ltda.

Mauricio Ossa/Enrique Saavedra

Atarfil, S. L.

Mario Garcia Girones/Emilio Torres

Republic Services Inc.

Clarke Lundell

Industrie Polieco – MPB

Enrico Pántano

GSE Europe

Stefan Baldauf/Mike Everest

Precision Geosynthetics Laboratories

Ronald Belanger

Geotechnics, Inc.

Rich Lacey

InterGeo Geosynthetics

Archie Filshill

ASSOCIATE MEMBERS

Delaware Solid Waste Authority

Richard P. Watson

Nebraska Department of Environmental Quality

Gerald Gibson

New York State Department of Environmental Conservation

Robert J. Phaneuf

Maine Department of Environmental Protection

David E. Burns

New York State Department of Transportation

L. David Suits [BoD]

California Water Resource Control Board

Joe Mello

New Jersey Dept. of Environmental Protection

Nelson Hausman

Pennsylvania Dept. of Environmental Protection

Steve Socash

Florida Dept. of Environmental Protection

Richard Tedder

U.S. Bureau of Reclamation

Jay Swihart

Michigan Dept. of Environmental Quality

V. Wesley Sherman

Environmental Agency of U. K.

Rob Marshall

IN THE NEXT ISSUE

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- Overview of GRI (Research) Projects
- Activities within GII (Information)
- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
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- Upcoming Events
- GSI's Member Organizations