



# CQA Training Week



Accredited Geosynthetics Laboratories  
Accreditation Designation # GAI-LAP-95-01



## **LINER INTEGRITY SURVEYS/ASSESSMENTS (LISA)**

**Mon.-Tues., Dec. 06-07, 2010**

## **CONSTRUCTION QA/QC for GEOSYNTHETIC INSTALLATIONS**

**Wed., Dec. 8, 2010**

## **CONSTRUCTION QA/QC FOR COMPACTED CLAY LINER & GCL INSTALLATION**

**Thurs., Dec. 09, 2010**

## **GEOSYNTHETIC INSTITUTE (GSI) - CQA INSPECTORS CERTIFICATION PROGRAM - CQA CERTIFICATION EXAM**

**Friday, Dec. 10, 2010**

### **Location**

**TRI/Environmental, Inc.**

**Bldg. A Facility**

**9063 Bee Cave Road, Austin, TX 78733, USA**

## About the Training Courses

### LISA (2-Day) Training (Dec. 06-07, 2010)



Recent CQA technology development has encouraged the geosynthetics industry to re-think the historical paradigm of destructive seam testing (peel and shear). Part of the response to these considerations has been the encouragement and rapid development of non-destructive testing specifically Liner Integrity Surveys/Assessments (LISA).



LISA technologies can be utilized to swiftly and non-destructively detect small holes or leaks in geomembrane liner systems. A variety of eclectically based LISA surveying methods are available for leak detection. The selection of a method is a contingent upon specific the lining conditions. Each method combines a different application technology with the use of electrical current to detect holes/leaks in lining systems.

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CQA firms adept with these technologies are creating new revenue centers for themselves while providing much needed services to their clients. LISA, as a service, naturally complements the existing services offered by most CQA firms practicing in the waste management construction industry.

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A 3-part certification process has been specifically designed for those persons who have a desire to perform LISA. Graduates of this certification program will:

- understand the basis of electrical leak testing
- be able to select the most appropriate LISA Methodology under a variety of circumstances
- be able to perform each method of LISA
- be able to report on their LISA findings
- have on-going access to the resources of TRI and Dr. Ian Peggs as they begin to preform LISAs for their clients.

This course, offered by the **TRI-Corp Liner Integrity Center (TCLIC)**, is intended to assist those who are interested in adding LISA to their core business, or for those reviewing results of LISA for regulatory or client approval.

## Field CQC / CQA Training (Dec. 08-09, 2010)



These two 1-day courses have been specifically designed for those persons who have a need for a detailed understanding of proper CQC and CQA procedures for waste containment facilities.

### ***This course is ideal preparation for the Geosynthetic Certification Institute's certification exam***

and will provide a comprehensive understanding to those professionals who are: preparing CQC/CQA plans, reviewing CQC/CQA plans, performing CQC/CQA observations and tests, and reviewing field CQC/CQA procedures.

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### Professionals who will benefit from this course include

- Specifying/Certifying Engineers
- Construction/Quality Assurance
- Project Managers
- Installers/Contractors
- Third Party Inspectors
- Regulators

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The two courses present the materials in two parts, each complementing the other to provide maximum benefit. The first day focuses on installation of geomembranes, geotextiles, geocomposites, geogrids and geoapertenance, and includes a geomembrane seaming demonstration with a detailed explanation & demonstration of seam peel and shear testing. The second day focuses on the installation of compacted clay and compacted clay and geosynthetic clay liner (GCLs). Special emphasis will be given to establishing rationale and standard operating procedures for field inspections, documentation of test and visual observations and implementation of CQA plans. A broad based appreciation for the manufacturing and installation of waste containment facility materials will be provided. A tour of TRI's Geosynthetic Testing and Research Laboratories will be provided with test demonstrations, explanation of some TRI internal R&D projects, etc. and other relevant topics, all supporting class curriculum.

