

The GSI Newsletter/Report



Geosynthetic Institute

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March, 2023

This quarterly newsletter, now in its 36th year, presents the activities of GSI and its related institutes to all who are interested. It is available on the institute's home page at www.geosynthetic-institute.org. It also serves as a quarterly report to its member organizations. Details are available by contacting George R. Koerner or Jamie Koerner at phone (610) 522-8440; or e-mail at gsigeokoerner@gmail.com or Jamie@geosynthetic-institute.org

Activities of GSI's Officers and Board of Advisors (BOA)

2023-2025 Board of Advisors

We would like to once again thank our Board of Advisors for their continued efforts and support of the Geosynthetic Institute. Their feedback and advice on issues impacting both the Geosynthetic Institute and the entire geosynthetics industrypriceless. The following are the names of the current BOA members and their contact information.

Term Ends 2023

- Te-Yang Soong - CTI Co.
(Consultants and Testing Labs)
email: tsoong@cticompanies.com
- Brian Fraser - Layfield Group
(Barrier Group)
email: brian.fraser@layfieldgroup.com
- Jacek Kawalec – Tensar
(International - 2)
e-mail: Jacek.Kawalec@vp.pl

Term Ends 2024

- Burrill (Bo) McCoy - Waste Management Inc.
(Owners and Operators)
e-mail: bmccoy2@wm.com
- Rene Laprade - Tencate Geosynthetics
(Geotextiles and Geogrids)
e-mail: r.laprade@tencategeo.com
- Sam Allen – TRI Environmental Inc.
(At-Large)
e-mail: Sallen@tri-env.com

Term Ends 2025

- Henning Ehrenberg – NAUE GmbH & Co. KG
(International-1)
email: hehrenberg@naue.com
- Miranda Rine – C.P. Chemical
(Resin and Additives Group)
email: Miranda.rine@cpchem.com
- David Carson – U.S. EPA
(Agencies)
email: carson.david@epa.gov

Please reach out to them if you have any questions or comments.

GSI continues to have virtual quarterly meetings with the Board of Advisors via Zoom. The First Quarter BOA meeting was held on March 31, 2023 at 11:00 am. Topics that were discussed during the meeting were: ongoing research projects, technical papers, upcoming conferences, specifications and the GAI-LAP Program. The BOA approved a \$100K USD expenditure over the next year to investigate polyethylene specifications beyond GRI GM13 and GM17. The 2Q BOA meeting is scheduled for June 30, 2023.

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Overview of GRI Projects (Research)

The following projects are all funded by GSI membership dues unless specifically noted. Most are long-term projects for which we are well positioned to accomplish. In an attempt not to repeat information in the quarterly newsletters, we will merely list the ongoing projects that have been written about in previous newsletters and will only provide details of new research. For details and/or discussion of ongoing projects contact:

George Koerner (gsigeokoerner@gmail.com)
Grace Hsuan (hsuanyg@drexel.edu)

1. Durability of Exposed Geosynthetics (GM, GT, GG, HPTRM, Turf, WD & GCCM)

GSI is using two outdoor exposure racks and four UV fluorescent devices to estimate the projected exposed lifetime of a litany of different geosynthetics. The newest material added to the repertoire are GCCM which are tested before and after exposure via ASTM D8058 Flexural Strength.

2. GSI wall, pH and durability of PET GGs

We continue to measure the pH between three types of dry cast masonry retaining wall blocks for over fourteen years. Concern here is over PET geogrids which are known to be sensitive to very high alkalinity environments. Indeed, the PH values started high, but over time they are now down below eight. It is nice to know that Mother Nature likes to buffer things from a pH perspective and we are always trying to reach equilibrium. Good news for geosynthetics.

3. EIA = PVC + KEE Specification

GSI has a long history of writing specifications for geosynthetics. Like all engineered materials, geosynthetics are used in many applications and need general requirements for plans and specifications. Our latest effort is on a specification which covers Polyvinyl Chloride (PVC) - Ethylene Interpolymer Alloy (EIA) geomembranes. Like our other material specifications, this document sets forth a set of minima, physical, mechanical, chemical and endurance properties that must be met, or exceeded by the geomembrane being manufactured. It is written in the context of quality systems for management and represents a manufacturing quality control (MQC) document.

After much testing and eight revisions we have a standard specification. It incorporates a few new endurance tests and also includes ASTM D8154 Standard Test Methods for H-NMR Determination of Ketone-Ethylene-Ester and Polyvinyl Chloride Contents in KEE-PVC Roofing Fabrics.” In short it will determine the amount of EIA in the geomembrane formulation.

