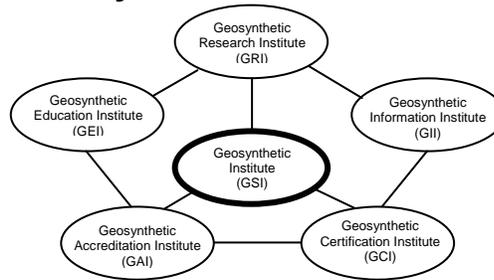


# The GSI Newsletter/Report

## Geosynthetic Institute



Vol. 20, No. 4

December 2006

This quarterly newsletter, now in its 20<sup>th</sup> 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](http://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](mailto:robert.koerner@coe.drexel.edu) or [mvashley@verizon.net](mailto:mvashley@verizon.net).

*Happy Holidays and a Healthy  
and Prosperous New Year*

### Activities of the Institute Directors & GSI Board of Directors

NOTICE: Due to the increasing cost of printing, shipping and handling, this Newsletter/Report will be made available on our Home Page at [www.geosynthetic-institute.org](http://www.geosynthetic-institute.org). It is in the open section under the heading "Newsletter/Report". Please share it with your friends and colleagues.

1. Professor Wayne Hsieh organized and hosted the first GSI-Taiwan Conference and it was an outstanding success. Read about it in this Newsletter/Report.
2. Our Inspectors Certification Exams (both geosynthetics and CCLs) are in high gear and will continue throughout the winter. Congratulations to TRI for their courses and proctoring in Chicago where 35-people are taking the GS exam and 32 are taking the CCL exam.
3. The dropping of our Product Certification Program and recommended warranty's on specifications has been accepted by all we heard from. Thanks for understanding our decisions in this regard.
4. The specification for exposed temporary geomembrane covers has been approved, as well as two test methods for geosynthetic aggregate. These three items are designed GM22, GC9, and GC10, respectively.
5. As of this writing we are finalizing our GRI-20 Conference set for January 18, 2007 in Washington, DC. We will also have our Annual Meeting, BoD Meeting, and several Focus Group Meetings. See our Website at [www.geosynthetic-institute.org](http://www.geosynthetic-institute.org) for details.

6. A listing of your GSI Board of Directors follow. Please don't hesitate to contact any of them with respect to GSI activities and programs. In this regard Tony Eith and Boyd Ramsey have been re-elected for 3-year terms. The At-Large position is being balloted currently.

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#### Term Ends 2006

Tony Eith - Waste Management Inc. (Owners and Operators)  
Boyd Ramsey (Chairman) - GSE Lining Technology, Inc.  
(Geotextiles and Geogrids)

Sam Allen - TRI/Environmental, Inc. (At-Large)

#### Term Ends 2007

David Jaros - Corps of Engineers (Government Agencies)

Rex Bobsein - Chevron/Phillips Co. (Resin Producers)

Kent von Maubeuge - Naue Fasertechnik GmbH  
(International)

#### Term Ends 2008

Dick Stulgis - GeoTesting Express (Consultants and Testing  
Laboratories)

Gary Kolbasuk - Raven (Geomembranes and GCLs)

Mark Sieracke - Weaver Boos Consultants, Inc. (At-Large)

## 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 following write-ups. **Projects marked with an asterisk have been written up as short "in-progress" papers.** Grace can be reached by phone at (610) 522-8440 or e-mail at <grace.hsuan@coe.drexel.edu>.

- 1. Stress Cracking of Geomembranes and Geopipe\*** - 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 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 in generic specifications.
- 2. Durability and Lifetime Prediction\*** - Last summer we reconfigured our 20-columns simulating landfill conditions for the purpose of estimating half-life of LLDPE geomembranes. The study was meant to extend the previous lifetime study of HDPE geomembranes which took approximately 10-years to conclude. The study uses elevated temperatures of 85, 75, 65, and 55°C to hasten degradation, followed by Arrhenius modeling to obtain the predicted lifetime. Unfortunately, our master temperature controller went "out-of-control" and became extremely hot with some columns having temperatures of over 100°C. This, of course, was way beyond our desired statistical control of temperature thereby negating all incubation to date. As a result, we

have abandoned the present 20-columns and must start over again from "scratch". We will see what the Winter brings since there is significant physical work necessary to set up these columns.

