

*Prepared for:*

**County of Kaua'i Solid Waste Division**

4444 Rice Street

Mo'ikeha Building, Suite 295

Lihue, HI 96766

# **REPORT OF CONSTRUCTION QUALITY ASSURANCE**

## **NEW LEACHATE EVAPORATION POND**

**Phase II Lateral Expansion, Cell 1 Base Liner Construction**

**Kekaha Sanitary Landfill**

**Kaua'i, Hawai'i**

*Prepared by:*

**Geosyntec**  
consultants

475 14<sup>th</sup> Street, Suite 400  
Oakland, California 94612  
(510) 836-3034

Project Number: WG1298  
25 May 2010

MAY 27 2010



**WASTE MANAGEMENT OF HAWAII, INC.**

92-460 Farrington Highway  
Kapolei, Hawaii 96707  
(808) 668-2985

May 26, 2010

Steven Y.K. Chang, P.E., Chief  
Solid and Hazardous Waste Branch  
State of Hawaii Department of Health  
Environmental Management Division  
919 Ala Moana Blvd., Suite 212  
Honolulu, Hawaii 96814

**RE: Kekaha Sanitary Landfill  
Phase II Lateral Expansion  
New Leachate Evaporation Pond Construction Quality Assurance Report**

Dear Mr. Chang:

Waste Management of Hawaii, Inc. (WMH), the operator of the Kekaha Sanitary Landfill, is hereby submitting two copies of the *Report of Construction Quality Assurance, New Leachate Evaporation Pond* for your review and approval.

As you are aware, the new leachate evaporation pond (NLEP) was constructed as one component of the overall Phase II lateral expansion construction project. The CQA report for the new Cell 1D/1C will follow this submission very shortly, and we hope to have the NLEP approved for use so that it can be connected to the Phase II and Cell 1D/1C leachate collection and removal systems (LCRS) and allow for the timely demolition of the old leachate pond. Given the very limited remaining airspace in the current Phase II area of the landfill, we appreciate your expedited review and approval of the new leachate evaporation pond.

Please contact me at (808) 668-2985 with any questions or comments on this submission.

Sincerely,

Jesse Frey  
Engineer  
Waste Management of Hawaii, Inc.

cc: Mr. Donald Fujimoto (County of Kauai)  
Mr. Troy Tanigawa (County of Kauai)  
Jeff Kaohi (WMH)



MAY 27 2010 <sup>AM</sup>

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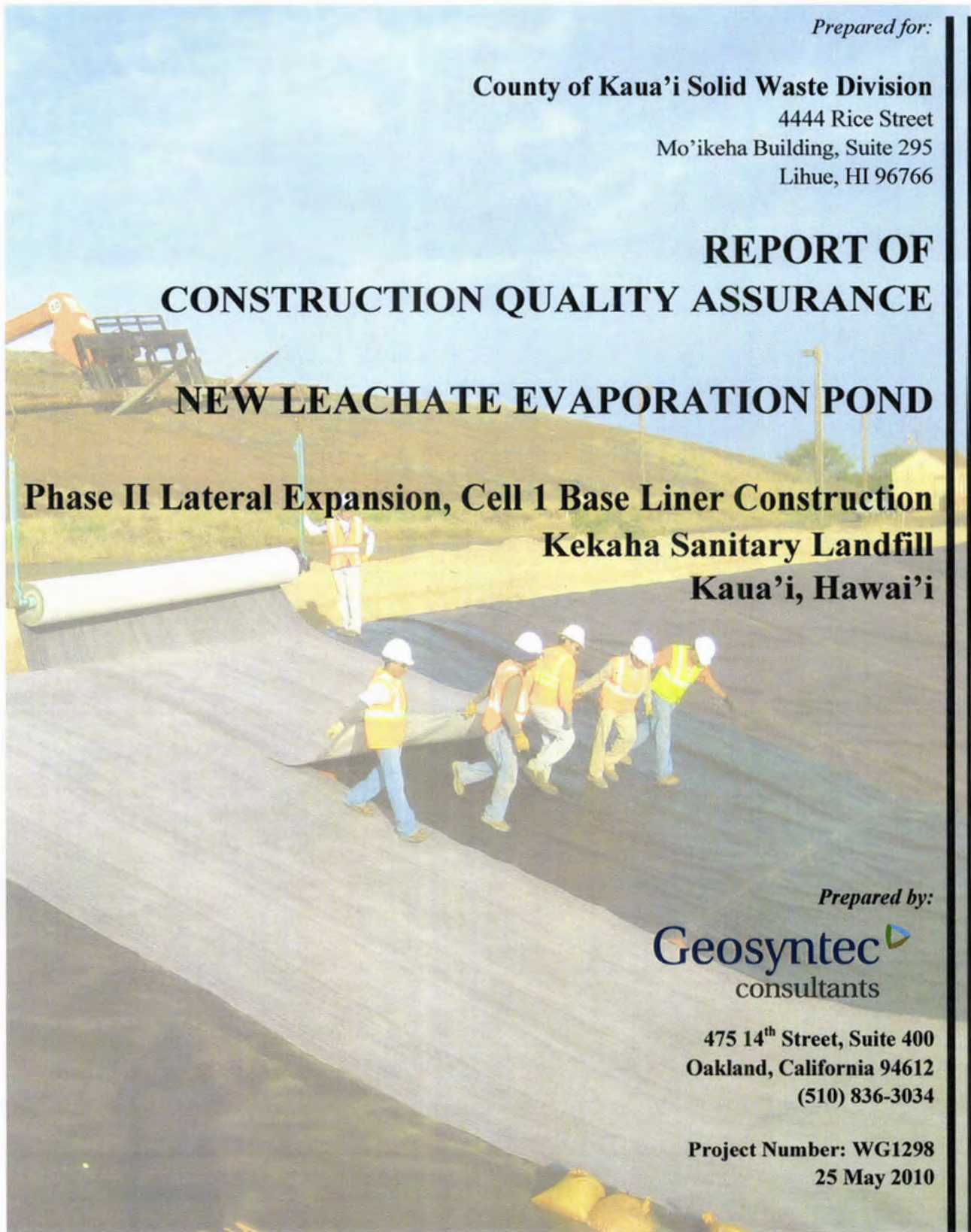
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## **1. INTRODUCTION**

### **1.1 Terms of Reference**

This report summarizes the construction quality assurance (CQA) monitoring activities performed by Geosyntec Consultants, Inc. (Geosyntec) for the construction of the containment system of the approximately 2-acre new leachate evaporation pond (NLEP), at the Kekaha Sanitary Landfill (Kekaha Landfill) in Kaua'i, Hawai'i. The NLEP was constructed as part of the Phase II Lateral Expansion, Cell 1 Base Liner Construction. This report has been prepared for the County of Kaua'i Solid Waste Division to satisfy the requirements of the Hawai'i Department of Health (HDOH). The CQA activities were performed in accordance with the CQA Manual for the project [Geosyntec, 2010].

This report was prepared by Kim Huynh and Michael J. Minch, and was reviewed by Hari D. Sharma, Ph.D., P.E., all of Geosyntec, in accordance with the internal review policy of the firm.

### **1.2 Organization of Report**

The remainder of this report is organized as follows:

- a description of the project including a summary of changes to the original design is presented in Section 2;
- the CQA program is summarized in Section 3;
- details of the CQA program during earthwork are presented in Section 4;
- details of the CQA program for the geosynthetic clay liner (GCL) are presented in Section 5;



- details of the CQA program for the geomembrane are presented in Section 6;
- details of the CQA program for the geotextiles are presented in Section 7;
- the summary and conclusions from the CQA work are presented in Section 8;
- certification is presented in Section 9;
- references are included in Section 10; and
- limitations on the application of information presented in this report are described in Section 11.

Photographic documentation related to the CQA activities is presented in Appendix A. Project correspondence, contractor submittals, and Requests for Information (RFIs) are included in Appendices B, C and D, respectively. CQA documentation, including laboratory test results, field test results, field logs, etc. are included in Appendices E through K. Red-lined construction drawings, documenting changes during construction, are provided in Appendix L. The as-built record drawings, including the geomembrane panel layout drawings, are presented in Appendix M. Samples of the geosynthetic materials used in the construction are provided in Appendix N.

For ease of reference during construction, a local site orientation was adopted that was based on the surrounding topography. For documentation purposes within this report, the mauka (mountain) side of the project is referred to as “north” and the makai (ocean) side of the project is referred to as “south.” These terms were used various construction documents (e.g., dailies, geosynthetic logs, etc.) to describe portions of the construction, such as the “south berm” of the NLEP.

Throughout the construction of the NLEP, other construction activities were underway for the rest of the Phase II expansion project. Therefore, much of the field documentation in the appendices of this report also refers to work on these other

components (Cell 1C and 1D, infiltration basin, existing utilities, and public drop-off area improvements).

### 1.3 Responsible Parties

The responsible parties involved in the NLEP construction included the Owner, the Design Engineer, the Construction Manager, the General Contractor, the Geosynthetics Installer, and the CQA Consultant (including CQA laboratories). The technical personnel for each company, who were key participants in the construction, are listed in Section 3.2.1 of this report.

The County of Kaua'i (County) is the owner of the site, and was responsible for funding and project management.

Waste Management of Hawai'i (WMH) is the operator of the site, and was responsible for site access and construction management.

AECOM was the Design Engineer, and prepared the NLEP construction drawings and technical specifications. As the Design Engineer, AECOM was responsible during construction for interpreting and answering design questions, approving design modifications and addressing material submittals if they did not meet the requirements of the technical specifications.

The General Contractor for the project was Goodfellow Brothers, Inc. (GBI). GBI was responsible for all construction associated with earthwork, granular operation layer, granular fill, HDPE pipe, surface water control features, and aerator systems.

The Geosynthetics Installer was Northwest Linings & Geotextile Products, Inc. (Northwest Linings) of Kent, Washington. Northwest Linings was responsible for deploying and installing the GCL, geomembrane, cushion and filter geotextiles, and Geocell.

The Surveyor was Esaki Surveying and Mapping, Inc. (Esaki) of Lihue, Hawai'i. Esaki was responsible for staking construction limits and grades, performing surveys for

various constructed layers (such final subbase and top of operations layer), and providing final record drawings.

CQA services were provided by Geosyntec. Geosyntec's responsibilities included preparing the CQA Manual, reviewing contractor submittals, sampling and testing of materials for conformance with technical specifications, observing and testing of contractor's work, documenting conformance with technical specifications, and preparing this report confirming that construction was completed in accordance with the construction documents.

CQA laboratory testing was performed by Texas Research International/Environmental, Inc. (TRI) laboratory of Austin, Texas for geosynthetics testing, Precision Geosynthetic Laboratories (Precision) of Anaheim, California, for both interface shear strength and geotechnical soils testing, and Hirata & Associates, Inc. (Hirata) of Aiea, Hawai'i, for geotechnical soils testing. All results from the CQA laboratories were reviewed by Geosyntec as part of the CQA work.



## 2. PROJECT DESCRIPTION

### 2.1 Background

Kekaha Landfill is an approximate 98-acre Class II disposal facility owned by the County, and operated by WMH. Kekaha Landfill is located on the southwest side of the Island of Kaua'i, Hawai'i, approximately 1.3 miles northwest of the town of Kekaha. The disposal facility comprises two distinct disposal units, Phase I (roughly 33 acres) and Phase II (roughly 32 acres), a 1.9-acre leachate evaporation pond, and administration and maintenance facilities. The Phase II landfill is currently undergoing an approximate 6.3-acre lateral expansion along its western boundary. As part of the Phase II Lateral Expansion, Cell 1 Base Liner Construction, the existing leachate pond, which is located west of the Phase II landfill, will be demolished after the construction and approval of the NLEP. Separate reports will be prepared for the other components of the Phase II expansion construction.

The NLEP is approximately 2 acres (plan), and is located adjacent to and northeast of the existing Phase II landfill, directly north of green waste/recycling drop off area and administration office. The NLEP incorporates the following containment system (from bottom to top):

- prepared subbase which includes 6-inch (in) thick final subbase compacted fill;
- double composite liner system consisting of:
  - subbase 60-mil thick double-sided textured HDPE geomembrane
  - geosynthetic clay liner (GCL);
  - secondary 60-mil thick double-sided textured HDPE geomembrane;
  - geosynthetic clay liner (GCL); and
  - primary 60-mil thick double-sided textured HDPE geomembrane;
- 16 oz/yd<sup>2</sup> non-woven cushion geotextile;

- 12-in thick granular operations layer on the floor overlain by 6 oz/yd<sup>2</sup> non-woven filter geotextile overlain by 2-in thick granular protection layer; and
- Geocell system with granular fill on the sideslopes.

A new leachate discharge pipe is located at the southeast side of the NLEP to transfer leachate from the Phase II landfill into the new pond. Two aerators are provided at the two ends of the NLEP to assist the evaporation removal process.

## 2.2 Reference Documents

The following list of references includes the applicable design and construction documents related to the construction of the overall project:

- *Construction Drawings, Phase II Lateral Expansion, Cell 1 Base Liner Construction, Kekaha Sanitary Landfill, Kauai, Hawaii*, prepared by AECOM, April 2009, Revised January 2010, February 2010, March 2010, and April 2010.
- *Project Specifications and Drawings for Phase II Lateral Expansion, Cell 1 Base Liner Construction, Kekaha Sanitary Landfill, County of Kauai, HI*, prepared by AECOM, July 2009, Revised February 2010.

## 2.3 Description of Work

The NLEP construction included the following primary activities:

- surveying;
- excavating soils from the NLEP area and the existing sand stockpile;
- site grading and preparing final subbase;

- controlling storm water and erosion;
- constructing the containment system;
- installing granular drainage materials, cushion and filter geotextiles, the sideslope Geocell system; and
- installing other ancillary structures, such as the leachate discharge pipe, aerators, and control panels, which were not completed at the time of the writing of this report.

## 2.4 Design Modifications

### 2.4.1 Introduction

A few changes to the design were made during the construction of the NLEP. These changes were made either to improve the performance of the project, to simplify its construction, or to adjust for field conditions. Each change was reviewed and approved by AECOM, the Design Engineer, prior to implementation. The changes were documented either in written email correspondence (Appendix B) or in the RFI process<sup>1</sup> (Appendix D). The following subsections describe the amendments and modifications along with the reasons for each change.

### 2.4.2 Subbase Preparation (RFI #2)

Section 02330, Part 3.01C of the Project Specifications requires the subbase to be proof rolled with a minimum 20-ton roller to identify potential soft areas. The equipment available during construction included a 10-ton vibratory roller for compaction and proof rolling. This reduction in roller weight was approved conditionally by the Design Engineer in, provided the minimum compaction requirements are met and no pumping

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<sup>1</sup> The RFI process included clarifications and responses from the Design Engineer which may or may not impact the design. Therefore, the RFIs described in Section 2.4 do not necessarily include all RFIs. Additionally, changes to the design were not necessarily captured in the RFI process. Therefore, some changes may not have an associated RFI.



or soft areas are visually observed. During construction of the subbase and NLEP berms, the compaction effort was field verified to meet the project requirements and the area was visually confirmed to be firm and unyielding.

#### 2.4.3 Perimeter Berm Anchor Trench (RFI #4)

The original design for the perimeter berm anchor trench included a 4-ft by 4-ft square anchor trench, the containment system geosynthetics buried against the vertical wall and floor of the trench, a triangular wedge of soil backfilled and compacted over the geosynthetics, the Geocell system installed over the backfill wedge, and trench fully backfilled to the top of berm. The backfill was to be compacted to a minimum of 95% relative compaction (ASTM D1557). This design was modified to a V trench configuration (Drawing 11 in Appendix L) based on concerns regarding construction of vertical walls and compaction of a 1 Vertical to 1 Horizontal (1V:1H) using a sand backfill material (onsite soils).

The revised anchor trench design consists of a 4-ft deep V trench with the containment system geosynthetics extending 4 ft minimum into the trench and Geocell anchor system extending to the bottom of the trench. During a construction meeting, the length of the geosynthetics was reduced to 3.5 ft in order to maintain separation between the geosynthetics and the Geocell anchorages.

As described in AECOM's approval response to RFI #4, the anchor trench backfill compaction was also revised to be a minimum of 90% relative compaction per ASTM D1557.

#### 2.4.4 As-built Subbase Grades (RFI #8)

The as-built survey of the constructed NLEP subbase, as provided in RFI #8, showed several point locations outside the project grading tolerance. The non-compliant points, located on the berm or along the toe of slopes, ranged from 0.01 ft to 1.04 ft beyond the +/-0.1-ft vertical tolerance. The higher deviations were generally found on the exterior berm slopes, along the northern daylight of the berm against the existing topography. However, within the NLEP containment system, the non-compliant points ranged from 0.02 ft to 0.29 ft beyond the grading tolerance.

The Design Engineer reviewed and accepted the as-built subbase grades based on the intended uses of the NLEP (retention and evaporation) and the factor of safety built into the pond volume capacity.

#### 2.4.5 Hydrated GCL (RFI #12)

Following the initial GCL deployment in the NLEP on 15 March 2010, a brief rain event exposed the installed GCL to moisture, resulting in partial hydration of the deployed material. Section 02074, Part 3.02F of the Specifications requires removal of GCL which has been prematurely hydrated and replacement with new GCL. It was agreed by the Design Engineer that unacceptably hydrated GCL should be removed and replaced with new GCL. However, partially hydrated GCL may still function as designed and be acceptable if the degree hydration is minimal. As described in RFI #12, a field verification method was developed and approved by the Design Engineer to identify criteria for unacceptably hydrated GCL.

Employing this method for the GCL exposed during the 15 March rain event, several panels of secondary GCL at the far east end of the NLEP floor were found to be unacceptably hydrated, and were subsequently removed and replaced with new GCL. Following this rain event, no other installed GCL panels within the NLEP were exposed to premature hydration.

#### 2.4.6 Heat Bonding of Nonwoven Cushion Geotextile (RFI #16)

Section 02075, Parts 3.02C and 3.03A of the Project Specifications required all geotextile seams and patches to be sewn, and thermal bonding of patches to be approved by the Engineer. Approval of thermal bonding was granted in the Design Engineer's response to RFI #16 for repair patches and for the nonwoven cushion geotextile flap along the toe of slope (as shown in Detail 1 of Drawing 11 of the Construction Drawings). This flap, which wraps around the granular operations layer, was thermally bonded to the floor cushion geotextile to hold the flap in place during granular operations layer placement. Thermal bonding of the nonwoven geotextile was visually observed, and no burnouts or holes were detected.

#### 2.4.7 Granular Operations Layer

Section 02062 of the Project Specifications was revised by the Design Engineer during construction (Appendix B). The original design for the granular operations layer specified a 1.5-inch maximum particle size. The revision decreased the granular operations layer gradation to a maximum particle size of 0.75 inch. The minimum permeability of  $3 \times 10^{-1}$  cm/sec, however, remained unchanged.

#### 2.4.8 Granular Protection Layer (RFI #20)

The 2-inch thick granular protection layer within the NLEP floor is required to meet gradation and permeability requirements (Section 02062, Part 2.02). Several attempts to produce the material at the Kauai Aggregate Quarry yielded a material which met the minimum permeability of  $6 \times 10^{-3}$  cm/sec, but had a small fraction of coarse particles above the maximum allowed 3/8-inch particle size. The Design Engineer accepted this material given the passing permeability results and the lack of particle size restrictions in the site permit and the design calculations.

RFI #20 states that all testing of the granular protection layer should show 100% passing the 1/2-inch sieve, minimum 93% passing the 3/8-inch sieve, less than 5% passing the #200 sieve, and acceptable interface direct shear results. The minimum permeability requirement of  $6 \times 10^{-3}$  cm/sec remained unchanged. These requirements were met during conformance testing of the granular protection layer (Appendix F-3).

#### 2.4.9 Batten Strip for Aerator Support Pad

Detail 3 of Drawing 13 indicated a 3/8-inch by 2-inch stainless steel flatbar batten strip be used in the anchor of the 6 oz/sy nonwoven separator geotextile to the leachate aerator support pad. Due to material availability, a 1/4-inch by 3-inch stainless steel flatbar was used instead (RFI #21, Appendix B).

### 3. CONSTRUCTION QUALITY ASSURANCE (CQA) PROGRAM

#### 3.1 Scope

##### 3.1.1 Introduction

Geosyntec's scope of work for the construction of the NLEP included the following:

- construction quality assurance; and
- preparation of this report.

These activities are described in Sections 3.1.2 through 3.1.4.

##### 3.1.2 Construction Quality Assurance

Geosyntec's primary role during construction of NLEP was as the CQA Consultant. The services performed were consistent with the CQA Manual [Geosyntec, 2010] and included:

- visually classifying, collecting samples of, and evaluating test results for all borrow soils to assure suitability for construction;
- monitoring compaction and final fine grading for subbase preparation;
- coordinating with the geosynthetics laboratory to collect all necessary geosynthetic conformance samples (either at the manufacturing plant or in the field);
- inspecting delivered geomembrane, GCL, geotextiles, and Geocell prior to deployment;
- reviewing conformance test results of geomembrane and GCL prior to deployment;



- monitoring and documenting deployment of GCL panels;
- monitoring geomembrane trial welding prior to deployment;
- monitoring and documenting deployment, welding, and repair of geomembrane panels;
- monitoring non-destructive testing of geomembrane seams;
- collecting destructive geomembrane seam samples for third-party testing and reviewing results for conformance with the specifications;
- monitoring and documenting deployment of Geocell panels;
- monitoring and documenting deployment of geotextile panels;
- collecting samples of and evaluating test results for granular drainage materials for conformance;
- monitoring placement of granular drainage materials;
- visually classifying, collecting samples of, and evaluating test results for granular operation layer and granular protection layer soils to verify specified properties;
- monitoring placement of granular operation layer and granular protection layer soils; and
- documenting construction activities.

### 3.1.3 Report Preparation

Included in this CQA report is a discussion of the findings and observations of Geosyntec's on-site CQA personnel and off-site laboratories for the tasks summarized in Section 3.1.2. Documentation of the construction activities, as well as third-party

laboratory and field testing associated with the construction, were completed by Geosyntec. This documentation is presented as appendices to this report.

Red-lined drawings, also provided in this report, present the design of the NLEP as revised during construction. As-built record drawings showing the survey elevations of the various layers were provided by the surveyor Esaki. Northwest Linings produced record drawings of the geomembrane panel placement for each of the subbase, secondary, and primary layers. All record drawings are included in Appendix N.

### 3.2 Personnel

#### 3.2.1 Project Technical Personnel

The key technical personnel involved in the construction of the NLEP are listed below:

##### County of Kaua'i (Owner)

Donald M. Fujimoto - Project Manager

Troy Tanigawa - Engineer

##### AECOM (Design Engineer)

Kenneth J. Bergschultz, P.E. - Design Engineer of Record

Jeffery Impens - Project Manager

##### Waste Management of Hawai'i, Inc. (Operator/Construction Manager)

Rick T. Von Pein, P.E. - Project Manager

Jeff Kaohi- Project Sponsor/Site Manager

Jesse Frey - Contract Administrator

Goodfellow Brothers, Inc. (General Contractor)

Keith Suga - Regional Manager/Project Manager

Jeff Griffin - Regional Manager

Jeff Orsatelli - Site Foreman

Northwest Linings & Geotextile Products, Inc. (Geosynthetics Installer)

Kirk Lilleskare - Project Manager

Joel Mondragon - Site Superintendent

Esaki Surveying & Mapping, Inc. (Surveyor)

Dennis M. Esaki - Surveyor-of-Record

Geosyntec Consultants, Inc. (CQA Consultant)

Hari D. Sharma, Ph.D., P.E. - CQA Officer

Michael J. Minch - Senior Project Engineer

Kim Huynh - Assistant Project Engineer

Chris Scott - Field Manager

Texas Research International/Environmental, Inc. (Geotechnical and Geosynthetics Laboratory Testing)

John Allen – Director of Geosynthetics Interaction Laboratory

Precision Geosynthetics Laboratories (Geotechnical and Geosynthetics Laboratory Testing)

Cora Queja – Vice President

Hirata & Associates, Inc. (Geotechnical Testing)

David M. Kitamura – Vice President

3.2.2 On-Site CQA Monitoring Personnel Schedules

Construction work was monitored by Geosyntec personnel on an as-needed basis. Monitoring was coordinated with WMH, GBI, and Northwest Linings staff to ensure that construction was monitored in accordance with the CQA Manual [Geosyntec, 2010]. Geosyntec personnel were on site, generally full time, during construction according to the following schedule:

- Chris Scott 12 January – 21 May 2010
- Kim Huynh 22-27 March 2010

When full time monitoring was not required (e.g., mobilization and site cleanup), Geosyntec personnel were not onsite but remained in communication with WMH, GBI, and Northwest Linings to verify when onsite monitoring would again be necessary.

## **4. EARTHWORK QUALITY ASSURANCE**

### **4.1 Soil Excavation**

Geosyntec CQA personnel monitored the excavation of soils as described in Section 2.3. The contractor excavated the soil with an excavator and hauled it to the NLEP for compacted fill placement. Approximately 13,800 cubic yards (yd<sup>3</sup>) of soil were excavated during the NLEP construction.

### **4.2 Subbase Preparation and Compacted Fill Placement**

Geosyntec personnel monitored the preparation of the subbase and placement of compacted fill as needed to bring the elevations to the lines and grades shown on the construction drawings [AECOM, 2009a]. The CQA activities performed during these phases of construction included:

- observing the placement and compaction procedures for compacted fills;
- in-situ moisture/density testing (ASTM D6938, and D2937) of the compacted fills;
- on-site and off-site laboratory testing of the compacted fills including oven moisture content (ASTM D2216) for moisture corrections and modified Proctor compaction tests (ASTM D1557) for density evaluation; and
- monitoring the final subbase compacted fill preparation.

Approximately 5,000 yd<sup>3</sup> of compacted fill (onsite soils) and final subbase compacted fill were placed in conformance with Section 02330 of the technical specifications. The compacted fill (onsite soils) and final subbase compacted fill were placed in a manner such that the maximum compacted lift thickness was approximately 6 inches upon the



completion of compactive effort. The fills were compacted to a minimum relative compaction of 95% as determined by ASTM D1557.

Areas that did not meet the required minimum dry density were reworked as necessary until field testing indicated that the areas met the specification. Daily field reports describing the construction and CQA activities were completed and are presented in Appendix E. Laboratory conformance test results are presented in Appendix F-1. The results of fill in-situ moisture/density tests are included in Appendix G-1.

The subbase surface upon which geosynthetics were placed was prepared by GBI in accordance with Sections 02330 and 02072 of the project specifications. GBI removed surface irregularities, rounded corners and any surface desiccation cracking as required. After certification of the grades by the surveyor Esaki and Northwest Linings, Geosyntec inspected the surface of each completed area. Record of the approval of the subgrade surface is included in the subgrade acceptance forms in Appendix I-1.

### **4.3 Granular Operations Layer**

Off-site soils were imported from the Kauai Aggregate Quarry to construct the granular operations layer on the NLEP floor. Approximately 2,000 yd<sup>3</sup> of granular operations layer material were placed.

One conformance samples of the ¾-in granular operations layer material was collected and tested in the laboratory for grain-size distribution (ASTM D422) and hydraulic conductivity (ASTM D2434), representing a test frequency of one test per 2,000 yd<sup>3</sup>. The project specifications [AECOM, 2009b] and CQA Manual [Geosyntec, 2010] required at least one sieve analysis and one permeability test per 3,000 yd<sup>3</sup>. Results of the tests indicate that the material conform to Section 02062 of the project specifications. Results of the granular operations layer material laboratory testing are presented in Appendix F-2.

Geosyntec observed that the granular operations layer material was placed in accordance with the requirements of the construction drawings and specifications. The

thickness of the granular operations layer was certified by Esaki in the record drawings presented in Appendix M.

#### 4.4 Granular Protection Layer

Off-site soils were imported from the Kauai Aggregate Quarry to construct the 2-in thick granular protection layer over the NLEP floor. Approximately 490 yd<sup>3</sup> of material were placed.

Geosyntec obtained one sample of the granular protection layer soil for conformance testing in accordance with the CQA Manual, representing a testing frequency of one test per 490 yd<sup>3</sup>. The CQA Manual required at least one test per 3,000 yd<sup>3</sup>. Results of the tests indicate that this material conforms with Section 02062 of the project specifications and AECOM's guidance (response to RFI #20). Results of the granular protection layer laboratory testing are presented in Appendix F-3.

Geosyntec observed that the granular protection layer material was placed in accordance with the construction drawings and in a manner that did not damage the underlying geosynthetic layers<sup>2</sup>.

#### 4.5 Granular Fill Material

Off-site soils were imported from the Kauai Aggregate Quarry to construct the 3-in minus granular fill within the NLEP sideslope Geocell system. Approximately 800 yd<sup>3</sup> of material were placed.

Geosyntec obtained one sample of the granular fill material for conformance testing in accordance with the CQA Manual, representing a testing frequency was one test per

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<sup>2</sup> In accordance with the Design Engineer's response to RFI #14, a test pad was constructed within the NLEP floor to evaluate the placement method. Placement of the granular operations layer above the 6 oz/sy nonwoven separator geotextile was performed in a limited area using a rubber-tire track drive skid steer. The separator geotextile below the test pad was exposed after placement, and no apparent damage was observed.

800 yd<sup>3</sup>. The CQA Manual required at least one test per 3,000 yd<sup>3</sup>. Results of the tests indicate that this material conforms with Section 02062 of the project specifications. Results of the granular fill laboratory testing are presented in Appendix F-4.

#### **4.6 Aerator Support Pad Concrete**

A Portland cement concrete mix was provided by O. Thronas Inc. for the construction of the two NLEP aerator support pads, designated as 3A and 3C on the design drawings. Hirata assisted in performing the field slump cone tests and collected cylinder samples from each aerator pad location. Results of the tests indicate that this material conforms with Detail I, Note 1D of Drawing 13 of the Construction Drawings. Results of the concrete field and laboratory testing are presented in Appendix F-5.

## **5. GEOSYNTHETIC CLAY LINER (GCL) QUALITY ASSURANCE**

### **5.1 Introduction**

Geosyntec monitored the deployment and installation of the GCL for the NLEP. CQA activities included:

- GCL conformance testing; and
- monitoring site storage, deployment, and seaming operations.

These activities are summarized in the following sections.

### **5.2 Manufacturer's Certifications**

CETCO-manufactured Bentomat FLW scrim-reinforced GCL was used during the construction of the NLEP containment system. CETCO produced 239 rolls of GCL for the entire Kekaha Phase II Lateral Expansion, Cell 1 construction project. The total installed GCL area within the NLEP was approximately 177,770 ft<sup>2</sup>. A sample of this material is provided in Appendix N.

CETCO provided manufacturer quality control (MQC) certifications for all rolls of GCL and also for the bentonite clay and geotextile used to produce the GCL. This documentation was reviewed by Geosyntec, and all test results provided for the materials were found to comply with the requirements in Section 02074 of the technical specifications. The GCL MQC certificates are included in Appendix K.

### **5.3 Conformance Sampling and Testing**

GCL conformance samples for the 239 rolls were collected at the manufacturer's plant by a representative from TRI. A total of six samples were collected and tested from the

239 rolls of GCL. This represents a test frequency of approximately one test per 89,625 ft<sup>2</sup> of GCL produced which meets the minimum frequency of one sample per 100,000 ft<sup>2</sup>, as required by the CQA Manual.

Geosyntec reviewed the conformance test results and compared them to the technical specifications. All conformance test results were found to meet Section 02074 of the technical specifications. The laboratory test results are presented in Appendix H-1.

In addition to material conformance, third-party laboratory testing was performed for the interface shear strength between the GCL and the 60 mil textured geomembrane. To represent actual field conditions, the higher asperity side, or "glossy" side, of the Microspike geomembrane was tested against the non-scrim side (white side) of the GCL, and the lower asperity side, or "matte" side, of the Microspike geomembrane was tested against the scrim (dark side) of the GCL. As required by the specifications, one test for each of the two interfaces was performed. All interface test results (Appendix H-3) met the minimum requirements of Section 02072 of the project specifications.

## **5.4 Monitoring of Operations**

### **5.4.1 Delivery and On-Site Storage**

Delivery of the GCL was observed by Geosyntec to verify that proper handling and storage procedures were used and on-site storage procedures provided for protection from ultraviolet light exposure, precipitation, mud, dirt, dust, and other conditions that could damage the material. Geosyntec observed that protective wrapping was maintained on the GCL rolls until placement operations began. Prior to deployment, all rolls were carefully checked and marked for repair, if necessary.

### **5.4.2 Deployment**

GCL rolls were visually checked for the following:

- manufacturing defects;



- evidence of damage, which may have occurred during shipping, storage, or handling; and
- damage caused during installation activities (e.g., as a consequence of placement or weather).

Geosyntec monitored the deployment of the GCL to verify that field deployment was consistent with the interface test conditions (e.g., Microspike “glossy” side against GCL white side), and that measures were taken to avoid the entrapment of stones, dust, or other objects in the GCL that could damage the material.

#### 5.4.3 Seams and Overlaps

GCL seaming and overlapping operations were monitored by Geosyntec personnel. Seams and overlaps were formed in accordance with Section 02074 of the project specifications and with the Design Engineer’s recommendations (23 December 2009 email correspondence, Appendix B). GCL was overlapped at a minimum of 6 in along the length (i.e., sides) and 12 in along the width (i.e., ends). Supplemental granular bentonite was placed within the width overlaps, and the “super groove” factory seam was provided along the length overlaps.

#### 5.4.4 Repairs

Defects or damaged areas detected by visual observation were repaired by Northwest Linings, and monitored by Geosyntec in accordance with Section 02074 of the Project Specifications and with the Design Engineer’s recommendations (AECOM response to RFI #16, Appendix B).

## 6. GEOMEMBRANE QUALITY ASSURANCE

### 6.1 Introduction

Geosyntec monitored installation of the 60-mil double-sided textured geomembrane liner for the NLEP. CQA activities included:

- geomembrane conformance testing;
- monitoring site storage, deployment, and seaming operations;
- monitoring the nondestructive seam test procedures;
- selecting locations for destructive geomembrane seam testing;
- coordinating laboratory testing of destructive samples; and
- monitoring geomembrane repairs.

These activities are summarized in the following sections.

### 6.2 Manufacturer's Certifications

Agru America (Agru) HDPE Microspike geomembrane was used during the construction of the NLEP. Agru provided 104 rolls of 60-mil double-sided textured HDPE Microspike geomembrane for the entire Kekaha Phase II Lateral Expansion, Cell 1 construction project. The total installed geomembrane area within the NLEP was approximately 266,660 ft<sup>2</sup>. A sample of the Microspike geomembrane is provided in Appendix N.

Agru provided MQC certifications for the 104 rolls of Microspike geomembrane and for the resin used to produce the geomembrane. This documentation was reviewed by

Geosyntec and the test results provided for the materials were found to comply with the requirements in Section 02072 of the technical specifications. MQC documentation for the Agru-manufactured materials were reviewed and approved. The geomembrane MQC certificates are included in Appendix K.

### 6.3 Conformance Sampling and Testing

Geomembrane conformance samples for the Agru-manufactured rolls were collected at the manufacturer's plant by a representative from TRI. A total of ten samples were collected and tested from the 104 rolls of geomembrane. This represents a test frequency of approximately one test per 98,072 ft<sup>2</sup> of geomembrane produced, which meets the minimum frequency of one sample per 100,000 ft<sup>2</sup> and one sample per lot as required by the CQA Manual.

Geosyntec reviewed the conformance test results and compared them to the project specifications. The conformance test results were found to meet Section 02072 of the project specifications. The laboratory test results are presented in Appendix H-2.

In addition to material conformance, Precision Laboratory tested the interface shear strength between the textured geomembrane and the GCL and between the textured geomembrane and the subbase soil. To represent actual field conditions, the following interfaces were tested:

- Microspike geomembrane higher asperity side ("glossy" side) versus GCL non-scrim side (white side);
- Microspike geomembrane lower asperity side ("matte" side) versus GCL scrim (dark side); and
- Microspike geomembrane lower asperity side ("matte" side) versus subbase soil.

As required by the specifications, one test for each of the three interfaces was performed. All interface test results (Appendix H-3) met the minimum requirements of Section 02072 of the project specifications.

## 6.4 Monitoring of Operations

### 6.4.1 Delivery and On-Site Storage

Delivery of geomembrane was observed by Geosyntec to verify that proper handling and storage procedures were followed and that on-site storage procedures provided protection from mud, dirt, dust, and other conditions that could damage the material. All rolls were carefully checked and, if required, marked for repair prior to deployment.

### 6.4.2 Deployment

The general installation procedure consisted of placing 60 mil double-sided textured HDPE geomembrane panels over the subbase or GCL and welding adjacent panels together.

Geosyntec monitored the deployment of each panel of geomembrane and marked visible defects/damage for repair. Geomembrane panels and/or rolls were visually checked for the following:

- manufacturing defects;
- evidence of damage, which may have occurred during shipping, storage, or handling; and
- damage caused during installation activities (e.g., as a consequence of placement or seaming operations).

Damaged materials were either discarded or repaired. Geosyntec identified the repair locations and monitored the repair activities. Whenever possible, the cause(s) of the damage was ascertained and addressed.

### 6.4.3 Trial Seams

Geomembrane trial seams were prepared daily prior to seaming operations by each operator, for each piece of seaming equipment, and for each field weld combination

(i.e., smooth to smooth, smooth to textured, and textured to textured<sup>3</sup>) to be used. Additional trial seams were prepared for each piece of seaming equipment and each field weld combination every five hours during seaming operations. The trial seams were constructed in conformance with the project specifications and the procedures were observed by Geosyntec.

For the trial seam test program, six test coupons, measuring 1 in. wide by 6 in. long, were cut from the trial seam samples. Each test coupon was tested by the Geosynthetics Installer, under Geosyntec's observation, using a calibrated tensiometer. Three of the test coupons were tested in peel and the other three coupons were tested in shear. If any of the trial seam test coupons failed any of the tests (passing criteria for trial seams are specified in Section 02072 of the technical specifications), the seaming equipment was adjusted, a new trial seam was fabricated, and the test procedure was repeated.

Once a trial seam passed the tests described above, the technician proceeded with production seaming operations. A total of 40 trial seam samples were fabricated using fusion welders and 10 trial seam samples were fabricated using extrusion welders during the geomembrane liner installation. The trial seam logs are presented in Appendix I-2.

#### 6.4.4 Seaming Operations

Geomembrane seaming operations were monitored and documented by Geosyntec personnel. Seaming documentation included the date, time, seam and panel numbers, technician, and machine number. This information was recorded on Production Seaming Logs presented in Appendix I-3. In addition, geomembrane seams were visually examined for workmanship and continuity. Any portion of a seam found to be out of compliance with Section 02072 of the Project Specifications was marked by CQA personnel and subsequently repaired by Northwest Linings.

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<sup>3</sup> The Agri manufactures double-sided textured Microspike geomembrane with texturing throughout the body of the geomembrane sheet except the final 6 inches along the length edge. The smooth edges are provided for ease of welding, and constitute the smooth component of the trial welds.



#### 6.4.5 Repairs

Northwest Linings repaired defects or damaged areas detected by visual observation, as well as non-destructive and destructive testing locations using extrusion or fusion welders to construct a patch or a cap strip, as appropriate. Repairs were performed in accordance with technical specifications (Section 02072) and generally followed the procedures described below.

- Welding equipment used in the repair procedures had trial seams approved prior to use.
- Geomembrane surfaces were clean and dry at the time of the repair.
- Geomembrane surfaces were abraded no more than 15 minutes prior to the repair.
- Patches or caps extended at least 6 in. beyond the edge of the defect and the corners were rounded.
- Repairs were non-destructively tested.

Geosyntec personnel monitored the geomembrane repair work and documentation of the repairs is provided in the daily field reports (Appendix E). Repair locations are documented in Appendix I-4.

#### 6.5 Non-Destructive Seam Testing

The geomembrane seams were non-destructively tested by Northwest Linings for continuity using air pressure test or vacuum test procedures. Double-track fusion seams were air pressure tested. The vacuum test method was used for seams constructed with extrusion welds. Failed air pressure test seams were repaired in accordance with Section 02072 of the project specifications. Extrusion welded seams failing vacuum testing were repaired and re-tested. Northwest Linings conducted the non-destructive testing under the observation of Geosyntec.

Whenever non-destructive testing indicated that geomembrane seam repairs were necessary, the repairs were made and tested in accordance with Section 02072 of the project specifications. Geosyntec observed these procedures giving special attention to critical locations such as grade breaks. The non-destructive seam test results are presented in Appendix I-3 and I-4.

## 6.6 Destructive Seam Testing

### 6.6.1 Introduction

Northwest Linings performed destructive seam testing of the geomembrane seams in the field and Geosyntec observed the testing. Independent off-site laboratory testing was performed by Precision. Geosyntec field personnel chose the seam sample locations for destructive testing and the samples were removed by Northwest Linings.

### 6.6.2 Sampling Procedure

At the locations selected by Geosyntec, test samples measuring approximately 12-in wide by 44-in long (along the seam) were removed by Northwest Linings for testing. Each test sample was then divided into segments and distributed as follows:

- several 1-in wide strips were collected from either end of the sample for initial field testing prior to shipping the CQA portion to the third-party laboratory;
- an approximately 12-in long sample for the Geosynthetic Installer's CQC technician to test in the field;
- an approximately 12-in long sample for the County archives; and
- an approximately 18-in long sample for off-site testing at the Precision laboratory.

The field testing was performed on site with a calibrated tensiometer for peel and shear strength by Northwest Linings, and Geosyntec personnel observed the testing. The field

destructive test results are summarized in Appendix I-5. Sampled areas were repaired as described in Section 6.4.5 of this report.

### 6.6.3 Laboratory Testing

Independent laboratory testing of seam samples was performed in accordance with the technical specifications. Ten 1-in. wide test coupons were removed with a punch press from each of the destructive seam samples. Each of the ten specimens was then tested per ASTM D6392 with a tensile-testing machine, five in peel and five in shear.

Per the project specifications, for a seam to be accepted, four out of five specimens had to achieve the minimum strength and five out of five had to be a film-tear-bond (FTB).

### 6.6.4 Destructive Test Results

A total of 38 samples for destructive testing were identified, removed and tested as described above to verify the integrity of the production seams. Any failing laboratory tests were bracketed with two additional passing destructive samples per the specifications. Defective areas were repaired in accordance with the specifications. Results of the laboratory destructive testing program are presented in Appendix J.

## 7. GEOTEXTILE QUALITY ASSURANCE

### 7.1 Introduction

Geosyntec monitored the deployment and installation of the geotextile used as filter/separation and cushion layers in the NLEP. CQA activities included:

- review of MQC data; and
- monitoring of site storage, deployment, and seaming operations.

Per Section 02075 of the specifications, third party conformance testing of the geotextiles was not required for this project.

### 7.2 Manufacturer's Certifications

TNS Advanced Technologies (TNS) manufactured non-woven needle-punched 16 oz/sy geotextile used to construct the cushion layer above the NLEP primary geomembrane. TNS provided 124 rolls of TNS E160 16 oz/yd<sup>2</sup> non-woven geotextile for the entire Kekaha Phase II Lateral Expansion, Cell 1 construction project. The total installed 16 oz/yd<sup>2</sup> geotextile area within the NLEP was approximately 88,887 ft<sup>2</sup>. A sample of the 16 oz/yd<sup>2</sup> geotextile is provided in Appendix N.

TNS also manufactured the non-woven needle-punched 6 oz/sy geotextile used to construct the separator layer above the NLEP granular operations layer. TNS provided 84 rolls of TNS E060 6 oz/yd<sup>2</sup> non-woven geotextile for the entire Kekaha Phase II Lateral Expansion, Cell 1 construction project. The total installed 6 oz/yd<sup>2</sup> geotextile area within the NLEP was approximately 56,750 ft<sup>2</sup>. A sample of the 6 oz/yd<sup>2</sup> geotextile is provided in Appendix N.

TNS provided MQC certifications for the geotextile rolls supplied. This documentation was reviewed by Geosyntec and the test results provided for the materials were found to

comply with the requirements in Section 02075 of the project specifications. The geotextile MQC certificates are included in Appendix K.

### 7.3 Monitoring of Operations

#### 7.3.1 Delivery and On-Site Storage

Deliveries of geotextiles were observed by Geosyntec to verify that proper handling and storage procedures were used and that on-site storage procedures provided for protection from ultraviolet light exposure, mud, dirt, dust, and other conditions that could damage the material. Geosyntec observed that protective wrapping was maintained on the geotextile rolls until placement operations began.

#### 7.3.2 Deployment

Geotextile rolls were visually checked for the following:

- manufacturing defects;
- evidence of damage, which may have occurred during shipping, storage, or handling; and
- damage caused during installation activities.

Damaged materials were either repaired (where possible) or removed and discarded. Geosyntec monitored the deployment of the geotextile to verify that under windy conditions the geotextile was weighed down with sandbags, and that measures were taken to avoid the entrapment of any objects and excessive ultraviolet exposure which could damage the geotextile.

#### 7.3.3 Seaming Operations

Geotextile seaming and overlapping operations were monitored by Geosyntec personnel. Seams and overlaps were formed in accordance with Section 02075 of the Project Specifications:



Geosyntec personnel visually checked geotextile connections to identify inadequate areas and brought them to the attention of Northwest Linings for repair. Holes and tears were similarly identified and damaged sections were cut out and patches were placed in accordance with the technical specifications.

## 8. SUMMARY AND CONCLUSIONS

The construction of New Leachate Evaporation Pond at the Kekaha Sanitary Landfill in Kaua'i, Hawai'i, occurred during the period of 28 December 2009 through 21 May 2010. Geosyntec provided qualified CQA personnel on site to monitor the construction activities as required by the CQA Manual. All significant construction of the leachate pond containment system was completed by the Contractor and accepted by the Owner prior to issuance of this report. Work on ancillary structures, such as HDPE piping, the aerator systems, electrical panels, etc., are anticipated to continue through early June 2010.

During construction, Geosyntec verified that the project was constructed in accordance with the contract documents, including the approved construction drawings and project specifications as revised by the Design Engineer during construction, and the CQA Manual. Geosyntec also verified that conditions or materials identified as non-conforming to the project specifications were rejected, resolved, or repaired and retested as described in this report.

## 9. CERTIFICATION

Based on the observations of Geosyntec Consultants, Inc. during construction, as well as on the data presented in the appendices of this report, the New Leachate Evaporation Pond containment system at the Kekaha Sanitary Landfill in Kaua'i, Hawai'i, was constructed in accordance with the project specifications and construction drawings with revisions as stated in this report.



*Hari D. Sharma*

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Hari D. Sharma, Ph.D., P.E.  
10694  
CQA Officer

## 10. REFERENCES

AECOM [2009a] “*Construction Drawings, Phase II Lateral Expansion, Cell 1 Base Liner Construction, Kekaha Sanitary Landfill, Kauai, Hawaii*,” April, Revised January 2010, February 2010, March 2010, April 2010.

AECOM [2009b] “*Project Specifications and Drawings for Phase II Lateral Expansion, Cell 1 Base Liner Construction, Kekaha Sanitary Landfill, County of Kauai, HI*,” July, Revised February 2010.

Geosyntec Consultants, Inc. [2010] “*Construction Quality Assurance (CQA) Manual, Phase II Lateral Expansion, Cell 1 Base Liner Construction, Kekaha Sanitary Landfill, Kekaha, Hawaii*,” 6 February, Revision 1 12 April 2010.

## 11. LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice, which existed in Hawai'i at the time this report was submitted to the County of Kaua'i. Geosyntec Consultants, Inc. has prepared this report for the exclusive use by the County of Kaua'i. No other representations, expressed or implied, and no warranty or guarantee is included or intended. No other party is authorized to use this report, unless granted permission in writing by Geosyntec Consultants, Inc.





**Appendix A**  
**Photographic Documentation**



Photo 1. Clearing and grubbing the new leachate evaporation pond (NLEP) area (looking east)



Photo 2. A Hitachi 450 LC excavator is used to excavate the NLEP area to design grades



Photo 3. The excavated material is placed as compacted fill (onsite soils) to construct the NLEP berms and graded to uniform 8-inch loose lifts using a Caterpillar D6 LGP dozer



Photo 4. A water truck provides moisture conditioning during compacted fill placement (looking west)





Photo 5. NLEP subbase is compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor (looking west)



Photo 6. Field density tests using a portable nuclear density gauge to verify compaction effort





Photo 7. Collecting thin-wall Shelby tube samples for moisture-density determination by the drive cylinder method



Photo 8. Grading and compacting the NLEP perimeter berm (looking west)





Photo 9. Grading the exterior slopes of the perimeter berms using a Hitachi 450 LC excavator (looking south)



Photo 10. Fine grading the floor and sideslope subbase using a Caterpillar 140H motor grader with GPS grade control (looking north)





Photo 11. Trimmings from fine grading are loaded into an articulated haul truck and hauled to Cell 1 for use as compacted fill (onsite soils) (looking north)



Photo 12. An Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor rolls the subbase to maintain a suitable subbase surface (looking south)





Photo 13. Fine grading the floor subbase using a Caterpillar 140H motor grader with GPS grade control (looking east)



Photo 14. Constructing the perimeter anchor trench using a Hitachi BH278 excavator (looking west)





Photo 15. Constructing the perimeter anchor trench along the south berm (looking west)



Photo 16. Perimeter anchor trench along the east berm (looking north)





Photo 17. Conducting field density tests of the final subbase compacted fill lift to verify compaction effort (looking east)



Photo 18. Temporary ramp (later removed) through west berm is left to allow import of granular drainage materials into NLEP





Photo 19. NLEP finished subbase with temporary west ramp left in place (looking west)



Photo 20. GCL rolls stockpiled on pallets near the administrative office area





Photo 21. Unloading and stockpiling 16 oz/sy nonwoven geotextile rolls near the administrative office area



Photo 22. Unloading Agru 60 mil double-sided textured HDPE Microspike geomembrane rolls





Photo 23. Complete geosynthetic inventory stockpiled adjacent to the administrative office area



Photo 24. Deploying subbase 60 mil double-sided textured (DST) HDPE geomembrane over the prepared subbase (looking south)





Photo 25. Trial welds are prepared at the start of the day and at midday for each welding apparatus and material combination used that day (extrusion welding textured-to-textured 60 mil HDPE geomembrane shown above)



Photo 26. Preparing a double-fusion trial weld of textured-to-textured 60 mil HDPE geomembrane





Photo 27. Coupons cut from the trial welds are tested (peel and shear) using a field tensiometer



Photo 28. DemTech's Pro-Tester T-0100 tensiometer is used to field test the peel and shear of the trial welds



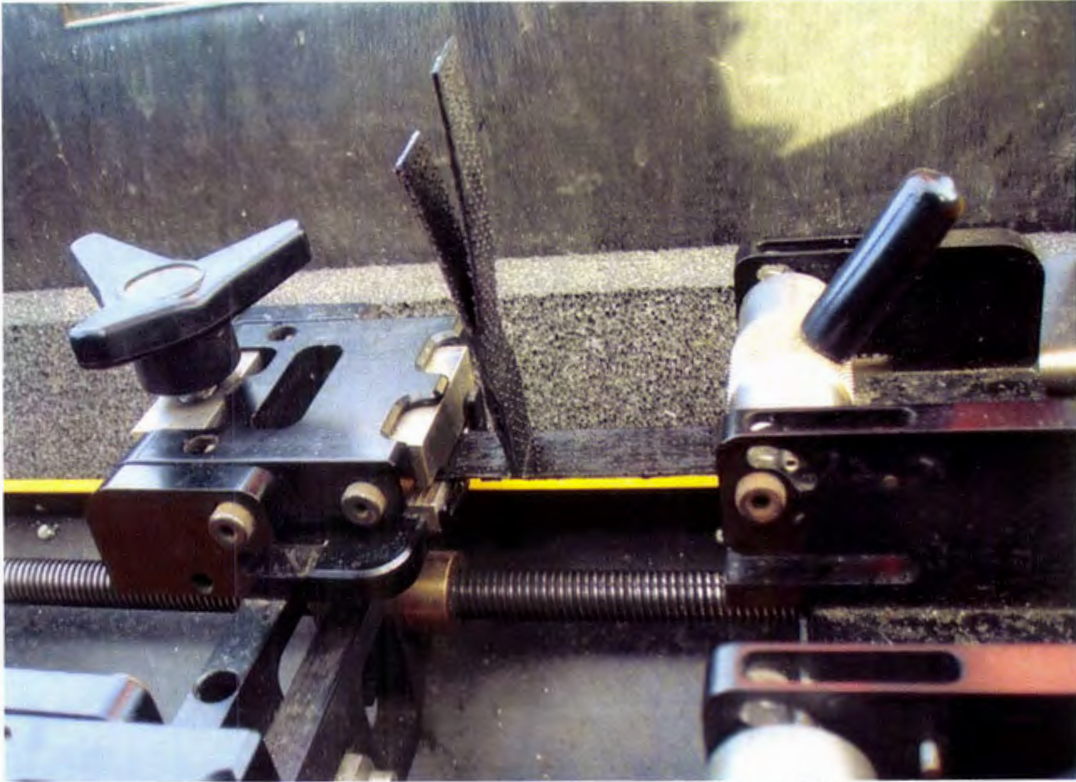


Photo 29. Textured-to-textured double-fusion trial weld field tested for peel strength

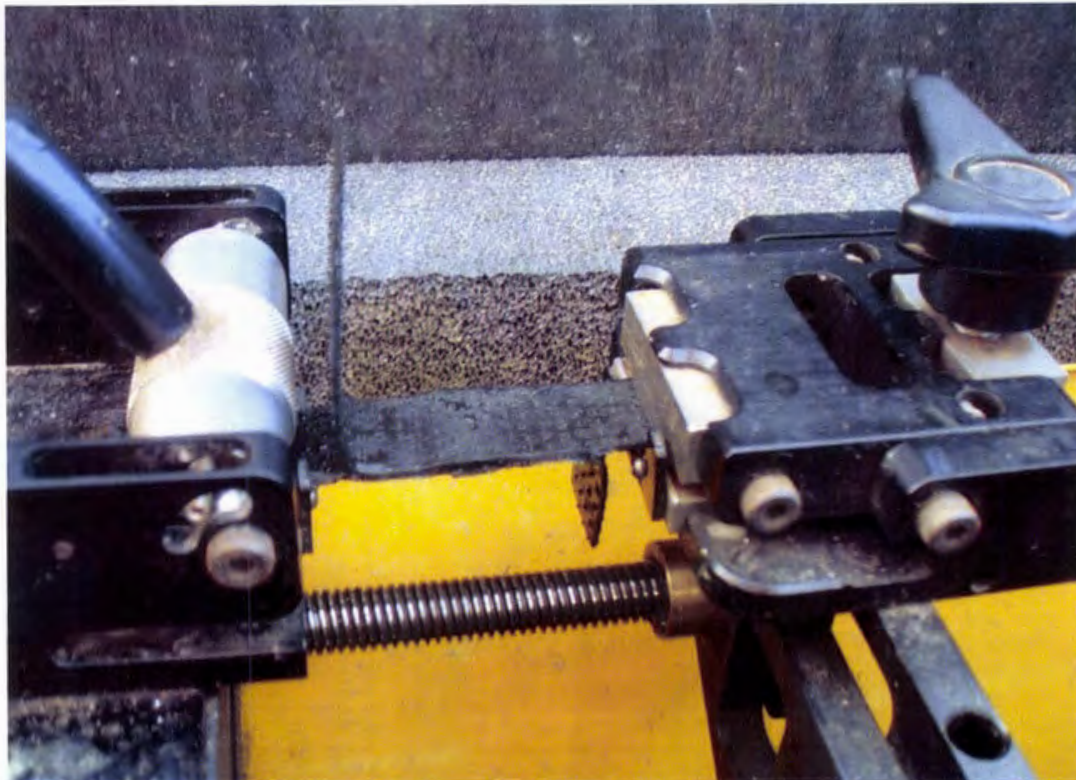


Photo 30. Textured-to-textured double-fusion trial weld field tested for shear strength



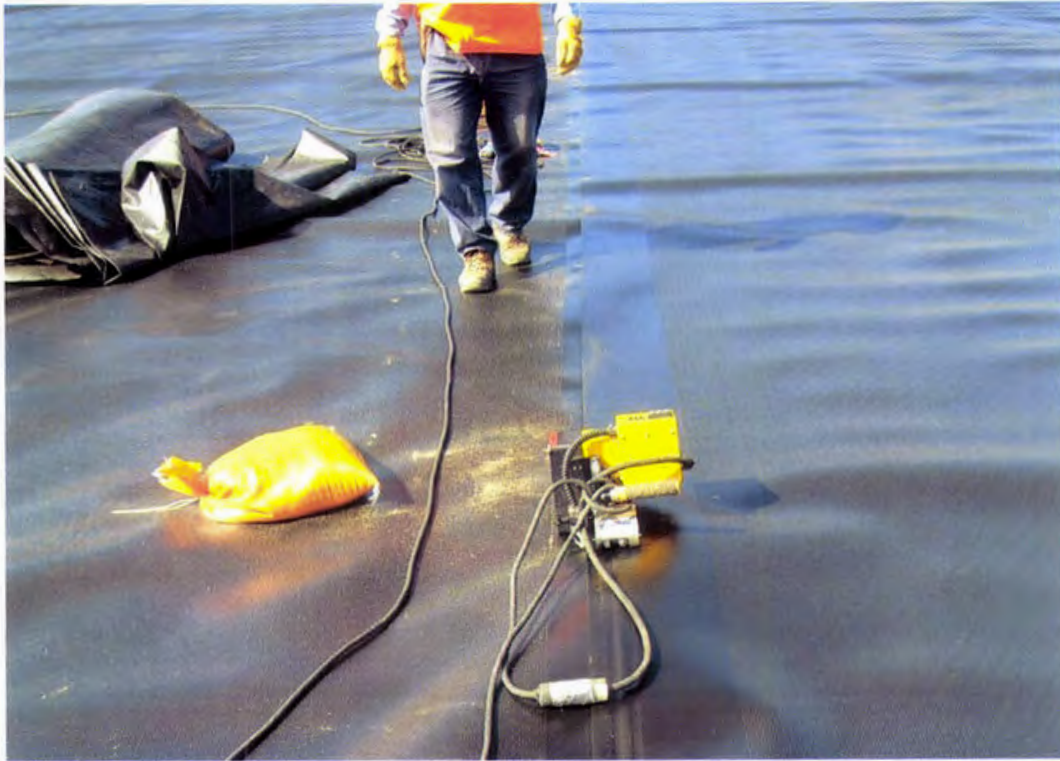


Photo 31. Production seaming subbase 60 mil HDPE geomembrane using a double-fusion wedge welder



Photo 32. Non-destructive air pressure testing of double-fusion welded production seams



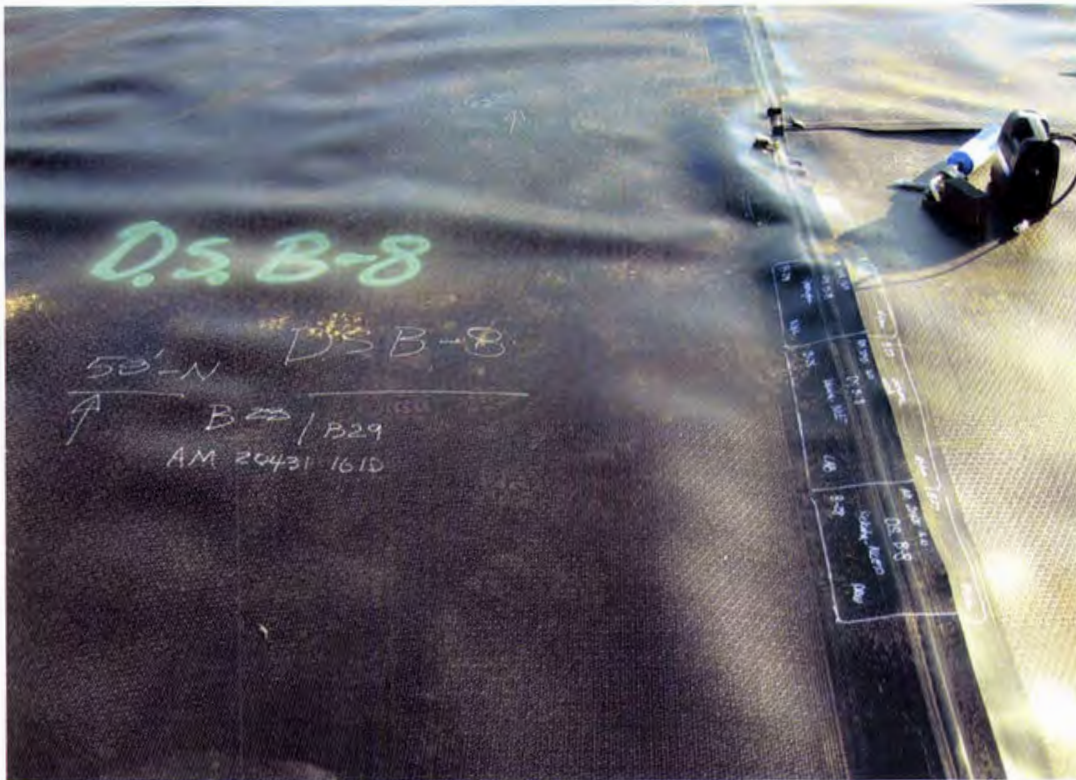


Photo 33. Destructive seam sample location marked within production seam

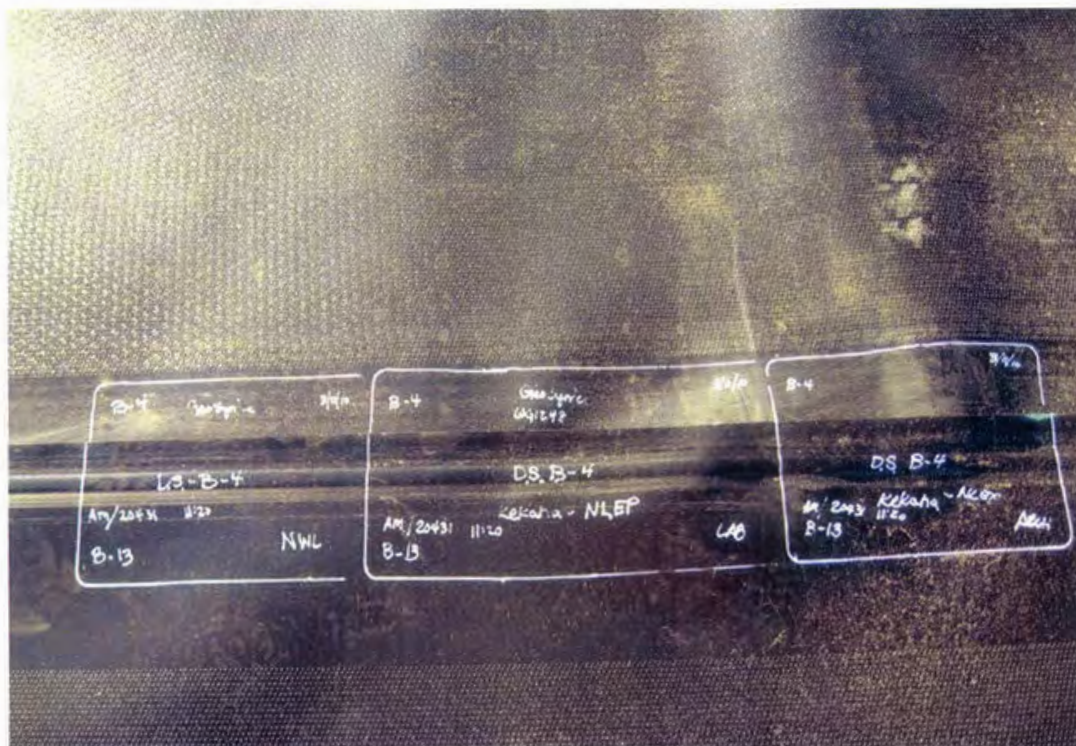


Photo 34. Each destructive seam sample consists of three parts: one part for the Contractor, one part for CQA conformance testing, and one part for the Owner's archive





Photo 35. A repair patch is constructed over the destructive seam sample location once the sample is removed; the repair patch is ground along the edges in preparation for an extrusion weld



Photo 36. Extrusion welding a destruct repair patch within the subbase 60 mil HDPE geomembrane





Photo 37. Non-destructive vacuum box testing the extrusion seam of a repair patch

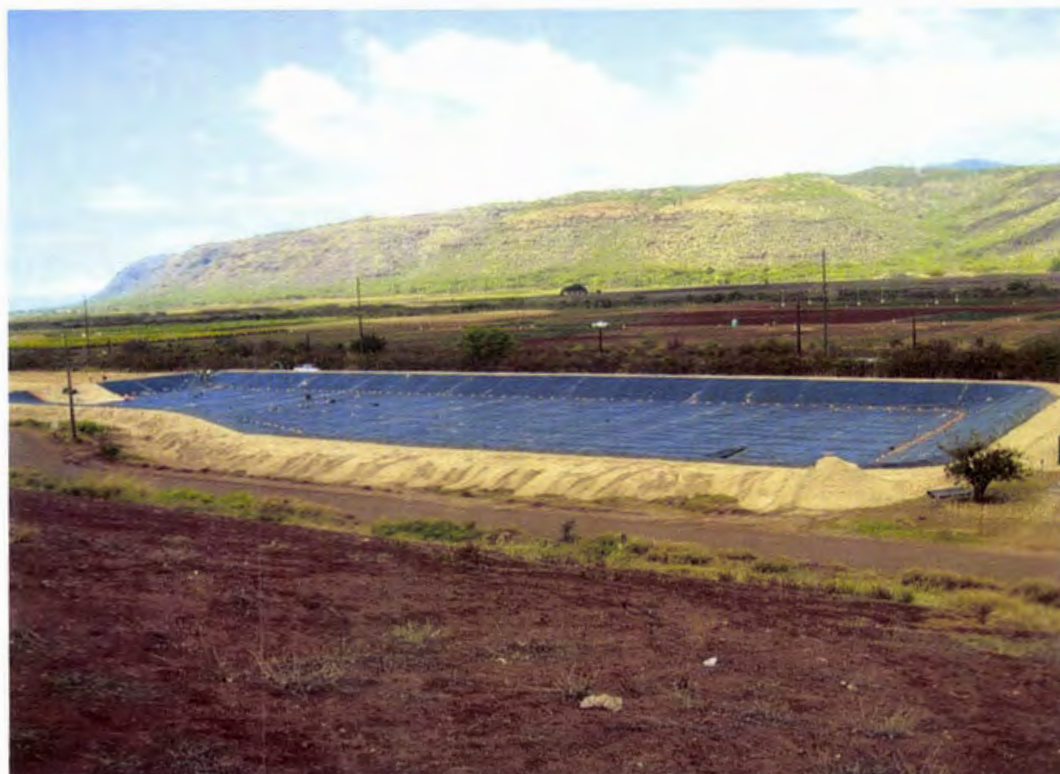


Photo 38. Completed subbase 60 mil HDPE geomembrane (with exception of west berm)





Photo 39. Deploying secondary GCL above the approved subbase 60 mil HDPE geomembrane



Photo 40. Secondary GCL panels are overlapped 12 inches minimum along the width and 6 inches minimum along the length; granular bentonite is placed along the width (butt) seam



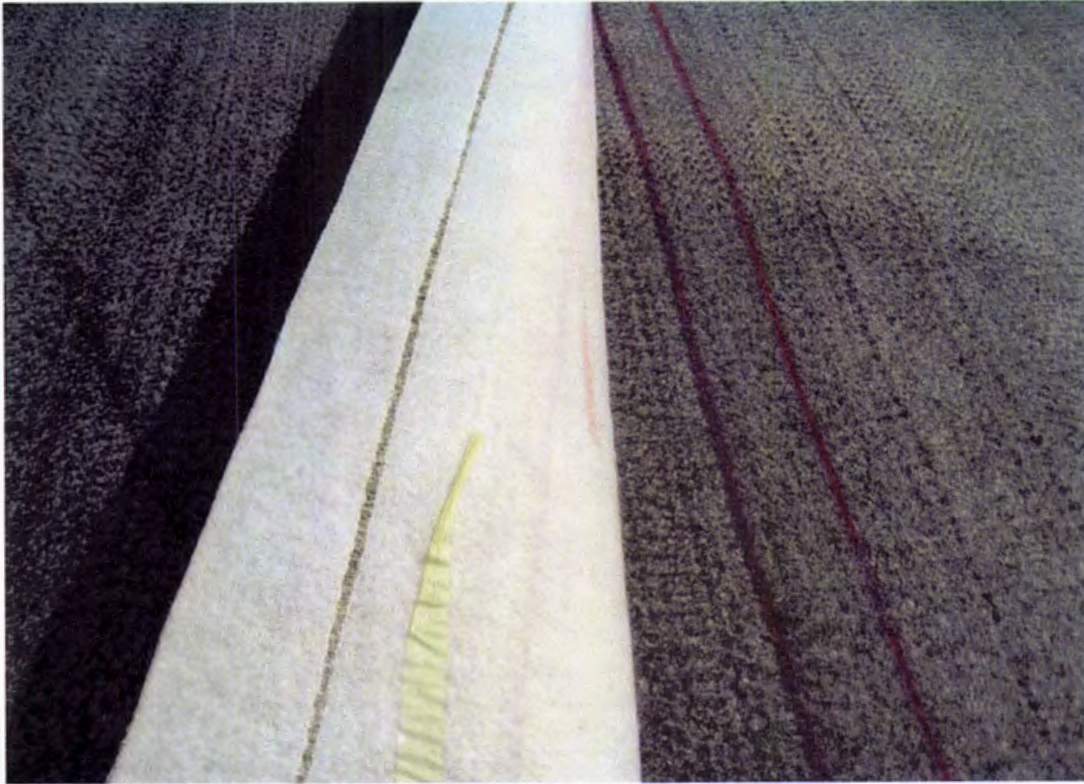


Photo 41. A “super-groove” factory seam along the length seam provides the means for a bentonite seal



Photo 42. Secondary 60 mil HDPE geomembrane is deployed over the GCL panels to ensure all GCL is covered by the end of the each day.





Photo 43. Sudden rains caused several panels of secondary GCL to be prematurely hydrated; per RFI #12, GCL panels shown above had an unacceptable degree of hydration and were removed and replaced with new GCL.