In addition to UV, oven and elevated heat aging we will also stress the material via chlorine immersion. The change of properties as a function of aging can be assessed after 30-, 60-, 90-, and 120-days immersion, via tensile properties, differential scanning calorimetry and visual observations. It appears that predictable minor changes of the above properties take place under the experimental conditions with 10 ppm chlorine dioxide (ClO₂) medium at 50 °C.

This practice also covers a procedure for the accelerated aging of geomembranes with double 180° folds (i.e., a star fold.) See Figures 1 through 3 for the typical sample coupon and situation with the immersion container (mason jar) and constant temperature water bath. The types of geomembranes that this practice is focused upon are ideally relatively thin (less than 30 mil or 0.75 mm). The procedure could allow for the examination of the effect of ClO₂ concentration (3, 5 or 10 ppm) at 50°C. Unfortunately, one can't use higher temperatures due to the accelerated consumption of ClO₂. Even at 50°C the solution needs to be changed once a week so that proper concentration can be maintained (controlled via pH = 6.8 +/- 0.1 monitoring).

The performance trends show that the choice of resin type plays a key role in the longevity of the geomembranes but also the stabilizer packages contributed to better resistance to degradation in chlorinated water.



Fig 1 – Star fold coupon



Fig 2 – Immersion bath



Fig 3 – Specimen Preparation

Many factors affect the performance of the geomembrane including diffusion, density, and thickness. The simultaneously increasing material embrittlement and the consumption of active antioxidant molecules imply an apparent unselective reaction of ClO₂ with the polymer and the stabilizers molecules. Moreover, the radical nature and the high reactivity of ClO₂ led to the formation of carbon-chlorine species, which are assumed to originate from degraded antioxidant molecules.

Geomembranes have shown themselves to function well as landfill liners and covers. However, our goal is to never stop improving. Such laboratory accelerated aging tests are of value in comparing different products or different formulations of the same product, the process can also be used to contrast against a given specification. It is the institute's intention to update GRI Standard GM24 "Standard Practice for Incubation and Subsequent Evaluation of Single 180° and Double 180° Folding of Geomembranes" and GRI Test Method GM16 "Standard Test Method for Observation of Surface Cracking of Geomembranes" and use these updated standards in a new wave of high-performance geomembrane specifications.

4. Beyond GRI GM13 and GM17

GM-13 and GM-17 have achieved acceptance and adaption in many markets and countries throughout the world. The documents have been modified over time with 16 and 14 modifications/revisions, respectively. However, the barrier market has significantly expanded in scope, range and expected performance over the past decade. A "one size fits all" approach, while appropriate in the past, is no longer adequate to address the industry's needs.

For this reason, GSI has contracted a group of talented engineers and scientist with a wealth of knowledge on formulating and manufacturing PE geomembranes to prepare new specifications for geomembrane barriers based on application requirements including, but not limited to durability, lifespan, barrier properties and other factors. This process would include investigation of existing databases from multiple sources and review and discussion of the proposed levels and values. This process will be somewhat lengthy and, of course, a proposed output will need review by a larger group.

The contract is for \$100K USD and will last a year. A contract was awarded to a group from TRI environmental. The project team consists Rick Thomas, Amber Douglas, Sam Allen and Boyd Ramsey. There will be monthly Zoom calls to discuss status, findings, and efforts within the group. There will also be quarterly meetings open to the GSI committee for the purpose of transparency. The project started on December 2022 and will end on December of 2023.

The First quarterly meeting was held on March 29 and over 72 people attended (fantastic Interest). The next quarterly meeting will be held on June 29th.

Progress within GII (Information)

Our GSI Home Page is accessed as follows:

www.geosynthetic-institute.org

Everyone (members and nonmembers) can access the open part, which has the following menu:

Newsletter
Prospectus
Specifications
White Papers
Bookstore
Keyword Search
Members Only

Research
Certification
Information
Education
Accreditation
Personnel
Contacts
Webinars

Members Only Section on Website

To go further one needs a members-only password. Your contact person/persons (names beneath member company) must obtain a password from Jamie Koerner to access the members-only section of the Geosynthetic Institute website. Jamie can be reached by e-mail at Jamie@geosynthetic-institute.org. When you get into this members-only section, the following information is then available.

- **GRI Test Methods (all)**
- **GRI Reports**
- **GRI Technical Papers (419 Citations)**
- **Notes of GSI Meetings**
- **Links to the GSs World**
- **Keyword Search for Generic Papers**
- **Example Problems**
- **Frequently Asked Questions (FAQs)**

GRI Reports

To date, we have 48 GRI Reports available to members and associate members. These reports vary in length from 30 to 200 pages. They are in the password protected section of our home page at www.geosynthetic-institute.org/member/reports.html.