- 3. Durability of Polypropylene Geotextile Fibers** - Incubation at temperatures of 75, 65 and 55°C in high oxygen pressure containers is ongoing using PP-woven geotextile fibers. This 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. In-Situ Temperature Monitoring of Liner and Cover Geomembranes in Dry and Wet Landfills\*** - Dr. George Koerner is measuring the in-situ temperature behavior of geomembranes and has installed 60± thermocouples for long term measurements in both a wet and dry municipal solid waste landfill in Pennsylvania. Presently data for 13-years is available. This is clearly the longest in-situ measurement project in all of geosynthetics.
- 5. 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 considerable monitoring 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 for 5 to 10 years. This activity will now extend to an adjacent landfill to see how reproducible the data is with a slightly different waste mass.

- 6. 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 approximately 1-year old and is at a landfill in the Philadelphia area.
- 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/m<sup>2</sup> protection geotextiles on 1.5 mm thick HDPE geomembranes is being evaluated; the time is

currently 10-years. The four-test setups use truncated cone simulations of coarse subgrade stones against the geotextile protecting the underlying geomembrane. The behavior of the geomembranes under these tests is a combination of creep and stress relaxation. The purpose of these 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 and environmental 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.

**9. UV Exposure of Geomembranes\*** - GSI is using its Xenon Arc device along with its two existing UV-fluorescent devices to evaluate the simulated outdoor lifetime of nine different types of geomembranes; HDPE, LLDPE, 4 fPPs, PVC, EPDM and PE-R. The effort is considered as part of GSI's Center for Polymers in Hydraulic Structures (CPHyS), but has relevancy in many other applications as well.

**10. Technical Guidance Document on QC/QA of Waste Containment Facilities** - Drs. Dave Daniel and Bob Koerner have completed the Second Edition of this Technical Guidance Document by greatly updating the original 1993 EPA report. Its publication will be through the ASCE Press and will be available in January. If members want a preliminary copy of the geosynthetics portions on CD (≈ 390 pages) contact us accordingly.

**11. Generic Specifications** - A major effort is ongoing with respect to the development of generic geosynthetic specifications. The current

status of these specifications is as follows: the fPP spec is being revised using weatherometer testing as opposed to OIT testing for the endurance criteria.

Completed and Ongoing

- GM13 – HDPE Geomembranes\*
- GM17 – LLDPE Geomembranes\*
- GM18 – fPP Geomembranes (Temporarily Suspended as of May 3, 2004)
- GM21 – EPDM Geomembranes
- GM22 – Exposed Temporary Covers
- GM19 – Geomembrane Seams
- GT10 – Geotextile Tubes
- GT12 – Geotextile Cushions
- GT13 – Geotextile Separators
- GCL3 – Geosynthetic Clay Liners

\*An important note regarding textured geomembranes was recently added to the effect that direct interface shear testing should always be performed to assure against slope instability.

Working Within Focus Groups

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

Delayed or Off in the Distance

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

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 note that this is where the latest modification will always be available.

These specifications are also available as a separate power point CD which shows photos of the test devices and can be used as a presentation to your clients and customers, as well as being an in-house training vehicle... don't hesitate to use and share this information which is on the open part of our Web Site.

**12.** George Koerner is presently testing three different high strength geotextiles from three manufacturers (TC Nicolon, Huesker, and Propex) in preparation of the high strength specification noted in the previous item.

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 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 only of nominal interest to most readers of this Newsletter/Report.

The second home page is the primary GSI Home Page 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
- 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](mailto:mvashley@verizon.net). When you get into this section, the following information is presented. This includes:

- GRI Test Methods
- GRI Reports (Summaries)
- 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 17,000 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 that we (and others we are told) use the most in our entire website.

## Progress within GEI (Education)

We currently have five 1-day long courses available that are taught on an "irregular" basis. They are the following:

1. GSs in Waste Containment
2. GSs in Transportation Engineering
3. GSs in Hydraulics Engineering
4. GSs in Private Development
5. QA/QC of Geosynthetics

The enrollment in these courses, however, has been decreasing. George, Grace and I are presently deliberating as to the future of these courses and we would like your input as well. The deeply discounted

price for GSI Members and Associate Members only covers our costs and if you don't send participants the offerings become less significant. We would like to hear commentary from the membership; e.g.,

- (a) Are the GSI Courses meaningful to you?
- (b) Should we continue these offerings?
- (c) Should we standardize the timing of the courses?
- (d) Do you have any comments/suggestions?