Photo 44. Production seaming secondary 60 mil HDPE geomembrane using a double-fusion wedge welder





Photo 45. Extrusion welding a repair patch within the secondary 60 mil HDPE geomembrane



Photo 46. Leading edge of the secondary 60 mil HDPE geomembrane is sealed (extrusion welded and sandbagged) at the end of the day to protect the underlying GCL from premature hydration





Photo 47. Majority of installed secondary 60 mil HDPE geomembrane



Photo 48. Deploying primary GCL above the approved secondary 60 mil HDPE geomembrane



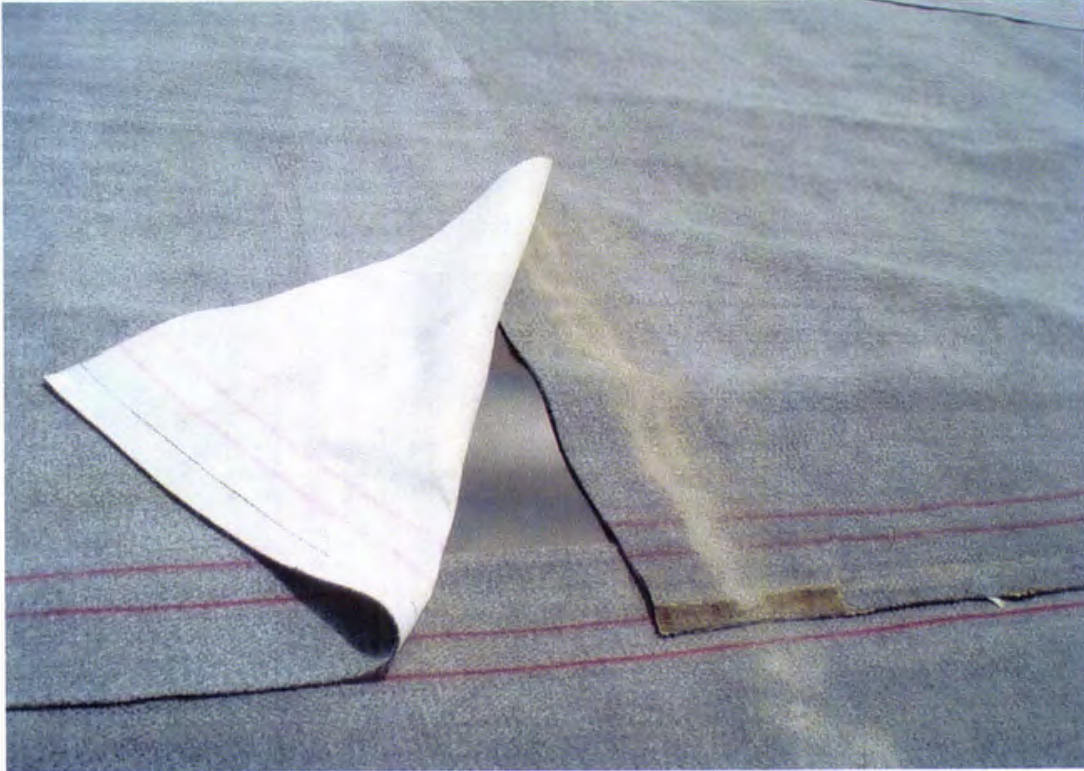


Photo 49. Primary GCL panels are overlapped 12 inches minimum along the width and 6 inches minimum along the length; granular bentonite is placed along the width (butt) seam, and a “super-groove” factory seam runs along the length of seam



Photo 50. Deploying primary 60 mil HDPE geomembrane over completed secondary GCL





Photo 51. Production seaming primary 60 mil HDPE geomembrane using a double-fusion wedge welder



Photo 52. Sealing a double-fusion welded production seam in preparation for a non-destructive air test



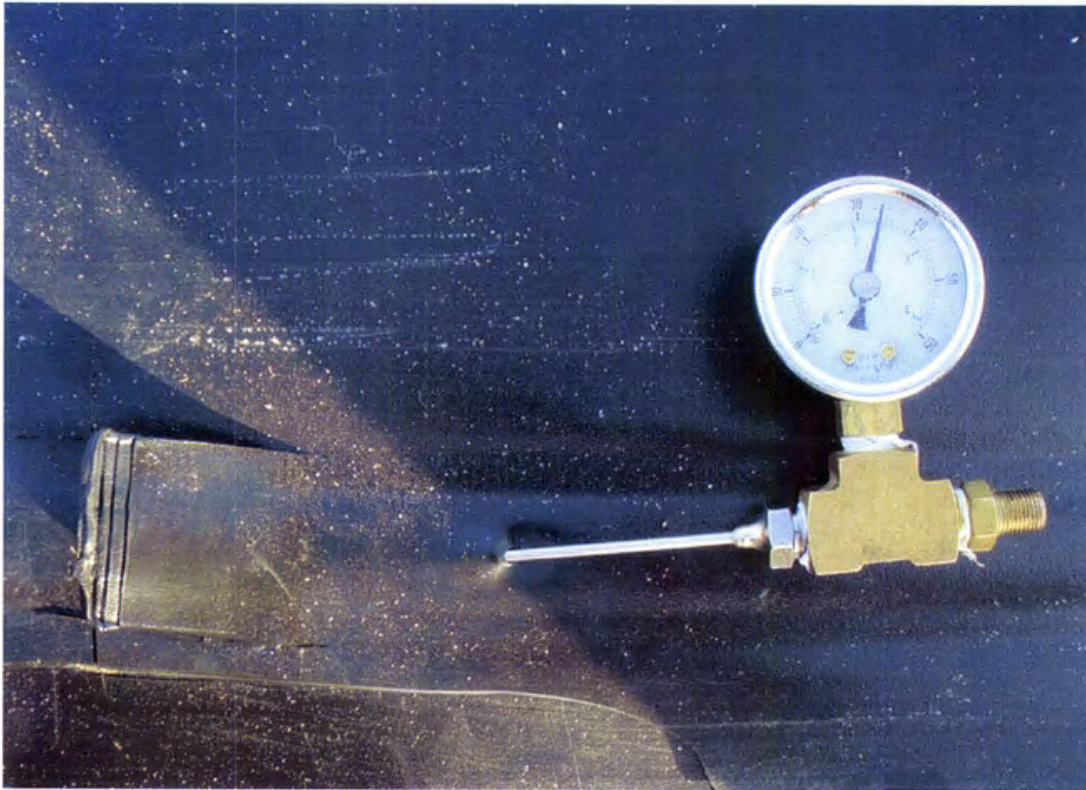


Photo 53. Non-destructive air pressure tests requires 30 psi minimum be held for 2 minutes

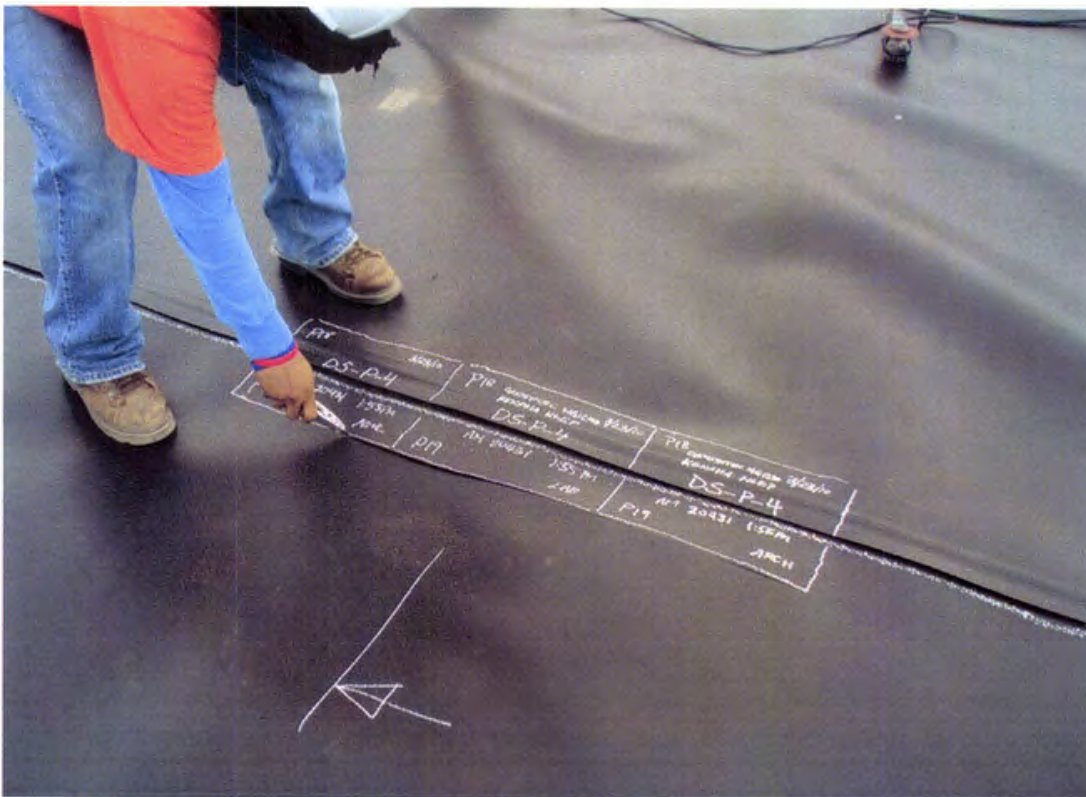


Photo 54. Collecting destructive seam samples from the primary 60 mil HDPE geomembrane





Photo 55. Extrusion welding a repair patch on the primary 60 mil HDPE geomembrane



Photo 56. Non-destructive vacuum box testing the extrusion seam of a repair patch



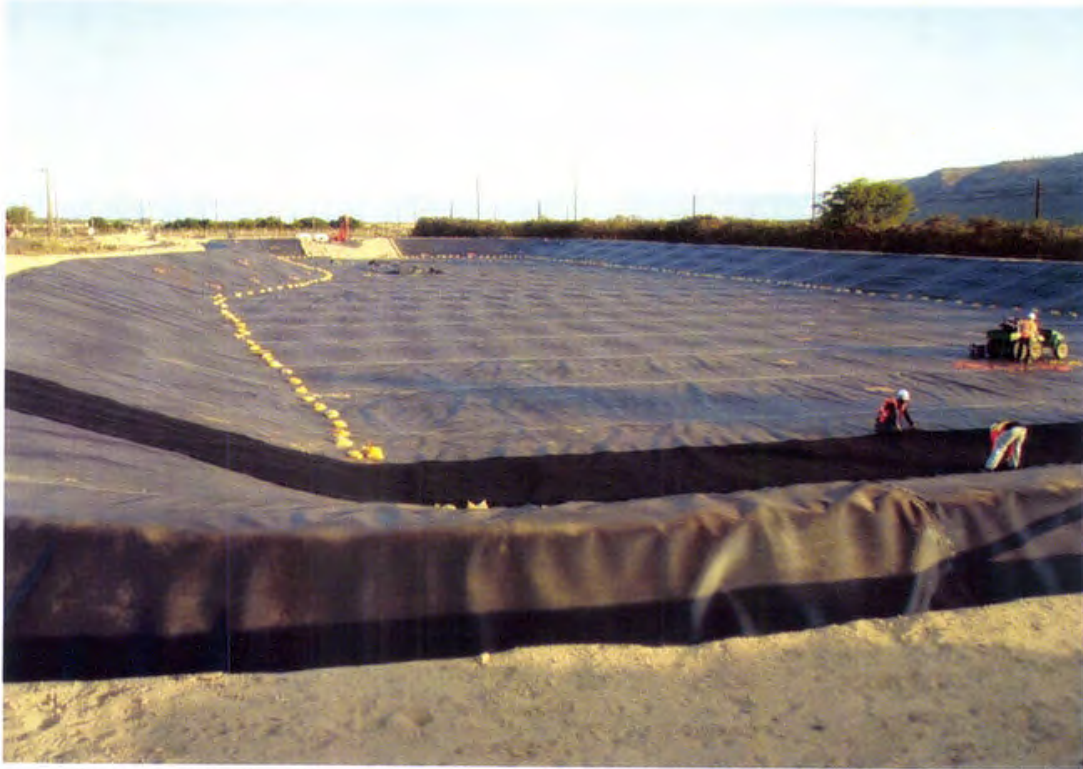


Photo 57. Installing 16 oz/sy nonwoven cushion geotextile above the completed primary 60 mil HDPE geomembrane (looking west)



Photo 58. Deploying 16 oz/sy nonwoven cushion geotextile above the completed primary 60 mil HDPE geomembrane (looking south)





Photo 59. Sewing 16 oz/sy nonwoven cushion geotextile panels using single-prayer seams



Photo 60. 16 oz/sy nonwoven cushion geotextile panels seams sewn using single-prayer seams





Photo 61. Majority of 16 oz/sy nonwoven cushion geotextile installed (with exception of west berm) (looking west)



Photo 62. Installing Presto-manufactured Geoweb® GW30V8 Geocell on the NLEP sideslopes above the completed 16 oz/sy nonwoven cushion geotextile (looking east)



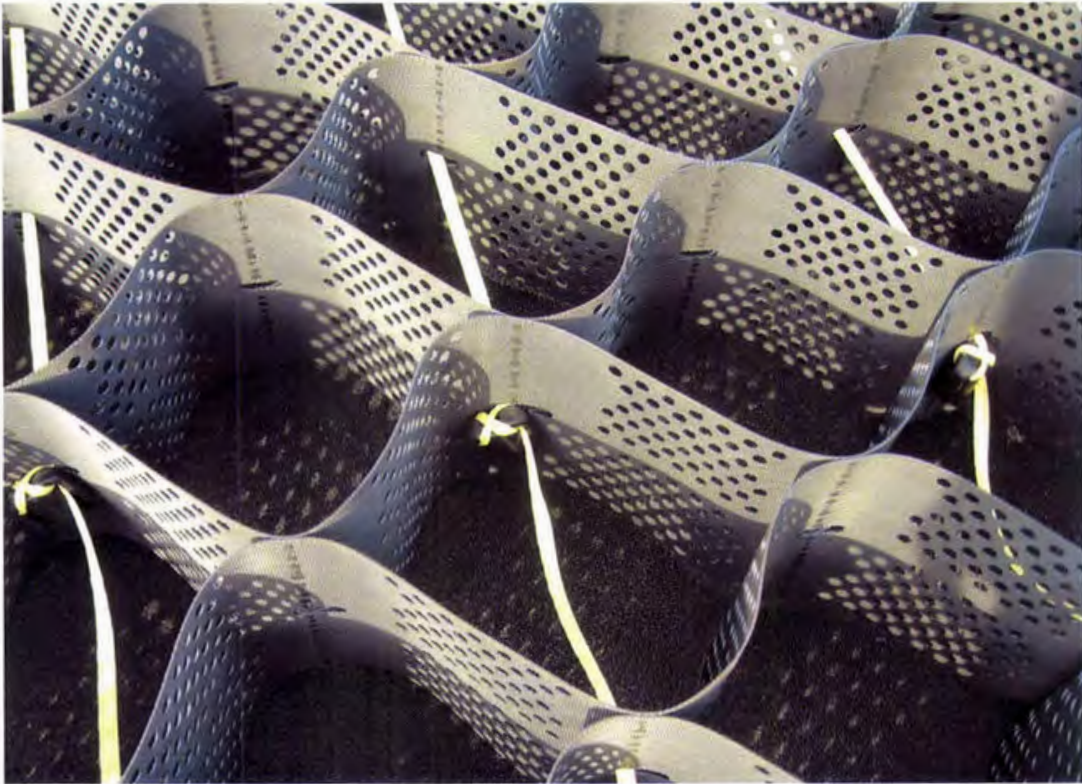


Photo 63. TK-89 tendons inserted through the Geoweb cells secure the ATRA® clips (restraint pins) using a Moore hitch

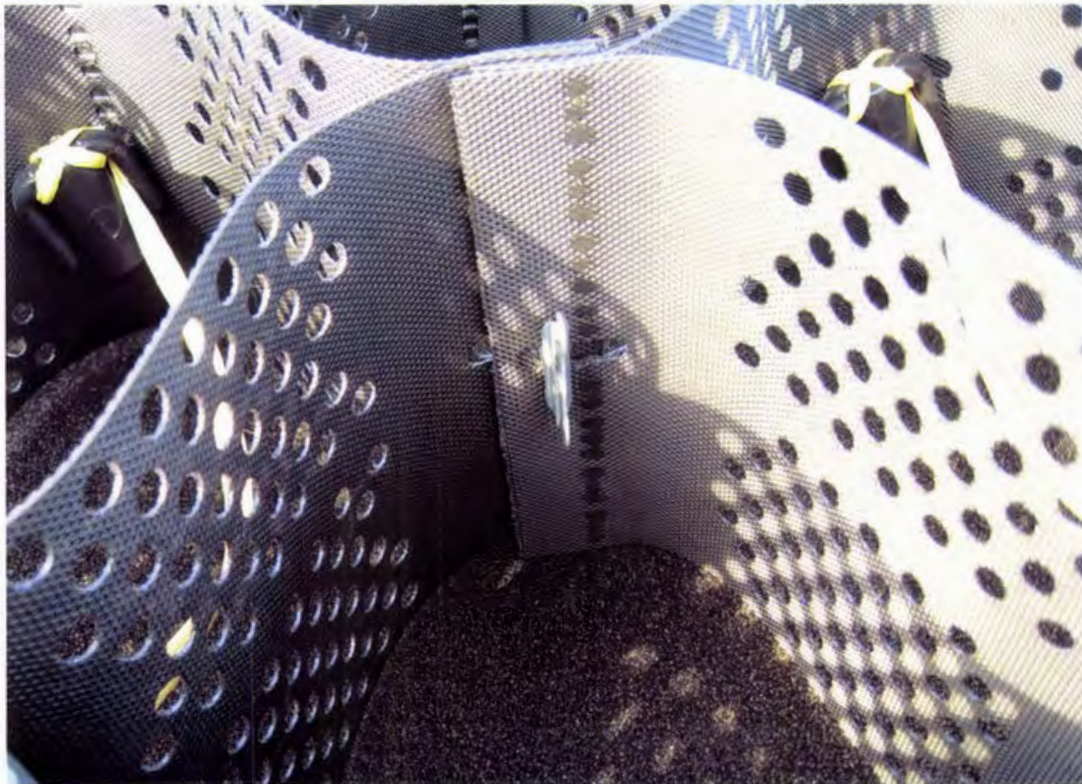


Photo 64. ATRA® keys connecting the Geoweb cell sections





Photo 65. Geoweb System's tendons are tied to a deadman anchor (6-inch PVC pipe) placed within the perimeter anchor trench



Photo 66. Geoweb System's deadman anchor along the east berm (looking north)





Photo 67. Partially backfilled and compacted perimeter anchor trench with a sand backfill (onsite soils) (looking east along south berm)



Photo 68. Three 2-inch diameter PVC electrical conduits are installed with marker tape within the southern perimeter anchor trench (looking west)





Photo 69. The perimeter anchor trenches are backfilled and compacted to the top with a sand backfill (onsite soils) (looking west)



Photo 70. Kauai Aggregate Quarry supplies the granular drainage materials for the NLEP





Photo 71. Collecting a sample of 3/8-inch minus granular operations layer material (imported from Kauai Aggregate Quarry) for conformance testing



Photo 72. Collecting a sample of 3-inch minus granular fill material (imported from Kauai Aggregate Quarry) for conformance testing





Photo 73. Imported 3/8-inch minus granular operations layer material is stockpiled directly in the NLEP



Photo 74. A Caterpillar LGP D6 dozer with GPS grade control pushes the stockpiled 3/8-inch minus granular operations layer material across the NLEP floor





Photo 75. Bottom of perimeter 6 oz/sy nonwoven filter geotextile is heat bonded to the floor cushion geotextile prior to granular operations layer placement against the toe of slope



Photo 76. A Hitachi excavator and articulated haul truck work above a 3-ft to 4-ft thick granular operations layer road to bring and place 3-inch minus granular fill on the the NLEP sideslopes (looking north)





Photo 77. The 3-inch minus granular fill is backfilled and spread in the Geocell using hand tools



Photo 78. Geocell backfilled with 3-inch minus granular fill





Photo 79. Backfilling Geocell on north sideslope with 3-inch minus granular fill (looking west)



Photo 80. A Caterpillar LGP D6 dozer with GPS grade control grades the granular operations layer to a final 12-inch thick layer over the NLEP floor





Photo 81. Compacting perimeter anchor trench sand backfill using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor



Photo 82. Two layers of 16 oz/sy nonwoven cushion geotextile is placed on the NLEP floor as part of the aerator pad construction





Photo 83. Half-inch chamfers are cut along edges of adjoining 2-inch thick HDPE flatstock panels prior to fillet extrusion welding

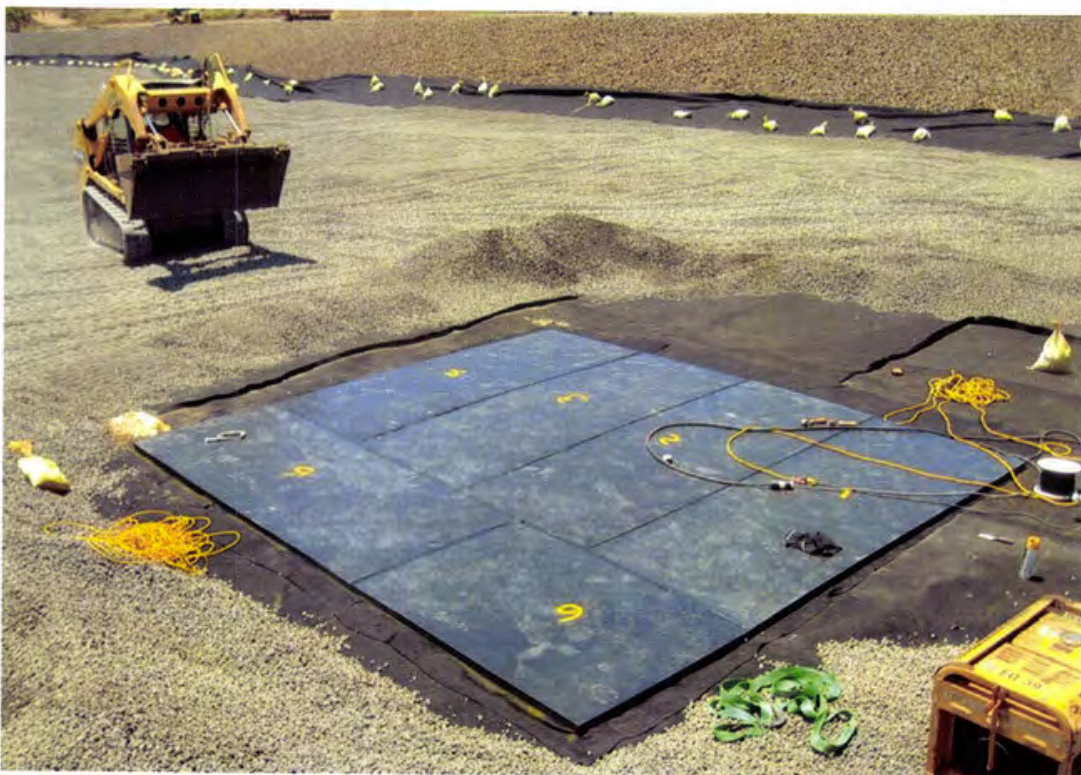


Photo 84. Six extrusion welded 2-inch thick HDPE flatstock panels, underlain by two layers of 16 oz/sy nonwoven geotextile, form the base support for the aerator pads





Photo 85. Form boards are constructed over the welded flatstock in preparation for the concrete pad construction.  
(Aerator Pad 3C shown in front) (looking west)

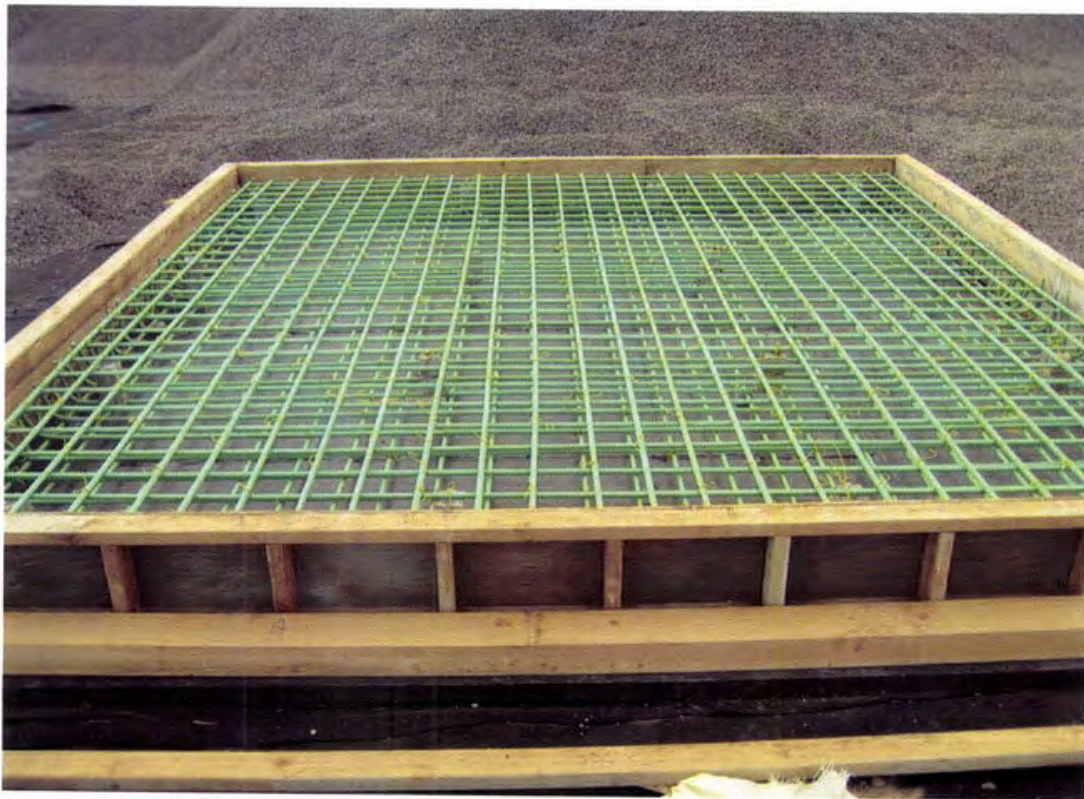


Photo 86. #5 epoxy coated rebar are placed in accordance with Detail 1 of Drawing 13





Photo 87. Sewing 6 oz/sy nonwoven separator geotextile above the 12-inch thick granular operations layer (looking west)



Photo 88. 6 oz/sy nonwoven separator geotextile installed above the granular operations layer (looking east)





Photo 89. Concrete pump delivering concrete to the aerator pads



Photo 90. Concrete is pumped into aerator pad forms (looking north)





Photo 91. Hirata & Associates performs the slump cone test and collects cylinders for the concrete mix



Photo 92. Completed concrete aerator pad





Photo 93. Installing the 2-inch thick granular protection layer above the 6 oz/sy nonwoven separator geotextile using a rubber tire track drive "skid steer" and manual hand raking (looking west)



Photo 94. The 2-inch thick granular protection layer is installed flush with the aerator pads with rubber seal and batten strip installed





Photo 95. Once the majority of the granular protection layer is installed, the western temporary ramp area is cleaned in preparation for completion of the west berm construction (looking northwest)



Photo 96. Trimmings from the NLEP exterior south berm is used to construct the west berm (looking west)





Photo 97. A HAMM 2420 rubber tire smooth vibratory compactor applies effort to the placed, moisture-conditioned compacted fill (onsite soils) (looking west)



Photo 98. Verifying compaction using a portable nuclear moisture density gauge





Photo 99. Completed NLEP west berm subbase and perimeter anchor trench (looking north)



Photo 100. The area of previously damaged geosynthetics within the NLEP floor is removed (looking east)



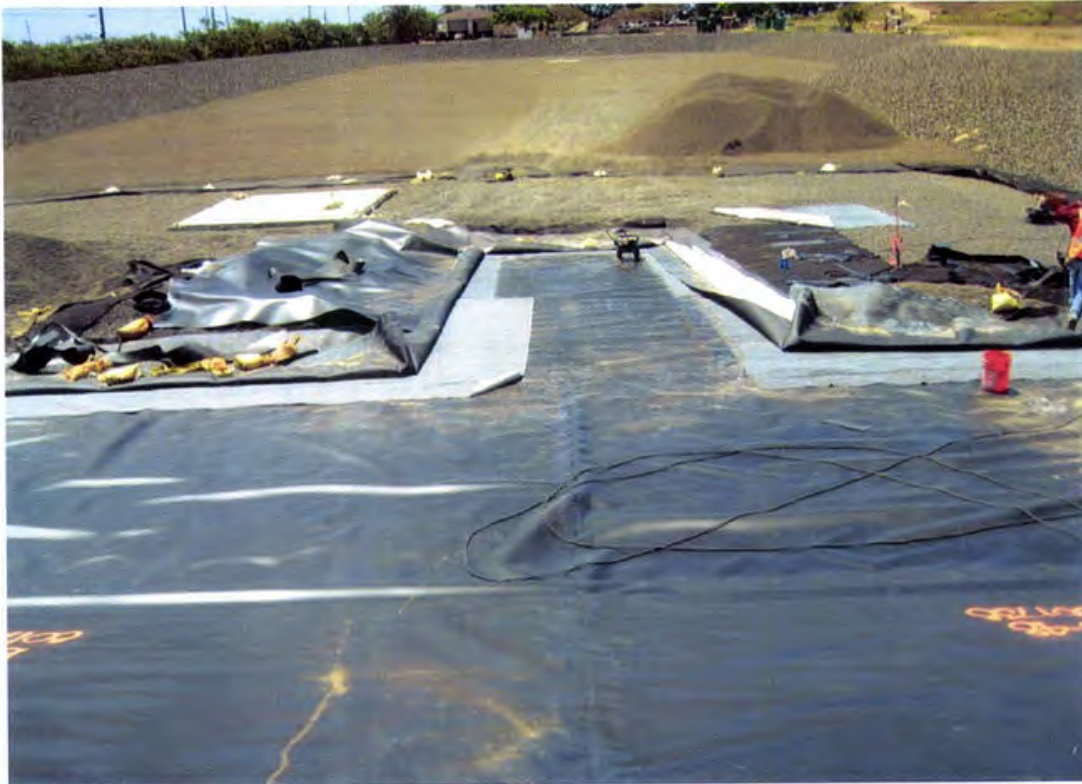


Photo 101. Subbase 60 mil HDPE geomembrane installed in the west berm area (looking east)



Photo 102. Deploying secondary GCL above the subbase 60 mil HDPE geomembrane (looking north)





Photo 103. Production seaming and air testing the fusion welded production seams of the deployed secondary 60 mil HDPE geomembrane above the secondary GCL (looking northwest)



Photo 104. Deploying primary GCL above the approved secondary 60 mil HDPE geomembrane (looking west)





Photo 105. Completed primary 60 mil HDPE geomembrane installed above the primary GCL (looking southeast)



Photo 106. Performing nondestructive vacuum box testing of a primary extrusion weld (looking east)





Photo 107. 16 oz/sy nonwoven cushion geotextile installed above the primary geomembrane (looking west)



Photo 108. Installing the Geocell system above the 16 oz/sy nonwoven cushion geotextile (looking northwest)





Photo 109. The 1-ft thick granular operations layer is completed over the NLEP floor (looking north)



Photo 110. A HAMM 2420 rubber tire smooth drum vibratory compactor performs final compaction and rolling of the west perimeter berm (looking south)





Photo 111. Granular fill installation in the Geocell system is complete on the west slope (looking north)



Photo 112. 6 oz/sy nonwoven separator geotextile is completed on the NLEP floor (looking north)







Photo 113. 2-inch thick granular protection layer is installed and graded over the 6 oz/sy nonwoven separator geotextile (looking northwest)



Photo 114. Completed NLEP containment system and aerator concrete pads (looking west)





Photo 115. Completed NLEP containment system and aerator concrete pads (looking northwest)







**Appendix B**  
**Project Correspondence**



## Mike Minch

---

**From:** Bergschultz, Ken [KEN.BERGSCHULTZ@aecom.com]  
**Sent:** Sunday, March 14, 2010 5:39 PM  
**To:** Mike Minch; JFrey@wm.com; Impens, Jeffrey  
**Subject:** Fw: GCL Seams

Here you go Mike.

Kenny Bergschultz

---

**From:** Bergschultz, Ken  
**To:** Keith Suga <keiths@goodfellowbros.com>; Frey, Jesse <JFrey@wm.com>  
**Cc:** Christine Erorita <christinee@goodfellowbros.com>; Kirk Lilleskare <klilleskare@northwestlinings.com>; Jeff Griffin <jeffg@goodfellowbros.com>  
**Sent:** Wed Mar 10 14:36:58 2010  
**Subject:** FW: GCL Seams

Everyone,

As referenced in the response on GCL seams to Keith.

Any questions, please let me know.

**Kenneth J. Bergschultz, PE**  
Office Manager, Midwest Region  
Environment  
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---

**From:** Bergschultz, Ken  
**Sent:** Wednesday, December 23, 2009 4:58 PM  
**To:** Troy Tanigawa; Frey, Jesse  
**Cc:** Impens, Jeffrey  
**Subject:** GCL Seams

Troy and Jesse,

Something to keep an eye out on with the GCL for the project is the seams of the GCL. The GCL as specified is comprised of two nonwoven geotextiles. The resulting seam from the GCL overlap should be enhanced through typically bentonite powder or in some cases a "super-groove" seam design for some manufacturers. The nonwoven geotextile deters bentonite migration so in theory when this type of GCL is overlapped and hydrated, the seam could be a means for migration.

If you have any questions, please let Jeff Impens know at (808) 356-5396.

Have a good holiday.

Kim Huynh

---

**From:** Mike Minch  
**Sent:** Monday, January 25, 2010 8:59 AM  
**To:** Chris Scott; Kim Huynh  
**Cc:** Hari Sharma; Frey, Jesse  
**Subject:** FW: Microspike deployment orientation

Thanks Kirk.

---

**From:** Kirk Lilleskare [mailto:klilleskare@northwestlinings.com]  
**Sent:** Monday, January 25, 2010 8:10 AM  
**To:** Mike Minch  
**Subject:** RE: Microspike deployment orientation

Mike,

The glossy side will be up for the deploy of the HDPE textured liner. Cora also has the orientation for the GCL and geotextiles for the interface testing.

Thanks,

KIRK LILLESKARE - VICE PRESIDENT CONSTRUCTION  
Northwest Linings & Geotextile Products, Inc.  
21000 77th Ave. South  
Kent, WA 98032  
Ph. 253-872-0244 x 109  
Fx. 253-872-6953

[kirk@northwestlinings.com](mailto:kirk@northwestlinings.com)

---

**From:** MMinch@Geosyntec.com [mailto:MMinch@Geosyntec.com]  
**Sent:** Friday, January 22, 2010 3:18 PM  
**To:** klilleskare@northwestlinings.com  
**Cc:** JFrey@wm.com; cqueja@precisionlabs.net; CScott@Geosyntec.com; KHuynh@Geosyntec.com; keiths@goodfellowbros.com  
**Subject:** Microspike deployment orientation

Kirk,

Just to confirm our phone conversation yesterday, I understand that Northwest plans to deploy the Agru Microspike geomembrane with the glossy side up and the matte side down. Please confirm this orientation. As part of our CQA efforts, Geosyntec will then verify that the interface shear tests and the field deployment all use the same orientation.

Thank you,

**Michael J. Minch, P.E., G.E.**

Senior Project Engineer

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consultants

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Kim Huynh

---

**From:** Kirk Lilleskare [klilleskare@northwestlinings.com]  
**Sent:** Wednesday, January 27, 2010 10:26 AM  
**To:** Mike Minch; cqueja@precisionlabs.net  
**Cc:** JFrey@wm.com; Chris Scott; Kim Huynh  
**Subject:** RE: Kekaha, Initial Interface Shear Test Results

Mike,

CETCO confirmed that the orientation rolling off the roll would be the black or dark side up and the light side down. This is typical for the DN products even with the scrim inside.

I talked to Christian at Precision this morning to confirm this.

Thanks

KIRK LILLESKARE - VICE PRESIDENT CONSTRUCTION  
Northwest Linings & Geotextile Products, Inc.  
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Kent, WA 98032  
Ph. 253-872-0244 x 109  
Fx. 253-872-6953

[kirkl@northwestlinings.com](mailto:kirkl@northwestlinings.com)

---

**From:** MMinch@Geosyntec.com [mailto:MMinch@Geosyntec.com]  
**Sent:** Tuesday, January 26, 2010 10:45 AM  
**To:** klilleskare@northwestlinings.com; cqueja@precisionlabs.net  
**Cc:** JFrey@wm.com; CScott@Geosyntec.com; KHuynh@Geosyntec.com  
**Subject:** Kekaha, Initial Interface Shear Test Results

Kirk/Cora,

Geosyntec has reviewed the initial interface shear laboratory reports for the Kekaha Landfill project, and we have a question regarding the tests #10 and 11 involving GCL:

We understand that the GCL will be deployed with the scrim side (black side) down and the non-scrim side (white side) will face up. If this is correct, the white side of the GCL will be in contact with the matte side (underside) of the geomembrane and the GCL scrim side will be in contact with the glossy side (topside) of the geomembrane. However, the orientation shown for interfaces #10 and #11 appears to be the reverse configuration.

Can you please confirm the correct configuration?

Thanks,

Mike

Kim Huynh

---

**From:** Chris Scott  
**Sent:** Saturday, February 27, 2010 10:09 PM  
**To:** Mike Minch; Kim Huynh  
**Subject:** FW: Revised Specification Section 02062  
**Attachments:** 02062 rev6.pdf

Mike,

Based on the revised Section 02062 (attached) It looks like no interface testing is required for the drainage gravel. <sup>3/4"</sup>  
Chris

---

**From:** Bergschultz, Ken [mailto:KEN.BERGSCHULTZ@aecom.com]  
**Sent:** Friday, February 26, 2010 1:35 PM  
**To:** Bergschultz, Ken; Frey, Jesse; Impens, Jeffrey  
**Cc:** Keith Suga; jeffg@goodfellowbros.com; Chris Scott  
**Subject:** Revised Specification Section 02062

Everyone,

As discussed in the project meeting on Tuesday, attached is the revised specification Section 02062 reflecting the change in the operations layer in the leachate evaporation pond. The change aligns this material with the permit defined gradation of maximum 0.75 inches verses the approved design of 1.5 inches. I would suggest a material that is a close to 0.75" as possible as the preferred selection. Portions of the specification that are deleted have been crossed out/highlighted and items added are highlighted in yellow.

GBI has acknowledged the change in the material and has also confirmed no schedule impact or additional costs for this material change.

Any questions, please let me know.

Have a good day.

**Kenneth J. Bergschultz, PE**  
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SECTION 02062  
GRANULAR DRAINAGE MATERIAL

PART 1 GENERAL

1.01 SUBMITTALS

A. Samples:

1. Granular drainage layer (Cell 1) and granular operations layer material (New Leachate Evaporation Pond). Minimum sample size 50 lb, each material type.
2. Operation layer (Cell 1) and granular protection layer material (New Leachate Evaporation Pond). Minimum sample size 50 lb.
3. Granular fill. Minimum sample size 50 lb.

B. Test Results:

1. Results of source evaluation tests for granular drainage materials.

C. Submit in accordance with Section 01330.

1.02 PROJECT/SITE CONDITIONS

A. Do not block or obstruct roads, streets or pavements except when authorized by OWNER.

B. Coordinate staging and stockpiling of materials with OWNER prior to transporting to site.

PART 2 PRODUCTS

2.01 GRANULAR DRAINAGE LAYER (CELL 1) ~~AND GRANULAR OPERATIONS LAYER (NEW LEACHATE EVAPORATION POND)~~

A. Clean gravels or other ENGINEER approved permeable material generally classified according to Unified Soil Classification System as GW or GP. No sands will be allowed as this layer.

B. Durable washed, coarse rounded to subangular gravel or crushed gravel:

1. Grain Size: Maximum particle size 1.5 inches, d85 particle size of 1 inch or larger, average particle size (d50) range of 1 inch to 0.6 inches (15 mm), and less than 5% passing a US #200 sieve.
2. Permeability:  $3 \times 10^{-1}$  cm/sec or greater.
3. Calcium content: <12%

2.02 OPERATIONS LAYER MATERIAL (CELL 1) AND GRANULAR PROTECTION LAYER (NEW LEACHATE EVAPORATION POND)

A. Clean gravels or other ENGINEER approved permeable material generally classified according to Unified Soil Classification System as GW or GP. No sands will be allowed as this layer.

B. Durable washed, coarse rounded to subangular gravel or crushed gravel:

1. Grain Size: Maximum particle size 3/8-inch and less than 5% passing a #200 US Sieve.
2. Permeability:  $6 \times 10^{-3}$  cm/sec or greater.
3. Calcium content: <12%

2.03 GRANULAR FILL (NEW LEACHATE EVAPORATION POND SIDESLOPES)

- A. Clean gravels or other ENGINEER approved permeable material generally classified according to Unified Soil Classification System as GW or GP. No sands will be allowed as this layer.
- B. Durable washed, coarse rounded to subangular gravel or crushed gravel:
  - 1. Grain Size: Maximum particle size 3-inches in all directions, between 40 and 60% passing a 1.5 inch sieve, and less than 5% passing a #200 US Sieve.
  - 2. Calcium content: <12%

2.04 SOURCE QUALITY CONTROL

- A. Source evaluation tests, including 2.04.A of this Section, shall be performed to confirm granular drainage materials procured from each on or off-site source area. Material evaluation tests shall be performed by QAC. Material will be accepted or rejected according to these results.

At minimum following tests shall be conducted:

- 1. Particle Size (ASTM D1140 and D422)
  - 2. Laboratory Hydraulic Conductivity at specified density (ASTM D2434)
  - 3. Calcium Carbonate content (test maybe waived at ENGINEER's discretion based upon source, i.e. volcanic, limestone, etc.).
- B. Perform tests at frequency of minimum of one sample per source for qualification and a minimum of one per 3000 cu yd (2500 cu m) per source placed, or upon visually observable changes in material type. If identification of additional drainage material sources becomes necessary during construction, same material qualification and consistency checking procedures shall be applied to each such source.

2.05 INTERFACE FRICTION ANGLE TESTING

- A. Prior to acceptance of source, provide sample of each source for interface friction angle testing per Section 02072. Material defined in 2.06 of this Section do not need interface friction angle testing.

2.06 GRANULAR OPERATIONS LAYER (NEW LEACHATE EVAPORATION POND)

- A. Clean gravels or other ENGINEER approved permeable material generally classified according to Unified Soil Classification System as GW or GP. No sands will be allowed as this layer.
- B. Durable washed, coarse rounded to subangular gravel or crushed gravel:
  - 1. Grain Size: Maximum particle size 0.75 inches and less than 5% passing a US #200 sieve.
  - 2. Permeability:  $3 \times 10^{-1}$  cm/sec or greater.
  - 3. Calcium content: <12%

PART 3 EXECUTION

3.02 MATERIAL USAGE

- A. Granular Material: Granular drainage layer as defined on Drawings.
- B. Operations Layer Material: Operations layer as defined on Drawings.



### 3.04 PLACEMENT OF GRANULAR DRAINAGE MATERIAL

#### A. Placement on Geomembrane:

1. Placement of materials on geomembrane shall not proceed at an ambient temperature below 32° F (0° C) nor above 104° F (40° C) unless otherwise specified.
2. Placement of materials on geomembrane should be done during the coolest part of day to minimize development of wrinkles in geomembrane.
3. Equipment used for placing materials shall not be driven directly on geomembrane.
4. Minimum thickness of 1 ft (0.3 m) of materials is specified between light dozer, ground pressure of 5 psi (935 kPa) or lighter, and geomembrane. Dozer used shall be no heavier than a Caterpillar D6H LGP dozer. Consult ENGINEER for other equivalent equipment approval.
5. In areas traversed by vehicles other than low ground pressure vehicles approved by ENGINEER; soil layer shall have minimum thickness of 3 ft (0.9 m). This requirement may be waived if provisions are made to protect geomembrane through an engineered design. Drivers shall proceed with caution when on overlying soil and prevent spinning of tires or sharp turns.
6. When placing overlying material on geomembrane, minimize wrinkle development. Small wrinkles should be isolated and covered as quickly as possible to prevent their growth. Placement of cover materials shall be observed by Geosynthetic QAC to ensure that wrinkle formation is minimized and that, geomembrane is not folded over on itself.

### 3.05 FIELD QUALITY CONTROL

- #### A.
- Granular drainage materials not in conformance with Specifications shall be removed and replaced at no cost to OWNER.

\*\*\* END OF SECTION \*\*\*

Subject: RE: 3" Rock

---

**From:** Frey, Jesse <JFrey@wm.com>  
**To:** Bergschultz, Ken  
**Cc:** keiths@goodfellowbros.com <keiths@goodfellowbros.com>  
**Sent:** Fri Mar 19 23:18:27 2010  
**Subject:** Re: 3" Rock

Big thanks for your quick and most thorough response. Especially at such a late hour for you!

----- Original Message -----

**From:** Bergschultz, Ken <KEN.BERGSCHULTZ@aecom.com>  
**To:** Keith Suga <keiths@goodfellowbros.com>; Frey, Jesse; Impens, Jeffrey <Jeffrey.Impens@aecom.com>  
**Cc:** Scott Pingrey <scottp@goodfellowbros.com>; Jeff Griffin <jeffg@goodfellowbros.com>; Christine Erorita <christinee@goodfellowbros.com>  
**Sent:** Sat Mar 20 00:29:33 2010  
**Subject:** RE: 3" Rock

Hi Keith,

You are correct that when screening a product it is really the least dimension of the particle that meets the sieve size specified. In reviewing Specification Section 02062 Article 2.03, I believe the product shown in the picture meets the intent of the granular fill. The design gradation is such that it allows more than one particle to occupy the depth of the geocell void/volume. The particles in the pictures would serve this purpose. I would ask that you visually verify the product during placement that any particles larger than the particle present at 11:00 on the photo. This particle is about 5 inches long and less than 3 inches in width based upon the scale provided.

Please maintain the specification sizing of 40-60% passing a 1.5 inch dimension to fill in the voids and help lock in the material and less than 5% passing a #200 sieve.

I have checked the permit and found no specified particle dimensions defined.

If you have any questions, please let me know.

Kenneth J. Bergschultz, PE  
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[www.aecom.com](http://www.aecom.com)

-----Original Message-----

**From:** Keith Suga [<mailto:keiths@goodfellowbros.com>]  
**Sent:** Friday, March 19, 2010 6:44 PM  
**To:** Bergschultz, Ken; 'JFrey@wm.com'  
**Cc:** Scott Pingrey; Jeff Griffin; Christine Erorita  
**Subject:** 3" Rock

We ran a sample of three inch minus rock today for the geocell. Please see attached picture. This material is passing through a 3" screen. The specs calls out max particle size in any direction to be 3". In the process of screening aggregates, although all material



passes through the 3" screen you still will get some pieces that are length wise more than 3". So the question is can this material be used for the geocell? chris scott has taken a sample and will have gradation run. We are hopeful that you could provide a quick response so we can continue crushing this material tomorrow. thanks.

— Original Message —

From: Scott Pingrey  
To: Keith Suga  
Sent: Fri Mar 19 14:33:44 2010  
Subject: Rock

Tape measure is one foot showing.

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**Waste Management recycles enough paper every year to save 41 million trees. By not printing this email, you can help save even more.**

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CONFIDENTIALITY NOTICE: If you have received this communication in error, please notify us immediately. This message is intended only for the use of the person, firm, or company it is addressed, and may contain information that is privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this information is prohibited.





**Appendix C**  
**Contractor Submittals**



Hirata &amp; Associates

Geotechnical  
Engineering

Hirata &amp; Associates, Inc.

99-1453 Koahe Pl  
Aiea, HI 96701  
tel 808.486.0787  
fax 808.486.0870

GFB-6

RECEIVED

JAN 14 2010

Goodfellow Bros., Inc.  
Kauai Officecc: Keith  
Scott

## FAX MEMORANDUM

January 13, 2010  
W.O. 09-4854

TO: Mr. Keith Suga  
Goodfellow Brothers, Inc.  
Fax: (808) 241-4605

FROM: David M. Kitamura *DMK*

RE: Laboratory Test Results - Mana Refuse Station Stockpile  
Waimea Water Main Replacement  
Waimea, Kauai, Hawaii

As requested, laboratory testing was performed on the import material from a stockpile near the Mana Refuse Station, at Barking Sands. Bulk soil samples were obtained by our field technician for laboratory testing, consisting of sieve analysis, as well as maximum density (modified Proctor) tests.

Visually, the material from the stockpile consisted of tan silty sand with few coral fragments (Bag #6). The sieve analysis indicated about 96.7% passing the 3/8" sieve, about 7.4% passing the #100 sieve, and less than 3% passing the #200 sieve. Our laboratory test results indicated that the material is classified as poorly graded sand (SP). This classification is based on the Unified Soil Classification System. The following is a summary of our laboratory testing results:

Sieve Analysis

Sieve Size	Percent Passing
1/2"	96.9
3/8"	96.7
#16	92.3
#100	7.4
#200	2.6

Maximum Density (modified Proctor)

Maximum density: 103 PCF  
Optimum Moisture Content: 14.5%

Should you have any questions concerning this memo, please call on us.

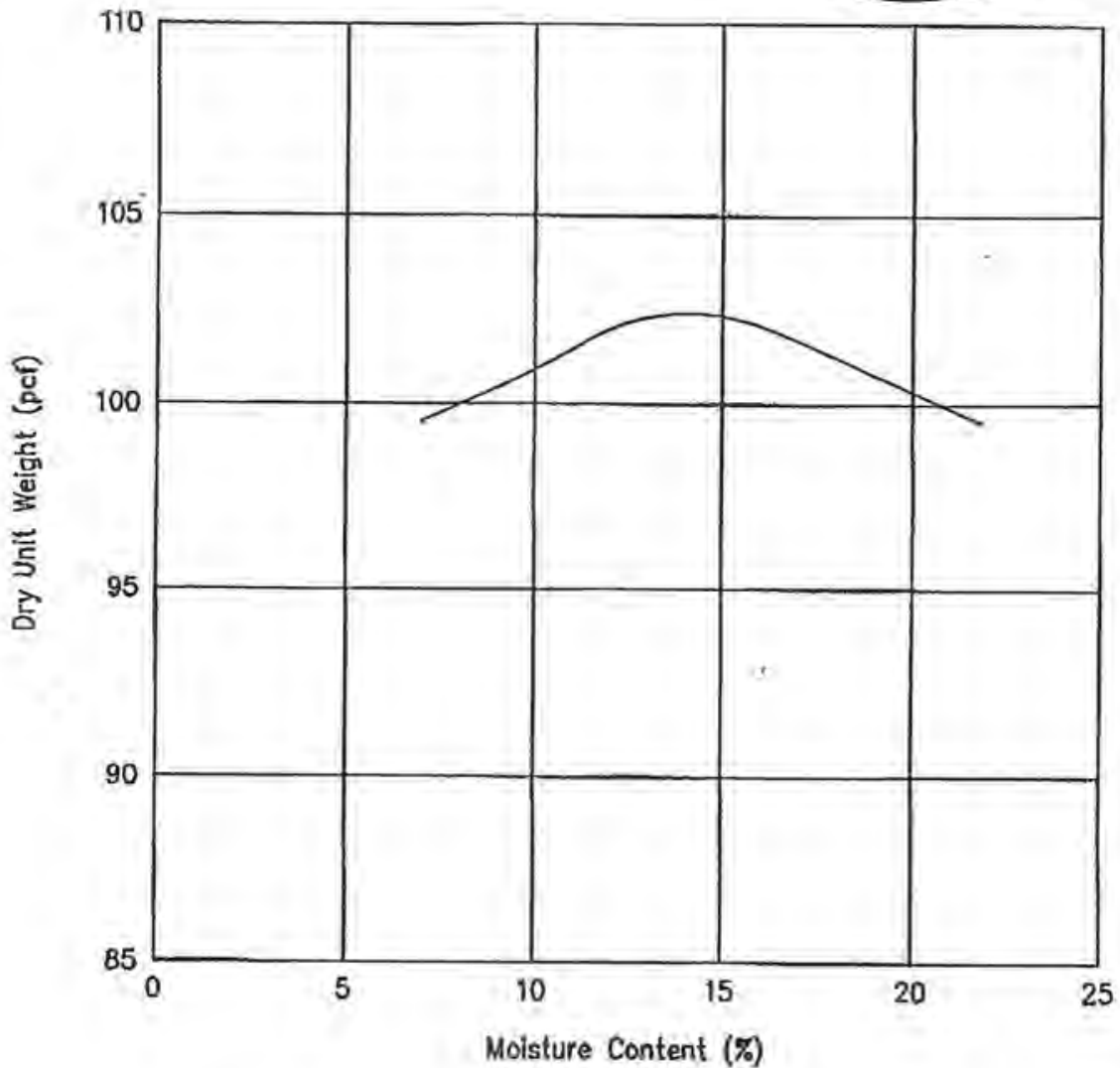
DMK:4854xm.003

enc: Modified Proctor Curve (Bag #6)

No. of pages transmitted: 2  
If this transmission is not complete,  
please call us at (808) 486-0787.



GFB-6



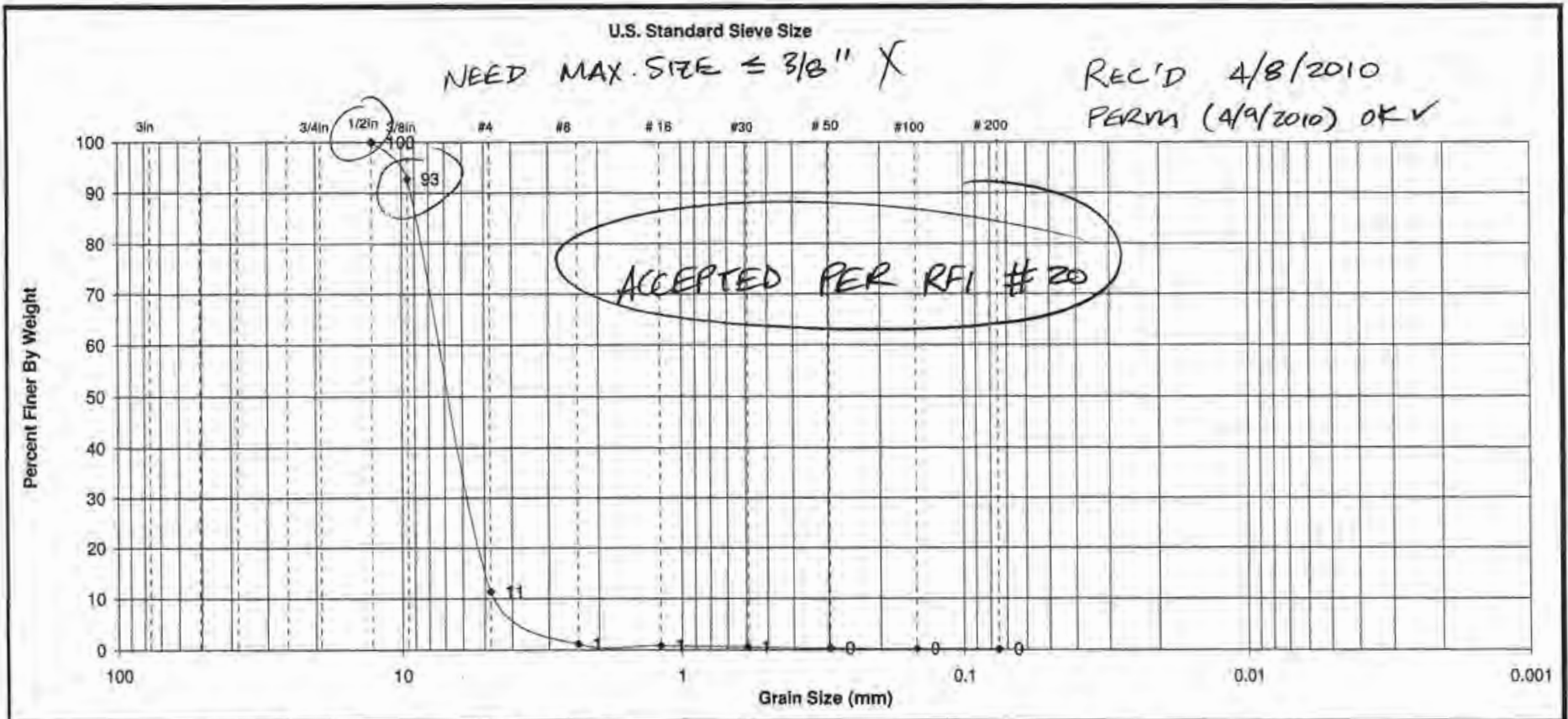
Soil Data

Bag No.: 6  
 Location: Mana Refuse Station  
 Description: Tan silty sand

Test Results

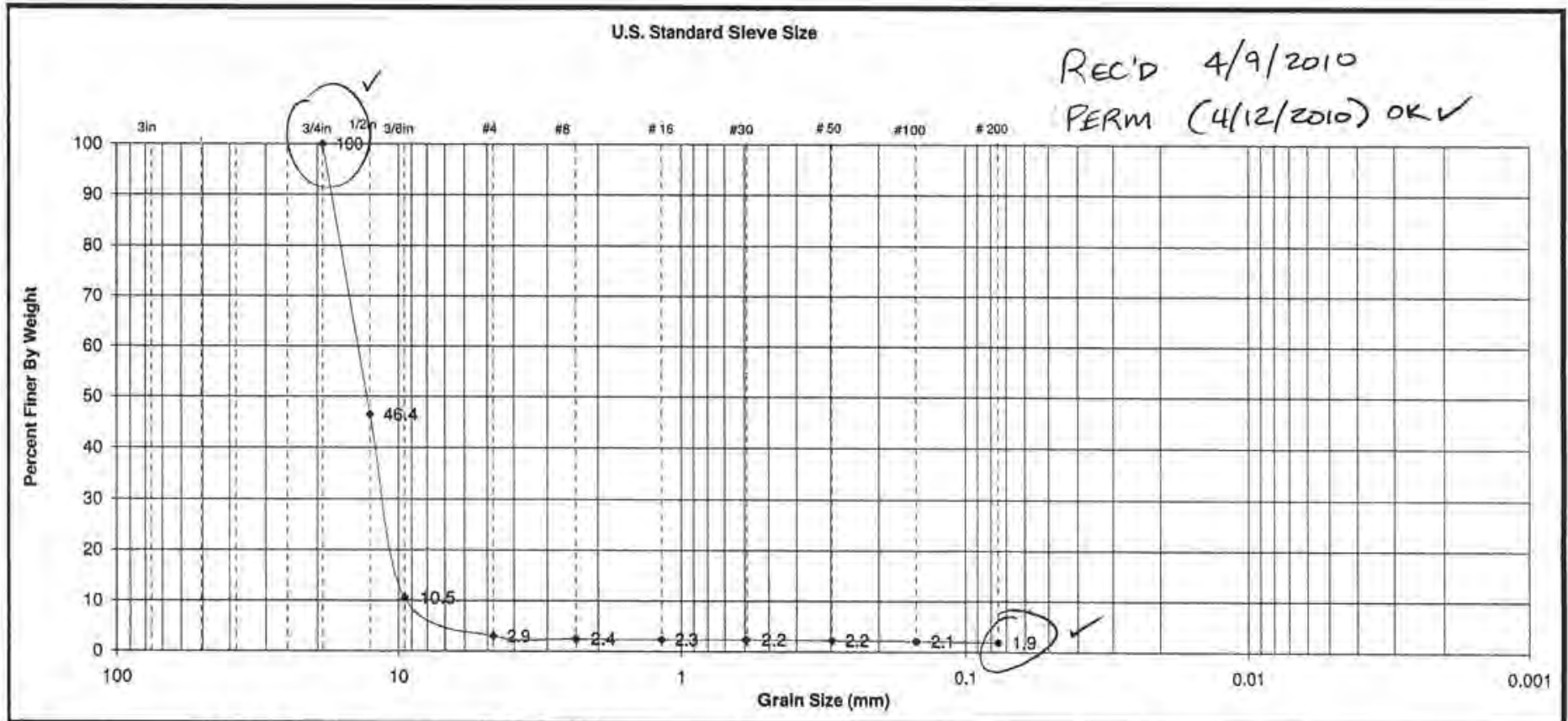
Maximum Dry Density: 103.0  
 Optimum Moisture Content: 14.5

<p>W.O. 09-4854.0</p>	<p>Waimea Main Replacement</p>
<p>Ernest K. Hirata &amp; Associates, Inc.</p>	<p><b>MODIFIED PROCTOR CURVE</b>                  Plate A1</p>



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
3/8" minus quarry sand										





Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
3/4" minus quarry gravel										

## CONSTANT-HEAD PRESSURE PERMEABILITY TESTS ASTM D 2434

PROJECT Precision Lab # G100274

Date 4/12/2010

Job No 2001-068

By LD

Sample 3/8" minus quarry sand			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k (cm/sec)
6815.3	Tare			11:20:00		11:20:10	1800	4.1E-01
10040	Init. Wet wt.			11:22:00		11:22:10	1821	4.1E-01
	Sat. Wt.	10140		11:23:00		11:23:10	1855	4.2E-01
	Trimmed Wt.	10140		11:24:00		11:24:10	1834	4.2E-01
1	% water	4.1						
94.0	Dry Density pcf	94.0						
			PSI	0.4	Total (Ave.)		7310	4.1E-01

✓OK

Sample 3/4" minus quarry gravel			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k (cm/sec)
6760	Tare			15:00:00		15:00:10	2450	5.5E-01
9820	Init. Wet wt.			15:03:00		15:03:10	2472	5.6E-01
	Sat. Wt.	9960		15:10:00		15:10:10	2449	5.5E-01
	Trimmed Wt.	9960		15:45:00		15:45:10	2480	5.6E-01
0.3	% water	4.9						
89.8	Dry Density pcf	89.8						
			PSI	0.4	Total (Ave.)		9851	5.6E-01

✓OK

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k
	Tare							
	Init. Wet wt.							
	Sat. Wt.							
	Trimmed Wt.							
	% water							
	Dry Density							
			PSI		Total (Ave.)			

K = coefficient of permeability (cm/sec)

L = sample height = 11.633 cm

A = area of sample = 182.322 cm<sup>2</sup>

H = Hydrostatic head (cm of H<sub>2</sub>O)    1 psi = 70.43 cm

$$K = QL / Aht$$





Hirata & Associates

Geotechnical  
Engineering

Hirata & Associates, Inc.

99-1453 Koahe Pl  
Aiea, HI 96701  
tel 808.486.0789  
fax 808.466.0870

# MEMORANDUM

March 30, 2010  
W.O. 10-4907.0

TO: Mr. Chris Scott  
Geosyntec Consultants Inc.  
via email: [cscott@geosyntec.com](mailto:cscott@geosyntec.com)

FROM: David Kitamura *DKM*

RE: Laboratory Test Results for 3" minus Geocell Material (Bag #5)  
Kekaha Landfill: Phase II Lateral Expansion  
Kekaha, Kauai, Hawaii

As requested, laboratory testing was performed on the 3" minus Geocell material for the above referenced project. Geosyntec provided us with a bulk soil sample from an onsite stockpile for laboratory testing, consisting of a sieve analysis test. This memo presents the results for the sieve analysis. Based on our sieve analysis test results, the material was classified as poorly-graded gravel with a corresponding Unified Soil Classification system symbol of GP. The sieve analysis results are summarized below:

<u>Test</u>	<u>Result</u>	
Sieve Analysis (ASTM C136)	<u>Sieve size</u>	<u>Percent finer (%)</u>
	3"	100.0 ✓
	1-1/2"	40.1 ✓
	3/4"	3.5
	#4	3.5
	#40	3.4
	#200	0.1 ✓

Feel free to call us if you have any questions.

\\4907memorandum005SieveBag5.wpd



Hirata & Associates

Geotechnical  
Engineering


Hirata & Associates, Inc.

99-1433 Koahe Pl  
Aiea, HI 96701  
tel 808.486.0787  
fax 808.486.0870

## MEMORANDUM

March 31, 2010  
W.O. 10-4907.0

TO: Mr. Chris Scott  
Geosyntec Consultants Inc.  
via email: [cscott@geosyntec.com](mailto:cscott@geosyntec.com)

FROM: David Kitamura 

RE: Laboratory Test Results for 3" minus Geocell Material (Bag #6)  
Kekaha Landfill: Phase II Lateral Expansion  
Kekaha, Kauai, Hawaii

As requested, laboratory testing was performed on the 3" minus Geocell material for the above referenced project. Geosyntec provided us with a bulk soil sample from an onsite stockpile for laboratory testing, consisting of a sieve analysis test. This memo presents the results for the sieve analysis. Based on our sieve analysis test results, the material was classified as poorly-graded gravel with a corresponding Unified Soil Classification system symbol of GP. The sieve analysis results are summarized below:

<u>Test</u>	<u>Result</u>	
	<u>Sieve size</u>	<u>Percent finer (%)</u>
Sieve Analysis (ASTM C136)	3"	100.0 ✓
	1-1/2"	43.5 ✓
	3/4"	1.1
	#4	0.9
	#40	0.5
	#200	0.1 ✓

Feel free to call us if you have any questions.

104907memorandum006SieveBag6.wpd





**BENTOMAT® FLW CERTIFIED PROPERTIES  
KEKAHA SANITARY LANDFILL PHASE II EXPANSION  
JANUARY 2010**

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY ft <sup>2</sup>	REQUIRED VALUES
Bentonite Swell Index <sup>1</sup>	ASTM D 5890	1 per 50 tonnes	24 mL/2g min. ✓
Bentonite Fluid Loss <sup>1</sup>	ASTM D 5891	1 per 50 tonnes	18 mL max. ✓
Cap Geotextile Mass/Area <sup>2</sup> (nonwoven)	ASTM D 5261	200,000 ft <sup>2</sup>	5.8 oz/yd <sup>2</sup> MARV ✓
Carrier Geotextile Mass/Area <sup>2</sup> (scrim-reinforced nonwoven)	ASTM D 5261	200,000 ft <sup>2</sup>	5.9 oz/yd <sup>2</sup> MARV ✓
GCL Mass/Area <sup>3</sup>	ASTM D 5993	40,000 ft <sup>2</sup>	0.82 lb/ft <sup>2</sup> min ✓
Bentonite Mass/Area <sup>3</sup>	ASTM D 5993	40,000 ft <sup>2</sup>	0.75 lb/ft <sup>2</sup> min ✓
GCL Tensile Strength <sup>4</sup>	ASTM D 6768	200,000 ft <sup>2</sup>	45 lbs/in MARV ✓
GCL Peel Strength <sup>4</sup>	ASTM D 6496	40,000 ft <sup>2</sup>	3.5 lbs/inch min. ✓
GCL Index Flux <sup>5</sup>	ASTM D 5887	270,000 ft <sup>2</sup>	1 x 10 <sup>-8</sup> m <sup>3</sup> /m <sup>2</sup> /sec max.
GCL Hydraulic Conductivity <sup>5</sup>	ASTM D 5887	270,000 ft <sup>2</sup>	5 x 10 <sup>-9</sup> cm/sec max ✓
GCL Hydrated Internal Shear Strength <sup>6</sup>	ASTM D 5321 ASTM D 6243	Periodic	500 psf (24 kPa) typ.

*Bentomat FLW is a reinforced GCL consisting of a layer of sodium bentonite between a scrim-reinforced nonwoven geotextile and a nonwoven geotextile, which are needlepunched together.*

**Notes**

<sup>1</sup> Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

<sup>2</sup> Geotextile property tests performed on the geotextile components before they are incorporated into the finished GCL product.

<sup>3</sup> Bentonite mass/area reported at 0 percent moisture content.

<sup>4</sup> All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request, tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

<sup>5</sup> Index flux and permeability testing with deaired distilled/deionized water at 80 psi (551kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of 5x10<sup>-9</sup> cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

<sup>6</sup> Peak values measured at 200 psf (10 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

TR 401-BMFLW-KEKAHA LF  
Revised 01/10

800.527.9948 Fax 847.577.5566

For the most up-to-date product information, please visit our website, [www.cetco.com](http://www.cetco.com).

A wholly owned subsidiary of AMCOL International Corporation. The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

# High Density Polyethylene Micro Spike® Liner



## Product Data

Property	Test Method	Values				
Thickness, nominal (mm)		30 (.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Thickness (min. ave.), mil (mm)	ASTM D5994*	29 (.71)	38 (.95)	57 (1.43)	76 (1.90)	95 (2.38)
Thickness (lowest indiv. for 8 of 10 spec.), mil (mm)	ASTM D5994*	27 (.68)	36 (.90)	54 (1.35)	72 (1.80)	90 (2.25)
Thickness (lowest indiv. for 1 of 10 spec.), mil (mm)	ASTM D5994*	26 (.64)	34 (.85)	51 (1.28)	66 (1.70)	85 (2.13)
<i>*The thickness values may be changed due to project specifications (i.e., absolute minimum thickness)</i>						
Asperity Height (min. ave.), mil (mm)	GRI GM12	16 (.41)	16 (.41)	16 (.41)	16 (.41)	16 (.41)
Density, g/cc, minimum	ASTM D792, Method B	0.94	0.94	0.94	0.94	0.94
Tensile Properties (ave. both directions)	ASTM D6693, Type IV					
Strength @ Yield (min. ave.), lb/in width (N/mm)	2 in/minute	66 (11.6)	88 (15.4)	132 (23.1)	176 (30.8)	220 (38.5)
Elongation @ Yield (min. ave.), % (GL=1.3in)	5 specimens in each direction	13	13	13	13	13
Strength @ Break (min. ave.), lb/in width (N/mm)		66 (11.6)	88 (15.4)	132 (23.1)	176 (30.8)	220 (38.5)
Elongation @ Break (min. ave.), % (GL=2.0in)		350	350	350	350	350
Tear Resistance (min. ave.), lbs. (N)	ASTM D1004	23 (102)	30 (133)	45 (200)	60 (267)	72 (320)
Puncture Resistance (min. ave.), lbs. (N)	ASTM D4833	60 (267)	90 (400)	120 (534)	150 (667)	180 (801)
Carbon Black Content (range in %)	ASTM D4218	2-3	2-3	2-3	2-3	2-3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates for 10 views: 9 views in Cat. 1 or 2, and 1 view in Cat. 3				
Stress Crack Resistance (Single Point NCTL), hours	ASTM D5397, Appendix	300	300	300	300	300
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O <sub>2</sub>	≥100	≥100	≥100	≥100	≥100
Melt Flow Index, g/10 minutes	ASTM D1238, 190°C, 2.16kg	≤1.0	≤1.0	≤1.0	≤1.0	≤1.0
Oven Aging	ASTM D5721	80	80	80	80	80
with HP OIT, (% retained after 90 days)	ASTM D5885, 150°C, 500psi O <sub>2</sub>					
UV Resistance	GRI GM11	20hr. Cycle @ 75°C/4 hr. dark condensation @ 60°C				
with HP OIT, (% retained after 1600 hours)	ASTM D5885, 150°C, 500psi O <sub>2</sub>	50	50	50	50	50

These product specifications meet or exceed GRI's GM13

## Supply Information (Standard Roll Dimensions)

Thickness		Width		Length		Area (approx.)		Weight (Average)	
mil	mm	ft	m	ft	m	ft <sup>2</sup>	m <sup>2</sup>	lbs	kg
30	.75	23	7	600.1	182.9	13,782	1,280	3,325	1,510
40	1.0	23	7	600.1	182.9	13,782	1,280	3,325	1,510
60	1.5	23	7	410.1	125	9,419	875	3,356	1,522
80	2.0	23	7	328.1	100	7,535	700	3,306	1,500
100	2.5	23	7	246.1	75	5,651	525	3,167	1,436

### Notes:

All rolls are supplied with two slings. All rolls are wound on a 6 inch core. Special roll lengths are available on request.

