

31 August 2007

Mr. Dane Finerfrock
Executive Secretary
Utah Radiation Control Board
State of Utah Department of Environmental Quality
168 North 1950 West
P.O. Box 144850
Salt Lake City, UT 84114-4850

**Subject: Geosynthetic Clay Liner Hydration Demonstration
Letter Report
Denison Mines Corporation
White Mesa Mill, Cell 4A
Blanding, Utah**

Dear Mr. Finerfrock,

Geosyntec Consultants (Geosyntec) is pleased to submit to the Utah Department of Environmental Quality (UDEQ), on behalf of Denison Mines (USA) Corp (DMC), this letter report summarizing the results of the hydration of geosynthetic clay liner (GCL) under field conditions at the subject site. This letter report summarizes the results of the GCL demonstration outlined in the Geosyntec letter to the UDEQ "Revised Geosynthetic Clay Liner Hydration Demonstration Work Plan," dated 27 March 2007.

OBJECTIVES

The objective of this letter report is to summarize the results of field and laboratory testing associated with the GCL hydration demonstration conducted at the DMC White Mesa Mill, Cell 4A site located near Blanding, UT. In addition, this letter report presents data associated with hydraulic conductivity testing of four GCL samples with different moisture content levels using pH 1 permeant.

METHODOLOGY

Field Demonstration

Three separate field demonstrations, along with associated laboratory testing, were conducted to evaluate the hydration required for GCL performance. Installation of each of the three field demonstrations was observed by Geosyntec and DMC personnel. Comanco Environmental

Corporation (Comanco), the geosynthetic installer for the Cell 4A project, installed the field demonstration materials in accordance with Section 02772 of the Technical Specifications and the Construction Quality Assurance (CQA) Plan. GCL used for this work is CETCO Bentomat ST (woven / nonwoven geotextile encased GCL). TRI Environmental (TRI) performed the laboratory testing. The same panel of geomembrane and the same roll of GCL were used in each of the three field demonstrations. Each of the three field demonstrations is discussed below.

Field demonstration 1 (FD-1) involved the installation of a GCL panel approximately 15 feet (ft) wide by 10 ft long overlying a portion of the existing soil subgrade in the northeast corner of Cell 4A, near the access ramp to the bottom of the cell (Photo 1, Attachment A). The GCL panel was installed with the woven geotextile side facing up and the nonwoven geotextile side facing down, directly overlying the existing soil subgrade, with no preparation of the subgrade soils or GCL. The soil subgrade was desiccated (Photo 2, Attachment A) and very dry at the surface. The GCL panel was covered with a panel of 60-mil thick high density polyethylene (HDPE) geomembrane extending past the GCL panel by a minimum of 2 ft in all directions. The HDPE geomembrane was placed with the white surface facing up, black surface against the GCL (Photo 3, Attachment A). The up-slope edge of the geomembrane was secured in an approximately 8 inch (in) by 6 in anchor trench and the trans-gradient and cross-gradient edges continuously covered by sand bags (Photo 4, Attachment A). FD-1 was installed on 24 May 2007 and was terminated on 14 June 2007. Upon completion of FD-1, the GCL panel was removed from under the geomembrane and discarded.

Field demonstration 2 (FD-2) involved the installation of a GCL panel approximately 15 feet (ft) wide by 10 ft long beneath the same HDPE geomembrane panel from FD-1 at the same location (HDPE geomembrane panel was not removed from anchor trench, just flipped back). The GCL panel was installed with the woven geotextile side facing up and the nonwoven geotextile side facing down, directly overlying the existing soil subgrade. The second GCL panel was installed after hydrating the subgrade soil and was covered by the HDPE geomembrane panel (Photos 5, Attachment A). The HDPE geomembrane panel was placed with the white surface facing up, black surface against the GCL and hydrated (Photo 6, Attachment A). All four sides of the HDPE geomembrane panel were secured in an approximately 8 in by 6 in anchor trench. FD-2 was installed on 10 July 2007 and terminated on 14 July 2007. Upon completion of FD-2, the GCL panel was removed from under the geomembrane panel and discarded.

Field demonstration 3 (FD-3) involved the installation of a GCL panel approximately 15 feet (ft) wide by 10 ft long beneath the same HDPE geomembrane panel from FD-1 and FD-2 at the same location (HDPE geomembrane panel was not removed from anchor trench, just flipped back).

The GCL panel was installed with the woven geotextile side facing up and the nonwoven geotextile side facing down, directly overlying the existing soil subgrade, with no preparation of the subgrade soils. The third GCL panel was directly hydrated by spraying the top surface of the GCL panel with a water truck. Water was applied in a short burst (5 seconds) from the water truck such that the GCL was visibly wet. The HDPE geomembrane panel was placed with the white surface facing up, black surface against the GCL. All four sides of the HDPE geomembrane panel were secured in an approximately 8 in by 6 in anchor trench. FD-3 was installed on 18 July 2007 and terminated on 19 July 2007. The field demonstration materials were removed from the Cell during grading for installation of the Cell 4A liner system.

Laboratory Testing

Prior to installation of the GCL for FD-1, six samples were collected and sent to TRI for moisture content testing.

The following sections describe the laboratory testing associated with each of the three field demonstrations.

FD - 1

Three (3) soil samples were collected from the top 3 inches of soil prior to installation of the GCL. These soil samples were placed in sealed plastic bags and shipped to TRI for moisture content testing in accordance with ASTM D 2216.

Six (6) approximately 12-inch square samples of the GCL were collected by DMC personnel after one, two, and three weeks of field demonstration material installation. Samples were collected after removing the sand bags and folding the geomembrane back over the anchor trench. Sample locations are shown on the field forms included in Attachment B. Samples were placed in plastic bags, sealed tightly, shipped to TRI, and tested in accordance with ASTM D 5993 and ASTM D 2216. Unfortunately, samples from the third week were lost in shipping and never located. Sampling forms and field logs are included in Attachment B. Sampling forms document: date, time, weather, subgrade and sample condition, sample id's, locations, and descriptions, and shipping information. Surface water leakage was not observed.

FD - 2

Three (3) soil samples were collected from the top 3 inches of soil prior to installation of the GCL. These soil samples were placed in sealed plastic bags and shipped to TRI for moisture content testing in accordance with ASTM D 2216.

Six (6) approximately 12-inch square samples of the GCL were collected by DMC personnel after one week of field demonstration material installation. Samples were collected after removing soil from three sides of the anchor trench and folding back the geomembrane over remaining anchor trench. Sample locations are shown on the field forms included in Attachment B. Samples were placed in plastic bags, sealed tightly, shipped to TRI, and tested in accordance with ASTM D 5993 and ASTM D 2216. Sampling forms and field logs are included in Attachment B. Sampling forms document: date, time, weather, subgrade and sample condition, sample id's, locations, and descriptions, and shipping information. Surface water leakage was not observed.

FD - 3

Six (6) approximately 12-inch square samples of the GCL were collected by DMC and Geosyntec personnel after one day of field demonstration material installation. Samples were collected after removing soil from three sides of the anchor trench and folding back the geomembrane over remaining anchor trench. Sample locations are shown on the field forms included in Attachment B. Samples were placed in plastic bags, sealed tightly, shipped to TRI, and tested in accordance with ASTM D 5993 and ASTM D 2216. Sampling forms and field logs are included in Attachment B. Sampling forms document: date, time, weather, subgrade and sample condition, sample id's, locations, and descriptions, and shipping information. Surface water leakage was not observed.

GCL Hydraulic Conductivity Testing

Four samples of GCL were hydrated in the laboratory to 50%, 75%, 100%, and 140% moisture contents. Each sample was loaded to a normal stress of 5 psi and immediately permeated by a pH 1 liquid.

RESULTS

The following sections describe the results of laboratory testing for each of the field demonstrations.

FD-1

Average soil subgrade sample results indicated that the soil moisture content was approximately 12.3%. Test results are presented in Attachment C.

The GCL moisture content, in its dry state, was 14.0 percent. GCL sample results indicated an increase in the GCL moisture content from 14% to 22.8% in the first week and from 22.8% to 26.3% in the second week. The samples collected in the third week were lost in shipping and not recovered; therefore no testing results are available. Test results are presented in Attachment C.

FD-2

Average soil subgrade sample results, after moisture conditioning, indicated that the soil moisture content was approximately 25.8%. Test results are presented in Attachment C.

GCL sample results indicated an increase in the GCL moisture content from 14% to 26.0% in the first week. Test results are presented in Attachment C.

FD-3

GCL sample results indicated an increase in the GCL moisture content from 14% to 97.6% in the first day. Test results are presented in Attachment C.

GCL Hydraulic Conductivity Testing

The results of the Hydraulic Conductivity Testing are as follows:

Hydration of GCL Sample	Approximate Initial Permeability	Approximate Permeability after One Half Pore Volume	Approximate Permeability after One Pore Volume	Approximate Permeability after Two Pore Volumes
50%	1.0×10^{-9}	2.0×10^{-9}	1.2×10^{-8}	3.0×10^{-8}
75%	6.0×10^{-10}	3.0×10^{-9}	9.0×10^{-9}	2.5×10^{-8}
100%	1.2×10^{-9}	4.5×10^{-9}	1.0×10^{-8}	3.5×10^{-8}
140%	8.0×10^{-10}	4.0×10^{-9}	1.2×10^{-8}	4.5×10^{-8}

Test results are presented in Attachment C.

DISCUSSION

The pre-installation moisture content of the GCL is lower than the as-manufactured GCL test results (samples collected at the manufacturing facility) likely due to drying during shipment and storage at the site.

Weather conditions during the demonstrations were typical for southeast Utah (Attachment D) with low humidity and high temperatures likely contributing to the reduced natural hydration time of GCL. Based on the field demonstration and associated laboratory testing, hydration of the GCL was most expediently accomplished with direct watering (spraying) of the surface of the GCL prior to placement of the overlying geomembrane. This methodology results in a moisture content of approximately 100%.

The UDEQ requirement outlined in the Design Approval letter dated 25 June 2007 is that the GCL be hydrated to a level of 140% moisture content. Since the field demonstration test results did not attain the 140% hydration level, hydraulic conductivity testing was performed on four samples of GCL hydrated to 50%, 75%, 100%, and 140% moisture content. The results of the hydraulic conductivity testing indicate that each of the four moisture content GCL samples exhibit low hydraulic conductivity in the presence of pH 1 permeant during the first ½ pore volume of flow through the GCL. Subsequent to the first ½ pore volume, the hydraulic conductivity begins to increase, however remains lower than approximately 5.0×10^{-8} cm/sec at 2 pore volumes.