## GCI CQA Certification Exam (Dec. 10, 2010)

Each CQA course student will be allowed to sit for the **Construction Quality Assurance-Inspectors Certification Program (CQA-ICP)** exams immediately following the CQA courses. The GCI exam itself is part of the GCI CQA technician certification program. Thus, students **MUST REGISTER** with the Geosynthetic Institute (GSI) and pay their required certification fee in order to take this exam. TRI does **NOT** collect this fee as it must be paid directly to GSI (GSI phone: 610-522-8440).

## **Why you should attend...**

Electrical Resistivity Testing and Construction QA of geosynthetics can be smooth additions to your Engineering Consulting and Design Practice. Each student will be provided a certificate of course completion, suitable for use in proposals and statements of qualifications for CQC/CQA work. This unique one-week dedicated CQA training program provides a wonderful opportunity for professional growth and business development.

## **Where to stay for the courses...**

Holiday Inn Express Hotel & Suites, Austin-Sunset Valley, 4892 US Highway 290 West, Austin, TX 78733, 1 800 315 2621, 10 miles from airport, 9.9 miles from short course, NO shuttle service  
Extended StayAmerica Austin – Southwest, 5100 US Hwy. 290 W., Austin, TX 78735, Telephone: 512-892-4272, 15.7 miles from airport, 9.54 miles from short course, NO shuttle service

## **About TRI...**

TRI/Environmental, Inc. (TRI) has been active in geosynthetics testing, inspection and research and development for over eighteen years. TRI is an independent, third party laboratory unaffiliated with any manufacturing, engineering/consulting, or construction management firm.

Download registration forms for the courses and exams at [www.GeosyntheticTesting.com](http://www.GeosyntheticTesting.com)

# INSTRUCTORS

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## Special Instructor: Dr. Ian Peggs, P.E.

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Dr. Peggs, a materials scientist, has been involved with the testing of plastics, geomembranes, seams, and lining systems for over 25 years. He has been performing and developing liner integrity and leak location surveys since 1987. Dr. Peggs has performed water-covered and exposed liner surveys on liners up to 6,350,000 ft<sup>2</sup> in area, waste-covered liners up to 15 ft deep, complex concrete basin liners, and GCL-only liners. In addition to applied potential methods, he is involved with acoustic, streaming potential, and IR spectroscopy methods for locating leaks in bottom liners and caps. He is also experienced with the use of other nondestructive detection technologies including IR thermography and ultrasonic methods used to locate leaks and internal flaws in seams and welds. As a geosynthetic materials performance consultant he has clients in over 30 countries.

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## Special Guest Instructor: Mark Sieracke, P.E. - Landfill Design and CQA Consultant

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Mark D. Sieracke, P.E. is an industry recognized expert in the fields of landfill design and construction quality assurance. Mark serves as a Principal and Solid Waste Practice Area Manager for Weaver Boos Consultants. Mark has served as a Technical Reviewer of the USEPA Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities (EPA/600/R-93/182, Sept. 1993). Mark has served as a hands-on CQA practitioner, certifying engineer and as a consultant for over 1000 acres of geosynthetic installations. He currently contributes routinely to landfill failure investigations and constructability reviews for design engineers. Mark currently serves on the Waste Management Inc. (WMI) Geosynthetic task force creating the corporate standards for CQA.

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## Dr. Robert Gilbert, P.E. - Professor, The University of Texas at Austin

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Robert (Bob) Gilbert, Ph.D., P.E. is a professor of civil engineering at The University of Texas at Austin. He has more than ten years of consulting experience in the design and construction of landfill lining and cover systems. He has authored or co-authored numerous publications on the stability of these systems. Dr. Gilbert has been very instrumental in understanding clay and GCL liner systems, interface friction testing, and the use of data for slope stability design.