Please advise and thanks in advance.

## Activities within GAI (Accreditation)

The Geosynthetic Accreditation Institute's (GAI) current mission is focused on a Laboratory Accreditation Program (LAP) for all 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.

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.

There have been significant additions to the number of GAI-LAP tests. There are currently 167 GAI-LAP methods available for accreditation. Please consult our home page for a current listing.

As of December 2006, 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<sup>A</sup> - TRI/Environmental Inc. (118 tests)  
Sam Allen -- (512) 263-2101
- 3<sup>A</sup> - Golder Associates (43 tests)  
Henry Mock -- (770) 496-8280
- 4<sup>C</sup> - Geosynthetic Institute (114 tests)  
George Koerner -- (610) 522-8440
- 5<sup>A</sup> - NTH Consultants, Ltd. (52 tests)  
Debra Klinger -- (610) 524-2300
- 6<sup>A</sup> - GeoSystems Consultants (27)  
Craig Calabria -- (215) 654-9600
- 8<sup>B</sup> - Synthetic Industries Inc., Ringgold (19 tests)  
Toni Ruppert -- (800) 258-3121
- 9<sup>B</sup> - Synthetic Industries, Inc., Alto (10 tests)  
Melvin Wallace -- (770) 532-9756
- 11<sup>A</sup> - STS Consultants Ltd. (13 tests)  
Bill Quinn -- (847) 279-2500
- 13<sup>A</sup> - Precision Laboratories, CA (95 tests)  
Ron Belanger -- (714) 520-9631

- 14<sup>A</sup> - Geotechnics (61 tests)  
Rick Lacey -- (412) 823-7600
- 18<sup>A</sup> - EMCON/OWT (55 tests)  
Rasheed Ahmed -- (845) 492-3170
- 19<sup>A</sup> - HTS Inc. (42 tests)  
Larry McMichael -- (713) 692-8373
- 20<sup>A</sup> - GeoTesting Express, MA (58 tests)  
Gary Torosian -- (978) 635-0424
- 22<sup>B</sup> - CETCO Arlington Heights (12 tests)  
Jim Olsta -- (847) 392-5800
- 23<sup>B</sup> - CETCO Cartersville (10 tests)  
Derek Reece -- (706) 337-5316
- 24<sup>B</sup> - CETCO Lovell (10 tests)  
Roger Wilkerson -- (307) 548-6521
- 25<sup>B</sup> - Ten Cate Nicolon (10 tests)  
Beth Wilbanks -- (706) 693-2226
- 26<sup>B</sup> - Agru America Inc. (14 tests)  
Grant Palmer -- (843) 546-0600
- 29<sup>C</sup> - FITI Testing & Research Institute (70 tests)  
Moon-Hyun Jeong -- (011-82-2-960-8034)
- 31<sup>D</sup> - NYS Dept. of Transportation (9 tests)  
James Curtis -- (518) 457-4735
- 32<sup>A</sup> - Vector Engineering (6 tests)  
Ken Criley -- (530) 272-2448
- 34<sup>B</sup> - GSE Richey Road (16 tests)  
Jane Allen -- (281) 230-6726
- 37<sup>B</sup> - GSE Chile (16 tests)  
Mauricio Ossa -- 56-2 6010153
- 38<sup>C</sup> - Sageos/CTT Group (82 tests)  
Eric Blond -- (450) 771-4608
- 40<sup>B</sup> - GSE Lining Technology Inc. (14 tests)  
Charles Miller -- (843) 382-4603
- 41<sup>A</sup> - SGI Testing Service, LLC (18 tests)  
Zehong Yuan -- (770) 931-8222
- 42<sup>C</sup> - NPUST (GSI-Taiwan) (39 tests)  
Chiwan Wayne Hsieh -- 011-886-8-7740468
- 43<sup>A</sup> - Ardaman & Associates (18 tests)  
George DeStafano -- (407) 855-3860
- 44<sup>B</sup> - BBA Fiber Web, Inc. (9 tests)  
Ken McLain -- (615) 847-7575
- 45<sup>B</sup> - Polyfelt Geosynthetics SDN Bhd. (23 tests)  
C. P. Ng -- (603) 519 28568
- 46<sup>B</sup> - Bentofix Technologies (13 tests)  
Pat Thiffault -- (705) 725-1938
- 47<sup>A</sup> - Precision Laboratories, TX (13 tests)  
Ron Belanger -- (866) 522-0843
- 48<sup>B</sup> - Tenax Corporation (9 tests)  
Tim Bauters -- (410) 522-7000
- 49<sup>B</sup> - Engepol Geossinteticos (20 tests)  
George Nastas -- (55) 11-4166 3001
- 50<sup>B</sup> - Advanced Drainage Systems, Inc. (7 tests)  
Terry McElfresh -- (513) 896-2065
- 51<sup>B</sup> - Solmax International Inc. (14 tests)  
Guy Elie -- (450) 929-1234
- 53<sup>B</sup> - Polytex (13 tests)  
Cristian Valdebenito -- 011 56 57 42 90 00
- 54<sup>B</sup> - Hancor (9 tests)  
David Gonso -- (419) 424-8377
- 54<sup>B</sup> - Atarfil Geomembranes (21 tests)  
Isabel Merida Fernandez -- 34 958 439 278