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, it is the users responsibility to determine the suitability for their own use of the products described herein. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Agru/America as to the effects of such use or the results to be obtained, nor does Agru/America assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

500 Garrison Road, Georgetown, South Carolina 29440

843-546-0600

800-373-2478

Fax: 843-527-2738

email: salesmkg@agruamerica.com

www.agruamerica.com





**Kekaha Sanitary Landfill Phase 2**  
**Kekaha, HI**

Agru America, Inc. will confirm that the material shall be first quality new polyethylene resin containing no more than 2 % clean recycled polymer by weight.

*Paul Barker* (with a circled "v" next to the signature)

---

Paul W. Barker  
Technical Director

Date: November 3, 2009

For more information and technical assistance contact:

Chevron Phillips Chemical Company LP  
 Box 4910  
 Woodlands, TX 77387-4910  
 800.231.1212



PREMIUM EXTRUSION AND RIGID PACKAGING RESINS

## Marlex® K307

MEDIUM DENSITY POLYETHYLENE

This medium density, high molecular weight hexene copolymer is tailored for geomembrane applications that require:

- Outstanding ESCR
- Broad fusion range
- Excellent melt strength
- Good processability

Typical geomembrane applications for K307 include:

- Landfill liners
- Gasoline and chemical tank containment liners
- Tunnel moisture barriers
- Mine tailing collection projects

This resin meets these specifications:

- ASTM D4978 - PE 225
- GRI-GM13 except carbon black requirements
- FDA 21 CFR 177.1520(c) 3.1a, use conditions C through G per 21 CFR 176.170(c). Volume of food contacting article must be equal to or greater than 5 gallons.

NOMINAL PHYSICAL PROPERTIES <sup>1</sup>	English	SI	Method
Density	—	0.937 g/cm <sup>3</sup>	ASTM D1505
Flow Rate (HMI, 190/21.6)	—	21.0 g/10 min	ASTM D1238
Tensile Strength at Yield, 2 in/min, Type IV bar	2,900 psi	20 MPa	ASTM D638
Elongation at Break, 2 in/min, Type IV bar	800%	800%	ASTM D638
Flexural Modulus, Tangent - 16:1 span:depth, 0.5 in/min	120,000 psi	830 MPa	ASTM D790
ESCR, Condition B (10% Igepal), F <sub>50</sub>	>1,500 h	>1,500 h	ASTM D1693
ESCR, Condition C (100% Igepal), F <sub>50</sub>	>1,500 h	>1,500 h	ASTM D1693
SP-NCTL	>900 h	>900 h	ASTM D5397 (Appendix)
Durometer Hardness, Type D (Shore D)	57	57	ASTM D2240
Vicat Softening Temperature, Loading 1, Rate A	221°F	105°C	ASTM D1525
Heat Deflection Temperature, 66 psi, Method A	137°F	58°C	ASTM D648
Brittleness Temperature, Type A, Type I specimen	<403°F	<75°C	ASTM D746
Tensile Impact, Type S bar	190 ft-lb/in <sup>2</sup>	400 kJ/m <sup>2</sup>	ASTM D1822

1. The nominal properties reported herein are typical of the product, but do not reflect normal testing variance and therefore should not be used for specification purposes. Values are rounded. The physical properties were determined on compression molded specimens that were prepared in accordance with Procedure C of ASTM D4703, Annex A1.

MSDS #240370

Revision Date July, 2004

Another quality product from



Before using this product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the product is suited and the information is applicable to the user's specific application. Chevron Phillips Chemical Company LP does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, or allegedly arising from any usage of any trade or from any course of dealing in connection with the use of the information contained herein or the product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or the product itself. Further, information contained herein is given without reference to any intellectual property issues, as well as federal, state or local laws which may be encountered in the use thereof. Such questions should be investigated by the user.



# TNS Advanced Technologies

681 DeYoung Road  
Greenville, SC 29651

(864) 968-0592 Tel  
(864) 879-4639 Fax

11/5/2009

REF: TNS E160  
Kekaha Sanitary Landfill

Northwest Linings & Geotextile Products, Inc.

Dear Sir/Madam:

This is to certify that TNS E160 is a polypropylene, nonwoven, needle-punched fabric. The fabric is comprised of 98% Polypropylene, and 2% Carbon Black and other additives. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. TNS E160 has been continuously inspected for needles and found to be needle free. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

<u>FABRIC PROPERTY</u>	<u>TEST METHOD</u>	<u>UNITS</u>	<u>M.A.R.V</u>
Weight	ASTM D 5261	oz/sqyd	16.0 ✓
Grab Tensile	ASTM D 4632	lbs	370 ✓
Grab Tensile Elongation	ASTM D 4632	%	50 ✓
Trap Tear	ASTM D 4533	lbs	145 ✓
Puncture	ASTM D 4833	lbs	170 ✓
UV Resistance(500 hrs)	ASTM D 4355	% retained	70 ✓

*Marshall O. Gaddy*

Marshall O. Gaddy  
Quality Control Manager



681 DeYoung Rd.  
Greer, SC 29651  
(864)968-0592

Geotextile Product Description Sheet

**Style TNS E160**  
**Kekaha Sanitary Landfill**

TNS E160 is a nonwoven geotextile produced by needlepunching 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E160 conforms to the physical property values listed below:

Fabric Property	Test Method	Units	Minimum Average Roll Value
Weight	ASTM D 5261	oz/sq.yd.	16.0 ✓
Grab Tensile	ASTM D 4632	lbs.	370 ✓
Grab Elongation	ASTM D 4632	%	50 ✓
Trap Tear	ASTM D 4533	lbs.	145 ✓
Puncture	ASTM D 4833	lbs *	170 ✓
UV Resistance after 500 hrs.	ASTM D 4355	% Strength Retained	70 ✓
<b>Packaging</b>			
Roll Dimensions-Feet			15 x 360
Square Yards Per Roll			600
Estimated Roll Weight-Lbs.			620

\* At time of manufacturing, handling may change these properties.

\*\* Modified

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies cannot anticipate all conditions under which TNS product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.



# TNS Advanced Technologies

681 DeYoung Road  
Greenville, SC 29651

(864) 968-0592 Tel  
(864) 879-4639 Fax

12/16/2009

REF: TNS E060  
Kekaha Sanitary Landfill

Northwest Linings & Geotextile Products, Inc.

Dear Sir/Madam:

This is to certify that TNS E060 is a polypropylene, nonwoven, needle-punched fabric. The fabric is comprised of 98% Polypropylene, and 2% Carbon Black and other additives. TNS E060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. TNS E060 has been continuously inspected for needles and found to be needle free. Polypropylene is stable within a pH range of 2 to 13. TNS E060 conforms to the physical properties listed in the following table:

<u>FABRIC PROPERTY</u>	<u>TEST METHOD</u>	<u>UNITS</u>	<u>M.A.R.V</u>
Weight	ASTM D 5261	oz/sqyd	6.0 ✓
A.O.S.	ASTM D 4751	U.S. Sieve	70 ✓
Permittivity	ASTM D 4491	1/sec	1.5 ✓
Permeability	ASTM D 4491	cm/sec	.30 ✓

*Marshall O. Gaddy*

Marshall O. Gaddy  
Quality Control Manager



681 DeYoung Rd.  
Greer, SC 29651  
(864)968-0592

Geotextile Product Description Sheet

**Style TNS E060**  
**Kekaha Sanitary Landfill**

TNS E060 is a nonwoven geotextile produced by needlepunching synthetic staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E060 conforms to the physical property values listed below:

Fabric Property	Test Method	Units	Minimum Average Roll Value
Weight	ASTM D 5261	oz/sq.yd.	6.0 ✓
Permittivity*	ASTM D 4491	1/sec	1.5 ✓
AOS	ASTM D 4751	U.S. Sieve	70 ✓
Permeability*	ASTM D 4491	cm/sec	.30 ✓
Packaging			
Roll Dimensions-Foot			12.5 x360
Square Yards Per Roll			500
Estimated Roll Weight-Lbs.			220

\* At time of manufacturing, handling may change these properties.

\*\* Modified

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies cannot anticipate all conditions under which TNS product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.



**NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.**

• 21000 77<sup>th</sup> Avenue South • Kent, WA 98032 •

Phone: (253) 872-0244 • Fax: (253) 872-0245

www.northwestlinings.com

**LETTER OF TRANSMITTAL**

<b>TO</b>	<b>Goodfellow Brothers Inc.</b>	<b>DATE:</b> February 1, 2010	<b>JOB NO.:</b> N09150
	P.O. Box 3029	<b>ATTENTION:</b> Jeff Griffin	
	Lihue, HI 96766	<b>RE:</b> Kekaha Sanitary Landfill Phase II Expansion/Cell 1 liner-Geomembrane submittals	
	jeffg@goodfellowbros.com		

WE ARE SENDING YOU:     Attached     Under Separate Cover via \_\_\_\_\_ the following items:

Shop Drawings     Prints     Plans     Specifications     Samples

Copy of Letter     Change Order     Submittals     Warranties     Other

Copies	Specification #	Description
1		NWL 's Project memo re: ATRA Key utilization in the project.
1		Presto TK-89 Tendon specification sheet.
1		Presto ATRA Clip Information materials

These are transmitted as checked below:

For Approval     Approved as submitted     Resubmit     Copies for Approval

For your use     Approved as noted     Submit     Copies for distribution

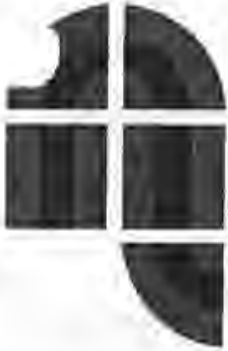
For review and comment     Returned for corrections     Return     Corrected Prints

For bids due \_\_\_\_\_     Other \_\_\_\_\_

Prints returned after loan to us

REMARKS:

COPY TO: \_\_\_\_\_ SIGNED: S.G. Jr.



**NORTHWEST LININGS &  
GEOTEXTILE PRODUCTS, Inc.**

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KENT, WA 98032

253-872-0244

FAX 253-872-0245

800-729-6954 Toll Free

E-Mail: [www.northwestlinings.com](http://www.northwestlinings.com)

February 1, 2010

SUBMITTAL MEMO

**TO: Jeff Griffin @ Goodfellow Brothers, Inc.**

**PROJECT: Kekaha Sanitary Landfill Phase II Expansion / Cell 1**

**RE: Use of Presto Atra Key in the Geocell System**

*Northwest Linings, Inc. proposes to use the new Presto Atra Key Standard connection on Geoweb section in lieu of the staplers as illustrated in the project drawing Sheet 11- Section 3: Geocell Installation and anchoring detail on the following reasons:*

- 1. Presto ATRA Key is a turn-key device designed for contractors to eliminate the hassles of stapling;*
- 2. The keys not only reduce installation time and cost, **they are three times stronger than staples**, giving more secure load-transfer connection than with other devices*
- 3. It Eliminates worker injuries associated with jammed or misfired staplers*
- 4. ATRA Key is made of high-strength aluminized metal*

*Please refer to attached information documents for the Geocell system.*





**GEOSYSTEMS**  
GLOBAL LEADER • GLOBAL PARTNER

**TURN-KEY INNOVATION  
IN CONSTRUCTION TOOLS**

The ATRA® Key is the newest innovation by Presto Geosystems for faster and more cost-efficient construction of Geoweb® projects.

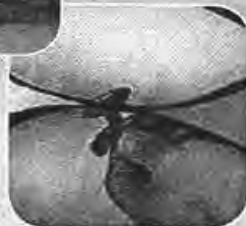
Developed for installation speed, productivity and overall economics, the versatile ATRA Key connects Geoweb sections with one quick and easy turn. The ATRA Key is suitable for connecting Geoweb sections through material slots both end-to-end and side-to-side, providing a more secure load-transfer connection than with other devices.

The ATRA Key is a safe, secure and strong device that offers contractors significant benefits over traditional stapling methods.



**ATRA® KEY**  
GEOWEB® CONNECTION ACCESSORY

PRODUCT OVERVIEW



Patent Pending

**FIVE KEYS to COST SAVINGS**



**1 EQUIPMENT SAVINGS**

Eliminates equipment needs and costs: Does not require air compressors, generators, pneumatic staplers or staples.

Eliminates equipment and production down-time caused by jammed staplers or equipment problems.



**2 ACCESSIBILITY AND PORTABILITY**

Easier to maneuver on steep slopes than with stapling operations.

Transports easily to remote or difficult-to-access locations; requires no electricity as with air compressors.



**3 LABOR SAVINGS**

Saves significant labor costs; requires only one worker to connect Geoweb® sections vs. two workers required for standard stapling operations.



**4 SAFETY**

Eliminates potential injury to workers caused by use of pneumatic staplers.



**5 LONGEVITY**

Lasts longer than staples: heavy-duty steel material provides long life (key for critical applications).





***Polyester Tendons***

The polyester tendons shall be manufactured from bright, high-tenacity, industrial-continuous filament polyester yarn woven into a braided strap. Elongation shall be 9 – 15% at break. The tendon reference name, diameter/width and minimum break strength shall be as shown in Table 6.

**Table 6 Polyester Tendons**

Reference Name	Tendon Diameter / Width		Tendon Minimum Break-strength	
	mm	In	kN	lbf
TP-31	13	0.500	3.11	700
TP-67	19	0.750	6.70	1506
TP-93	19	0.750	9.30	2090

***Kevlar® Aramid Tendons***

The Kevlar aramid tendons shall be woven strap having the reference name, width and minimum break-strength as shown in Table 7.

**Table 7 Kevlar® Aramid Tendon**

Reference Name	Tendon Diameter / Width		Tendon Minimum Break-strength	
	mm	In	kN	Lbf
TK-89	10	0.375	8.90	2000
TK-133	16	0.625	13.24	3000
TK-178	19	0.75	17.8	4000

***Polypropylene Tendons***

The polypropylene tendons shall be a 3-strand twisted rope having the reference name, diameter and minimum break-strength as shown in Table 8.

**Table 8 Polypropylene Tendon**

Reference Name	Tendon Diameter / Width		Tendon Minimum Break-strength	
	mm	in	kN	Lbf
TPP-44	6 dia	0.25 dia	4.40	990

***Anchoring Requirements***

***Specifier Choice for Anchoring Systems***

The specifier shall determine which of the anchoring methods are required for the application. NOTE: ATRA Clips, ATRA Keys and ATRA® GFRP Anchors are available from Presto Geosystems.

Geoweb sections shall be anchored in accordance with the construction drawings. The size, type and distribution of anchors shall be in accordance with the construction drawings.





## The Presto ATRA® Clip

The ATRA® Clip, illustrated in Figure 1, is a molded, high-strength polyethylene device developed by Presto Geosystems. The ATRA Clip is used on a stake to form the ATRA® Anchor as illustrated in Figure 2 or as a load transfer restraint pin as illustrated in Figure 15.

The ATRA Clip provides time and material savings during the installation of the Presto Geoweb system.

The ATRA® Clip is available in two styles:

- 1) For US applications to fit #4 rebar
- 2) For Metric applications to fit 10-12 mm diameter rods



Figure 1 The ATRA® Clip



Figure 2 The ATRA® Anchor

## The ATRA® Anchor System

### Benefits

The ATRA Anchor offers unique advantages over other anchoring methods.

**1) Both metal and non-metallic materials can be used as the ATRA stake.**

The ATRA stake material can be selected based on site soil conditions. If long-term durability is desirable, the sand coated, Glass Fiber Reinforced Polymer (GFRP) stake is the recommended material rather than more costly corrosion-resistant metals. Presto Geosystems provides pre-assembled ATRA GFRP Anchors in a variety of anchor lengths.

**2) Cost savings: ATRA Anchor vs. J-Pins.**

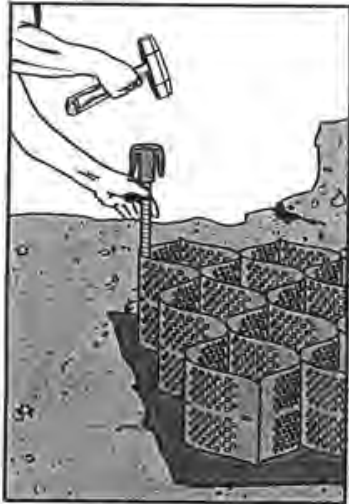
J-Pins require an additional 20%-25% material for the bend (the 'J' end) plus the cost of bending the stake. This cost can be substantial when larger quantities of stakes are required.

**3) ATRA Anchors are easier and faster to drive than J-pin anchors.**

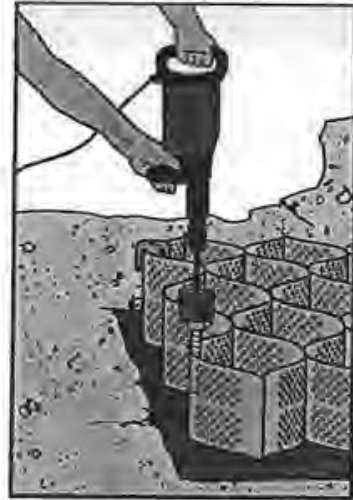
J-Pin anchors are very difficult to drive in harder soils. When hard soils are encountered, driving against the bend of the J-Pin, which is off the major axis of the stake, will result in bending of the stake. This causes further difficulties in driving the stake. The J-Pin's hook also does not make a secure connection with the Geoweb cell wall. The characteristics of the J-Pin lead to greater investment of time and money. The ATRA Anchor saves both time and money over alternative staking methods. Options for driving the ATRA Anchors are either by hand (hammer) or with electric driving tools as illustrated in Figures 3 and 4.

### PRESTO GEOSYSTEMS

670 N PERKINS STREET, APPLETON, WISCONSIN, USA 54914  
Ph: 920-738-1707 or 800-548-3424 ■ Fax: 920-738-1222  
e-mail: [INFO@PRESTOGEO.COM](mailto:INFO@PRESTOGEO.COM) [WWW.PRESTOGEO.COM/](http://WWW.PRESTOGEO.COM/)



**Figure 3 Driving the ATRA Anchor with a Hammer**



**Figure 4 Driving the ATRA Anchor with an Electric Driver**

***The ATRA® Anchor Installation***

***Making the ATRA® Anchor***

The ATRA Clip easily installs on the end of the ATRA stake to form the ATRA Anchor. The ATRA stake can be a #4 metal rebar or 10-12 mm diameter rod that is cut-to-length to meet the needs of the application. The ATRA Anchor is made by simply hammering the ATRA Clip onto the ATRA Stake or by hammering the ATRA Stake (metal stakes only) into the ATRA® Clip as illustrated in Figures 5 and 6. When properly made, the end of the ATRA Stake should be flush with, to within 3 mm (1/8 in) maximum above the top of the ATRA Clip.



**Figure 5 Inserting the ATRA Clip on the Stake**



**Figure 6 Inserting the Stake into the ATRA Clip**





### Using the ATRA® Anchor with Geoweb sections

The ATRA Anchor can directly hold Geoweb sections down as illustrated in Figures 7 and 8. The ATRA Anchor is driven so the arm of the ATRA Clip is inserted through the Geoweb cell wall slot, or passes over the Geoweb cell wall providing direct hold-down as well as resistance to sliding and uplift forces.



Figure 7 ATRA Anchor Integrated with Cell-Wall Slots



Figure 8 ATRA Anchor Connected Over the Cell Wall

### Using the ATRA® Anchor with tendoned Geoweb sections

The ATRA Anchor can indirectly hold Geoweb sections in place when the arm of the clip passes over a tendon as illustrated in Figure 9. Greater hold-down can be obtained by passing the tendon under both arms of the ATRA Clip as illustrated in Figures 10 and 11.

Greater resistance to sliding forces can be obtained when the tendon wraps around the clip and under both arms as illustrated in Figures 12 and 13.



Figure 9 ATRA Anchor and tendon anchoring



Figure 10 Half Wrap

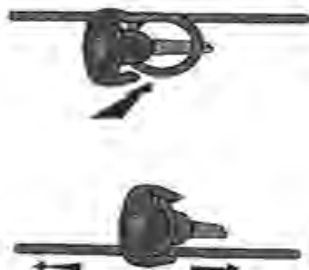


Figure 11 Full Wrap



Figure 12 Double Wrap



Figure 13 Under-Arm Wrap



The ATRA Anchor is also used at the end of the tendons as shown in Figure 14 to provide crest and toe anchorage for Geoweb sections used in slope and channel protection applications.

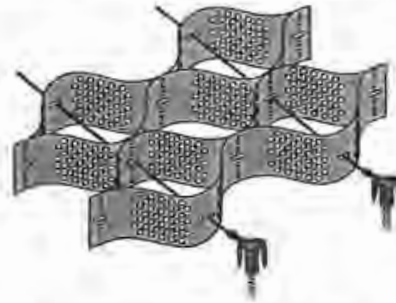


Figure 94 ATRA Anchor for Crest and Toe Anchorage

### The ATRA® Clip Restraint Pin

#### Benefits

The ATRA Clip used as a restraint pin, transfers sliding load forces from the Geoweb cell to the tendon. See Figure 15.

Cost savings can be realized when using the ATRA Clip. Securing tendons to other mechanisms, such as straight pins, is difficult. The ATRA Clip arms allow for the rapid securing of tendons using the Moore Hitch. See Figure 17 for the Moore Hitch illustration.

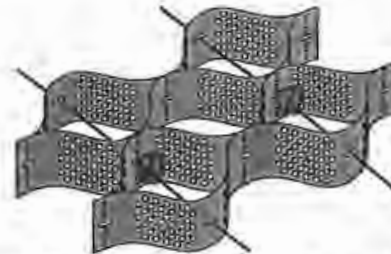


Figure 15 ATRA Load Transfer Restraint Pin

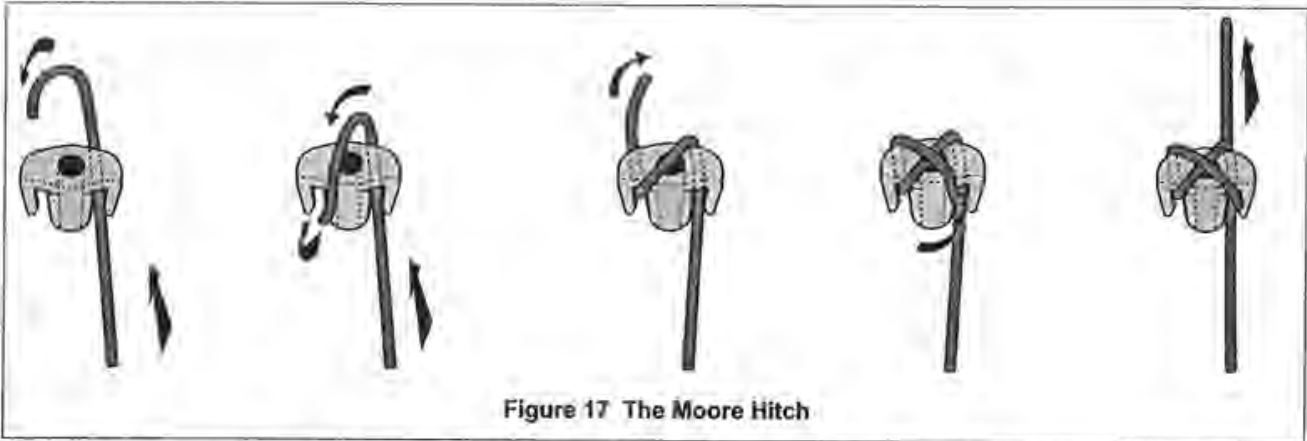
#### ATRA® Clip Restraint Pin Installation

1. After the tendons are inserted in the collapsed Geoweb section and the section is expanded, determine the cells that are the load transfer points by referring to the engineering details. ATRA Clips are to be inserted in these cell locations.
2. The location on the tendon where the ATRA Clip is to be tied is the point where the tendon intersects the up-slope cell wall as shown in Figure 15.
3. The ATRA Clip can be attached to the tendon either moving down slope or up slope.
  - If moving up slope, secure the tendon at the bottom of the slope to an ATRA Anchor before starting. See Figure 14.
  - If moving down slope, secure the tendon at the top of the slope to an ATRA Anchor illustrated in Figure 14 or deadman anchor illustrated in Figure 17 before starting.
  - In both cases, cut the tendon long enough to allow for all the knots. Leave plenty of extra slack in the tendon for the Moore Hitch to be used for the load transfer.
4. Use the Moore Hitch as illustrated in Figure 18 to secure the tendon to the ATRA Clip. Other knots are not acceptable.



Figure 10 Tendon Secured to Deadman Anchor





**Figure 17 The Moore Hitch**

5. Place the arm of the ATRA Clip over the tendon and move the clip up or down on the tendon to ensure contact with the Geoweb cell wall. Once the ATRA Clip is properly positioned, the Moore Hitch should be finished.
6. Move to the next cell along the tendon and repeat the appropriate steps.

***Special Construction Technique Using ATRA® Clip Restraint Pins***

When slopes are steep or difficult to work on, such as working over a geomembrane, the following procedure is used to avoid working directly on the steep slope.

- After inserting the tendons through the unexpanded Geoweb section, expand the Geoweb section at the top of the slope embankment or other flat area.
- Attach all ATRA Clip Restraint Pins to the tendons using the Moore Hitch in the proper cells to make a pre-assembled section.
- Maintain a sufficient amount of tendon length for the top-of-slope anchoring method.
- Collapse the pre-assembled Geoweb section with the tendons and ATRA Clip Restraint Pins.
- Move the pre-assembled Geoweb section into its position at the top of the slope and secure the up-slope end with the appropriate anchoring system.
- Expand the pre-assembled Geoweb section down the slope and secure the down-slope end with the appropriate anchoring system.
- Prior to the infilling process, visually inspect ATRA Clip Restraint Pins to ensure they have maintained their position on the tendon.

**NOTE:** ATRA® is a registered trademark of Presto Products Company. The ATRA® Clip is patented.



## THE ATRA® CLIP OVERVIEW

### The ATRA® Clip

The ATRA® Clip, illustrated in Figure 1, is a molded, high-strength polyethylene device developed by Presto Products Company Geosystems' group. The ATRA® Clip is used as a restraint pin or an end cap on an ATRA® Stake, which forms the ATRA® Anchor system. The ATRA® Clip provides time and material savings during the installation of the Presto Geoweb system. NOTE: ATRA® is a registered trademark of Presto Products Company. The ATRA® Clip is patented.



Figure 1 The ATRA® Clip

### The ATRA® Anchor System

The ATRA® Clip easily installs on the end of the ATRA® Stake to form the ATRA® Anchor. The ATRA® Stake can be a 12-13 mm (½ in) glass fiber reinforced polymer (GFRP) rebar with a sand coating or a #4 metal rebar that is cut-to-length to meet the needs of the application. The ATRA® GFRP Stake is available from Presto with the ATRA® Clip already attached to form the ATRA® GFRP Anchor. ATRA® Anchors can be used several ways to quickly secure the Geoweb section in place as illustrated in Figure 3 and Figure 4. Significant savings can be realized through use of the ATRA® Anchor. Contact your authorized Presto Geosystems Distributor for additional details.

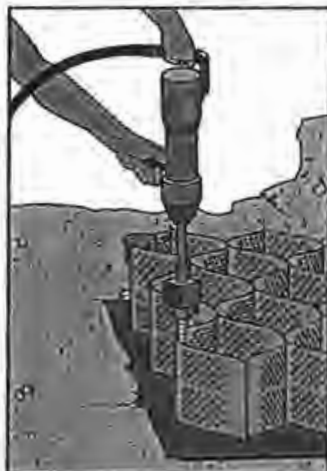


Figure 2

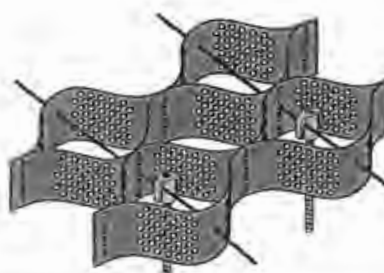


Figure 4



### The ATRA® Clip Restraint Pin

The ATRA® Clip used as a restraint pin, as illustrated in Figure 3, easily installs on the tendons, securing the Geoweb section in place on steeper slopes and over materials that cannot be penetrated with stakes such as very hard soils, rock and geomembranes. Significant savings can be realized through using the ATRA® Clip as a restraint pin. Contact your authorized Presto Geosystems Distributor or Representative for additional details.

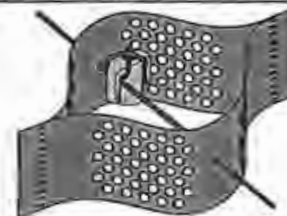
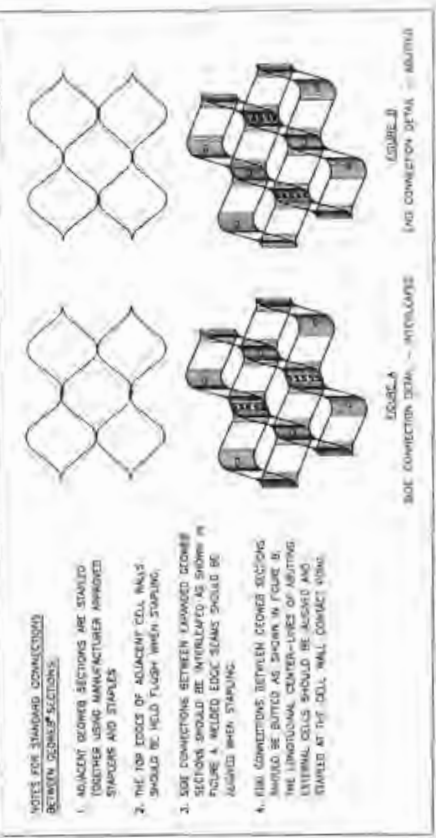


Figure 3

For Project Support and Order Placement  
Soil Stabilization Products Company, Inc.  
PO BOX 2779 Merced, CA 95344-0779

Ph: (800) 523-9992 or (209) 383-3296 Fax: (209) 383-7849

Website: [www.sspco.com](http://www.sspco.com) Email: [info@sspco.com](mailto:info@sspco.com)



- NOTES FOR STAGGERED CONNECTIONS BETWEEN GEOWEB SECTIONS:**
- ADJACENT GEOWEB SECTIONS ARE STAPLED TOGETHER USING MANUFACTURER APPROVED STAPLERS AND STAPLES.
  - THE TOP EDGES OF ADJACENT CELL UNITS SHOULD BE HELD FLUSH WHEN STAPLING.
  - JOINT CONNECTIONS BETWEEN EXPANDED GEOWEB SECTIONS SHOULD BE INTRODUCED AS SHOWN IN FIGURE A. RECESSED EDGE SEAMS SHOULD BE FORMED WITH STAPLING.
  - JOINT CONNECTIONS BETWEEN CONEED SECTION SHOULD BE AS SHOWN IN FIGURE B. THE LONGITUDINAL CENTER-LINES OF ADJACENT LATERAL CELLS SHOULD BE ALIGNED AND STAPLED AT THE CELL WALL CONTACT POINT.

**GEOWEB® PRODUCT CODE FORMAT**

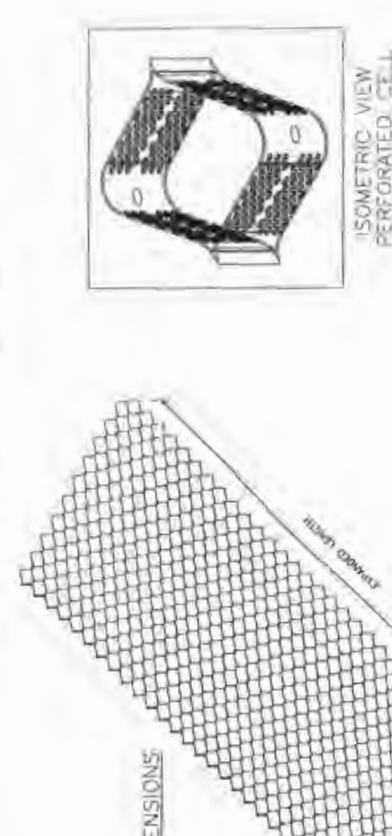
DESCRIPTION: (6 characters)  
 CELL TYPE: (1 character)  
 CELL SIZE: (1 character)  
 CELL WEIGHT: (1 character)  
 CELL LENGTH: (1 character)  
 CELL WIDTH: (1 character)  
 CELL HEIGHT: (1 character)

**GEOWEB® CELL SIZES**

CELL TYPE	CELL SIZE (mm)	CELL WEIGHT (g)	CELL LENGTH (mm)	CELL WIDTH (mm)	CELL HEIGHT (mm)	APPROX. OPEN AREA (%)	APPROX. TENSILE STRENGTH (kN)
CONEED	18	2.7	5.1	2.2	2.1	11.8	18.4
	21	4.1	5.1	3.1	3.1	14.4	21.8
	24	5.5	5.1	4.1	4.1	17.0	25.2
	27	6.9	5.1	5.1	5.1	19.6	28.6
EQUIDIA	18	2.7	5.1	2.2	2.1	11.8	18.4
	21	4.1	5.1	3.1	3.1	14.4	21.8
	24	5.5	5.1	4.1	4.1	17.0	25.2
	27	6.9	5.1	5.1	5.1	19.6	28.6

**GEOWEB® SECTION SIZES**

CELL TYPE	CELL SIZE (mm)	CELL WEIGHT (g)	CELL LENGTH (mm)	CELL WIDTH (mm)	CELL HEIGHT (mm)	APPROX. OPEN AREA (%)	APPROX. TENSILE STRENGTH (kN)
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	27	6.9	5.1	5.1	5.1	19.6	28.6
EQUIDIA	18	2.7	5.1	2.2	2.1	11.8	18.4
	21	4.1	5.1	3.1	3.1	14.4	21.8
	24	5.5	5.1	4.1	4.1	17.0	25.2
	27	6.9	5.1	5.1	5.1	19.6	28.6



PRESTO GEOSYSTEMS®

GEOWEB® CELL AND GEOWEB® SECTION DETAILS

DATE: APRIL 2008  
 SCALE: 1/2"=1'-0"  
 FULL NAME: PRESTO GEOSYSTEMS  
 PROJECT NUMBER: 1000014180







**Product Data She  
GW30V - 8 inch Depth**

**GEOWEB® SYSTEM PERFORMANCE & MATERIAL SPECIFICATION SUMMARY**

	Property	Value				Test Method	
Base Material	Material Composition	Polymer – Polyethylene with density of 58.4 - 60.2 lb/ft <sup>3</sup>				ASTM D 1505	
	Color	Black - from Carbon Black	Tan, Green, Other Colors with no heavy metal content		N/A		
	Stabilizer	Carbon black content 1.5% - 2% by weight	Hindered amine light stabilizer (HALS) 1.0% by weight of carrier		N/A		
	Minimum ESCR	5000 hr				ASTM D 1693	
Strip Properties	Sheet Thickness	50 mil -5% +10%				ASTM D 5199	
	Surface Treatment	<b>Performance:</b> The polyethylene strips shall be textured and perforated such that the peak friction angle between the surface of the textured / perforated plastic and a #40 silica sand at 100% relative density shall be no less than 85% of the peak friction angle of the silica sand in isolation when tested by the direct shear method per ASTM D 5321. The quantity of perforations shall remove 13.85% ± 0.5% of the cell wall area.		<b>Material:</b> The polyethylene strips shall be textured with a multitude of rhomboidal (diamond shape) indentations. The rhomboidal indentations shall have a surface density of 22 – 31 per cm <sup>2</sup> (140 – 200 per in <sup>2</sup> ). In addition, the strips shall be perforated with horizontal rows of 10 mm (0.4 in) diameter holes. Perforations within each row shall be 19 mm (0.75 in) on-center. Horizontal rows shall be staggered and separated 12 mm (0.50 in) relative to the hole centers. The edge of strip to the nearest edge of perforation shall be 8 mm (0.3 in) minimum and the centerline of the weld to the nearest edge of perforation shall be 18 mm (0.7 in) minimum. A slot with a dimension of 10 mm x 35 mm (3/8 in x 1 3/8 in) is standard in the center of the non-perforated areas and at the center of each weld.			
Cell & Seam Properties	Cell Details	Depth	Nominal Dimensions ±10%		Density per yd <sup>2</sup>	Nominal Area ±1%	
			Length	Width			
	GW30V	8 inch	11.3 inch	12.6 inch	18.2	71.3 in <sup>2</sup>	
	Short-term Seam Peel Strength	Cell Depth			Minimum Certified Cell Seam Strength		
8 inch			640 lbf				
Long-term Seam Peel Strength	Long-term seam peel-strength test shall be performed on all resin or pre-manufactured sheet or strips. A 4.0 in wide seam sample shall support a 160 lb load for a period of 168 hours (7 days) minimum in a temperature-controlled environment undergoing a temperature change on a 1-hour cycle from ambient room to 130°F. Ambient room temperature is per ASTM E 41.						
Section Properties	GW30V Nominal Section Dimension	Item Description	Variable Width	Variable Length	Area	Weight (lbs.)	Sections/Pallet
		GW30V80818P	7.7 ft to 9.2 ft	15.4 – 18.6 ft.	143 ft <sup>2</sup>	59.9	15
		GW30V80821P	7.7 ft to 9.2 ft	18.0 – 21.7 ft.	167 ft <sup>2</sup>	69.9	15
		GW30V80825P	7.7 ft to 9.2 ft	21.4 – 25.8 ft.	198 ft <sup>2</sup>	83.3	10
		GW30V80829P	7.7 ft to 9.2 ft	24.8 – 30.0 ft.	230 ft <sup>2</sup>	96.6	10
		GW30V80834P	7.7 ft to 9.2 ft	29.1 – 35.1 ft.	270 ft <sup>2</sup>	113.2	10
Certifications & Warranties	Geoweb® Material	Geoweb® sections are manufactured under a quality management system that is ISO-9001:2000 certified. For additional certification and warranty information, refer to the Presto Geosystems <i>Geoweb® Cellular Confinement System Material Specification</i> .					



## GEOWEB® LIMITED WARRANTY

### *Limited Warranty*

Presto Geosystems warrants each Geoweb® section which it ships to be free from defects in materials and workmanship at the time of manufacture. Presto's exclusive liability under this warranty or otherwise will be to furnish without charge to Presto's customer at the original f.o.b. point a replacement for any section which proves to be defective under normal use and service during the 10-year period which begins on the date of shipment by Presto. Presto reserves the right to inspect any allegedly defective section in order to verify the defect and ascertain its cause.

This warranty does not cover defects attributable to causes or occurrences beyond Presto's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation, improper alteration or improper application.

*PRESTO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WRITTEN OR ORAL, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, IN CONNECTION WITH THE GEOWEB® SYSTEM. IN NO EVENT SHALL PRESTO BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY OR FOR ANY OTHER REASON, INCLUDING NEGLIGENCE, IN CONNECTION WITH THE GEOWEB® SYSTEM.*

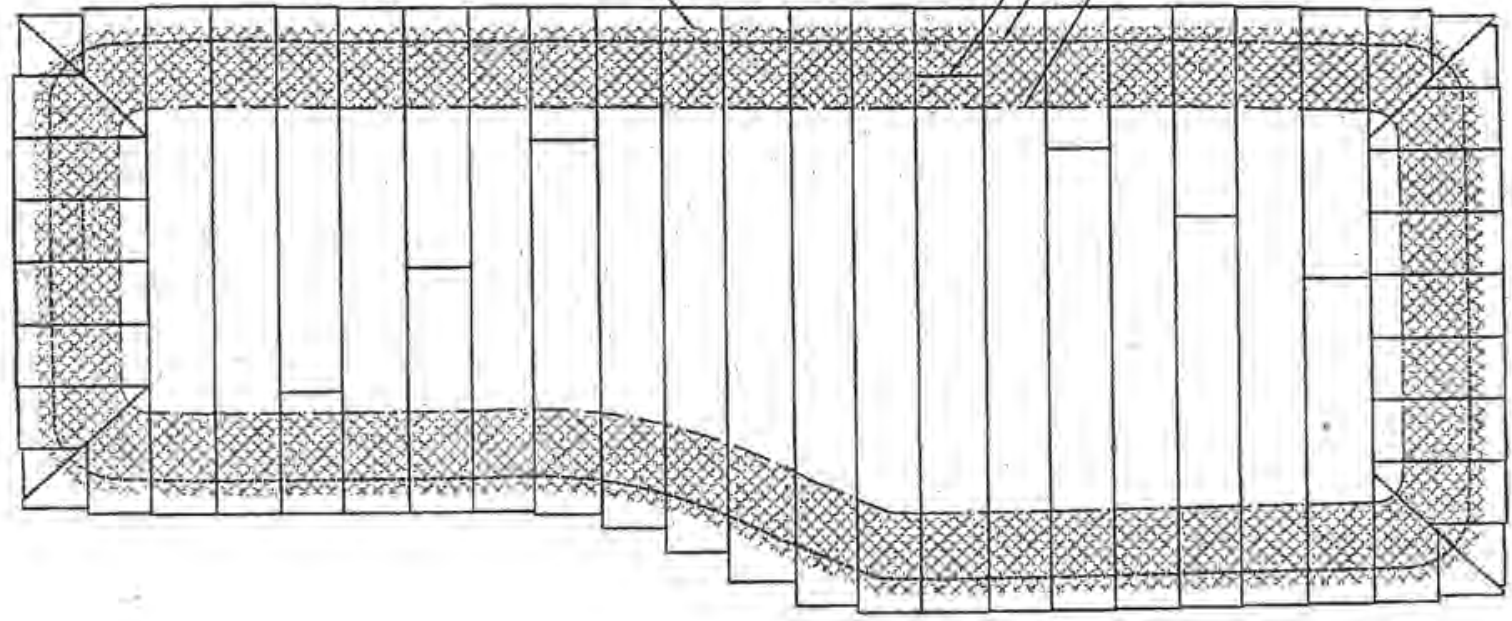
**Geosystems®, Geoweb®, and ATRA®** are registered trademarks of Presto Products Company.



Geocell on slopes only and extends 1.5' min into anchor trench

Butt seam  
 Top of slope  
 (El. 16- Perimeter = ± 1,306')  
 Toe of slope

22.5



note: exact number, position and sequence of panel installation will be determined in the field by the civil site supervisor.

*New Leachate Evaporation Pond  
 Proposed 60-mil Textured HDPE liner panel layout*

SHEET NO.	DETAIL 	<b>NORTHWEST LININGS &amp;          GEOTEXTILE PRODUCTS, Inc.</b> www.northwestlinings.com 21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX		JOB NAME: <i>Kekaha Sanitary Landfill</i>	
				JOB NO. N 0 9 1 5 0	
			DATE: 10 29 09	CHECKED: KL	
			BY: SG	SCALE: AS SHOWN	





**South Pacific Steel**  
*Corp*

*Letter of Transmittal*

To: GOODFELLOW BROS.  
Attention: KEITH SUGA  
Address: 3018 B AUKELE STREET  
LIHUE, KAUAI, HAWAII 96766

Date: 2/12/2010  
Phone: 808-241-4601  
Fax: 808-241-4605  
MAS90: 1448

**Subject:** KEKAHA LANDFILL EXPANSION **File No.** -2

*We Are Sending You*

Attached  Under Separate Cover Via: \_\_\_\_\_

*The following Items*

Rebar Placement Drawings  Plans  Other

Copies	Description	Drwg No.	Dated
NOTE:	DRAWINGS ARE 24X36		
8	CONCRETE PADS	S-1	2/12/10

*The Above Are Transmitted For*

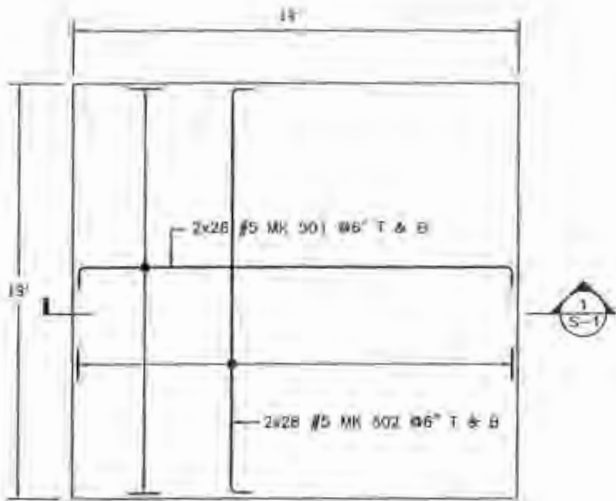
Approval  As requested  For your information  
 For your use  For review & comment  Other

Note: If you have any questions please contact the undersigned.

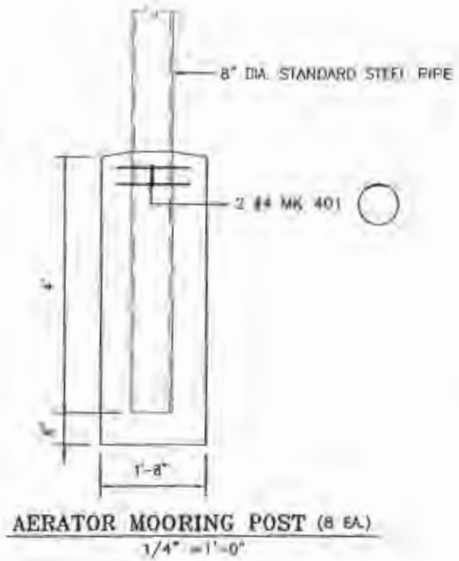
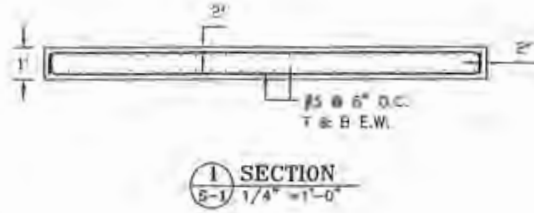
Via: EMAIL (keiths@goodfellowbros.com) & UPS 2/12/10  
C.C.: SUGI - EMAIL & UPS 2/12/10

South Pacific Steel Corp  
91-178 Kalaeloa Blvd Kapolei, HI 96707  
Telephone 808-682-IRON (4766)  
Fax 808-682-4732

By: Starla Gonzalez  
Plans Coordinator



**PLAN-CONCRETE PAD (2 EA)**  
1/4" = 1'-0"



**AERATOR MOORING POST (8 EA)**  
1/4" = 1'-0"

REBAR-CAD Software  
EADS - USA Inc.

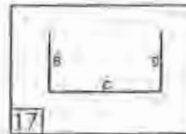
CUSTOMER: GOODFELLOW BROS  
PROJECT: KEKANA SANITARY LANDFILL  
LOCATION: KAUAI, HI  
MATERIAL FOR: CONCRETE PADS

JOB NO. 1448  
DWG. NO. S-1  
SHEET 1 of 1  
DATE 2/12/10  
DRAWN BY ROS  
REVISED

Bar Mark	Qty	Size	Total Length	Type	A'	B'	C'	D'	E'	F'	G'	H'	I'	J'	K'	L'	M'
401	16	#4	4' 3/4"	T3			3' 6"										
501	104	#5	15' 11"			8"	12' 8"	8"									
502	112	#5	14' 11"			8"	12' 8"	8"									

ALL DIMENSIONS ARE OUT TO OUT  
ALL STEEL A615 Grade 60  
EPOXY COATED, ASTM 775, GR 60

FOR TYPICAL BAR BONDS REFER TO  
CRSI MANUAL OF STANDARD PRACTICE



**South Pacific Steel Corp**

91-78 Kapahe Rd, Kapaa, Hawaii 96707 Tel: 808 832 8000/8100  
Fax: 808 832 4121 E-mail: [spsteel@comcast.net](mailto:spsteel@comcast.net)

Job title	Revision details	Date
REKANA LANDFILL EXPANSION		
Drawing title		
CONCRETE PADS		
DATE	REV	DATE
2/12/10		2/12/10

Contractor: GOODFELLOW BROS  
Ref. STRUCTURAL DWGS :-  
JOB NO. 1448  
SHEET 05

# 9G-EF (Mercury Free) Direct Acting Float Switch (B100)

✓ The 9G-EF is the most reliable non-mercury float switch. It is Teflon®-coated, non-differential float of Type 316 SS, measures 5.5" (13.97 cm) in diameter and is appropriate for a variety of applications, including sewage wet wells, storm water basins, water reservoirs, sludge tanks, irrigation canals and process sumps. The float operates reliably in even the most difficult environments. The 9G-EF can be used singly to sense an alarm level, but typically two or more switches are used in conjunction with our controllers to provide a float-based control system. The 9G-EF can be used as the redundant control sensor in larger automation installations.

#### Typical Specifications

Float switch body shall be constructed of Teflon®-coated, 20 gauge, 316 stainless steel housing measuring not less than 5 1/2" (13.97 cm) in diameter. A long life, high reliability, potted SPST magnetic reed switch rated for not less than 100 VA at up to 250 Volts shall be mounted inside the float and connected to a multi-stranded, 2 conductor plus ground, 16 gauge, CPE jacketed cable. The cord shall have fine strand conductors (not more than 34 gauge) made especially for heavy flexing service. The cable connection point shall be potted in epoxy providing a strong bond to the float and reed switch forming a water/moisture tight connection. A flexible Neoprene sleeve, not less than 1/8" (0.457 cm) thick, shall be provided over the CPE jacketed cable extending not less than 5" (12.7 cm) from the top of the mounting bracket extending down through the cable mounting bracket hinge point to the top of the float switch body, providing cable stress point relief and extended operational life.

A 316 stainless steel flanged cable mounting clamp assembly shall be supplied allowing pipe or cable mounting as specified below. The float cable-mounting bracket shall be flared on both sides providing hinge point stress relief to both sides of the cable.

The float switch assembly shall provide a minimum of two pounds of buoyancy in solutions with a specific gravity of 1.0 (water) and shall have an operating temperature rating of -31 to 194 degrees F (-35 to +90 degrees C).

The float switches shall be Model 9G-EF floats as manufactured by Siemens Water Technologies, Control Systems Products.

#### Features

- Mercury Free – Magnetic Reed Switch
- Long life and reliable operation
- Non-oxidizing contacts allow low DC voltage signals for use with intrinsic safety devices
- Non-stick surface
- High buoyancy
- Pipe or suspension mounting
- 3 year factory warranty

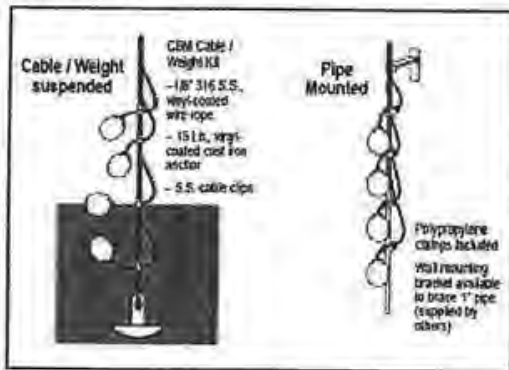




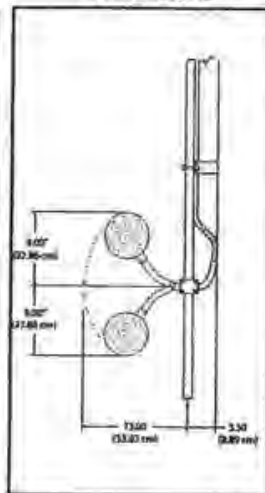
9G-EF (Mercury Free) Direct Acting Float Switch (B100)

Description	Part Number
<b>9G-EF (Mercury Free) NOTP Float Switch</b>	
Teflon coated 316 SS Float Switch w/1 N.O. Contact & 30' (9.144 m) Cable	6013520030
Teflon coated 316 SS Float Switch w/1 N.O. Contact & 60' (18.288 m) Cable	6013520060
<b>9G-EF (Mercury Free) NCTP Float Switch</b>	
Teflon coated 316 SS Float Switch w/1 N.C. Contact & 30' (9.144 m) Cable	6013530030
Teflon coated 316 SS Float Switch w/1 N.C. Contact & 60' (18.288 m) Cable	6013530060
<b>Mounting Hardware &amp; Accessories</b>	
9G Float Cable Clamp Assembly	6012120001
9G Float 1" (2.54 cm) Pipe Clamp Assembly	6011840001
316 SS cable suspension kit, 21' (6.4 m)	6014400020
316 SS cable suspension kit, 31' (9.448 m)	6014400030
316 SS cable suspension kit, 41' (12.496m)	6014400040
316 SS cable suspension kit, 61' (18.592 m)	6014400060
316 SS cable suspension kit, 81' (24.688 m)	6014400080
316 SS cable suspension kit, 101' (30.784 m)	6014400100
5 Float Suspension Mount, 2 piece bracket w/strain reliefs	8031340001
9G CL3 1" (2.54 cm) stainless steel pipe mount clamps (transducer or float mount)	6011340001
15# (6.8 kg) Anchor	xx-333-100
Float Cable/Anchor kit 30' (w/15lb (6.8 kg) anchor, 30' (9.144 m) SS cable, wall bracket, 5 cable clamp)	8032110003
Float Cable/Anchor kit 60' (w/15lb (6.8 kg) anchor, 60' (18.288 m) SS cable, wall bracket, 5 cable clamp)	8032110006
IS6 Six Circuit Intrinsically Safe (Switch Circuit) Barrier: 12-24V DC powered	6013160002
9G JCTF fiberglass junction box (supports up to XXXX floats)	6011020001

Typical Mounting



Pipe Mounting Dimensions



Complete Control Capabilities

Siemens Water Technologies offers a single, high-quality source for everything from simple level sensors to telemetry systems involving complex system control engineering and software. Based in Vadnais Heights, Minnesota, Control Systems is part of the Siemens Water Technologies leading global provider of industrial, municipal and residential water and wastewater treatment systems, products and services. As a major manufacturer/integrator with an extensive selection of specialized product lines in the areas of SCADA and telemetry, power equipment integration, automation and measurement, Control Systems is uniquely positioned to provide cost effective, comprehensive solutions for water, wastewater and process control and telemetry applications.

Siemens  
Water Technologies  
1239 Willow Lake Boulevard  
Vadnais Heights, MN 55110  
800.224.9474 phone  
651.766.2700 phone  
651.766.2701 fax

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CS-9GFFD-05-0308  
Subject to change without prior notice.

The information provided in this literature contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of the contract.

# IS6 Intrinsic Safety Barrier

The IS6 Intrinsic Safety Barrier is a six-circuit, shunt-diode barrier ON/OFF switch circuit interface that is used between Monitoring and Pump/Alarm Controller Equipment and its level sensor float switch circuitry to render such circuitry "intrinsically safe" and thus suited for installation in a hazardous location such as a sewage or freeway stormwater-handling pump station collection sump.

Powered by the associated Monitor/Controller, the IS6 Barrier has open-collector drivers that provide input sensor signals to the controller in response to the operation of level-sensing float switches in the hazardous location. The IS6 Barrier is most commonly used with our LS and 9G Float Switches, but it can be used with any general purpose simple switch device with N.O. or N.C. non-powered contacts within its application parameters.

✓ The IS6 module is designed to make its associated switches and circuitry suited for Class I, Division 1 or 2, Groups A, B, C and D, and Class II, Division 1 or 2, Groups E, F, and G hazardous locations as defined by the NEC (National Electrical Code). The IS6 is ideally suited for applications requiring compliance with UL 913 procedures pertaining to electrical control panels with intrinsically safe extensions to hazardous areas. It includes LED indicators for power and circuit activation.

## IS6 Product Specification

**Cable Lengths:** Cable lengths from the module to the switches are to be limited to 300 feet each, or a maximum of 18,000 pF and 60 uH per circuit.

**Hazardous Area Connections:** Entity parameters (per channel):

- Maximum voltage: 12.6 volts
- Maximum output current: 1.3 mA
- Maximum allowable capacitance: 0.018 uF
- Maximum allowable inductance: 0.06 mH

**IS6 Power:** The IS6 Module is typically powered by +10.5 to 25 VDC and requires a maximum of 50 mA from an associated monitor/controller, such as our CB1T, CMC15, CB2D, CB23, CB234 or DC power supply. The outputs of the IS6 are open-collectors capable of sinking up to 150 mA and withstanding up to 50 VDC.

**Operating Temperature Ranges:** -29° to +149° F (-20° to +65° C) ✓

**Outside Dimensions:** 4" high x 3" wide x 2-1/4" deep

## IS6 Typical Specifications

The float switch level sensors shall interface to the control circuitry via an intrinsic safety barrier. The barrier shall provide an intrinsically safe interface for up to six sensors located in a hazardous area rated Class 1, Division 1 or 2, Group A, B, C, and D, and Class II, Division 1 or 2, Groups E, F, and G. The barrier shall contain an LED indicator for each of up to six sensor inputs, providing visible indication of sensor actuation as well as an LED to indicate barrier "Power On" status. The intrinsic safety barrier shall be UL-listed for use in hazardous locations. ✓

## NEC Definition of Hazardous Locations

The NEC Handbook defines hazardous locations by Class, Division and Group as follows:

**Class I Locations** – Are those in which flammable gasses or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

**Class II Locations** – Are those which are hazardous because of the presence of combustible dust.

**Class III Locations** – Are those which are hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in air in quantities sufficient to produce ignitable mixtures.

**Division 1** – Locations in which hazardous concentrations in the air exist continuously, intermittently, or periodically under normal operating conditions.

**Division 2** – Locations in which hazardous concentrations are handled, processed, or used but are normally confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown.

**Group A** – Atmospheres containing acetylene.

**Group B** – Atmospheres containing hydrogen, or gasses or vapors of equivalent hazard, such as manufactured gas.

**Group C** – Atmospheres containing ethyl-ether vapors, ethylene, or cyclopropane.

**Group D** – Atmospheres containing gasoline, hexane, naphtha, benzene, butane, propane, alcohol, acetone, benzol, lacquer solvent vapors, or natural gas.

**Group E** – Atmospheres containing metal dust, including aluminum, magnesium, and their commercial alloys, and other metals of similarly hazardous characteristics.

**Group F** – Atmospheres containing carbon black, coal, or coke dust.

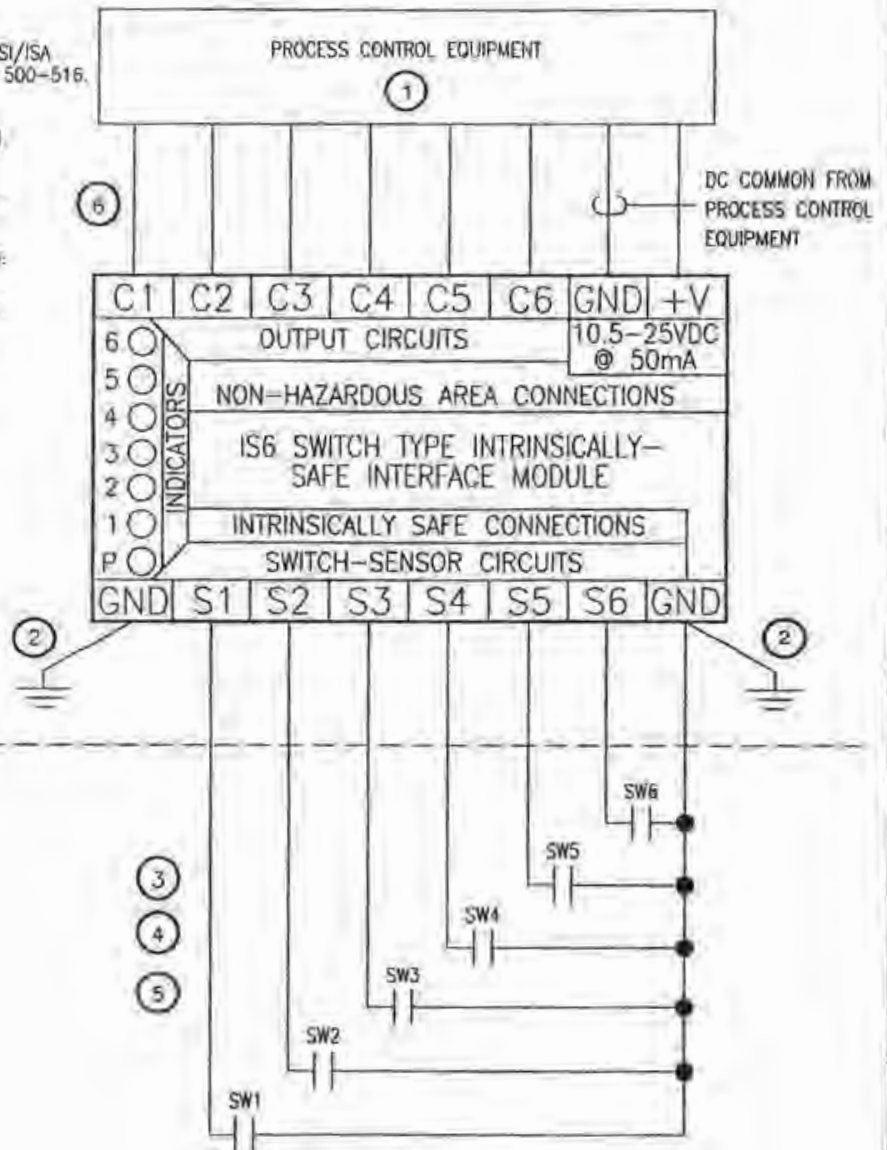
**Group G** – Atmospheres containing flour, starch, or grain dusts.





**NOTES:**

- 1 THE IS6 INTRINSIC SAFETY BARRIER SHALL NOT BE CONNECTED TO ANY EQUIPMENT WHICH USES OR GENERATES GREATER THAN 250 V.
- 2 BOTH GROUND TERMINALS SHALL BE CONNECTED TO A SUITABLE EARTH GROUND MEMBER IN A NON-HAZARDOUS AREA. THE DC RESISTANCE BETWEEN THE GROUND TERMINAL AND EARTH GROUND SHALL BE LESS THAN 1 OHM. REFERENCE NFPA 70, NEC ARTICLES 250 AND 504 FOR PROPER GROUNDING AND INTRINSIC SAFETY BARRIER INSTALLATION INFORMATION.
- 3 INTRINSICALLY SAFE WIRING MUST BE POSITIVELY SEGREGATED FROM NON-INTRINSICALLY SAFE WIRING BY SEPARATE CONDUITS, HOUSINGS AND GROUNDED METAL BARRIERS PER ANSI/ISA RP12.6, AND NFPA 70, NEC ARTICLES 500-516.
- 4 INTRINSICALLY SAFE WIRING FROM THE IS6 TO THE SWITCHES (SW1-SW6) LOCATED IN THE HAZARDOUS AREA MUST BE THROUGH SEALED CONDUITS WHICH ONLY CONTAIN THE IS6 CIRCUIT EXTENSIONS. PER ANSI/ISA RP12.6, AND NFPA 70, NEC ARTICLES 500-516.
- 5 THE MAXIMUM LENGTH OF EACH CABLE MUST NOT EXCEED 300 FEET OR A MAXIMUM OF 18,000 pF CAPACITANCE AND 60 uH INDUCTANCE.
- 6 THE IS6 OUTPUTS (C1-C6) ARE TRANSISTOR OPEN-COLLECTORS WHICH ARE CAPABLE OF SINKING 150mA EACH AT UP TO 50 VDC.



NON-HAZARDOUS AREA

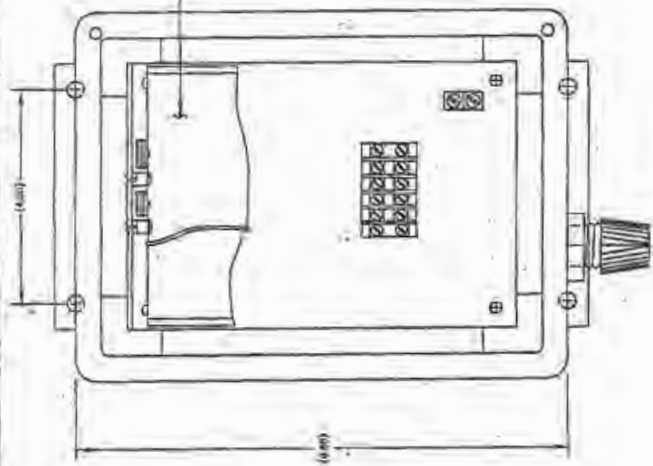
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HAZARDOUS AREA  
(PER NEC ARTICAL 500)  
CLASS I, DMSION 1  
GROUPS A, B, C, D:  
CLASS II, DIVISION 1  
GROUPS E, F, G  
CLASS III, DMSION 1

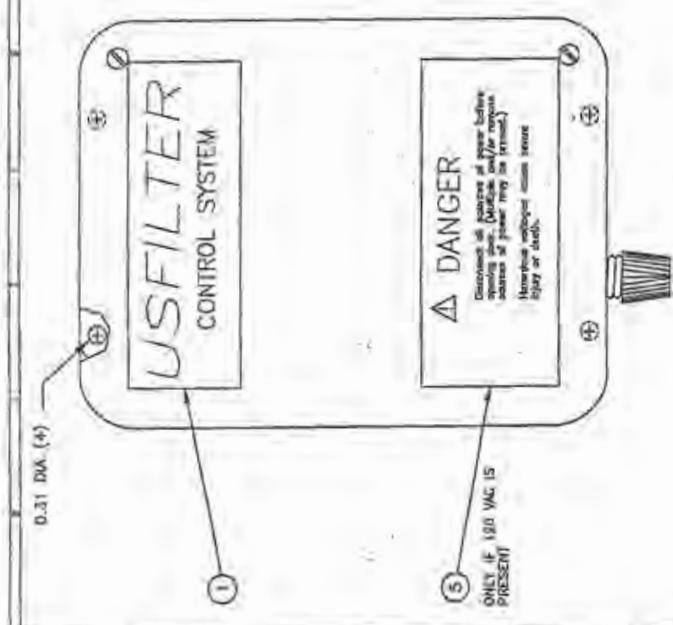
C	11040	11/8/01	UPDATED NOTES	MRB	TITLE					
B	11026	2/13/01	PER ECO	TP	INSTALLATION INSTRUCTIONS - IS6					
A	10024		RELEASED	REW	DSGN	REW	DWN	MG	CHK	DATE
REV	C.O. NO.	DATE	DESCRIPTION	CHK	APR					6/28/94
<b>SIEMENS</b> Water Technologies					JOB NAME					
					STANDARD					
					SHOP ORDER		DWG. NO.		REV	
							AIM08916		C	

ENCLOSURE SPECIFICATIONS	
MANUFACTURER	STANLEY
PART NUMBER	40261A
SIZE	5 5/8 x 6
CONSTRUCTION	FIBREGLASS
FPL	NEMA 4X
THIRD	LEFT
FINISH	GRAY
BACK PANEL SPECIFICATIONS	
MANUFACTURER	ELECTRIMATE
PART NUMBER	702110002E
SIZE	5 x 7
FINISH	ALUMINUM

**IMPORTANT INSTALLATION NOTE:**  
 WHEN MOUNTING BREATHER BAG,  
 MAKE SURE TO INFLATE TO 3/8"  
 THICKNESS BEFORE CONNECTING  
 TO TRANSDUCER TUBE AND MOUNT  
 CLAMPS APPROX. 9" APART.



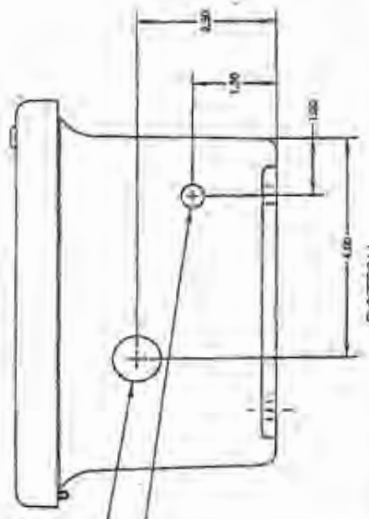
BACK PANEL



FRONT

LABELED DESCRIPTIONS

NUMBER	PART NO.	DESCRIPTION
1	FLOOR STOCK (8003040001)	LABEL, US FILTER CONTROL SYSTEMS (ON OUTSIDE OF DOOR)
2	FLOOR STOCK (8003020001)	LABEL, FIBR, MADE IN USA (ON INSIDE OF DOOR, NOT SHOWN)
3	FLOOR STOCK (8003020001)	LABEL, SEAL ALL CONDUITS (ON INSIDE OF DOOR, NOT SHOWN)
4	FLOOR STOCK (8003020001)	LABEL, IMPORTANT, BEFORE APPLYING POWER (ON INSIDE OF DOOR, NOT SHOWN)
5	FLOOR STOCK (8003020001)	LABEL, DANGER, DISCONNECT ALL SOURCES (ON OUTSIDE OF DOOR)



BOTTOM

**CAUTION:**  
 ALTHOUGH THE UPPER ASSEMBLY HOUSING IS OF A CORROSION RESISTANT NATURE, CHE  
 SHOULD BE TAKEN TO LOCATE IT AWAY FROM CORROSIVE ELEMENTS PRESENT IN WASTE/WASTEWATER  
 APPLICATIONS. CONDUITS TO THE HOUSING MUST BE SEALED. EXPOSURE OF THE UPPER ASSEMBLY  
 HOUSING AND ITS ASSOCIATED ELECTRONIC CIRCUITRY TO MOISTURE AND CORROSIVE ELEMENTS MAY  
 VOID WARRANTY.