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## Sam Allen - Vice President and Division Manager

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Mr. Allen is the Vice President of the Texas Research International (TRI) Geosynthetics Services Division. Sam is the Chairman of Committee D35 on Geosynthetics within ASTM. Sam also serves on the Technical Advisory Board of Geotechnical Fabrics Report, and is special advisor to the In the Lab column presenting testing issues. Sam currently serves on the Board of Directors of the Geosynthetics Institute in Folsom, PA.



## Short Course / GCI Exam Cost/Tuition (see registration form) For registrations before Friday, November 13th, 2010

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### Liner Integrity Survey Short Course

Dec. 06-07, 1 registrant per company	\$1250/person
Dec. 06-07, 2 registrants per company	\$1150.00/person
Dec. 06-07, 3 + registrants per company	\$995.00/person

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### CQC/CQA Short Courses and CQA Exam

Dec. 08-09, both courses, 1 registrant per company	\$775.00/person
Dec. 08-09, both courses, 2 registrants per company	\$700.00/person
Dec. 08-09, both courses, 3 + registrants per company	\$625.00/person
Dec. 08-09, both courses, both courses, government	\$180.00/person
One course (day) only, 1 registrant per company	\$475.00/person
One course (day) only, 2 registrants per company	\$425.00/person
One course (day) only, 3 + registrants per company	\$375.00/person
One course (day) only, government	\$95.00/person

### GCI Exam

Dec. 10, TRI fee for one applicant only per company	\$35.00/person*
Dec. 10, TRI fee for 2+ applicants per company	\$20.00/person*

\*The exam costs above **DO NOT reflect the cost for sitting for the GCI exam**, only TRI's exam proctoring cost for offering the exam as part of the short course event.

The GCI exam is part of the GCI CQA technician certification program. Because of this, **one MUST REGISTER** with the **Geosynthetic Institute (GSI)** and **pay their required certification fee** in order to take this exam. **TRI does NOT collect this fee**, it must be paid directly to GSI.

**GSI phone:** 610-522-8440

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## LISA - SHORT COURSE OUTLINE

Days 1 and 2 – Monday & Tuesday, December 06-07, 2010

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### **PART 1: Classroom – Monday, December 6, 2010**

8:30-8:45 am	Welcome
8:45-9:00	LIS Accreditation System
9:00-9:30	Why Liner Integrity Surveys? Introduction and LIS History and Statistics
9:30-10:30	Theory, Boundary Conditions
10:30-10:45	Break
10:45-11:30	Designing Facilities for LIS
11:30-12:15	LUNCH
12:15-1:15	Field Procedures - for pond, soil, uncovered, in-situ; ASTM procedure review; Calibration
1:15-1:45	Technology Limitations; Examples
1:45-2:30	Case Histories / Questions / Answers
2:30-3:00	Field Coordination
3:00-5:00	Field Demonstrations (water-covered, soil-covered and exposed liner test installations)
5:00-5:30	Refreshments/Questions/Answers (in classroom)
5:30-6:30 pm	Tour of TRI's Accredited Geosynthetics Testing Laboratory
6:30-9:00 pm	<b><i>Tex-Mex Bash</i></b>

### **PART 2: Field Training – Tuesday, December 07, 2010**

8:30-9:00 am	Classroom review and planning
9:00-12:00 pm	HANDS-ON GROUP FIELD TRAINING
12:00-1:00 pm	LUNCH
1:00-4:30 pm	HANDS-ON GROUP FIELD TRAINING (continued)
4:30-5:00 pm	Closing CLASS Session (Questions/Answers)