<sup>A</sup>Third Party Independent    <sup>I</sup>Institute  
<sup>B</sup>Manufacturers QC            <sup>D</sup>Government

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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Folsom, PA 19033-1208  
Telephone: (610) 522-8440  
Fax: (610) 522-8441  
E-mail: [gkoerner@dca.net](mailto:gkoerner@dca.net)

## Activities within GCI

### (a) Inspectors Certification Program

This new venture for GCI was initiated in January, 2006 and presently consists of a certification program for Construction Quality Assurance field inspectors for installation of geosynthetic materials and for compacted clay liners. It is focused on landfill liner and cover systems, as well as surface impoundments, waste piles, and related geoenvironmental applications.

The requirements are as follows:

1. Candidate must be recommended by a Professional Engineer (or equivalent) who knows and can attest to at least six months of acceptable field experience performing CQA activities with geosynthetic materials and/or compacted clay liners.
2. Pay a one-time \$400 fee for either geosynthetic materials or compacted clay liners, or \$500 for both material systems each of which covers a 5-year period upon successful completion of an examination.
3. Successfully pass a written examination proctored by GCI or a GCI designated individual and subsequently graded by the Geosynthetic Certification Institute.

There are separate examinations for both geosynthetic materials and compacted clay liners. To date, 150 people have successfully taken the Geosynthetics Materials Examination and 120 have successfully taken the Compacted Clay Liner Examination. See our Website for the most recent additions and/or changes.

The GCI Steering Committee is as follows:

Jeff Blum of STS	Jim Olsta of CETCO
Maria Tanase of Earth Tech	Boyd Ramsey of GSE
Rick Thiel of Vector	Te-Yang Soong of CTI
Jeff Fassett of Golder	Steve Wintheiser of CTI
Sam Allen of TRI	Dan Rohe of EPI
Mark Sieracke of Weaver Boos	Jim Goddard of ADS

### (b) Product Certification Program

We have discontinued our GCI-PCP as described in Item #2 of the Activities of the Institute Director and GSI Board of Directors comments in this Newsletter/Report.

## 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 many 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. We introduce these institutes to you in this Newsletter/Report and will present ongoing details of their respective activities.

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. It employs 120 people (8 with doctoral degrees) and 42 engineers. The geosynthetics testing group within FITI has 12 people (2 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 (50 km west of Seoul) 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. The ongoing efforts of both FITI and INHA will be described in future Newsletter/Reports.

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 Director of the Computer Center. 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 32 geosynthetic test methods. Dr. Hsieh has 10-

students working on geosynthetic-related projects and is extremely active nationally and internationally. The ongoing efforts of GSI-Taiwan will be described in future Newsletter/Reports.

## The Geosynthetic Institute Centers-of-Excellence

1. The Center for Polymeric Reinforced Structures (CPRoS) 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 Home Page at <geosynthetic-institute.org>. Ongoing 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 and a paper is available. The second topic will be presented at GRI-19 in December, 2005.
  - (b) Grace Hsuan is utilizing the Stepped Isothermal Method (SIM) for assessing the long-term behavior of various geosynthetic reinforcements including geofoam. Graduate student Sang-Sik Yeo, is performing the requisite research. A paper will be presented at GRI-19 in the Student Paper Session.
  - (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... the following photograph is of the "GSI Wall". Data is currently available. [As a comment, this wall has geogrid reinforcement between every block layer and is backfilled completely with AASHTO #57 stone. It will not collapse or even deform!]