White papers are available for free to everyone, however GRI reports are only free to members (located in the member's only section of the website). Non-members can purchase the reports from the online GSI bookstore.

- **HP-TRM's**
- **Polk Co. EGC**
- **Closure Turf Durability and Freeze Thaw**
- **Pearce Creek Exposed Geotextile**
- **GAI-LAP: A 25-year Retrospective**
- **Alternative for ASTM D5397 Testing Stress Crack**
- **Survivability of GS with Aeroaggregates**
- **GG Seepage induced Flow in Levees**

Progress within GEI (Education)

ATA Geosynthetic Conference 2023



We were overjoyed to participate in co-sponsored IECA and ATA Geosynthetic conference on February 5th - 8th, 2023 in Kansas City MO USA. The weather cooperated with spring like temperatures, which created high spirits in the two thousand participants. Combining the events allowed for a huge exhibit area (215 different companies) for geoprofessionals to connect during this four day event. A comprehensive look at the latest issues, challenges and successes surrounding geosynthetics and the environment were shared during the technical sessions.

GSI had a special session at the event on Exposed Geosynthetic Performance. The room was overflowing with interest and people for what the four excellent speakers had prepared. The presentations and presenters were as follows;

Evaluation of UV Exposure of Polymeric Geomembranes Using Geographic and Climate Data

- David Beaumier and Ali Fazli, SAGEOS-CTT Group

Engineering Turf Landfill Closure: How long will it last?

- Bryan Scholl and Ming Zhu, Watershed Geosynthetics; Zehang Yuan, SGI testing Services

Exposed NPNW Geotextile Exposed Performance at a Large Surface Impoundment for Nearly one Year.

- Stephan Fourmont, Afitex-Texel Geosynthetics Inc. Silda Rivas, Alkegen and George Koerner Geosynthetic Institute (GSI)

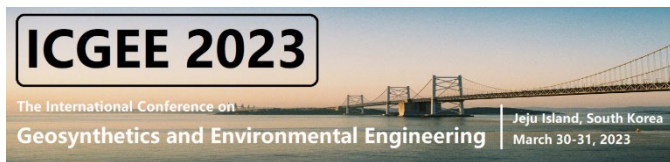
Exposed Geomembrane Cover Performance at Polk County Landfill in Florida

- George Reinhart III, Jones Edmunds & Associates Inc. and George Koerner Geosynthetic Institute (GSI)

GMA's Koerner Lecture

J.P. Giroud Ph.D., presented the fourth Koerner lecture. Established by GMA in 2016, the award and lecture series is given to an individual who has had a measurable impact on the geosynthetics industry in North America. This occasion created a unique opportunity for attendees at the Geosynthetics Conference 2023 to ask questions about geosynthetics to a legend in our industry.

Dr. Giroud joined us via live from France. The title of his lecture was "**From Zero Leak at end of Geomembrane Installation to Zero Leakage in Service**". The lecture presented mechanisms of failure and recommended design measures to avoid each failure going forward. The conclusion of the lecture made clear that geomembranes in containment facilities are essential for the protection of the environment, not only by preventing migration of contaminants into the ground but also by reducing water waste. Indeed, saving water will be a major economic and environmental challenge for the coming decades. The lecture was excellent and very well received. A good time was had by over 2000 attendees who were at the conference, either in person or virtually.



International Conference on Geosynthetics and Environmental Engineering

The International Conference on Geosynthetics and Environmental Engineering, organized by ASGES, INHA University and co-organized by the Korean Geosynthetic Society was held in Jeju Island, South Korea from March 30-31, 2023. ICGEE 2023 brought together leading academic researchers to share their experiences on all aspects of geosynthetics and environmental engineering.

The hybrid event had the following eight keynote speakers:

1. Prof. Richard J. Bathhurst, Department of Civil Engineering at the GeoEngineering Centre at Queen's-Royal Military College, Canada
Performance-based analysis and design for internal stability of MSE walls
2. Prof. Nelson N. S. Chou, National Taiwan University, Taiwan
Sustainable/Green Geosynthetic Structures to Protect the Environmental
3. Prof. Sabatino Cuomo, University of Salerno, Italy
Geogrid Material Reinforcement, Slope Stability and Slope Erosion
4. Prof. Han-Yong Jeon, Inha University, South Korea
Approach of Geosynthetic as Sustainability Concept for Environmental Adaptive and Eco-friendly Future
5. Dr. George R. Koerner, Director of the Geosynthetic Institute, U.S.A.
Advancing Environmental Containment with a Quality System Approach to Geosynthetic Barrier
6. Prof. Sai Vanapalli, University of Ottawa, Canada
Activities Related to the Mechanics of Unsaturated Soils
7. Assoc. Prof. Yaolin Yi, Nanyang Technological University, Singapore
Geotechnical and Geoenvironmental Engineering, Sustainable Construction Materials and Waste Treatment for Civil Engineering Applications
8. Prof. Yewei Zheng, Wuhan University, China
Geotextiles and Geomembranes in Intelligent Transportation Infrastructure