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## CQA FOR GEOSYNTHETIC INSTALLATIONS SHORT COURSE OUTLINE

Day 3 – Wednesday, December 08, 2010

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7:30-8:00am	Registration	
8:00-8:15	Welcome and Introductions	Allen
8:15-8:30	CQA Principles and Philosophy <i>(Responsibilities, appreciation of role, professional considerations and on-site protocol, conflict resolution, etc.)</i>	Sieracke
8:30-9:30	Background of Geosynthetics and Manufacturing <i>(Polymers to products, material properties, product manufacturing)</i>	Allen
9:30-10:30	HDPE & LLDPE & fPP Geomembranes & Seams <i>(Types and specifications, shipping/receiving, unloading, storage &amp; installation)</i>	Sieracke
10:30-10:45	Break	
10:45-11:15	HDPE & LLDPE & fPP Geomembranes & Seams - Continued	Sieracke
11:15-12:15	Welding Demonstration/Seam Testing <i>(Double track fusion welds, extrusion welds, "T" welds, seam sampling, peel and shear testing, peel incursion and strain measurements, modes of failure, break codes, field vs. laboratory testing)</i>	Sieracke & Installer
12:15-1:00 pm	Lunch (provided)	
1:00-2:00	<b>Special Guest Lecture: TBD</b>	
2:00-2:30	PVC Geomembranes & Seams <i>(Types and specifications, shipping/receiving, unloading, storage &amp; installation)</i>	Allen
2:30-3:30	Geotextiles, Geonets/Geocomposites, Geogrids, Pipe, Erosion Control <i>(Types and specifications, shipping/receiving, unloading, storage &amp; installation)</i>	Allen
3:30-3:45	Break	
3:45-4:30	Protection and Soil Cover	Sieracke
4:30-4:45	CQA Paperwork and Record Keeping <i>(Importance of documentation, communication records, examples of record keeping and documentation, checklists)</i>	Sieracke
4:45-5:00 pm	Discussion	
5:00-6:30 pm	Tour of TRI Geosynthetic Testing and Research Laboratories (test demonstrations, explanation of some TRI internal R&D projects, etc.)	
6:00-8:00	<b>Texas BBQ Dinner !!!! (provided)</b>	



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CQA FOR COMPACTED CLAY & GEOSYNTHETIC CLAY LINER INSTALLATIONS  
SHORT COURSE OUTLINE – Dr. Robert (Bob) Gilbert  
Day 4: Thursday, December 09, 2010

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8:00-8:30 am	Registration
8:30-9:00	Liner and Cover Systems <i>(single liners/double liners/composite liners, leakage rates through soil, composite action with geomembranes, importance of drainage layer properties)</i>
9:00-10:30	Compacted Clay <i>(materials, factors affecting hydraulic conductivity, clod vs. particle orientation theory, keys to low hydraulic conductivity, water content-density criteria, recommended procedures for determining acceptable zone, influence of overburden stress, bonding of lifts, thickness)</i>
10:30-10:45	break
10:45-12:00	Construction of Compacted Clay Liners and Covers <i>(equipment, preprocessing of soil, soil moisture control, sieving, clod control, crushing/pulverizing materials, compaction, test pads)</i>
Noon-1:00 pm	Lunch (provided)
1:00-2:00	CQA for Compacted Clay Liners and Covers <i>(CQA principles, CQA plan, tests, observations, field water content tests, field density tests, hydraulic conductivity compliance tests, frequency of tests, sampling pattern, outliers, corrective action, role of test pads, final certification)</i>
2:00-3:00	History of GCLs <i>(commercially-produced GCLs, geosynthetic materials, manufacturing of GCLs, manufacturing quality control, recommended specifications)</i>
3:00-3:15	break
3:15-4:00	Bentonite <i>(measures of and tests for bentonite quality, recommended specifications for bentonite in GCLs, contaminant-resistant bentonite)</i>
4:00-5:00	Installation of GCLs <i>(transportation, handling, storage, subgrade preparation, placement procedures, seaming protection, construction quality control and assurance, observations, types of tests, frequency of testing, field case history)</i>
5:00-5:30	Open discussion



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## CERTIFICATION EXAM

### Construction Quality Assurance-Inspectors Certification Program

Day 5 - Friday, December 10, 2010

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7:45-8:00 am	Registration and Introduction
8:00-10:00 am	Geosynthetic Exam
10:00 - 10:25 am	Break (on your own)
10:30-11:30 am	Compacted Clay Liner Exam

#### INFORMATION regarding exams:

1) ALL students wishing to sit for the exam(s) **MUST FIRST register for certification through the Geosynthetics Certification Institute and pay the applicable fees directly to GSI** (phone: 610-522- 8440). GSI registration must be received by the GSI 7-10 days before the Dec. 10th exam(s).