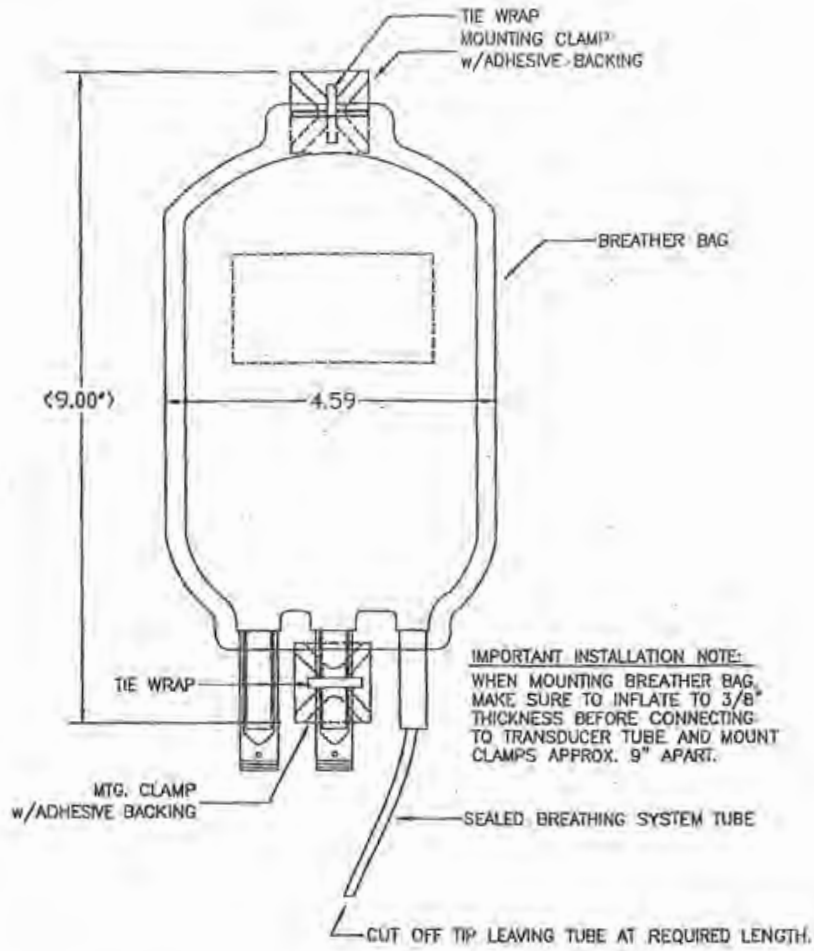
REV	DATE	BY	CHK	APP
1				

DESIGNED BY: [Signature]  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]

UNITED STATES JACKSON BOX ASSEMBLY  
 WITH BREATHER BAG

US FILTER CONTROL SYSTEM  
 ALL PARTS MADE IN USA

8012110003 801 1 1 1 1 1



1. EXAMINE FOR DAMAGE DATE: _____ BY: _____		2. CHECK FOR LEAKS DATE: _____ BY: _____		3. RECORD DATA DATE: _____ BY: _____		4. SIGNATURE DATE: _____ BY: _____		5. COMMENTS _____ _____ _____		6. PARTS LIST QTY. PART NO. DESCRIPTION _____ _____		7. MATERIALS _____ _____		8. REVISIONS NO. DATE BY DESCRIPTION _____ _____		9. DRAWING TITLE BREATHING BAG ASSEMBLY		10. DRAWING NO. 801280001		11. SCALE 1" = 1"		12. SHEET NO. 1 OF 1		13. DATE _____		14. BY _____		15. CHECKED BY _____		16. APPROVED BY _____	
--	--	---	--	---	--	---------------------------------------	--	--	--	--	--	--------------------------------	--	---	--	--	--	------------------------------	--	----------------------	--	-------------------------	--	-------------------	--	-----------------	--	-------------------------	--	--------------------------	--

**US** FLEX CONTROL SYSTEMS  
 BREATHING PRODUCTS DIV.  
 P.O. BOX 2000 - 2007  
 WILSON, N.C. 27157



**ESTIMATE FOR CHANGE ORDER**

*SUBMITAL FOR  
PADDLEWHEEL*

PROJECT: PHASE II LATERAL EXPANSION CELL1 BASE LINER CONSTRUCTION  
KEKAHA SANITARY LANDFILL

DATE: 3/22/2010

Bid Document no. 3037 CONTRACTOR: GOODFELLOW BROTHERS, INC.

REFERENCE: Bulletin No. \_\_\_\_\_ P.C.D. NO. \_\_\_\_\_ Field Change X

DESCRIPTON: Furnish two (2) paddlewheels and cords

**MATERIALS**

Description	Unit	Unit Price	Subtotal
5 H.P. BigJohn all plastic Aerator	2	\$7,000.00	\$14,000.00
10/4 Cord	400	\$3.16	\$1,263.86
Cord Connectors	2	\$28.00	\$56.00
			\$0.00
			\$0.00

**TOTAL FOR MATERIALS** \$15,319.86 (1)

**LABOR**

Classification	Hours	Wages Hour Rate	*Fringe Rate	(Fringe x Hrs)	(Wage x Hrs.)
Electrician	16	\$39.30	\$24.56	\$392.96	\$628.80
				\$0.00	\$0.00
				\$0.00	\$0.00
				\$0.00	\$0.00
				\$0.00	\$0.00

**SUBTOTALS** \$392.96 (2) \$628.80 (3)

\*If requested, fringe benefit shall be indicated separately under each classification

**TOTAL FOR LABOR (Wages & Fringe) (2) + (3)** \$1,021.76 (4)

**SUBTOTAL - Materials & Labor (1) + (4)** \$16,341.62 (5)

Overhead & Profit 20% of (5) \$3,268.32 (6)

Insurance & Tax 27% of (3) \$169.78 (7)

Overhead for Insurance & Taxes (6%) of (7) \$10.19 (8)

**TOTAL - MATERIALS & LABOR (5) + (6) + (7) + (8)** \$19,789.91 (9)

**EQUIPMENT / REIMBURSABLE COSTS (per dlem, air fare, etc.)**

Classification	Unit/Hours	Rate	Subtotal
Truck	16.00	\$10.00	\$160.00
			\$0.00
			\$0.00
			\$0.00
			\$0.00

**TOTAL FOR EQUIPMENT / REIMBURSABLE COSTS** \$0.00 (10)

**SUBCONTRACTORS**

Allowed Mark-up: 7%

NAME	AMOUNT	Markup	Subtotal
	\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00
		\$0.00	\$0.00
		\$0.00	\$0.00

**TOTAL FOR SUBCONTRACTORS** \$0.00 (11)

**TOTAL (MATERIAL, LABOR, EQUIPMENT) (9) + (10) + (11)** \$19,789.91 (12)

Bond Fee 0% on (12) (If Applicable) \$0.00 (13)

General Excise Tax (4.712% for Honolulu, change to 4.166% Outer Island) 4.166%

General Excise Tax (Less Subcontractor's Cost) on (12) + (13) - (11) \$824.45 (14)

**TOTAL FOR CHANGE ORDER (12) + (13) + (14)** \$20,614.38

Tri nearest \$1.00

**\$20,614**

Telephone: (334) 844-4786  
FAX: (334) 844-9208  
United States of America

May 15, 2008

Mr. John Caradine  
Southern Machine Welding, Inc.  
7013 West Jefferson Road  
Quinton, Alabama 35130

Dear Mr. Caradine,

We have finished the tests on the 1.0-hp paddlewheel aerator which is fabricated from polyethylene. The aerator was tested with the channel-type paddles and the dog-bone type paddles. The results are summarized below and the sheets of calculations are attached.

Paddle	Standard oxygen-transfer rate (lb O <sub>2</sub> /hp·hr)
Channel-type	4.50, 4.38, 4.50; Average = 4.46
Dog-bone type	4.59, 4.57, 4.62; Average = 4.59

The aerator performed well with both paddle types. The slightly greater value for the dog-bone type paddle is not significant; the paddles performed the same. I suspect that the dog-bone type paddle is more durable.

The polyethylene aerator transferred oxygen with an efficiency equal to that achieved with steel paddlewheel aerators. The polyethylene construction would be ideal for corrosive waters found in ponds with low pH or with high salinity. I recommend that you continue your effort to produce polyethylene aerators.

If you have questions about the oxygen-transfer test, please telephone me.

Sincerely,

  
Claude E. Boyd  
Professor

## Plastic Aerators



Big John Aerators now offers a new corrosion-resistant plastic aerator that is ideal for use in ponds with low pH or high salinity. These new aerators have the following quality features:

- Marine grade, stress relieved, and UV-stabilized plastic
- The toughest marine HDPE available
- Are impervious to salt and moisture
- High heat distortion temperature to resist softening
- Materials are extruded and exhibit consistent color with matte finish
- Compact spiral design
- Closed-cell foam flotation enclosed in the frame
- Double-reduction in-line gear motors
- Water-lubricated bearings

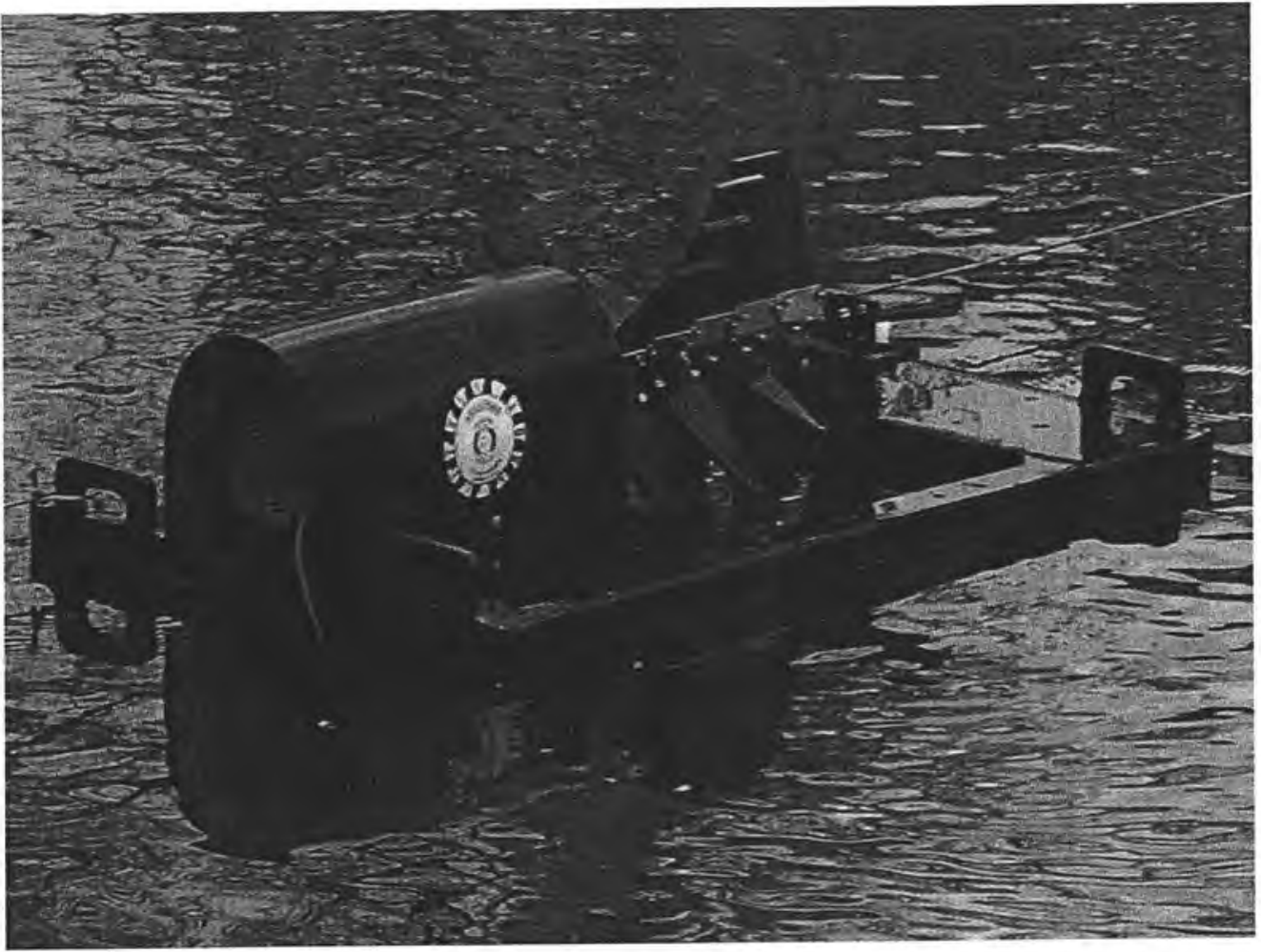


Plastic aerators are offered in 1/2 HP, 1-HP, and 2-HP models.

\*Click the image for a larger view.

**[Click Here](#) for Engineer's Statement of Oxygen Transfer Rates**





Kim Huynh

---

**From:** Bergschultz, Ken [KEN.BERGSCHEULTZ@aecom.com]  
**nt:** Thursday, March 25, 2010 2:57 PM  
**cc:** Frey, Jesse; Impens, Jeffrey  
**Subject:** Mike Minch; Kim Huynh; Chris Scott; Keith Suga; Jeff Griffin; Kaohi, Jeffrey; Christine Erorita  
RE: Paddlewheel

Jesse,

Here are AECOM's comments on the proposed new aerators.

Three things:

- 1) The change order (page 1 of the submittal) says that the contractor is proposing to provide two "5 Hp Big John all plastic aerators". However, page 3 of the submittal says that "plastic aerators are offered in ½ Hp, 1 Hp and 2 Hp models". This is inconsistent and needs to be corrected.
- 2) The change order (page 1 of the submittal) says that the contractor is providing 400 ft of 10 gage/4 conductor cable. Our electrical staff says that the voltage loss through 400 ft of 10 gage cable powering a 5 Hp 460V motor is acceptable. Therefore, OK.
- 3) The second page of the submittal indicates that the proposed aerator can transfer an average of about 4.5 lb O<sub>2</sub>/hp-hr. Metcalf & Eddy (Wastewater Engineering, second edition, 1979, page 497) says a low speed surface aerator should transfer 1.2 – 2.4 kg O<sub>2</sub>/kWh (or 3.5 – 7.0 lb O<sub>2</sub>/hp-hr). Therefore, the performance of the proposed aerator is about what would be expected for this type of unit. Therefore, OK.

**Conclusion.** If the contractor can, to our satisfaction, resolve the discrepancy highlighted in item 1 above AND will provide at least as much Hp as the old aerators, then the proposed aerators could be considered to be OK.

Any questions, please let us know.

**Kenneth J. Bergschultz, PE**  
Office Manager, Midwest Region  
Environment  
D 920.451.2452 C 920.918.3299  
[ken.bergschultz@aecom.com](mailto:ken.bergschultz@aecom.com)

**AECOM**  
4135 Technology Parkway  
Shaboygan, WI 53083  
T 920.458.8711 F 920.458.0550  
[www.aecom.com](http://www.aecom.com)

---

**From:** Frey, Jesse [mailto:JFrey@wm.com]  
**Sent:** Wednesday, March 24, 2010 5:04 PM  
**To:** Bergschultz, Ken; Impens, Jeffrey  
**Cc:** MMinch@Geosyntec.com; KHuynh@Geosyntec.com; CScott@Geosyntec.com; Keith Suga; Jeff Griffin; Kaohi, Jeffrey; Christine Erorita  
**Subject:** FW: Paddlewheel

Kenny and Jeff,

Attached is what GBI is proposing to order for the paddlewheels. These HDPE models look like a good fit for use in the leachate pond. Please let us know what you think.

Thanks,

Jesse Frey  
Engineer  
Waste Management of Hawaii  
460 Farrington Hwy.  
Kapolei, HI 96707  
Ph: 808-250-0574  
Fax: 808-668-1366

---

**From:** Keith Suga [mailto:keiths@goodfellowbros.com]  
**Sent:** Wednesday, March 24, 2010 11:22 AM  
**To:** Frey, Jesse  
**Cc:** Kaohi, Jeffrey; Jeff Griffin; Christine Erorita  
**Subject:** FW: Paddlewheel

Jesse,

Please see attached product information for proposed paddle wheel aerators. The 5 HP would be a special order item, so if we could get a preliminary ok based on the information provided then we can have them actually work up shop drawings if necessary. Please ignore the first page as it's just a proposal sheet for GBI from our sub.

Keith

---

**From:** Randall Nishimura [mailto:ronsrandy@hawaiiink.net]  
**Sent:** Monday, March 22, 2010 12:10 PM  
**To:** Keith Suga  
**Subject:** Paddlewheel

Attached please find our proposal for 2 each 5 hp paddlewheels. Please advise if you have any questions. I've enclosed cuts for evaluation. These are made of HDPE.

Randall Nishimura

Ron's Electric Inc.  
P O Box 311  
Lihue, HI 96766

Ph 808-245-4611  
F 808-246-9515  
C 808-639-0101

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**Waste Management recycles enough paper every year to save 41 million trees. By not printing  
is email, you can help save even more.**



SUBMITAL FOR AERATOR  
PAD CONCRETE MIX DESIGN

**MIX DESIGN FOR PORTLAND CEMENT CONCRETE**  
(APPROVAL OF MIX DESIGN BY D.A. ENGINEER REQUIRED PRIOR TO USAGE IN CONCRETE WORK)

DOT 4-151

TO: QUALITY ASSURANCE ENGINEER

FROM: GOODFELLOW BROS.

DATE: 4/28/2010

PROJECT: Kekaha Landfill

LOCATION:

CLASS: STATE 4000-67(4000 PSI) concrete will be supplied by O. Thomas Inc

MIX NUMBER: ST4067

PLACEMENT:

DESIGN WEIGHTS PER CUBIC YARD

MATERIAL	CEMENT TYPE & II	3C #57 #113	3F #67 #106	#4 FINE #100	SAND	WATER	AIR %	TOTAL / FT <sup>3</sup>
SOURCE:	HAWAIIAN	KAUAI AGG	KAUAI AGG	KAUAI AGG	KEKAHA	COUNTY		
SSD WTS LBS	705	0	1424	972	713	300	3	4114
SP. GRAV.	3.15	2.82	2.85	2.92	2.57	1		
AB. VOL.	3.59	0	8.01	5.34	4.45	4.81	0.81	27
% MOISTURE		2.7	3.9	4.7	8.5			
% ABSORPTION		2.7	2.9	3.2	2.8			
CORRECTIONS %:		0	1	1.5	5.7			
CORRECTION LBS		0	14	15	41	-70		
SSD WTS LBS	705	0	1438	987	754	230		4114

W/C RATIO = 0.42 = 27.6 GALLONS/ YD<sup>3</sup>

ADMIX	WRDA-20	DARATARD - HC	DAREX II AEA
DOSAGE:	6 OZ/ CWT	2 OZ/ CWT	0.5 OZ/ CWT
ADMIX YD <sup>3</sup>	42 OZ/ YD <sup>3</sup>	14 OZ/ YD <sup>3</sup>	4 OZ/ YD <sup>3</sup>

ADMIX	ECLIPSE	DCI-S
DOSAGE:	0 OZ/ CWT	0 OZ/ CWT
ADMIX YD <sup>3</sup>	0 OZ/ YD <sup>3</sup>	0 OZ/ YD <sup>3</sup>

Slump: 4"-1"      % Air: 3% - 6%      Unit Wt.: 152.38 lbs/ft<sup>3</sup>

SACK: 7.5      Lab#

REMARKS: 2 oz/cwt of Daratard-HC retarder may be added to delay initial set time.

SLUMP:	4"	7 DAY	5390
UT/WT	149.6	28 DAY	7870
TEMP	76.5	28 DAY	7870
YIELD:	100.7%		

SUBMITTED BY: Wayland R. Reynolds  
WAYLAND R. REYNOLDS  
CONCRETE DESIGN TECHNICIAN

By: \_\_\_\_\_  
Prime Contractor

MIX DESIGN SUBJECT TO MODIFICATION TO MAINTAIN YIELD, STRENGTH, WORKABILITY, AND/OR SETTING TIME.  
UPON ARRIVAL AT JOB SITE, UP TO ONE (1) GAL OF WATER / CUBIC YARD MAY BE ADDED, ONCE, PROVIDED MAXIMUM  
SLUMP IS NOT EXCEEDED, AND WITHIN 90 MINUTES FROM TIME OF BATCHING, (A.W. ASTM C94 para. 11.7)



**Appendix D**  
**Requests For Information**



**LIST OF REQUESTS FOR INFORMATION**  
**Phase II Lateral Expansion, Cell 1 Base Liner Construction**  
**Kekaha Sanitary Landfill**  
**May 25, 2010**

RFI NO.	SPECIFICATION/ DRAWING	TITLE	WASTE UNIT		
			NEW LEACHATE EVAPORATION POND	CELLS 1C & 1D	CELLS 1A & 1B
#1	02330	Sand Compaction	✓	✓	✓
#2	02330, Part 3.01	Subbase Proof Rolling with 20-ton Roller	✓	✓	✓
#3	02072, Part 2.04	Interface Shear Strength		✓	✓
#4	02058, Part 3.05, and Drawings 11 & 15	Perimeter Berm Anchor Trench	✓	✓	✓
#5	02072, Part 2.04	Interface Shear Strength		✓	✓
#6	02062, Parts 2.01 & 2.02	Granular Drainage Materials		✓	✓
#7	Drawing 2	Existing Forcemain to be Removed		✓	
#8	Drawing 3	NLEP As-Built Subgrade Survey	✓		
#9	Drawing 9	Headwall Structure for Infiltration Basin		✓	✓
#10	Drawing 18	Pipe Penetration Air Test		✓	✓
#11	Drawing 22	Gas Monitoring Probe Construction		✓	✓
#12	02074, Part 3.02	Hydrated GCL	✓	✓	✓
#13	02074, Part 3.02	HDPE Pipe Pressure Tests		✓	✓
#14	Drawing 11	NLEP 2-inch Granular Protection Layer	✓		
#15	15019, Part 2.02D	HDPE Cleanout Flange and Fasteners		✓	✓
#16	02075, Part 3.03A	Heat Bonding of 16 oz/sy Geotextile	✓	✓	✓
#17	Drawing 13	2-inch HDPE Flatstock in NLEP	✓		
#18	Drawing 22	Gas Monitoring Protective Casing		✓	✓
#19	Drawing 18	Backfill of Void Below Pipe Penetration		✓	✓
#20	02062, Part 2.02B	3/8-inch Minus Operations & Protection Layers	✓	✓	✓
#21	Drawing 13	Batten Strip for Aerator Support Pad	✓		
#22	Drawing 15, Details 2 & 3	Cell Separator Geotextile Anchoring		✓	✓
#23	Drawing 17, Detail 6	Temporary Cell Termination		✓	✓
#24	02072, Part 2.04F	Interface Shear Strength		✓	✓

GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

RESCINDED  
BY GBI

## REQUEST FOR INFORMATION

TO: Waste Management of Hawaii RFI No.: 1  
ATTN: Jesse Frey Request submitted: January 6, 2010  
Respond requested by: Jeff Griffin  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference: 02330 Plan Reference: \_\_\_\_\_

Subject:  Discrepancy  Clarification  Suggestion  Other

Request:

Approximately 38,000 cy of onsite native sand material will be embanked in the bottom of Cell 1. We believe the material may have a higher variance than the specified  $\pm 2\%$  of optimum moisture content due to its close proximity to the water table, please clarify if alternative methods of testing will be developed to measure compaction when near the existing water table.

Signed: Jeff M. Griffin

Date: January 6, 2010

Reply:

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

Request VIA:  Telephone  Facsimile  Email  
Copies to:  File

GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

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## REQUEST FOR INFORMATION

TO: Waste Management of Hawaii RFI No.: 2  
ATTN: Jesse Frey Request submitted: January 7, 2010  
Respond requested by: Keith Suga  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference: 02330,3.01C Plan Reference: \_\_\_\_\_

Subject:  Discrepancy  Clarification  Suggestion  Other

---

Request:

Per the above referenced specification section a 20 ton roller is required to proof roll subbase to identify areas of soft material. We currently have a 10 ton vibratory roller on island that we would like to utilize for all of the projects proof rolling and compaction needs. Please advise if this is acceptable.

Signed: Keith Suga

Date: January 7, 2010

---

Reply:

Change in the above referenced specification is acceptable as long as compaction is still achieved as specified and that visual observation of prepared areas, when traversed by loaded vehicles, do not demonstrate pumping or soft areas. Repair and fix pumping or soft areas encountered as specified.

Signed: 

Date: 1/9/2010

Request VIA:  Telephone  
Copies to:  File

Facsimile

Email



GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

---

## REQUEST FOR INFORMATION

TO: Waste Management of Hawaii RFI No.: 4  
ATTN: Jesse Frey Request submitted: February 1, 2010  
Respond requested by: Keith Suga  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference: Section 02058, 3.05 Plan Reference: DWG 11

Subject:  Discrepancy  Clarification  Suggestion  Other

---

Request:

Per plan drawing no. 11 the anchor trench for the Leachate Pond is to be excavated at a depth of about 4' by 4' wide. Due to the physical nature of the onsite sand material we feel excavating the anchor trench vertical will be difficult to achieve and maintain. We also have concerns with the triangular area within the anchor trench that calls out "backfill and compact anchor trench prior to geocell installation. We would like clarification on how we are to compact onsite sand material on a one to one slope within a 4' wide anchor trench. We would like to recommend running out the liner and eliminating the anchor trench. This would address vertical trenches and compaction in the anchor trench prior to geocell installation. A similar situation occurs with the cell 1 anchor trench with the vertical walls. Please advise how to proceed with leachate pond and cell 1 anchor trench work.

Signed: Keith Suga

Date: February 1, 2010

---

GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

Reply: Based upon discussions with Presto and evaluating your concerns on the geometry of the anchor trench shown on Drawing 11 for the leachate evaporation pond, the anchor trench can be modified. The anchor trench is required for anchoring and protecting the end of the geosynthetics. The anchor trench can be modified to a "vee" shape which can be cut by a dozer or grader to a 1:1 slope. The dead man for the geoweb requires the overburden and proper compaction to perform as designed. The revised leachate evaporation pond anchor trench will remain to be 4 feet deep with a 1:1 slope along the pond side and shaped on the opposite side to fit construction needs. The geosynthetics of the pond will be required to be placed at least 4 feet into the anchor trench. The location of the dead man remains the same as shown on the drawing. The anchor trench will need to be compacted in 1 foot lifts with the final lift tested by nuclear density moisture gauge at an interval of 1 test per 100 lf of anchor trench. Compaction requirement is 90% maximum dry density of the Modified Proctor. A revised Drawing #11 will be provided. The anchor trench for Cell 1 along the perimeter berm can be cut in the same "vee" format to the design depth of 2 feet. A revised detail will be provided as well.

Signed:



Date:

2/8/10

Request VIA:  
Copies to:

File

Telephone

Facsimile

Email

Kim Huynh

---

From: Chris Scott  
Date: Friday, March 05, 2010 7:44 PM  
Subject: Kim Huynh  
Fw: RFI #8

Fyi

---

**From:** Bergschultz, Ken <KEN.BERGSCHULTZ@aecom.com>  
**To:** Frey, Jesse <JFrey@wm.com>; Impens, Jeffrey <Jeffrey.Impens@aecom.com>  
**Cc:** Keith Suga <keiths@goodfellowbros.com>; Jeff Griffin <jeffg@goodfellowbros.com>; Kaohi, Jeffrey <jkaohi@wm.com>; Mike Minch; Chris Scott  
**Sent:** Fri Mar 05 21:18:29 2010  
**Subject:** RE: RFI #8

Jesse,

I have reviewed RFI #8 in regards to the acceptability of the subbase grade elevation for the evaporation pond. I am approving the points as shown as the purpose of the pond is retention and evaporation. The design of the pond also has defined factor of safety of 3.0 for volume retention.

However, the remaining control points which define the west crest and sideslope should be brought to within closer tolerance of 0.10.

Also during deployment, ensure installation and deployment techniques that will not erode or reduce the crest of slope elevations.

If questions, please let me know.

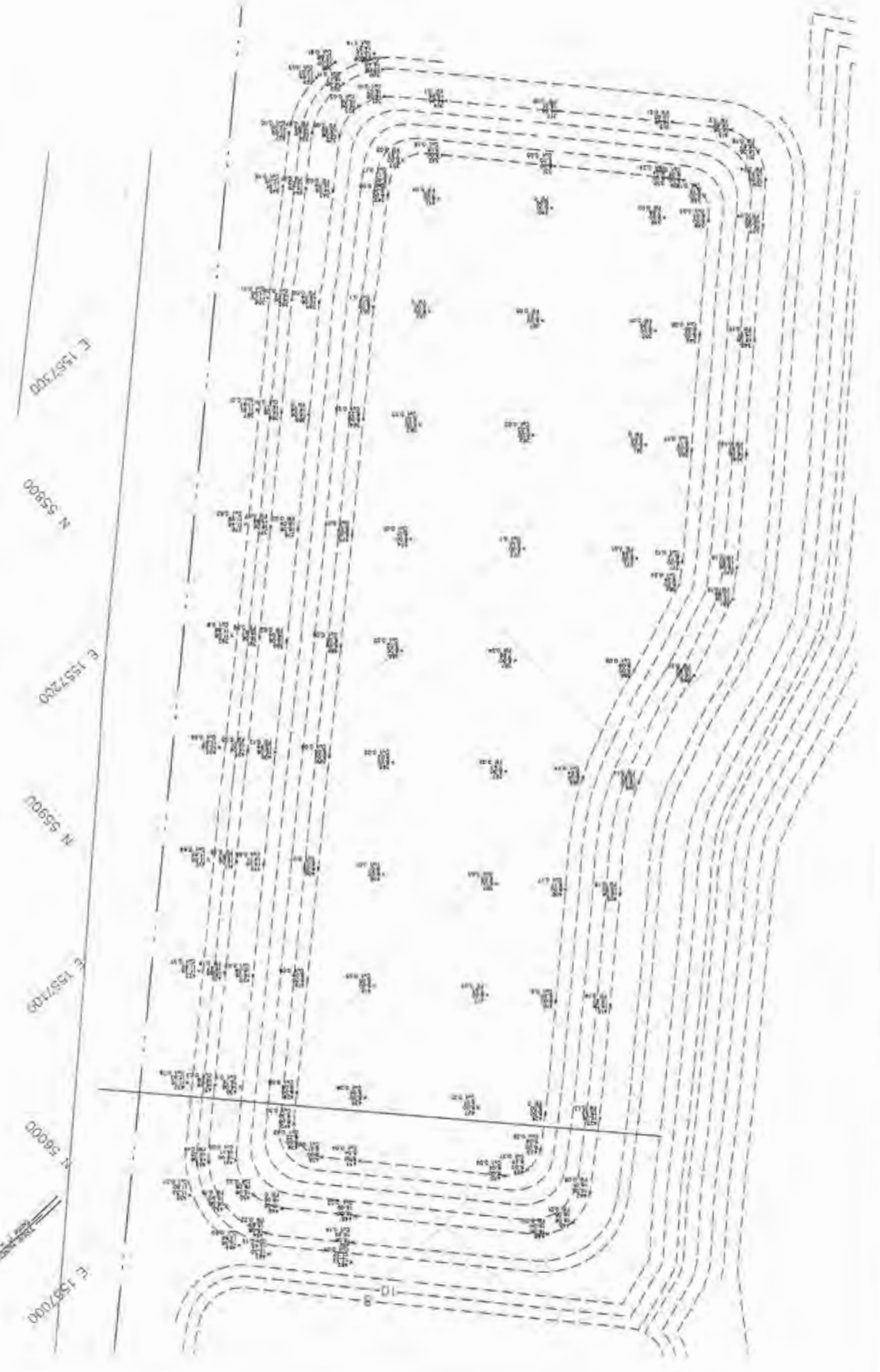
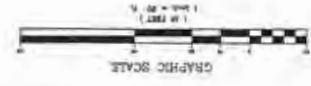
**Kenneth J. Bergschultz, PE**  
Office Manager, Midwest Region  
Environment  
D 920.451.2452 C 920.918.3299  
[ken.bergschultz@aecom.com](mailto:ken.bergschultz@aecom.com)

**AECOM**  
4135 Technology Parkway  
Sheboygan, WI 53083  
T 920.458.8711 F 920.458.0550  
[www.aecom.com](http://www.aecom.com)



MAP SHOWING  
 LEACHATE POND ELEVATIONS  
 DATE OF SURVEY - FEBRUARY 29, 2010  
 ESCROW, CALIF., HAWAII  
 Prepared For: Goodrich Park

Legend  
 20' Spot Elevation  
 5' Contour Interval  
 10' Contour Interval  
 15' Contour Interval  
 20' Contour Interval



Geosyntec Consultants, Inc.  
475 14<sup>th</sup> Street, Suite 400 Oakland, California 94612  
(510) 836-3034 phone (510) 836-3036 fax

---

## REQUEST FOR INFORMATION

TO: <u>Waste Management of Hawaii</u>	RFI No.: <u>12</u>
ATTN: <u>Jesse Frey</u>	Request submitted: <u>17 March 2010</u>
<u>cc: Hari Sharma, Chris Scott</u>	Respond requested by: <u>Mike Minch, Geosyntec</u>
	Project: <u>Kekaha Sanitary Landfill Phase II Lateral Expansion</u>

Specification Reference: 02074, Part 3.02F Plan Reference: \_\_\_\_\_

Subject:  Discrepancy  Clarification  Suggestion  Other

---

Requests: Section 02074 Part 3.02F of the specifications specifies removing "GCL exposed to moisture and prematurely hydrated prior to placement of overlying material" and replacing with new GCL. Following the initial GCL deployment on 15 March, a brief rain event exposed the GCL to moisture, resulting in partial hydration of the deployed material. Such rain events are common and are expected to continue throughout the construction of the NLEP and Cell 1. As discussed during the 16 March construction meeting, unacceptably hydrated GCL should be removed and replaced with new GCL. However, partially hydrated GCL may still function as designed and be acceptable if the degree hydration is minimal. As requested by AECOM, we propose following field verification method to determine the acceptability of partially-hydrated GCL:

If hydration is suspected, cut open a sample of the partially hydrated GCL in question to expose and inspect the sandwiched bentonite. If the bentonite granules remain separate and fall out of the cut, then accept the partial hydration and patch the test area per the specifications. If the bentonite granules have swollen, stick together, or otherwise appear hydrated, then remove the hydrated GCL and replace with fresh, unaffected GCL.

Please confirm whether this proposed field verification approach is consistent with the design intent.

Signed:   
Date: 30 March 2010

---

Geosyntec Consultants, Inc.

475 14<sup>th</sup> Street, Suite 400 Oakland, California 94612  
(510) 836-3034 phone (510) 836-3036 fax

---

Reply: This response to RFI #12 is formal and coincides with the verbal approval to the proposed procedures as discussed in the project weekly meeting on March 16, 2010 and presented above.

Signed: 

Date: 05/11/10

Request VIA:  Telephone  Facsimile  Email  
Copies to:  File



GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

---

## REQUEST FOR INFORMATION

TO: Waste Management of Hawaii  
ATTN: Jesse Frey

RFI No.: **14**  
Request submitted: March 18, 2010  
Respond requested by: Keith Suga  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference: 02062

Plan Reference: Drawing #11

Subject:  Discrepancy  Clarification  Suggestion  Other

Request: As illustrated on Drawing #11 detail 1 there is a 2" granular protection layer that is to be installed above the granular operations layer and separated by a non-woven geotextile. We have concerns with constructability of the granular protection layer. Running any type of equipment on 2" of 3/8" gravel will potentially damage the geotextile. Can this detail be modified to still meet the intent of the design yet make installation more feasible?

Signed: Keith Suga

Date: March 18, 2010

---

GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

---

Reply: As noted in our project discussions, the separator geotextile for the leachate evaporation pond is an indicator of "potential damage" to the underlying geomembranes from aerator or other operations when the pond is operation. The placement of the 2 inches of granular protective layer will need to be coordinated such that damage to this geotextile is does not happen.

Noting placement of the granular protection layer consists of a large surface area, placement of bulk material over the geotextile has been proposed by GBI. To verify no damage is done to the geotextile, a small portion of the pond should be evaluated for placement techniques ("test pad"). GBI will be initially allowed to use a "gator" type vehicle traversing over a minimum of 1 foot of material above the separator geotextile to bulk stage granular material. The material is then to be pushed and raked into place by hand as needed. A portion of the geotextile is to be exposed where the "gator" traversed to determine visually no damage has occurred. If damage has occurred, repair or replace the geotextile as needed. The geotextile upon observation should not be thinned, contain any holes, and all field seams/repairs intact.

If damage is observed, repeat "test pad" process by increasing thickness of road until damage is no longer encountered or change vehicle type and placement technique.

Signed: 

Date: 4/26/10

---

Request VIA:  
Copies to:

Telephone  
File

Facsimile

Email

Northwest Linings & Geotextile Products, Inc.

21000 77<sup>th</sup> Avenue South Kent, WA 98032  
Phone (253) 872-0244 Fax (253) 872-0245

**REQUEST FOR INFORMATION**

TO: <u>Waste Management of Hawaii</u>	RFI No.: <u>16</u>
ATTN: <u>Jesse Frey</u>	Request submitted: <u>April 6, 2010</u>
	Respond requested by: <u>Joel Mondragon, Northwest Linings</u>
	Project: <u>Kekaha Sanitary Landfill Phase II Lateral Expansion</u>

Specification Reference: 02075, Parts 3.03A Plan Reference: \_\_\_\_\_

Subject:  Discrepancy  Clarification  Suggestion  Other


Requests: Section 02075 Part 3.03A specifies to "sew patch in place or thermally bond" for repairs of the geotextile, but that thermal bonding requires the engineer's approval. Thermal bonding of the geotextile is anticipated to be used at the T-intersections of deployed panels and for repair patches, as well as along the Phase II/Cell 1 tie-in as allowed by the Construction Drawings (Detail 4, Drawing 15). Please confirm that thermal bonding with a Leister is an approved method for geotextile patching within Cell 1 and the new leachate evaporation pond containment systems.

Signed: \_\_\_\_\_  
Date: April 6, 2010

Reply: Thermally bonding of repairs as presented above and approved in the weekly construction meeting discussion are approved methods.

This seam type will also be applicable cushion/separation geotextile flap in the leachate evaporation pond along the toe of slope between the geocells and granular operations layer.

Close attention during thermal bonding show be maintained to insure no burnouts or holes.

Signed:   
Date: 04/12/10

Request VIA:  Telephone  Facsimile  Email  
Copies to:  File



GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

**REQUEST FOR INFORMATION**

*NO LONGER  
NEEDED*

TO: Waste Management of Hawaii  
ATTN: Jesse Frey

RFI No.: 17  
Request submitted: April 1, 2010  
Respond requested by: Keith Suga  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference:

Plan Reference: Drawing #13

Subject:  Discrepancy  Clarification  Suggestion  Other

Request: Per drawing no.13 details 1 and 2, 2" flatstock is required to be installed under the leachate aerator support pad. We currently are not able to find 2" flatstock locally and would like to propose installing two layers of 1" flatstock as a substitute. We appreciate your input to give us more options. Please advise.

Signed: Keith Suga

Date: April 1, 2010

Reply:

Signed:

Date:

Request VIA:  Telephone  Facsimile  Email  
Copies to:  File

GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

---

## REQUEST FOR INFORMATION

TO: Waste Management of Hawaii  
ATTN: Jesse Frey

RFI No.: 20  
Request submitted: April 12, 2010  
Respond requested by: Keith Suga  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference: Section 02062,  
2.02B

Plan Reference:

Subject:  Discrepancy  Clarification  Suggestion  Other

---

Request: We recently received the results back for the 3/8" material which indicates a gradation of 100% passing the 1/2" sieve, 93% passing the 3/8" sieve and 0% passing the #200 sieve. The permeability of  $4.1 \times 10^{-1}$  meets the specifications. Specifications call out a max particle size of 3/8". Can this material be utilized for the operations later in the cell and the protection layer in the leachate pond? Please advise.

Signed: Keith Suga

Date: April 12, 2010

---

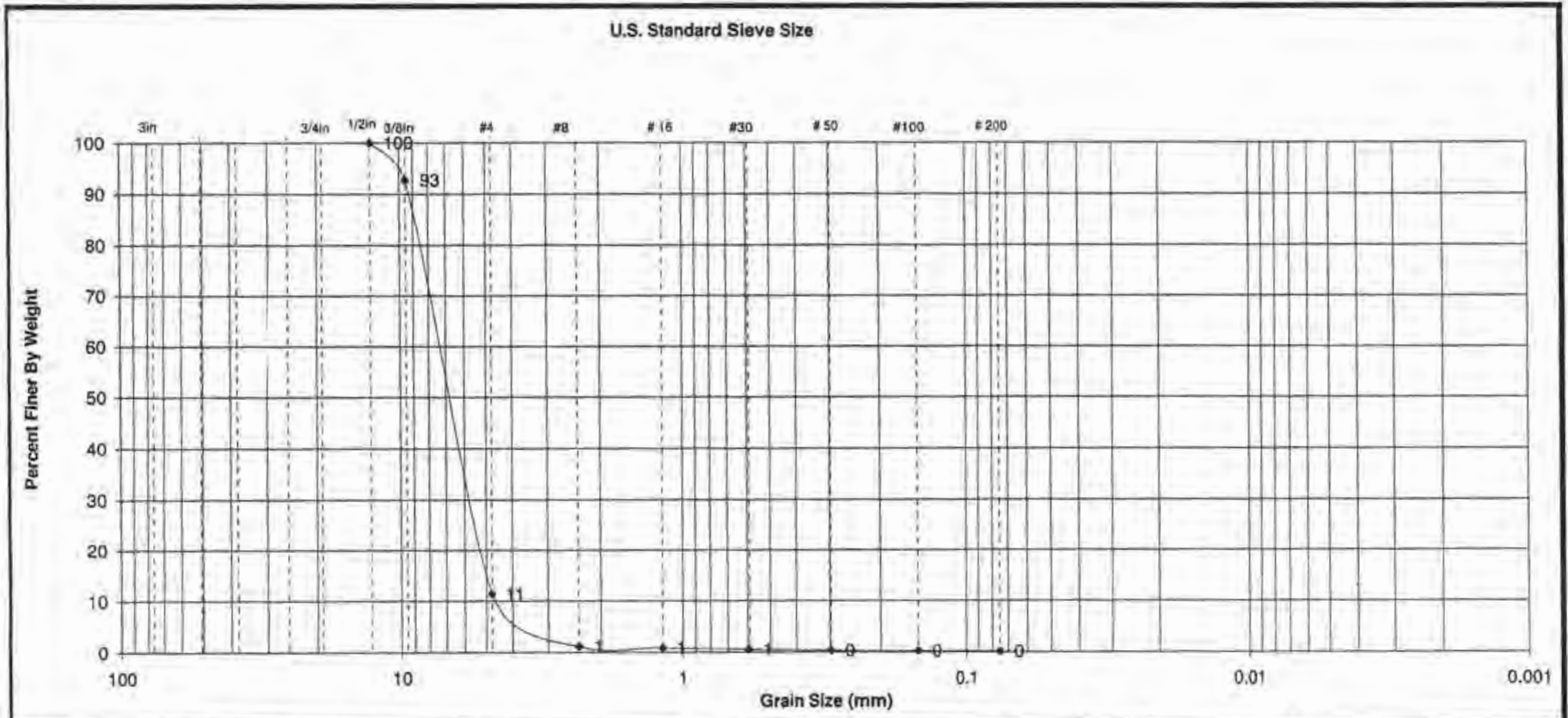
Reply: I have reviewed the site permit Section B 1.b.viii and 1.c.x and did not see a defined maximum for the particle size and in review of the ER calculations this particle size does not affect any of the calculations since the permeability is greater than specified. This test result will be acceptable given the application of the operations layer for Cell 1 and protection layer in the leachate pond. All remaining tests should meet the 100% less than 1/2" sieve, a minimum of 93% passing the 3/8" sieve, and less than 5% passing the #200 sieve and acceptable interface friction angle test results.

Signed: 

Date: 4/14/10

---

Request VIA:  Telephone  Facsimile  Email  
Copies to:  File



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
3/8" minus quarry sand										



## CONSTANT-HEAD PRESSURE PERMEABILITY TESTS ASTM D 2434

PROJECT Precision Lab # G100274

Date 4/9/2010

Job No 2001-068

By LD

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k (cm/sec)
6815.3	Tare			11:20:00		11:20:10	1800	4.1E-01
10040	Init. Wet wt			11:22:00		11:22:10	1821	4.1E-01
	Sat. Wt.	10140		11:23:00		11:23:10	1855	4.2E-01
	Trimmed Wt.	10140		11:24:00		11:24:10	1834	4.2E-01
1	% water	4.1						
94.0	Dry Density pcf	94.0						
			PSI	0.4	Total (Ave.)		7310	4.1E-01

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k
	Tare							
	Init. Wet wt							
	Sat. Wt.							
	Trimmed Wt.							
	% water							
	Dry Density							
			PSI		Total (Ave.)			

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k
	Tare							
	Init. Wet wt							
	Sat. Wt.							
	Trimmed Wt.							
	% water							
	Dry Density							
			PSI		Total (Ave.)			

K = coefficient of permeability (cm/sec)

L = sample height = 11.633 cm

A = area of sample = 182.322 cm<sup>2</sup>

H = Hydrostatic head (cm of H<sub>2</sub>O)    1 psi = 70.43 cm

$$K = QL / Aht$$

GOODFELLOW BROS., INC.  
P.O. Box 3029 Lihue, Hawaii 96766  
(808) 241-4601 phone (808) 241-4605 fax

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**REQUEST FOR INFORMATION**

TO: Waste Management of Hawaii  
ATTN: Jesse Frey

RFI No.: 21  
Request submitted: April 19, 2010  
Respond requested by: Keith Suga  
Project: Kekaha Sanitary Landfill  
Phase II Lateral Expansion

Specification Reference:

Plan Reference: Drawing 13 Detail 3

Subject:  Discrepancy  Clarification  Suggestion  Other

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Request: Per drawing no. 13, detail 3 we are getting ready to install the leachate aerator support pad. If you look at detail 3 on that sheet it calls out a 3/8" x 2" stainless steel flatbar batten strip. My steel supplier has checked and said that is typically a non-stock item in the islands. What is readily available though is 1/4" x 3" stainless steel flatbar. Can we substitute the 1/4" in place of the 3/8"? Please advise

Signed: Keith Suga

Date: April 19, 2010

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Reply: The 1/4" x 3" SS flat bar is an acceptable substitute for the batten strip.

Signed: 

Date: 4/26/10

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Request VIA:  Telephone  
Copies to:  File

Facsimile

Email





**Appendix E**  
**Daily Field Reports**

**DAILY FIELD REPORT**

**Report Sequence No.: 001**

PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Kauai, Hawaii  
 DESCRIPTION: Phase II Lateral Expansion  
 Cell 1 Base Liner Construction  
 DAY OF WEEK: Tuesday  
 WEATHER: Sunny and warm during the day.

PROJECT NO.: WG1298  
 TASK NO.: 02  
 CONTRACTORS: Goodfellow Bros. / Northwest Linings  
 DATE: DAY: 12 MONTH: January YEAR: 2010

0600	I arrived on site, I introduced myself to Jeffery Kaohi (District Manager). Mr. Kaohi showed me around the site and identified the secure area for storage of the nuclear gauge. The nuclear gauge is currently in locked and secure in the building.
1000	I attended the weekly construction meeting for the project. See meeting minutes for meeting discussions.
1100	I returned from the weekly construction meeting.
	During the weekly construction meeting, Goodfellow Bros. identified a concern with shipping soil samples to the mainland for interface direct shear testing. Geosyntec was requested by Waste Management to assist with the shipping and collection of interface direct shear samples.
	Keith Suga (Goodfellow Bros. Superintendent) and I identified the site-specific soil which will be used for the construction of the subbase material and compacted fill in the Cell 1 and the new leachate evaporation pond (NLEP) embankments. I collected two (2) 5-gallon buckets of the sandy compacted fill material which was stockpiled along the southern end of the site.
	Keith identified that the borrow source for the 3/8-in minus Cell 1 operations layer /NLEP granular protection layer material and the 1 1/2-in minus granular Cell 1 granular drainage layer/NLEP granular operations layer material will be provided by Kauai Aggregate. Keith and I traveled to the quarry to collect samples of the proposed materials.
	I spoke with Scott Pingrey (contact number 808.652.1050) of Kauai Aggregate Quarry. Mr. Pingrey identified the proposed materials (3/8-inch minus quarry fines and 1 1/2-inch base course) which was stockpiled at the site and proposed for construction. The material visually appeared to have over 20% fines content (vs. 5% passing #200 US Sieve per the specifications). However Mr. Pingrey assured me that if the material does not meet the project requirements the quarry would adjust the screening operation to meet the project requirements.
	I collected samples of the 3/8-inch minus drainage gravel and 1 1/2-inch base course for interface direct shear and conformance testing.
	Keith and I traveled to FedEx to ship the samples under Precision Geosynthetics Laboratory's soil permit. The samples were received by FedEx and are pending shipping approval by the Agricultural Inspector.
1630	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 002**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 13 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. already on site.
	<p>Equipment on site during construction:</p> <p>Deer 350D Excavator, Caterpillar140H motor grader, Deer 644J front end loader, and a Komatsu backhoe.</p>
	<p><u>Clearing and Grubbing</u></p> <p>The contractor is working to clear and grub the area of the Cell 1 containment system and the new leach evaporation pond (NLEP). The spoils are hauled to an onsite stockpile approved by the Owner.</p>
	<p><u>Interface Direct Shear</u></p> <p>I received a call from Nad (USDA inspector). Precision Geosynthetics Laboratory's soil sample permit was approved and validated. However, based on the permit requirements, the soil samples must be dual contained in a sealed water tight container. Nad has requested that I return to Fed Ex to remove the soil samples from the buckets, place the soils in plastic bags, seal the bags, and then replace the bags in the buckets and place the water tight covers on the buckets.</p> <p>I returned to Fed Ex and corrected the shipping container condition. Nad approved the soil samples for delivery to Precision Laboratory.</p>
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 003**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 14 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. already on site.
	Equipment on site during construction:  Deer 350D Excavator, Caterpillar140H motor grader, Deer 644J front end loader, and a Komatsu backhoe.
	<u>Clearing and Grubbing</u>  The contractor continues working to clear and grub the area of the Cell 1 containment system and the new leachate evaporation pond (NLEP). The spoils are hauled to an onsite stockpile approved by the Owner.
	<u>Cell 1 Construction</u>  One (1) operator using a WB 146 Komatsu backhoe with a straight edge bucket and a laborer are working to expose the existing Phase II / Cell 1 liner tie-in and stake the perimeter berm every 50 ft along the construction area in accordance with Note 4 on Drawing 4 of the Construction Drawings: "The contractor shall provide a survey stakeout of the perimeter berm and Phase II / Cell 1 liner tie-in prior to berm and Cell 1 construction."  Esaki Surveying & Mapping, Inc. will be onsite next week to document the tie-in as-built condition.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor is working to expose the force main piping to the NLEP.
	<u>Interface Direct Shear Testing</u>  Cora Queja (Precision Laboratory) confirmed that all of the samples (eight 5-gallon buckets) arrived this morning at the laboratory.
1630	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 004**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE:      DAY: 15      MONTH: January      YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site, Goodfellow Bros. already on site.
	Equipment on site during construction:  Deer 350D Excavator, Caterpillar 140H motor grader, Deer 644J front end loader, and a Komatsu backhoe.
	<u>Clearing and Grubbing</u>  The contractor continues working to clear and grub the area of the Cell 1 containment system and the new leachate evaporation pond (NLEP). The spoils are hauled to an onsite stockpile approved by the Owner.
	<u>Cell 1 Construction</u>  The contractor has pot holed at 50-ft intervals along the Phase II / Cell 1 liner tie-in to identify the as-built condition. During excavation, a small area of the existing Phase II liner system was inadvertently damaged next to the anchor trench. Esaki Surveying & Mapping has provided the survey location of the damaged area:  Repair location: N:55837.75, E: 1556683.57, El: 13.60  The contractor will cover and protect the damaged area until repairs can be completed by Northwest Lining.  Esaki Surveying & Mapping, Inc. is onsite to document the existing Phase II tie-in as-built condition.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor is working to expose the force main piping to the NLEP.
1330	I left the site to pick up field supplies.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 005**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE:      DAY: 18      MONTH: January      YEAR: 2010

WEATHER: Sunny and warm during the day.

0700	Mike Minch (Geosyntec Sr. Project Engineer) and I arrived on site. Goodfellow Bros. is currently off site.
	<p>Keith Suga (Goodfellows Bros. Construction) has arranged for an informal meeting between Geosyntec and Dennis Esaki (Esaki Surveying &amp; Mapping) to introduce the surveying team to the project CQA team (Geosyntec).</p> <p>Esaki Surveying and Goodfellow Bros. Construction appear to have a good understanding of the project specifications and survey requirements for the project.</p> <p>Keith escorted Mike and I to the Kauai Aggregate Quarry to meet with Scott Pingrey (Kauai Aggregates Superintendent). Mr. Pingrey showed us around the quarry and identified the materials proposed for use during construction. Although the materials required for the project have not yet been processed, similar materials are currently being processed which are close to the gradation required by the Kekaha project specifications.</p> <p>Mr. Pingrey assured Goodfellow Bros and Geosyntec that the quarry has the capabilities to meet the project specifications for the proposed materials and that an onsite laboratory would be utilized to verify that the material is in conformance.</p>
1230	Mike and I left the quarry.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 006**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 19      MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0800	Mike Minch (Geosyntec Sr. Project Engineer) and I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site during construction:</p> <p>Deer 350D Excavator, Caterpillar 140H motor grader, Deer 644J front end loader, and a Komatsu backhoe.</p> <p>Equipment arrived on site today:</p> <p>Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
1030	Mike and I attended the weekly construction meeting. See meeting minutes for discussions during the meeting. 1200 Returned from construction meeting.
	<p><u>Clearing and Grubbing</u></p> <p>The contractor has completed the clearing and grubbing the Cell 1 subbase.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has proof-rolled the subbase using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. The subbase condition was visually observed to be firm and non-yielding in accordance with the project specifications.</p> <p>The contractor identified the haul truck (Caterpillar 740 articulated haul truck) to be used to haul compacted fill material to construct the Cell 1 subbase grades. Before placement of the compacted fill material, a loaded Caterpillar 740 haul truck was driven over the subbase to verify that the equipment does not damage the existing condition. Visual observation indicated that the equipment does not damage the existing subbase.</p>
1500	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 007**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 20 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0800	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site during construction:</p> <p>Deer 350D Excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Equipment arrived on site today: Caterpillar 735 articulated haul truck.</p>
	<p><u>Clearing and Grubbing</u></p> <p>The County of Kauai has removed the majority of the green waste and white goods from within the new leachate evaporation pond (NLEP) construction area.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has cleared the area and proof-rolled the perimeter of the NLEP area to received compacted fill. The area was proof-rolled using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>The subbase was observed to be firm and non-yielding in accordance with the project requirements.</p>
	<p><u>Cell 1 Construction</u></p> <p>Jesse Frey (Waste Management of Hawaii) notified me that AECOM (design engineer) would be preparing a revision to the Cell 1 design based on the re-surveyed western property line. The contractor has temporarily suspended construction within the Cell 1 construction area pending the revised grading plan from AECOM.</p>
1500	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 008**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE:      DAY: 21      MONTH: January      YEAR: 2010

WEATHER: Sunny and warm during the day

0800	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site during construction:</p> <p>Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Equipment arrived on site today: Hitachi 450 LC excavator Equipment removed from site today: Deere 350D Excavator.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has begun to excavate the NLEP to construct the design grades. The excavated material is being placed along the "west" side (shrimp ponds side) of the NLEP to construct the design grades along the perimeter.</p> <p>The compacted fill material is being placed using a Hitachi 450 LC excavator. The lifts are uniformly graded to an 8-inch loose lift, moisture-conditioned using a water truck, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-02 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-001. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended construction within the Cell 1 area pending a design revision by AECOM (design engineer).</p>
1500	I left site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 009**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 22 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0800	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material is being placed along the western side of the pond to construct the design grades along the perimeter.</p> <p>The compacted fill material is being placed into a Cat. 735 articulated haul truck using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill material directly onto the perimeter berm of the NLEP. The lifts are uniformly graded to an 8-inch loose layer using a Cat. D6 LGP dozer, moisture-conditioned using a water truck and then compacted using a Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-13 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-002. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).</p> <p>A bulk sample of the compacted fill (onsite soils) was collected from within the field density test location FDT-13. The sample was placed into a 5-gallon bucket labeled SB-003 and then shipped via Fed Ex to Precision Laboratories for conformance testing.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended construction within the Cell 1 area pending a design revision by AECOM (design engineer).</p>
1500	I left the site and traveled to Fed Ex to drop off sample SB-003.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 010**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday


DATE: DAY: 25 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0730	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material is being placed along the "north" side (mountain side) of the pond to construct the design grades along the perimeter.</p> <p>The compacted fill material is being placed into a Cat. 735 articulated haul truck using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill material directly onto the perimeter berm of the NLEP. The lifts are uniformly graded to an 8-inch loose layer using a Cat. D6 LGP dozer, moisture-conditioned using a water truck and then compacted using a Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-27 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-003. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended construction within the Cell 1 area pending a design revision by AECOM (design engineer).</p>
1600	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 011**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE:

DAY: 26

MONTH: January

YEAR: 2010

WEATHER: Overcast and cloudy with rain in the morning.

0730	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
1000	I attended the weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  Suspended construction today due to rain.
	<u>Cell 1 Construction</u>  The contractor has suspended construction within the Cell 1 area pending a design revision by AECOM (design engineer).
1400	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 012**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday


DATE: DAY: 27 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0700	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material being placed along the "north" side (mountain side) of the pond to construct the design grades along the perimeter.</p> <p>The compacted fill material is being placed into two Cat. 735 articulated haul trucks using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill material directly onto the perimeter berm of the NLEP. The lifts are uniformly graded to an 8-inch loose layer using a Cat. D6 LGP dozer, moisture-conditioned using two water trucks and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-39 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-004. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended construction within the Cell 1 area pending a design revision by AECOM (design engineer).</p>
1600	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 013**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 28 MONTH: January

YEAR: 2010

WEATHER: Sunny and warm during the day.

0730	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP to construct the design grades. The excavated material is being placed along the "north" side (mountain side) and "west" side (administration building) of the NLEP to construct the design grades along the perimeter.</p> <p>The compacted fill material is being placed into two Cat. 735 articulated haul trucks using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill directly onto the perimeter berm of the NLEP. The lifts are uniformly graded to an 8-inch loose layer using a Cat. D6 LGP dozer, moisture-conditioned using two water trucks and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>The contractor has begun to cut the NLEP slopes and floor to the final subbase design grades. During grading, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually rolls the surface to maintain compaction.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended construction within the Cell 1 area pending a design revision by AECOM (design engineer).</p>
1600	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 014**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 29 MONTH: January

YEAR: 2010

WEATHER: Light rain during the day.

0730	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP to construct the design grades. The excavated material is being placed along the "north" side (mountain side) of the NLEP to construct the design grades along the perimeter.</p> <p>The compacted fill material is being placed into two (2) Cat. 735 articulated haul trucks using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill material directly onto the perimeter berm of the NLEP. The lifts are uniformly graded to an 8-inch loose layer using a Cat. D6 LGP dozer, moisture conditioned using two water trucks and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>The contractor continues to cut the NLEP slopes and floor to construct the final subbase design grades. During grading, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually rolls the surface to maintain compaction.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor's grade setter has begun to set stakes for the revised Cell 1 design grades.</p>
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 015**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 1 MONTH: February

YEAR: 2010

WEATHER: Warm and sunny during the day.

0730	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
1000	I attend the weekly construction meeting.
00	Returned from the weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material is being placed along the northern side (mountain side) of the NLEP to construct the design grades along the perimeter.  The contractor has placed and compacted the compacted fill material to complete the NLEP subbase. The subbase was intentionally overbuilt to accommodate the lines and grades of the final product. The contractor continues to cut the NLEP slopes and floor to construct the final subbase design grades. During grading, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually rolls the surface to maintain compaction.
	<u>Cell 1 Construction</u>  No work in the Cell 1 construction area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 016**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday


DATE: DAY: 2 MONTH: February

YEAR: 2010

WEATHER: Light rain in the morning, sunny and warm during the afternoon.

0730	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material is being placed along the northern side (mountain side) of the NLEP to construct the design grades along the perimeter.</p> <p>The contractor has placed and compacted the compacted fill (onsite soils) material to complete the NLEP subbase. The subbase was intentionally overbuilt to accommodate the lines and grades of the final design. The contractor continues to cut the NLEP slopes and floor to construct the final subbase design grades. During grading, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually rolls the surface to maintain compaction.</p>
	<p><u>Cell 1 Construction</u></p> <p>No work in the Cell 1 construction area today.</p>
1600	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 017**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 3 MONTH: February

YEAR: 2010

WEATHER: Cool and breezy during the morning, sunny and warm during the afternoon.

0730	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material is being placed along the "north" side (mountain side) of the NLEP to construct the design grades along the perimeter.  The contractor has placed and compacted the compacted fill (onsite soils) material to complete the NLEP subbase. The subbase was intentionally overbuilt to accommodate the lines and grades of the final design. The contractor continues to cut the NLEP slopes and floor to construct the final subbase design grades. During grading, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually rolls the surface to maintain compaction.
	<u>Cell 1 Construction</u>  No work in the Cell 1 construction area today.
	<u>Geosynthetic Materials</u>  As of today, the following geosynthetics for the project are approved for delivery:  CETCO Bentomat FWL GCL, Agru 60 mil double-sided textured HDPE Microspike geomembrane, Geocell System, 16 oz/sy nonwoven geotextile, and 6 oz/sy nonwoven geotextile.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 018**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

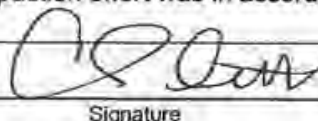
DATE: DAY: 4 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0700	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the NLEP pond to construct the design grades. The excavated material is being placed along the northern side (mountain side) of the NLEP to construct the design grades along the perimeter.</p> <p>The contractor continues to cut the NLEP slopes and floor to construct the final subbase design grades. During grading, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually rolls the surface to maintain compaction.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has begun to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D). The existing subbase condition was scarified using a Caterpillar 140H motor grader, moisture conditioned using a water truck, and finally compacted using Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>The contractor is hauling the NLEP trimmings, which are being excavated to obtain final NLEP subbase grades, to the Cell 1 area to be used as compacted fill (onsite soils) material.</p> <p>The NLEP trimmings material is being placed into two Caterpillar 735 articulated haul trucks using a Hitachi 450 LC excavator. The haul trucks then dump the material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch loose layers using a Caterpillar D6 LGP dozer, moisture conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p>

Chris Scott  
Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 4 February 2010

	A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at the density test location FDT-1 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-001. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 019**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE:      DAY: 5      MONTH: February      YEAR: 2010

WEATHER: Sunny and warm during the day.

0700	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Equipment arrived on site today: End dump "Bobcat" haul truck, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has temporarily suspended construction of NLEP earthwork.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D). The existing subbase condition was scarified using a Caterpillar 140H motor grader, moisture conditioned using a water truck, and finally compacted using Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>The contractor is hauling the compacted fill (onsite soils) material from the existing sand stockpile which is located west of the NLEP. The compacted fill material is being placed into two Caterpillar 735 articulated haul trucks and one end dump "bobcat" haul truck using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p>
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 020**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 8 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, End dump "Bobcat" haul truck, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has temporarily suspended construction of NLEP earthwork.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D).</p> <p>The contractor depleted the existing sand stockpile which is located west of the NLEP, and has begun to excavate the grades for the New Infiltration Basin (NIB). The excavated sand material is hauled to Cell 1 and used as subbase compacted fill (onsite soils).</p> <p>The compacted fill (onsite soils) material is being placed into two Caterpillar 735 articulated haul trucks and one end dump "bobcat" haul truck using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture-conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p>
	<p><u>Survey</u></p> <p>A survey crew from Esaki Surveying &amp; Mapping, Inc. is on site this morning to set grade control for the new infiltration basin and to establish limits of Cell 1 (Cells 1C &amp; 1D) to facilitate the final subbase compacted fill construction.</p>

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 8 February 2010

	<u>New Infiltration Basin (NIB)</u> The contractor has begun to excavate the lines and grades to construct the new infiltration basin.
1600	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

Report Sequence No.: 021

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 9 MONTH: February YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, End dump "Bobcat" haul truck, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
1000	I attended the weekly construction meeting.
10	Returned from the weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to final grade the NLEP floor and side slope using a Caterpillar 140H motor grader.
	<u>Cell 1 Construction</u>  The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C & 1D).  The contractor continues to excavate the grades for the New Infiltration Basin (NIB). The excavated sand is hauled to Cell 1 and used as subbase compacted fill (onsite soils).  The compacted fill material is being placed into two Caterpillar 735 articulated haul trucks and one end dump "bobcat" haul truck using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C & 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture-conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.
	<u>New Infiltration Basin (NIB)</u>  The contractor continues to excavate the lines and grades to construct the new infiltration basin.
00	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 022**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

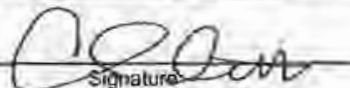
DATE: DAY: 10 MONTH: February

YEAR: 2010

WEATHER: Overcast, cloudy and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Equipment off site today: End dump "Bobcat" haul truck.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to final grade the NLEP floor and side slope using a Caterpillar 140H motor grader.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D).</p> <p>The contractor continues to excavate the grades for the New Infiltration Basin (NIB). The excavated sand is hauled to Cell 1 and used as subbase compacted fill (onsite soils).</p> <p>A sample (SB-004) was collected from the excavated NIB sand and was sent to Precision Laboratories for geotechnical testing.</p> <p>The compacted fill material is being placed into two Cat. 735 articulated haul trucks and one end dump "bobcat" haul truck using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture-conditioned using two (2) water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>The contractor has removed the existing electrical conduit from within the limits of Cell 1 (Cells 1C &amp; 1D). The</p>

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 10 February 2010

	excavated utility trench was backfilled and compacted using sand (onsite soils).
	<u>New Infiltration Basin (NIB)</u> The contractor continues to excavate the lines and grades to construct the new infiltration basin.
	<u>Fencing</u> Wellington Fencing company is on site working to install the new fencing along the western side of the access road into the landfill as shown on Drawing 2 of the Construction Drawings.
	<u>Mixed Waste Drop Off</u> The contractor sawcuts and removes the existing concrete sidewalk adjacent to the mixed waste drop off in accordance with the "Site Plan" identified on Drawing 25 of the Construction Drawings.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 023**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

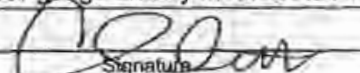
DATE: DAY: 11 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Equipment arrived on site today: Hitachi BH278 excavator.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to final grade the floor and side slope of the NLEP using a Caterpillar 140H motor grader.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D).</p> <p>The contractor continues to excavate the grades for the New Infiltration Basin (NIB). The excavated sand is hauled to Cell 1 and used as subbase compacted fill (onsite soils).</p> <p>The compacted fill (onsite soils) material is being placed into two Caterpillar 735 articulated haul trucks using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture-conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-50 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-003. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).</p>

Chris Scott  
Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 11 February 2010

	The contractor has removed the existing electrical conduit from within the limits of Cell 1 (Cells 1C & 1D). The excavated utility trench was backfilled and compacted using excavated NIB sand material.
	<u>New Infiltration Basin (NIB)</u> The contractor has suspended construction in this area today.
	<u>Fencing</u> Wellington Fencing company is on site working to install the new fencing along the western side of the access road into the landfill as shown on Drawing 2 of the Construction Drawings.
	<u>Mixed Waste Drop Off</u> The contractor has sawcut and removed the existing concrete sidewalk adjacent to the mixed waste drop off in accordance with the "Site Plan" identified on Drawing 25 of the Construction Drawings.
1600	I left the site.

Chris Scott

Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 024**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 12      MONTH: February

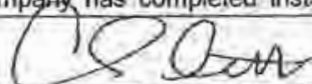
YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator. Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Equipment arrived on site today: Caterpillar D5 dozer with GPS grade control.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has suspended construction on the NLEP today.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D).</p> <p>The contractor continues to excavate the grades for the New Infiltration Basin (NIB). The excavated sand is hauled to Cell 1 and used as subbase compacted fill (onsite soils).</p> <p>The compacted fill material is being placed into two Caterpillar 735 articulated haul trucks using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture-conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor has suspended construction in this area today.</p>
	<p><u>Fencing</u></p> <p>Wellington Fencing company has completed installation of the new fencing along the western side of the</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 12 February 2010

	access road into the landfill as shown on Drawing 2 of the Construction Drawings.
1600	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

Report Sequence No.: 025

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 16 MONTH: February

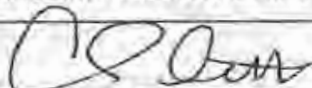
YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
10	I attended the weekly construction meeting.
1100	I returned from the weekly construction meeting.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has begun the process of final grading to achieve design grades of the leachate impoundment.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils) to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D).</p> <p>The contractor continues to excavate the grades for the New Infiltration Basin (NIB). The excavated sand is hauled to Cell 1 and used as subbase compacted fill (onsite soils).</p> <p>The compacted fill material is being placed into two (2) Caterpillar 735 articulated haul trucks using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Caterpillar D6 LGP dozer, moisture-conditioned using two (2) water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p> <p>Keith Suga (Goodfellow Bros.) has informed me that the Kauai Aggregate Quarry has produced stockpiles of the 1½-inch base course and ¾-inch minus gravel materials which Goodfellow Bros. proposes to be used for the Cell 1 Granular Drainage Layer and the NLEP Granular Operations Layer, respectively. I went to the quarry and collected samples of 1½-inch base course and ¾-inch minus gravel from the stockpiled sources.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

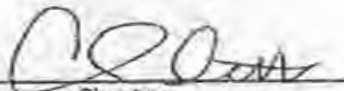
PROJECT NO.: WG1298 / 02

DAY/DATE: 16 February 2010

	<p><u><i>New Infiltration Basin (NIB)</i></u></p> <p>Due to the identification of existing underground utilities within the footprint of the infiltration basin design side slope, the contractor has suspended construction in this area until the issue can be resolved.</p>
1600	<p>I left the site and traveled to Fed Ex to drop off the quarry samples (1½-inch base course and ¾-inch minus granular drainage materials) for delivery to Precision Laboratory.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch



**Kekaha Landfill**  
**Kekaha, Kauai, Hawaii**

**DAILY FIELD REPORT**

**Report Sequence No.: 026**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 17 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues final grading operations to achieve design grades of the NLEP.
	<u>Cell 1 Construction</u>  The contractor has temporarily suspended construction of Cell 1.
	<u>New Infiltration Basin (NIB)</u>  The contractor has suspended construction in the NIB due to the identification of existing underground utilities within the NIB side slope.
1600	I left the site.