In addition, the event had six other invited speakers and a host of student papers over the two day event. We would like to congratulate Prof. Han-Yong Jeon as chairman of the conference and bring your attention to the ICGEE2023 Conference Proceedings, which were published through Springer in their "**Lecture Notes in Civil Engineering (LNCE)**" (ISSN: 2366-2557) and submitted for indexing to EI-Compendex, and Scopus.

“GSI Fellowships for Graduate Students”

GSI and the BOA have voted to switch funding from the 2023-2024 Fellowship Program to a sponsored research award to address the need for expansion of geomembrane specifications. We will access future funding of graduate students on a yearly basis, but there will be no funding for academic year 2023-2024.

The 2022-2023 fellowship recipients are listed below.

More information can be found at:

<https://geosynthetic-institute.org/gsfellows.htm>

No.	Name	University	Advisor(s)	Research Topic
1-22	Daniel Adeleke	Villanova USA	Kristin M. Sample-Lord	Coupled Hydraulic-Mech.-Chem. Behavior of Bentonite Polymer Composite in Waste Containment Applications
2-22	Mahmoud Ali	Queens University Canada	Kerry Rowe	Brittle Stress Crack of HDPE GM Caused by Extrusion Weld
3-22	Pourya Alidoust	Temple University USA	Joseph Coe	Advancement in Quality Control of GCLs using Full Waveform Inversion of Seismic Data
4-22	Mehran Azizian	University of Texas Arlington USA	Xinbao Yu	Analysis of Geocells-Reinforced Percussion Anchors under Static Uplift Load by Experimental and Numerical Methods
5-22	Yunhui Fan	Queens University Canada	Kerry Rowe	Geomembrane Physical Response and Leakage for Waste Covers due to Differential Settlement
6-22	Li He	University of Massachusetts-Amherst USA	Guoping Zhang	Water Drainage and Harvesting in Soils via Wicking Geotextile with Super Hydrophilic and Super Hydrophobic Patterns
7-22	Kasra Salemi Kouchesfahani	Queens University Canada	Richard Brachman	Physical Modelling of Geosynthetic Waste Covers under Differential Settlement
8-22	Rishneswar Ramineni	Texas A&M USA	Anand J. Puppala	Performance Evaluation of the Geosynthetic Reinforced Unpaved Pavement Sections Constructed over Weaker Subgrade Conditions Based on Large-Scale Repeated Load Tests
9-22	Kairen Shen	Rutgers University USA	Hao Wang	Numerical Modeling and Performance Analysis of Geogrid-Reinforced Airfield Flexible Pavement
10-22	Md. Wasif Zaman	University of Kansas USA	Jie Han	Investigation of Moisture Reduction in Unsaturated Soils using Geotextiles

Free Webinar Wednesdays

From January 4, 2023 until March 15, 2023, the Geosynthetic Institute gave **FREE 15 minute webinars** every Wednesday. This was open to everyone (members and non-members). The purpose was to educate everyone, even those not familiar with geosynthetics. The links are still posted on the Geosynthetic Institute's website and anyone who is interested in viewing the recorded webinars can do so at no cost. The following link provides access: <https://geosynthetic-institute.org/free.html>

Webinar Wednesday Schedule 2023

The “live” webinar schedule will resume in April, with one webinar per month. These GSI webinars (1 ½ hours in duration) will be available for purchases on our website.

www.geosynthetic-institute.org/webinar.htm

Date	GSI No.	Title
April 19	W-35	Geosynthetics used as Hydraulic Barriers - Description
May 31	W-31	Laboratory Testing of Geosynthetics- Description
June 21	W-32	Sustainability of Geosynthetics - Description
July 19	W-33	Ultraviolet Resistance of Geosynthetics- Description
August 16	W-23	Geosynthetic Filters: Concerns and Issues - Description
September 6	W-36	Geosynthetics used in Canal Linings - Description
October 11	W-26	Applications and Design of Geotextile Tubes- Description
November 15	W-34	Geosynthetics in Roadways- Description
December 13	W-6	Geosynthetics in Heap Leach Mining - Description

Each webinar provides 1.5 Professional Development Hours available upon completion of a short quiz

GSI Members Cost - \$200
(unlimited number of attendees for GSI Members)
Nonmembers Cost - \$250

Courses

We have abandoned our in-house, one-day, courses (which have been given for the past 30-years) and are presently delivering two of them in six segments over three consecutive days, one each morning and then afternoon. They are the following:

1. Quality Assurance/Quality Control of Geosynthetic in Waste Containment Facilities
(Recordings are available)
2. Construction Inspection of Mechanically Stabilized Earth (MSE) Walls, Berms and Slopes
(Recordings are available)

The third and newest of GSI courses is an On-Line “Designing with Geosynthetics (DwG)” course. Please go to www.geosynthetic-institute.org/courses.htm and scroll down to Course #3. Here you will see the requisite details. The course itself is completely synchronized with the 6th Edition of the DwG textbook. It consists of 1540 slides with \approx 18 hours of voice over; about one minute for each slide.