To evaluate the performance of the GCL, based on the hydraulic conductivity data presented herein, an analysis of the anticipated flow through the GCL with time will be discussed. The following equation will be used:

$$Q = kiA \quad \text{(Equation 1)}$$

Where:

Q = flow through the GCL (cm³/sec)

k = permeability of the GCL, from test data (cm/sec)

i = hydraulic gradient

A = area (cm²), use 1

Based on the Action Leakage Rate calculation package, the quantity of liquids passing through the primary geomembrane into the leak detection system will result in a very small head (0.17 mm) on the secondary geomembrane. Conservatively assuming that the secondary geomembrane is non-existent and the liquid can not drain laterally, the small head would act to drive the liquid vertically down into the GCL. Therefore, the head on the GCL will be 0.017 cm.

Given a thickness of the GCL as 0.3 inches, or 0.762 cm, the hydraulic gradient can be estimated as follows:

$$i = 0.017 \text{ cm} / 0.762 \text{ cm} = 0.022$$

Placing the hydraulic gradient, area, and the permeability into Equation 1, results in a flow rate. Using the permeability for the 0.5 pore volumes of the 50% GCL of approximately 2.0×10^{-9} cm/sec, results in the following:

$$Q = (2.0 \times 10^{-9} \text{ cm/sec}) \times (0.022) \times (1 \text{ cm}^2) = 4.4 \times 10^{-11} \text{ cm}^3/\text{sec} = 1.4 \times 10^{-3} \text{ cm}^3/\text{year}$$

Based on a typical GCL thickness of 0.762 cm and a porosity of 0.75, one pore volume per square centimeter can be estimated as follows:

$$\text{Pore volume} = 0.762 \text{ cm} \times 1 \text{ cm}^2 \times 0.75 = 0.57 \text{ cm}^3$$

The time for $\frac{1}{2}$ of a pore volume of pH 1 liquid to permeate through the GCL hydrated to a moisture content of 50% can be estimated as follows:

$$T_{1/2} = \frac{1}{2} V_p / Q$$

$$T_{1/2} = \frac{1}{2} \times 0.57 \text{ cm}^3 / 2.1 \times 10^{-3} \text{ cm}^3/\text{year} = 137 \text{ years}$$

Therefore, based on the boundary conditions and test data presented above, the permeant would require approximately 137 years to permeate $\frac{1}{2}$ of a pore volume of pH 1 liquid into the GCL hydrated to a moisture content of 50%. To permeate one pore volume through the GCL would require an additional approximately 34 years (based on 1.2×10^{-8} cm/sec at 1 pore volume) for a total of approximately 171 years.


CONCLUSIONS

Based on the field demonstrations, the GCL can be hydrated to approximately 100% moisture content by directly spraying the top of the GCL with water prior to deploying the overlying geomembrane. Based on the hydraulic conductivity testing, GCL hydrated to a moisture content of 50% or more exhibits low permeability values when permeated with a pH 1 permeant. Based on the project conditions, GCL hydrated to 50% moisture content can effectively perform as a secondary barrier layer for this project.

DMC recommends that the GCL be hydrated to a minimum of 50% moisture content with a water truck prior to installing the overlying geomembrane. Based on an initial water content of 14% and a GCL mass per unit area of 1 lb/ft² (specifications require a minimum of 0.75 lb/ft²), hydration to 50% moisture content of the GCL will require approximately 0.043 gallons per square foot of water, or approximately 1,880 gallons per acre.

If you have any questions or require additional information, please contact the undersigned at (858) 674-6559.

Sincerely,



Gregory T. Corcoran, PE
Principal Engineer

Attachments: A – Photos
 B – Field Documentation
 C – Laboratory Test Data
 D- Weather Data
Copies to: Harold R. Roberts – DMC

Attachment A

Photographs

SITE PHOTOGRAPHS

SITE: White Mesa Mill – Cell 4A, Geosynthetic Clay Liner Hydration Demonstration
DATE: May - July 2007



PHOTOGRAPH 1:

FD-1, Placement of
GCL



PHOTOGRAPH 2:

FD-1, GCL Subgrade.

SITE PHOTOGRAPHS

SITE: White Mesa Mill – Cell 4A, Geosynthetic Clay Liner Hydration Demonstration
DATE: May - July 2007



PHOTOGRAPH 3:

FD-1, Geomembrane placed above GCL. 8-inch x 6-inch anchor trench along upslope edge.



PHOTOGRAPH 4:

FD-1, Sandbags placed along edges of geomembrane.

SITE PHOTOGRAPHS

SITE: White Mesa Mill – Cell 4A, Geosynthetic Clay Liner Hydration Demonstration
DATE: May - July 2007



PHOTOGRAPH 5:

FD-2, Hydration of subgrade prior to GCL installation

Attachment B
Field Documentation



PROJECT: DENISON MINES

LOCATION: BLANDING, UTAH

LOCATION: BLANDING, UTAH

PROJECT NO.: SC0349 TASK NO.: 02/05

DESCRIPTION: GCL HYDRATION TEST

DATE: 24 day MAY month 2007 year

CONTRACTOR: COMANCO

THURSDAY

WEATHER: PARTLY CLOUDY, HIGH $\sim 70^{\circ}\text{F}$, LOW $\sim 35^{\circ}\text{F}$

1000 - ARRIVE ON SITE. MEET JOSE HERNANDEZ OF COMANCO. CHECK IN WITH MIKE SPIELMAN OF DENISON MINES (DENISON).

102A- GO TO CELL AREA WITH JOSE AND TWO LABORERS. ALSO TWO LABORERS/OPERATORS FROM DENISON ASSIST. A FORKLIFT WITH A SINGER IS UTILIZED TO HANDLE GEOSYNTHETICS.

1030 - HEALTH AND SAFETY TAILGATE MEETING, WORKING WITH HEAVY MACHINERY AND HEAVY LOADS DISCUSSED.

- JOSE AND WRITER LOCATE PAD AREA

- A GEOSYNTHETIC CLAY LINER (GCL) ROLL IS OBTAINED. ROLL IS WRAPPED IN PLASTIC SHEET. ROLL WAS STORED OVER OTHER ROLLS. THE ROLL NUMBER IS ~~200640L~~ 200640^(B) 200640^(B) (CETCO BENTONITE ST.)

1. A ^{11.46} 16-FOOT PANEL IS UNROLLED FROM THE GCL ROLL. SIX 1-FOOT SQUARE SAMPLES ARE OBTAINED FROM THE END SPACED APPROXIMATELY EVENLY ACROSS THE ROLL. INNER BENTONITE IS IN DRY GRANULAR FORM.

1100 - GCL PANEL IS CARRIED TO CELL ON TINES OF FORKLIFT. PANEL IS PLACED WOVEN-SIDE UP. PANEL IS AT LEAST 100-FT. FROM SIDE-SLOPES. PANEL IS ORIENTED WITH UPSLOPE SIDE PERPENDICULAR TO LINE OF ACCESS RAMP. (PANEL TRIMMED TO BE 15x10-FT BEFORE PLACEMENT.) ^{24" MAX} ^{ACB}

1120 - A PANEL OF GEOMEMBRANE IS OBTAINED. PANEL IS ~22-FT BY 16-FT.
PANEL OBTAINED FROM ROLL #: 30222 (AS READ FROM WHITE-OUT MARKING) ~18" ^{24" MAX} ⁶
PANEL IS CARRIED TO CELL BY HAND.

- NOTE: SOIL SUBGRADE SURFACE IS DRY AT TIME OF PLACEMENT,
ALTHOUGH SITE RECEIVED SIGNIFICANT RAIN ON PREVIOUS DAY.

130 - GEOMEMBRANE PANEL PLACED OVER GCL PANEL WITH WHITE SURFACE FACING UP. DOWN-SLOPE SIDE EXTENDS ~3-FT BEYOND GCL EDGE. TRANS-GRADIENT SIDES EXTEND ~3.5 FT BEYOND SIDES OF GCL.

1150- AN ANCHOR TRENCH IS BEING DUG WITH SHOVELS. SOIL IS VERY COMPACT AND DIFFICULT TO DIG. (ANCHOR TRENCH ON UP-SLOPE SIDE BF GEOMEMBRANE ONLY.)

COPY TO: FILE

PER:

HRS: 5.0



DAILY FIELD REPORT

DATE: 24 day MAY month 67 year

1200 - OBTAIN THREE SOIL SAMPLES FOR LABORATORY MOISTURE CONTENT ANALYSIS. SAMPLES OBTAINED FROM APPROXIMATELY 1 TO 3 INCHES BELOW SURFACE.

1215 ¹²³⁵ ~~1300~~ - ANCHOR TRENCH EXCAVATION COMPLETE. ~~UPPE~~ ^{UPPER} @ UPSLOPE EDGE OF GEOMEMBRANE PLACED IN TRENCH AND SOIL REPLACED.

TIRE OF TRUCK USED TO COMPACT SOIL IN ANCHOR TRENCH. TWO LIFTS PLACED WITH ONE TIRE PASS EACH FOR COMPACTION.

1235 ¹³³⁰ ~~1330~~ - SANDBAGS PLACED ON PERIMETER OF GEOMEMBRANE (TRANSGRADIENT & DOWNGRADIENT SIDES). SANDBAGGING IS CONTINUOUS.

1345 ¹³⁴⁵ ~~1345~~ - TEST PAD COMPLETE. COMANCO PUTS PLASTIC FILM BACK ON GCL ROLL AND PLACES ROLL BACK ON STOCKPILE. STOCKPILE COVERED.