Chris Scott

Printed Name

Signature

cc: Mike Minch



**DAILY FIELD REPORT**

Report Sequence No.: 027

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 18 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 844J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues final grading operations to achieve design grades of the NLEP.  No compacted fill was placed in this area today.
	<u>Cell 1 Construction</u>  The contractor has temporarily suspended construction of Cell 1.
	<u>New Infiltration Basin (NIB)</u>  The contractor is working to final grade the eastern and northern ends of the NIB side slopes to achieve design grades.  No compacted fill was placed in this area today.
1600	I left the site.

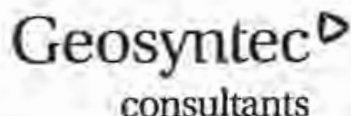
Chris Scott

Printed Name



Signature

cc: Mike Minch



**Kekaha Landfill**  
**Kekaha, Kauai, Hawaii**

**DAILY FIELD REPORT**

**Report Sequence No.: 028**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
 Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 19      MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator. Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues final grading operations to achieve design grades of the NLEP.  No compacted fill was placed in this area today.
	<u>Cell 1 Construction</u>  The contractor has temporarily suspended construction of Cell 1.
	<u>New Infiltration Basin (NIB)</u>  The contractor is working to final grade the eastern and northern ends of the NIB side slopes to achieve design grades.  No compacted fill was placed in this area today.
1600	I left the site.

Chris Scott

Printed Name

Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 029**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE:      DAY: 22      MONTH: February      YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has begun to excavate the anchor trench using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.</p> <p>The contractor continues to final grade the floor of the NLEP using a Caterpillar 140H motor grader with GPS grade control. The trimmings from final grading operations are hauled from the pond to Cell 1 and placed as compacted fill (onsite soils).</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to place compacted fill (onsite soils), taken from the NLEP final grading trimmings, to construct the subbase design grades within Cell 1 (Cells 1C &amp; 1D).</p> <p>The compacted fill material is being placed into two Cat. 735 articulated haul trucks using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C &amp; 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Cat. D5 dozer with GPS grade control, moisture conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor has suspended construction in this area today.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 22 February 2010

	<p><u>Geosynthetics Inventory</u></p> <p>Three (3) shipping containers were delivered to the site today. The following materials were inventoried and received in good condition;</p> <ul style="list-style-type: none"><li>• 14 rolls of CETCO Bentomat FWL Geosynthetic Clay Liner (GCL);</li><li>• 28 rolls of TNS E160 16 oz/sy nonwoven geotextile; and</li><li>• 84 rolls of TNS E060 6 oz/sy nonwoven geotextile.</li></ul>
1630	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 030**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

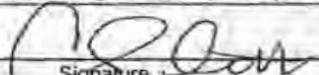
DATE: DAY: 23 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
10	I attended the weekly construction meeting.
1200	Returned from the construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to excavate the anchor trench using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.  The contractor continues to final grade the NLEP floor using a Caterpillar 140H motor grader. The trimmings from final grading operations are hauled from the pond to Cell 1 and placed as compacted fill (onsite soils).
	<u>Cell 1 Construction</u>  The contractor continues to place compacted fill (onsite soils), taken from the NLEP final grading trimmings, to construct the subbase design grades within Cell 1 (Cells 1C & 1D).  The compacted fill material is being placed into two Cat. 735 articulated haul trucks using a Hitachi 450 LC excavator. The haul trucks dump the compacted fill material directly into the limits of Cell 1 (Cells 1C & 1D) construction. The lifts are uniformly graded to 8-inch to 10-inch loose lifts using a Cat. D5 LGP dozer with GPS grade control, moisture-conditioned using two water trucks, and then compacted using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.  A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-66 using an Army Corps sampler. The sample was extracted by hand, capped at

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 23 February 2010

	each end, and then labeled TW-004. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).
	<u>New Infiltration Basin (NIB)</u> The contractor has suspended construction in this area today.
	<u>Geosynthetics Inventory</u> Two (2) shipping containers were delivered to the site today. The following materials were inventoried and received in good condition; <ul style="list-style-type: none"><li>• 27 rolls of TNS E160 16 oz/sy nonwoven geotextile; and</li><li>• 14 rolls of AGRU 60 mil double-sided textured HDPE Microspike geomembrane.</li></ul>
1630	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 031**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 24 MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 740 articulated haul truck, Caterpillar 735 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the anchor trench using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.</p> <p>The contractor continues to final grade the NLEP floor using a Caterpillar 140H motor grader. The trimmings from final grading operations are hauled from the pond to Cell 1 and placed as compacted fill (onsite soils).</p> <p>Keith Suga (Goodfellow Bros.) has identified a 3-inch minus granular drainage material from the Kauai Aggregate Quarry as a proposed source for the NLEP Granular Fill (backfill for sidelobe Geocell). I went to the quarry and visually observed a poorly-graded, clean, subangular coarse gravel. A sample of the 3-inch minus material was collected into a 5-gallon bucket and delivered to Precision Laboratories for gradation testing.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended construction on Cell 1 at this time.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor has suspended construction in this area today.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>Three (3) shipping containers were delivered to the site today. The following materials were inventoried and received in good condition:</p> <ul style="list-style-type: none"> <li>42 rolls of AGRU 60 mil double-sided textured HDPE Microspike geomembrane and 16 rolls of HDPE welding rod.</li> </ul>

Chris Scott  
Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 24 February 2010

	<u>Perimeter Access Road Improvement</u> Keith has identified a 1.5-inch minus base course gravel material located at the Kauai Aggregate Quarry as a proposed source to be used for the perimeter access road improvement. I went to the quarry and visually observed a poorly-graded gravel with fines. A sample of the 1.5-inch minus gravel was collected into a 5-gallon bucket and delivered to Hirata & Associates for gradation testing.
1630	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

Report Sequence No.: 032

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 25      MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to excavate the anchor trench using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.  The contractor has completed the final grading of the floor within the NLEP. Several field density tests using a portable Nuclear moisture/density gauge indicate the 6-inch final subbase compacted fill was placed and compacted in accordance with the project specifications.
	<u>Cell 1 Construction</u>  The contractor continues to final grade the Cell 1 (Cells 1C & 1D) floor using a D5 dozer with GPS grade control. An Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually compacts the graded surface.
	<u>New Infiltration Basin (NIB)</u>  The contractor has suspended construction in this area today.
	<u>Geosynthetics Inventory</u>  One (1) shipping container was delivered to the site today. The following materials were inventoried and received in good condition:  <ul style="list-style-type: none"> <li>• 16 pallets of Geosystem's GEOCELL, Model number GW30V80834; and</li> <li>• one pallet of Presto ATRA -4 clips.</li> </ul>
0630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 033**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 26      MONTH: February

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	<p>I arrived on site. Goodfellow Bros. is already on site.</p>
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the anchor trench using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.</p> <p>The western end of the NLEP was intentionally left partially constructed to allow for access into the floor of the NLEP. The final grading will be completed and surveyed later in the project.</p> <p>The contractor has completed the final grading of the floor within the NLEP.</p> <p>Esaki Surveying and Wagner Engineering Services, Inc. arrived on site this morning to survey the NLEP design grades.</p> <p>During construction today Goodfellow Bros, Esaki and Wagner checked control points at locations K1 thru K4. The survey control data is as follows:</p> <p><u>Goodfellow Bros</u></p> <p>K-1 (Southeast Corner of the site): N.55154.01 E.1557985.58, EL: 11.58          K2 (Southwest Corner of the site): N.56416.93, E.156890.86, EL: 11.62          K3 (Northwest Corner of the site): N.57580.74, E.1557995.96, EL: 11.96          K4 (Northeast Corner of the site): N.56311.73, E.1559172.81, EL: 12.67</p>

Chris Scott  
Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 26 February 2010

	<p><b><u>Wagner Engineering Services, Inc.</u></b></p> <p>K-1 (Southeast Corner of the site): N.53989.07, E.1556599.02, EL: 11.58 K2 (Southwest Corner of the site): N.55251.87, E.1555504.29, EL: 11.62 K3 (Northwest Corner of the site): N.56415.60, E.1556609.42, EL: 11.99 K4 (Northeast Corner of the site): N.55146.68, E.1557786.08, EL: 12.60</p> <p><b><u>Esaki Surveying and Mapping</u></b></p> <p>K-1 (Southeast Corner of the site): N.53989.050, E.1556598.904, EL: 11.24 K2 (Southwest Corner of the site): N.55251.931, E.1555504.216, EL: 11.41 K3 (Northwest Corner of the site): N.56415.6723, E.1556609.358, EL: 11.986 K4 (Northeast Corner of the site): N.55146.783, E.1557786.202, EL: 12.42</p> <p>All of the prepared NLEP subbase grades completed, including anchor trench, were surveyed today by both Esaki and Wagner.</p>
	<p><b><u>Cell 1 Construction</u></b></p> <p>The contractor continues to final grade the floor of Cell 1 (Cells 1C &amp; 1D) using a D5 dozer with GPS grade control. An Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually compacts the graded surface.</p>
	<p><b><u>New Infiltration Basin (NIB)</u></b></p> <p>The contractor has suspended construction in this area today.</p>
	<p><b><u>Geosynthetics Inventory</u></b></p> <p>No materials were delivered to the site today.</p>
1630	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 034**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 1 MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor continues to excavate the anchor trench along the western end of the NLEP using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.</p> <p>The section of the western end of the NLEP will be intentionally left partially constructed to allow for access in to the floor of the NLEP. The final grading will be completed and surveyed later in the project.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to final grade the Cell 1 (Cells 1C &amp; 1D) floor using a D5 dozer with GPS grade control. An Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor continually compacts the graded surface.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor has suspended construction in this area today.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>Five (5) shipping containers were delivered to the site today. The following materials were inventoried and received in good condition:</p> <ul style="list-style-type: none"> <li>• 42 rolls of Agru 60 mil double-sided textured HDPE Microspike geomembrane with 15 spools of HDPE welding rod; and</li> <li>• 30 rolls of CETCO FWL GCL.</li> </ul>

Chris Scott

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 1 March 2010

	The GCL material was stockpiled onto wooden pallets and protected with plastic sheeting. The plastic cover... was anchored to the ground using sand bags.
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 035**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 2 MONTH: March

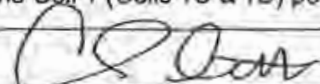
YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
10	I attended the weekly construction meeting.
1100	Returned from the weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to excavate the anchor trench along the western end of the NLEP using a Hitachi BH278 excavator. The anchor trench is visually observed to be constructed in accordance with the project requirements.  The section of the western end of the NLEP will be intentionally left partially constructed to allow for access in to the floor of the NLEP. The final grading will be completed and surveyed later in the project.
	<u>Cell 1 Construction</u>  The contractor has completed the majority of the floor and has begun to construct the perimeter berm within the limits of Cell 1 (Cells 1C & 1D). Material is excavated from the floor of the New Infiltration Basin (NIB), loaded into a haul truck, and then placed within the limits of the Cell 1 perimeter berm to construct the design grades. A Caterpillar D5 dozer with GPS grade control uniformly grades the placed material to a uniform 8 to 10-inch loose lift. Once the lift has been spread over the entire width of the berm, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor provides compaction effort. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project specifications.
	<u>New Infiltration Basin (NIB)</u>  The contractor has begun to over-excavate the floor of the NIB to obtain compacted fill (onsite soils) material for the construction of the Cell 1 (Cells 1C & 1D) perimeter berm.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 2 March 2010

	<p><u>Geosynthetics Inventory</u></p> <p>Six (6) shipping containers were delivered to the site today. The following materials were inventoried and received in good condition:</p> <ul style="list-style-type: none"><li>• 90 rolls of CETCO FWL GCL.</li></ul> <p>The GCL material was stockpiled onto wooden pallets and protected with plastic sheeling. The plastic covering was anchored to the ground using sand bags.</p>
1630	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 036**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 3 MONTH: March

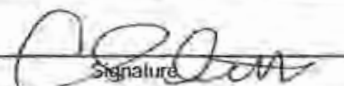
YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Survey:</u> Esaki Surveying and Mapping was on site this afternoon to collect additional as-built survey points along the eastern limits of the NLEP. The survey crew collected data from the inside slope and anchor trench.</p> <p>Survey points 436, 447, 458 and 461 will require survey once the temporary access ramp has been removed, and the west end of the NLEP has been constructed to the design grades.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C &amp; 1D). Material is excavated from the floor of the New Infiltration Basin (NIB), loaded into a haul truck using an excavator, and then placed within the limits of the Cell 1 perimeter berm to construct the design grades.</p> <p>A Caterpillar D5 dozer with GPS grade control uniformly grades the placed material to a uniform 8 to 10-inch loose lift. Once the lift has been spread over the entire width of the berm, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor provides compaction effort. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project specifications.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor continues to over-excavate the floor of the NIB to obtain compacted fill (onsite soils) material for the construction of the Cell 1 (Cells 1C &amp; 1D) perimeter berm.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>Four (4) shipping containers were delivered to the site today. The following materials were inventoried and</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 3 March 2010

	received in good condition: <ul style="list-style-type: none"><li>• 60 rolls of CETCO FWL GCL</li></ul> The GCL material was stockpiled onto wooden pallets and protected with plastic sheeting. The plastic covering was anchored to the ground using sand bags.
1630	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 037**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 4      MONTH: March      YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>No work in this area today.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C &amp; 1D). Material is excavated from the floor of the New Infiltration Basin (NIB), loaded into a haul truck using an excavator, and then placed within the limits of the Cell 1 perimeter berm to construct the design grades.</p> <p>A Caterpillar D5 dozer with GPS grade control uniformly grades the placed material to a uniform 8 to 10-inch loose lift. Once the lift has been spread over the entire width of the berm, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor provides compaction effort. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project specifications.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor continues to over-excavate the floor of the NIB to obtain compacted fill (onsite soils) material for the construction of the Cell 1 (Cells 1C &amp; 1D) perimeter berm.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>Three (3) shipping containers were delivered to the site today. The following materials were inventoried and received in good condition:</p> <ul style="list-style-type: none"> <li>• 45 rolls of CETCO FWL GCL.</li> </ul> <p>The GCL material was stockpiled onto wooden pallets and protected with plastic sheeting. The plastic covering was anchored to the ground using sand bags.</p>
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 038**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 5      MONTH: March

YEAR: 2010

WEATHER: Cool and cloudy with light rain during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  No work in this area today.
	<u>Cell 1 Construction</u>  The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C & 1D). Material is excavated from the floor of the New Infiltration Basin (NIB), loaded into a haul truck using an excavator, and then placed within the limits of the Cell 1 perimeter berm to construct the design grades.  A Caterpillar D5 dozer with GPS grade control uniformly grades the placed material to a uniform 8 to 10-inch loose lift. Once the lift has been spread over the entire width of the berm, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor provides compaction effort. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project specifications.
	<u>New Infiltration Basin (NIB)</u>  The contractor continues to over-excavate the floor of the NIB to obtain compacted fill (onsite soils) material for construction of the Cell 1 (Cells 1C & 1D) perimeter berm.
	<u>Geosynthetics Inventory</u>  No materials were delivered to the site today.
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 039**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 8      MONTH: March

YEAR: 2010

WEATHER: Cool and cloudy with light rain during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor was rolling the floor of the NLEP using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>Cell 1 Construction</u>  The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C & 1D). Material is excavated from the floor of the New Infiltration Basin (NIB), loaded into a haul truck using an excavator, and then placed within the limits of the Cell 1 perimeter berm to construct the design grades.  A Caterpillar D5 dozer with GPS grade control uniformly grades the placed material to a uniform 8 to 10-inch loose lift. Once the lift has been spread over the entire width of the berm, an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor provides compaction effort. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project specifications.
	<u>New Infiltration Basin (NIB)</u>  The contractor continues to over-excavate the floor of the NIB to obtain compacted fill (onsite soils) material for construction of the Cell 1 (Cells 1C & 1D) perimeter berm.  The contractor has begun to remove the fire hydrant supply line along the southern side of the NIB. The pipe is removed in sections so as to not damage the pipe.
	<u>Geosynthetics Inventory</u>  No materials were delivered to the site today.
1430	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 040**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 8      MONTH: March

YEAR: 2010

WEATHER: Cloudy and overcast during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (28,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
0730	Hari Sharma and Mike Minch (both of Geosyntec) are on site today for the weekly construction meeting and to conduct a site visit.
1000	Hari, Mike and I attend the weekly construction meeting.
1120	Returned from the weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor was rolling the floor of the NLEP using an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>Cell 1 Construction</u>  The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C & 1D).  The contractor has temporarily suspended the subbase compacted fill placement within the limits of the Cell 1 perimeter berm, and has begun to final grade the floor and sideslopes to obtain the design grades. Once the forcemain and forcemain penetration have been installed, the Cell 1 perimeter berm construction will resume.  The contractor has begun to expose the existing Phase II containment system tie-in along the western anchor trench.
	<u>New Infiltration Basin (NIB)</u>  The contractor continues to over-excavate the floor of the NIB to obtain compacted fill (onsite soils) material for construction of the Cell 1 (Cells 1C & 1D) perimeter berm.  The contractor continues to remove the fire hydrant supply line along the southern side of the NIB. The pipe is

Chris Scott

Printed Name

Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 9 March 2010

	removed in section so as to not damage the pipe.
	<u>Geosynthetics Installation</u> Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today. No geosynthetics installation work today as the construction equipment container is not on site. NWL is waiting for delivery of the container.
	<u>Geosynthetics Inventory</u> No materials were delivered to the site today.
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 041**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 10      MONTH: March

YEAR: 2010

WEATHER: Cloudy and overcast during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Lining Superintendent [NWL]) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u> NWL unloaded the equipment container and began to fill sand bags in preparation for deployment.
	<u>Cell 1 Construction</u>  The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C & 1D).  The contractor has temporarily suspended the subbase compacted fill placement within the limits of the Cell 1 perimeter berm, and has begun to final grade the floor and sideslopes to obtain the design grades. Once the forcemain and forcemain penetration have been installed, the Cell 1 perimeter berm construction will resume.  The contractor continues to expose the existing Phase II containment system tie-in along the western anchor trench.  ITC Water Management, Inc. (HDPE pipe welding subcontractor) is on site to remove a section of the existing cleanout within Cell 1D. The cleanout pipe was cut 1.80 feet below top of subbase grade and capped using an HDPE cap with an electro-fusion coupler. The existing cleanout section, existing vault, and backfill material were removed per AECOM's response to RFI #7, dated 5 March 2010. Goodfellow Bros. will monitor the new connection for 24 hours before backfilling to ensure the connection does not leak.  Cleanout pipe GPS survey data by GBI as follows: N: 57015.00, E: 1557878.29; EL 11.61 (fill 1.8 ft)
	<u>New Infiltration Basin (NIB)</u> No work in this area today.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 10 March 2010

	<p><u>Geosynthetics Inventory</u></p> <p>One (1) shipping container was delivered to the site today. The following materials were inventoried and received in good condition;</p> <ul style="list-style-type: none"><li>• two (2) rolls of Agru 80-mil HDPE geomembrane;</li><li>• six (6) rolls of Agru 60-mil HDPE geomembrane; and</li><li>• fourteen (14) rolls of TNS E160 16 oz/sy geotextile.</li></ul>
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



DAILY FIELD REPORT

Report Sequence No.: 042

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 11 MONTH: March

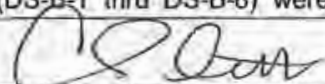
YEAR: 2010

WEATHER: Cool in the morning (69 degrees) sunny and warm (81 degrees) during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><i>Geosynthetics Installation</i></p> <p>NWL began to install the subbase 60 mil double-sided textured HDPE geomembrane in the NLEP today.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>67,724 sq ft</u> of 60 mil double-sided textured HDPE geomembrane above the approved NLEP subbase during construction today.</p> <p>Total subbase 60 mil HDPE geomembrane deployed to date is <u>67,724 sq ft</u>.</p> <p><u>28 panels</u> of subbase 60 mil HDPE geomembrane were used today in various widths and lengths for a total of <u>28 panels</u> to date.</p> <p><u>2,992 linear feet</u> (lf) of subbase 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>2,992 lf</u>. None of the seams were air tested today. The production seams not tested are documented and the seam air tests are pending.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Eight seam samples (DS-B-1 thru DS-B-8) were marked within the fusion-welded production seams for</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 11 March 2010

	destructive seam testing.
	<u>Cell 1 Construction</u> The contractor continues to construct the perimeter berm within the limits of Cell 1 (Cells 1C & 1D). The contractor has temporarily suspended the subbase compacted fill placement within the limits of the Cell 1 perimeter berm, and has begun to final grade the floor and sideslopes to obtain the design grades. Once the forcemain and forcemain penetration have been installed, the Cell 1 perimeter berm construction will resume. The contractor continues to expose the existing Phase II containment system tie-in along its western anchor trench (eastern side of Cell 1). The existing cleanout, which was cut and capped during construction yesterday, had been exposed for 24 hours for monitoring. No leaks were observed at the new connection; therefore, GBI backfilled the pipe using clean sand (onsite soils). The fill was placed in uniform lifts then compacted using a walk-behind pad-footed "jumping jack" compactor.
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Geosynthetics Inventory</u> No materials were delivered to the site today.
1630	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

DAILY FIELD REPORT

Report Sequence No.: 043

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 12 MONTH: March

YEAR: 2010

WEATHER: Cool in the morning (69 degrees) sunny and warm (81 degrees) during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>NWL continues to install the subbase 60 mil HDPE geomembrane today.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>30,407 sq ft</u> of subbase 60 mil HDPE geomembrane above the approved subbase during construction today.</p> <p>Total subbase 60 mil HDPE geomembrane deployed to date is <u>98,131 sq ft</u>.</p> <p><u>17 panels</u> of subbase 60 mil HDPE geomembrane were used today in various widths and lengths for a total of <u>45 panels</u> to date.</p> <p><u>1,407 linear feet (lf)</u> of subbase 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>4399 lf</u>. The majority of the seams were air tested in accordance with the project specifications. The remaining production seams not tested are documented and the seam air tests are pending.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Eight seam samples (DS-B-1 thru DS-B-8) were collected from the fusion-welded production seams and delivered to Precision Geosynthetics Laboratory, located in Anaheim, CA. for destructive seam testing. A</p>

Chris Scott

Printed Name

Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 12 March 2010

	<p>specimen from each of the seam samples was tested in the field in accordance with the project specificatio... The field destructive seam tests showed passing results.</p> <p><u>25 repairs</u> were performed today in various lengths and widths for a total of <u>25 repairs</u> to date. The repairs have been documented, and the non-destructive tests of the repairs are pending.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended work in this area today.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>The contractor is working to remove the existing fencing and to clear and grub the area around the perimeter of the existing leachate evaporation pond.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
1730	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 044**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 13      MONTH: March

YEAR: 2010

WEATHER: Cool in the morning (69 degrees) sunny and warm (81 degrees) during the day.

0600	I arrived on site. Goodfellow Bros. is not on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Destructive test results were received from Precision Laboratories today. The test results for seam samples DS-B-1 through DS-B-8 showed passing results.</p> <p>NWL did not deploy 60 mil HDPE geomembrane today. Construction activities were concentrated on completing the non-destructive testing and repairs.</p> <p><u>60 mil DST geomembrane:</u></p> <p>Total subbase 60 mil HDPE geomembrane deployed to date is <u>98,131 sq ft.</u></p> <p>A total of <u>45 panels</u> of subbase 60 mil HDPE geomembrane have been installed to date.</p> <p>All of the seams were air tested in accordance with the project specifications; all air test results met the project requirements.</p> <p>All trial welds for extrusion welder were prepared and tested in the field. The field tensiometer test results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Four (4) seam samples (DS-B-9 thru DS-B-12) were collected from the subbase 60 mil HDPE geomembrane fusion-welded production seams and delivered to Precision Geosynthetics Laboratory for destructive seam testing. A specimen from each of the seam samples was tested in the field in accordance with the project</p>

Chris Scott

Printed Name

Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 13 March 2010

	specifications. The field destructive seam tests showed passing results.  <u>Seventeen (17) repairs</u> were performed today in various lengths and widths for a total of <u>42 repairs</u> to date. The repairs have been documented, and all of the non-destructive tests were completed today with passing results.
	<u>Cell 1 Construction</u>  The contractor has suspended work in this area today.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Existing Leachate Evaporation Pond</u>  No work in this area today.
	<u>Geosynthetics Inventory</u>  No materials delivered to the site today
1430	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 045**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 15 MONTH: March

YEAR: 2010

WEATHER: Cloudy and overcast with light rainfall during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>NWL has completed the majority of the subbase 60-mil HDPE geomembrane installation. The contractor begins to install the secondary containment system within the NLEP. Four seam samples are en-route to Precision Laboratories for destructive seam testing, and test results are pending.</p> <p>The temporary ramp into the NLEP, located at the west end of the NLEP, will be removed later in the project.</p> <p><u>GCL deployment:</u></p> <p>NWL deployed approximately <u>12,821 sq ft</u> of secondary GCL along the NLEP western sideslopes and floor, providing 12-inch overlaps along the width and 8-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p>Total secondary GCL deployed to date: approximately <u>12,821 sq ft</u>.</p> <p>During the rain event today, all of the installed secondary GCL was observed to be prematurely hydrated. Section 02074, Part 3.02F specifies to "Remove GCL exposed to moisture and prematurely hydrated prior to placement of overlying material and replaced with new GCL."</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 15 March 2010

	<p>I have informed the contractor that the GCL material deployed today (approximately 12,821 sq ft) has been exposed to premature hydration.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>12,821 sq ft</u> of secondary 60 mil HDPE geomembrane above the prematurely-hydrated GCL during construction today.</p> <p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>12,821 sq ft</u>. Total 60 mil HDPE geomembrane deployed to date (subbase and secondary) is <u>110,952 sq ft</u>.</p> <p><u>11 panels</u> of secondary 60 mil HDPE geomembrane were used today in various widths and lengths for a total of <u>11 panels</u> of secondary 60 mil HDPE geomembrane to date.</p> <p><u>541 linear feet (lf)</u> of secondary 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>541 lf</u>. All of the production seams were documented, and the seam air tests are pending.</p> <p>All trial welds for fusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p>
	<p><u>Cell 1 Construction</u></p> <p>Esaki Surveying &amp; Mapping and Wagner Engineering Services, Inc. arrived on site this morning to survey the Cell 1 (Cells 1C &amp; 1D) subbase grades.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor is working to final grade the floor and side slopes of the NIB.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>The contractor continues to clear and grub the areas around the pond.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
1430	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 046**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 16 MONTH: March

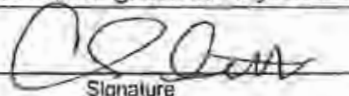
YEAR: 2010

WEATHER: Cloudy and overcast with light rainfall during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
1000	I attended weekly construction meeting.
1130	Returned from weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  Destructive test results were received from Precision Laboratories today. The test results for seam samples DS-B-9 through DS-B-12 showed passing results.  Due to yesterday's rain event the NWL has suspended the geosynthetics installation to remove the standing water on the subbase geomembrane.  <u>GCL deployment:</u>  NWL has suspended deployment of the GCL today due to rain.  Total secondary GCL deployed to date: approximately <u>12,821 sq ft.</u>  The GCL material installed on 15 March 2010 was inspected today due to exposure to yesterday's rain event.  During today's weekly construction meeting, Ken Bergschultz (AECOM design engineer) provided acceptance criteria for the prematurely-hydrated GCL: if the prematurely hydrated GCL is cut open, and the bentonite sandwiched between the carrier geotextile layers is still in the granular form and the geotextile components

Chris Scott

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 16 March 2010

	<p>have not been damaged, then the GCL will provide protection within the liner system as designed and can be accepted. Refer to AECOM's response to RFI #12 for this clarification to Section 02074 of the specifications.</p> <p>During construction today, the secondary GCL under the secondary 60 mil HDPE geomembrane Panel #1 (located on the far east end of the floor) was evaluated and did not meet the acceptance criteria for prematurely-hydrated GCL as the bentonite appeared saturated and was not in granular form. The GCL was removed, and will be replaced with new GCL when the rain has stopped and all standing water has been removed. As for the remaining secondary GCL panels along the eastern side slope (beneath secondary geomembrane panels 2 through 11), the bentonite was inspected and visually observed to be in the granular form and the geotextile components were not damaged. Therefore, the remaining secondary GCL was accepted.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL suspended deployment of the secondary 60 mil HDPE geomembrane today.</p> <p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>12,821 sq ft.</u> Total 60 mil HDPE geomembrane deployed to date (subbase and secondary) is <u>110,952 sq ft.</u></p> <p>A total of <u>11 panels</u> of secondary 60 mil HDPE geomembrane panels have been installed to date.</p> <p>All of the production seams were documented, and the seam air tests are pending.</p>
	<p><u>Cell 1 Construction</u></p> <p>No work in this area today.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>The contractor is working to final grade the floor and side slopes of the NIB.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>The contractor continues to clear and grub the areas around the pond.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

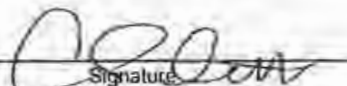
**Report Sequence No.: 047**

PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Kauai, Hawaii  
 DESCRIPTION: Phase II Lateral Expansion  
 Cell 1 Base Liner Construction  
 DAY OF WEEK: Wednesday  
 WEATHER: Cloudy and overcast with light rainfall during the day.

PROJECT NO.: WG1298  
 TASK NO.: 02  
 CONTRACTORS: Goodfellow Bros. / Northwest Linings  
 DATE: DAY: 17 MONTH: March YEAR: 2010

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Due to yesterday's and today's rain event, NWL has suspended the geosynthetics installation to remove the standing water on the subbase geomembrane.</p> <p><u>GCL deployment:</u></p> <p>NWL has suspended deployment of the secondary GCL today due to rain.</p> <p>Total secondary GCL deployed to date: approximately <u>12,821 sq ft.</u></p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL suspended deployment of the secondary 60 mil HDPE geomembrane today.</p> <p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>12,821 sq ft.</u>          Total geomembrane deployed to date (subbase and secondary) is <u>110,952 sq ft.</u></p> <p>A total of <u>11 panels</u> of secondary 60 mil HDPE geomembrane panels have been installed to date.</p> <p>All of the production seams were documented, and the seam air tests are pending.</p>

Chris Scott  
Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 17 March 2010

	<p><u>Cell 1 Construction</u></p> <p>GBI subcontractor ITC Water Management, located on Kauai (phone number 808-742-7243), continues to production weld the double-wall forcemain pipe. Visual observation of the production welds indicates that the welds were constructed in accordance to the manufacturer's recommendations and therefore meets the project requirements. Non-destructive air tests of the welds are pending.</p> <p>During construction today, the contractor has begun to expose the cleanout riser pipes along the southern end of the existing landfill. One operator with a small excavator carefully exposes the HDPE tee section while a laborer spots the work to ensure that the operator does not damage the existing landfill containment system.</p> <p>Eight of the 14 cleanout risers were exposed during construction today. Visual observation around the cleanouts confirmed that no damage was observed in or around the existing landfill containment system.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>No work in this area today.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
1630	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 048**

PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Kauai, Hawaii  
 DESCRIPTION: Phase II Lateral Expansion  
 Cell 1 Base Liner Construction  
 DAY OF WEEK: Thursday  
 WEATHER: Cloudy and overcast during the day.

PROJECT NO.: WG1298  
 TASK NO.: 02  
 CONTRACTORS: Goodfellow Bros. / Northwest Linings  
 DATE: DAY: 18 MONTH: March YEAR: 2010

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  All destructive test results for the subbase 60-mil geomembrane production seam testing were reviewed and showed passing results. Destructive test results for the secondary geomembrane seam samples DS-S-1 through DS-S-2 showed passing results. NWL continues to install the secondary containment system above the approved subbase 60-mil HDPE geomembrane within the NLEP.  <u>GCL deployment:</u>  NWL continues deployment of the secondary GCL above the 60-mil HDPE subbase geomembrane, providing 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).  Total secondary GCL deployed to date: approximately <u>51,185 sq ft.</u>  <u>60 mil DST geomembrane:</u>  NWL installed <u>38,364 sq ft</u> of secondary 60-mil HDPE geomembrane during construction today.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 18 March 2010

	<p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>51,185 sq ft.</u> Total geomembrane deployed to date (subbase and secondary) is <u>149,316 sq ft.</u></p> <p>Twelve secondary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>23 secondary panels</u> to date.</p> <p><u>1,083 linear feet</u> (lf) of secondary 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>1,624 lf</u> of secondary fusion-welded-seams. None of the seams were air tested today. The production seams not tested are documented and air tests are pending.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Six seam samples (DS-S-1 through DS-S-6) were marked within the secondary 60 mil HDPE geomembrane welded production seams for destructive testing</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI subcontractor ITC Water Management continues to production weld the double-wall forcemain pipe. Visual observation of the production weld indicates that the welds were constructed in accordance to the manufacturer's recommendations, and therefore meets the project requirements. Non-destructive air tests of the welds are pending.</p> <p>During construction today, the contractor has exposed all the remaining cleanout riser pipes along the south end of the existing Phase II landfill. One operator with a small excavator carefully exposes the HDPE section while a laborer spots the work to ensure that the operator does not damage the existing landfill containment system.</p> <p>Fourteen of the 14 cleanout risers were exposed during construction today. Visual observation around the cleanouts confirmed that no damage was observed in or around the existing landfill containment system.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>No work in this area today.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
1830	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 049**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 19      MONTH: March

YEAR: 2010

WEATHER: Cloudy and overcast during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Destructive test results were received from Precision Laboratories today. The test results for seam samples DS-S-1 through DS-S-6 showed passing results. NWL continues to install the secondary containment system above the approved subbase 60-mil HDPE geomembrane.</p> <p><u>GCL deployment:</u></p> <p>NWL continues the deployment of the secondary GCL above the approved subbase 60-mil HDPE geomembrane, providing 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p>Total secondary GCL deployed to date: approximately <u>84,420 sq ft.</u></p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>33,235 sq ft</u> of the secondary 60-mil HDPE geomembrane during construction today.</p> <p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>84,420 sq ft.</u> Total 60-mil HDPE geomembrane (subbase and secondary) deployed to date is <u>182,551 sq ft.</u></p>

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 19 March 2010

	<p>Twelve secondary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>35 secondary panels</u> to date.</p> <p><u>2,147 linear feet</u> (lf) of secondary 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>3,771 lf</u> of secondary fusion-welded-seams. The production seams where seam samples (for destructive testing) were marked have been air tested and showed passing results. The seam samples were cut from the production seams and delivered to Precision Laboratories for conformance testing. The remaining production seams not tested are documented and seam air tests are pending.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Three seam samples (DS-S-7 thru DS-S-9) were marked within the secondary 60 mil HDPE geomembrane welded production seams for destructive seam testing.</p> <p>GBI delivered one truck load of 3-inch minus subangular gravel to the site today. A sample of the material was collected and submitted to Hirata and Associates for gradation testing.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI subcontractor ITC Water Management located continues to production weld the double-wall forcemain pipe. Visual observation of the production weld indicates that the welds were constructed in accordance to the manufacturer's recommendations, and therefore meets the project requirements. Non-destructive air tests of the welds are pending.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>No work in this area today.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
1830	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

Report Sequence No.: 050

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 20 MONTH: March

YEAR: 2010

WEATHER: Cool in the morning (69 degrees) sunny and warm (81 degrees) during the day.

0600	I arrived on site. Goodfellow Bros. is not on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Destructive test results were received from Precision Laboratories today. The test results for seam samples DS-S-3 through DS-S-6 showed passing results.</p> <p>NWL did not deploy secondary 60 mil HDPE geomembrane today; construction activities were concentrated on completing the non-destructive testing and repairs of the deployed secondary geomembrane.</p> <p><u>60 mil DST geomembrane:</u></p> <p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>84,420 sq ft.</u> Total geomembrane (subbase and secondary) deployed to date is <u>182,551 sq ft.</u></p> <p>A total of <u>35 panels</u> of secondary 60-mil HDPE geomembrane have been installed to date.</p> <p>All of the seams were air tested in accordance with the project specifications. All air tests performed today were found meeting the project requirements.</p> <p>All trial welds for the extrusion welder were prepared and tested in the field. The field tensiometer test results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Three seam samples (DS-S-7 through DS-S-9) were collected from the 60 mil HDPE geomembrane fusion-welded production seams and delivered to Precision Geosynthetics Laboratory for destructive seam testing. A</p>

Chris Scott

Printed Name

Signature


cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 20 March 2010

	<p>specimen from each of the seam samples was tested in the field in accordance with the project specification. The field seam tests samples showed passing results.</p> <p><u>Thirty-nine repairs</u> were installed within the secondary 60-mil HDPE geomembrane today in various lengths and widths for a total of <u>39 secondary repairs</u> to date. The repairs have been documented and all non-destructive tests were completed with passing results.</p>
	<p><u>Cell 1 Construction</u></p> <p>The contractor has suspended work in this area today.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Existing Leachate Evaporation Pond</u></p> <p>No work in this area today.</p>
	<p><u>Geosynthetics Inventory</u></p> <p>No materials delivered to the site today.</p>
1430	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 051**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 22      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site. Kim Huynh (Geosyntec CQA Monitor) is on site to assist in the geosynthetics CQA of the NLEP.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  Kim Huynh is observing the geosynthetics installation activities in the NLEP. NWL completes the secondary layer and begins to install the primary layer of the NLEP containment system.
	<u>Cell 1 Construction</u>  GBI subcontractor ITC Water Management (ITC) continues to production weld the double-wall forcemain pipe. Visual observation of the production weld indicates that the welds were constructed in accordance to the manufacturer's recommendations, and therefore meets the project requirements.  During construction today, ITC performs field pressure testing of the section of double-wall pipe which will be used to extend the new wet well located at Cell 1C and will extend to the gravity sump located at Cell 1D. The double-wall pipe components (carrier and containment) were tested independently of each other and test results met the project requirements with less than 1% pressure drop (see pressure test certification form).
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Existing Leachate Evaporation Pond</u>  No work in this area today.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 22 March 2010

	<u>Geosynthetics Inventory</u> No materials were delivered to the site today.
	<u>Phase II Cleanout retrofit</u> ITC has removed the first cleanout riser located on the southwest corner of the existing Phase II landfill, and modified the existing cleanout riser in accordance with Detail 2 on Drawing 24 of the Construction Drawings. The final connection was completed using an electro-fusion coupler. The cleanout riser modified today was completed in accordance with the project requirements.
1830	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 051A**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 22 MONTH: March

YEAR: 2010

WEATHER: Cool in the morning (69 degrees) sunny and warm (85 degrees) during the day.

0630	I arrived on site. Goodfellow Bros. is already on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>During today's construction, NWL completes the majority of the secondary containment system above the approved subbase 60-mil HDPE geomembrane, and begins to install the primary containment system above the approved secondary 60-mil HDPE geomembrane.</p> <p><u>GCL deployment:</u></p> <p>NWL completes the majority of the secondary GCL above the subbase 60-mil HDPE geomembrane along the western sideslopes and floor, and begins to deploy the primary GCL above the secondary 60-mil HDPE geomembrane along the eastern sideslopes and floor. GCL deployment included 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p>Total secondary GCL deployed to date: approximately <u>98,667 sq ft.</u> Total primary GCL deployed to date: approximately <u>12,990 sq ft.</u></p> <p><u>60 mil DST geomembrane:</u></p> <p>During construction today, NWL installed <u>14,247 sq ft</u> of the secondary 60-mil HDPE geomembrane and <u>12,990 sq ft</u> of primary 60-mil HDPE geomembrane.</p> <p>Total secondary 60 mil HDPE geomembrane deployed to date: <u>98,667 sq ft.</u> Total primary 60 mil HDPE geomembrane deployed to date: <u>12,990 sq ft.</u> Total 60-mil HDPE geomembrane (subbase, secondary, and primary) deployed to date is <u>209,788 sq ft.</u></p> <p>Ten secondary 60 mil HDPE geomembrane panels were used today in random widths and lengths for a total of</p>

Kim Huynh  
Printed Name

*Kim Huynh*  
Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 22 March 2010

	<p>45 <u>secondary panels</u> to date. Eleven primary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>11 primary panels</u> to date.</p> <p><u>1,252 linear feet</u> (lf) of 60-mil HDPE geomembrane fusion-welded seams were recorded today. The production seams are documented and air tests are pending.</p> <p>All trial welds for fusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p>
1830	I left the site.

Kim Huynh  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 052**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 23      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site. Kim Huynh (Geosyntec CQA Monitor) is on site to assist in the geosynthetics CQA of the NLEP.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
1000	Kim and I attended the weekly construction meeting.
1115	Kim and I returned from weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  Destructive test results were received from Precision Laboratories today. The destructive seam test results for DS-S-7 through DS-S-9, showed passing results.  Kim Huynh is observing the geosynthetics installation activities in the NLEP. NWL continues to install the primary layer of the NLEP containment system.
	<u>Cell 1 Construction</u>  GBI subcontractor ITC Water Management continues to production weld the double-wall forcemain pipe. Visual observation of the production weld indicates that the welds were constructed in accordance to the manufacturer's recommendations, and therefore meets the project requirements.  During construction today, a 480-foot long section of double-wall pipe, constructed for various locations along the forcemain system within Cell 1 (Cells 1C & 1D) was pressure tested in the field. The carrier component of the double-wall pipe section was tested independently of the dual containment pipe section; test results met the project requirements with less than 1% pressure drop (see pressure test certification form).

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 23 March 2010

	The testing of the 480-ft dual containment pipe section is pending.
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Existing Leachate Evaporation Pond</u> No work in this area today.
	<u>Geosynthetics Inventory</u> No materials were delivered to the site today.
	<u>Phase II Cleanout retrofit</u> ITC Water Management has removed the 2nd through the 5th cleanout risers located on the southern end of the existing Phase II landfill, and modified the existing cleanout risers in accordance with Detail 2 on Drawing 24 of the Construction Drawings. The final connection was completed using an electro-fusion coupler. Six of the 13 the cleanout risers were modified today, and were completed in accordance with the project requirements.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 052A**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 23 MONTH: March

YEAR: 2010

WEATHER: Cool in the morning (65 degrees) sunny and warm (85 degrees) during the day.

0630	I arrived on site. Goodfellow Bros. is already on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Destructive tests results were received from Precision Laboratories today. The tests results for DS-S-7 through DS-S-9 showed passing results.</p> <p>NWL continues to install the primary containment system above the approved secondary containment system.</p> <p><u>GCL deployment:</u></p> <p>NWL continues the deployment of the primary GCL above the secondary 60-mil HDPE geomembrane along the north and south sideslopes and the floor, providing 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p>Total primary GCL deployed to date: approximately <u>46,731 sq ft.</u></p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>33,741 sq ft</u> of the primary 60-mil HDPE geomembrane during construction today.</p> <p>Total primary 60 mil HDPE geomembrane deployed to date: <u>46,731 sq ft.</u> Total 60-mil HDPE geomembrane (subbase, secondary, and primary) deployed to date is <u>243,529 sq ft.</u></p> <p>Ten primary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>21 primary panels</u> to date.</p> <p><u>1,533 linear feet (lf)</u> of 60 mil HDPE geomembrane fusion-welded seams were recorded today. Today's</p>

Kim Huynh

Printed Name



Signature

cc: Mike Minch

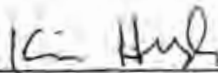
PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 23 March 2010

	production seams are documented and air tests are pending.  All trial welds for fusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.
1830	I left the site.

Kim Huynh

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 053**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 24      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site. Kim Huynh (Geosyntec CQA Monitor) is on site to assist in the geosynthetics CQA of the NLEP.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  Kim Huynh is observing the geosynthetics installation activities in the NLEP. NWL continues to install the primary barrier layer of the containment system.
	<u>Cell 1 Construction</u>  GBI subcontractor ITC Water Management continues to fabricate the new pipe sections to modify the remaining existing cleanout risers in the Phase II landfill.  During construction today, GBI requested that I collect a sample of the 3-inch minus gravel material stockpiled at the Kauai Aggregate Quarry. GBI is proposing to use this material as the granular fill on the NLEP sideslopes. I traveled to the quarry and collected a sample of the 3-inch minus subangular, well-graded gravel. The sample was delivered to Hirata and Associates for gradation testing.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Existing Leachate Evaporation Pond</u>  No work in this area today.

Chris Scott

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 24 March 2010

	<u>Geosynthetics Inventory</u> No materials were delivered to the site today.
	<u>Phase II Cleanout retrofit</u> ITC Water Management has only modified the cleanout riser sections today. No installation has been completed.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 053A**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 24 MONTH: March

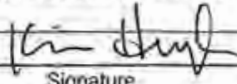
YEAR: 2010

WEATHER: Cool in the morning (65 degrees) sunny and warm (80 degrees) during the day.

0630	I arrived on site. Goodfellow Bros. is already on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>NWL continues to install the primary containment system above the approved secondary containment system.</p> <p><u>GCL deployment:</u></p> <p>NWL continues the deployment of the primary GCL above the secondary 60-mil HDPE geomembrane along the north and south sideslopes and the floor, providing 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p>Total primary GCL deployed to date: approximately <u>64,165 sq ft.</u></p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>17,434 sq ft</u> of the primary 60-mil HDPE geomembrane during construction today.</p> <p>Total primary 60 mil HDPE geomembrane deployed to date: <u>64,165 sq ft.</u></p> <p>Total 60-mil HDPE geomembrane (subbase, secondary, and primary) deployed to date is <u>260,963 sq ft.</u></p> <p>Six primary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>27 primary panels</u> to date.</p> <p><u>835 linear feet (lf)</u> of 60 mil HDPE geomembrane fusion-welded seams were recorded today. Production seams where seam samples (for destructive testing) were marked, have been air tested and showed passing results. The seam samples were cut from the production seams and delivered to Precision Laboratories for destructive seam testing. The remaining production seams not tested are documented and air tests are pending.</p>

Kim Huynh

Printed Name



Signature

cc: Mike Minch

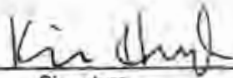
PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 24 March 2010

	<p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p><u>Nine repairs</u> were installed on the secondary 60-mil HDPE geomembrane repairs today in various lengths and widths for a total of <u>48 secondary repairs</u> to date. <u>Twenty repairs</u> were installed on the primary 60-mil HDPE geomembrane repairs were installed today in various lengths and widths for a total of <u>20 primary repairs</u> to date. All repairs have been documented and all non-destructive tests were completed with passing results.</p> <p>Four seam samples (DS-S-10 through DS-S-13) were marked within the welded production seams of the secondary liner, and 4 seam samples (DS-P-1 through DS-P-4) were marked within the welded production seams of the primary liner. A specimen from each seam sample was tested in the field in accordance with the project specifications. The field seam tests showed passing results.</p>
1645	I left the site.

Kim Huynh

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 054**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 25      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site. Kim Huynh (Geosyntec CQA Monitor) is on site to assist in the geosynthetics CQA of the NLEP.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Destructive tests results were received from Precision Laboratories today. The tests results for DS-S10 through DS-S13 and DS-P-1 through DS-P-4, showed passing results.</p> <p>Kim Huynh is observing the geosynthetics installation activities. NWL continues to install the primary layer of the NLEP containment system.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI has installed the double-wall forcemain piping section into the trench within the Cell 1 perimeter berm. The forcemain extends from Wet Well #3 to the Cell 1D gravity drain sump.</p> <p>The double-wall pipe section was covered with 6 inches of clean sand fill and then compacted using a walk-behind vibratory compactor. Once the backfill lift was compacted, two electrical conduits were installed within the trench and along the outside of the perimeter berm. The electrical conduits were covered with clean sand fill then compacted using a walk-behind vibratory compactor. Once the backfill lift was completed, "marker" tape was installed above the utilities for future identification.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 25 March 2010

	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Existing Leachate Evaporation Pond</u> No work in this area today.
	<u>Geosynthetics Inventory</u> No materials were delivered to the site today.
	<u>Phase II Cleanout retrofit</u> GBI subcontractor ITC Water Management has only modified the cleanout riser sections today. No installation has been completed.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

Report Sequence No.: 054A

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 25 MONTH: March

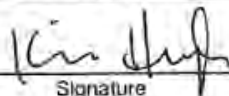
YEAR: 2010

WEATHER: Cool in the morning (65 degrees) sunny and warm (85 degrees) during the day.

0630	I arrived on site. Goodfellow Bros. is already on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><u>Geosynthetics Installation</u></p> <p>Destructive tests results were received from Precision Laboratories today. The tests results for seam samples DS-S-10 through DS-S-13 and DS-P-1 through DS-P-4 showed passing results.</p> <p>NWL continues installation of the primary containment system above the approved secondary containment system.</p> <p><u>GCL deployment:</u></p> <p>NWL continues the deployment of the primary GCL above the secondary 60-mil HDPE geomembrane along the western sideslopes and floor, providing 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p>Total primary GCL deployed to date: approximately <u>98,344 sq ft</u>.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>34,179 sq ft</u> of the primary 60-mil HDPE geomembrane during construction today.</p> <p>Total primary 60 mil HDPE geomembrane deployed to date: <u>98,344 sq ft</u>. Total 60-mil HDPE geomembrane (subbase, secondary, and primary) deployed to date is <u>295,142 sq ft</u>.</p> <p>Seventeen primary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>44 primary panels</u> to date.</p> <p><u>1,632 linear feet</u> (lf) of 60 mil HDPE geomembrane fusion-welded seams were recorded today. The production</p>

Nim Huynh

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

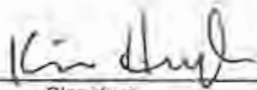
PROJECT NO.: WG1298 / 02

DAY/DATE: 25 March 2010

	seams are documented and air tests are pending.  All trial welds for fusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.
1700	I left the site.

Kim Huynh

Printed Name



Signature

cc: Mike Minch



**Kekaha Landfill**  
**Kekaha, Kauai, Hawaii**

**DAILY FIELD REPORT**

**Report Sequence No.: 055**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
 Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 26      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	Goodfellow Bros. is not on site today in recognition of the Hawaiian holiday Prince Kuhio Day. Kim Huynh (Geosyntec CQA Monitor) is on site to monitor the geosynthetics CQA of the NLEP.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <i>Geosynthetics Installation</i> Kim Huynh is observing the geosynthetics installation activities. NWL has completed the majority of the primary containment system installation and has begun to install the 16 oz/sy nonwoven cushion geotextile.
	<u>Cell 1 Construction</u>  No work in this area today.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Existing Leachate Evaporation Pond</u>  No work in this area today.
	<u>Geosynthetics Inventory</u>  No materials were delivered to the site today.
	<u>Phase II Cleanout retrofit</u>  No work in this area today.
1510	I left the site.

Chris Scott  
 Printed Name

Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 055A**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 26      MONTH: March

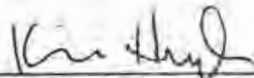
YEAR: 2010

WEATHER: Cool in the morning (65 degrees) sunny and warm (80 degrees) during the day.

0630	I arrived on site. Goodfellow Bros. is not onsite today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><i>Geosynthetics Installation</i></p> <p>NWL has completed installation of the composite liner system (subbase, secondary, and primary layers) for the NLEP. NWL performs repairs and non-destructive testing (air and vacuum box testing) of all production seams for the installed primary 60 mil HDPE geomembrane.</p> <p><u>Twenty-two</u> primary 60-mil HDPE geomembrane repairs were installed today in various lengths and widths for a total of <u>42 primary repairs</u> to date. The repairs have been documented and all non-destructive tests were completed with passing results.</p> <p>Trial welds for the extrusion welder were prepared and tested in the field. The field tensiometer test results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Eight seam samples (DS-P-5 through DS-P-12) were marked and cut within the welded production seams of the primary 60 mil HDPE geomembrane. A specimen from each seam sample was tested in the field in accordance with the project specifications. The field seam tests showed passing results. The 8 seam samples were cut from the production seams and delivered to Precision Laboratories for destructive seam testing.</p>
1510	I left the site.

Kim Huynh

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 056**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 27 MONTH: March

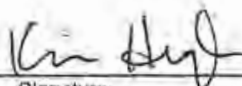
YEAR: 2010

WEATHER: Cool in the morning (65 degrees) sunny and warm (80 degrees) during the day.

0630	I arrived on site. Goodfellow Bros. is not onsite today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p><i>Geosynthetics Installation</i></p> <p>NWL begins installation of the 16 oz/sy nonwoven cushion geotextile above the approved primary 60 mil HDPE geomembrane within the NLEP. Adjacent geotextile panels were overlapped 3 inches prior to seaming and sewn in accordance with the project specifications.</p> <p>However, where cross seams (end width seams) met length-wise seams, NWL was unable to sew across the two intersecting seams as the combined material was thick and caused the sewing needles to break. NWL trimmed roughly 2.9 inches off the 3-inch overlaps at the final 6 to 9 inches of the cross seams to enable sewing at the cross seams. I discuss this seaming procedure with Chris Scott and Mike Minch (Geosyntec), and it was agreed that a Leister patch will need to be constructed at the cross seams to repair the trimmed overlap.</p>
1200	I left the site.

Kim Huynh

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 057**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 29      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site. Kim Huynh (Geosyntec CQA Monitor) is currently off site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <i>Geosynthetics Installation</i>  NWL has completed the majority of the NLEP containment system with exception to a portion of the west berm where a temporary access ramp has been left in place. The ramp will be used to import ¾-inch minus granular operations layer material into the NLEP, and will be removed and the west berm completed after import operations are completed.  NWL has begun to install the Geocell system along the southern side slope of the NLEP. The Geocell installed today was visually observed to be constructed in accordance with the project requirements.
	<u>Cell 1 Construction</u>  GBI has begun to expose the Phase II / Cell 1 (Cells 1C & 1D) tie-in, and to field-adjust the Cell 1 subbase grades to tie to the existing Phase II subbase.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Existing Leachate Evaporation Pond</u>  No work in this area today.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 29 March 2010

	<p><u>Geosynthetics Inventory</u></p> <p>No materials were delivered to the site today.</p>
	<p><u>Phase II Cleanout Retrofit</u></p> <p>GBI subcontractor ITC Water Management has removed the sixth (6th), ninth (9th), eleventh (11th), thirteenth (13th), and fourteen (14th) cleanout risers located on the southern end of the existing Phase II landfill, and modified the existing cleanouts in accordance with Detail 2 on Drawing 24 of the Construction Drawings. The final connection was completed using an electro-fusion coupler.</p> <p>Ten of the 14 cleanout risers requiring modification have been completed in accordance with the project requirements.</p>
1830	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 058**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 30      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
1000	Kim Huynh and I attended weekly construction meeting.
1100	Returned from weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  NWL continues to install the Geocell system along the southern side slope of the NLEP. The geocell installed today was visually observed to be constructed in accordance with the project requirements.
	<u>Cell 1 Construction</u>  GBI continues to expose the Phase II / Cell 1 (Cells 1C & 1D) tie-in and field-adjust the Cell 1 subbase grades to tie to the existing Phase II subbase.  NWL has begun to cut the Phase II existing geomembrane along the edge of the existing anchor trench. The existing geosynthetics consists of 60 mil HDPE geomembrane overlying GCL (bentonite layer with geomembrane carrier, carrier side down) overlying subbase. The geomembrane panels are overlapped 6 inches with bentonite in the seams.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 30 March 2010

	<u>Existing Leachate Evaporation Pond</u> No work in this area today.
	<u>Geosynthetics Inventory</u> One (1) shipping container arrived on site and 27 rolls of 16 oz/sy nonwoven geotextile was delivered to the site in good condition.
	<u>Phase II Cleanout retrofit</u> GBI subcontractor ITC Water Management is off site today.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 059**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 31      MONTH: March

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor and an Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  NWL continues to install the Geocell system along the southern side slope of the NLEP. The Geocell installed today was visually observed to be constructed in accordance with the project requirements.
	<u>Cell 1 Construction</u>  GBI continues to expose the Phase II / Cell 1 (Cell 1C & 1D) tie-in, and field-adjust the Cell 1 subbase grades to tie to the existing Phase II subbase.  NWL continues to cut the Phase II existing geomembrane along the edge of the existing anchor trench in order to remove the existing geosynthetics from the anchor trench. The existing geosynthetics consists of 60 mil HDPE geomembrane overlying GCL (bentonite layer with geomembrane carrier, carrier side down) overlying subbase. The geomembrane panels are overlapped 6 inches with bentonite in the seams.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Phase II Cleanout retrofit</u>  GBI subcontractor ITC Water Management is on site today. The remaining four cleanout risers were modified today for a total of fourteen (14) risers modified to date. All of the cleanouts which required modification (as noted in the Construction Drawings) were completed in accordance with the project requirements.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 060**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE:

DAY: 1

MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	I arrived on site. Goodfellow Bros. is already on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.  Equipment removed from the site today: Ingersoll-Rand SD122DX rubber tire smooth drum vibratory compactor
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  During construction today, NWL continues to install the Geocell system along the northern side slope of the NLEP. The Geocell installed today was visually observed to be constructed in accordance with the project requirements.
	<u>Cell 1 Construction</u>  GBI continues to expose the Phase II / Cell 1 (Cells 1C & 1D) tie-in and field-adjust the Cell 1 subbase grades to tie to the existing Phase II subbase.  The Cell 1 subbase surface was smooth drum rolled using a HAMM 2420 rubber tire smooth drum vibratory compactor.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 061**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG-1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 2      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0630	Goodfellow Bros. is currently off site today in observation of Good Friday.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <i>Geosynthetics Installation</i> NWL cannot install the Geocell system as material supplies did not arrive for construction today.
	<u>Cell 1 Construction</u>  No work in this area today
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
1400	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 062**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 3 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0930	Goodfellow Bros. is currently off site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (28,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  <u>Geosynthetics Installation</u>  NWL has completed the majority of the Geocell system installation. The temporary access ramp located along the western side slope still remain to be removed and replaced with the west berm.
	<u>Cell 1 Construction</u>  No work in this area today
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
1200	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 063**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 5 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  NWL has begun to remove the excess geosynthetic layers from the NLEP perimeter anchor trench. The materials were trimmed back to be a minimum of 1.5 feet from the 6-inch PVC pipe, in accordance with Detail 4, Drawing 11 of the Construction Drawings. GBI is working to backfill the anchor trench as the geosynthetic materials are trimmed to secure the liner system within the anchor trench.
	<u>Cell 1 Construction</u>  Esaki Surveying & Mapping crew and Wagner Surveying are on site to survey the Cell 1 (Cells 1C & 1D) subbase grades.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop-off Area Improvements</u>  GBI has begun to over excavate the existing perimeter curb and gutter transition for the new alignment of concrete. The foundation of the curb and gutter was over excavated 18 inches and replaced with new base course, in accordance with Drawing 25 of the Construction Drawings.  A sample (1 1/2" BC-Curb and Gutter) of the base course was collected and provided to Hirata and Associates for laboratory conformance testing.
1700	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 064**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 6      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 844J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>NWL has completed the trimming of the excess geosynthetic layers from the NLEP perimeter anchor trench. The materials were trimmed in accordance with Detail 4, Drawing 11 of the Construction Drawings.</p> <p>GBI continues to backfill the anchor trench as the geosynthetic materials are trimmed to secure the liner system within the anchor trench.</p> <p>Three 2-inch PVC electrical conduits were installed within the southern anchor trench and then backfilled using clean sand backfill. The pipe was then identified using a "marker" tape.</p>
	<p><u>Cell 1 Construction</u></p> <p><u>Geosynthetics Installation</u></p> <p>NWL has begun to install the subbase geomembrane above the previously approved subbase of Cell 1 (Cells 1C &amp; 1D).</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>34,224 sq ft</u> of subbase 60 mil HDPE geomembrane during construction today.</p> <p>Total subbase 60 mil HDPE geomembrane deployed to date is <u>34,224 sq ft</u>.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 6 April 2010

	<p>Ten subbase 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total <u>10 subbase panels</u> to date.</p> <p><u>1,324 linear feet</u> (lf) of 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>1,324 lf</u>. None of the production seams were air tested today. The production seams not tested are documented and air tests are pending.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Four seam samples (DS-S-1 through DS-S-4) were marked within the welded production seams for destructive seam testing.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Area Improvements</u></p> <p>GBI has begun to over-excavate the existing perimeter curb and gutter transition for new alignment of concrete. The foundation of the curb and gutter was over-excavated 18 inches and replaced with new base course. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the base course material was compacted in accordance with the project requirements.</p>
1700	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 065**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 7 MONTH: April

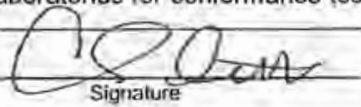
YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI continues to backfill the NLEP perimeter anchor trench to support the liner system. The backfill material is a clean sand and is being compacted using a walk behind "sled" vibratory compactor.</p> <p>The contractor has begun to import ¾-inch minus granular operations layer material from the Kauai Aggregate Quarry. The first load of granular operations layer material was driven directly onto the floor of the NLEP. The driver of the haul truck did not understand the directions given by Goodfellow Bros. before entering the construction area. Once the driver realized his mistake, damage to the NLEP containment system had already occurred.</p> <p>I inspected the damaged area (approximately 10-ft by 24-ft area), and observed that all of the geosynthetic layers were compromised as a result of the haul truck driving on the containment system. Therefore, the damaged layers will require removal and replacement with new materials.</p> <p>I requested that GBI survey the damaged area which I have identified to document the location. GBI agrees and provides the survey data as follows:</p> <p>N: 57014.438, E: 1558329.783;  N: 57008.394, E: 1558322.061;  N: 57032.989, E: 1558314.067; and  N: 57026.078, E: 1558306.260.</p> <p>A sample (NLEP-OPS-001) was collected from the placed ¾-inch minus granular operations layer material and provided to Precision Laboratories for conformance testing.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

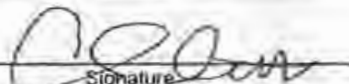


PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 7 April 2010

	<p><u>Cell 1 Construction</u></p> <p>Keith Suga (Goodfellow Bros.) has informed me that the Kauai Aggregate Quarry has screened and stockpiled the 3/8-inch minus gravel to be used for the project and would like for Geosyntec to test the material at the quarry for compliance with the project requirements. I went to the Kauai Aggregate Quarry and collected a sample (3/8-Quarry fines). The sample will be delivered to Precision Laboratories for gradation testing.</p> <p><u>Geosynthetics Installation</u></p> <p>NWL has begun to install the subbase 60 mil HDPE geomembrane above the previously approved areas of Cell 1 (Cells 1C &amp; 1D).</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>25,116 sq ft</u> of subbase 60 mil HDPE geomembrane during construction today.</p> <p>Total subbase 60 mil HDPE geomembrane deployed to date is <u>59,340 sq ft</u>.</p> <p>Seven subbase 60-mil HDPE geomembrane panels were used today in various widths and lengths for a total of <u>17 subbase panels</u> to date.</p> <p><u>1,137 linear feet</u> (lf) of subbase 60 mil HDPE geomembrane fusion-welded seams were recorded today, for a total of <u>2,461 lf of subbase fusion-welded seams</u>. All of the production seams were air tested today. The production seam air tests performed today were found meeting the project requirements.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Three seam samples (DS-S-5 through DS-S-7) were marked within the welded production seams for destructive seam testing. The samples were cut from the seams after air tests were completed with passing results; coupons cut from the samples were field tested using a tensiometer. The field tests showed passing results. Therefore, the seam samples were delivered to Precision Laboratories for destructive seam testing.</p> <p><u>Nineteen repairs</u> were installed today in various lengths and widths for a total of <u>19 repairs</u> to date. The repairs have been documented and the non-destructive vacuum box tests show passing results.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>GBI has completed the curb and gutter form work and installed the reinforcing steel in accordance with the Construction Drawings.</p> <p>During construction today, the forms were filled using concrete. The concrete batch was tested in the field for temperature slump. The concrete material was then approved for use. After the concrete material properties were measured in the field and approved, a sample of the concrete was collected and placed into three (3) test cylinders to verify the material strength after 7, 14 and 28 days of curing.</p>
1700	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

DAILY FIELD REPORT

Report Sequence No.: 066

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 8 MONTH: April

YEAR: 2010

WEATHER: Overcast and cloudy with rain during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today: Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u> GBI continues to backfill the NLEP perimeter anchor trench to support the liner system. The backfill material is a clean sand and is being compacted using a walk behind "sled" vibratory compactor.  The contractor continues to import ¾-inch minus granular operations layer material from the Kauai Aggregate Quarry, and stockpiles the material outside of the NLEP.  The contractor is also stockpiling 3-inch minus granular fill on site to be used within the NLEP side slope Geocell. A sample (NLEP GC-001) was collected from the onsite stockpile and delivered to Hirata and Associates for conformance testing.
	<u>Cell 1 Construction</u> Laboratory results for seam samples DS-S-1 through DS-S-7 were received from Precision Laboratory. The tests showed passing results.  <u>Geosynthetics Installation</u> Due to today's rainfall, liner deployment has been suspended.
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Waste Drop off Area Improvements</u> No work in this area today.
1700	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 067**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

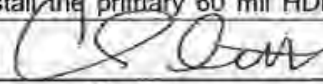
DATE: DAY: 9 MONTH: April YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI continues to backfill the NLEP perimeter anchor trench to support the liner system. The backfill material is clean sand and is being compacted using a walk behind "sled" vibratory compactor.</p> <p>The contractor continues to import ¾-inch minus granular operations layer material from the Kauai Aggregate Quarry. The material is temporarily stockpiled outside of the NLEP until the contractor can place the material onto the floor of the pond.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI has excavated a utility force main trench within the Cell 1 (Cells 1C and 1D) perimeter berm, and has begun the process of installing the Cell 1D pipe penetration within the sump.</p> <p>GBI subcontractor ITC Water Management (ITC) has production-welded the gravity flow double wall pipe section, and has fabricated the section of double wall pipe which will extend the gravity flow pipe into forcemain Manhole 14. After the section of pipe was fabricated, ITC pressurized the outer wall of the containment pipe. During the tests visual observation of the pre-fabricated 90-degree elbow identified a leak in the factory joint of containment pipe. The test was terminated until the 90-degree elbow is replaced with a new pre-fabricated pipe section.</p> <p><u>Geosynthetics Installation</u></p> <p>NWL has begun to install the primary 60 mil HDPE geomembrane above the previously installed GCL and</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 9 April 2010

	<p>subbase 60 mil HDPE geomembrane within the Cells 1C &amp; 1D area.</p> <p><u>GCL Deployment</u></p> <p>NWL installed approximately <u>25,000 sq ft</u> of GCL above the previously installed subbase 60 mil HDPE geomembrane. The GCL installed today was installed and overlapped in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p><u>60 mil DST geomembrane</u></p> <p>NWL installed <u>22,724 sq ft</u> of primary 60 mil HDPE geomembrane during construction today.</p> <p>Total 60 mil HDPE geomembrane (subbase and primary) deployed to date is <u>82,064 sq ft</u>.</p> <p>Six primary 60 mil HDPE geomembrane panels were used today in various widths and lengths for a total of six primary panels.</p> <p><u>786 linear feet</u> (lf) of 60 mil HDPE geomembrane fusion-welded seams were recorded today. All of the production seams were air tested today. The production seam air tests performed today were found meeting the project requirements.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Three seam samples (DS-P-1 through DS-P-3) were marked within the welded production seams for destructive testing. The seam samples are pending air tests results before removal.</p> <p>No repairs were installed today.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 068**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 10 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. A Goodfellow Bros. equipment operator is on site to assist in the importing operation for the materials received from the Kauai Aggregate Quarry.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  No work in this area today.
	<u>Cell 1 Construction</u>  <u>Geosynthetics Installation</u>  No geosynthetics deployment were performed today. NWL performs repairs, patches and tie-in production-seaming for the installed primary 60 mil HDPE geomembrane within Cells 1C & 1D.  Total 60 mil HDPE geomembrane (subbase and primary) deployed to date is <u>82,064 sq ft</u> .  <u>252 linear feet</u> (lf) of extrusion-welded seams within the subbase layer tie-in to the existing Phase II containment system and <u>92 lf</u> of extrusion-welded seams within the primary layer tie-in to the existing Phase II containment system were recorded today.  All of the production seams were vacuum box tested today. The extrusion-welded production seams tested today were found meeting the project requirements.  The extrusion trial weld was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.  One seam sample (DS-P-8) was cul from the extrusion-welded production seam. A coupon from the seam

Chris Scott

Printed Name

Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 10 April 2010

	<p>sample was tested in the field using a tensiometer. The field tests results showed passing results. Therefore, the seam sample DS-S-8 will be delivered to Precision Laboratories for conformance testing.</p> <p>Three subbase layer repairs and seven primary layer repairs were installed today. All repairs were vacuum box tested. The repairs constructed today were completed in accordance with the project requirements.</p> <p>During construction today, NWL prepared a trail weld to evaluate the shear and peel strength of the 80 mil HDPE geomembrane extrusion-welded to the 1/2-inch thick HDPE flat stock. The temperature of the hand-held extruder was set to 550 degrees, and the preheat temperature was set to 500 degrees. The 80 mil HDPE geomembrane was leistered to the 1/2-inch thick HDPE plate, and the weld seam was prepared using a hand grinder. After the 80 mil HDPE geomembrane was extrusion-welded to the plate, several sample coupons were cut from the trail weld and tested using a tensiometer. The field shear and peel strength tests showed passing results. Therefore, a trial seam sample will be delivered to Precision Laboratories for conformance testing.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Area Improvements</u></p> <p>No work in this area today.</p>
1400	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 069**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY 12 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to import 3/4-inch minus granular operations layer material from the Kauai Aggregate Quarry. The material is hauled to the temporary ramp located on the western end of the NLEP and dumped along the side slope. A Caterpillar D6 LGP dozer pushes the dumped material over the floor of the NLEP to construct the 1-ft thick granular operations layer.
	<u>Cell 1 Construction</u>  GBI subcontractor ITC Water Management has repaired the defective 90 degree elbow, and has pressure tested the secondary "containment" component of the pipe section from the Cell 1D sump to Manhole #14. The pressure test was sustained for one hour with no leakage observed.  A penetration was cut into the existing Manhole #14 and the downstream end of the double-wall gravity flow pipe was installed into the manhole and sealed using an extrusion weld. The end of the primary "carrier" pipe was capped in preparation for the pressure tests.  <u>Geosynthetics Installation</u>  NWL continues to install GCL over the previously installed subbase 60 mil HDPE geomembrane, and has begun to install the primary 80 mil HDPE geomembrane above previously installed GCL within Cell 1 (Cells 1C & 1D).