Contact Jamie Koerner at jamie@geosynthetic-institute.org if you want additional information.

Activities within GAI (Accreditation)

As of March 2023, 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. (155 tests)
Jarrett Nelson -- (512) 263-2101
jnelson@tri-env.com
- 3^A - WSP (43 tests)
Henry Mock -- (770) 492-1893
Henry_Mock@golder.com
- 4^C - Geosynthetic Institute (108 tests)
George Koerner -- (610) 522-8440
gsigeokoerner@gmail.com
- 8^B - Propex Operating Co., Ringgold (18 tests)
Todd Nichols -- 438-553-3757
todd.nichols@propexglobal.com
- 9^B - Lumite (17 tests)
Rebecca Kurek -- (770) 869-1787
rkurek@lumiteco.com
- 13^A - Precision Geosynthetic Labs (TRI Env.) (77 tests)
Chad Blackwell -- (714) 520-9631
cblackwell@tri-env.com
- 14^A - Geotechnics (55 tests)
J. P. Kline -- (412) 823-7600
JPkline@geotechnics.net
- 20^A - GeoTesting Express, MA (62 tests)
David Norton - (978) 635-0424
dnorton@geotesting.com
- 22^B - CETCO Hoffman Estates (11 tests)
Minerals Technologies Inc.
Dennis Wind -- (847) 851-1904
Dennis.wind@mineralstech.com
- 24^B - CETCO Lovell (11 tests)
Minerals Technologies Inc.
Stuart Yates -- (307) 548-6521
stuart.yates@mineralstech.com
- 25^B - Ten Cate, Pendergrass (13 tests)
Melissa Medlin -- (706) 693-2226
m.medlin@tencategeo.com
- 26^B - Agru America Inc. (27 tests)
Serena Evans-- (843) 546-0600
Sevans@AgruAmerica.com
- 29^e - FITI Testing and Research Institute (80 tests)
Hang Won-Cho -- 82-2-3299-8071
hwcho@fitiglobal.com
- 31^D - NYS Dept. of Transportation (8 tests)
Jim Simonds -- (518) 485-5707
Jim.Simonds@dot.ny.gov
- 34^B - Solmax (GSE) - Houston, TX USA (29 tests)
Jeremy Stephenson
Jstephenson@solmax.com
- 38^C - CTT Group SAGEOS (120 tests)
Oliver Vermeersch -- (450) 771-4608
overmeersch@gcttq.com
- 40^B - Solmax (GSE) - Kingstree, SC USA (20 tests)
Bruce Pressley -- (843) 382-4603
bpressley@solmax.com
- 41^A - SGI Testing Service, LLC (19 tests)
Zehong Yuan -- (770) 931-8222
ZYuan@sgilab.com
- 43^A - Ardaman & Associates (22 tests)
George DeStefano -- (407) 855-3860
gdestafano@ardaman.com
- 44^B - Berry Global Inc. (9 tests)
Julie Solarz -- (615) 847-7299
juliesolarz@berryglob.com
- 45^B - Ten Cate Geosynthetics Malaysia SDN Bhd. (24 tests)
Boon Kean Tan -- (603) 519 28576
BK.tan@tencategeo.com