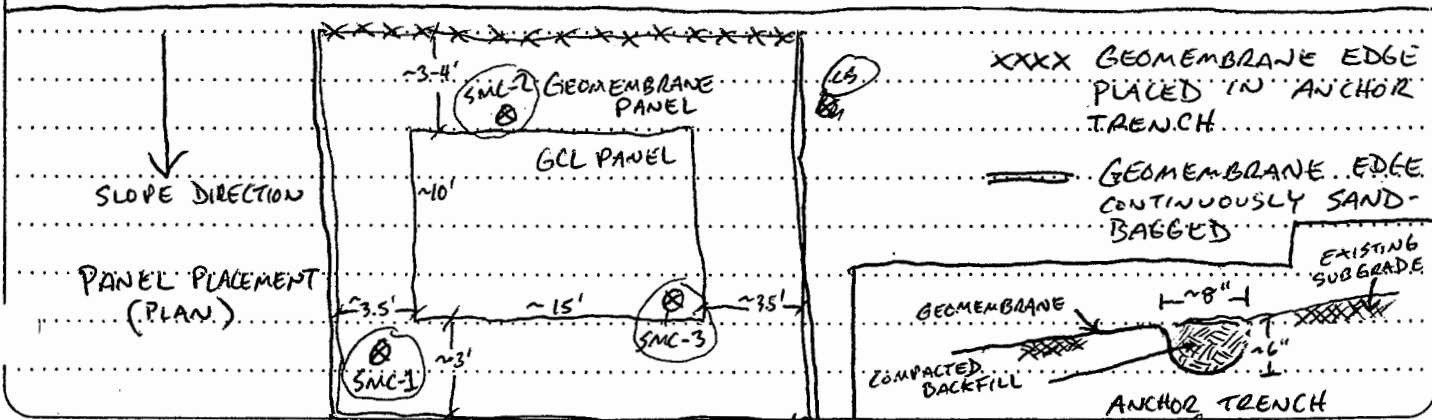
PREPARE SAMPLES FOR SHIPMENT. GCL SAMPLES LABELED GCL-1 THROUGH GCL-6. ~~MOISTURE~~ ^(SOIL SAMPLES LABELED MC-1 THROUGH MC-3) EACH GCL SAMPLE WRAPPED INDIVIDUALLY IN 9-MIL, 13 GALLON TRASH BAG. EXCESS AIR SUCKED FROM BAG. EACH BAG THEN TAPED TIGHTLY.

SPEND TIME SHOWING DENISON PERSONNEL SAMPLING AND SHIPPING PROCEDURES. MAKE COPIES OF SAMPLING AND SHIPPING FORMS. DISCUSS SAMPLING CONDITIONS. TURN OVER SAMPLES COLLECTED TODAY FOR SHIPMENT TOMORROW. SAMPLES SCHEDULED TO BE DELIVERED TO TRI ENVIRONMENTAL IN AUSTIN, TEXAS, ON TUESDAY, 29 MAY.

1450 - DECON WASH CAR

1455 - RADIATION CHECK CAR AND SELF. ALL CLEAR.

1500 - DEPART SITE. TRAVEL TO CORTEZ, COLORADO.

COPY TO: FILEPER: ALB

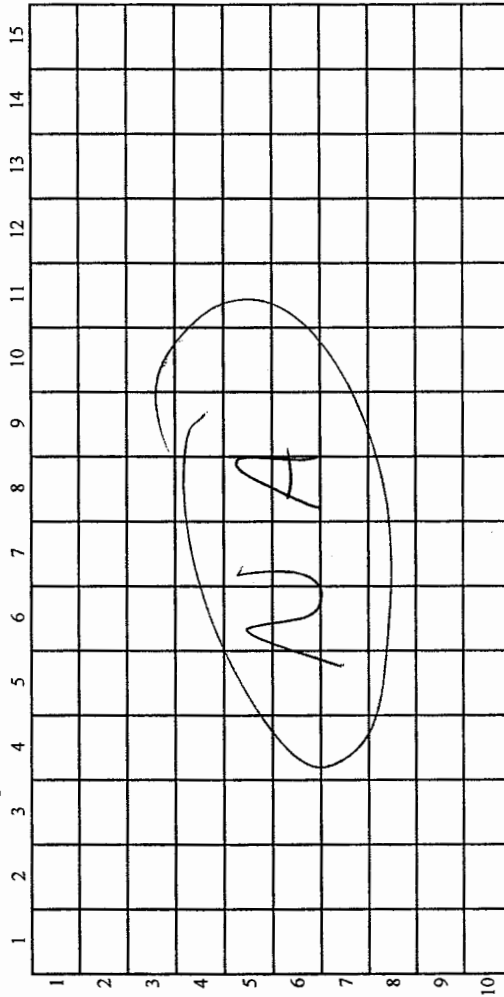
Sample Collection Field Form
GCL Hydration Demonstration

Date: 24 MAY 07 Time: ~10:45 Weather: PARTLY CLOUDY H ~ 70°F Name: CHAD BIRD (GEOSYNTEC)

Condition of Subgrade: Dry To Moist Wet Additional Subgrade Details: TOP INCH DRY/LOOSE. MOIST AND COMPACT BELOW.

Sample ID	Description	Packaging/Shipments Details
GCL-1	~12" SQUARE, DRY, GRANULAR BENTONITE INSIDE	EACH WRAPPED IN 2 MIL, 13 GALLON TRASH BAG. EXCESS AIR SUCKED OUT OF BAG. SEALED TIGHTLY WITH DUCT TAPE.
GCL-2		SHIPPED PRIORITY OVERNIGHT BY COURIER TO THE ENVIRONMENTAL IN AUSTIN, TEXAS.
GCL-3		
GCL-4		
GCL-5		
GCL-6		

Approximate GCL Sample Locations:



SAMPLES TAKEN FROM END OF GCL ROLL BEFORE PANEL CUT.

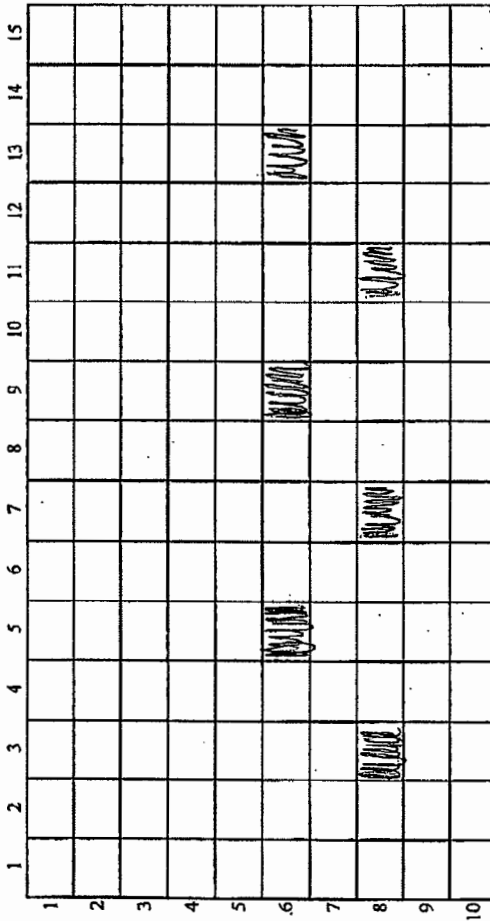
Repairs Performed:

Sample Collection Field Form
GCL Hydration Demonstration

Date: 31 May 07 Time: 8:43 Weather: Sunny, ~85°F Name: Avery Olsen
 Condition of Subgrade: Dry Moist Wet Additional Subgrade Details: Slight sign of water

Sample ID	Description	Packaging/Shipments Details
GCL-7	1x1 Square moist / Dry	Each wrapped in bag excess air sucked out Bag Sealed with Tape
GCL-8	Little moist / mostly Dry	Shipped Priority overnight By Courier to Tri Environmental in Austin Texas
GCL-9	Damp	
GCL-10	little moist / mostly Dry	
GCL-11	little moist / mostly Dry	
GCL-12	Damp	

Approximate GCL Sample Locations:



Repairs Performed:

NA

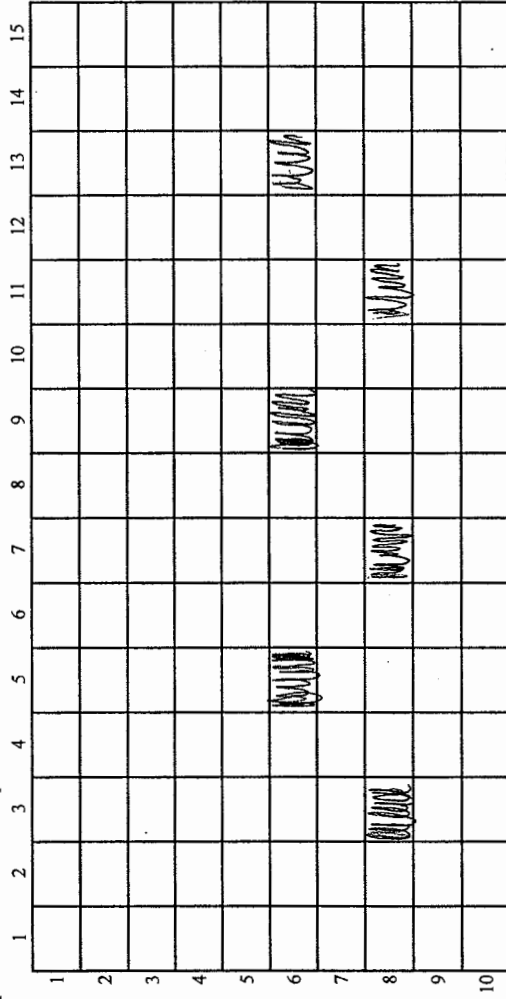
Sample Collection Field Form
GCL Hydration Demonstration

Date: 31 May 07 Time: 8:43 Weather: Sunny, $H \sim 85^{\circ}F$, $L \sim 52^{\circ}F$ Name: Avery Olsen

Condition of Subgrade: Dry Moist Wet Additional Subgrade Details: Slight sign of water

Sample ID	Description	Packaging/Shipment Details
GCL-7	1x1 square moist / Dry	Each wrapped in Bag excess air sucked out Bag Sealed with Tape
GCL-8	Little moist / mostly Dry	Shipped Priority overnight By Courier to Tri Environmental in Austin Texas
GCL-9	Damp	
GCL-10	little moist / mostly Dry	
GCL-11	little moist / mostly Dry	
GCL-12	Damp	

Approximate GCL Sample Locations:



