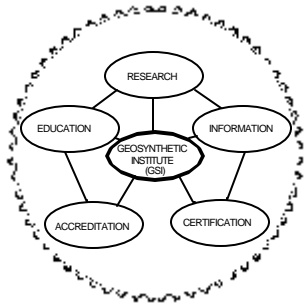




ACCREDITED GEOSYNTHETICS LABORATORIES

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2008 Statement of Qualifications Geosynthetics Services

TRI is a full service geosynthetics testing laboratory, unaffiliated with any other engineering/design, manufacturing, installation or distribution firm. TRI has been servicing the geosynthetics industry for over twenty years. In the context of geosynthetics and construction quality assurance (CQA) project work, TRI provides support in the following ways.

SERVICE AREAS

C In-plant Sampling and Inspection Services

While traditional quality assurance programs have involved on-site sampling of product rolls after they arrive, they have often resulted in expensive delays and costly corrections when subsequent testing identifies non-conforming product rolls. TRI was the first to revolutionize this approach by establishing in-plant manufacturing quality assurance (MQA) inspection and sampling services in the locations of product manufacture. These services are now established in the following cities and geosynthetic plants.

Location

Houston, Tx.
Kingstree, SC.
Grand Prairie, Tx.
Georgetown, SC
Greenville, SC
Evergreen, AL
Lovell, WY
Baltimore, MY
Fairmount, GA
Barrie, Canada
Spearfish, SD
Varennes, Canada

Inspection/Sampling for

GSE Lining Company
GSE Lining Company
PolyFlex
AGRU America
South East Manufacturers (Skaps, Tensar, Newvown)
Tenax Corporation
CETCO
Tenax Corporation
CETCO
GSE - BentoFix
GSE - Gundseal
SOLMAX

TRI provides two levels of service in this regard.

- 1) Client selects product rolls from planned production lists or actual product roll lists. TRI then independently samples these product rolls at the plant for testing.
- 2) Armed with the site-specific material sampling frequency, TRI selects product rolls in compliance with the required frequency and tests accordingly.

TRI's in-plant services are established in the host-city of the manufacturer of interest, thus eliminating the need for sponsors to pay for travel and lodging costs traditionally associated with MQA inspection and sampling events.

C Geosynthetics Conformance/Verification Testing and Laboratory Accreditation

TRI's geosynthetics laboratories and governing quality assurance system are accredited by the Geosynthetics Accreditation Institute (GAI). TRI is proud to be the first testing laboratory to achieve this accreditation, and is currently distinguished as holding the most comprehensive (117 tests) accreditation in the world. TRI has been testing and evaluating geosynthetics materials for over twenty years and has earned a superior reputation as an internationally acclaimed, highest quality testing and research facility. Our staff are active on ASTM's Committee D35 and ISO Committee TC221 for geosynthetics testing, and assure the most up-to-date, state-of-the-art testing systems and standard operating procedures for all sponsored work.

Various test hardware to support this laboratory's activities includes:

- C a 150,000-pound capacity Instron Universal Testing Machine;
- C a 600 kN (135,000-pound) capacity long extension Instron model 5889 testing machine equipped with Merlin Series IX "Smart-Data" acquisition system
- C a 22,000-pound Instron Servo-Hydraulic Testing Machine with various direct-mounting extensometers;
- C a 150 kN (35,750-pound) capacity Instron Model 5583 testing machine equipped with Merlin Series IX "Smart-Data" acquisition system;
- C a 5 kN (1,125-pound) capacity Instron Model 5565 testing machine equipped with Merlin Series IX "Smart-data" acquisition system;
- C fixturing and support apparatus for diversified materials testing;
- C a 10,000-pound United Testing screw-driven testing machine equipped with "Datum" data acquisition system;
- C 3 five station five-500-pound load cell, screw-driven testing machines equipped with automatic data acquisition software to test multiple seam samples concurrently;
- C load cells and instrumentation for the above with the capability to measure 1 g - 100,000 lbs in tension or compression;
- C durometer hardness testers;
- C microtome precision cutting apparatus;
- C Mullen Model A burst tester with 2,500 psi capability;
- C hydrostatic resistance test apparatus;
- C constant and falling head permittivity apparatus;
- C 5 hydraulic transmissivity test apparatus;
- C GeoTac hydraulic conductivity test apparatus;
- C IBM-PC compatibles equipped with a variety of interfacing, networking and software capability.

C **Destructive Seam Testing During Installation**

During geomembrane installation, most CQA plans include third party destructive seam testing to assure the quality of the welds. TRI may provide this service at a competitive cost and rapid turnaround time. All **results of destructive seam tests are provided the same day as sample receipt** via facsimile with hard copies mailed the next day. At the end of the project a complete summary of all results is provided for project records. TRI also provides seam forensic capabilities to assist the project if and when any problems are encountered with dirty seams or welds marked by too much or insufficient heat, bad alignment, etc. We may provide microtomes and photographs of observations to assist you in responding appropriately to any quality assurance issue.