- 46^B - TAG Environmental Inc. (13 tests)
Manpreet Saini-- (705) 725-1938
manpreet.Saini@tagenv.com
- 49^B - Engepol Geossintéticos (16 tests)
Patricia Natali -- (55) 51 3303-3901
patricia@engepol.com
- 50^B - ADS, Inc. Hamilton (7 tests)
Justin Elder -- (513) 896-2065
justin.elder@ads-pipe.com
- 51^B - SOLMAX - Canada (22 tests)
Claude Cormier -- (450) 929-1234
ccormier@solmax.com
- 53^B - Polytex Autofagasta (18 tests)
Mario Contreras Cardenas -- 011 55-288-3308
mcontreras@polytex.cl
- 55^B - Atarfil Geomembranas (21 tests)
Gabriel Martin Sevilla -- 34 958 439 200
gmartin@atarfil.com
- 56^B - Polytex Santiago (14 tests)
Sebastian Iturrita Monroe-- 011 56-2-677-1000
Siturrita@polytex.cl
- 57^B - Ten Cate Cornelia (22 tests)
Randy Johnson -- (706) 778-9794
r.johnson@tencategeo.com
- 58^B - Propex Furnishing Solutions - Hazlehurst (10 tests)
Lee Branch -- (912) 375-6180
Lee.Branch@propexglobal.com
- 59^B - Holcim Solutions & Products (9 Tests)
Janie Simpson -- (864) 439-5641
Janie.Simpson@holcim.com
- 60^B - TDM Geosintéticos S.A. (19 tests)
Henry De La Cruz -- 051-1-6300330
Hdelacruz@tdmgeosinteticos.com.pe
- 61^B - Viaflex (24 tests)
Clint Boerhave -- (605) 335-0288
Clint.Boerhave@viaflex.com
- 62^B - SOLMAX - Selangor - Malaysia (16 tests)
Pei Ching Teoh -- (450) 929-1234
pcteoh@solmax.com
- 63^A - TRI-SC Labs (12 tests)
Jay Sprague -- (864) 346-3107
Jesprague@tri-env.com
- 64^B - Agru America (NV) (14 tests)
Ryan Steele -- (775) 835-8282
RSteele@AgruAmerica.com
- 65^C - Bombay Textile Research Assoc. (BTRA) (23 tests)
PK Panda (0) 022-25003651
geotech@btraindia.com
- 66^B - Rowad International Geosynthetics Co. Ltd (13 tests)
Mohammad Ishad Hussain-- +966-3-812-1360
irshad@rowadplastic.com
- 69^B - Solmax (GSE) - Rayong - Thailand (18 tests)
Siriporn Chayaporenler -- 66-386-36758
siripornc@solmax.com
- 70^A - RSA Geo Lab LLC (48 tests)
Rasheed Ahmed -- (908) 964-0786
geolab13@yahoo.com
- 71^B - Plásticos Agrícolas y Geomembranas S.A.C. (24 tests)
Manuel Constantino Olivares Espinoza --
073-511814-511829
calidad@pqaperu.com
- 72^B - Tensar Corp. GA (5 tests)
Lynn Cassidy-Potts (770) 968-3255
lcassidy@tensarcorp.com
- 73^B - Gai Loi JSE (10 tests)
Paul Wong 84-650-362-5825
paul905677@gmail.com
- 74^B - Agru America Inc. (9 tests)
Mark Lockliear - (843) 221-4121
mlockliear@agruamerica.com
- 75^B - GeoMatrix S.A.S. (42 tests)
Javier Diaz Cipagauta (571) 424-9999
jdiaz@geomatrix.com.co
- 76^B - Tehmco (Chile) (15 tests)
Rodrigo Campoy 56-22-580-2852
rcampoy41@gmail.com
- 78^B - PQA Mexico (16 tests)
Cesar Augusto Arcila (669) 954-8202
directorcalidad@pqagag.com
- 79^A - TRI Geosynthetic Testing and Services (32 tests)
Mansukh Patel 86-512-6283-1396
Mpatel@tri-env.com
- 80^B - Texel Technical Materials (10 tests)
Eric Trudel (418) 387-4801
Etrudel@alkegen.com
- 81^B - Solmax (GSE) - Rechlin - Germany (18 tests)
Evelyn Kroeger 49-40-767420
ekroeger@solmax.com
- 83^B - Solmax Geosynthetics S.A.E. (13 tests)
Ahmed Abdel Tawab - 202-2-828-8888
atawab@solmax.com
- 84^B - Owens Corning (18 tests)
Ashutosh Dixit - 1-778-945-2888
Ashutosh.dixit@owenscorning.com
- 85^B - PAG Tacna (17 tests)
Manuel Constantino Olivares Espinoza --
073-511814-511829
calidad@pqapag.com
- 86^B - BOSTD China (29 tests)
Zheng Hong - 86-532-8780-6917
zhenghong@bostd.com
- 87^B - Willacochee Industrial (19 tests)
Miranda Adams - 912-534-5757
miranda@winfabusa.com
- 88^B - Geosynthetic Testing Services Pvt. Ltd. (16 tests)
Ravi Kant - 02717-250019
rkant@gts-pl.com
- 89^B - Megaplast India Pvt. Ltd. (13 tests)
Tatwadarsi Tripathy - 91-937404-4620
geo_sqc@megaplast.in
- 90^B - Techfab (India) Industries Ltd. - Daman (10 tests)
Anant Kanoi - 91-22-2287-6224
anant@techfabindia.com
- 91^B - Techfab (India) Industries Ltd. - Rakholi (3 tests)
Rajendra Chavan - 91-982-593-9922
geogrid.qualitylab@techfabindia.com
- 92^B - Techfab (India) Industries Ltd. - Khadoli (2 tests)
Navir Kumar - 91-22-229-76224
woven.qualitylab@techfabindia.com
- 93^B - Garware Technical Fibres (19 tests)
Rajendra K. Ghadge - 0-932-601-8083
rghadge@garwarefibres.com
- 95^B - Mexichem Colombia (Pavco) (8 tests)
Jenny Colmenares Chavez - 57-1-782-5100 (ext. 1534)
jjenny.colmenares@wavin.com
- 96^B - Tensar China (6 tests)
Zhu Shaolian - 603-6148-3276
zsl@tensar.com.cn
- 97^A - TUV SUD PSB Singapore (17 tests)
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- 99^B - Atarfil Middle East (16 tests)
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- 100^B - Atarfil Geomembranas USA (12 tests)
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- 101^B - Solmax (GSE) - Spearfish, SD USA (7 tests)
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- 102^B - SKAPS Industries (12 tests)
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- 103^B - STRATA Geosystems Pvt. Ltd. (6 tests)
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- 104^A - Advanced Terra Testing (32 tests)
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- 105^B - Pavco Wavin - Peru (6 tests)
Nestor Sifuentes Boggio - 51 990 277 136
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- 106^C - Auburn University-Erosion & Sediment Control Testing Facility (1 test)
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- 107^A - TRI Australasia PTY LTD (38 tests)
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- 108^B - Solmax Geosynthetic Co. Ltd. Suzhou (13 tests)
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- 109^B - Hock Technology Co. Ltd. (17 tests)
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- 110^C - Geofabrics Australia Pty. Ltd. - GRID (53 tests)
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- 111^B - Huesker Inc. - Shelby (9 tests)
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- 112^C - Instituto Mauá Tecnologia Brazil (7 tests)
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- 113^B - Azul Pack Filmes - Studio Tech (7 tests)
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- 114^B - Lonax Industria Brasileira DeLonas Ltda. (12 tests)
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^AThird Party Independent ^CInstitute
^BManufacturers QC ^DGovernment