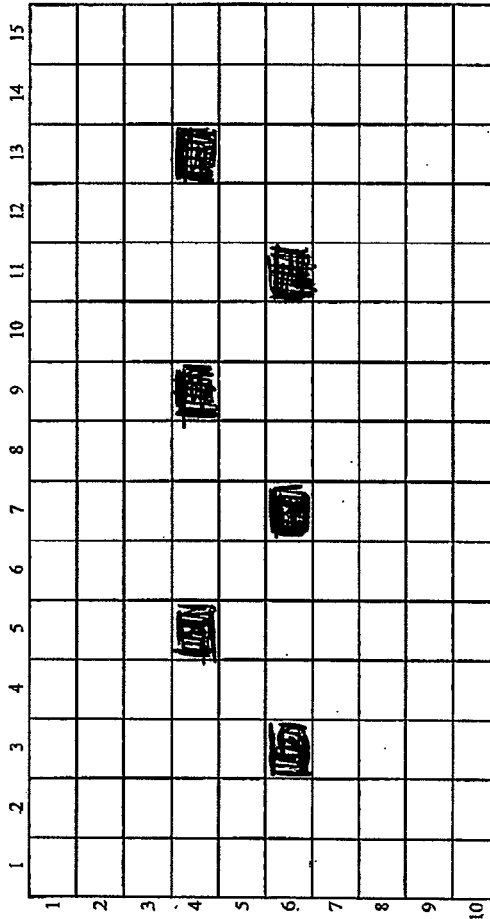
Repairs Performed:

N/A

Sample Collection Field Form
GCL Hydration DemonstrationDate: 7 June 07 Time: 8:00 AM Weather: Partly Cloudy L ~ 88°F Name: Avery OlsenCondition of Subgrade: Dry Some Moist Wet Additional Subgrade Details: Top inch moist / still little loose

Sample ID	Description	Packaging/Shipment Details
GCL-13	Damp / little Dry	Each wrapped in a mil, 13
GCL-14	Damp / some Dry spots	Gallon trash Bags Excess Air
GCL-15	One Side/Corner wet Rest Damp	Sucked out sealed with tape
GCL-16	Dry with few damp spots	Shipped overnight to Tri Environmental
GCL-17	Damp half Dry	in Austin Texas
GCL-18	Damp some wet spots	

Approximate GCL Sample Locations:



Repairs Performed:

N/A

Moved sand Bags to fit
Cover Better

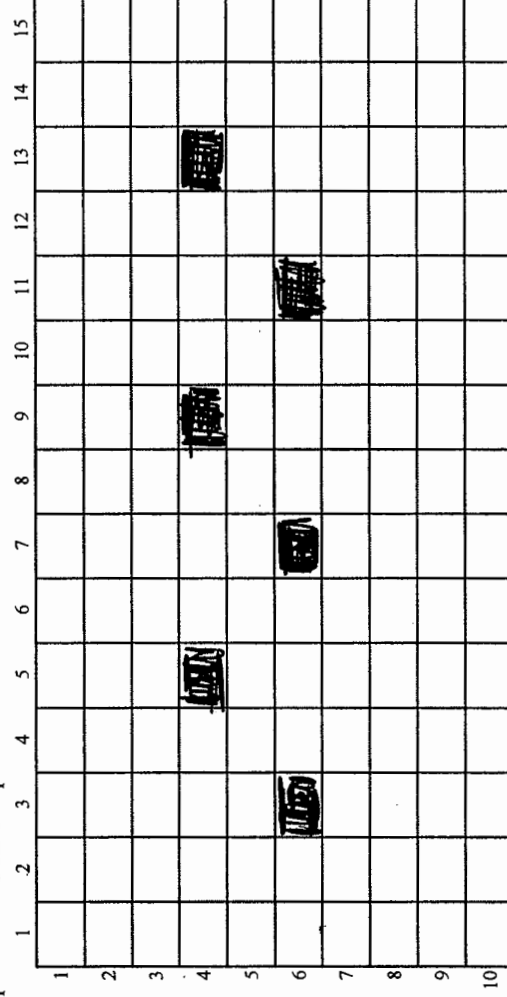
Sample Collection Field Form
GCL Hydration Demonstration

Date: 7 June 07 Time: 8:00 AM Weather: Partly Cloudy HN 66°F Name: Avery Olsen

Condition of Subgrade: Dry Some Moist Wet Additional Subgrade Details: Top inch moist / still little loose

Sample ID	Description	Packaging/Shipment Details
GCL-13	Damp / little Dry	Each wrapped in a mil, 13
GCL-14	Damp / some Dry spots	Gallon trash Bags Excess Air
GCL-15	one Side/corner wet Rest Damp	Sucked out sealed with tape
GCL-16	Dry with few damp spots	Shipped overnight to Tri Environmental
GCL-17	Damp half Dry	in Austin Texas
GCL-18	Damp some wet spots	

Approximate GCL Sample Locations:



Repairs Performed:

N/A
Moved sand Bags to fit
cover Better

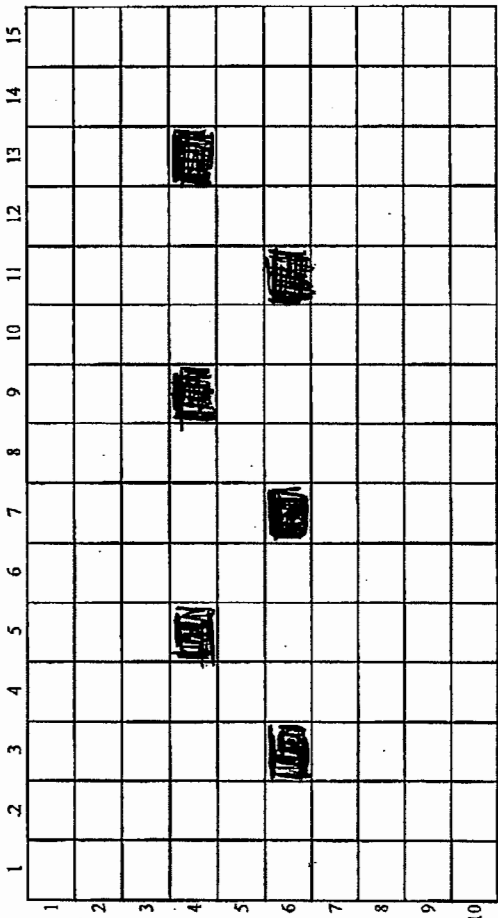
Sample Collection Field Form
GCL Hydration Demonstration

Date: 7 June 07 Time: 8:00 AM Weather: partly Cloudy L~88°F Name: Avery Olsen

Condition of Subgrade: Dry Moist Some Wet Additional Subgrade Details: Top inch moist / still little loose

Sample ID	Description	Packaging/Shipping Details
GCL-13	Damp / little Dry	Each wrapped in a mil, 13
GCL-14	Damp / some Dry spots	Gallon trash Bags Excess Air
GCL-15	One side/corner wet Best Damp	Suicised out sealed with tape
GCL-16	Dry with few damp spots	Shipped overnight to Tri Environmental
GCL-17	Damp half Dry	in Austin Texas
GCL-18	Damp some wet spots	

Approximate GCL Sample Locations:



Repairs Performed:

N/A

Moved sand bags to fit
cover better

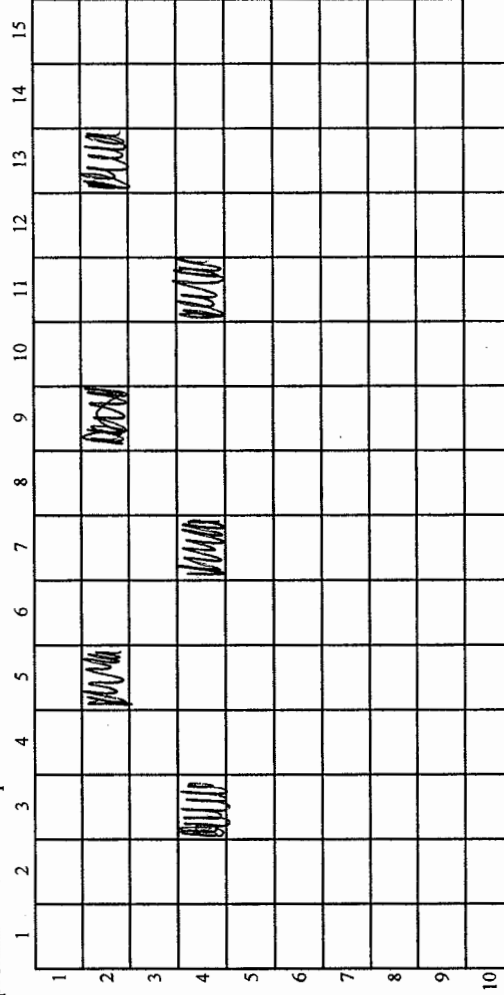
Sample Collection Field Form
GCL Hydration Demonstration

Date: 6/14/07 Time: 10:30 Weather: Clear $H \sim 87^{\circ}F$ $L \sim 54^{\circ}F$ Name: Avery Olsea

Condition of Subgrade: Dry Moist TO Wet Additional Subgrade Details: Top 1 inch moist some damp/wet

Sample ID	Description	Packaging/Shipment Details
GCL-19	Damp / some wet spots	Each wrapped in a Bag
GCL-20	most moist / little damp spots	Excess air sucked out
GCL-21	most damp / tiny moist spots	Sealed with tape shipped
GCL-22	moist / some dry spots	overnight to Trienviro.
GCL-23	Damp / most moist	Austin Texas
GCL-24	moist / some dry	

Approximate GCL Sample Locations:



Repairs Performed:

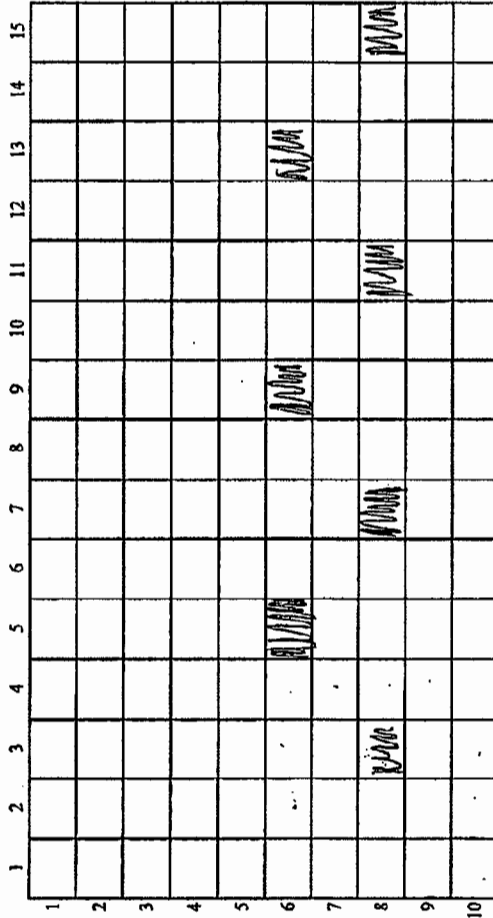
NA

Sample Collection Field Form
GCL Hydration Demonstration

Date: 7/17/07 Time: 9:00 AM Weather: Cloudy H ~ 81°F Name: Avery Olsen
Condition of Subgrade: Dry Moist Wet Additional Subgrade Details: little windy / very damp