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 Home Page at <<geosynthetic-institute.org>>. Initial projects are being decided upon, but two are certain.

- (a) Grace Hsuan is focusing 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, via a GSI funded graduate student, Christine Weber, will focus on drainage behind exposed geomembranes on dams.
- (c) George Koerner's activities are within GSI and focus on the Xenon Arc and UV fluorescent devices.

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. In particular we are looking to team with a university specializing in CAFO's, i.e., large-scale agricultural operations. Please contact Bob Koerner with suggestions and ideas.

## Items of Interest

### 1. Construction Work Facilities Decline - But Remain High

The number of construction workers fatalities in the U.S. decreased 4% last year and the industry's death rate also went down, but construction still had the largest number of on-the-job-fatalities of any occupation.

The latest census from the Bureau of Labor Statistics released August 10, 2006, reports that there were 1,186 private-industry construction deaths in 2005, down 4% from 2004. Construction's 2005 fatality rate improved to 11 per 100,000 workers from 12 in 2004. The decline in the fatality rate is a good thing since work continues to increase. The Bureau reports that

deaths rose in 2005 for residential building, utility system and heavy construction.

(ref. *Foundation Drilling*, Sept./Oct., 2006)

Editors Note: Recently a workman died after getting hit by a wind blown block of geofoam!

### 2. Fresh Kills Landfill Transforms to Park Land

Opened in 1948 on almost 3,000 acres, the Fresh Kills Landfill on Staten Island, New York became one of the largest refuse landfills in human history. The park design goals are as follows:

- Transform Fresh Kills into a unique asset.
- Create a world-class park through public engagement, creative design and environmental innovation.
- Improve quality of life an active recreation opportunities on Staten Island and in the region.
- Build an ecologically-sound road system that provides a framework for the park and reduces local traffic congestion.

To find out more about the Fresh Kills transformation project. visit [www.nyc.gov/freshkills](http://www.nyc.gov/freshkills).

(ref. *IAGI Newsletter*, Vol. 7, No. 3, 2006)

### 3. Infrastructure Report Card

2005 Report Card for America's Infrastructure

Category	Grade
Aviation	D+
Bridges	C
Dams	D
Drinking Water	D-
Electric Power Grid	D
Hazardous Waste	D
Navigable Waterways	D
Public Parks & Recreation	C
Roads	D
Schools	D
Security	Incomplete
Solid Waste	C+
Transit	D+
Wastewater	D-

(ref. *The American Surveyor*, Oct., 2006)

4. Speaking of Report Cards; How Would You Grade this Second Grader's Idea of His "Hero"?

*"My community helper is a garbage collector. His job is to keep the earth clean by picking up trash. He also picks up things that can be recycled. The main tool he uses is a garbage truck. My hero makes a difference because if we did not have garbage collectors we would not have a clean earth."*

(Ed. Comment: Our 2<sup>nd</sup> grader is Max Koerner (George's Son)!) )

## The First GSI-Taiwan Conference

Building on years of successful cooperation with geosynthetics in Southeast Asia, Pintung Taiwan was the location for the first International GSI-Taiwan Geosynthetic Conference held on December 4, 2006. The conference was held in the international conference hall at the National Pingtung University of Science and Technology (NPUST). The Conference Theme was "Geosynthetic Engineering Properties and Testing Techniques". University President Dr. Yuan-Kuang Guu opened the conference. NPUST is situated in the south of Taiwan on a 248 hectare campus approximating 10 km from downtown Pintung. The conference coincided with the University's 82 birthday celebration. Upon opening the conference a MOU was signed between The Geosynthetic Institute and GSI Taiwan pledging academic exchange and reciprocal assistance. We are confident about the continued cooperation between GSI and GSI Taiwan in the future.