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

PROJECT NO.: WG1298 / 02

LOCATION: Kekaha Landfill

DAY/DATE: 12 April 2010

	<p><u>GCL Deployment</u></p> <p>NWL installed approximately <u>30,000 sq ft</u> of GCL today. The GCL installed today with 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p><u>60 mil DST HDPE geomembrane:</u></p> <p>NWL installed <u>28,773 sq ft</u> of 60 mil HDPE geomembrane during construction today.</p> <p>Total 60 mil HDPE geomembrane (subbase and primary) deployed to date is <u>110,837 sq ft</u>.</p> <p><u>Seven panels</u> of primary 60 mil HDPE geomembrane were used today in various widths and lengths for a total of <u>seven primary panels</u>.</p> <p><u>1319 linear feet</u> (lf) of fusion-welded seams were recorded today. The production seams welded today were documented and the air tests are pending.</p> <p>All trial welds for both fusion and extrusion welders were prepared and tested in the field. The field tensiometer tests results indicate the welders were able to achieve the required seam strengths for the project.</p> <p>Four seam samples (DS-P-4 through DS-P-7) were marked within the welded production seams for destructive seam testing. The seam samples are pending air tests results before removal.</p> <p>No repairs were installed today.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 070**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 13      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to import ¾-inch minus granular operations layer material from the Kauai Aggregate Quarry. The material is hauled to the temporary ramp located on the western end of the pond and dumped along the side slope. A Caterpillar D6 LGP dozer pushes the dumped material over the floor of the NLEP to construct the 1-ft thick granular operations layer.
	<u>Cell 1 Construction</u>  GBI subcontractor ITC Water Management has tested the 1 inch void space within pipe penetrations assemblies for the Cell 1C and 1D sumps. The void spaces were tested independently and found to meet the project requirements.  The pipe penetration for Cell 1D sump was installed, and the inside wall "carrier" pipe of the double-wall containment pipe, which connects the pipe penetration to Manhole #14, was connected using an electro-fusion coupler.  The double-wall inside "carrier" pipe was capped and a test flange was installed at the inlet of the pipe. The pipe assembly was then tested in accordance with Section 01457 of the project specifications. The pressure test was found meeting the project requirements.  <u>Geosynthetics Installation</u>  Laboratory results for seam samples DS-S-8, ½"-Plate/5117, and DS-P-1 through DS-P-3 were received from

Chris Scott

Printed Name

Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 13 April 2010

	<p>Precision Laboratory. All tests showed passing results.</p> <p>No geosynthetics deployment was performed today. NWL concentrated on repairs, patches and tie-in production seaming.</p> <p>Total geomembrane (subbase and primary) deployed to date is <u>110,837 sq ft.</u></p> <p><u>115 linear feet</u> (lf) of extrusion-welded seams along the primary liner tie-in to existing Phase II containment system were recorded today. All production seams were vacuum box tested today. The extrusion-welded production seams tested today were found meeting the project requirements.</p> <p>The extrusion trial weld was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>One seam sample (DS-P-7) cut from the extrusion welded production seam for destructive seam testing. A coupon from the seam sample was tested in the field using a tensiometer. The tests results showed passing results. Therefore, the seam sample DS-P-7 will be delivered to Precision Laboratories for destructive seam testing.</p> <p>Thirteen repairs were installed for the primary 60 mil HDPE geomembrane today. All of the repairs were vacuum box tested. The repairs constructed today were completed in accordance with the project requirements.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

Report Sequence No.: 071

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 14 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor continues to import ¾-inch minus granular operations layer material from the Kauai Aggregate Quarry. The material is hauled to the temporary ramp located on the western end of the pond and dumped along the side slope. A Caterpillar D6 LGP dozer pushes the dumped material over the floor of the NLEP to construct the 1-ft thick granular operations layer.
	<u>Cell 1 Construction.</u>  GBI subcontractor ITC Water Management continues to production weld double-wall pipe to be used for the various containment systems applications. The fusion welds conducted today were visually observed during welding and completed in accordance with the project requirements.  GBI has begun to backfill the utility trench within the Cell 1 perimeter berm adjacent to the gravity flow double-wall conveyance pipe. The utility trench was backfilled using onsite sand. The material was placed in uniform lifts approximately 6 to 8 inches loose, moisture conditioned, and then compacted using a walk behind vibratory plate compactor. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort is meeting the project requirements.  <u>Geosynthetics Installation</u>  NWL continues to install the subbase containment system within Cells 1C and 1D, and to perform repairs, patches and tie-in production seaming.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 14 April 2010

	<p><u>GCL Deployment:</u></p> <p>No GCL installed today during construction.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>25,208 sq ft</u> of subbase 60 mil HDPE geomembrane during construction today.</p> <p>Total 60 mil HDPE geomembrane (subbase and primary) deployed to date is <u>135,355 sq ft</u>.</p> <p>Nine subbase geomembrane panels were used today in various widths and lengths.</p> <p><u>23 linear feet</u> (lf) of extrusion-welded seams along the primary liner tie-in to existing Phase II containment system were recorded today. All of the fusion production seams were air tested and all the extrusion production seams were vacuum box tested today. The production seams tested today were found meeting the project requirements.</p> <p>Both fusion and extrusion welded trial seams was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Four seam samples (DS-S-8 through DS-S-11) were cut from the production seams for destructive testing. A coupon from each destructive sample was tested in the field using a tensiometer. The tests showed passing results. Therefore, the seam samples DS-S-8 through DS-S-11 will be delivered to Precision Laboratories for destructive seam testing.</p> <p><u>Eight repairs</u> were performed on the subbase 60 mil HDPE geomembrane today. All of the repairs were vacuum box tested. The repairs constructed today were completed in accordance with the project requirements.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 072**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 15      MONTH: April

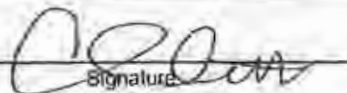
YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has the majority of the ¾-inch minus granular operation layer stockpiled within the NLEP floor area. Import of the material from the Kauai Aggregate Quarry has been temporarily suspended.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI subcontractor ITC Water Management (ITC) continues to production weld double-wall pipe to be used for the various containment systems applications. The fusion welds conducted today were visually observed during welding and completed in accordance with the project requirements.</p> <p>ITC has installed the double-wall containment pipe from Cell 1C sump to the Cell 1C temporary wet well location. Although the wet well has not yet been installed, the double-wall pipe has been extended to the design location.</p> <p>The carrier and containment pipes installed from the Cell 1C penetration to the Cell 1C wet well were independently tested and found to meet the project requirements. However, the final weld connecting the double-wall containment pipe to the Cell 1C wet well has not yet been tested. Air pressure tests are pending the installation of the wet well.</p> <p>GBI has grouted the 1-inch void spaces within the Cell 1C and 1D pipe penetration assemblies. The grout was mixed in a wheelbarrow by hand using the following mix: 30 gallons of water, 94 pounds of Portland cement, and 15 pounds of granular bentonite. The mix was poured into the void space until the space was full.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 15 April 2010

	<p><u>Geosynthetics Installation</u></p> <p>Laboratory results for seam samples DS-P-4 through DS-P-7 were received from Precision Laboratory. All tests showed passing results. NWL continues to install the subbase containment system within Cells 1C and 1D.</p> <p><u>GCL Deployment</u></p> <p>No GCL installed today during construction.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>32,729 sq ft</u> of 60 mil HDPE geomembrane during construction today.</p> <p>Total 60 mil HDPE geomembrane (subbase and primary) deployed to date is <u>168,084 sq ft</u>.</p> <p>Ten subbase 60 mil HDPE geomembrane panels were used today in various widths and lengths.</p> <p><u>207 linear feet</u> (lf) of extrusion-welded seams along the primary liner tie-in to existing Phase II containment system were recorded today. All of the fusion production seams were air tested and all the extrusion production seams were vacuum box tested today. The production seams tested today were found meeting the project requirements.</p> <p>Both fusion and extrusion welded trial seams was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Five seam samples (DS-S-12 through DS-S-16) were cut from the production seams. A coupon from each seam sample was tested in the field using a tensiometer. The tests showed passing results. Therefore, the seam samples DS-S-8 through DS-S-11 will be delivered to Precision Laboratories for destructive seam testing.</p> <p>No repairs were performed for the primary 60 mil HDPE geomembrane today. Fourteen repairs on the subbase 60 mil HDPE geomembrane were observed during construction today. All of the repairs were vacuum box tested. The repairs constructed today were completed in accordance with the project requirements.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 073**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 16 MONTH: April

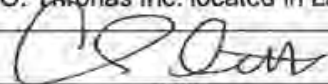
YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
1030	I contacted Joel Mondragon (Northwest Linings [NWL] Superintendent) to inform him of failing destructive tests results received today from Precision Laboratories.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI has begun to place 3-inch minus granular fill material into the Geocell on the NLEP side slopes. The material is being hauled to the NLEP from an onsite stockpile using a Caterpillar articulated haul truck. Once the material is hauled to the NLEP, a Hitachi excavator removes the material directly from the haul truck and places the material into the Geocell. Two laborers uniformly grade the granular fill using hand tools.
	<u>Cell 1 Construction.</u>  GBI subcontractor ITC Water Management has installed the double-wall forcemain containment pipe from Manhole #14 to Cell 1C sump. A penetration was cut into the manhole, and the forcemain conveyance pipe was installed so that the discharge end of the pipe extends through the sidewall of the manhole. The forcemain was then fusion-welded around the penetration to provide a seal. A copper wire was installed around the joint before the weld was completed. Once the weld was completed, a non-destructive spark tester was used to verify that the weld provided a positive seal. No leaks were observed during the spark test.  Once the forcemain was installed, GBI continues to backfill the utility trench using onsite sand. The backfill material was placed in uniform 6 to 8 inches loose, moisture conditioned using a water truck, and then compacted using a walk behind vibratory compactor. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project requirements.  GBI has backfilled the space beneath the Cell 1C and 1D pipe penetration assemblies using a #4 quarry dust CLSM mix provided by O. Thomas Inc. located in Lawai, HI.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 16 April 2010

	The backfill material was poured directly into the area beneath the pipe penetrations, after which a vibrator was used to remove any voids within the fill material. A sample of the batch was obtained and three cylinders were cast to verify the CLSM strength after seven days of curing.
1100	NWL arrived on site to evaluate the failing destructive seam sample DS-S-14. The production seam was tracked a minimum of 10 feet before and after the failing destruct sample location. Additional samples of the production seam were cut and tested in the field using a tensiometer. The peel and shear tests results provided by NWL using the field tensiometer showed passing results. Therefore, two additional destructive seam samples (DS-S-17-after and DS-S-18-before) were marked in the production seams tested in the field and delivered to Precision Laboratories for destructive seam testing
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Waste Drop off Improvements</u> No work in this area today.
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 074**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 17      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Northwest Linings (NWL) is not on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI continues to place the 3-inch minus granular fill material into the Geocell on the NLEP side slopes. The material is being hauled into the NLEP from an onsite stockpile using a Caterpillar articulated haul truck. Once the material is hauled to the NLEP, a Hitachi excavator removes the material directly from the haul truck and places the material into the Geocell. Three laborers uniformly grade the gravel using hand tools.
	<u>Cell 1 Construction.</u>  GBI is working to construct the design grades for the perimeter berm for Cells 1C and 1D. The contractor is placing onsite sand (excavated from the infiltration basin) using a Caterpillar articulated haul truck. The compacted fill (onsite soils) material is then spread in uniform 6- to 8-inch loose lifts using a D6 LGP dozer. Once the lift has been graded over the entire width of the berm, the lift is moisture conditioned using a water truck and then compacted using a HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project requirements.
	<u>New Infiltration Basin (NIB)</u>  GBI is excavating soil from the NIB to be used as compacted fill (onsite soils) within the Cells 1C and 1D perimeter berm.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1530	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 075**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE:      DAY: 19      MONTH: April      YEAR: 2010

WEATHER: Sunny and warm during the day.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI continues to place the 3-inch minus granular fill into the Geocell within the NLEP side slopes. The material is being hauled into the NLEP from an onsite stockpile using a Caterpillar articulated haul truck. Once the material gets to the NLEP, a Hitachi excavator removes the material directly from the haul truck and places the material into the Geocell. Three laborers uniformly grade the gravel using hand tools.
	<u>Cell 1 Construction</u>  Esaki Surveying & Mapping, Inc. is on site to perform the as built survey of the Cell 1D northern side slope.  <u>Geosynthetics Installation</u>  NWL continues to install the primary containment system above the approved subbase layer within Cells 1C and 1D.  <u>GCL Deployment</u>  NWL installed approximately <u>35,000 sq ft</u> of GCL today. The GCL was installed today with 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 19 April 2010

	<p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>34,592 sq ft</u> of double-sided textured HDPE geomembrane during construction today.</p> <p>Total geomembrane (subbase and primary) deployed to date is <u>202,678 sq ft</u>.</p> <p>Eight panels were used today in various widths and lengths.</p> <p>All of the fusion production seams were non-destructive air tested, and the extrusion production seams were vacuum box tested today. The production seams tested today were found meeting the project requirements.</p> <p>Both fusion and extrusion welded trial seams were prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Three destructive samples (DS-P-8 through DS-P-10) were cut from the production seams. Coupons from the destructive samples were tested in the field using a tensiometer. The field tests showed passing results. Therefore, the laboratory samples DS-S-8 through DS-P-10 will be delivered to Precision Laboratories for conformance testing.</p> <p>No repairs were installed today.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 076**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 20 MONTH: April

YEAR: 2010

WEATHER: Overcast and cloudy in the morning, light showers during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
1000	I attended weekly construction meeting.
1130	I returned from weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI has placed the majority of the 3-inch minus granular fill into the Geocell within the NLEP side slopes. The only remaining area to be completed is the west berm area adjacent to the temporary access ramp.  GBI has begun to grade the ¾-inch minus granular operations layer material to 1-ft thick above the NLEP floor containment system using a Caterpillar LGP D6 dozer with GPS grade control. A laborer is working with the operator to ensure no damage occurs to the underlying geosynthetics.
	<u>Cell 1 Construction</u>  <u>Geosynthetics Installation</u>  NWL continues to install the primary containment system above the approved subbase layer within Cells 1C and 1D.  Destructive seam test results from Precision Laboratories for seam sample DS-S-17 indicate the production seam did not meet the minimum project specification for peel adhesion. NWL elected to cap the entire production seam from destructive seam sample DS-S-18 (passing laboratory destructive seam test results) to the end of the production seam at location of destructive seam sample DS-S-16. The entire seam was capped and vacuum box tested during construction today.

Chris Scott

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 20 April 2010

	<p><u>GCL Deployment</u></p> <p>No GCL deployment was performed today.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL did not install HDPE geomembrane during construction today. The contractor worked to complete repairs and patches</p> <p>Total geomembrane (subbase and primary) deployed to date is <u>202,676 sq ft.</u></p> <p><u>161 linear feet</u> (lf) of extrusion-welded seams along the primary tie-in to existing Phase II containment system were recorded today. All of the extrusion production seams were vacuum box tested today. The production seams tested today were found meeting the project requirements.</p> <p>The extrusion welded trial seams was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>One destructive seam sample (DS-P-11) was cut from the production seams. A coupon from the seam sample was tested in the field using a lensiometer. The field tests showed passing results. Therefore, the seam sample DS-S-11 will be delivered to Precision Laboratories for conformance testing.</p> <p>Nine primary repairs and eleven subbase repairs were installed today. All repairs installed today were non-destructive vacuum box tested, and no leaks were observed during the test.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 077**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 21 MONTH: April

YEAR: 2010

WEATHER: Overcast and cloudy in the morning, light showers during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI continues to grade the ¾-inch minus granular operations layer material to 1-ft thick above the NLEP containment system using a Caterpillar LGP D6 dozer with GPS grade control. A laborer is working with the operator to ensure no damage occurs to the underlying geosynthetics.</p>
	<p><u>Cell 1 Construction.</u></p> <p><u>Geosynthetics Installation</u></p> <p>NWL continues to install the subbase 60 mil HDPE geomembrane above the approved subgrade.</p> <p><u>GCL Deployment</u></p> <p>No GCL deployment was performed today.</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>12,719 sq ft.</u> of subbase 60 mil HDPE geomembrane during construction today.</p> <p>Total geomembrane (subbase and primary) deployed to date is <u>215,395 sq ft.</u></p> <p>Twelve subbase 60 mil HDPE geomembrane panels were installed today in various widths and lengths.</p> <p>All of the fusion welded production seams were non-destructive air tested today. The production seams tested</p>

Chris Scott  
Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 21 April 2010

	<p>today were found meeting the project requirements.</p> <p>The fusion welded trial seams was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Three destructive seam samples (DS-S-19 through DS-S-21) were cut from the production seams. Coupons from the seam samples were tested in the field using a tensiometer. The field tests showed passing results. Therefore, the seam samples DS-S-19 through DS-S-21 will be delivered to Precision Laboratories for conformance testing.</p> <p>Fifteen repairs on the subbase HDPE geomembrane were observed during construction today. All repairs installed today were non-destructive vacuum box tested, and no leaks were observed during the test.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 078**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

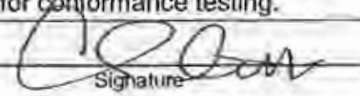
DATE: DAY: 22      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI continues to grade the ¾-inch minus granular operations layer material to 1-ft thick above the NLEP containment system using a Caterpillar LGP D6 dozer with GPS grade control. A laborer is working with the operator to ensure no damage occurs to the underlying geosynthetics.</p>
	<p><u>Cell 1 Construction.</u></p> <p>Destructive seam test results for seam samples DS-P-11 and DS-S-19 through DS-S-21 were received from Precision Laboratories. The laboratory test results for seam samples DS-S-20 and DS-P-11 showed failing results.</p> <p>NWL tracked the production seam located at DS-S-20 a minimum of 10 feet before and after the failing destructive sample location. As for DS-P-11, this destructive seam sample was located at the beginning of the extrusion welded production seam and at the start of the day. Therefore, this destructive seam sample (DS-P-11) was only tracked after the failing sample location.</p> <p>Additional samples of the production seam were cut and tested in the field using a tensiometer. The field peel and shear test results provided by NWL using the field tensiometer showed passing results. Therefore, three additional destructive seam samples (DS-S-22-before, DS-S-23-after and DS-P-14-after) were marked in the production seams.</p> <p>Coupons from the destructive seam samples were cut from the production seam and then tested in the field using a tensiometer. The field test data indicate that the seams tested in the field meet the project requirements. The seam samples (DS-S-22-before, DS-S-23-after and DS-P-14-after) were delivered to Precision Laboratories for performance testing.</p>

Chris Scott  
Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 22 April 2010

	<p><u>Geosynthetics Installation</u></p> <p>NWL continues to install the primary 60 mil HDPE geomembrane and GCL above the approved subbase 60 mil HDPE geomembrane.</p> <p><u>GCL Deployment</u></p> <p>NWL installed approximately <u>25,000 sq ft</u> of GCL today. The GCL were installed today with 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>23,644 sq ft.</u> of primary 60 mil HDPE geomembrane during construction today.</p> <p>Total geomembrane (subbase and primary) deployed to date is <u>239,039 sq ft.</u></p> <p>Six primary 60 mil HDPE geomembrane panels were installed today in various widths and lengths.</p> <p>All of the fusion welded production seams were non-destructive air tested today. The production seams tested today were found meeting the project requirements.</p> <p>The fusion welded trial seams was prepared and tested in the field. The field tensiometer tests results indic the welder was able to achieve the required seam strengths for the project.</p> <p>Four seam samples (DS-P-12 through DS-S-15) were cut from the production seams. Coupons from the seam samples were tested in the field using a tensiometer. The field tests showed passing results. Therefore, the seam samples DS-P-12 through DS-P-15 will be delivered to Precision Laboratories for conformance testing.</p> <p>Nineteen repairs on the primary 60 mil HDPE geomembrane were observed during construction today. All repairs installed today were non-destructive vacuum box tested, and no leaks were observed during the test.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1730	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch

DAILY FIELD REPORT

Report Sequence No.: 079

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 23 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (28,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI has completed the majority of the installation and grading of the ¾-inch minus granular operations layer material, 1-ft thick above the NLEP floor containment system.</p> <p>Esaki Surveying &amp; Mapping, Inc. and Wagner Surveyors are on site today to survey the top of granular operations layer within the NLEP.</p> <p>GBI subcontractor ITC Water Management is on site to install the 2-inch thick HDPE plate in preparation for the concrete aerator pad construction. The 2-inch HDPE plate is underlain by two layers of 16 oz/sy nonwoven geotextile, and was installed in several pieces and fusion-welded together in-place. A ¼-inch bevel was cut into the adjoining panels and then butt welded together to provide a continuous 2-inch thick HDPE plate underlying the future concrete aerator pad.</p>
	<p><u>Cell 1 Construction.</u></p> <p>Precision Laboratories provided test results for the destructive seam samples submitted on 22 April 2010. All the destructive seam tests showed passing results.</p> <p><u>Geosynthetics Installation</u></p> <p>NWL continues to install the primary 60 mil HDPE geomembrane and GCL above the approved subbase 60 mil HDPE geomembrane.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 23 April 2010

	<p><u>GCL Deployment</u></p> <p>NWL installed approximately <u>19,500 sq ft</u> of GCL today. The GCL was installed today with 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).</p> <p><u>60 mil DST geomembrane:</u></p> <p>NWL installed <u>18,814 sq ft.</u> of primary 60 mil HDPE geomembrane during construction today.</p> <p>Total geomembrane (subbase and primary) deployed to date is <u>257,853 sq ft.</u></p> <p>Fourteen primary 60 mil HDPE geomembrane panels were installed today in various widths and lengths.</p> <p>All of the fusion welded production seams were non-destructive air tested today. The production seams tested today were found meeting the project requirements.</p> <p>The fusion welded trial seams was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Three destructive seam samples (DS-P-16 through DS-P-18) were cut from the production seams. Coupons from the seam samples were tested in the field using a tensiometer. The field tests showed passing results. Therefore, the seam samples DS-P-16 through DS-P-18 will be delivered to Precision Laboratories conformance testing.</p> <p>Sixteen repairs on the primary 60 mil HDPE geomembrane were observed during construction today. All repairs installed today were non-destructive vacuum box tested, and no leaks were observed during the test.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1800	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 080**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE: DAY: 24      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is not on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI subcontractor ITC Water Management is on site to install the 2-inch thick HDPE plate in preparation for the concrete aerator pad construction.  The 2-inch HDPE plate is underlain by two layers of 16 oz/sy nonwoven geotextile, and was installed in several pieces and fusion-welded together in-place. A 1/2-inch bevel was cut into the adjoining panels and then butt welded together to provide a continuous 2-inch thick HDPE plate underlying the future concrete aerator pad.
	<u>Cell 1 Construction.</u>  <u>Geosynthetics Installation</u>  NWL did not install geosynthetics during construction today. The contractor worked to complete repairs, patches, and production seaming.  <u>GCL Deployment</u>  No GCL was installed today.  <u>60 mil DST geomembrane:</u>  Total geomembrane (subbase and primary) deployed to date is <u>257,853 sq ft.</u>

Chris Scott

Printed Name



Signature

cc: Mike Minch



PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 24 April 2010

	<p>115 linear feet (lf) of extrusion-welded seams along the primary tie-in to existing Phase II containment system... were recorded today. All of the extrusion welded production seams were non destructive vacuum box tested today. The production seams tested today were found meeting the project requirements.</p> <p>The extrusion welded trial seam was prepared and tested in the field. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Two repairs on the primary 60 mil HDPE geomembrane were observed during construction today.</p> <p>The subbase and primary 80 mil HDPE geomembrane panels were extrusion welded to the 1/2-inch thick HDPE flatstock in accordance with the project requirements. The extrusion welder used the trial weld parameters previously tested to ensure the project strength requirements were achieved. A copper wire was inserted into the weld during welding to provide a means to "spark test" the weld. The spark tests indicate that the welds were constructed in accordance with the project requirements.</p> <p>All repairs installed today were non-destructive vacuum box tested, and no leaks were observed during the tests.</p> <p>NWL has begun to install the 16 oz/sy nonwoven cushion geotextile above the approved Cell 1 (Cells 1C and 1D) containment system. The panels are installed by hand and then sewn together using a sewing machine. The 16 oz/sy nonwoven geotextile panels installed today were installed in accordance with the project requirements.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1200	I left the site.

Chris Scott  
Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 081**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 26      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI subcontractor ITC Water Management (ITC) has completed the installation of the 2-inch HDPE plate, underlain by two layers of 16 oz/sy nonwoven geotextile, in preparation for the concrete aerator pad construction.  The contractor has begun to install the concrete form boards in preparation for the concrete pad construction.
	<u>Cell 1 Construction.</u>  NWL has completed installation of the primary 60 mil HDPE geomembrane within approved Cells 1C/1D areas.  NWL continues to install the 16 oz/sy nonwoven cushion geotextile above the approved Cell 1 containment system. The panels are installed by hand and then sewn together using a sewing machine. The 16 oz/sy nonwoven geotextile panels installed today were installed in accordance with the project requirements.  ITC has pressurized the temporary wet well structure, and pressure test results indicate that structure does not leak.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1700	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 082**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 27      MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
0800	Mike Minch (Geosyntec Senior Project Engineer) is on site to attend weekly construction meeting.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
1000	Mike and I attended weekly construction meeting.
1130	Returned from the construction meeting.
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has completed final grading the ¾-inch minus granular operations layer on the NLEP floor. Esaki Surveying &amp; Mapping, Inc. and Wagner Surveying are on site to survey the top of granular operations layer and verify the gravel layer thickness.</p>
	<p><u>Cell 1 Construction.</u></p> <p>NWL has completed the installation of the 16 oz/sy nonwoven cushion geotextile above the approved Cell 1 containment system.</p> <p>GBI has begun importing the 1 ½-inch minus granular drainage layer materials from the Kauai Aggregate Quarry to the Cell 1C and 1D containment system. The gravel is imported from the quarry using several "end dump" haul trucks. The haul trucks back up to the edge of the installed Cell 1C/1D liner and then dumped directly onto the containment system. The stockpiled 1 ½-inch minus gravel is then pushed into a uniform 3-ft thick lift using a Caterpillar D6 LGP dozer.</p> <p>GBI subcontractor ITC Water Management is on site to install the 8-inch diameter HDPE perforated leachate</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 27 April 2010

	collection pipe extending from Cell 1D sump approximately 250-ft to the south within the swale.
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Waste Drop off Improvements</u> No work in this area today.
1700	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 083**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 28 MONTH: April

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site. Northwest Linings (NWL) is not on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>The contractor has completed the majority of the ¾-inch minus granular operations layer installation, and the as-built survey of the top of granular operations layer provided by Esaki Surveying &amp; Mapping, Inc. confirms that the granular operations layer thickness meets the project requirements.</p> <p>NWL will be on site in the morning to install the 6 oz/sy nonwoven separator geotextile above the granular operations layer.</p>
	<p><u>Cell 1 Construction.</u></p> <p>GBI continues to import the 1 ½-inch minus granular drainage materials for the Cell 1C and 1D containment systems. The gravel is imported from the Kauai Aggregate Quarry using several "end dump" haul trucks. The haul trucks back up to the edge of the installed Cell 1C/1D liner and then dumped directly onto the containment system. The stockpiled 1 ½-inch minus gravel is pushed into a uniform 3-ft thick lift using a Caterpillar D6 LGP dozer.</p> <p>A conformance sample (Cell1 GD-002) of the placed granular drainage layer material was collected into a 5-gallon bucket and will be delivered to Precision Laboratories for geotechnical testing.</p> <p>GBI subcontractor ITC Water Management is on site to connect the installed forcemain double-wall containment pipe to the newly installed temporary wet well. A section of the forcemain pipe was production-welded together in preparation for installation. The secondary (containment) component of the double-wall pipe was pressure tested, and no leaks were observed. Once the forcemain is connected to the wet well, the inside "carrier" pipe will be tested.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 28 April 2010

	<p>The contractor continues to place on-site sandy soils to construct the remaining portion of the Cell 1D perimeter berm. The compacted fill material is placed into a Cat. 735 articulated haul truck using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill material directly onto the Cell 1D perimeter berm. The lifts are uniformly graded to 8-inch thick loose layers using a Cat. D5 dozer, moisture-conditioned using a water truck, and then compacted using a HAMM 2420 rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p> <p>A 3-inch thin-wall Shelby tube was advanced into the compacted fill within the nuclear gauge footprint at field density test location FDT-140 using an Army Corps sampler. The sample was extracted by hand, capped at each end, and then labeled TW-007. The sample will be used to compare the in-place moisture and density as measured by the nuclear gauge and by method ASTM D 2937 (Density of Soils by Drive Cylinder Method).</p>
	<p><u>New Infiltration Basin (NIB)</u> No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u> No work in this area today.</p>
1800	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 084**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 29      MONTH: April

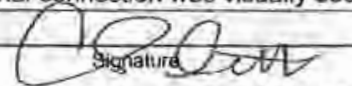
YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site today.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>NWL has installed the majority of the 6 oz/sy nonwoven separator geotextile above the granular operations layer within the NLEP. The 6 oz/sy nonwoven geotextile installed today was installed in accordance with the project requirements.</p> <p>GBI has installed the NLEP form boards and reinforcing steel within the forms in preparation for the concrete aerator pad installation. The epoxy coated reinforcing rebar was installed in accordance with the project drawings.</p>
	<p><u>Cell 1 Construction.</u></p> <p>GBI continues to import the 1 ½-inch minus granular drainage materials for the Cell 1C and 1D containment system. The gravel is imported from the Kauai Aggregate Quarry using several "end dump" haul trucks. The haul trucks back up to the edge of the installed Cell 1C/1D liner and then dumped directly onto the containment system. The stockpiled 1 ½-inch minus gravel is pushed into a uniform 3-ft thick lift using a Caterpillar D6 LGP dozer.</p> <p>GBI subcontractor ITC Water Management has connected both the 12-inch HDPE double-wall gravity flow pipe and the 8-inch double-wall forcemain pipe to the temporary wet well.</p> <p>The 12-inch double-wall gravity flow pipe was previously tested from the Cell 1C pipe penetration to immediately before the temporary wet well structure, and no leaks were observed. However, due to limited accessibility of the temporary wet well, visual observation of the final connection was approved in lieu of air pressure testing. The final connection was visually observed during construction and was approved.</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 29 April 2010

	The 8-in forcemain pipe was connected to the temporary wet well, and the inside "carrier" pipe was pressure tested in accordance with the project requirements. The air pressure test was observed for 1 hour, and no leaks were observed.
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Waste Drop off Improvements</u> No work in this area today.
1800	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 085**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 30 MONTH: April

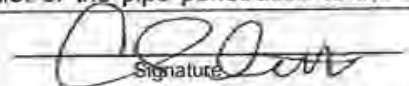
YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI has poured the concrete mix into the previously constructed form boards to construct the concrete aerator pads within the floor of the NLEP. Visual inspection of the epoxy coated reinforcing rebar confirms the steel was installed in accordance with the construction drawings.</p> <p>The concrete mix was tested in the field using a slump cone to verify the material was mixed in accordance with the project specifications. After testing the field tests indicated that the material meets the project requirements. No water was added to the mix at the site.</p> <p>A set of three 4-in diameter by 6-in tall cylinders were cast using the concrete material from each aerator pad location, for a total of two sets of three cylinders. The samples were stored on site for 24 hours until delivery to the Hirata &amp; Associates geotechnical laboratory. The test cylinders will be used to evaluate the concrete break strength after 7, 14 and 28 days of curing.</p>
	<p><u>Cell 1 Construction.</u></p> <p>GBI continues to import the 1 1/2-inch minus granular drainage materials for the Cell 1C and 1D containment systems. The gravel is imported from the Kauai Aggregate Quarry using several "end dump" haul trucks. The haul trucks back up to the edge of the installed Cell 1C/1D liner and then dumped directly onto the containment system. The stockpiled 1 1/2-inch minus gravel is pushed into a uniform 3-ft thick lift using a Caterpillar D6 LGP dozer.</p> <p>GBI subcontractor ITC Water Management has connected the Cell 1D cleanout riser located at the inlet of the pipe penetration assembly. The cleanout connection was constructed using HDPE pipe fittings. The cleanout extends from the inlet of the pipe penetration to the crest of the Cell 1D sideslope, and has two flanges as</p>

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 30 April 2010

	<p>shown in the construction drawings. The cleanout was installed in accordance to the project requirements.</p> <p>The contractor continues to place on-site sandy soils to construct the remaining portion of the Cell 1D perimeter berm. The compacted fill material is placed into a Cat. 735 articulated haul truck using a Hitachi 450 LC excavator, and then the haul truck dumps the compacted fill material directly onto the Cell 1D perimeter berm. The lifts are uniformly graded to 8-inch thick loose layers using a Cat. D5 dozer, moisture-conditioned using a water truck and then compacted using a HAMM 2420 rubber tire smooth drum vibratory compactor. Several field density tests (FDTs) using a Troxler portable nuclear moisture/density gauge indicate the compaction effort was in accordance with the project specifications.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1800	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 086**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Saturday

DATE:

DAY: 1

MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  No work in this area today.
	<u>Cell 1 Construction.</u>  GBI has temporarily suspended the import of the 1 1/2-inch minus granular drainage materials for the Cell 1C and 1D containment system, and has begun to grade the stockpiled gravel material to a uniform 1-ft thick lift using a Caterpillar D6 LGP dozer. The 1 1/2-inch minus granular drainage layer installed to date was constructed in accordance with the project requirements.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1300	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 087**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 3 MONTH: May YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  The contractor has removed the form boards around the newly constructed aerator pads within the floor of the NLEP.
	<u>Cell 1 Construction.</u>  GBI continues to import the 1 1/2-inch minus granular drainage materials for the Cell 1C and 1D containment systems. The gravel is imported from the Kauai Aggregate Quarry using several "end dump" haul trucks. The haul trucks back up to the edge of the installed Cell 1C/1D liner and then dumped directly onto a 3-foot thick haul road directly on the containment system. The material is then pushed to a uniform 1-ft thick lift over the entire containment system.  GBI is working to final grade the Cell 1C perimeter berm, and to cut the anchor trench within the area around the newly installed temporary wet well structure.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 088**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 4 MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
0700	I attended weekly construction meeting.
0730	I returned from weekly construction meeting.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI has constructed a test pad within the floor of the NLEP. The test pad was used to evaluate the placement method for the 2-inch thick granular protection layer above the 6 oz/sy nonwoven separator geotextile.  A 2- to 3-inch thick layer of the 3/8-inch minus granular protection layer material was placed on the 6 oz/sy nonwoven geotextile, and then graded by hand using rakes. Once the area was graded, a rubber tire track drive "skid steer" drove on the granular protection layer underlain with 6 oz/sy nonwoven geotextile. No turns or sharp direction changes were observed. The gravel was then carefully removed to expose the underlying 6 oz/sy nonwoven geotextile, and no apparent damage was visually observed. Therefore, per AECOM's response to RFI #14, this placement method is approved.  GBI has begun to install the 3/8-inch minus granular protection layer above the 6 oz/sy nonwoven separator geotextile. A sample (NLEP GP-001) was collected and delivered to Precision Laboratories for conformance testing.
	<u>Cell 1 Construction.</u>  GBI continues to import the 1 1/2-inch minus granular drainage materials for the Cell 1C and 1D containment systems. The gravel is imported from the Kauai Aggregate Quarry using several "end dump" haul trucks. The haul trucks back up to the edge of the installed Cell 1C/1D liner and then dumped directly onto a 3-foot thick haul road directly on the containment system. The material is then pushed to a uniform 1-ft thick lift over the entire containment system.

Chris Scott

Printed Name

Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 4 May 2010

	GBI is working to final grade the Cell 1C perimeter berm, and to cut the anchor trench within the area around the newly installed temporary wet well structure.
	<u>New Infiltration Basin (NIB)</u> No work in this area today.
	<u>Waste Drop off Improvements</u> No work in this area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 089**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 5      MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI continues to install the 3/8-inch minus granular operations layer above the 6 oz/sy nonwoven separator geotextile. Two track driven "skid steer" loaders are used to place the granular operations layer while several laborers using hand tools uniformly grade the gravel to a minimum 2-inch thick layer above the geotextile.
	<u>Cell 1 Construction.</u>  GBI completes final grading of the 1 1/2-inch minus granular drainage layer above the Cell 1D containment system. The granular drainage layer was visually observed to be approximately 1 foot thick. GBI has stockpiled 1 1/2-inch minus granular drainage layer material on the Cell 1C containment system in preparation for placement.  Wagner Surveying and Esaki Surveying & Mapping, Inc. are on site to survey the Cell 1D top of granular drainage layer as well as the as built Cell 1C perimeter berm subbase.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 090**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 6 MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI continues to install the 3/8-inch minus granular protection layer above the 6 oz/sy nonwoven separator geotextile. Two track driven "skid steer" loaders are used to place the granular protection layer while several laborers using hand tools uniformly grade the gravel to a minimum 2-inch thick layer above the geotextile.
	<u>Cell 1 Construction.</u>  GBI subcontractor ITC Water Management (ITC) is on site to extend Manhole #14. A section of the HDPE structure was prefabricated and shipped to the site. ITC extrusion welds the manhole extension to the existing structure to complete the manhole above the design grades.  Once the manhole was extended, GBI completed the Cell 1D northeast corner tie-in to the existing Phase II containment system and constructed the perimeter berm along the northern limits of Cell 1D.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 091**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE:

DAY: 7

MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI continues to install the 3/8-inch minus granular protection layer above the 6 oz/sy nonwoven separator geotextile. Two track driven "skid steer" loaders are used to place the granular protection layer while several laborers using hand tools uniformly grade the gravel to a 2-inch thick layer above the geotextile.  GBI has connected the 6 oz/sy nonwoven separator geotextile to Aerator Pad 3C using the previously approved stainless steel flat bar (RFI #21) and rubber spacer. The stainless steel flat bar and rubber spacer were secured using stainless steel fasteners.
	<u>Cell 1 Construction.</u>  Esaki Surveying & Mapping, Inc. is on site to provide the as built survey of the Cell 1D subbase grades and perimeter anchor trench.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 092**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 10 MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI completed the majority of the granular drainage layer installation within the NLEP. In preparation for completion of the granular drainage layer installation at the west end of the NLEP, the contractor has stockpiled granular drainage layer materials within the floor of the NLEP.  GBI has removed all of the gravel from the west end of the NLEP (former temporary access ramp location), and has completed construction of the west berm. The soils used to construct the NLEP west berm subbase were excavated from the exterior south berm side slope of the NLEP, which had been over-built during construction. The material was moisture conditioned using a water truck and then placed in uniform 6- to 8-inch thick lifts. Once the material was graded, compaction effort was applied using a HAMM 2420 rubber tire smooth vibratory compactor. Several field density tests using a Troxler portable nuclear moisture/density gauge indicate the compaction effort meets the project requirements.
	<u>Cell 1 Construction</u>  No work in this area today.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1600	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 093**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 11      MONTH: May

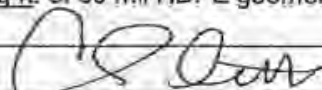
YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI subcontractor ITC Water Management is on site to fabricate the forcemain pipe which will connect the existing leachate collection system to the NLEP. The final connections will not be completed until later in the construction.
	<u>Cell 1 Construction</u>  NWL is on site to install both the secondary and primary liner systems within Cells 1C and 1D.  <u>GCL Deployment</u>  NWL installed approximately <u>3,500 sq ft</u> of GCL today. The GCL was installed today with 12-inch overlaps along the width and 6-inch overlaps along the length. Granular bentonite was placed along the width of the seam (butt seam) overlaps, and the super groove factory seam was used along the length of the seam overlaps. The GCL was installed in accordance with the project specifications and the design engineer recommendations (23 December 2009 email correspondence from AECOM).  <u>Geosynthetics Installation</u>  <u>60 mil DST geomembrane:</u>  NWL installed <u>13,828 sq ft</u> of 60 mil HDPE geomembrane during construction today.

Chris Scott

Printed Name



Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion  
LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02  
DAY/DATE: 11 May 2010

	<p>Total geomembrane (subbase and primary) deployed to date is <u>271,681 sq ft.</u></p> <p>Sixteen 60 mil HDPE geomembrane panels were installed today in various widths and lengths.</p> <p><u>161 linear feet</u> of extrusion-welded seams were recorded today. All of the extrusion welded production seams were nondestructive vacuum box tested today. The production seams tested today were found meeting the project requirements.</p> <p>During construction today, both extrusion and fusion trial seams were constructed before production welding began, the trial welds were completed in the morning and then again in the afternoon. The field tensiometer tests results indicate the welder was able to achieve the required seam strengths for the project.</p> <p>Four primary geomembrane repairs and twelve secondary geomembrane repairs were observed during construction today. All repairs installed today were non-destructive vacuum box tested and no leaks were observed during the tests.</p> <p>The 80 mil HDPE geomembrane secondary liner system was extrusion welded to the ½ thick HDPE flatstock plate in accordance with the project requirements. During production welding, the welder used the same methods as the previously tested and passing trial plate-to-sheet extrusion weld. A copper wire was inserted into the weld during welding to provide a means to "spark test" the repair. Spark tests did not indicate any leaks.</p> <p>NWL installed the 16 oz/yd nonwoven cushion geotextile above the approved Cell 1 (Cells 1C and 1D) containment system installed today. The panels are installed by hand and then sewn together using a sewing machine. The 16 oz/yd nonwoven geotextile panels installed today were installed in accordance with the project requirements.</p>
	<p><u>New Infiltration Basin (NIB)</u></p> <p>No work in this area today.</p>
	<p><u>Waste Drop off Improvements</u></p> <p>No work in this area today.</p>
1830	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

Report Sequence No.: 094

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 12 MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  GBI subcontractor ITC Water Management is on site to pressure test the piping section before installation. The 1-hour pressure tests were completed with no leaks observed.
	<u>Cell 1 Construction</u>  NWL has completed the installation of the primary and secondary liner systems within Cells 1C and 1D.  NWL has begun to install the 6 oz/yd nonwoven separator geotextile above the approved 1 1/2-inch minus granular drainage layer. The panels are installed by hand and then sewn together using a sewing machine. The 6 oz/yd nonwoven separator geotextile panels installed today were installed in accordance with the project requirements.
	<u>New Infiltration Basin (NIB)</u>  No work in this area today.
	<u>Waste Drop off Improvements</u>  No work in this area today.
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 095**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 13      MONTH: May      YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  No work in this area today.
	<u>Cell 1 Construction</u>  NWL completes installation of the 16 oz/yd nonwoven cushion geotextile within Cells 1C and 1D, and installs the 6 oz/sy nonwoven separator geotextile above the approved 1 1/2-inch minus granular drainage layer within Cell 1D. The 6 oz/sy and 16 oz/sy nonwoven geotextile panels were installed by hand and then sewn together using a sewing machine. The geotextile panels installed today were installed in accordance with the project requirements.  GBI continues to final grade the 1 1/2-inch minus granular drainage layer within Cell 1C using a Caterpillar D6 LGP dozer with GPS assist.  GBI has begun to install the 3/8-inch minus operations layer gravel above the installed 6 oz/sy nonwoven separator geotextile. The operations layer material is imported from Kauai Aggregates Quarry using "end dump" transfer trucks. The haul trucks back up to the 6 oz/sy nonwoven geotextile and dump the gravel material directly onto the containment system. A Caterpillar D5 dozer with GPS grade control uniformly grades the material to two feet thick above the 6 oz/sy nonwoven geotextile. During placement of the 3/8-inch minus operations layer, a sample (Cell 1-Ops-001) of the material was collected in a plastic bucket and then shipped to Precision Laboratories for conformance testing
1830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 096**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298 TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE: DAY: 14 MONTH: May YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI has removed the temporary access ramp and completed construction of the west berm. Esaki Surveying &amp; Mapping provided the as-built subbase survey of the west berm, and Geosyntec accepted the as-built grades.</p> <p>NWL has installed all geosynthetic layers on the NLEP western side slope to complete the containment system installation. During completion of the containment system installation, the area of the containment system previously damaged (see daily field report #65, dated 7 April 2010) were removed and replaced with new geosynthetic materials. All geosynthetic layers were constructed in accordance with the project specifications.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI continues to final grade the 1 1/2-inch minus granular drainage layer within Cell 1C using a Caterpillar D6 LGP dozer with GPS assist.</p> <p>GBI continues to install the 3/8-inch minus operations layer above the installed 6 oz/sy nonwoven separator geotextile. The operations layer material is imported from Kauai Aggregates Quarry using "end dump" transfer trucks. The haul trucks back up to the 6 oz/sy nonwoven geotextile and dump the gravel material directly onto the containment system. A Caterpillar D5 dozer with GPS grade control uniformly grades the material to two feet thick above the 6 oz/sy nonwoven geotextile.</p> <p>GBI subcontractor ITC Water Management has connected the 8-inch diameter perforated pipe to the Cell 1C pipe penetration assembly and constructed the Cell 1C cleanout riser to the crest of the embankment. All connections were completed in accordance with the project requirements.</p>
0830	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 097**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings


DAY OF WEEK: Saturday

DATE:      DAY: 15      MONTH: May      YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site. NWL is not on site today.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>No work in this area today pending destructive seam sample DS-P-13 laboratory test results.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI has completed final grading of the 1 ½-inch minus granular drainage layer within Cell 1C. The granular drainage layer was visually observed to be approximately 1 foot thick. Esaki Surveying and Mapping, Inc. and Wagner surveying are on site to survey the top of the 1 ½-inch minus granular drainage layer above the Cell 1C containment system.</p> <p>GBI continues to install the 3/8-inch minus operations layer gravel above the installed 6 oz/sy nonwoven separator geotextile. The 3/8-inch minus operations layer material is imported from Kauai Aggregates Quarry using "end dump" transfer trucks. The haul trucks back up to the 6 oz/sy nonwoven geotextile and dump the gravel material directly onto the containment system. A Caterpillar D5 dozer with GPS grade control uniformly grades the material to two feet thick above the 6 oz/sy nonwoven geotextile. During placement of the 3/8-inch minus operations layer, a sample (Cell1 Ops-002) of the material was collected in a plastic bucket and then delivered to Precision Laboratories for conformance testing.</p>
1230	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 098**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Monday

DATE: DAY: 17      MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
1000	I attend the weekly construction meeting. Kenny Bergschultz and Jeff Impens of AECOM, and Mike Minch of Geosyntec also onsite to attend the construction meeting. The Draft NLEP CQA report is presented to the County and WMH today for review and comment.
	<u>New Leachate Evaporation Pond (NLEP)</u>  No work in this area today pending destructive sample (DS-P-13) tests results.
	<u>Cell 1 Construction</u>  GBI has completed final grading of the 1 1/2-inch minus granular drainage layer within Cell 1C. The granular drainage layer was visually observed to be approximately 1 foot thick. Esaki Surveying and Mapping and Wagner Surveying are on site to survey the as-built top of the granular drainage layer.  GBI continues to install the 3/8-inch minus operations layer gravel above the installed 6 oz/sy nonwoven separator geotextile. The operations layer material is imported from Kauai Aggregates Quarry using "end dump" transfer trucks. The haul trucks back up to the 6 oz/sy nonwoven geotextile and dump the gravel material directly onto the containment system. A Caterpillar D5 dozer with GPS grade control uniformly grades the material to two feet thick above the 6 oz/sy nonwoven geotextile.
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 099**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298      TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Tuesday

DATE: DAY: 18      MONTH: May      YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  Test results received from Precision Laboratories for destructive seam sample DS-P-13 are passing.  NWL has completed installation of the 16 oz/sy nonwoven cushion geotextile on the NLEP floor, and has installed the Geocell system along the western side slope. Both layers were installed in accordance with the project requirements.  GBI has installed the 1-ft thick granular operations layer above the 16 oz/sy nonwoven cushion geotextile. The gravel was installed in accordance with the construction drawings. Esaki Surveying and Mapping will be on site in the morning to survey the top of the granular operations layer.
	<u>Cell 1 Construction</u>  GBI continues to install the 3/8-inch minus operations layer above the installed 6 oz/sy nonwoven separator geotextile. The operations layer material is imported from Kauai Aggregates Quarry using "end dump" transfer trucks. The haul trucks back up to the 6 oz/sy nonwoven geotextile and dump the gravel material directly onto the containment system. A Caterpillar D5 dozer with GPS grade control uniformly grades the material to two feet thick above the 6 oz/sy nonwoven geotextile. During placement of the 3/8-inch minus operations layer, a sample (Cell1 Ops-003) of the material was collected in a plastic bucket and then delivered to Precision Laboratories for conformance testing.
1730	I left the site.

Chris Scott  
Printed Name

  
Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 100**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Wednesday

DATE: DAY: 19 MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D8 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  NWL has trimmed the NLEP geosynthetic layers within the anchor trench to provide adequate separation from the Geocell "dead man" pipe. GBI then completes the backfilling of the anchor trench along the western berm.  GBI has installed the 3-inch minus granular fill in the Geocell on the western side slope. The granular fill was placed in accordance with the project requirements.
	<u>Cell 1 Construction</u>  GBI continues to install the 3/8-inch minus operations layer above the installed 6 oz/sy nonwoven separator geotextile within Cells 1C and 1D. The operations layer material is imported from Kauai Aggregates Quarry using "end dump" transfer trucks. The haul trucks back up to the 6 oz/sy nonwoven geotextile and dump the gravel material directly onto the containment system. A Caterpillar D5 dozer with GPS grade control uniformly grades the material to two feet thick above the 6 oz/sy nonwoven geotextile.
	<u>Phase II Containment System Repair</u>  GBI has exposed the existing Phase II liner system which was inadvertently damaged during construction as described in daily field report #15, dated 15 January 2010. NWL repaired the damaged area using the following previously certified and approved materials:  CETCO FWL GCL roll # 201004CV-326, Agru DST 60-mil HDPE geomembrane roll # 7191467-80211, and TNS 16 oz/sy nonwoven cushion geotextile roll # 20201-74353.  An extrusion trial weld was prepared, and three coupons from the trial weld were tested in the field. The test

Chris Scott

Printed Name

Signature

cc: Mike Minch

PROJECT: Phase II Lateral Expansion

LOCATION: Kekaha Landfill

PROJECT NO.: WG1298 / 02

DAY/DATE: 19 May 2010

	<p>results summarized below met the project requirements:</p> <p>Welder ID: AM Machine ID: #5117 Barrel Temperature: 800 degrees Pre-heat Temperature: 350 degrees Shear Strength Results: 145 ppi; 146 ppi; and 146 ppi Peel Strength Results: 143ppi; 144 ppi; and 123 ppi</p> <p>A new section of GCL was installed over the damaged area. Granular bentonite was placed along the width (butt) seam. A new 4'x3' patch was extrusion welded to the existing Phase II primary liner to repair the damaged area. Once the weld was allowed to cool, the entire extrusion weld was vacuum box tested, and no leaks were observed.</p> <p>After the repair was vacuum box tested, the 16 oz/sy nonwoven cushion geotextile was installed and heat bonded to the existing cushion geotextile.</p> <p>The area within the existing Phase II containment system was repaired in accordance with the project requirements.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



**DAILY FIELD REPORT**

**Report Sequence No.: 101**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Thursday

DATE: DAY: 20 MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site. Goodfellow Bros. is already on site.
0700	Joel Mondragon (Northwest Linings [NWL] Superintendent) and five (5) technicians are on site today.
	Equipment on site today:  Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar140H motor grader, Deer 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.
	<u>New Leachate Evaporation Pond (NLEP)</u>  Esaki Surveying and Mapping have surveyed the top of granular operations layer. Geosyntec Consultants reviewed and accepted the survey data.  NWL has installed the final section of 6 oz/sy nonwoven separator geotextile above the 1-ft thick granular operations layer within the NLEP floor. The 6 oz/sy separator geotextile was installed in accordance the project requirements.
	<u>Cell 1 Construction</u>  NWL has installed and welded the temporary rain flap to the Cell 1C primary liner and has welded the leading edges of the primary and subbase 60 mil HDPE geomembranes together to encapsulate the sandwiched GCL per RFI #23.  GBI has suspended installation of the operations layer today.  GBI subcontractor Valley Well Drilling Inc. (located at 91-458 Komohana Street, Kapolei, HI 96707; phone number 808 682-1767) is on site to install the two gas monitoring probes west of the Cell 1 area.
1730	I left the site.

Chris Scott

Printed Name:



Signature

cc: Mike Minch

**DAILY FIELD REPORT**

**Report Sequence No.: 102**

PROJECT: Kekaha Landfill

LOCATION: Kekaha, Kauai, Hawaii

PROJECT NO.: WG1298

TASK NO.: 02

DESCRIPTION: Phase II Lateral Expansion  
Cell 1 Base Liner Construction

CONTRACTORS: Goodfellow Bros. / Northwest Linings

DAY OF WEEK: Friday

DATE:

DAY: 21

MONTH: May

YEAR: 2010

WEATHER: Sunny and warm during the afternoon.

0600	I arrived on site, Goodfellow Bros. is already on site.
	<p>Equipment on site today:</p> <p>Hitachi 450 LC excavator, Hitachi BH278 excavator, Caterpillar 140H motor grader, Deere 644J front end loader, Komatsu backhoe, Caterpillar 735 articulated haul truck, Caterpillar 740 articulated haul truck, Caterpillar D6 LGP dozer, Caterpillar D5 dozer with GPS grade control, and an HAMM 2420 (26,450 lb) rubber tire smooth drum vibratory compactor.</p>
	<p><u>New Leachate Evaporation Pond (NLEP)</u></p> <p>GBI has completed the installation of the 2-inch thick granular protection layer above the 6 oz/sy nonwoven separator geotextile. Visual verification confirms that the granular protection layer thickness meets the project requirement of 2 inches.</p> <p>GBI has completed the installation of the 3-inch minus granular fill material within the Geocell. Several localized areas required additional 3-inch minus gravel to completely cover the geocell system. These areas were addressed and covered during construction today.</p> <p>Today's activities complete the containment system of the NLEP. Other ancillary work including plumbing, electrical, and aerator system installation remain to be completed. At this stage, the CQA report for the NLEP containment system will be submitted to HDOH for approval as the other ancillary work is ongoing.</p>
	<p><u>Cell 1 Construction</u></p> <p>GBI has suspended construction of the operations layer today.</p> <p>Both Esaki Surveying and Mapping and Wagner Surveying are on site to survey completed portions of the Cells 1C and 1D as-built 2-ft thick operations layer.</p> <p>GBI subcontractor Valley Well Drilling Inc. has completed the installation of the gas monitoring probes. However, the protective stove pipes around the gas probes have not yet been installed.</p>
1730	I left the site.

Chris Scott

Printed Name



Signature

cc: Mike Minch



## **Appendix F**

### **Soil Conformance Testing: Laboratory Test Results**

<b>Appendix F-1</b>	<b>Compacted Fill Materials Test Results</b>
<b>Appendix F-2</b>	<b>Granular Operation Layer Test Results</b>
<b>Appendix F-3</b>	<b>Granular Protection Layer Test Results</b>
<b>Appendix F-4</b>	<b>Granular Fill Test Results</b>
<b>Appendix F-5</b>	<b>Concrete Test Results</b>



**Appendix F-1**  
**Compacted Fill Materials Test Results**

GFB-6

RECEIVED



Hirata & Associates  
Geotechnical  
Engineering

Hirata & Associates, Inc.  
99-1433 Kaha Pt  
Aiea, HI 96701  
tel 808.486.0747  
fax 808.486.0870

FAX MEMORANDUM

JAN 14 2010

Goodfellow Bros., Inc.  
Kauai Office

cc: Keith  
Scott

January 13, 2010  
W.O. 09-4854

TO: Mr. Keith Suga  
Goodfellow Brothers, Inc.  
Fax: (808) 241-4605

FROM: David M. Kitamura *DMK*

RE: Laboratory Test Results - Mana Refuse Station Stockpile  
Walmea Water Main Replacement  
Walmea, Kauai, Hawaii

As requested, laboratory testing was performed on the import material from a stockpile near the Mana Refuse Station, at Barking Sands. Bulk soil samples were obtained by our field technician for laboratory testing, consisting of sieve analysis, as well as maximum density (modified Proctor) tests.

Visually, the material from the stockpile consisted of tan silty sand with few coral fragments (Bag #6). The sieve analysis indicated about 96.7% passing the 3/8" sieve, about 7.4% passing the #100 sieve, and less than 3% passing the #200 sieve. Our laboratory test results indicated that the material is classified as poorly graded sand (SP). This classification is based on the Unified Soil Classification System. The following is a summary of our laboratory testing results:

Sieve Analysis

Sieve Size	Percent Passing
1/2"	96.8
3/8"	96.7
#18	92.3
#100	7.4
#200	2.6

Maximum Density (modified Proctor)

Maximum density: 103 PCF  
Optimum Moisture Content: 14.5%

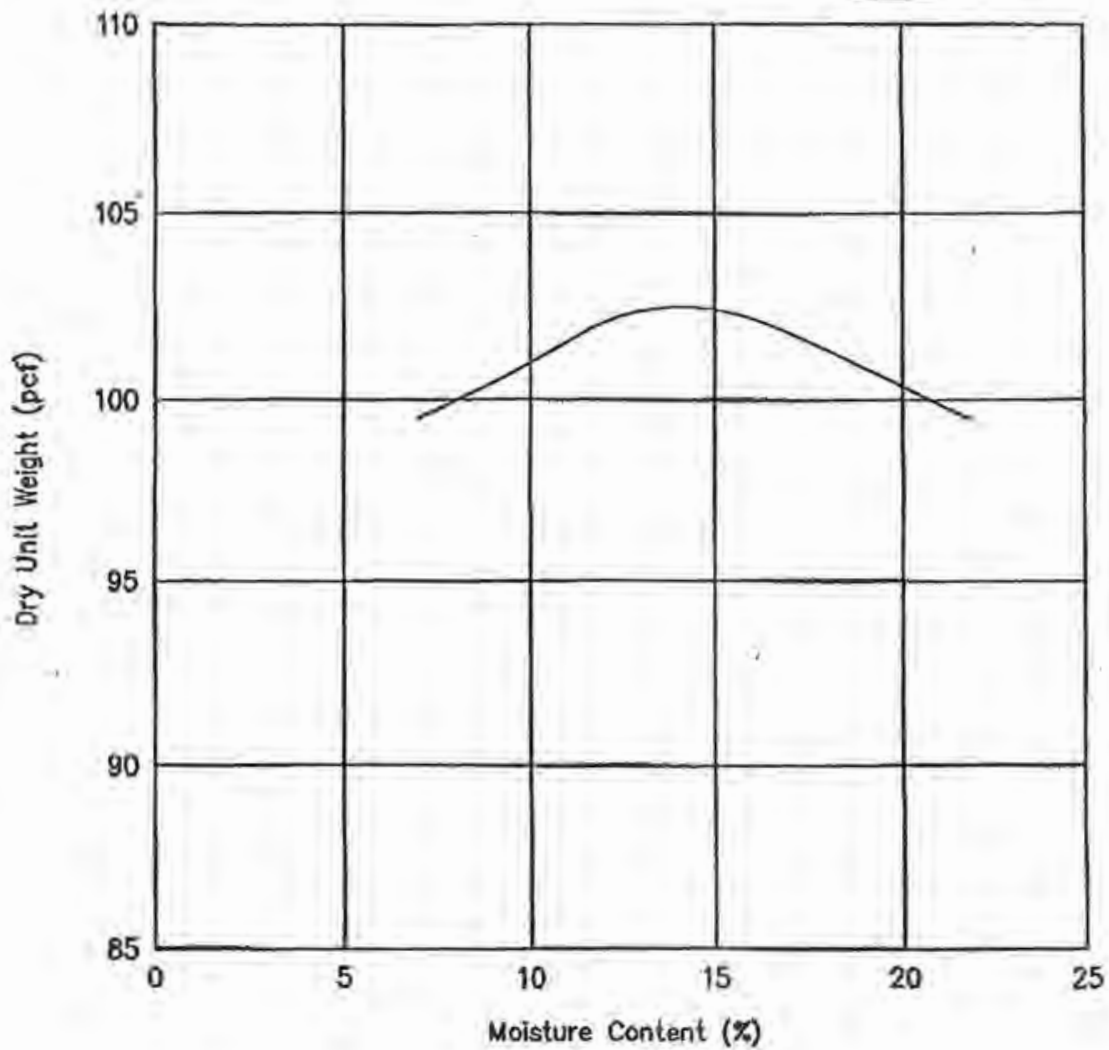
Should you have any questions concerning this memo, please call on us.

DMK:4854xm.003

enc: Modified Proctor Curve (Bag #6)

No. of pages transmitted: 2  
If this transmission is not complete,  
please call us at (808) 486-0787.

GFB-6



Soil Data

Bag No.: 6  
 Location: Mana Refuse Station  
 Description: Tan silty sand

Test Results

Maximum Dry Density: 103.0  
 Optimum Moisture Content: 14.5

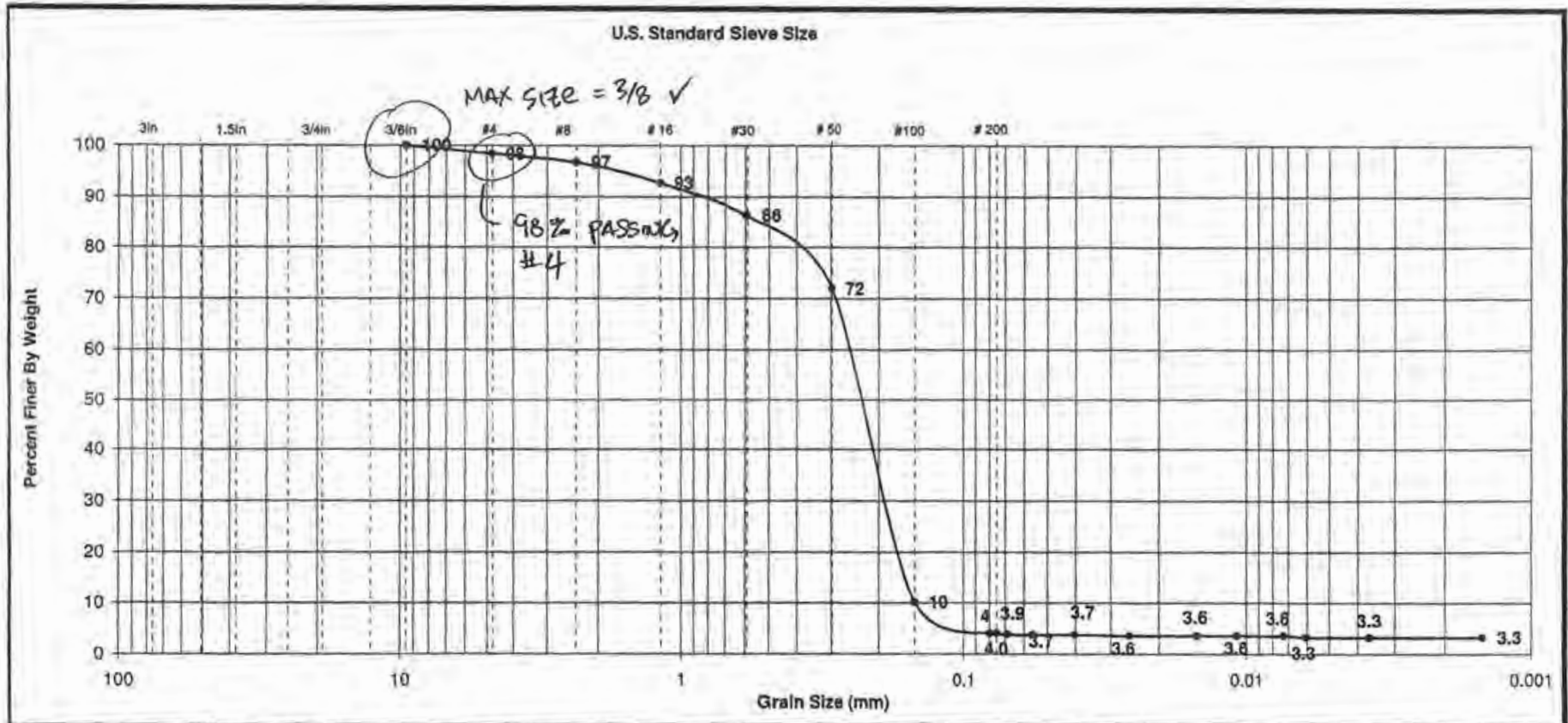
W.O. 09-4854.0

Waimea Main Replacement

Ernest K. Hirata & Associates, Inc.