Sample ID	Description	Packaging/Shipment Details
GCL-1	Moist / Dry Still Flaky	Each wrapped in Bags
GCL-2	Moist / Damp little clay feeling	Excess Air sucked out
GCL-3	Wet lots of clay texture	Sealed with Tape shipped overnight to Tri Enviro.
GCL-4	Dry mostly flaky	
GCL-5	Moist / little clay texture	Austin Texas
GCL-6	Moist / mostly flaky	

Approximate GCL Sample Locations:



Repairs Performed:

NA

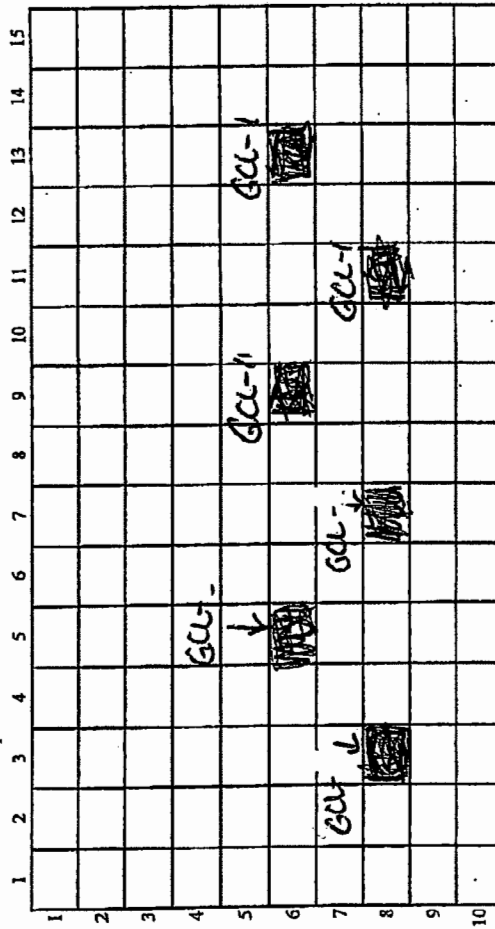
Sample Collection Field Form
GCL Hydration Demonstration

Date: 7/19/07 Time: 9:00 AM Weather: PARTLY CLOUDY, 22° Name: Avery Olson

Condition of Subgrade: Dry Wet Moist Additional Subgrade Details: Muddy

Sample ID	Description	Packaging/Shipment Details
GCL-100	Clay good even texture	Each wrapped in garbage
GCL-101	Clay no sign of dry spots	Bags Sealed with tape
GCL-102	" Clay	Shipped overnight to
GCL-103	" Clay	Tri Service Austin Texas
GCL-104	" Clay	
GCL-105	" Clay	

Approximate GCL Sample Locations:



Repairs Performed:

NA

Attachment C

Laboratory Test Data



TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

01 June, 2007

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd.
Suite 200
San Diego, CA 92127
Ph 858-674-6559
gcorcoran@geosyntec.com

Subject: Denison Mines soil moisture content
(TRI Log #: E2279-24-09)

Dear Mr. Corcoran:

TRI is please to present this letter report in support of the Denison Mines project. Three soil samples received and tested for moisture content in accordance with ASTM D 2216. The results for SMC-1, SMC-2, and SMC-3 are 13.4%, 11.2%, and 12.3% respectively. If you have any questions regarding the data or the testing please feel free to contact me.

Sincerely,

John M. Allen, E.I.T.
Director of the Geosynthetics Interaction Laboratory
TRI/Environmental, Inc.



June 1, 2007

Mail To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

Bill To:

<= Same

email: gcorcoran@geosyntec.com

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Denison Mines
TRI Job Reference Number:	E2284-24-08
Material(s) Tested:	6 Cetco Bentomat ST GCL(s)
Test(s) Requested:	Mass/Unit Area (ASTM D 5993)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

A handwritten signature in black ink, appearing to read 'John M. Allen'.

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS
TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)
TRI Log #: E2284-24-08

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Sample Identification: GCL - 1												
Bentonite mass/unit area (lbs/ft ²)	1.12	0.84	1.04	1.05							1.01	0.12
Moisture Content (%)	15.9	16.5	17.2	17.6							16.8	0.8
Sample Identification: GCL - 2												
Bentonite mass/unit area (lbs/ft ²)	1.01	0.94	0.85	0.79							0.90	0.10
Moisture Content (%)	13.5	11.6	13.9	13.1							13.0	1.0
Sample Identification: GCL - 3												
Bentonite mass/unit area (lbs/ft ²)	0.74	0.61	0.82	0.81							0.75	0.10
Moisture Content (%)	12.6	14.5	15.5	15.1							14.4	1.3
Sample Identification: GCL - 4												
Bentonite mass/unit area (lbs/ft ²)	0.97	1.00	1.06	1.09							1.03	0.05
Moisture Content (%)	8.9	12.4	10.7	14.3							11.6	2.3
Sample Identification: GCL - 5												
Bentonite mass/unit area (lbs/ft ²)	0.91	0.78	0.77	1.08							0.89	0.14
Moisture Content (%)	12.1	11.0	14.5	14.9							13.1	1.9
Sample Identification: GCL - 6												
Bentonite mass/unit area (lbs/ft ²)	1.08	0.83	0.84	0.99							0.94	0.12
Moisture Content (%)	17.0	16.3	13.5	13.2							15.0	1.9

Note: The provided sample only allowed for four 4" x 8" coupons.

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



June 7, 2007

Mail To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

Bill To:

<= Same

email: gcorcoran@geosyntec.com

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Denison Mines
TRI Job Reference Number:	E2279-26-02
Material(s) Tested:	6 Cetco Bentomat ST GCL(s)
Test(s) Requested:	Mass/Unit Area (ASTM D 5993)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS
TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)
TRI Log #: E2279-26-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Sample Identification: GCL - 7												
Bentonite mass/unit area (lbs/ft ²)	0.83	0.86									0.85	0.02
Moisture Content (%)	24.5	23.1									23.8	1.0
Sample Identification: GCL - 8												
Bentonite mass/unit area (lbs/ft ²)	0.75	0.94									0.85	0.13
Moisture Content (%)	26.2	27.2									26.7	0.7
Sample Identification: GCL - 9												
Bentonite mass/unit area (lbs/ft ²)	0.99	0.97									0.98	0.01
Moisture Content (%)	21.3	22.5									21.9	0.8
Sample Identification: GCL - 10												
Bentonite mass/unit area (lbs/ft ²)	0.72	1.06									0.89	0.24
Moisture Content (%)	23.6	23.6									23.6	0.0
Sample Identification: GCL - 11												
Bentonite mass/unit area (lbs/ft ²)	0.87	1.28									1.08	0.29
Moisture Content (%)	21.3	20.1									20.7	0.8
Sample Identification: GCL - 12												
Bentonite mass/unit area (lbs/ft ²)	1.01	0.85									0.93	0.11
Moisture Content (%)	20.8	19.2									20.0	1.1

Note: The provided sample only allowed for two 4" x 8" coupons.

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



June 13, 2007

Mail To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

Bill To:

<= Same

email: gcorcoran@geosyntec.com

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Denison Mines**
TRI Job Reference Number: E2279-26-02
Material(s) Tested: 6 Cetco Bentomat ST GCL(s)
Test(s) Requested: Mass/Unit Area (ASTM D 5993)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS

TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Moisture Content, ASTM D 2216
TRI Log #: E2279-26-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Sample Identification: GCL - 13												
Moisture Content (%)	25.8	23.0									24.4	2.0
Sample Identification: GCL - 14												
Moisture Content (%)	27.1	28.2									27.7	0.8
Sample Identification: GCL - 15												
Moisture Content (%)	29.5	26.4									28.0	2.2
Sample Identification: GCL - 16												
Moisture Content (%)	26.1	27.1									26.6	0.7
Sample Identification: GCL - 17												
Moisture Content (%)	23.4	25.9									24.7	1.8
Sample Identification: GCL - 18												
Moisture Content (%)	27.4	26.0									26.7	1.0

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

01 June, 2007

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd.
Suite 200
San Diego, CA 92127
Ph 858-674-6559
gcorcoran@geosyntec.com

Subject: Denison Mines soil moisture content
(TRI Log #: E2279-24-09)

Dear Mr. Corcoran:

TRI is please to present this letter report in support of the Denison Mines project. Three soil samples received and tested for moisture content in accordance with ASTM D 2216. The results for SMC-1, SMC-2, and SMC-3 are 13.4%, 11.2%, and 12.3% respectively. If you have any questions regarding the data or the testing please feel free to contact me.

Sincerely,

John M. Allen, E.I.T.
Director of the Geosynthetics Interaction Laboratory
TRI/Environmental, Inc.



June 13, 2007

Mail To:

Bill To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

<= Same

email: gcorcoran@geosyntec.com

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: Denison Mines
TRI Job Reference Number: E2279-26-02
Material(s) Tested: 6 Cetco Bentomat ST GCL(s)
Test(s) Requested: Mass/Unit Area (ASTM D 5993)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS
TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Moisture Content, ASTM D 2216
TRI Log #: E2279-26-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Sample Identification: GCL - 13												
Moisture Content (%)	25.8	23.0									24.4	2.0
Sample Identification: GCL - 14												
Moisture Content (%)	27.1	28.2									27.7	0.8
Sample Identification: GCL - 15												
Moisture Content (%)	29.5	26.4									28.0	2.2
Sample Identification: GCL - 16												
Moisture Content (%)	26.1	27.1									26.6	0.7
Sample Identification: GCL - 17												
Moisture Content (%)	23.4	25.9									24.7	1.8
Sample Identification: GCL - 18												
Moisture Content (%)	27.4	26.0									26.7	1.0

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

16 July, 2007

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd.
Suite 200
San Diego, CA 92127
Ph 858-674-6559
gcorcoran@geosyntec.com

Subject: Denison Mines soil moisture content
(TRI Log #: E2279-37-05)

Dear Mr. Corcoran:

TRI is please to present this letter report in support of the Denison Mines project. Three soil samples received and tested for moisture content in accordance with ASTM D 2216. The results for sample 1, 2, and 3 are 19.4%, 33.8%, and 24.1% respectively. If you have any questions regarding the data or the testing please feel free to contact me.