The conference program was as follows;

Dr. G. Koerner, Director Designate, GSI  
Geosynthetics in Erosion Control

Prof. Han-Yong Jeon, Inha National University of  
Inchon South Korea  
Geosynthetics in Korea

Prof. S. H. Chew, National University of Singapore  
Effectiveness of Adding Geosynthetics to  
Reinforcement for Piled Embankments on Soft Soils

Prof. S. H. Lee, National University of Science and  
Technology  
A Concept of High Load Levels Needed for the Creep  
Test

Prof. C. W. Hsieh, National Pingtung University of  
Science and Technology  
Friction and Pullout Behavior of Geogrid  
Reinforcement Soils

Prof. S. C. Cheng, Drexel University  
Use of Geotextile to Filtering Low Density Suspended  
Organic Particles from Runoff or Combined Sewer  
Overflows

Prof. R H. Chen, National Taiwan University  
Filtration Behavior of Geotextiles Under Bi-directional  
Cyclic Flow

Prof. Wei F. Lee, Taiwan Construction Research  
Institute  
Seismic Design update based on Geosynthetic  
Inclusions

Prof. C. C. Huang, National Cheng Kung University  
Dewatering Tests and Analyses for Reservoir  
Sediment Slurry Using Woven Geotextiles

The oral presentation of papers and the prepared remarks by panel members were then followed by open discussion from the audience. The tone now changed from highly focused needs to more general issues and concerns. Some that were expressed by the crowd of over 150 people were better knowledge transfer, more involvement of the regulator community, and educational outreach in general.

Attendees made the most of the conference by visiting exhibitors and supporting organizations spaced around the perimeter of the exhibition hall. The following companies displayed geotextiles, geogrids, drainage composite, geopipes, erosion control products and geomembranes; EcoTrends International Co., Ltd., Bravogrid Enterprise Co., Ltd., Jih Dah Co., Ltd., Jin Tai Ming Plastics Enterprises Corp., Newmark Engineering Products Co., Ltd., Yuan Peing Garment Co., Ltd., Gold-Joint Industry Co., Ltd., Fu Been Enterprise Co., Ltd., Uni-Geotech Co., Ltd., and Geo Taitex, Ltd. The conference activities were concluded with a reception, which set a tone for fruitful days ahead.

Taiwan has much to offer in regards to geosynthetics manufacturing. After the conference a band of brothers (Prof. C. W. Hsieh of NPUST, Prof. S. C. Cheng, Drexel University, Prof. Chew Soon Hoe, National University of Singapore, and George Koerner, Geosynthetic Institute) set off on a northward journey from Pintung to Tiapa to sample this offering. We had great fun and learned many items and details. See the attached photographs taken on our 200 km two day trek.

Our travel ended in Taipei which is Taiwan's largest city. Two observations that struck me are that the companies visited all are interested in creating demand rather than competing with each other. This idea of growing the business and investing in the technology was contagious and corroborated by the witness of very large design/service staffs. The second observation was that all the upper management of these companies were hands-on technical people who had worked their way up through the organization. Most were mechanical or process engineers who had intimate knowledge of the production equipment and methods.

*George R. Koerner*



## 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 Pétromont (Sylvie Coulange-Suarex and Nathalie Legros), EPI (Daniel S. Rohe and Mark Wolschon), Vector Engineer (Vince Suryasmita and Richard Thiel), and Weaver Boos Consultants, Inc. (Mark Sieracke). A sincere thanks to all and welcome!

