



Date:

Purchase Order:

Order Number:

Customer Contact

Customer Company Name

Street Address

City, State, & Zip Code

Dear Contact Name,

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Company. The shipments left our Lovell, Wyoming plant on 08/12/2004.

If you have any questions regarding this information, please contact me at 800-322-1149 ext. 423.

Sincerely,

A handwritten signature in black ink, appearing to read 'Roger B. Wilkerson', followed by a horizontal line.

Roger B. Wilkerson  
Quality Assurance Coordinator  
CETCO Lovell Plant



**GEOSYNTHETIC CLAY LINER  
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE**

PROJECT NAME:  
CUSTOMER P.O.:  
ORDER NUMBER:  
PREPARED FOR:

**CONTENTS:**

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL MQA tracking form
- GCL manufacturing quality control test data
- Bentonite clay certification
- Raw material test results

PREPARED BY: Roger B. Wilkerson  
Quality Assurance Coordinator  
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## **DAILY GCL PRODUCTION & NEEDLE DETECTION CERTIFICATION**

PROJECT NAME:  
CUSTOMER P.O.:  
PREPARED FOR:

Order Number:  
Ship Date:

Colloid Environmental Technologies

Company hereby affirms and certifies that all of the BENTOMAT CL manufactured for the above order has been continually inspected for the presence of broken needles through the use of a metal detector, and that all detected needle fragments have been removed with an in-line magnet.

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

Roger B. Wilkerson  
Quality Assurance Coordinator  
Colloid Environmental Technologies Co. ( CETCO )



### GCL PROPERTY SPECIFICATIONS FOR BENTOMAT CL

| Test Method | Test Method Property                 | Test Frequency              | Certified Value  |
|-------------|--------------------------------------|-----------------------------|--|
| ASTM D 5891 | Bentonite Fluid Loss                 | 1 per 50 Tons               | 18 ml Max  |
| ASTM D 5993 | Bentonite Mass/Area                  | 40,000 sq ft (4000 sq m)    | 0.75 lb /sq ft (3.6 kg/sq m) Min                             |
| ASTM D 5890 | Bentonite Swell Index                | 1 per 50 Tons               | 24 ml/2g Min   |
| ASTM D 4632 | GCL Grab Strength                    | 200,000 sq ft (20,000 sq m) | 120 lbs (530 N) Min  |
| ASTM D 6768 | GCL Grab Strength                    | 200,000 sq ft (20,000 sq m) | 30 lbs/in (53 N/cm) Min                                      |
| ASTM D 5321 | GCL Hydrated Internal Shear Strength | Periodic                    | 500 psf (24 kPa) typ @ 200 psf                               |
| ASTM D 5887 | GCL Hydraulic Conductivity           | Periodic                    | 5 x 10 <sup>-9</sup> cm/ sec Max                             |
| ASTM D 5887 | GCL Index Flux                       | Weekly                      | 1 x 10 <sup>-8</sup> m <sup>3</sup> /m <sup>2</sup> /sec Max |
| ASTM D 6496 | GCL Peel Strength                    | 40,000 sq ft (4000 s)       | 2.5 lbs/in (4.4 N/cm) Min                                    |
| ASTM D 4632 | GCL Peel Strength                    | 40,000 sq ft (4000 sq m)    | 15 lbs (65 N) Min  |

Bentonite property tests are performed at a bentonite processing facility before shipment to CETCO's production facility.

All tensile testing is in the machine direction.



CETCO's MQA laboratory is GAI-accredited ([www.geosynthetic-institute.org/gai/lab.html](http://www.geosynthetic-institute.org/gai/lab.html)).

### FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT CL

| Raw Material                  | test method | mass per area | units  | test method | grab strength | units |
|-------------------------------|-------------|---------------|--------|-------------|---------------|-------|
| Nonwoven Cover Fabric         | ASTM D 5261 | 6.0           | oz/yd2 | ASTM D 4632 | 70 X 70       | lbs   |
| Bentomat ST Woven Base Fabric | ASTM D 5261 | 3.2           | oz/yd2 | ASTM D 4632 | 120           | lbs   |

Fabric certifications from our raw material suppliers are on file at our production facility.



## GCL ORDER PACKING LIST

GCL shipped for certification package number 000190471

| Order #        | Product        | Lot Number | Roll Number | Length (ft)                                | Width (ft) | Square Ft    | Weight (lbs) |
|----------------|----------------|------------|-------------|--|------------|--------------|--------------|
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000940    | 150  | 15         | 2250         | 2521         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000941    | 150  | 15         | 2250         | 2501         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000942    | 150  | 15         | 2250         | 2530         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000947    | 150  | 15         | 2250         | 2503         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000953    | 150  | 15         | 2250         | 2512         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000964    | 150  | 15         | 2250         | 2527         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000965    | 150  | 15         | 2250         | 2511         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000966    | 150  | 15         | 2250         | 2504         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000967    | 150  | 15         | 2250         | 2517         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000994    | 150  | 15         | 2250         | 2509         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000995    | 150  | 15         | 2250         | 2517         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00000996    | 150  | 15         | 2250         | 2520         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00001000    | 150  | 15         | 2250         | 2528         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00001001    | 150  | 15         | 2250         | 2503         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00001002    | 150  | 15         | 2250         | 2525         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00001003    | 150  | 15         | 2250         | 2510         |
| 000190471      | LO-BENTOMAT CL | 200432LO   | 00001004    | 150  | 15         | 2250         | 2531         |
| <b>Totals:</b> |                |            |             | <b>2550</b>                                | <b>255</b> | <b>38250</b> | <b>42769</b> |
|                |                |            |             | Total Number of Rolls Certified: <b>17</b> |            |              |              |



## GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 000190471

| GCL            |            |               | Geotextiles     |            |               | Clay        |             |
|----------------|------------|---------------|-----------------|------------|---------------|-------------|-------------|
| LO-BENTOMAT CL |            |               | LO-N/W-WHITE-CL |            |               | LO-WOVEN-CL | LO-CG 50-CL |
| GCL Lot #      | GCL Roll # | Roll # Tested | Cap Lot #       | Cap Roll # | Roll # Tested | Base Lot #  | Clay Lot #  |
| 200432LO       | 00000940   | 00000929      | 2.23926         |            |               | 080504W1    | 080204B     |
| 200432LO       | 00000941   | 00000929      | 2.23926         |            |               | 080504W1    | 080204B     |
| 200432LO       | 00000942   | 00000929      | 2.23926         |            |               | 20562881    | 080204B     |
| 200432LO       | 00000947   | 00000946      | 2.23907         |            |               | 20562881    | 080204B     |
| 200432LO       | 00000953   | 00000946      | 2.23907         |            |               | 20562881    | 080204C     |
| 200432LO       | 00000964   | 00000963      | 2.24529         |            |               | 20562881    | 080204C     |
| 200432LO       | 00000965   | 00000963      | 2.24221         |            |               | 20562881    | 080204C     |
| 200432LO       | 00000966   | 00000963      | 2.24221         |            |               | 20562881    | 080204C     |
| 200432LO       | 00000967   | 00000963      | 2.24221         |            |               | 20562881    | 080204C     |
| 200432LO       | 00000994   | 00000980      | 2.24527         |            |               | 20573791    | 080204D     |
| 200432LO       | 00000995   | 00000980      | 2.24527         |            |               | 20573791    | 080204D     |
| 200432LO       | 00000996   | 00000980      | 2.24527         |            |               | 20573791    | 080204D     |
| 200432LO       | 00001000   | 00000997      | 2.24527         |            |               | 20573791    | 080204D     |
| 200432LO       | 00001001   | 00000997      | 2.24525         |            |               | 20573791    | 080204D     |
| 200432LO       | 00001002   | 00000997      | 2.24525         |            |               | 20573791    | 080204D     |
| 200432LO       | 00001003   | 00000997      | 2.24525         |            |               | 20573791    | 080204D     |
| 200432LO       | 00001004   | 00000997      | 2.24525         |            |               | 20573791    | 080204D     |



## GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 000190471 have been tested in our production facility lab.

| Product                 | Lot # Tested | Roll # Tested | Mass Area          | Grab Strength | Peel Strength |
|-------------------------|--------------|---------------|--------------------|---------------|---------------|
| Standard Test Method:   |              |               | ASTM D 5993        | ASTM D 4632   | ASTM D 4632   |
| Standard Specification: |              |               | 0.75 lb/sq ft MARV | 120lbs MARV   | 15lbs MARV    |
| LO-BENTOMAT CL          | 200432LO     | 00000929      | 0.88               | 263.8         | 31.3          |
| LO-BENTOMAT CL          | 200432LO     | 00000946      | 0.81               | 263.8         | 29.9          |
| LO-BENTOMAT CL          | 200432LO     | 00000963      | 0.87               | 263.8         | 23.2          |
| LO-BENTOMAT CL          | 200432LO     | 00000980      | 0.87               | 263.8         | 35.7          |
| LO-BENTOMAT CL          | 200432LO     | 00000997      | 0.84               | 377.0         | 32.2          |

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.  
 Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.



## AMERICAN COLLOID COMPANY

### BENTONITE CLAY CERTIFICATION

The bentonite clay used to produce certification package 000190471 has been tested by American Colloid Co. with the following results.

| Clay Type      | Clay Lot # | Swell       | Fluid Loss  | Moisture    | % Passing 200m | % Retained 10m |
|----------------|------------|-------------|-------------|-------------|----------------|----------------|
| Test Method:   |            | ASTM D 5890 | ASTM D 5891 | ASTM D 2216 | ASTM C 136     | ASTM C 136     |
| Specification: |            | 24ml/2g Min | 18ml Max    | 12% Max     | 1% Max         | 0%             |
| LO-CG 50-CL    | 080204B    | 26          | 13          | 10.8        | 0.5            | 0              |
| LO-CG 50-CL    | 080204C    | 26          | 13          | 10.8        | 0.4            | 0              |
| LO-CG 50-CL    | 080204D    | 26          | 13          | 10.8        | 0.8            | 0              |

Tests approved by  
Moses Briseno  
American Colloid Company  
Quality Assurance Coordinator





## GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 000190471 was manufactured with geotextiles which were tested with the following results.

| <b>BASE</b>              |                    |  |                              |
|--------------------------|--------------------|--|------------------------------|
| <b>Material Supplier</b> | <b>Roll Number</b> | <b>Mass Area<br/>oz/yd<sup>2</sup></b> | <b>Grab Strength<br/>lbs</b> |
| PT                       | 080404W9           | 3.8                                    | 155.3                        |
| Wayn-Tex                 | 20562881           | 3.7                                    | 124.0                        |
| Wayn-Tex                 | 20573791           | 3.4                                    | 120.0                        |
| <b>CAP</b>               |                    |  |                              |
| <b>Material Supplier</b> | <b>Roll Number</b> | <b>Mass Area<br/>oz/yd<sup>2</sup></b> | <b>Grab Strength<br/>lbs</b> |
| Skaps*                   | 2.23904            | 6.7                                    | 99.2                         |
| Skaps*                   | 2.24216            | 6.9                                    | 92.3                         |
| Skaps*                   | 2.24262            | 7.2                                    | 95.1                         |

Certifications from our suppliers are on file at our production facility. An '\*' or 'PT' indicates supplier certifications were unavailable prior to shipping so testing was performed at a CETCO lab.