Sincerely,

John M. Allen, E.I.T.
Director of the Geosynthetics Interaction Laboratory
TRI/Environmental, Inc.



July 20, 2007

Mail To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

email: gcorcoran@geosyntec.com

Bill To:

<= Same

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Denison Mines
TRI Job Reference Number:	E2279-38-04
Material(s) Tested:	6 Cetco Bentomat ST GCL(s)
Test(s) Requested:	Moisture Content (ASTM D 2216)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS
TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Moisture Content, ASTM D 2216
TRI Log #: E2279-38-04

PARAMETER	TEST REPLICATE NUMBER										MEAN
	1	2	3	4	5	6	7	8	9	10	
Sample Identification: GCL - 1											
Moisture Content (%)	25.7										25.7
Sample Identification: GCL - 2											
Moisture Content (%)	25.5										25.5
Sample Identification: GCL - 3											
Moisture Content (%)	30.8										30.8
Sample Identification: GCL - 4											
Moisture Content (%)	24.5										24.5
Sample Identification: GCL - 5											
Moisture Content (%)	23.6										23.6
Sample Identification: GCL - 6											
Moisture Content (%)	25.9										25.9

Bentonite was granular for all samples.

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



July 25, 2007

Mail To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

Bill To:

<= Same

email: gcorcoran@geosyntec.com

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: **Denison Mines**

TRI Job Reference Number: E2279-40-04

Material(s) Tested: 6 Cetco Bentomat ST GCL(s)

Test(s) Requested: Moisture Content (ASTM D 2216)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

A handwritten signature in black ink, appearing to read 'John M. Allen'.

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS
TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Moisture Content, ASTM D 2216
TRI Log #: E2279-40-04

PARAMETER	TEST REPLICATE NUMBER										MEAN
	1	2	3	4	5	6	7	8	9	10	
Sample Identification: GCL - 100											
Moisture Content (%)	89.9										89.9
Sample Identification: GCL -101											
Moisture Content (%)	104.8										104.8
Sample Identification: GCL - 102											
Moisture Content (%)	103.0										103.0
Sample Identification: GCL - 103											
Moisture Content (%)	100.0										100.0
Sample Identification: GCL - 104											
Moisture Content (%)	86.0										86.0
Sample Identification: GCL - 105											
Moisture Content (%)	102.0										102.0

Bentonite was granular for all samples.

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



July 30, 2007

Mail To:

Mr. Greg Corcoran
Geosyntec Consultants
10875 Rancho Bernardo Rd. Suite 200
San Diego, CA 92127

Bill To:

<= Same

email: gcorcoran@geosyntec.com

Dear Mr. Corcoran:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Denison Mines
TRI Job Reference Number:	E2279-40-04
Material(s) Tested:	6 Cetco Bentomat ST GCL(s)
Test(s) Requested:	Moisture Content (ASTM D 2216)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

John M. Allen, E.I.T
Director of Geosynthetics Interaction Laboratory
Geosynthetic Services Division
www.GeosyntheticTesting.com



GCL TEST RESULTS
TRI Client: Geosyntec Consultants
Project: Denison Mines

Material: Cetco Bentomat ST GCL
Bentonite - Moisture Content, ASTM D 2216
TRI Log #: E2279-40-04

PARAMETER	TEST REPLICATE NUMBER										MEAN
	1	2	3	4	5	6	7	8	9	10	
Sample Identification: GCL - 106											
Moisture Content (%)	56.6										56.6
Sample Identification: GCL -107											
Moisture Content (%)	45.3										45.3
Sample Identification: GCL - 108											
Moisture Content (%)	36.1										36.1
Sample Identification: GCL - 109											
Moisture Content (%)	44.4										44.4
Sample Identification: GCL - 110											
Moisture Content (%)	27.9										27.9
Sample Identification: GCL - 111											
Moisture Content (%)	28.3										28.3

Bentonite was granular for all samples.

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

31 August, 2007

Gregory T Corcoran, P.E.
Geosyntec Consultants, Inc.
10875 Rancho Bernardo Road
Suite 200
San Diego, California 92078
Phone: 858.674.6559
GCorcoran@Geosyntec.com

Subject: Preliminary Results for permeability of the Bentomat ST GCL for the Denison Mines Project, (TRI Log #: E2279-43-02)

Dear Mr. Corcoran,

The intent of letter is to provide you with the preliminary results for the compatibility of the Bentomat ST GCL with the hydrochloric acid solution for the Denison Mines Project. Representative specimens of the Bentomat ST GCL from roll number 6836, were selected for permeability testing per ASTM D 6766, Scenario 1. Specimens were pre-hydrated with de-ionized water to target bentonite moisture contents of 50, 75, 100 and 140%. Specimens were allowed to equilibrate prior to mounting in the triaxial permeameters.

Upon mounting in the permeameter the specimen was immediately tested for permeability without back pressure saturating the sample at the client's request. The cell pressure was 80 psi, the head water pressure was 77 psi and the tail water pressure was 75 psi. The specimens were permeated with a hydrochloric (HCl) acid solution with a pH of 1. Permeability with time and pore volumes is presented in the attached figures for each of the hydration conditions. One pore volume is approximately 50 ml.

Sincerely,

John M. Allen, E.I.T.
Director of the Geosynthetics Interaction Laboratory
TRI/Environmental, Inc.

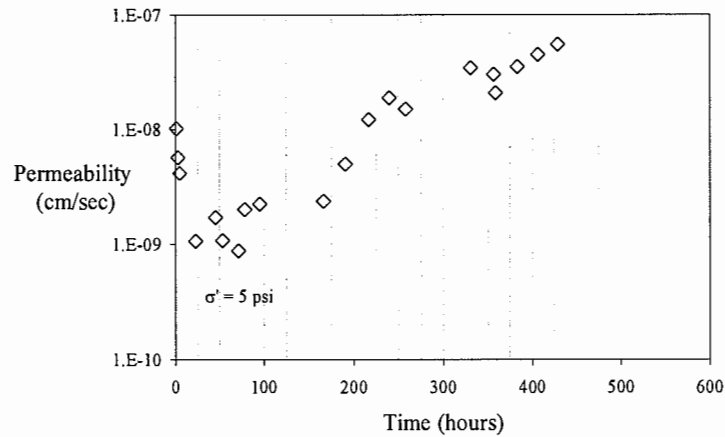


Figure 1 Permeability with time for 50% moisture content specimen with pH of 1 HCL Solution

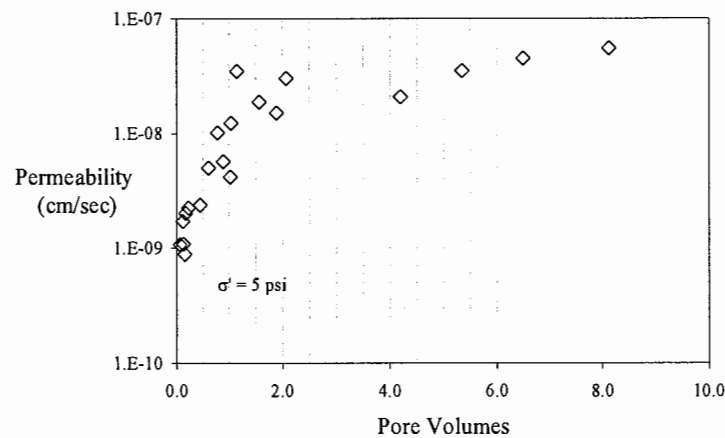


Figure 2 Permeability with pore volumes for 50% moisture content specimen with pH of 1 HCL Solution

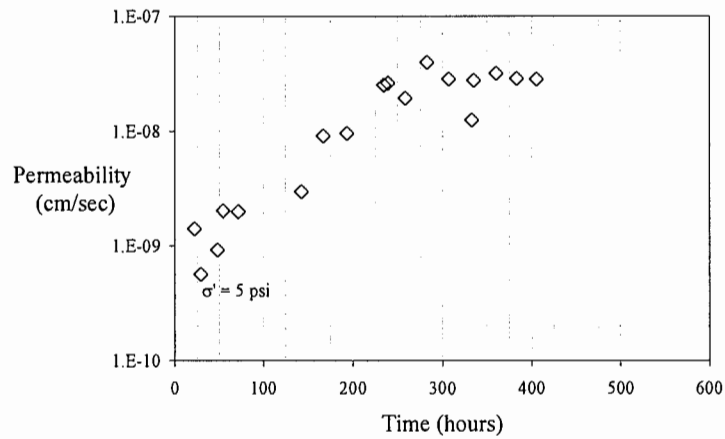


Figure 3 Permeability with time for 75% moisture content specimen with pH of 1 HCL Solution

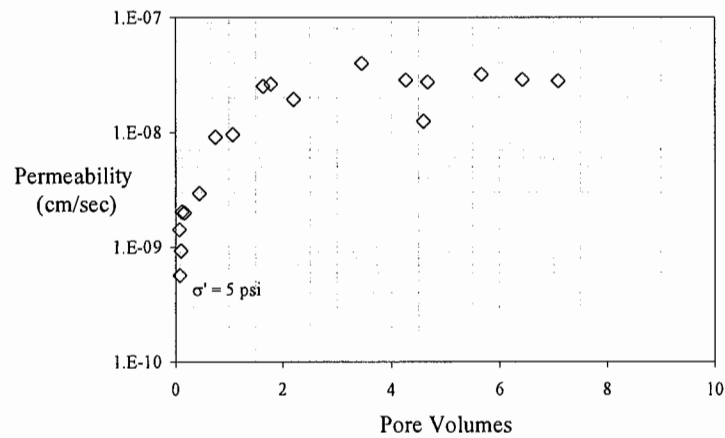


Figure 4 Permeability with pore volumes for 75% moisture content specimen with pH of 1 HCL Solution

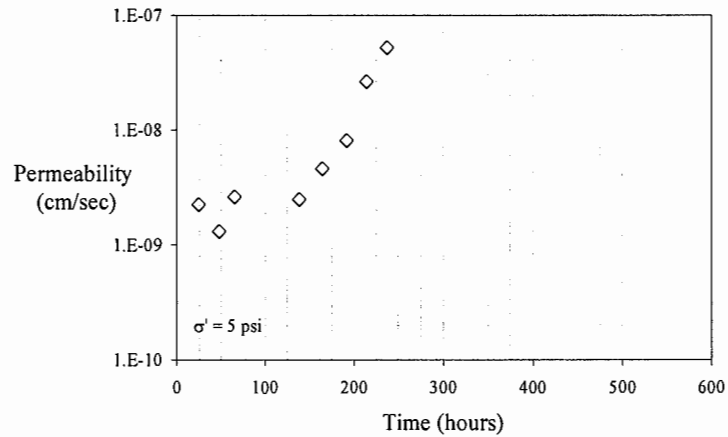


Figure 5 Permeability with time for 100% moisture content specimen with pH of 1 HCL Solution