6 new laboratories joined the GAI-LAP program this year. If anyone desires more information on the GAI-LAP program, its test methods, the associated laboratories, etc., please go to our website www.geosynthetic-institute.org/gai/lab.htm or contact George Koerner.

Activities within GCI (Certification)

GSI presently has three separate inspector certification programs. One (began in 2006) is focused on QA/QC of field inspection of waste containment geosynthetics and

compacted clay liners. The second (began in 2011) is focused on MSE Wall, Berm and Slope field inspection. The third, on Geosynthetic Designer Certification began on September 1, 2016. See our website at www.geosynthetic-institute.org under "certification" for a description and information on all three of them.

Applications to sit for the GCI-ICP exams need to be submitted to the Geosynthetic Institute for approval prior to taking the exams. Applications and payment information for the exams can be found at: <https://geosynthetic-institute.org/applications.htm>

Program #1 - Inspection of Liner Systems for Waste Containment Facilities

The certification program for certified inspectors of geosynthetic materials and compacted clay liners started in 2006.

There are currently 566 practicing certified inspectors, 426 inspectors (2018-2023) and 140 inspectors (2006-2018) who have renewed to keep their certification current.

TRI Environmental Inc. will be presenting a virtual QA/QC class April 3-6, 2023, which is the first training class this year. TRI Australasia will be holding an IN-Person training class on April 26-28. For more information and registration, please contact the director of TRI Australasia, Warren Hornsey.
whornsey@tri-env.com

Inspector Certification Test Results 2006-2023

Year	Geosynthetic Materials		Compacted Clay Liners	
	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%)
2007	82	11 (13%)	73	12 (16%)
2008	95	25 (26%)	89	20 (22%)
2009	36	7 (19%)	36	2 (5%)
2010	59	12 (20%)	54	7 (13%)
2011	54	6 (11%)	53	3 (6%)
2012	34	5 (15%)	28	3 (11%)
2013	32	4 (12%)	30	1 (3%)
2014	45	1 (3%)	42	3 (7%)
2015	56	6 (11%)	51	6 (12%)
2016	36	3 (10%)	35	5 (18%)
2017	78	5 (6%)	66	3 (4%)
2018	53	5 (10%)	51	1 (3%)
2019	114	20 (18%)	119	15 (13%)
2020	100	14 (14%)	92	10 (11%)
2021	70	14 (20%)	61	8 (13%)
2022	89	15 (17%)	80	13 (16%)
2023	April Exam			
Total	1174	158 (13%)	1088	124 (11%)