2) Students are **REQUIRED** to bring a government-issued photo ID prior to entering the testing room. They must also supply the Proctor with a photocopy of the ID when turning in the test.

3) Time allowed:

Students will be given two hours to take the geosynthetic test. There are 140 questions and you must answer 70% of the questions correctly in order to pass. Please note that there is only one correct answer for each question.

You will be given one hour to take the compacted clay liner test; there are 30 questions and you must answer 70% of the questions correctly in order to pass. Please note that there is only one correct answer for each question.

4. The test is a multiple-choice test. The student must circle the correct answer (and only one answer) for each question. They must not select multiple answers for the same question.

# TRI REGISTRATION FORM

## LISA – Electrical Resistivity testing Course Registration Fees:

- Dec. 06-07, 1 registrant per company \$1250.00/person
- Dec. 06-07, 2 registrants per company \$1150.00/person
- Dec. 06-07, 3 + registrants per company \$995.00/person

## CQA Course Registration Fees:

- Dec. 08-09, both courses, 1 registrant per company \$775.00/person
- Dec. 08-09, both courses, 2 registrants per company \$700.00/person
- Dec. 08-09, both courses, 3 + registrants per company \$625.00/person
  
- One course only, 1 registrant per company \$475.00/person
- One course only, 2 registrants per company \$425.00/person
- One course only, 3 + registrants per company \$375.00/person

## GCI Exam Fees

- Dec. 10, One applicant only per company \$35.00/person\*
- Dec. 10, 2+ applicants per company \$20.00/person\*

\* These fees DO NOT pay for the exam, only the venue for taking the exam. The GCI exam is part of the GCI CQA technician certification. You MUST REGISTER with the Geosynthetic Institute (GSI) and pay the required certification fee directly to GSI in order to take this exam, (GSI phone: 610-522-8440)

Registrations must be received by **5:00 pm CST, Friday, November 13, 2010** - \$50.00 /person late fee thereafter. Fee includes: course notes and handouts, designated dinners the evenings of Dec. 06 and 08, and lunch and AM & PM breaks each day. \$50.00 cancellation fee for refunds requested before November 13, 2010 -- no refund thereafter. Course notes are NOT sold separately.

Method of Payment: Payment may be made by check, money order, American Express, Visa or MasterCard.

- Check  Money Order  Purchase Order

Make check or purchase order payable to TRI/Environmental, Inc.,

Credit Card:  American Express  Visa  MasterCard

Credit Card # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

Please direct questions to Ms. Melissa Hunter or Mr. Sam Allen, phone: (800) 880-8378, fax: (512) 263 2558.

## PLEASE TYPE OR PRINT CAREFULLY

Name		
Position / Company		
Address		
phone / e-mail		
amount paid (\$'s)		
<b>I have registered with GCI &amp; paid the GCI certification fee. I will take the <span style="color: red;">Geosynthetic CQA Exam Dec. 10, 2009</span> <span style="float: right;">(check=&gt;)</span></b>		
<b>I have registered with GCI &amp; paid the GCI certification fee, and I will take the <span style="color: red;">Compacted Clay Liner CQA Exam Dec. 10, 2009</span> <span style="float: right;">(check=&gt;)</span></b>		

Return Registration and Payment via Mail or Fax to:

**TRI**  
**ATTN: Chris Perez**  
**9063 Bee Caves Road**

**Austin, Texas 78733**  
**Fax Number: (512) 263-2558**