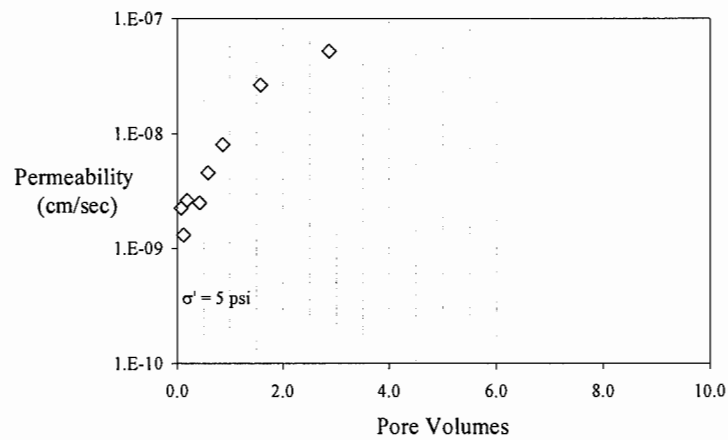


Figure 6 Permeability with pore volumes for 100% moisture content specimen with pH of 1 HCL Solution

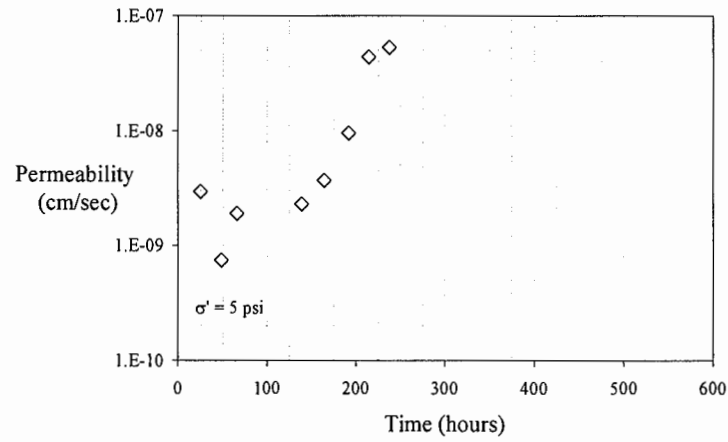


Figure 7 Permeability with time for 140% moisture content specimen with pH of 1 HCL Solution

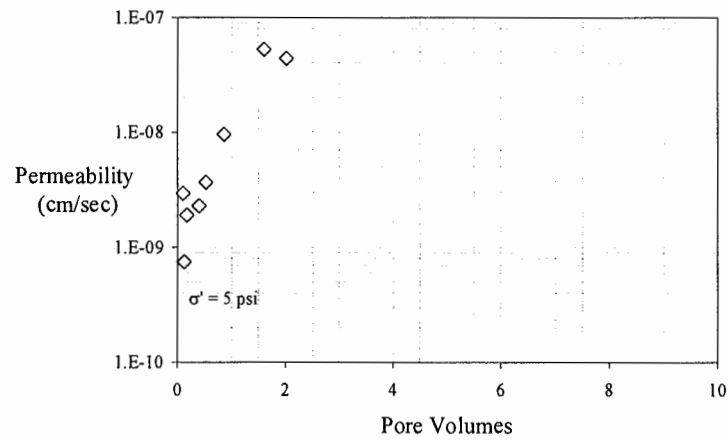


Figure 8 Permeability with pore volumes for 140% moisture content specimen with pH of 1 HCL Solution

Attachment D

Weather Data

Summary of Daily Weather
May 1, 2007 - August 29, 2007
GCL Hydration Demonstration
White Mesa Mill - Cell 4A
Blanding, Utah

Geosyntec Consultants

Date	Maximum Temperature (°F)	Minimum Temperature (°F)	Average Temperature (°F)	Precipitation (inches)
5/1/2007	83	50	67	0.18
5/2/2007	59	46	53	0.6
5/3/2007	69	44	57	0
5/4/2007	63	40	52	T
5/5/2007	45	32	39	0.15
5/6/2007	53	31	42	0
5/7/2007	67	33	50	0
5/8/2007	73	36	55	0
5/9/2007	78	43	61	0
5/10/2007	82	48	65	0
5/11/2007	85	52	69	0
5/12/2007	86	55	71	0
5/13/2007	85	59	72	T
5/14/2007	85	52	69	0
5/15/2007	84	50	67	0
5/16/2007	81	49	65	0
5/17/2007	79	46	63	T
5/18/2007	80	49	65	0
5/19/2007	83	50	67	0
5/20/2007	81	50	66	T
5/21/2007	79	50	65	0
5/22/2007	67	39	53	0.12
5/23/2007	57	38	48	0.09
5/24/2007	66	33	50	0
5/25/2007	77	46	62	0
5/26/2007	80	49	65	0
5/27/2007	85	53	69	0
5/28/2007	84	51	68	0
5/29/2007	84	52	68	0
5/30/2007	79	43	61	0
5/31/2007	85	48	67	0
6/1/2007	83	53	68	0
6/2/2007	86	56	71	0
6/3/2007	87	56	72	0
6/4/2007	88	59	74	0
6/5/2007	88	58	73	0
6/6/2007	72	46	59	0
6/7/2007	69	35	52	0
6/8/2007	79	47	63	0
6/9/2007	86	50	68	0
6/10/2007	88	53	71	0
6/11/2007	82	55	69	0
6/12/2007	77	49	63	0.38
6/13/2007	85	49	67	0

Summary of Daily Weather
May 1, 2007 - August 29, 2007
GCL Hydration Demonstration
White Mesa Mill - Cell 4A
Blanding, Utah

Geosyntec Consultants

Date	Maximum Temperature (°F)	Minimum Temperature (°F)	Average Temperature (°F)	Precipitation (inches)
6/14/2007	92	57	75	0
6/15/2007	96	62	79	0
6/16/2007	97	63	80	0
6/17/2007	92	61	77	0
6/18/2007	92	59	76	0
6/19/2007	93	61	77	0
6/20/2007	95	63	79	0
6/21/2007	97	63	80	0
6/22/2007	96	62	79	0
6/23/2007	97	63	80	0
6/24/2007	95	61	78	0
6/25/2007	92	60	76	0
6/26/2007	95	60	78	0
6/27/2007	93	60	77	0
6/28/2007	93	62	78	0
6/29/2007	95	62	79	0
6/30/2007	95	63	79	0
7/1/2007	98	62	80	0
7/2/2007	100	64	82	0
7/3/2007	101	63	82	0
7/4/2007	100	64	82	0
7/5/2007	95	64	80	0
7/6/2007	93	65	79	0
7/7/2007	92	62	77	0
7/8/2007	97	64	81	T
7/9/2007	93	64	79	0
7/10/2007	99	65	82	0
7/11/2007	92	68	80	T
7/12/2007	87	63	75	0
7/13/2007	90	62	76	0
7/14/2007	96	60	78	0
7/15/2007	95	60	78	0
7/16/2007	97	61	79	T
7/17/2007	98	69	84	0
7/18/2007	97	67	82	0
7/19/2007	97	65	81	T
7/20/2007	90	61	76	0
7/21/2007	91	67	79	0
7/22/2007	92	63	78	0.03
7/23/2007	93	65	79	0
7/24/2007	93	62	78	0
7/25/2007	92	62	77	0
7/26/2007	88	64	76	0.31
7/27/2007	92	61	77	0.23

Summary of Daily Weather
May 1, 2007 - August 29, 2007
GCL Hydration Demonstration
White Mesa Mill - Cell 4A
Blanding, Utah

Geosyntec Consultants

Date	Maximum Temperature (°F)	Minimum Temperature (°F)	Average Temperature (°F)	Precipitation (inches)
7/28/2007	87	59	73	0.34
7/29/2007	92	60	76	0
7/30/2007	89	60	75	0.14
7/31/2007	90	61	76	0
8/1/2007	88	62	75	0.04
8/2/2007	85	63	74	0.05
8/3/2007	81	62	71.5	0.06
8/4/2007	82	65	73.5	0.06
8/5/2007	85	64	74.5	0.01
8/6/2007	84	62	73	0
8/7/2007	85	61	73	0
8/8/2007	87	56	71.5	0
8/9/2007	88	57	72.5	0
8/10/2007	90	61	75.5	0
8/11/2007	92	57	74.5	0
8/12/2007	95	62	78.5	0.02
8/13/2007	91	63	77	0.06
8/14/2007	90	64	77	0.05
8/15/2007	88	66	77	0.05
8/16/2007	91	60	75.5	0.02
8/17/2007	93	63	78	0
8/18/2007	92	64	78	0
8/19/2007	91	61	76	0
8/20/2007	90	56	73	0
8/21/2007	92	59	75.5	0
8/22/2007	92	58	75	0
8/23/2007	91	59	75	0.1
8/24/2007	91	57	74	0
8/25/2007	93	55	74	0
8/26/2007	90	64	77	0
8/27/2007	76	57	66.5	0.18
8/28/2007	82	57	69.5	0
8/29/2007	89	57	73	0

Sources:

5/1/2007 - 7/31/2007:

NOAA, 2007, "Record of Climatological Observations for Blanding, Utah." Available at www.noaa.gov

8/1/2007 - 8/29/2007:

Available at www.weather.com, Monthly Weather for Blanding, Utah.