GSI has a pre-recorded “QA/QC of geosynthetics in waste containment facilities” course that can be purchased by anyone wanting to take the course online (accommodates your schedule) in preparation for the GCI-ICP certification exams. More information can be found at: www.geosynthetic-institute.org/courses.htm

Program #2 - Inspection of MSE Walls, Berms and Slopes

While a field inspector cannot require proper design or direct a contractor how to build a wall, flaws can be identified for possible design modification or mitigation action. Furthermore, and at minimum, construction practices can be observed and corrected if inadequate or improper. The official launch of this inspection program was on December 1, 2011 with a course and the examination afterward. A somewhat revised course on November 29, 2012 was presented. Presently, the corresponding course for this certification program has been transferred into a series of six presentations that have been recorded and can be viewed at your leisure.

Program #3 - Geosynthetic Designer Certification

Please see www.geosynthetic-institute.org/gdcpintro.pdf for the requisite details. Included are introduction (rationale behind the program was given in a recent GSI Column called “We’re Losing the Battle”), disclaimer, requirements, application, reference material, sample questions, proctor manual and proctor application. You must have six-months geosynthetic designer experience to take the exam.

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 three countries (Korea, Taiwan and India), and potentially others in the future. These affiliated institutes are full members of GSI and are empowered to translate and use all available information so as to create similar institutes and activities in their respective countries.

GSI-Korea was formed on February 9, 1998 as a collaborative effort between FITI Testing and Research Institute (a quasi-government organization) and INHA University (through its Geosynthetics Research Laboratory). It is presently held entirely within INHA University. **INHA University** is located in Incheon and the geosynthetics laboratory is led by Professor Han-Yong Jeon. Dr. Jeon has 10-students working on geosynthetic-related projects and is extremely active both nationally and internationally. His active

participation at conferences worldwide is very admirable. He has provided research and development in many geosynthetic subjects including geotextiles, geomembranes, geocells, and additives for GCLs, recycled plastics for improved formulations, etc.

GSI-Taiwan was formed on August 18, 2000 and is wholly contained within the National Pingtung University of Science and Technology in Nei Pu, Pingtung (southern Taiwan). 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-India under the direction of Dr. T.V. Sreekumar was formed in 2015. The hosting organization is the Bombay Textile Research Association (BTRA) which is a premier textile research institute providing testing, research, training and consultancy services. BTRA is located in Mumbai, India and is accredited as per ISO 17025. The Geosynthetic test lab is also GAI-LAP accredited. Testing at BTRA is performed as per the latest EDANA, ASTM, INDA, AATCC, ISO, EN and AASHTO international standards. BTRA is known for its excellence in textile R & D and is currently branching out into all forms of geosynthetics with a fantastic R & D laboratory. BTRA has a quarterly publication called “BTRA scan” and is worth checking out if you haven’t seen it.

GSI Member Organizations

We sincerely thank all of our sponsoring organizations for their continued support. Without members, GSI could not exist. The current GSI member organizations and their contact members are listed below.

Solmax

*Mark Harris/Jacques Cote/Simon Gilbert St-Pierre/
Jimmy Youngblood/Guillaume Beaumier*

U.S. Environmental Protection Agency

David A. Carson (BOA)

Federal Highway Administration

Silas Nichols/Daniel Alzamora

Golder Associates Inc.

Frank Adams/Paul Whitty/Linda Grover

Tensor International Corporation

Mark H. Wayne/Joseph Cavanaugh/Jacek Kawalec [BOA]

TenCate Geosynthetics

John Henderson/John Lostumbo/Rene Laprade [BOA]

Minerals Technology/CETCO

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TRI Environmental Inc.

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Member Organizations (Cont.)

U. S. Army Corps of Engineers

Kevin Pavlik/Richard DePasquale

Chevron Phillips Chemical Co.

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CARPI, Inc.

Alberto M. Scuero/Massimo Bugliosi/John A. Wilkes

Civil & Environmental Consultants, Inc.

Tony Eith

AGRU America, Inc.

Tom Nichols/Markus Haager

INHA (GSI-Korea)

H.-Y. Jeon

Waste Management Inc.

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GeoComp/GeoTesting Express

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Gabriel Martin/Alejandro Carreras Torres

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INOVA Geosynthetics/AERO Aggregates

Archie Filshill/Theresa Loux

Owens Corning Science & Technology LLC

Katie Hill/Jason Woodall

SKAPS Industries

Nilay Patel/Anurag Shah

Duke Energy

Asha Sree/Ken Karably

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Layfield Group

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Cooley Inc.

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Doha

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Nebraska Department of Environmental Quality

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