**GSE Lining Technology, Inc.**

*Boyd Ramsey [BoD]*

**Earth Tech Consultants, Inc.**

*Kevin McKeon/Ken Bergschultz*

**U.S. Environmental Protection Agency**

*David A. Carson*

**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.**

*Mark E. Case/Jeffrey B. Fassett*

**Tensar Earth Technology, Inc.**

*Donald G. Bright/Joseph Cavanaugh*

**Poly-Flex, Inc.**

*James Nobert/George Yazdani*

**Colbond Geosynthetics**

*Wim Voskamp/Joseph Luna*

**Tenax, S.p.A.**

*Aigen Zhao/Piergiorgio Recalcati*

**Basell USA, Inc.**

*Michael J. Balow/Robert G. Butala*

**TC Nicolon USA**

*John Henderson/Chris Lawson*

**CETCO**

*James T. Olsta*

**Huesker, Inc.**

*Thomas G. Collins/Dimiter Alexiew/Steven Lothspeich*

**Naue GmbH & Co.**

*Georg Heerten/Kent von Maubeuge [BoD]*

**Propex**

*Mark Marienfeld/Scott Manning*

**STS Consultants**

*Jeff Blum/John Trast*

**BBA Nonwovens**

*William M. Hawkins/William Walmsley*

**NTH Consultants, Ltd.**

*James J. Parsons/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]*

**URS Corp.**

*John C. Volk/Robert B. Wallace*

## Upcoming Events

- January 16-19, 2007  
GMA/GSI/NAGS Conference  
Washington, DC  
Contact: <[jmrutledge@ifai.com](mailto:jmrutledge@ifai.com)>
  - GRI-20 Conference: Jan. 18<sup>th</sup>
  - GSI Annual Meeting: Jan. 18<sup>th</sup>
  - GSI BoD Meeting: Jan. 19<sup>th</sup>
  - GSI Focus Group Meetings: Jan. 19<sup>th</sup>
 (see our Home Page for details)
- January 31, February 1-2, 2007  
ASTM D35 on Geosynthetics  
Costa Mesa, California  
Contact: <[csierke@asmt.org](mailto:csierke@asmt.org)>
- June 27-29, 2007  
ASTM D35 on Geosynthetics  
Norfolk, Virginia  
Contact: <[csierke@asmt.org](mailto:csierke@asmt.org)> 15<sup>th</sup>
- January 29-31, 2008  
ASTM D35 on Geosynthetics  
Tampa, Florida  
Contact: <[csierke@asmt.org](mailto:csierke@asmt.org)>
- March 2-5, 2008  
GeoAmericas  
Cancun, Mexico  
Contact: <[jmrutledge@ifai.com](mailto:jmrutledge@ifai.com)>

**Solmax Géosynthétiques**  
*Robert Denis*

**Envirosource Technologies, Inc.**  
*Douglas E. Roberts*

**CARPI, Inc.**  
*Alberto M. Scuerto/John A. Wilkes*

**Civil & Environmental Consultants, Inc.**  
*Chris O'Connor*

**Agru America, Inc.**  
*Paul W. Barker/Peter Riegl*

**Firestone Specialty Products**  
*Mark Munley/Paul Oliveira*

**FITI (GSI-Korea)**  
*Jeonhyo Kim/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*

**GSE Chile, S.A.**  
*Mauricio Ossa*

**Atarfil, S. L.**  
*Mario Garcia Girones/Emilio Torres*

**Republic Services Inc.**  
*Clarke Lundell*

**GSE Europe**  
*Stefan Baldauf/Mike Everest*

**Precision Geosynthetics Laboratories**  
*Ronald Belanger/Cora Queja*

**CETCO Contracting Services**  
*Archie Filshill*

**Raven Industries, Inc.**  
*Gary M. Kolbasuk [BoD]*

**CTI and Associates, Inc.**  
*Te-Yang Soong/P.D. Deo*

**Advanced Earth Sciences, Inc.**  
*Kris Khilnani/Suji Somasundaram*

**Polytex, Inc.**  
*Jaime Morales/Elias Jarufe*

**Carlisle Syntec, Inc.**  
*Randy Ober/Chris Taylor*

**Ring Industrial Group**  
*Ben Berteau/Jeffrey Karl*

**Pétromont**  
*Sylvie Coulange-Suarez/Nathalie Legros*

**EPI, The Liner Co.**  
*Daniel S. Rohe/Mark Wolschon*

**Vector Engineering, Inc.**  
*Vince Suryasmita/Richard Thiel*

**Weaver Boos Consultants, Inc.**  
*Mark Sieracke [BoD]*

**ASSOCIATE MEMBERS**

**Delaware Solid Waste Authority**  
*Richard P. Watson*

**Nebraska Department of Environmental Quality**  
*Gerald Gibson*

**New York State Dept. of Environmental Conservation**  
*Robert J. Phaneuf*

**Maine Department of Environmental Protection**  
*David E. Burns*

**New York State Department of Transportation**  
*James Curtis/Bob Burnett*

**California Water Resource Control Board**  
*Joe Mello*

**New Jersey Dept. of Environmental Protection**  
*Michael Burlingame*

**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*

**Environment Agency of U. K.**  
*Rob Marshall*

**Florida Dept. of Transportation**  
*Rodney G. Powers*

**National Design, Construction & Soil Mechanics Center**  
*Stephen D. Reinsch*

**Virginia Dept. of Environmental Quality**  
*E. Paul Farrell, Jr.*

IN THE NEXT ISSUE

- Activities of the GSI Directors and Board
- Overview of GRI (Research) Projects
- Activities within GII (Information)
- Progress within GEI (Education)
- Activities within GAI (Accreditation)
- Activities within GCI (Certification)
- The GSI Affiliate Institutes
- The GSI Centers-of-Excellence
- Items of Interest
- Recap of GRI-20 Conference and Related Happenings
- GSI's Member Organization