C **Interface Friction/Direct Shear and Related Performance Testing**

TRI laboratories perform a variety of performance testing services to support design verification and confirmation of material performance properties. This testing includes interface friction/direct shear testing to investigate slope stability as well as hydraulic conductivity for geosynthetic clay liner materials. TRI employs 10 interface friction boxes facilitating a superb testing turnaround time for the determination of slope stability behavior. We also maintain traditional geotechnical testing capabilities via pinhole dispersion, California bearing ratio, and one-dimensional consolidation. Pinhole dispersion testing provides TRI with capabilities to test for dispersive clays that could be used in earthen dams and levees. California bearing ratio enables TRI to determine subgrade suitability for roads and parking lots. One-dimensional consolidation allows TRI to estimate settlements of earthen structures such as dams and soft soils, which are subject to large overburden pressures. With these test procedures combined with routine triaxial shear strength testing and extensive soil hydraulic conductivity testing, TRI provides all of the testing needed to support major earthwork projects involving geosynthetics.

Also included are durability testing services such as long-term creep and stress-rupture testing, long-term transmissivity, clogging potential, UV resistance, oxidation and hydrolysis resistance, and other related performance evaluations. TRI staff are well versed in design issues and assist our customers in developing and performing responsive performance testing programs.

- C 11 direct shear/interface friction apparatus (12" box; 3-1/2" depth; GeoDurham);
- C Environmental chambers and forced air/convection ovens for oxidation resistance testing.
- C Q-Panel and Atlas Weatherometers for Xenon arc and QUV ultraviolet light chambers for UV resistance testing.
- C Large-scale connection and pull-out test apparatus for testing coefficient of interactions and connection strengths supportive of reinforcement design;
- C Long term tension creep/stress rupture test apparatus for conventional characterization of creep reduction factors
- C Elevated temperature tension creep/stress rupture test apparatus for accelerated characterization of creep reduction factors. This equipment includes capacity for performance of the Stepped Isothermal Method (SIM).
- C gradient ratio and biological clogging test apparatus;
- C notched constant load test apparatus capable of testing up to 120 specimens;
- C multi-axial tension and large scale hydrostatic puncture test apparatus;
- C Full-scale laboratory soils testing equipment (Atterburg limits, grain size, proctor compaction, consolidation, tri-axial shear, permeability, CBR, etc).
- C Analytical chemistry equipment (digestion, titration and viscosity apparatus) necessary for molecular weight and carbonyl end group testing of polyester based geogrids.

C Research and Development of New Geosynthetic Products

As an independent third party testing facility, TRI is well known for its capability to perform advanced research and development but at a high level of confidentiality. As new geosynthetic products are introduced into the market, their relative performance characteristics are tested and evaluated in the context of product development and definition.

C Forensics and Failure Analysis

TRI maintains a broad capability to evaluate the microstructural properties of geosynthetic materials. This capacity, in concert with our performance testing capability, is often employed to investigate the cause for geosynthetic seaming problems or geosynthetic material failures. Senior technical staff bring their experience to bear on specific technical challenges encountered as geosynthetic materials are installed. Forensic investigation is also called upon when new and/or unknown materials are evaluated, or where premature field failures have occurred.

C Specification Review and Product Selection

Within the geosynthetics industry, there is all too often a tendency to mis-specify or over-specify a geosynthetic material. Problems in material specifications often result in an apparent “failure” in material even though the material was never appropriate for the application. Wasted money is often spent on mis-applied materials or laboratory testing that provides no benefit in the context of material quality verification or investigation. In the worst cases, irrelevant specifications often lead to expensive delays in material acquisition and installation.

TRI's technical staff review geosynthetic material specifications to assure their relevancy to the material for which they exist. When product selection questions are defined, TRI's staff assist the client in comparing candidate materials and in formulating responsive testing programs. In addition, TRI staff help develop specifications where none exist or where a new material is proposed for application. Through this work, TRI staff have saved significant money and time for our clients.

C Training Services

To assist our clients in maintaining their awareness of continual industry developments, TRI staff routinely provide lectures, workshops and short courses designed to focus on various aspects of geosynthetic materials, testing and specifications. Professional Development Hours (PDHs) are offered for most course offerings. Currently, the following short courses are provided.

The Testing and Specification of Geomembranes
Slope Stability and Interface Friction Testing
The Performance of Site-Specific Liner Integrity Surveys
The Design, Testing and Specification of Geocomposite Drains
GS1 CQA Technician Certification - Exam Preparation Course

*Accreditation for Liner Integrity Surveys
Green Engineering Using Rolled Erosion Control Products*

WEB-SITE AND DATA REPORTING

TRI provides resource information and client reports in client-confidential files on our website:

www.GeosyntheticTesting.com

TRI clients, and their authorized contacts have free use of this web-site via TRI provision of a user-name and password. In addition to faxing and e-mailing completed laboratory test reports, these individual project reports are posted to our web-site for access by all authorized parties. The project-specific data report files are filed by project name making access easy and immediate, facilitating final report download at any time. TRI accreditation documentation, TechNotes (providing answers to typically asked questions), and Test Request Forms are also provided for downloading. In addition, an up-to-date listing of test standards and procedures, to assist in specification development and review, is provided.

TRI appreciates your interest and values each opportunity to serve you. As always, please call if we may answer any questions or provide any additional information (**1-800-880-8378**) or E-mail me at SAllen@tri-env.com.

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