Station: BLANDING

State: UT County: SAN JUAN Standard Time: MOUNTAIN

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Observation Time Temperature: 2300 Precipitation: 2300

(LST)

Precipitation	Temperature (°F)			Precipitation (see **)		Monthly Temperature (°F)					Monthly Precipitation			
	at observation time			24 Hour Amounts ending at observation time	At Observation Time	Mean Max	Mean Temp	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Precip	Snowfall
	Max.	Min.	at observation time	Rain, melted snow, etc. (Inches & hundredths)	F Snow, ice pellets (Inches & tenths)	F Snow, ice pellets, hail, ice on ground (Inches)								
Year	Month	Day	Month	Day	Month	Day	Month	Day	Month	Day	Month	Day	Month	Day
* 2007051	83	50	67	2	0	0	0	0	0	0	0	0	0	0
* 2007052	59	46	53	0	0.60	0	0	0	0	0	0	0	0	0
* 2007053	69	44	57	0	0	0	0	0	0	0	0	0	0	0
* 2007054	63	40	52	0	T	0	0	0	0	0	0	0	0	0
* 2007055	45	32	39	0	0.15	T	0	0	0	0	0	0	0	0
* 2007056	53	31	42	0	0	0	0	0	0	0	0	0	0	0
* 2007057	67	33	50	0	0	0	0	0	0	0	0	0	0	0
* 2007058	73	36	55	0	0	0	0	0	0	0	0	0	0	0
* 2007059	78	43	61	0	0	0	0	0	0	0	0	0	0	0
* 20070510	82	48	65	0	0	0	0	0	0	0	0	0	0	0
* 20070511	85	52	69	4	0	0	0	0	0	0	0	0	0	0
* 20070512	86	55	71	6	0	0	0	0	0	0	0	0	0	0
* 20070513	85	59	72	7	0	0	0	0	0	0	0	0	0	0
* 20070514	85	52	69	4	0	0	0	0	0	0	0	0	0	0
* 20070515	84	50	67	2	0	0	0	0	0	0	0	0	0	0
* 20070516	81	49	65	0	0	0	0	0	0	0	0	0	0	0
* 20070517	79	46	63	0	0	0	0	0	0	0	0	0	0	0
* 20070518	80	49	65	0	0	0	0	0	0	0	0	0	0	0
* 20070519	83	50	67	2	0	0	0	0	0	0	0	0	0	0
* 20070520	81	50	66	1	0	0	0	0	0	0	0	0	0	0
* 20070521	79	50	65	0	0	0	0	0	0	0	0	0	0	0
* 20070522	67	39	53	0	0.12	0	0	0	0	0	0	0	0	0
* 20070523	57	38	48	0	0.09	0	0	0	0	0	0	0	0	0
* 20070524	66	33	50	0	0	0	0	0	0	0	0	0	0	0
* 20070525	77	46	62	0	0	0	0	0	0	0	0	0	0	0
* 20070526	80	49	65	0	0	0	0	0	0	0	0	0	0	0
* 20070527	85	53	69	4	0	0	0	0	0	0	0	0	0	0
* 20070528	84	51	68	3	0	0	0	0	0	0	0	0	0	0
* 20070529	84	52	68	3	0	0	0	0	0	0	0	0	0	0
* 20070530	79	43	61	0	0	0	0	0	0	0	0	0	0	0

Record of Climatological Observations

* 2007/05/31	85	48	67	2	0	0	0	0	0	60.7	75.6	45.7	86	31	40	164	1.14	0
* 2007/06 1	83	53	68	3	0	0	0	0	0	99999								
* 2007/06 2	86	56	71	6	0	0	0	0	0	0								
* 2007/06 3	87	56	72	7	0	0	0	0	0	0								
* 2007/06 4	88	59	74	9	0	0	0	0	0	0								
* 2007/06 5	88	58	73	8	0	0	0	0	0	0								
* 2007/06 6	72	46	59	0	6	0	0	0	0	0								
* 2007/06 7	69	35	52	0	13	0	0	0	0	0								
* 2007/06 8	79	47	63	0	2	0	0	0	0	0								
* 2007/06 9	86	50	68	3	0	0	0	0	0	0								
* 2007/06 10	88	53	71	6	0	0	0	0	0	0								
* 2007/06 11	82	55	69	4	0	0	0	0	0	0								
* 2007/06 12	77	49	63	0	2	0.38	0	0	0	0								
* 2007/06 13	85	49	67	2	0	0	0	0	0	0								
* 2007/06 14	92	57	75	10	0	0	0	0	0	0								
* 2007/06 15	96	62	79	14	0	0	0	0	0	0								
* 2007/06 16	97	63	80	15	0	0	0	0	0	0								
* 2007/06 17	92	61	77	12	0	0	0	0	0	0								
* 2007/06 18	92	59	76	11	0	0	0	0	0	0								
* 2007/06 19	93	61	77	12	0	0	0	0	0	0								
* 2007/06 20	95	63	79	14	0	0	0	0	0	0								
* 2007/06 21	97	63	80	15	0	0	0	0	0	0								
* 2007/06 22	96	62	79	14	0	0	0	0	0	0								
* 2007/06 23	97	63	80	15	0	0	0	0	0	0								
* 2007/06 24	95	61	78	13	0	0	0	0	0	0								
* 2007/06 25	92	60	76	11	0	0	0	0	0	0								
* 2007/06 26	95	60	78	13	0	0	0	0	0	0								
* 2007/06 27	93	60	77	12	0	0	0	0	0	0								
* 2007/06 28	93	62	78	13	0	0	0	0	0	0								
* 2007/06 29	95	62	79	14	0	0	0	0	0	0								
* 2007/06 30	95	63	79	14	0	0	0	0	0	0								
* 2007/07 1	98	62	80	15	0	0	0	0	0	73.0	89.2	56.9	97	35	270	23	0.38	0
* 2007/07 2	100	64	82	17	0	0	0	0	0	99999								
* 2007/07 3	101	63	82	17	0	0	0	0	0	0								
* 2007/07 4	100	64	82	17	0	0	0	0	0	0								
* 2007/07 5	95	64	80	15	0	0	0	0	0	0								
* 2007/07 6	93	65	79	14	0	0	0	0	0	0								
* 2007/07 7	92	62	77	12	0	0	0	0	0	0								
* 2007/07 8	97	64	81	16	0	T	0	0	0	0								
* 2007/07 9	93	64	79	14	0	0	0	0	0	0								
* 2007/07 10	99	65	82	17	0	0	0	0	0	0								
* 2007/07 11	92	68	80	15	0	T	0	0	0	0								
* 2007/07 12	87	63	75	10	0	0	0	0	0	0								
* 2007/07 13	90	62	76	11	0	0	0	0	0	0								
* 2007/07 14	96	60	78	13	0	0	0	0	0	0								
* 2007/07 15	95	60	78	13	0	0	0	0	0	0								
* 2007/07 16	97	61	79	14	0	T	0	0	0	0								
* 2007/07 17	98	69	84	19	0	0	0	0	0	0								
* 2007/07 18	97	67	82	17	0	0	0	0	0	0								
* 2007/07 19	97	65	81	16	0	T	0	0	0	0								

* 2007/07/20	90	61	76	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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The '*' flags in Preliminary indicate the data has not completed processing and quality control and may contain errors

All 9's (e.g. 999999, 99999.9, etc.) in the data column indicate that the value was not received or is missing

****T=TRACE, A=Accumulated amount since last measure, B=Accumulated amount includes estimated values, S=Included in a subsequent value, E=Estimated amount.**

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Around the Home: Home Improvement > Home Improvement Forecast > MONTHLY WEATHER for Blanding, UT

Yesterday	Today	Tomorrow	Radar Map	Hour-by-Hour	Weekend	10-Day	Mon
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Video: Today's top weather news | Hurricane Central: Areas to watch in Atlantic

Home Weather Planner for
Blanding, UT
[English | Metric]

Weather for your life
Home Improvement

Previous Month			August				Next Month	
Sun	Mon	Tue	Wed 1	Thu 2	Fri 3	Sat 4		
			OBSERVED	OBSERVED	OBSERVED	OBSERVED		
			Hi 88°F Lo 62°F	Hi 85°F Lo 63°F	Hi 81°F Lo 62°F	Hi 82°F Lo 65°F		
			Precip (in) 0.04in.	Precip (in) 0.05in.	Precip (in) 0.06in.	Precip (in) 0.06in.		
5	6	7	8	9	10	11		
OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED		
Hi 85°F Lo 64°F	Hi 84°F Lo 62°F	Hi 85°F Lo 61°F	Hi 87°F Lo 56°F	Hi 88°F Lo 57°F	Hi 90°F Lo 61°F	Hi 92°F Lo 57°F		
Precip (in) 0.01in.	Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0in.		
12	13	14	15	16	17	18		
OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED		
Hi 95°F Lo 62°F	Hi 91°F Lo 63°F	Hi 90°F Lo 64°F	Hi 88°F Lo 66°F	Hi 91°F Lo 60°F	Hi 93°F Lo 63°F	Hi 92°F Lo 64°F		
Precip (in) 0.02in.	Precip (in) 0.06in.	Precip (in) 0.05in.	Precip (in) 0.05in.	Precip (in) 0.02in.	Precip (in) 0in.	Precip (in) 0in.		

ACE

The helpful place.

Friday, August 31st -
Monday, September 3rd
FIND YOUR LOCAL ACE

INTERIOR

ACE ROYAL

Flat Wall Paint

ACRYLIC LATEX

OUR VERY BEST

Sale retail

\$18.99 gal

-\$5 mail-in rebate

\$13.99 gal

final cost

- Our best paint

- Maximum rebate: \$50
(10 gallons)

- At participating stores

John Madden's kickoff sale

Sponsored Listings

what?

19	20	21	22	23	24	25
OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED	OBSERVED

Hi 91°F Lo 61°F	Hi 90°F Lo 56°F	Hi 92°F Lo 59°F	Hi 92°F Lo 58°F	Hi 91°F Lo 59°F	Hi 91°F Lo 57°F	Hi 93°F Lo 55°F
Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0in.	Precip (in) 0.01in.	Precip (in) 0in.	Precip (in) 0in.

26	27	28	29	Today	31
OBSERVED	OBSERVED	OBSERVED	OBSERVED		

Hi 90°F Lo 64°F	Hi 76°F Lo 57°F	Hi 82°F Lo 57°F	Hi 89°F Lo 57°F	Hi - Lo 60°F	Hi 85°F Lo 59°F
Precip (in) 0in.	Precip (in) 0.18in.	Precip (in) 0in.	Precip (in) 0in.	Precip 20 % Indoor Heating Need -10 Very High	Precip 30 % Indoor Cooling Need 1 Low

FORECAST: Updated Aug 30 03:08 p.m. MT

Details	Video	Text	Averages
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Month-to-Date Totals

Temperatures	Precipitation
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What tempertaure do you like to keep home during the summer months?

- ☐ 65 - 68 degrees
- ☐ 69 - 71 degrees
- ☐ 72 - 73 degrees
- ☐ 74 - 76 degrees
- ☐ 77 - 79 degrees
- ☐ 80+ degrees

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