# MODIFIED PROCTOR CURVE

Plate A1



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
SB001 Subbase						N/A	NP		SP ✓	Sand

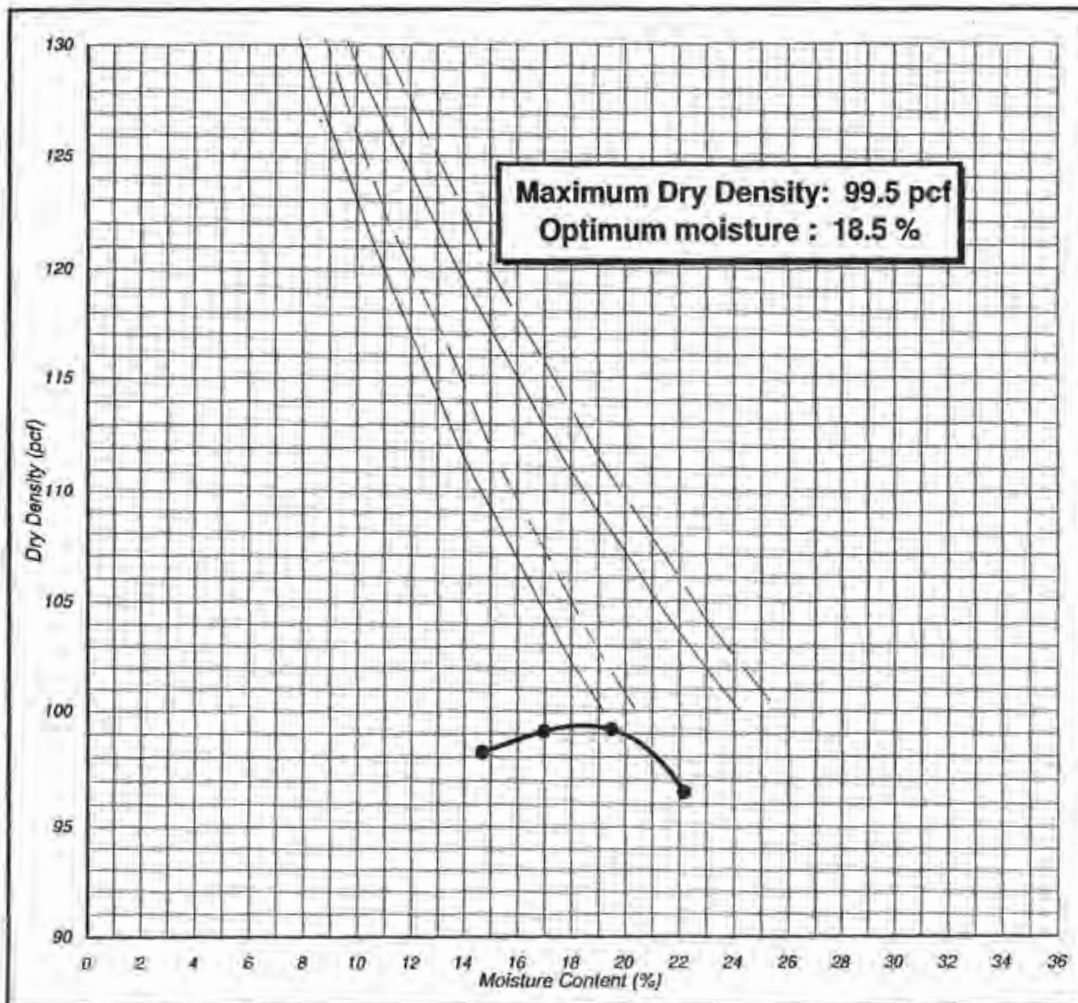


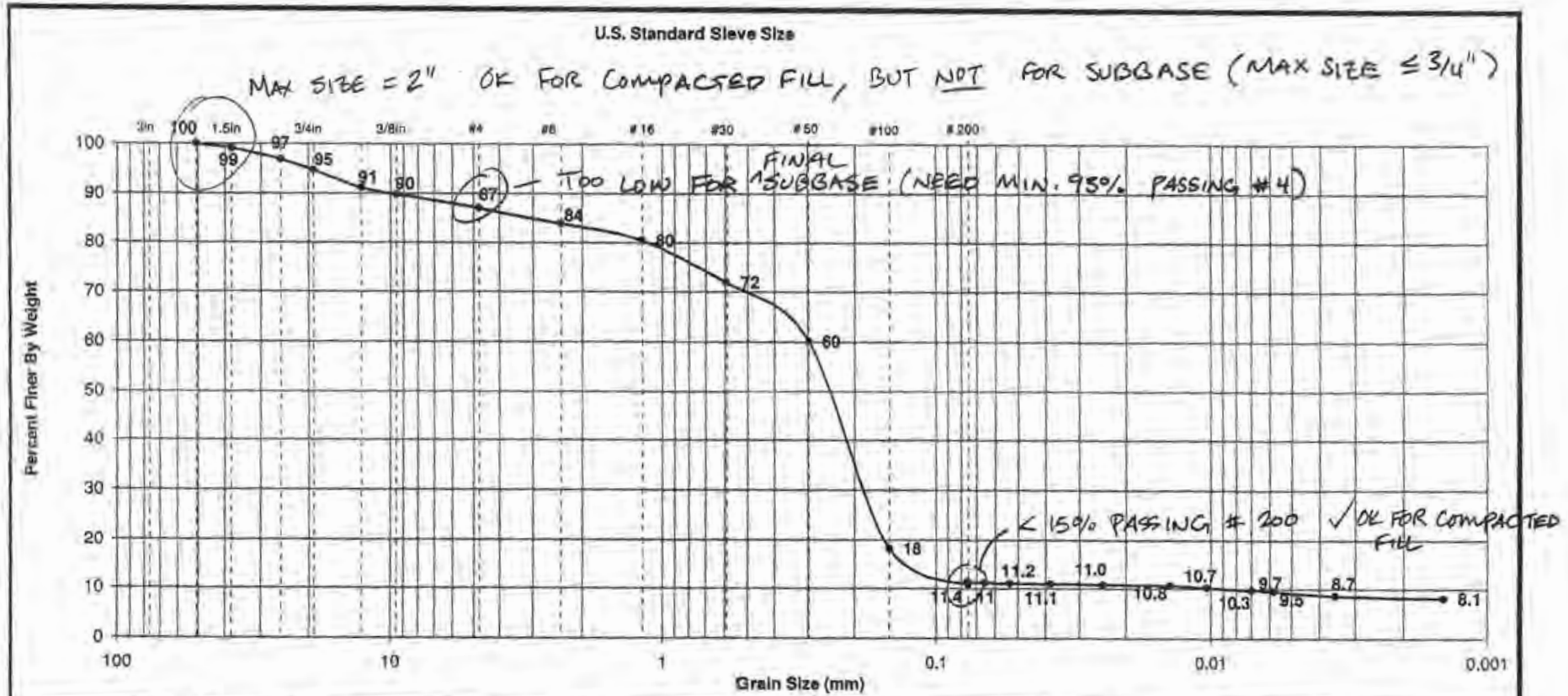
MAXIMUM DENSITY TEST ASTM D 1557

Job Name Precision Geosynthetic Lab. # G100020  
 Job No. 2001-068  
 Boring/Sample No. SB 001  
 Description: Yellowish Brown, F.M. Sand w. trace Silt

Date: 1/20/2010  
 By: SE

Mold Volume (cf):	0.0333	Hammer (lbs):	10.0	Blows:	25	Layers:	5
Specimen	A	B	C	D	E		
Total Wet Weight (grs)	3586	3570	3520	3600			
Weight of Mold (grs)	1794	1817	1817	1817			
Wet Weight of Soil (grs)	1792	1753	1703	1783			
Wet Density (pcf)	118.5	115.9	112.6	117.9			
Moisture Can No.							
Dry Weight							
Moisture Content (%)	19.5	17.0	14.7	22.2			
Dry Density (pcf)	99.2	99.1	98.2	96.5			





Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
SB002 Subbase						N/A	NP	N/A	✓ GM	} SP, SP-SM FOR SUBBASE } OK FOR COMPACTED FILL
FROM POND EXCAVATION										

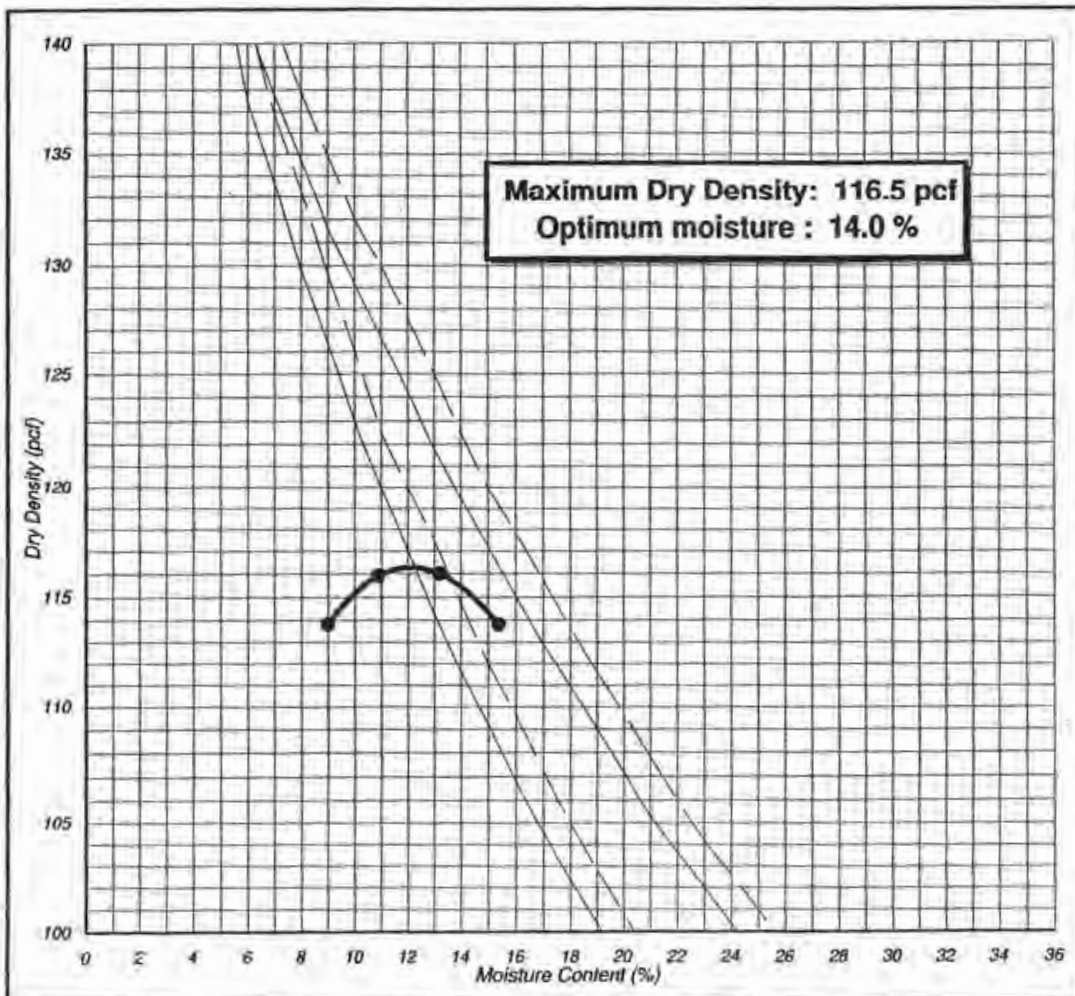
\* DOES NOT MEET SUBBASE; OK FOR COMPACTED FILL

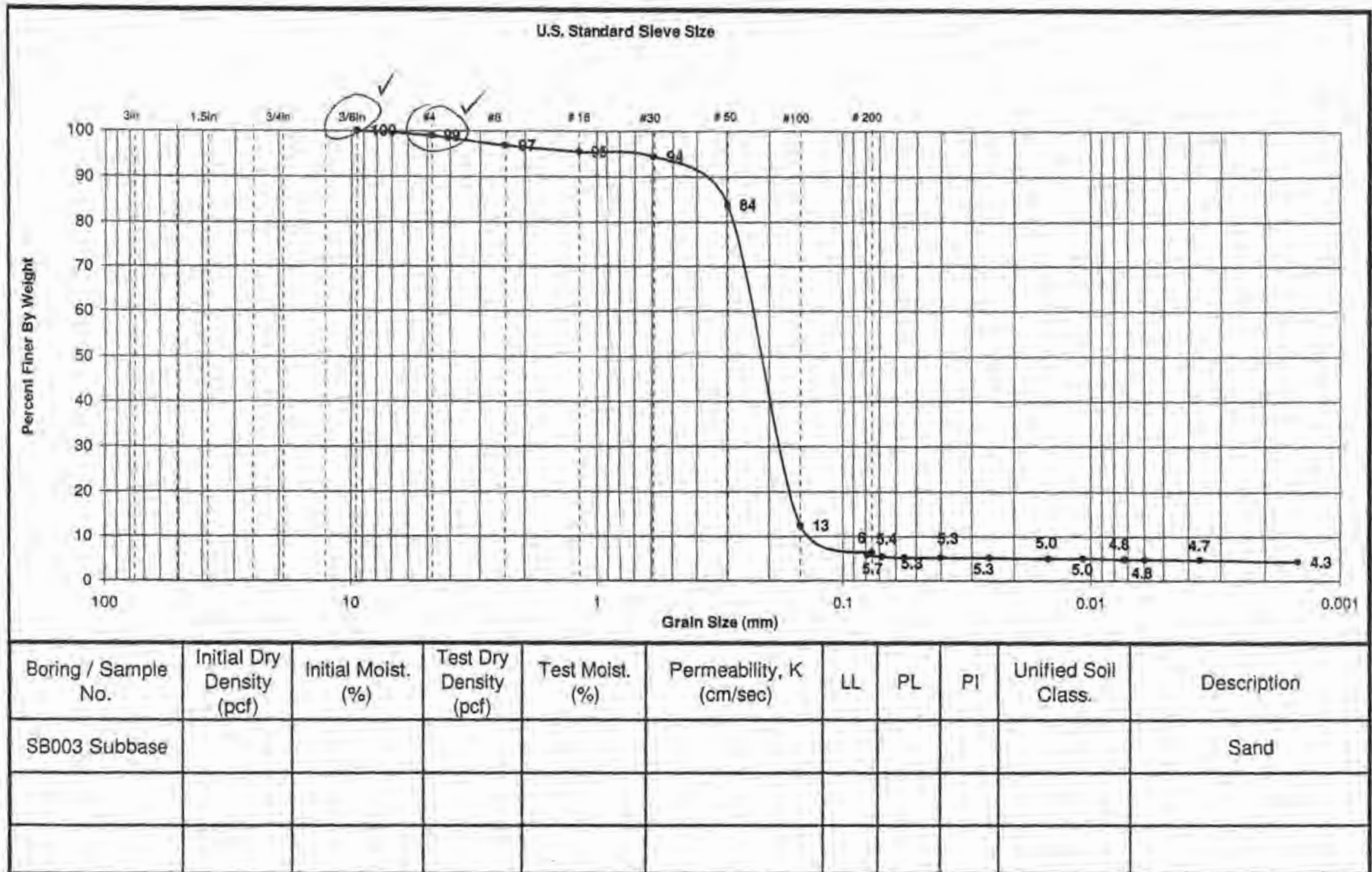
MAXIMUM DENSITY TEST ASTM D1557

Job Name Percision Goesynthetic # 6100020  
 Job No. 2001-068  
 Boring/Sample No. SB 002  
 Description: Reddish Brown, F.C. Silty Sand

Date: 1/20/2010  
 By: SE

Method:	C	Mold Volume (cf):	0.0750	Blows:	56	Layers:	5
Specimen		A	B	C	D	E	
Total Wet Weight (lbs)		7363	7457	7458	7210		
Weight of Mold (lbs)		2990	2990	2990	2990		
Wet Weight of Soil (lbs)		4373	4467	4468	4220		
Wet Density (pcf)		128.5	131.3	131.3	124.0		
Moisture Can No.							
Dry Weight							
Moisture Content (%)		10.9	13.2	15.4	9.0		
Dry Density (pcf)		115.9	116.0	113.8	113.8		





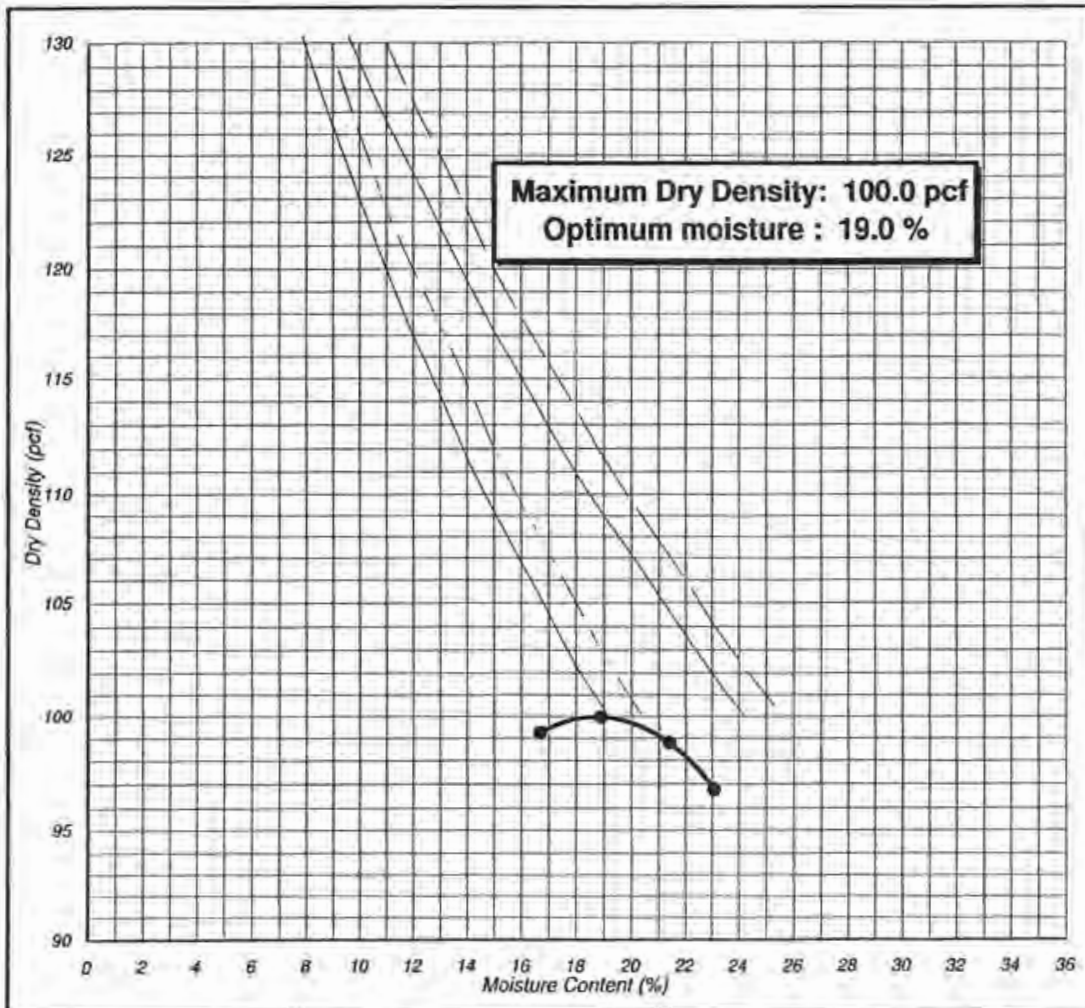


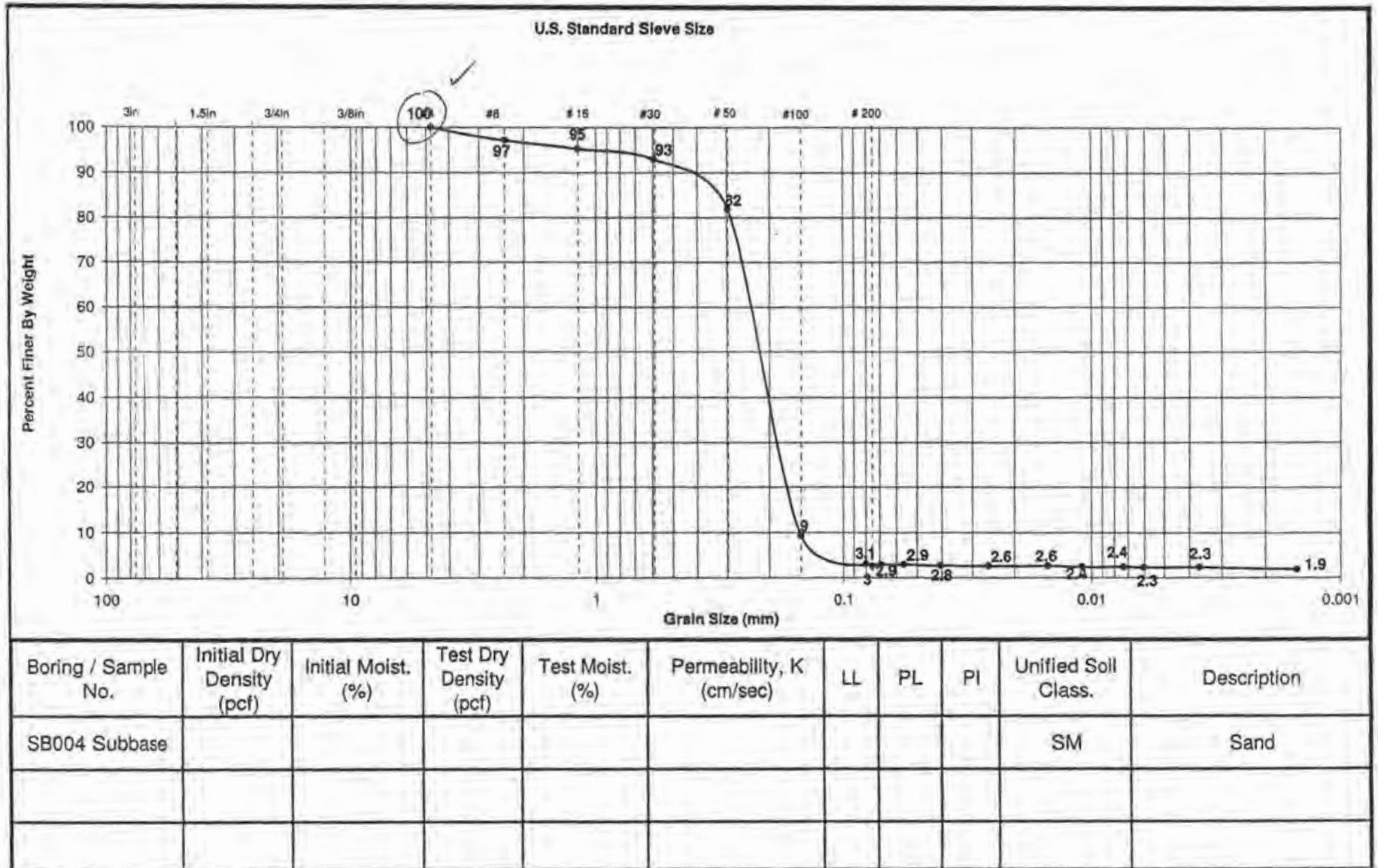
MAXIMUM DENSITY TEST ASTM D 1557

Job Name Precision Geosynthetic Lab. # G100020  
 Job No. 2001-068  
 Boring/Sample No. SB 003 Subbase  
 Description: Yellowish Orange Brown, F.M. Sand w. trace Silt

Date: 1/28/2010  
 By: SE

Mold Volume (cf):	0.0333	Hammer (lbs):	10.0	Blows:	25	Layers:	5
Specimen	A	B	C	D	E		
Total Wet Weight (grs)	3606	3590	3544	3594			
Weight of Mold (grs)	1793	1793	1793	1793			
Wet Weight of Soil (grs)	1813	1797	1751	1801			
Wet Density (pcf)	119.9	118.8	115.8	119.1			
Moisture Can No.							
Dry Weight							
Moisture Content (%)	21.4	18.9	16.7	23.1			
Dry Density (pcf)	98.8	100.0	99.2	96.8			



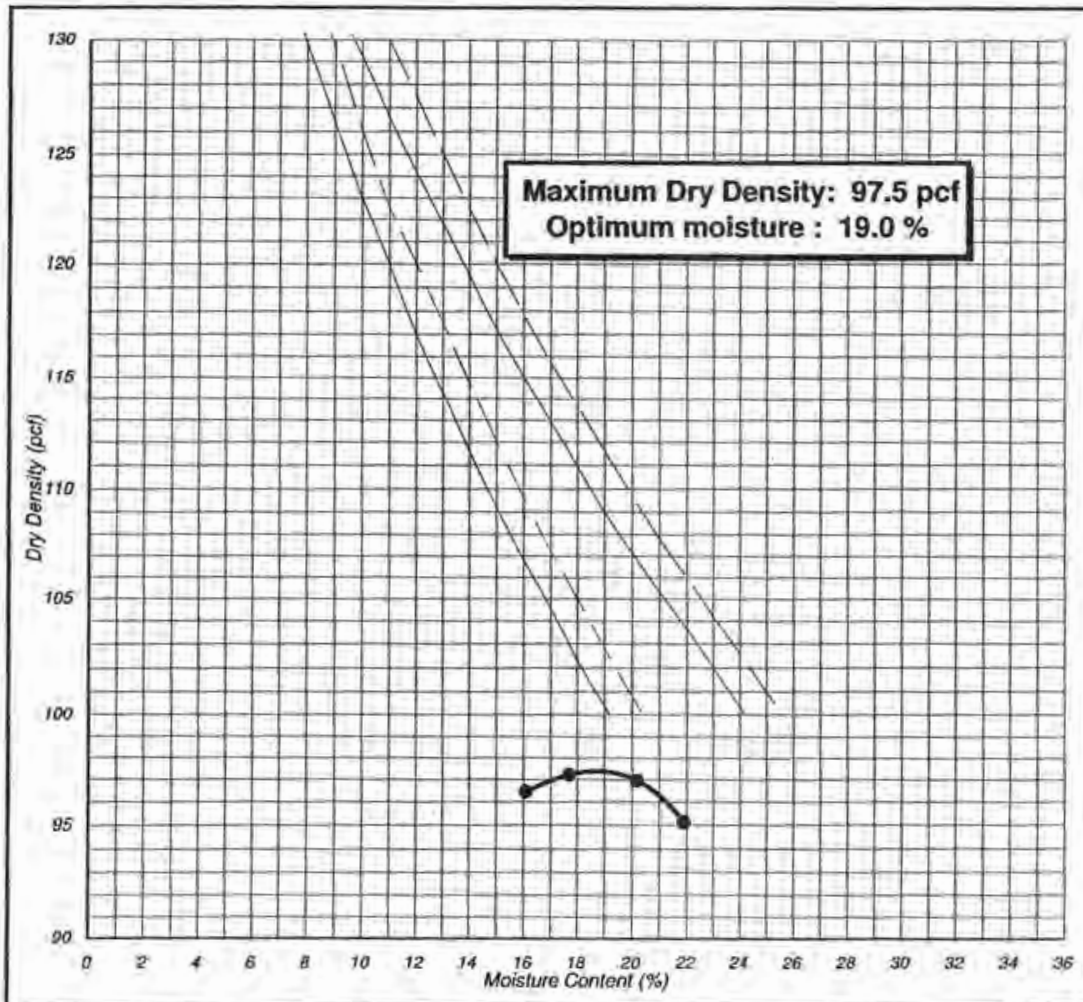


MAXIMUM DENSITY TEST ASTM D 1557

Job Name: Precision Geosynthetic Lab. # G100020  
 Job No.: 2001-068  
 Boring/Sample No.: SB 004 Subbase  
 Description: Yellowish Orange Brown, F.M. Sand w. trace Silt

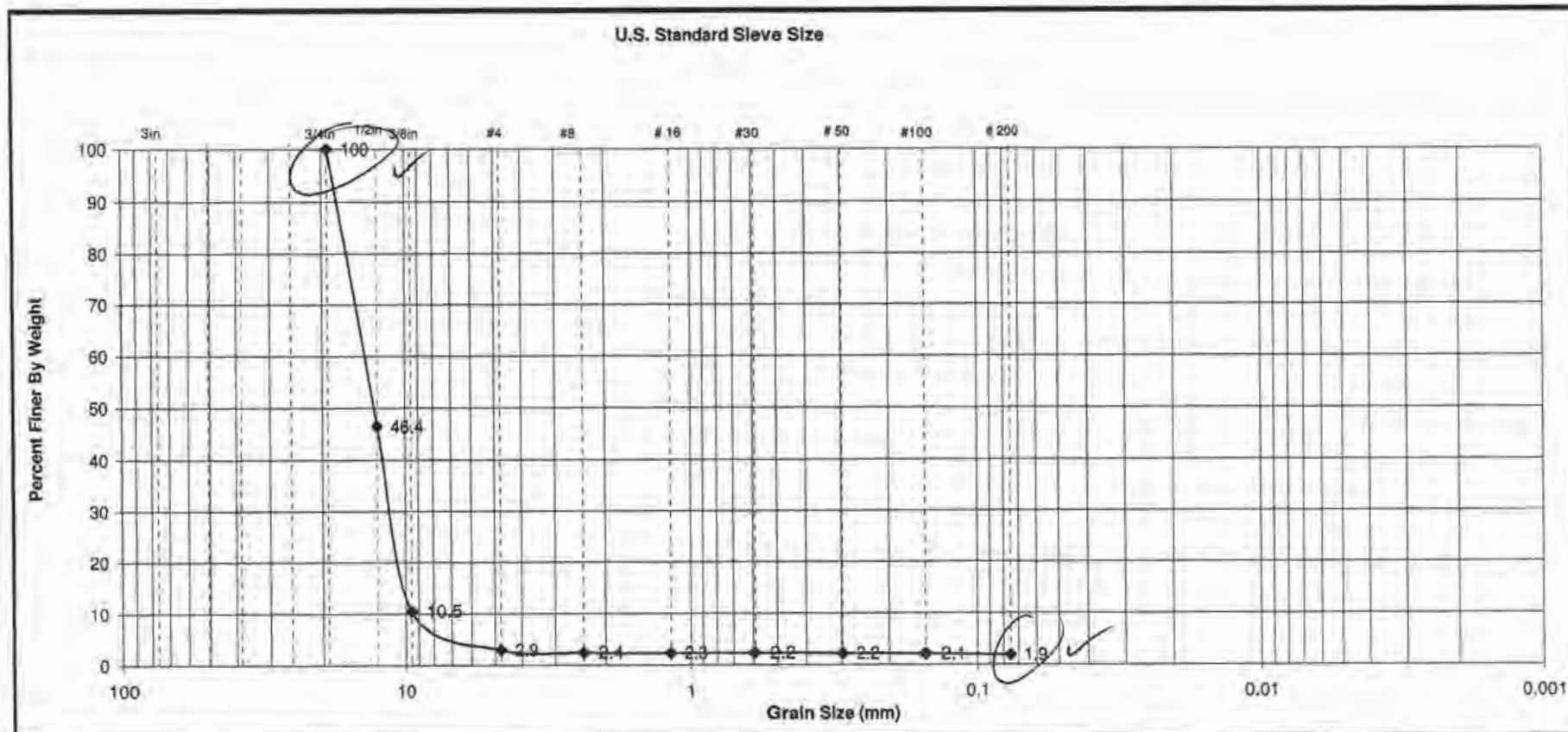
Date: 2/16/2010  
 By: LD

Mold Volume (cf):	0.0333	Hammer (lbs):	10.0	Blows:	25	Layers:	5
Specimen	A	B	C	D	E		
Total Wet Weight (grs)	3554	3522	3545	3485			
Weight of Mold (grs)	1792	1792	1792	1792			
Wet Weight of Soil (grs)	1762	1730	1753	1693			
Wet Density (pcf)	116.5	114.4	115.9	112.0			
Moisture Can No.							
Dry Weight							
Moisture Content (%)	20.2	17.7	21.9	16.1			
Dry Density (pcf)	97.0	97.2	95.1	96.4			



**Appendix F-2**  
**Granular Operations Layer Test Results**





Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
NLEP-Ops-001										

# CONSTANT-HEAD PRESSURE PERMEABILITY TESTS ASTM D 2434

PROJECT Precision Lab # G100274

Date 4/12/2010

Job No 2001-068

By LD

Sample		3/8" minus quarry sand		Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k (cm/sec)	
6815.3	Tare			11:20:00		11:20:10	1800	4.1E-01	
10040	Init. Wet wt			11:22:00		11:22:10	1821	4.1E-01	
	Sat. Wt.	10140		11:23:00		11:23:10	1855	4.2E-01	
	Trimmed Wt.	10140		11:24:00		11:24:10	1834	4.2E-01	
1	% water	4.1							
94.0	Dry Density pct	94.0							
			PSI	0.4	Total (Ave.)		7310	4.1E-01	

Sample		NLEP-Ops-001		Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k (cm/sec)	
6760	Tare			15:00:00		15:00:10	2450	5.5E-01	
9820	Init. Wet wt			15:03:00		15:03:10	2472	5.6E-01	
	Sat. Wt.	9960		15:10:00		15:10:10	2449	5.5E-01	
	Trimmed Wt.	9960		15:45:00		15:45:10	2480	5.6E-01	
0.3	% water	4.9							
89.8	Dry Density pct	89.8							
			PSI	0.4	Total (Ave.)		9851	5.6E-01	✓

Sample				Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k	
	Tare								
	Init. Wet wt								
	Sat. Wt.								
	Trimmed Wt.								
	% water								
	Dry Density								
			PSI		Total (Ave.)				

K = coefficient of permeability (cm/sec)

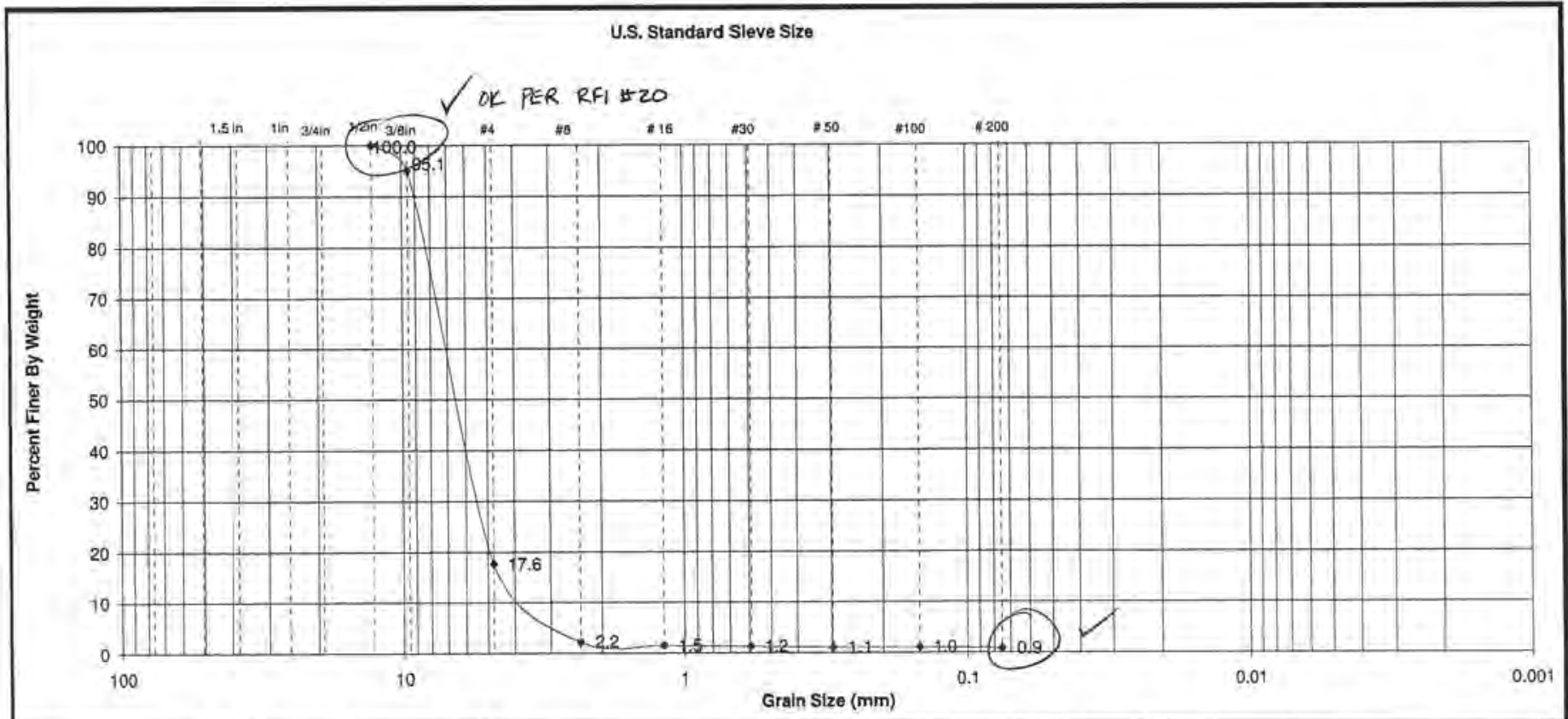
L = sample height = 11.633 cm

A = area of sample = 182.322 cm<sup>2</sup>

H = Hydrostatic head (cm of H<sub>2</sub>O)    1 psi = 70.43 cm

$$K = QL / Ah_i$$

**Appendix F-3**  
**Granular Protection Layer Test Results**



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeability, K (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
NLEP GP-001										



# CONSTANT-HEAD PRESSURE PERMEABILITY TESTS ASTM D 2434

PROJECT Precision Lab # G100453

Date 5/9/2010

Job No 2001-068

By LD

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k (cm/sec)
2540	Tare			11:08:00		11:08:10	1330	4.7E-01
6400	Init. Wet wt			11:11:00		11:11:10	1315	4.6E-01
	Sat. Wt.	6580		11:13:00		11:13:10	1315	4.6E-01
	Trimmed Wt.	6580		11:15:00		11:15:10	1322	4.6E-01
3.8	% water	8.6						
84.0	Dry Density pcf	84.0						
			PSI	0.4	Total (Ave.)		5282	4.6E-01

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k
	Tare							
	Init. Wet wt							
	Sat. Wt.							
	Trimmed Wt.							
	% water							
	Dry Density							
			PSI		Total (Ave.)			

Sample			Start		Stop			
As Rec'd		As Tested	Wt.	Time/Day	Wt.	Time/Day	cc	k
	Tare							
	Init. Wet wt							
	Sat. Wt.							
	Trimmed Wt.							
	% water							
	Dry Density							
			PSI		Total (Ave.)			

K = coefficient of permeability (cm/sec)

L = sample height = 16.51 cm

A = area of sample = 167.445 cm<sup>2</sup>

H = Hydrostatic head (cm of H<sub>2</sub>O)    1 psi = 70.43 cm

$$K = QL / Ah t$$

**Appendix F-4**  
**Granular Fill Test Results**



Hirata & Associates

Geotechnical  
Engineering

Hirata & Associates, Inc.

99-1433 Kaha Pl

Kona, HI 96701

tel 808.486.0787

fax 808.486.0870

## MEMORANDUM

April 16, 2010  
W.O. 10-4907.0

TO: Mr. Chris Scott  
Geosyntec Consultants Inc.  
via email: [cscott@geosyntec.com](mailto:cscott@geosyntec.com)

FROM: David Kitamura

RE: Laboratory Test Results for 3" minus Geocell Material (Bag #8, W.O. 1298 NLEP-GC-001)  
Kekaha Landfill: Phase II Lateral Expansion  
Kekaha, Kauai, Hawaii

As requested, laboratory testing was performed on the 3" minus Geocell material (W.O. 1298 NLEP-GC-001) for the above referenced project. Geosyntec provided us with a bulk soil sample from an onsite stockpile for laboratory testing, consisting of a sieve analysis test. This memo presents the results for the sieve analysis. Based on our sieve analysis test results, the material was classified as poorly-graded gravel with a corresponding Unified Soil Classification system symbol of GP. The sieve analysis results are summarized below:

<u>Test</u>	<u>Result</u>	
	<u>Sieve size</u>	<u>Percent finer (%)</u>
Sieve Analysis (ASTM C136)	3"	100.0
	1-1/2"	42.6 ✓
	3/4"	1.0
	#4	0.6
	#40	0.3
	#200	0.1 ✓

Feel free to call us if you have any questions.

W907memorandum009SieveBag8.wpd

**Appendix F-5**  
**Concrete Test Results**





### Concrete Sample & Strength Test Report

Project: Kekaha Landfill Expansion W.O.: 4907.0 Date: 4/30/2010

Sample No.	Sample Made By	Mix Design	Specified Strength (psi)	Aggregate Size	Aggregate Source	Admixture Type	Required Slump	Concrete Ticket No.
3	ATF		4,000		Kauai Aggregates		4" ± 1"	39277
Time Sampled	Cement Factor	Concrete Supplier	Supplier Location	Air Content	Mix Temperature	Air Temperature	Actual Slump	Concrete Truck No.
9:35 AM		Thronas	Lawai Valley	N/A	84° F	77° F	5"	2

Concrete Placement Location: Aerator Pad # 2

Concrete Sample Location: Aerator Pad # 2 Southeast side. **AERATOR 3A**

Notes & Comments: \_\_\_\_\_

Number of Cylinders: 3    1 at 7 days    2 at 28 days    at days    at days    Hold

### Compressive Strength Test Data

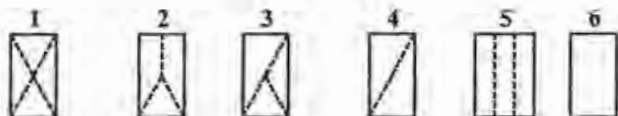
Mold Type: Cylinder

Cylinder No.	Test Age (days)	Test Date	Cure Type	Diameter (inch)	Length (inch)	Maximum Load (lbs)	Strength (psi)	Fracture Type
3-2-1	7	5/7/2010	H <sub>2</sub> O	6"	12"	126,491	4476 ✓	4
3-2-2	28	5/28/2010	H <sub>2</sub> O	6"	12"		0	
3-2-3	28	5/28/2010	H <sub>2</sub> O	6"	12"		0	

Comments / Special Instructions: \_\_\_\_\_

Lab Technician:  
Anthony Frey

Fracture Type





HIRATA & ASSOCIATES, INC.

99-1433 Koaia Place  
Aiea, Hawaii 96701  
Ph: 808-486-0787 Fax: 808-486-0870  
Email: mail@hirata-hawaii.com

Page 1 of 1

### Concrete Sample & Strength Test Report

Project: Kekaha Landfill Expansion W.O.: 4907.0 Date: 4/30/2010

Sample No.	Sample Made By	Mix Design	Specified Strength (psi)	Aggregate Size	Aggregate Source	Admixture Type	Required Slump	Concrete Ticket No.
3	ATF		4,000		Kauai Aggregates		4" ±1"	9327
Time Sampled	Cement Factor	Concrete Supplier	Supplier Location	Air Content	Mix Temperature	Air Temperature	Actual Slump	Concrete Truck No.
8:20 AM		Thronas	Lawai Valley	N/A	84° F	76° F	4"	1

Concrete Placement Location: Aerator Pad # 1

Concrete Sample Location: Aerator Pad # 1 northeast side **AERATOR 3C**

Notes & Comments: \_\_\_\_\_

Number of Cylinders: 3 | 1 at 7 days | 2 at 28 days | at days | at days | Hold

### Compressive Strength Test Data

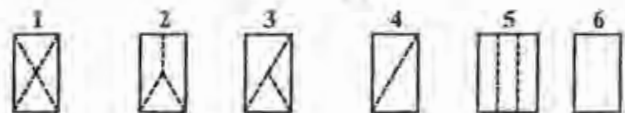
Mold Type: Cylinder

Cylinder No.	Test Age (days)	Test Date	Cure Type	Diameter (inch)	Length (inch)	Maximum Load (lbs)	Strength (psi)	Fracture Type
3-1-1	7	5/7/2010	H <sub>2</sub> O	6"	12"	145,531	5150 ✓	4
3-1-2	28	5/28/2010	H <sub>2</sub> O	6"	12"		0	
3-1-3	28	5/28/2010	H <sub>2</sub> O	6"	12"		0	

Comments / Special Instructions: \_\_\_\_\_

Lab Technician:  
Anthony Frey

Fracture Type





# **Appendix G**

## **Nuclear Density and Moisture Test Results**

**Appendix G-1    Compacted Fill Materials**  
**Appendix G-2    Anchor Trench Backfill**



**Appendix G-1**  
**Compacted Fill Materials**

**SUMMARY OF FIELD DENSITY TEST**

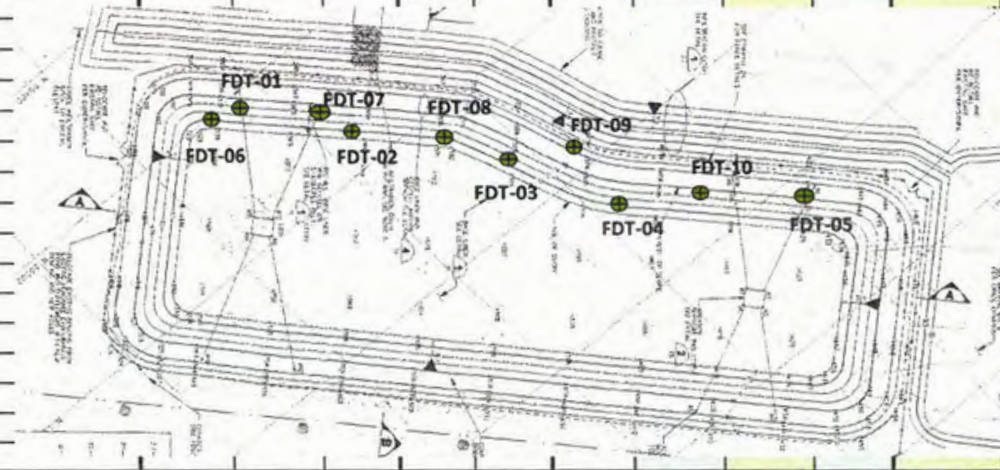
**PROJECT:** Kekaha Landfill  
**LOCATION:** Kekaha, Hawaii  
**CONTRACTOR:** Goodfellow Bros. Construction

**PROJECT NO.:** WG1298  
**TASK NO.:** 02  
**DATE:** 21-Jan-10

**SPECIFICATION REQUIREMENTS**

**SOURCE:** Onsite soil (NLEP - Excavation)  
**% COMPACTION:** 95% **MOISTURE RANGE:** +/- 2%  
**NUCLEAR GAUGE TYPE:** Troxler 3440 A **NUCLEAR GAUGE SERIAL NO.:** 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
21/Jan	FDT-01	SW corner of Berm EL:12.95 msl	GFB-6	103	14.5			6-in	113.7	97.5	16.7	95	Pass		CAS
21/Jan	FDT-02	Southern end of Berm EL:12.95 msl	GFB-6	103	14.5			6-in	113.5	98.8	14.9	96	Pass		CAS
21/Jan	TW-001	Thin wall Shelby tube collected @ FDT-02	GFB-6	103	14.5			3-in	111.8	99.3	12.6	96	Pass		CAS
21/Jan	FDT-03	Southern end of Berm EL:12.95 msl	GFB-6	103	14.5			6-in	114.7	98.6	16.4	96	Pass		CAS
21/Jan	FDT-04	Southern end of Berm EL:12.95 msl	GFB-6	103	14.5			6-in	115.3	99.0	16.5	96	Pass		CAS
21/Jan	FDT-05	Southeast corner of corner of Berm EL:12.95 msl	GFB-6	103	14.5			6-in	111.7	97.5	14.6	95	Pass		CAS
21/Jan	FDT-06	Southwest corner of Berm EL:13.50 msl	GFB-6	103	14.5			6-in	113.0	98.6	14.8	96	Pass		CAS
21/Jan	FDT-07	Southern end of Berm EL:13.51 msl	GFB-6	103	14.5			6-in	114.3	99.0	15.5	96	Pass		CAS
21/Jan	FDT-08	Southern end of Berm EL:13.55 msl	GFB-6	103	14.5			6-in	116.3	100.1	16.2	97	Pass		CAS
21/Jan	FDT-09	Southern end of Berm EL:13.57 msl	GFB-6	103	14.5			6-in	117.6	103.2	14.0	100	Pass		CAS
21/Jan	FDT-10	Southern end of Berm EL:14.13 msl	GFB-6	103	14.5			6-in	111.0	97.9	13.8	95	Pass		CAS





**SUMMARY OF FIELD DENSITY TEST**

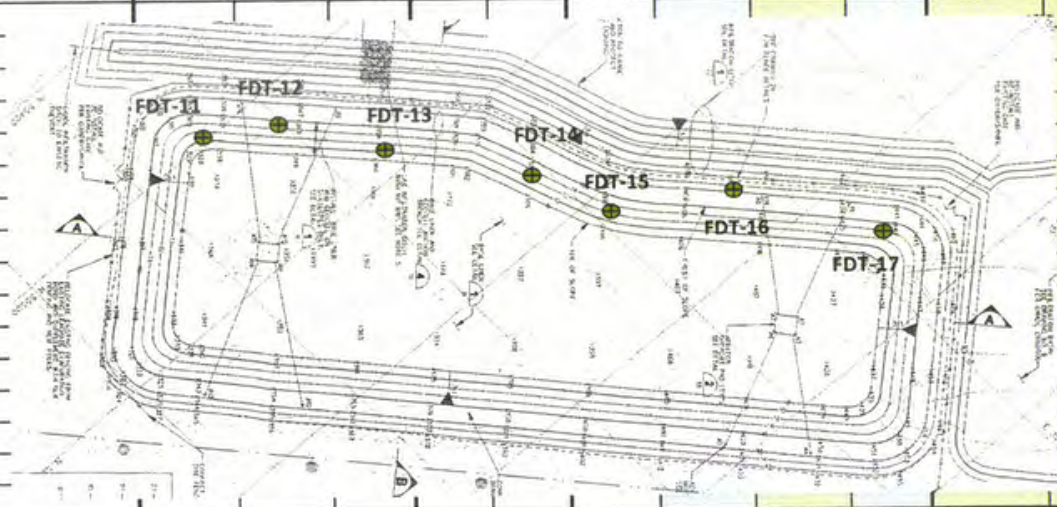
PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Hawaii  
 CONTRACTOR: Goodfellow Bros. Construction

PROJECT NO.: WG1298  
 TASK NO.: 02  
 DATE: 22-Jan-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
22/Jan	FDT-11	Southwest corner of Berm EL:14.59 msl	GFB-6	103	14.5			6-in	113.2	100.6	12.6	98	Pass		CAS
22/Jan	FDT-12	Southern end of Berm EL:14.59 msl	GFB-6	103	14.5			6-in	114.1	98.5	15.8	96	Pass		CAS
22/Jan	FDT-13	Southern end of Berm EL:14.67 msl	GFB-6	103	14.5			6-in	120.8	103.5	16.7	100	Pass		CAS
22/Jan	TW-002	Thin wall Shelby tube collected @ FDT-13	GFB-6	103	14.5			3-in	120.8	103.0	17.4	100	Pass		CAS
22/Jan	FDT-14	Southern end of Berm EL:14.67 msl	GFB-6	103	14.5			6-in	110.1	97.7	12.5	95	Pass		CAS
22/Jan	FDT-15	Southern end of Berm EL:14.74 msl	GFB-6	103	14.5			6-in	115.8	102.7	12.7	100	Pass		CAS
22/Jan	FDT-16	Southern end of Berm EL:14.82 msl	GFB-6	103	14.5			6-in	118.2	103.4	14.3	100	Pass		CAS
22/Jan	FDT-17	Southeast corner of corner of Berm EL:14.86 msl	GFB-6	103	14.5			6-in	115.1	100.3	14.8	97	Pass		CAS





**SUMMARY OF FIELD DENSITY TEST**

PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Hawaii  
 CONTRACTOR: Goodfellow Bros. Construction

PROJECT NO.: WG1298  
 TASK NO.: 02  
 DATE: 25-Jan-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
25/Jan	FDT-18	Southeast corner of corner of Berm EL:14.95 msl	GFB-6	103	14.5			6-in	116.0	99.4	16.7	97	Pass		CAS
25/Jan	FDT-19	Southeast corner of corner of Berm EL:14.95 msl	GFB-6	103	14.5			6-in	112.7	98.0	15.0	95	Pass		CAS
25/Jan	FDT-20	Northern end of Berm EL:12.30 msl	GFB-6	103	14.5			6-in	114.9	102.7	11.9	100	Pass		CAS
25/Jan	FDT-21	Northern end of Berm EL: 12.36	GFB-6	103	14.5			6-in	113.2	98.9	14.5	96	Pass		CAS
25/Jan	FDT-22	Northern end of Berm EL: 12.40	GFB-6	103	14.5			6-in	113.3	100.8	12.4	98	Pass		CAS
25/Jan	FDT-23	Northern end of Berm EL: 12.45	GFB-6	103	14.5			6-in	129.3	110.7	16.8	107	Pass		CAS
25/Jan	FDT-24	Northwest corner of the Berm EL: 12.45	GFB-6	103	14.5			6-in	113.9	98.6	15.6	96	Pass		CAS
25/Jan	FDT-25	Northern end of Berm EL: 13.10	GFB-6	103	14.5			6-in	116.5	100.2	16.3	97	Pass		CAS
25/Jan	FDT-26	Northern end of Berm EL: 13.15	GFB-6	103	14.5			6-in	117.9	103.4	13.9	100	Pass		CAS
25/Jan	FDT-27	Northern end of Berm EL: 13.17	GFB-6	103	14.5			6-in	113.1	99.8	14.3	97	Pass		CAS
25/Jan	TW-003	Thin wall Shelby tube collected @ FDT-27	GFB-6	103	14.5			3-in	114.8	100.4	14.4	97	Pass		CAS
25/Jan	FDT-28	Western end of Berm EL:12.97	GFB-6	103	14.5			6-in	118.6	100.9	17.6	98	Pass		CAS
25/Jan	FDT-29	Western end of Berm EL:13.50	GFB-6	103	14.5			6-in	116.2	98.4	18.0	96	Pass		CAS





**SUMMARY OF FIELD DENSITY TEST**

PROJECT: Kekaha Landfill PROJECT NO.: WG1298  
 LOCATION: Kekaha, Hawaii TASK NO.: 02  
 CONTRACTOR: Goodfellow Bros. Construction DATE: 27-Jan-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
27/Jan	FDT-30	Northeast corner of corner of Berm EL:14.20 msl	GFB-6	103	14.5			6-in	112.4	98.4	14.3	96	Pass		CAS
27/Jan	FDT-31	Northeast corner of corner of Berm EL:14.25 msl	GFB-6	103	14.5			6-in	114.6	99.1	15.7	96	Pass		CAS
27/Jan	FDT-32	Northern end of the Berm EL: 14.26	GFB-6	103	14.5			6-in	113.9	100.1	13.8	97	Pass		CAS
27/Jan	FDT-33	Northern end of the Berm EL: 14.26	GFB-6	103	14.5			6-in	118.3	101.3	16.8	98	Pass		CAS
27/Jan	FDT-34	Northern end of the Berm EL: 14.26	GFB-6	103	14.5			6-in	116.3	99.5	16.9	97	Pass		CAS
27/Jan	FDT-35	Northwest corner of the Berm EL: 14.26	GFB-6	103	14.5			6-in	115.7	102.4	13.0	99	Pass		CAS
27/Jan	FDT-36	Western end of Berm EL: 14.34	GFB-6	103	14.5			6-in	116.5	103.2	12.9	100	Pass		CAS
27/Jan	FDT-37	Northern end of the Berm EL: 14.55	GFB-6	103	14.5			6-in	112.0	98.5	13.7	96	Pass		CAS
27/Jan	FDT-38	Northern end of the Berm EL: 14.55	GFB-6	103	14.5			6-in	113.0	99.2	14.0	96	Pass		CAS
27/Jan	FDT-39	Northern end of the Berm EL: 14.68	GFB-6	103	14.5			6-in	114.5	100.9	13.5	98	Pass		CAS
27/Jan	TW-004	Thin wall Shelby tube collected @ FDT-39	GFB-6	103	14.5			3-in	113.8	101.0	12.8	98	Pass		CAS
27/Jan	FDT-40	Northern end of the Berm EL: 14.73	GFB-6	103	14.5			6-in	119.2	102.3	16.6	99	Pass		CAS
27/Jan	FDT-41	Northern end of the Berm EL: 14.73	GFB-6	103	14.5			6-in	115.3	100.7	14.5	98	Pass		CAS
27/Jan	FDT-42	Northern end of the Berm EL: 14.73	GFB-6	103	14.5			6-in	113.9	98.7	15.4	96	Pass		CAS
27/Jan	FDT-43	Northern end of the Berm EL: 14.73	GFB-6	103	14.5			6-in	115.9	102.4	13.2	99	Pass		CAS
27/Jan	FDT-44	Western end of Berm EL: 15.00	GFB-6	103	14.5			6-in	113.7	97.7	16.4	95	Pass		CAS





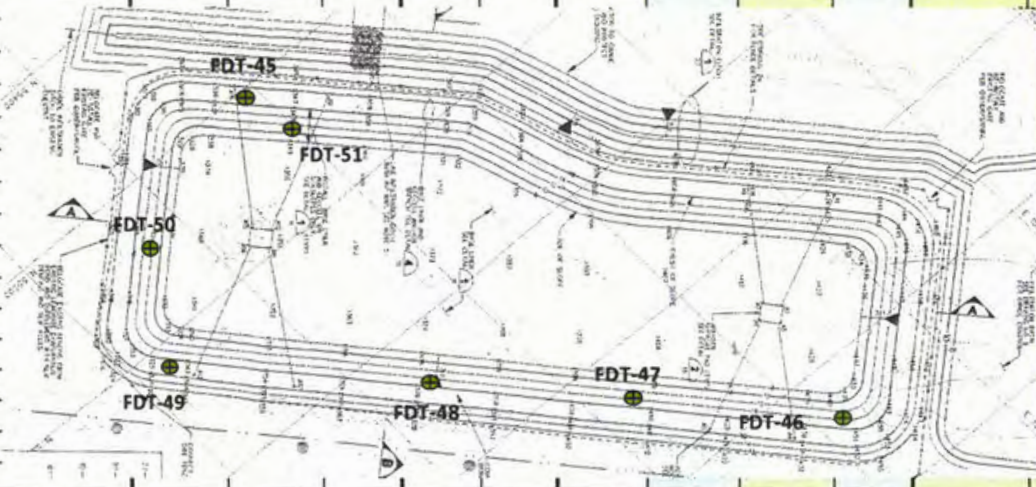
**SUMMARY OF FIELD DENSITY TEST**

PROJECT: Kekaha Landfill PROJECT NO.: WG1298  
 LOCATION: Kekaha, Hawaii TASK NO.: 02  
 CONTRACTOR: Goodfellow Bros. Construction DATE: 28-Jan-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
28/Jan	FDT-45	Southern end of Berm EL: 16.00	GFB-6	103	14.5			6-in	114.3	99.9	14.5	97	Pass		CAS
28/Jan	FDT-46	Northern end of Berm EL: 16.00	GFB-6	103	14.5			6-in	111.2	98.7	12.7	96	Pass		CAS
28/Jan	FDT-47	Northern end of Berm EL: 16.00	GFB-6	103	14.5			6-in	116.7	100.3	16.4	97	Pass		CAS
28/Jan	FDT-48	Northern end of Berm EL: 16.00	GFB-6	103	14.5			6-in	114.6	101.4	13.1	98	Pass		CAS
28/Jan	FDT-49	Northern end of Berm EL: 16.00	GFB-6	103	14.5			6-in	114.2	99.2	15.2	96	Pass		CAS
28/Jan	FDT-50	Western end of Berm EL: 16.00	GFB-6	103	14.5			6-in	116.2	100.1	16.1	97	Pass		CAS
28/Jan	FDT-51	Southern end of Berm EL: 16.00	GFB-6	103	14.5			6-in	113.6	98.0	16.0	95	Pass		CAS





**SUMMARY OF FIELD DENSITY TEST**

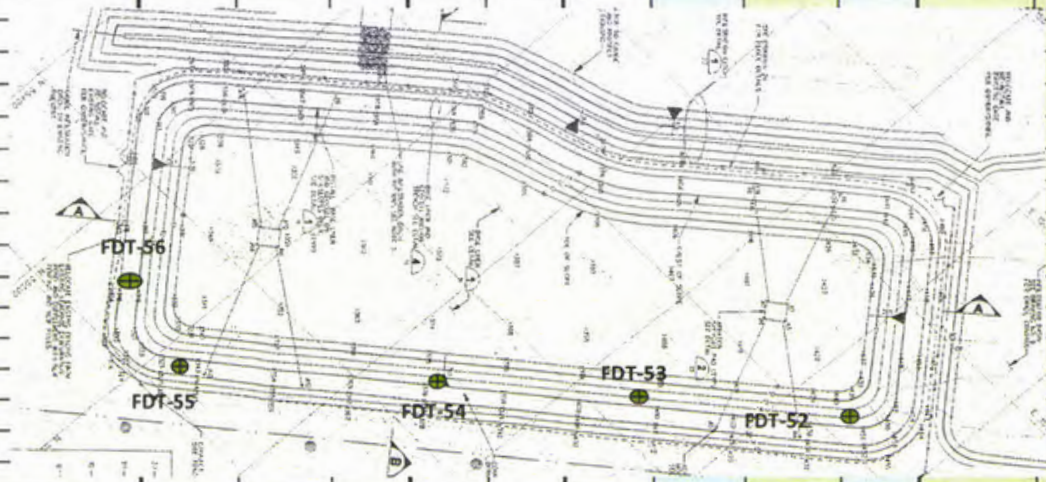
PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Hawaii  
 CONTRACTOR: Goodfellow Bros. Construction

PROJECT NO.: WG1298  
 TASK NO.: 02  
 DATE: 29-Jan-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
29/Jan	FDT-52	Northern end of Berm EL: 16.40	GFB-6	103	14.5			6-in	113.8	99.0	15.0	96	Pass		CAS
29/Jan	FDT-53	Northern end of Berm EL: 16.40	GFB-6	103	14.5			6-in	111.5	99.5	12.1	97	Pass		CAS
29/Jan	FDT-54	Northern end of Berm EL: 16.40	GFB-6	103	14.5			6-in	118.4	101.9	16.2	99	Pass		CAS
29/Jan	FDT-55	Northern end of Berm EL: 16.40	GFB-6	103	14.5			6-in	117.1	100.3	16.8	97	Pass		CAS
29/Jan	FDT-56	Northern end of Berm EL: 16.40	GFB-6	103	14.5			6-in	112.6	99.0	13.8	96	Pass		CAS





**SUMMARY OF FIELD DENSITY TEST**

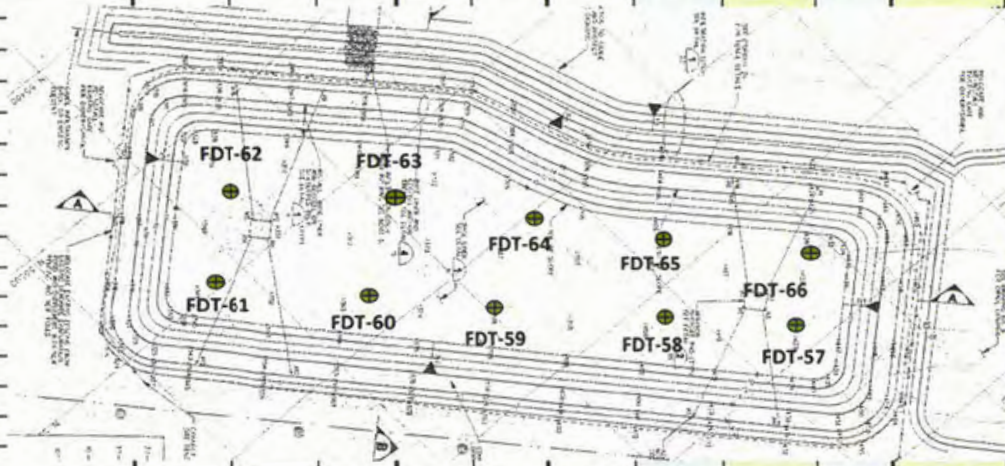
**PROJECT:** Kekaha Landfill  
**LOCATION:** Kekaha, Hawaii  
**CONTRACTOR:** Goodfellow Bros. Construction

**PROJECT NO.:** WG1298  
**TASK NO.:** 02  
**DATE:** 25-Feb-10

**SPECIFICATION REQUIREMENTS**

**SOURCE:** Onsite soil (NLEP - Excavation)  
**% COMPACTION:** 95% **MOISTURE RANGE:** +/- 2%  
**NUCLEAR GAUGE TYPE:** Troxler 3440 A **NUCLEAR GAUGE SERIAL NO.:** 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
25/Feb	FDT-57	NLEP Floor	GFB-6	100	14.5			6-in	117.0	102.7	13.9	103	Pass		CAS
25/Feb	FDT-58	NLEP Floor	GFB-6	103	14.5			6-in	111.7	99.2	12.6	96	Pass		CAS
25/Feb	FDT-59	NLEP Floor	GFB-6	103	14.5			6-in	110.5	97.7	13.1	95	Pass		CAS
25/Feb	FDT-60	NLEP Floor	GFB-6	103	14.5			6-in	116.4	102.4	13.7	99	Pass		CAS
25/Feb	FDT-61	NLEP Floor	GFB-6	103	14.5			6-in	121.5	105.4	15.2	102	Pass		CAS
25/Feb	FDT-62	NLEP Floor	GFB-6	103	14.5			6-in	116.1	103.4	12.3	100	Pass		CAS
25/Feb	FDT-63	NLEP Floor	GFB-6	103	14.5			6-in	116.7	103.8	12.5	101	Pass		CAS
25/Feb	FDT-64	NLEP Floor	GFB-6	103	14.5			6-in	117.8	103.8	13.5	101	Pass		CAS
25/Feb	FDT-65	NLEP Floor	GFB-6	103	14.5			6-in	117.3	100.7	16.4	98	Pass		CAS
25/Feb	FDT-66	NLEP Floor	GFB-6	103	14.5			6-in	116.1	100.7	15.3	98	Pass		CAS





**SUMMARY OF FIELD DENSITY TEST**

PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Hawaii  
 CONTRACTOR: Goodfellow Bros. Construction

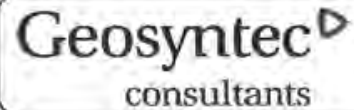
PROJECT NO.: WG1298  
 TASK NO.: 02  
 DATE: 10-May-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
10/May	FDT-79	NLEP Temporary Access Ramp Backfill	GFB-6	100	14.5			6-in	115.2	99.1	16.3	99	Pass		CAS
10/May	FDT-80	NLEP Temporary Access Ramp Backfill	GFB-6	100	14.5			6-in	115.8	100.1	15.7	100	Pass		CAS
10/May	FDT-81	NLEP Temporary Access Ramp Backfill	GFB-6	100	14.5			6-in	115.4	100.5	14.9	101	Pass		CAS
10/May	FDT-82	NLEP Temporary Access Ramp Backfill	GFB-6	100	14.5			6-in	114.5	98.7	16.1	99	Pass		CAS





**MOISTURE/DENSITY TESTS USING THIN-WALL DRIVE TUBES - ASTM D2937**

**PROJECT:** Kekaha Landfill

**LOCATION:** Kekaha, Hawaii

**CONTRACTOR:** Goodfellow Bros. Construction

**PROJECT:** WG1298

**TASK:** 02

**DATE:** 21 January 2010

REFERENCE NUMBER	FDT-02	FDT-13	FDT-27	FDT-39		
SAMPLE NUMBER	TW-001(Oven)	TW-002(Oven)	TW-003(Oven)	TW-004(Oven)		
DEPTH OR LIFT NUMBER	3"	3"	3"	3"		
DIAMETER (in)	2.82	2.82	2.82	2.82		
LENGTH (in)	2.73	2.73	2.73	2.73		
VOLUME (in <sup>3</sup> )	17.05	17.05	17.05	17.05	-	
<b>WATER CONTENT DETERMINATION:</b>						
TARE NUMBER:	A72	A57	A72	A57		
WET MASS + TARE (g)	328.9	448.9	422.0	419.0		
DRY MASS + TARE (g)	292.7	383.2	369.4	372.1		
MASS OF TARE (g)	4.4	4.4	4.4	4.4		
MASS OF WATER (g)	36.3	65.7	52.6	46.9	-	
MASS OF DRY SOIL (g)	288.3	378.8	365.0	367.7	-	
WATER CONTENT (%)	12.6%	17.4%	14.4%	12.8%	-	
<b>UNIT WEIGHT DETERMINATION:</b>						
WET MASS W/TUBE (g)	756.9	797.3	770.4	765.9		
TUBE MASS (g)	256.5	256.5	256.5	256.5		
WET UNIT WEIGHT (pcf)	111.8	120.8	114.8	113.8	-	
DRY UNIT WEIGHT (pcf)	99.3	103.0	100.4	101.0	-	

**Appendix G-2**  
**Anchor Trench Backfill**



**SUMMARY OF FIELD DENSITY TEST**

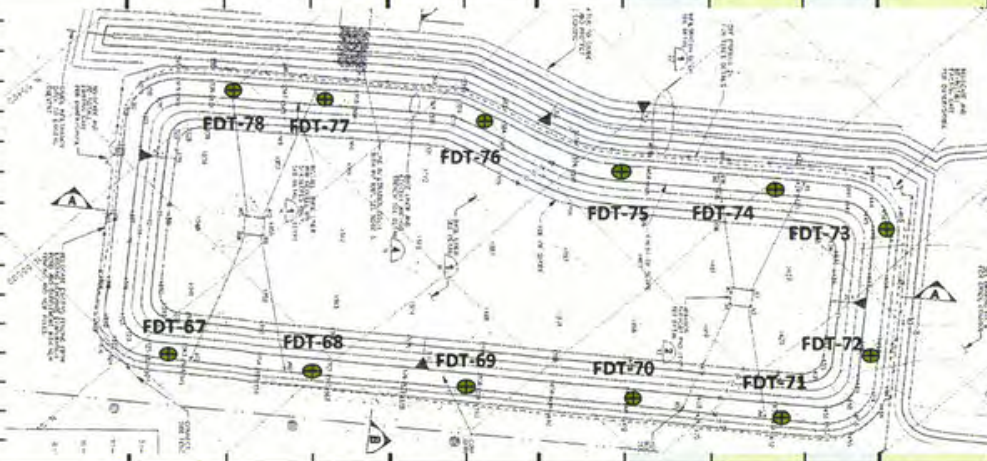
PROJECT: Kekaha Landfill  
 LOCATION: Kekaha, Hawaii  
 CONTRACTOR: Goodfellow Bros. Construction

PROJECT NO.: WG1298  
 TASK NO.: 02  
 DATE: 17-Apr-10

**SPECIFICATION REQUIREMENTS**

SOURCE: Onsite soil (NLEP - Excavation)  
 % COMPACTION: 95% MOISTURE RANGE: +/- 2%  
 NUCLEAR GAUGE TYPE: Troxler 3440 A NUCLEAR GAUGE SERIAL NO.: 20877

DATE OF TEST (day/mo)	TEST NO.	TEST LOCATION	LAB RESULTS			TYPE OF TEST		FIELD TEST RESULTS				PERCENT COMPACT (%)	PASS/ FAIL	RETEST NO.	QA ID
			SAMPLE NO.	MAX UNIT WT (pcf)	O.M.C. (%)	ASTM D-2922	ASTM D-1556	DEPTH/ ELEV (ft)	WET UNIT WT (pcf)	DRY UNIT WT (pcf)	F.M.C. (%)				
17/Apr	FDT-67	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	113.4	98.7	14.9	99	Pass		CAS
17/Apr	FDT-68	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	109.2	96.5	13.2	97	Pass		CAS
17/Apr	FDT-69	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	116.4	101.2	15.1	101	Pass		CAS
17/Apr	FDT-70	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	116.5	103.2	12.9	103	Pass		CAS
17/Apr	FDT-71	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	111.8	99.0	13.0	99	Pass		CAS
17/Apr	FDT-72	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	109.5	97.1	12.8	97	Pass		CAS
17/Apr	FDT-73	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	114.8	100.1	14.7	100	Pass		CAS
17/Apr	FDT-74	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	116.3	101.3	14.9	101	Pass		CAS
17/Apr	FDT-75	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	119.7	104.1	15.0	104	Pass		CAS
17/Apr	FDT-76	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	115.8	99.3	16.7	99	Pass		CAS
17/Apr	FDT-77	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	110.2	97.1	13.5	97	Pass		CAS
17/Apr	FDT-78	NLEP Anchor Trench Backfill	GFB-6	100	14.5			6-in	107.9	95.6	12.9	96	Pass		CAS







## **Appendix H**

# **Geosynthetic Conformance Testing: Laboratory Test Results**

<b>Appendix H-1</b>	<b>GCL</b>
<b>Appendix H-2</b>	<b>60 mil Double-sided Textured Geomembrane</b>
<b>Appendix H-3</b>	<b>Interface Shear Test Results</b>

**Appendix H-1**  
**GCL**



January 29, 2010

**Mail To:**

**Mike Minch**  
Geosyntec  
475 14th Street, Suite 400  
Oakland, California 94612

**Bill To:**

← Project # WG1298

email: Mminch@Geosyntec.com  
cc: khuynh@geosyntec.com  
cc: Cscott@geosyntec.com  
cc: jfrey@wm.com

Dear Mr. Minch:

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:** Kekaha Sanitary Landfill  
**TRI Job Reference Number:** E2337-13-10  
**Material(s) Tested:** 6 Bentomat FLW GCL(s)  
**Test(s) Requested:** Mass/Unit Area (ASTM D 5993)  
Peel Strength (ASTM D 6496)  
Index Flux (ASTM D 5887)

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

Sincerely,



Richard S. Lacey, P.E.  
Senior Engineer  
Geosynthetic Services Division  
[www.GeosyntheticTesting.com](http://www.GeosyntheticTesting.com)





**GCL TEST RESULTS**

TRI Client: Geosyntec  
Project: Kekaha Sanitary Landfill

Material: Bentomat FLW GCL  
Sample Identification: 257  
TRI Log #: E2337-13-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.) ✓</b>													
Bentonite mass/unit area (lbs/ft <sup>2</sup> )	0.88	0.90	0.85	0.82	0.87							0.86	0.03
GCL mass/unit area (lbs/ft <sup>2</sup> )	0.98	0.99	0.95	0.92	0.96							0.96	0.03
Moisture Content (%)	32.5	31.9	32.8	32.0	33.4							32.5	0.6
<b>Peel Strength (ASTM D 6496) ✓</b>													
MD - Peel Strength (lbs/in)	10.8	12.0	11.3	8.6	11.6							10.9	1.3
<b>Index Flux (ASTM D 5887) ✓</b>													
Index Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	2.5E-09										2.5E-09		
Hydraulic Conductivity (cm/sec)	2.1E-09										2.1E-09		
MD Machine Direction	TD Transverse Direction					NA Not Available							

This 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.



**GCL TEST RESULTS**  
TRI Client: Geosyntec  
Project: Kekaha Sanitary Landfill

Material: Bentomat FLW GCL  
Sample Identification: 302  
TRI Log #: E2337-13-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)</b>													
Bentonite mass/unit area (lbs/ft <sup>2</sup> )	0.80	0.79	0.84	0.80	0.82							0.81	0.02
GCL mass/unit area (lbs/ft <sup>2</sup> )	0.89	0.89	0.94	0.90	0.91							0.91	0.02
Moisture Content (%)	34.1	35.3	33.6	33.5	32.8							33.9	0.9
<b>Peel Strength (ASTM D 6496)</b>													
MD - Peel Strength (lbs/in)	7.7	7.7	4.8	5.8	5.6							6.3	1.3
<b>Index Flux (ASTM D 5887)</b>													
Index Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	3.1E-09										3.1E-09		
Hydraulic Conductivity (cm/sec)	2.9E-09										2.9E-09		
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.



**GCL TEST RESULTS**  
TRI Client: Geosyntec  
Project: Kekaha Sanitary Landfill

Material: Bentomat FLW GCL  
Sample Identification: 348  
TRI Log #: E2337-13-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)</b>													
Bentonite mass/unit area (lbs/ft <sup>2</sup> )	0.87	0.87	0.82	0.88	0.85							✓ 0.86	0.02
GCL mass/unit area (lbs/ft <sup>2</sup> )	0.97	0.97	0.92	0.98	0.95							✓ 0.96	0.02
Moisture Content (%)	31.7	33.4	32.1	32.1	33.9							32.6	1.0
<b>Peel Strength (ASTM D 6496)</b>													
MD - Peel Strength (lbs/in)	6.0	3.5	4.2	6.2	5.3							✓ 5.0	1.2
<b>Index Flux (ASTM D 5887)</b>													
Index Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	3.1E-09										3.1E-09		
Hydraulic Conductivity (cm/sec)	2.8E-09										2.8E-09		
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.



**GCL TEST RESULTS**

TRI Client: Geosyntec  
Project: Kekaha Sanitary Landfill

Material: Bentomat FLW GCL  
Sample Identification: 396  
TRI Log #: E2337-13-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)</b>													
Bentonite mass/unit area (lbs/ft <sup>2</sup> )	0.84	0.85	0.86	0.86	0.83							0.85	0.01
GCL mass/unit area (lbs/ft <sup>2</sup> )	0.94	0.95	0.96	0.96	0.93							0.95	0.01
Moisture Content (%)	30.9	32.4	32.5	31.3	32.0							31.8	0.7
<b>Peel Strength (ASTM D 6496)</b>													
MD - Peel Strength (lbs/in)	14.1	14.1	12.5	11.3	9.3							12.3	2.0
<b>Index Flux (ASTM D 5887)</b>													
Index Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	2.9E-09										2.9E-09		
Hydraulic Conductivity (cm/sec)	2.1E-09										2.1E-09		
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.





**GCL TEST RESULTS**  
TRI Client: Geosyntec  
Project: Kekaha Sanitary Landfill

Material: Bentomat FLW GCL  
Sample Identification: 438  
TRI Log #: E2337-13-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)</b>													
Bentonite mass/unit area (lbs/ft <sup>2</sup> )	0.95	0.97	0.97	0.92	0.78							0.92	0.08
GCL mass/unit area (lbs/ft <sup>2</sup> )	1.05	1.07	1.07	1.01	0.88							1.02	0.08
Moisture Content (%)	32.6	32.5	33.4	32.5	68.1							39.8	15.8
<b>Peel Strength (ASTM D 6496)</b>													
MD - Peel Strength (lbs/in)	6.4	7.6	8.5	7.5	6.1							7.2	1.0
<b>Index Flux (ASTM D 5887)</b>													
Index Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	3.0E-09										3.0E-09		
Hydraulic Conductivity (cm/sec)	3.0E-09										3.0E-09		
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.



**GCL TEST RESULTS**

TRI Client: Geosyntec  
Project: Kekaha Sanitary Landfill

Material: Bentomat FLW GCL  
Sample Identification: 484  
TRI Log #: E2337-13-10

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)</b>													
Bentonite mass/unit area (lbs/ft <sup>2</sup> )	0.62	0.82	0.80	0.79	0.82							0.81	0.01
GCL mass/unit area (lbs/ft <sup>2</sup> )	0.92	0.91	0.90	0.89	0.92							0.91	0.01
Moisture Content (%)	32.8	35.4	33.4	33.7	35.3							34.1	1.2
<b>Peel Strength (ASTM D 6496)</b>													
MD - Peel Strength (lbs/in)	5.7	5.0	7.5	6.1	5.8							6.0	0.9
<b>Index Flux (ASTM D 5887)</b>													
Index Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	3.4E-09										3.4E-09		
Hydraulic Conductivity (cm/sec)	3.4E-09										3.4E-09		
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.

**Appendix H-2**  
**60 mil Double-Sided Textured Geomembrane**



January 18, 2010

**Mail To:**

**Michael J. Minch**  
**Geosyntec**  
475 14th Street, Suite 400  
Oakland, CA 94612

**Bill To:**

**Project # WG1298**

email: Mminch@Geosyntec.com  
cc: Cscott@geosyntec.com  
cc: jfrey@wm.com  
cc: kimhuynh@Geosyntec.com

Dear Mr. Minch:

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:** Kekaha  
**TRI Job Reference Number:** E2339-46-07  
**Material(s) Tested:** 4, Agru 60mil Microspike HDPE Geomembrane(s)  
**Test(s) Requested:** Thickness (ASTM D 5994)  
Asperity Height (GRI GM 12)  
Density (ASTM D 1505)  
Carbon Content (ASTM D 1603, mod.)  
Carbon Dispersion (ASTM D 5596)  
Tensile (ASTM D 6693/GRI GM13)

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

Sincerely,

Dr. Mansukh Patel  
Sr. Laboratory Coordinator  
Geosynthetic Services Division  
[www.GeosyntheticTesting.com](http://www.GeosyntheticTesting.com)

cc: Sam R. Allen, Vice President and Division Manager





### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agri 80mil Microspike HDPE Geomembrane(s)  
Sample Identification: 801613.10  
TRI Log #: E2339-46-07

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994) ✓													
Thickness (mils)	59	61	58	61	59	61	60	59	62	60	60	58	1 ← min
Asperity Height (GRI GM 12) ✓													
Asperity Height (mils) - Side A	32	32	32	31	32	33	34	32	32	34	32	32	1
Asperity Height (mils) - Side B	25	26	26	26	25	27	28	26	25	27	26	26	1
Density (ASTM D 1505) ✓													
Density (g/cm3)	0.945	0.945	0.945								0.945	0.000	
Carbon Black Content (ASTM D 1603, mod.) ✓													
% Carbon Black	2.36	2.37									2.37	0.01	
Carbon Black Dispersion (ASTM D 5596) ✓													
Rating - 1st field view	1	1	1	1	1	1	1	1	1	1	1	1	✓
Rating - 2nd field view	1	1	1	1	1	1	1	1	1	1	1	1	✓
Stress Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE) ✓													
MD Yield Strength (psi)	144	153	154	154	152						151	4	
TD Yield Strength (psi)	163	166	169	167	167						166	2	
MD Break Strength (psi)	222	206	206	155	226						203	28	
TD Break Strength (psi)	177	168	119	182	130						155	29	
MD Yield Elongation (%)	22	22	21	21	21						21	1	
TD Yield Elongation (%)	15	15	15	15	15						15	0	
MD Break Elongation (%)	454	461	479	371	431						439	42	
TD Break Elongation (%)	545	501	64	545	158						363	233	
MD Machine Direction	TD Transverse Direction										NA Not Available		

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.



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kakaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: #01723.10  
TRI Log #: E2339-46-07

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Thickness (ASTM D 5994)</b>													
Thickness (mils)	62	62	59	59	61	62	59	60	60	61	61	59	1 61 59 ✓ << min
<b>Asperity Height (GRI GM 12)</b>													
Asperity Height (mils) - Side A	30	31	31	31	31	30	32	32	26	25	30	27	2 30 ✓ 27 ✓
Asperity Height (mils) - Side B	25	26	25	27	27	25	27	29	28	27	27	27	1 27 ✓
<b>Density (ASTM D 1505)</b>													
Density (g/cm3)	0.944	0.944	0.944										0.944 ✓ 0.000
<b>Carbon Black Content (ASTM D 1603, mod.)</b>													
% Carbon Black	2.33	2.31											2.32 ✓ 0.01
<b>Carbon Black Dispersion (ASTM D 5596)</b>													
Rating - 1st field view	1	1	1	1	1								1 ✓
Rating - 2nd field view	1	1	1	1	1								1 ✓
<b>Tensile Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>													
MD Yield Strength (ppi)	145	146	149	151	156								149 ✓ 4
TD Yield Strength (ppi)	162	160	161	181	159								161 ✓ 3
MD Break Strength (ppi)	182	243	180	177	292								209 ✓ 40
TD Break Strength (ppi)	167	163	165	172	115								160 ✓ 27
MD Yield Elongation (%)	22	23	21	19	23								22 ✓ 2
TD Yield Elongation (%)	16	18	18	18	18								18 ✓ 0
MD Break Elongation (%)	436	491	423	489	485								465 ✓ 33
TD Break Elongation (%)	586	496	403	543	121								448 ✓ 187
MD Machine Direction	TD Transverse Direction				N/A Not Available								

The testing is based upon accepted industry practice as well as the test method listed. Trial 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.



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: 801734.10  
TRI Log #: E2339-46-07

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Thickness (ASTM D 5994)</b>													
Thickness (mils)	61	65	62	63	61	61	61	62	63	61		62 61 ✓	1 << min
<b>Asperity Height (GRI GM 12)</b>													
Asperity Height (mils) - Side A	30	31	31	32	31	32	32	35	32	33		32 ✓	1
Asperity Height (mils) - Side B	25	26	27	25	29	28	27	28	29	28		27 ✓	1
<b>Density (ASTM D 1505)</b>													
Density (g/cm <sup>3</sup> )	0.944	0.944	0.944									0.944 ✓	0.000
<b>Carbon Black Content (ASTM D 1603, mod.)</b>													
% Carbon Black	2.32	2.31										2.32 ✓	0.01
<b>Carbon Black Dispersion (ASTM D 5596)</b>													
Rating - 1st field view	1	1	1	1	1 ✓								
Rating - 2nd field view	1	1	1	1	1 ✓								
<b>Matte Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>													
MD Yield Strength (ppi)	175	168	183	157	163							165 ✓	7
TD Yield Strength (ppi)	183	184	191	173	180							182 ✓	7
MD Break Strength (ppi)	238	182	207	146	174							189 ✓	35
TD Break Strength (ppi)	179	197	180	162	160							177 ✓	13
MD Yield Elongation (%)	23	23	23	23	23							23 ✓	0
TD Yield Elongation (%)	18	18	18	18	18							18 ✓	0
MD Break Elongation (%)	506	418	481	465	418							458 ✓	39
TD Break Elongation (%)	486	566	491	475	494							503 ✓	36
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: 802103.10  
TRI Log #: E2339-46-07

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
<b>Thickness (ASTM D 5994)</b>												
Thickness (mils)	83	61	60	62	59	62	60	61	62	63	61	1 59 << min
<b>Asperity Height (GRI GM 12)</b>												
Asperity Height (mils) - Side A	30	30	29	27	29	30	32	31	34	33	31	2
Asperity Height (mils) - Side B	25	24	26	25	27	25	26	28	25	28	26	1
<b>Density (ASTM D 1505)</b>												
Density (g/cm <sup>3</sup> )	0.944	0.944	0.944								0.944	0.000
<b>Carbon Black Content (ASTM D 1603, mod.)</b>												
% Carbon Black	2.39	2.34									2.37	0.04
<b>Carbon Black Dispersion (ASTM D 5996)</b>												
Rating - 1st field view	1	1	1	1	1	✓						
Rating - 2nd field view	1	1	1	1	1	✓						
<b>Tensile Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>												
MD Yield Strength (ppi)	146	149	155	162	155						153	6
TD Yield Strength (ppi)	163	162	163	165	173						165	4
MD Break Strength (ppi)	226	176	216	223	247						218	26
TD Break Strength (ppi)	180	175	173	149	177						171	12
MD Yield Elongation (%)	22	22	22	22	22						22	0
TD Yield Elongation (%)	15	15	15	15	15						15	0
MD Break Elongation (%)	466	464	486	486	479						477	11
TD Break Elongation (%)	566	544	526	433	516						517	51
MD Machine Direction	TD Transverse Direction		NA Not Available									

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.





January 18, 2010

**Mail To:**

**Michael J. Minch**  
Geosyntec  
475 14th Street, Suite 400  
Oakland, CA 94612

**Bill To:**

**Project # WG1298**

email: Mminch@Geosyntec.com  
cc: Cscott@geosyntec.com  
cc: jfrey@wm.com  
cc: kimhuynh@Geosyntec.com

Dear Mr. Minch:

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:** Kekaha  
**TRI Job Reference Number:** E2339-48-03  
**Material(s) Tested:** 2, Agru 60mil Microspike HDPE Geomembrane(s)  
**Test(s) Requested:** Thickness (ASTM D 5994)  
Asperity Height (GRI GM 12)  
Density (ASTM D 1505)  
Carbon Content (ASTM D 1603, mod.)  
Carbon Dispersion (ASTM D 5596)  
Tensile (ASTM D 6693/GRI GM13)

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

Sincerely,

Dr. Mansukh Patel  
Sr. Laboratory Coordinator  
Geosynthetic Services Division  
[www.GeosyntheticTesting.com](http://www.GeosyntheticTesting.com)

cc: Sam R. Allen, Vice President and Division Manager



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agri 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: 802114.10  
TRI Log #: E2339-48-03

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.		
	1	2	3	4	5	6	7	8	9	10				
<b>Thickness (ASTM D 5994)</b>														
Thickness (mils)	62	64	63	63	61	62	62	59	63	62	62	59	✓ 1 ✓ << min	
<b>Asperity Height (GRI GM 12)</b>														
Asperity Height (mils) - Side A	30	27	27	28	29	28	30	32	31	29	29	✓ 2		
Asperity Height (mils) - Side B	29	26	25	26	24	26	25	28	28	27	26	✓ 2		
<b>Density (ASTM D 1505)</b>														
Density (g/cm3)	0.944	0.944	0.944									0.944	✓ 0.000	
<b>Carbon Black Content (ASTM D 1603, mod.)</b>														
% Carbon Black	2.33	2.35											2.34	✓ 0.01
<b>Carbon Black Dispersion (ASTM D 5596)</b>														
Rating - 1st field view	1	1	1	1	1	✓								
Rating - 2nd field view	1	1	1	1	1	✓								
<b>Table Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>														
MD Yield Strength (psi)	162	166	169	170	164								166	✓ 3
TD Yield Strength (psi)	193	183	180	174	186								183	✓ 7
MD Break Strength (psi)	210	200	215	217	253								219	✓ 20
TD Break Strength (psi)	185	192	178	163	182								180	✓ 11
MD Yield Elongation (%)	23	23	23	23	23								23	✓ 0
TD Yield Elongation (%)	18	18	18	18	18								18	✓ 0
MD Break Elongation (%)	446	443	461	459	486								459	✓ 17
TD Break Elongation (%)	526	568	528	491	535								530	✓ 27
MD Machine Direction	TD Transverse Direction										NA Not Available			

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.



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: 302225.10  
TRI Log #: E2239-48-03

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.		
	1	2	3	4	5	6	7	8	9	10				
<b>Thickness (ASTM D 5994)</b>														
Thickness (mils)	61	62	62	62	59	62	62	58	61	61	61	61	58	i << min
<b>Asperity Height (GRI GM 12)</b>														
Asperity Height (mils) - Side A	32	33	33	28	32	33	32	34	33	32	32	32	32	i
Asperity Height (mils) - Side B	26	27	26	26	26	28	26	27	26	26	26	26	26	i
<b>Density (ASTM D 1505)</b>														
Density (g/cm <sup>3</sup> )	0.943	0.943	0.943										0.943	0.000
<b>Carbon Black Content (ASTM D 1603, mod.)</b>														
% Carbon Black	2.33	2.34											2.34	0.01
<b>Carbon Black Dispersion (ASTM D 5596)</b>														
Rating - 1st field view	1	1	1	1	1	1	1	1	1	1	1	1	1	
Rating - 2nd field view	1	1	1	1	1	1	1	1	1	1	1	1	1	
<b>Tensile Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>														
MD Yield Strength (ppi)	158	157	154	155	160								157	2
TD Yield Strength (ppi)	151	158	163	163	166								160	6
MD Break Strength (ppi)	238	227	183	190	196								207	24
TD Break Strength (ppi)	177	204	175	177	196								186	13
MD Yield Elongation (%)	23	23	23	23	23								23	0
TD Yield Elongation (%)	17	17	17	15	15								16	1
MD Break Elongation (%)	466	470	414	419	425								439	27
TD Break Elongation (%)	539	616	514	526	581								555	42
MD Machine Direction	TD Transverse Direction					NA Not Available								

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.



January 19, 2010

**Mail To:**

**Michael J. Minch**  
Geosyntec  
475 14th Street, Suite 400  
Oakland, CA 94612

email: Mminch@Geosyntec.com  
cc: Cscott@geosyntec.com  
cc: jfrey@wm.com  
cc: kimhuynh@Geosyntec.com

**Bill To:**

**Project # WG1298**

Dear Mr. Minch:

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:** Kekaha  
**TRI Job Reference Number:** E2339-49-08  
**Material(s) Tested:** 2, Agru 60mil Microspike HDPE Geomembrane(s)  
**Test(s) Requested:** Thickness (ASTM D 5994)  
Asperity Height (GRI GM 12)  
Density (ASTM D 1505)  
Carbon Content (ASTM D 1603, mod.)  
Carbon Dispersion (ASTM D 5596)  
Tensile (ASTM D 6693/GRI GM13)

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

Sincerely,

Mansukh Patel  
Sr. Laboratory Coordinator  
Geosynthetic Services Division  
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager





**GEOMEMBRANE TEST RESULTS**

TRI Client: Geosyntec  
Project: Kekaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: #02235.10  
TRI Log #: E2339-49-88

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
<b>Thickness (ASTM D 5994)</b>												
Thickness (mils)	60	60	60	62	59	60	59	60	61	62	60	1
											59 ✓	<< min
<b>Asperity Height (GRI GM 12)</b>												
Asperity Height (mils) - Side A	31	33	34	34	34	34	35	35	36	35	34 ✓	1
Asperity Height (mils) - Side B	26	28	26	27	27	29	28	29	28	28	28 ✓	1
<b>Density (ASTM D 1505)</b>												
Density (g/cm3)	0.944	0.944	0.945								0.944 ✓	0.001
<b>Carbon Black Content (ASTM D 1603, mod.)</b>												
% Carbon Black	2.21	2.19									2.20 ✓	0.01
<b>Carbon Black Dispersion (ASTM D 5596)</b>												
Rating - 1st field view	1	1	1	1	1							✓
Rating - 2nd field view	1	1	1	1	1							✓
<b>Membrane Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>												
MD Yield Strength (ppi)	151	147	147	149	152						149 ✓	2
TD Yield Strength (ppi)	162	162	162	170	160						163 ✓	4
MD Break Strength (ppi)	219	185	191	233	227						211 ✓	22
TD Break Strength (ppi)	153	170	164	165	178						166 ✓	9
MD Yield Elongation (%)	22	22	22	22	22						22 ✓	0
TD Yield Elongation (%)	15	15	15	15	15						15 ✓	0
MD Break Elongation (%)	453	414	419	465	426						435 ✓	22
TD Break Elongation (%)	479	513	464	459	531						489 ✓	32
MD Machine Direction	TD Transverse Direction					NA Not Available						

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.



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: 802346.10  
TRI Log #: E2339-49-08

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
<b>Thickness (ASTM D 5994)</b>												
Thickness (mils)	61	62	61	61	59	60	60	60	62	63	61 59 ✓	1 << min
<b>Asperity Height (GRI GM 12)</b>												
Asperity Height (mils) - Side A	32	32	31	31	34	30	32	32	34	32	32 ✓	1
Asperity Height (mils) - Side B	26	28	29	28	26	27	28	29	29	28	28 ✓	1
<b>Density (ASTM D 1505)</b>												
Density (g/cm3)	0.943	0.944	0.944								0.944 ✓	0.001
<b>Carbon Black Content (ASTM D 1603, mod.)</b>												
% Carbon Black	2.41	2.41									2.41 ✓	0.00
<b>Carbon Black Dispersion (ASTM D 5596)</b>												
Rating - 1st field view	1	1	1	1	1 ✓							
Rating - 2nd field view	1	1	1	1	1 ✓							
<b>Tensile Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>												
MD Yield Strength (ppi)	146	153	153	164	154						154 ✓	6
TD Yield Strength (ppi)	165	166	167	168	172						169 ✓	5
MD Break Strength (ppi)	229	209	216	220	254						226 ✓	17
TD Break Strength (ppi)	192	159	173	188	176						178 ✓	13
MD Yield Elongation (%)	24	21	23	21	23						22 ✓	1
TD Yield Elongation (%)	16	16	16	16	18						16 ✓	0
MD Break Elongation (%)	469	496	464	504	486						484 ✓	17
TD Break Elongation (%)	581	475	488	553	486						517 ✓	47
MD Machine Direction	TD Transverse Direction					NA Not Available						

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.



January 20, 2010

**Mail To:**

**Michael J. Minch**  
**Geosyntec**  
475 14th Street, Suite 400  
Oakland, CA 94612

email: Mminch@Geosyntec.com  
cc: Cscott@geosyntec.com  
cc: jfrey@wm.com  
cc: klmhuynh@Geosyntec.com

**Bill To:**

**Project # WG1298**

Dear Mr. Minch:

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:** Kekaha  
**TRI Job Reference Number:** E2339-51-04  
**Material(s) Tested:** 2, Agru 60mil Microspike HDPE Geomembrane(s)  
**Test(s) Requested:** Thickness (ASTM D 5994)  
Asperity Height (GRI GM 12)  
Density (ASTM D 1505)  
Carbon Content (ASTM D 1603, mod.)  
Carbon Dispersion (ASTM D 5596)  
Tensile (ASTM D 6693/GRI GM13)

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

Sincerely,

Dr. Mansukh Patel  
Sr. Laboratory Coordinator  
Geosynthetic Services Division  
[www.GeosyntheticTesting.com](http://www.GeosyntheticTesting.com)

cc: Sam R. Allen, Vice President and Division Manager



### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
Project: Kekaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
Sample Identification: 802356.10  
TRI Log #: E2339-51-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Thickness (ASTM D 5994)</b>													
Thickness (mils)	61	61	62	61	60	62	61	61	63	63	62	60 ✓	1 << min
<b>Asperity Height (GRI GM 12)</b>													
Asperity Height (mils) - Side A	33	31	34	31	32	31	34	34	35	33	33 ✓	1	
Asperity Height (mils) - Side B	25	26	27	26	27	28	27	28	27	26	27 ✓	1	
<b>Density (ASTM D 1505)</b>													
Density (g/cm <sup>3</sup> )	0.944	0.944	0.944								0.944 ✓	0.000	
<b>Carbon Black Content (ASTM D 1603, mod.)</b>													
% Carbon Black	2.37	2.38									2.38 ✓	0.01	
<b>Carbon Black Dispersion (ASTM D 5596)</b>													
Rating - 1st field view	1	1	1	1	1 ✓								
Rating - 2nd field view	1	1	1	1	1 ✓								
<b>Staple Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>													
MD Yield Strength (ppi)	176	171	168	163	164						168 ✓	5	
TD Yield Strength (ppi)	161	158	166	178	172						167 ✓	8	
MD Break Strength (ppi)	228	229	204	231	241						227 ✓	14	
TD Break Strength (ppi)	198	185	184	180	183						186 ✓	7	
MD Yield Elongation (%)	23	23	23	23	23						23 ✓	0	
TD Yield Elongation (%)	16	16	16	16	16						16 ✓	0	
MD Break Elongation (%)	476	471	471	466	465						470 ✓	5	
TD Break Elongation (%)	588	553	540	489	548						543 ✓	36	
MD Machine Direction	TD Transverse Direction					NA Not Available							

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.





### GEOMEMBRANE TEST RESULTS

TRI Client: Geosyntec  
 Project: Kakaha

Material: Agru 60mil Microspike HDPE Geomembrane(s)  
 Sample Identification: #02467.10  
 TRI Log #: E2339-51-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
<b>Thickness (ASTM D 5994)</b>												
Thickness (mils)	60	60	60	60	62	62	62	62	63	64	62	1
											60	<< min
<b>Asperity Height (GRI GM 12)</b>												
Asperity Height (mils) - Side A	32	32	31	30	32	34	33	35	33	35	33	2
Asperity Height (mils) - Side B	24	24	25	26	25	27	27	27	27	29	26	2
<b>Density (ASTM D 1505)</b>												
Density (g/cm <sup>3</sup> )	0.944	0.944	0.944								0.944	0.000
<b>Carbon Black Content (ASTM D 1603, mod.)</b>												
% Carbon Black	2.32	2.36									2.34	0.03
<b>Carbon Black Dispersion (ASTM D 5596)</b>												
Rating - 1st field view	1	1	1	1	1	1	1	1	1	1	1	
Rating - 2nd field view	1	1	1	1	1	1	1	1	1	1	1	
<b>Tensile Properties (ASTM D 6693/GRI GM 13, Type IV specimen - HDPE)</b>												
MD Yield Strength (ppi)	150	155	147	155	153						152	3
TD Yield Strength (ppi)	158	161	169	178	172						168	8
MD Break Strength (ppi)	220	220	222	191	253						221	22
TD Break Strength (ppi)	185	175	211	212	188						194	17
MD Yield Elongation (%)	23	23	23	23	23						23	0
TD Yield Elongation (%)	16	16	16	16	16						16	0
MD Break Elongation (%)	459	449	458	468	501						467	20
TD Break Elongation (%)	566	531	620	605	580						581	35
MD Machine Direction	TD Transverse Direction					NA Not Available						

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.

**Appendix H-3**  
**Interface Shear Test Results**

### SUMMARY OF INTERFACE SHEAR TEST RESULTS

New Leachate Evaporation Pond  
Kekaha Sanitary Landfill

Test No. <sup>a</sup>	Number of Runs per Configuration	Normal Stress (psi)				Specification Peak Friction Angle	Lab Peak Friction Angle	Lab Post-Peak Friction Angle	PASS OR FAIL
10	3	2, 5, 10	60mil HDT (shiny side)	GCL (white side)		15 degr	30.8 degr	20.7 degr	Pass
11	3	2, 5, 10	60mil HDT (dull side)	GCL (black side)		15 degr	37.9 degr	17.1 degr	Pass
12	3	2, 5, 10	60mil HDT (dull side)		Subbase Soil	15 degr	42.0 degr	34.5 degr	Pass

Note:

- a Test number corresponds to table in Section 02072, Part 2.04E of the Project Specifications (AECOM, July 2009).



# Precision Geosynthetic Laboratories



February 1, 2010

Kirk Lilleskare  
**Northwest Linings & Geotextile Products, Inc.**  
21000 77th Ave. South  
Kent, WA 98032

RE: **Kekaha Landfill**

Dear Mr. Lilleskare:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the **final** laboratory report for interface shear testing of the materials in accordance to the test configurations listed on the next page.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. PGL neither accepts responsibility for nor makes claims to the intended final use and purpose of the material and data evaluated.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. **Tested specimens and retained samples are kept for one (1) month.** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100020)





# Precision Geosynthetic Laboratories



CLIENT: Northwest Linings & Geotextile Products, Inc.  
PROJECT: Kekaha Landfill

## INTERFACE SHEAR TESTING (PGL Job No. G100020)

### MATERIAL DESCRIPTION & IDENTIFICATIONS:

Material	Type	Manufacturer	Roll No.	PGL Control No.	Date Received
<u>Soil</u>	Subbase 001	NA	NA	64124	1/14/2010
<u>Soil</u>	1 1/2" Base Course	NA	NA	64127	1/14/2010
<u>Soil</u>	3/8" Quarry Fine	NA	NA	64129	1/14/2010
<u>Geomembrane</u>	60mil HDPE Microspike	AGRU	801613-10	64168	1/18/2010
<u>Geomembrane</u>	80mil HDPE Microspike	AGRU	801611-10	64168	1/18/2010 & 1/30/2010
<u>Geotextile</u>	16oz Non woven	TNS	2020626855	64183	1/21/2010
<u>Geotextile</u>	16oz Non woven	TNS	2020626871	64184	1/21/2010
<u>Geotextile</u>	6oz Non woven	TNS	300294086	64185	1/21/2010
<u>Geotextile</u>	6oz Non woven	TNS	300294615	64186	1/21/2010
<u>Geotextile</u>	6oz Non woven	TNS	300294624	64187	1/21/2010
<u>GCL</u>	Bentomat DN FLW	CETCO	257	64231	1/23/2010
<u>GCL</u>	Bentomat DN FLW	CETCO	287	64232	1/23/2010
<u>GCL</u>	Bentomat DN FLW	CETCO	318	64233	1/23/2010

**SAMPLE SENT BY:** CETCO Industries / AGRU America / TRI Environmental / Geosyntec Consultants

### TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D6243	Interface Shear
ASTM D5231	Interface Shear

### TEST CONFIGURATIONS:

Test No.	Configuration
1	3/8" Quarry Fine vs. 6oz Separation Geotextile
2	6oz Separation Geotextile vs. 1 1/2" Base Course
3A	1 1/2" Base Course vs. 16oz Cushion Geotextile vs 60mil HDPE Microspike
3B	1 1/2" Base Course vs. 16oz Cushion Geotextile vs 80mil HDPE Microspike
4A	60mil HDPE Microspike vs. Bentomat DN
4B	80mil HDPE Microspike vs. Bentomat DN
5A	Bentomat DN vs. 60mil HDPE Microspike
5B	Bentomat DN vs. 80mil HDPE Microspike
6A	60mil HDPE Microspike vs Subbase 001
6B	80mil HDPE Microspike vs Subbase 001
7	3/8" Quarry Fine vs. 6oz Separation Geotextile
8	6oz Separation Geotextile vs. 1 1/2" Base Course
9	1 1/2" Base Course vs. 16oz Cushion Geotextile vs 60mil HDPE Microspike
10	60mil HDPE Microspike vs. Bentomat DN
11	Bentomat DN vs. 60mil HDPE Microspike
12A	60mil HDPE Microspike vs Subbase 001

CELL 1 ONLY

MS



# Precision Geosynthetic Laboratories



**TEST CONDITIONS:** The samples were conditioned for a minimum one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

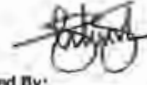
## **TEST RESULTS:**

The test results are summarized in Tables 1 to 12A.

## **PRECISION GEOSYNTHETIC LABORATORIES**



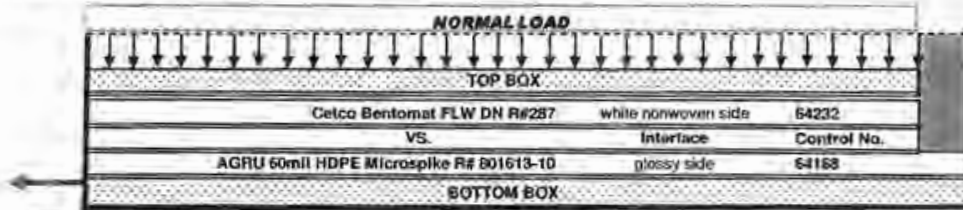
Carmelo V. Zantua  
Technical/Laboratory Director



**INTERFACE SHEAR TEST RESULT (ASTM D6243)**  
 PGL Job No. G10-0020

Reviewed By: \_\_\_\_\_  
 Date: 01/25/10

**TEST CONFIGURATION 10**



**TEST CONDITIONS:**

**SAMPLE PREPARATION:**

1. Specimens were cut along machine direction to 14" x 17" for the upper box, and 14" x 19" for the lower box, with an effective test area of 12" x 12"
2. Geosynthetic specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7-pairs).

**CONSOLIDATION:**

1. Each set of specimen was consolidated under flooded condition for 24 hrs @ normal load before shearing.
2. Normal loads were applied using Bladder for the highest load, Dead Weight for the medium load, and Dead Weight for the lowest load.
3. Normal loads were applied at approximately 10% increments.

**SHEAR TEST:**

1. Shear test was conducted @ 0.040 in/min.
2. Sheared @ minimum 3.0 inch horizontal displacement.
3. The test specimens were sheared at flooded condition.
4. Test were performed in general accordance with ASTM D6243 using Brinhard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

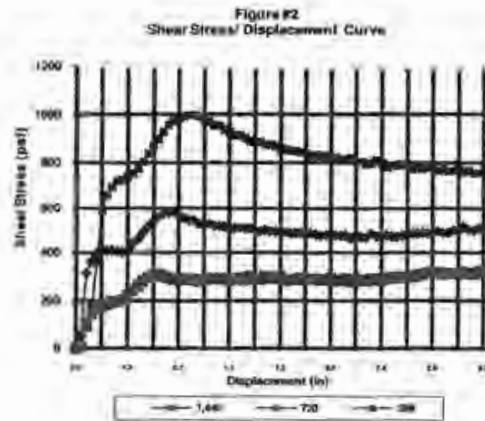
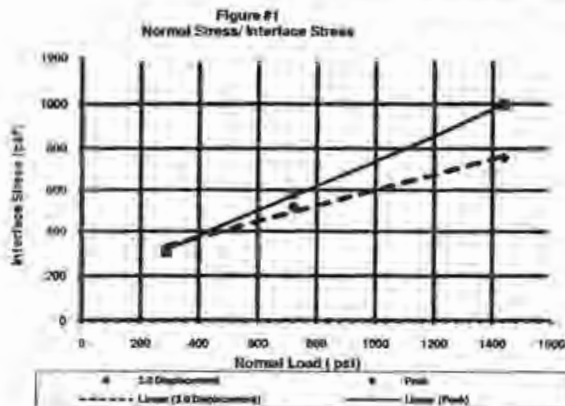
**TEST RESULTS:**

Normal Stresses Applied		GCL Moisture Content		Asperity Heights		PEAK STRENGTH		POST- PEAK STRENGTH AT 3.0 INCHES	
		Before	After	Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psi)	(psf)	(%)	(%)	(mils)	(mils)	(psi)	(degrees)	(psi)	(degrees)
2.00	288	19.0	105.7	31	30	308	47	316	48
5.00	720	19.0	94.6	31	30	579	39	517	36
10.00	1,440	19.0	88.3	32	29	996	35	758	28
<b>Note:</b>						COHESION (psf) :		221	
						COEFFICIENT OF FRICTION :		0.60	
						FRICTION ANGLE (degrees) :		30.8	

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

**OBSERVATIONS:**

1. No filling of the system or any abnormalities observed during and after the test.
2. Superficial abrasion on the geosynthetics interfacing sides (typical to all loads).
3. Sliding occurred between the two interfacing surfaces.

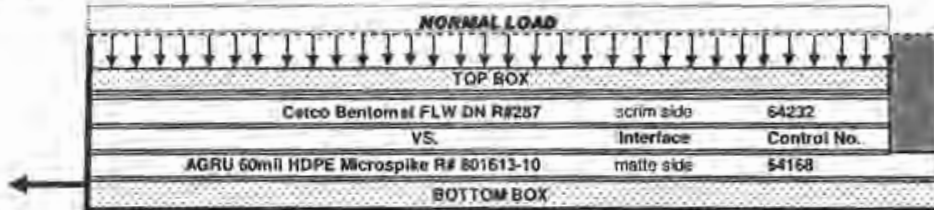


In accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or issues, due to removal of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

INTERFACE SHEAR TEST RESULT (ASTM D6243)  
 PGL Job No. G10-0020

Reviewed By: \_\_\_\_\_  
 Date: 01/25/10

TEST CONFIGURATION 11



TEST CONDITIONS:

SAMPLE PREPARATION:

- Specimens were cut along machine direction to 14" x 17" for the upper box, and 14" x 19" for the lower box, with an effective test area of 12" x 12".
- Geosynthetic specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7-pairs).

CONSOLIDATION:

- Each set of specimen was consolidated under flooded condition for 24 hrs @ normal load before shearing.
- Normal loads were applied using Bladder for the highest load, Dead Weight for the lowest load, and Dead Weight for the medium load.
- Normal loads were applied at approximately 10% increments.

SHEAR TEST:

- Shear test was conducted @ 0.040 in/ min.
- Sheared @ minimum 3.0 inch horizontal displacement.
- The test specimens were sheared at flooded condition.
- Test were performed in general accordance with ASTM D6243 using Brainard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

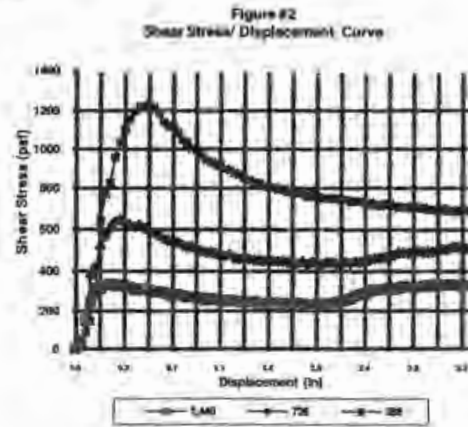
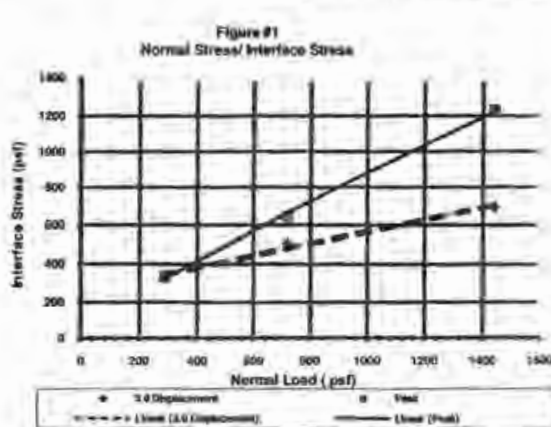
TEST RESULTS:

Normal Stresses Applied		GCL Moisture Content		Asperity Heights		PEAK STRENGTH		POST- PEAK STRENGTH AT <u>3.0</u> INCHES	
		Before	After	Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psi)	(psf)	(%)	(%)	(mils)	(mils)	(psf)	(degrees)	(psf)	(degrees)
2.00	288	19.3	108.1	27	26	337	49	331	49
5.00	720	19.3	94.2	27	25	642	42	502	35
10.00	1,440	19.3	83.5	26	24	1230	41	691	26
Note:		COHESION (psf) :				100		257	
		COEFFICIENT OF FRICTION :				0.78		0.31	
		FRICTION ANGLE (degrees) :				37.9		17.1	

NOTE: The friction angles and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

- No tilting of the system or any abnormalities observed during and after the test.
- Superficial abrasion on the geosynthetics interfacing sides (typical to all loads).
- Sliding occurred between the two interfacing surfaces.



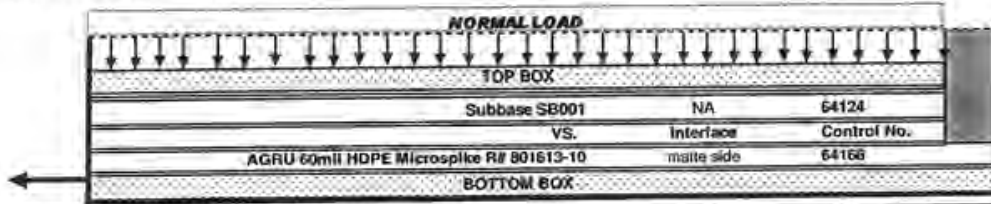
By accepting the data and results presented in this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on damages due to the use of this data, to the extent for the respective tests presented in this report, and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



INTERFACE SHEAR TEST RESULT (ASTM D5321)  
 PGL Job No. G10-0020

Reviewed By: \_\_\_\_\_  
 Date: 1/25/2010

TEST CONFIGURATION 12A



TEST CONDITIONS:

SAMPLE PREPARATION:

- The TOP box contained the soil.
- Specimens were cut along machine direction to 14" x 19" for the BOTTOM box, with effective test area of 12" x 12".
- The Maximum Dry Density (MDD) of the soil is 99.5 pcf at 18.5% Optimum Moisture Content (OMC).
- Soil specimen was remolded to 94.5 pcf at 18.6% moisture content.
- forming 2 inch layer in the TOP box.
- Specimens were secured via flat bar clamping mechanisms complete with bolts and nuts (7 pairs).

CONSOLIDATION:

- Each set of specimen was consolidated under flooded condition for 1 hr @ normal load before shearing.
- Normal loads were applied using Bladder for the highest load, Dead Weight for the medium load and Dead Weight for the lowest load.

SHEAR TEST:

- Shear test was conducted @ 0.040 in/min.
- Sheared @ minimum 3.0 inch horizontal displacement.
- The test specimens were sheared at flooded condition.
- Test were performed in general accordance with ASTM D5321 using Brinard-Kilman LG-112 Direct Shear machine with effective test area of 12 in X 12 in.

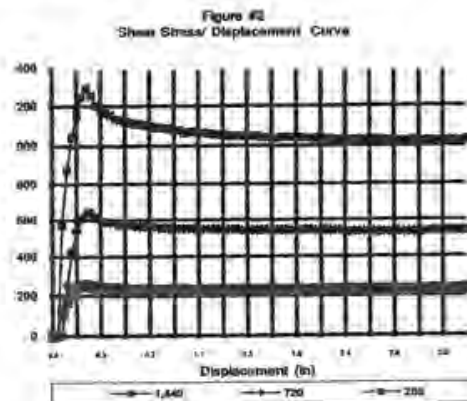
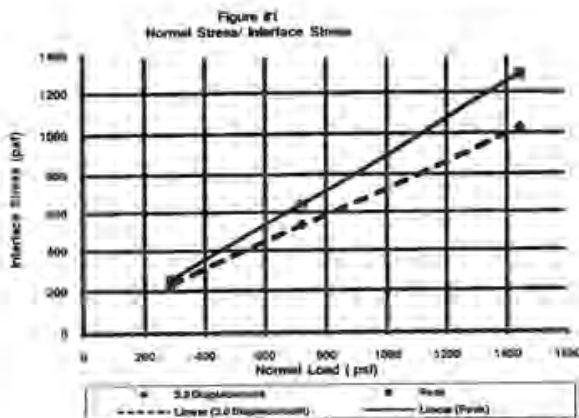
TEST RESULTS:

Normal Stresses Applied		Moisture Content		Asperity Heights		PEAK STRENGTH		POST- PEAK STRENGTH AT 3.0 INCHES	
		Before	After	Before	After	Shear Stress	Secant Angle	Shear Stress	Secant Angle
(psf)	(psf)	(%)	(%)	(mils)	(mils)	(psf)	(degrees)	(psf)	(degrees)
2,00	288	18.6	23.1	26	25	253	41	228	38
5,00	720	18.6	21.6	26	25	539	42	532	36
10,00	1,440	18.6	18.6	26	24	1291	42	1022	35
Note:						COHESION (psf):	0	32	
						COEFFICIENT OF FRICTION:	0.90	0.69	
						FRICTION ANGLE (degrees):	42.0	34.5	

NOTE: The friction angle and cohesion results given here are based on mathematically determined best fit line.

OBSERVATIONS:

- No tilting of the system or any abnormalities observed during and after the test.
- Superficial abrasion on the geosynthetic interfacing sides (typical to all loads).
- Sliding occurred within the soil substrate on all loads as soil film was retained on the surface of the geomembrane.



By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or losses, due to the use of this data, to the extent for the respective tests presented in this report, and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



# **Appendix I**

## **Geosynthetic Field Logs**

- Appendix I-1 Subgrade Acceptance Forms**
- Appendix I-2 Geomembrane Trial Seam Logs**
- Appendix I-3 Geomembrane Production Seam Logs**
- Appendix I-4 Geomembrane Panel Placement and Repair Summary Logs**
- Appendix I-5 Geomembrane Destructive Sample Logs**

**Appendix I-1**  
**Subgrade Acceptance Forms**





# Subgrade Surface Acceptance

Date: 11-Mar-10

Project: WM of Hawaii, Inc.

Site Mgr. Joel Mondragon

Project # \_\_\_\_\_

Location: Kekaha, Hawaii

Partial: x

Final: \_\_\_\_\_

*This document only applies to the acceptability of surface conditions for installation of geosynthetic products. ESI does not accept responsibility for compaction, elevation or moisture content, nor for the surface maintenance during deployment. Structural integrity of the subgrade and maintenance of these conditions are the responsibility of the owner or earthwork contractor.*

New Leachate Evaporation Pond (NLEP)

Panels # B-1 to # B-28

For Northwest Lining & Geotextile Products, Inc.

Joel Mondragon

Joel Mondragon

For Owner / Contractor

Chris Scott/ Geosyntec

Chris Scott

Acceptance Number: 1

Area Accepted 69,265 s.f.

Total Area Accepted to date: 69,265 s.f.



# Subgrade Surface Acceptance

Date: 12-Mar-10

Project: WM of Hawaii, Inc.

Site Mgr. Joel Mondragon

Project # \_\_\_\_\_

Location: Kekaha, Hawaii

Partial: x

Final: \_\_\_\_\_

*This document only applies to the acceptability of surface conditions for installation of geosynthetic products. ESI does not accept responsibility for compaction, elevation or moisture content, nor for the surface maintenance during deployment. Structural integrity of the subgrade and maintenance of these conditions are the responsibility of the owner or earthwork contractor.*

New Leachate Evaporation Pond (NLEP)

Panels # B-29 to # B-46

For Northwest Linings & Geotextile Products, Inc.

For Owner / Contractor

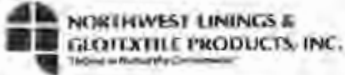
Joel Mondragon

Chris Scott/ Geosyntec

Acceptance Number: 2

Area Accepted 28,866 s.f.

Total Area Accepted to date: 98,131 s.f.



# Subgrade Surface Acceptance

Date: 14-May-10

Project: WM of Hawaii, Inc.

Site Mgr. Joel Mondragon

Project # \_\_\_\_\_

Location: Kekaha, Hawaii

Partial: \_\_\_\_\_

Final: x

*This document only applies to the acceptability of surface conditions for installation of geosynthetic products. ESI does not accept responsibility for compaction, elevation or moisture content, nor for the surface maintenance during deployment. Structural integrity of the subgrade and maintenance of these conditions are the responsibility of the owner or earthwork contractor.*

New Leachate Evaporation Pond (NLEP)

Panels # B-47 to # B-48

For Northwest Lining & Geotextile Products, Inc.

For Owner / Contractor

Joel Mondragon

Chris Scott/ Geosyntec

Joel Mondragon

Chris Scott

Acceptance Number: 3

Area Accepted 2,300 s.f.

Total Area Accepted to date: 100,431 s.f.

**Appendix I-2**  
**Geomembrane Trial Seam Logs**





**Trial Seam Log - Fusion**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunialii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Tensiometer Description: <u>M2405-750</u>		

Material Type	gml : 2	Peel Inside:	91 ppi	Shear:	120 ppi
		Peel Outside:	91 ppi		

Trial Seam No	Date	Time	Mach ID	Oper ID	Mat Desc	Fusion		Test Results					QA ID
						Wedge ° Celsius	Speed ft./Min	Peel In	Peel Out	Shear	Unit ppi/psi	Result	
1-070	3/22/2010	13:20	20431	AM	SxS	d	6.0	125	112	141	ppi	p	LKH
1-071	3/22/2010	13:20	20431	AM	SxS	d	6.0	133	110	147	ppi	p	LKH
1-072	3/22/2010	13:20	20431	AM	SxS	d	6.0	130	119	139	ppi	p	LKH
1-073	3/22/2010	13:30	20431	AM	SxT	d	5.0	120	120	129	ppi	p	LKH
1-074	3/22/2010	13:30	20431	AM	SxT	d	5.0	115	109	125	ppi	p	LKH
1-075	3/22/2010	13:30	20431	AM	SxT	d	5.0	119	109	122	ppi	p	LKH
1-076	3/23/2010	8:25	20431	AM	SxS	d	6.0	126	131	174	ppi	p	LKH
1-077	3/23/2010	8:25	20431	AM	SxS	d	6.0	129	131	173	ppi	p	LKH
1-078	3/23/2010	8:25	20431	AM	SxS	d	6.0	116	122	173	ppi	p	LKH
1-079	3/23/2010	8:35	20431	AM	TxT	d	5.0	144	141	148	ppi	p	LKH
1-080	3/23/2010	8:35	20431	AM	TxT	d	5.0	128	128	143	ppi	p	LKH
1-081	3/23/2010	8:35	20431	AM	TxT	d	5.0	134	129	138	ppi	p	LKH
1-082	3/23/2010	13:05	20431	AM	SxS	d	6.0	116	104	151	ppi	p	LKH
1-083	3/23/2010	13:05	20431	AM	SxS	d	6.0	115	109	157	ppi	p	LKH
1-084	3/23/2010	13:05	20431	AM	SxS	d	6.0	110	120	129	ppi	p	LKH
1-085	3/23/2010	13:15	20431	AM	TxT	d	5.0	135	121	140	ppi	p	LKH
1-086	3/23/2010	13:15	20431	AM	TxT	d	5.0	129	117	136	ppi	p	LKH
1-087	3/23/2010	13:15	20431	AM	TxT	d	5.0	121	119	132	ppi	p	LKH
1-088	3/24/2010	13:00	20431	AM	SxS	d	6.5	114	114	146	ppi	p	LKH
1-089	3/24/2010	13:00	20431	AM	SxS	d	6.0	146	127	148	ppi	p	LKH
1-090	3/24/2010	13:00	20431	AM	SxS	d	6.0	108	112	142	ppi	p	LKH
1-091	3/24/2010	13:10	20431	AM	TxT	d	5.0	117	114	124	ppi	p	LKH
1-092	3/24/2010	13:10	20431	AM	TxT	d	5.0	128	118	129	ppi	p	LKH
1-093	3/24/2010	13:10	20431	AM	TxT	d	5.0	128	124	129	ppi	p	LKH
1-094	3/25/2010	7:55	20431	AM	SxS	d	6.0	132	114	123	ppi	p	LKH
1-095	3/25/2010	7:55	20431	AM	SxS	d	6.0	121	115	173	ppi	p	LKH
1-096	3/25/2010	7:55	20431	AM	SxS	d	6.0	132	110	174	ppi	p	LKH
1-097	3/25/2010	8:10	20431	AM	TxT	d	5.0	148	138	150	ppi	p	LKH
1-098	3/25/2010	8:10	20431	AM	TxT	d	5.0	141	134	153	ppi	p	LKH
1-099	3/25/2010	8:10	20431	AM	TxT	d	5.0	143	135	147	ppi	p	LKH
1-100	3/25/2010	13:30	20431	AM	SxS	d	6.0	122	11	157	ppi	p	LKH
1-101	3/25/2010	13:30	20431	AM	SxS	d	6.0	130	115	154	ppi	p	LKH
1-102	3/25/2010	13:30	20431	AM	SxS	d	6.0	103	109	145	ppi	p	LKH
1-103	3/25/2010	13:40	20431	AM	TxT	d	5.0	111	115	127	ppi	p	LKH



## Trial Seam Log - Fusion

Project: Kekaha Landfill	ProjNo: WG1298	TaskNo: 02
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752		
Description: New Leachate Evaporation Pond Construction		
Tensiometer Description: M2405-750		
Material Type: gml : 2	Peel Inside: 91 ppi	Shear: 120 ppi
	Peel Outside: 91 ppi	

Trial Seam No	Date	Time	Mach ID	Oper ID	Mat Desc	Fusion		Test Results					QA ID
						Wedge ° Celsius	Speed ft./Min	Peel In	Peel Out	Shear	Unit ppi/psi	Result	
1-104	3/25/2010	13:40	20431	AM	TxT	d	5.0	120	119	133	ppi	p	LKH
1-105	3/25/2010	13:40	20431	AM	TxT	d	5.0	114	119	128	ppi	p	LKH
1-106	3/25/2010	15:10	20431	AM	SxT	d	5.0	124	130	147	ppi	p	LKH
1-107	3/25/2010	15:10	20431	AM	SxT	d	5.0	133	109	140	ppi	p	LKH
1-108	3/25/2010	15:10	20431	AM	SxT	d	5.0	119	106	145	ppi	p	LKH
1-109	5/14/2010	9:10	1110	AM	SxS	d	6.0	121	131	159	ppi	p	CAS
1-110	5/14/2010	9:10	1110	AM	SxS	d	6.0	115	119	132	ppi	p	CAS
1-111	5/14/2010	9:10	1110	AM	SxS	d	6.0	124	111	147	ppi	p	CAS
1-112	5/14/2010	9:50	1110	AM	TxT	d	5.0	117	117	152	ppi	p	CAS
1-113	5/14/2010	9:50	1110	AM	TxT	d	5.0	128	120	138	ppi	p	CAS
1-114	5/14/2010	9:50	1110	AM	TxT	d	5.0	127	114	134	ppi	p	CAS
1-115	5/14/2010	0:30	1110	AM	SxS	d	6.0	119	107	141	ppi	p	CAS
1-116	5/14/2010	0:30	1110	AM	SxS	d	6.0	112	113	125	ppi	p	CAS
1-117	5/14/2010	0:30	1110	AM	SxS	d	6.0	104	104	134	ppi	p	CAS
1-118	5/14/2010	13:15	1110	AM	TxT	d	5.0	131	118	132	ppi	p	CAS
1-119	5/14/2010	13:15	1110	AM	TxT	d	5.0	133	114	129	ppi	p	CAS
1-120	5/14/2010	13:15	1110	AM	TxT	d	5.0	127	120	131	ppi	p	CAS
2-034	3/15/2010	10:40	20431	AM	SxS	d	5.5	121	114	155	ppi	p	CAS
2-035	3/15/2010	10:40	20431	AM	SxS	d	5.5	126	124	152	ppi	p	CAS
2-036	3/15/2010	10:40	20431	AM	SxS	d	5.5	124	120	139	ppi	p	CAS
2-037	3/15/2010	11:15	1110	GM	SxT	d	5.5	112	121	148	ppi	p	CAS
2-038	3/15/2010	11:15	1110	GM	SxT	d	5.5	104	114	133	ppi	p	CAS
2-039	3/15/2010	11:15	1110	GM	SxT	d	5.5	109	114	142	ppi	p	CAS
2-040	3/18/2010	8:30	20431	AM	SxS	d	6.0	123	123	171	ppi	p	CAS
2-041	3/18/2010	8:30	20431	AM	SxS	d	6.0	116	122	184	ppi	p	CAS
2-042	3/18/2010	8:30	20431	AM	SxS	d	6.0	118	126	163	ppi	p	CAS
2-043	3/18/2010	8:50	20431	AM	SxT	d	5.0	150	147	158	ppi	p	CAS
2-044	3/18/2010	8:50	20431	AM	SxT	d	5.0	141	139	151	ppi	p	CAS
2-045	3/18/2010	8:50	20431	AM	SxT	d	5.0	143	143	156	ppi	p	CAS
2-046	3/18/2010	0:45	20431	AM	SxT	d	5.0	124	122	137	ppi	p	CAS
2-047	3/18/2010	0:45	20431	AM	SxT	d	5.0	129	116	141	ppi	p	CAS
2-048	3/18/2010	0:45	20431	AM	SxT	d	5.0	119	115	122	ppi	p	CAS
2-049	3/18/2010	0:50	20431	AM	SxS	d	6.0	126	113	135	ppi	p	CAS
2-050	3/18/2010	0:50	20431	AM	SxS	d	6.0	121	106	139	ppi	p	CAS



## Trial Seam Log - Fusion

Project: <u>Kekaha Landfill</u>	ProfNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Tensiometer Description: <u>M2405-750</u>		
Material Type: <u>gml : 2</u>	Peel Inside: <u>91 ppi</u>	Shear: <u>120 ppi</u>
	Peel Outside: <u>91 ppi</u>	

Trial Seam No	Date	Time	Mach ID	Oper ID	Mat Desc	Fusion		Test Results					QA ID
						Wedge ° Celsius	Speed ft/Min	Peel In	Peel Out	Shear	Unit ppi/psi	Result	
2-051	3/18/2010	0:50	20431	AM	SxS	d	6.0	116	116	145	ppi	p	CAS
2-052	3/19/2010	7:50	20431	AM	TxT	d	5.0	143	140	156	ppi	p	CAS
2-053	3/19/2010	7:50	20431	AM	TxT	d	5.0	138	128	152	ppi	p	CAS
2-054	3/19/2010	7:50	20431	AM	TxT	d	5.0	142	136	156	ppi	p	CAS
2-055	3/19/2010	8:00	20431	AM	SxS	d	6.0	121	127	177	ppi	p	CAS
2-056	3/19/2010	8:00	20431	AM	SxS	d	6.0	119	131	177	ppi	p	CAS
2-057	3/19/2010	8:00	20431	AM	SxS	d	6.0	142	142	182	ppi	p	CAS
2-058	3/19/2010	13:20	20431	AM	TxT	d	5.0	135	129	142	ppi	p	CAS
2-059	3/19/2010	13:20	20431	AM	TxT	d	5.0	135	132	132	ppi	p	CAS
2-060	3/19/2010	13:20	20431	AM	TxT	d	5.0	121	134	121	ppi	p	CAS
2-061	3/19/2010	13:30	20431	AM	SxS	d	6.0	112	127	156	ppi	p	CAS
2-062	3/19/2010	13:30	20431	AM	SxS	d	6.0	114	125	158	ppi	p	CAS
2-063	3/19/2010	13:30	20431	AM	SxS	d	6.0	122	123	160	ppi	p	CAS
2-064	3/22/2010	7:40	20431	AM	SxS	d	6.0	115	119	179	ppi	p	LKH
2-065	3/22/2010	7:40	20431	AM	SxS	d	6.0	129	136	174	ppi	p	LKH
2-066	3/22/2010	7:40	20431	AM	SxS	d	6.0	128	122	172	ppi	p	LKH
2-067	3/22/2010	11:25	20431	AM	SxT	d	5.0	125	127	148	ppi	p	LKH
2-068	3/22/2010	11:25	20431	AM	SxT	d	5.0	130	132	151	ppi	p	LKH
2-069	3/22/2010	11:25	20431	AM	SxT	d	5.0	132	134	147	ppi	p	LKH
3-001	3/11/2010	8:20	20431	AM	SxS	d	5.5	124	119	181	ppi	p	CAS
3-002	3/11/2010	8:20	20431	AM	SxS	d	5.5	129	117	181	ppi	p	CAS
3-003	3/11/2010	8:20	20431	AM	SxS	d	5.5	151	121	189	ppi	p	CAS
3-004	3/11/2010	8:50	1110	GM	TxT	d	5.5	131	136	130	ppi	p	CAS
3-005	3/11/2010	8:50	1110	GM	TxT	d	5.5	119	137	146	ppi	p	CAS
3-006	3/11/2010	8:50	1110	GM	TxT	d	5.5	120	131	140	ppi	p	CAS
3-007	3/11/2010	9:35	1110	GM	SxT	d	5.5	115	111	161	ppi	p	CAS
3-008	3/11/2010	9:35	1110	GM	SxT	d	5.5	106	120	151	ppi	p	CAS
3-009	3/11/2010	9:35	1110	GM	SxT	d	5.5	117	122	158	ppi	p	CAS
3-010	3/11/2010	11:10	1110	GM	SxS	d	5.0	111	121	155	ppi	p	CAS
3-011	3/11/2010	11:10	1110	GM	SxS	d	5.0	121	111	141	ppi	p	CAS
3-012	3/11/2010	11:10	1110	GM	SxS	d	5.0	119	108	143	ppi	p	CAS
3-013	3/11/2010	13:00	20431	AM	SxS	d	6.0	106	115	154	ppi	p	CAS
3-014	3/11/2010	13:00	20431	AM	SxS	d	6.0	113	107	165	ppi	p	CAS
3-015	3/11/2010	13:00	20431	AM	SxS	d	6.0	118	105	146	ppi	p	CAS



**Trial Seam Log - Fusion**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Tensionmeter Description: <u>M2405-750</u>		

Material Type	gml : 2	Peel Inside:	91 ppi	Shear:	120 ppi
		Peel Outside:	91 ppi		

Trial Seam No	Date	Time	Mach ID	Oper ID	Mat Desc	Fusion		Test Results				QA ID	
						Wedge ° Celsius	Speed ft./Min	Peel In	Peel Out	Shear	Unit ppi/psi		Result
3-016	3/11/2010	13:20	1110	GM	TxT	d	5.0	124	132	142	ppi	p	CAS
3-017	3/11/2010	13:20	1110	GM	TxT	d	5.0	124	111	126	ppi	p	CAS
3-018	3/11/2010	13:20	1110	GM	TxT	d	5.0	111	117	123	ppi	p	CAS
3-019	3/11/2010	13:45	1110	GM	SxS	d	6.0	117	116	152	ppi	p	CAS
3-020	3/11/2010	13:45	1110	GM	SxS	d	6.0	119	111	128	ppi	p	CAS
3-021	3/11/2010	13:45	1110	GM	SxS	d	6.0	114	116	144	ppi	p	CAS
3-022	3/12/2010	11:45	20431	AM	SxS	d	5.8	110	127	136	ppi	p	CAS
3-023	3/12/2010	11:45	20431	AM	SxS	d	5.8	125	117	150	ppi	p	CAS
3-024	3/12/2010	11:45	20431	AM	SxS	d	5.8	113	114	145	ppi	p	CAS
3-025	3/12/2010	11:50	1110	GM	TxT	d	5.0	143	136	136	ppi	p	CAS
3-026	3/12/2010	11:50	1110	GM	TxT	d	5.0	132	121	146	ppi	p	CAS
3-027	3/12/2010	11:50	1110	GM	TxT	d	5.0	131	131	140	ppi	p	CAS
3-028	3/12/2010	0:30	1110	GM	SxS	d	5.0	112	120	162	ppi	p	CAS
3-029	3/12/2010	0:30	1110	GM	SxS	d	5.0	117	118	154	ppi	p	CAS
3-030	3/12/2010	0:30	1110	GM	SxS	d	5.0	122	118	150	ppi	p	CAS
3-031	3/12/2010	14:20	1110	GM	SxT	d	5.0	129	118	151	ppi	p	CAS
3-032	3/12/2010	14:20	1110	GM	SxT	d	5.0	133	119	142	ppi	p	CAS
3-033	3/12/2010	14:20	1110	GM	SxT	d	5.0	134	119	146	ppi	p	CAS





## Trial Seam Log - Extrusion

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Tensiometer Description: <u>M2405-750</u>		

Material Type	gml : 2	Peel:	78 ppi	Shear:	120 ppi
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Trial Seam No	Date	Time	Mach ID	Oper ID	Mat Desc	Extrusion		Test Results				Retest No	QA ID
						Pre heat ° Celsius	Barrel ° Celsius	Peel	Shear	Unit ppi/psi	Result P/F		
1-022	3/26/2010	7:40	5117	AM	TxT	500	350	112	153	ppi	p		LKH
1-023	3/26/2010	7:40	5117	AM	TxT	500	350	110	149	ppi	p		LKH
1-024	3/26/2010	7:40	5117	AM	TxT	500	350	109	150	ppi	p		LKH
1-025	5/14/2010	9:50	5117	AM	TxT	500	350	115	147	ppi	p		CAS
1-026	5/14/2010	9:50	5117	AM	TxT	500	350	123	134	ppi	p		CAS
1-027	5/14/2010	9:50	5117	AM	TxT	500	350	129	143	ppi	p		CAS
1-028	5/14/2010	13:15	5117	AM	TxT	500	350	127	143	ppi	p		CAS
1-029	5/14/2010	13:15	5117	AM	TxT	500	350	121	138	ppi	p		CAS
1-030	5/14/2010	13:15	5117	AM	TxT	500	350	123	149	ppi	p		CAS
2-007	3/16/2010	12:00	5117	AM	TxT	500	350	118	146	ppi	p		CAS
2-008	3/16/2010	12:00	5117	AM	TxT	500	350	114	153	ppi	p		CAS
2-009	3/16/2010	12:00	5117	AM	TxT	500	350	121	152	ppi	p		CAS
2-010	3/19/2010	18:35	5117	AM	TxT	500	350	117	139	ppi	p		CAS
2-011	3/19/2010	18:35	5117	AM	TxT	500	350	112	142	ppi	p		CAS
2-012	3/19/2010	18:35	5117	AM	TxT	500	350	100	137	ppi	p		CAS
2-013	3/20/2010	7:30	5117	AM	TxT	500	350	105	169	ppi	p		CAS
2-014	3/20/2010	7:30	5117	AM	TxT	500	350	131	160	ppi	p		CAS
2-015	3/20/2010	7:30	5117	AM	TxT	500	350	97	163	ppi	p		CAS
2-016	3/20/2010	7:30	5117	AM	TxT	500	350	105	169	ppi	p		CAS
2-017	3/20/2010	7:30	5117	AM	TxT	500	350	131	160	ppi	p		CAS
2-018	3/20/2010	7:30	5117	AM	TxT	500	350	97	163	ppi	p		CAS
2-019	3/24/2010	7:48	5117	AM	TxT	500	350	151	154	ppi	p		LKH
2-020	3/24/2010	7:48	5117	AM	TxT	500	350	107	151	ppi	p		LKH
2-021	3/24/2010	7:48	5117	AM	TxT	500	350	141	145	ppi	p		LKH
3-001	3/12/2010	8:00	5117	AM	TxT	500	350	147	154	ppi	p		CAS
3-002	3/12/2010	8:00	5117	AM	TxT	500	350	154	147	ppi	p		CAS
3-003	3/12/2010	8:00	5117	AM	TxT	500	350	123	152	ppi	p		CAS
3-004	3/13/2010	7:30	5117	AM	TxT	500	350	118	156	ppi	p		CAS
3-005	3/13/2010	7:30	5117	AM	TxT	500	350	137	160	ppi	p		CAS
3-006	3/13/2010	7:30	5117	AM	TxT	500	350	126	150	ppi	p		CAS

**Appendix I-3**  
**Geomembrane Production Seam Logs**



Production Seam Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type	gml : 2	Specifications:	Seam Pressure: <u>30 psi / 5 min</u>	Vacuum Box: <u>5 psi / 10 sec</u>
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Primary / Secondary: <u>Other SUBBASE</u>	Series: <u>3</u>
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Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Exu/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/11/2010	9:10	20431	AM	f	3-005-006-0-38	38	CAS	0-38	AT	EB	P		CAS
3/11/2010	9:15	20431	AM	f	3-006-007-0-40	40	CAS	0-40	AT	EB	P		CAS
3/11/2010	9:25	20431	AM	f	3-007-008-0-40	40	CAS	0-40	AT	EB	P		CAS
3/11/2010	9:27	1110	GM	f	3-002-003-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	9:30	20431	AM	f	3-008-009-0-40	40	CAS	0-40	AT	EB	P		CAS
3/11/2010	9:45	20431	AM	f	3-009-010-0-40	40	CAS	0-40	AT	EB	P		CAS
3/11/2010	9:50	20431	AM	f	3-011-012-0-26	26	CAS	0-26	AT	EB	P		CAS
3/11/2010	10:00	20431	AM	f	3-001-002-0-150	150	CAS	0-150	AT	EB	P		CAS
3/11/2010	10:20	20431	AM	f	3-001-003-0-58	58	CAS	0-58	AT	EB	P		CAS
3/11/2010	10:25	1110	GM	f	3-014-015-0-33	33	CAS	0-33	AT	EB	P		CAS
3/11/2010	10:40	1110	GM	f	3-005-014-0-22	22	CAS	0-22	AT	EB	P		CAS
3/11/2010	10:45	20431	AM	f	3-002-004-0-150	150	CAS	0-150	AT	EB	P		CAS
3/11/2010	10:45	1110	GM	f	3-005-015-0-15	15	CAS	0-15	AT	EB	P		CAS
3/11/2010	10:50	1110	GM	f	3-001-014-0-34	34	CAS	0-34	AT	EB	P		CAS
3/11/2010	10:50	1110	GM	f	3-010-012-0-10	10	CAS	0-10	AT	EB	P		CAS
3/11/2010	10:55	1110	GM	f	3-010-011-0-21	21	CAS	0-21	AT	EB	P		CAS



Production Seam Log

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml ; 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Other SUBBASE Series: 3

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/11/2010	10:57	1110	GM	f	3-001-005-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	11:00	1110	GM	f	3-001-006-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	11:03	1110	GM	f	3-001-007-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	11:07	1110	GM	f	3-001-008-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	11:10	1110	GM	f	3-001-009-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	11:13	1110	GM	f	3-001-010-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	11:16	1110	GM	f	3-001-011-0-32	32	CAS	0-32	AT	EB	P		CAS
3/11/2010	11:20	20431	AM	f	3-004-013-0-210	210	CAS	0-210	AT	EB	P		CAS
3/11/2010	11:40	1110	GM	f	3-013-016-0-210	210	CAS	0-210	AT	EB	P		CAS
3/11/2010	11:50	20431	AM	f	3-003-004-0-58	58	CAS	0-58	AT	EB	P		CAS
3/11/2010	13:20	20431	AM	f	3-016-017-0-150	150	CAS	0-150	AT	EB	P		CAS
3/11/2010	13:32	20431	AM	f	3-016-018-0-62	62	CAS	0-62	AT	EB	P		CAS
3/11/2010	13:35	1110	GM	f	3-017-018-0-23	23	CAS	0-23	AT	EB	P		CAS
3/11/2010	13:50	20431	AM	f	3-017-019-0-150	150	CAS	0-150	AT	EB	P		CAS
3/11/2010	14:03	1110	GM	f	3-020-021-0-23	23	CAS	0-23	AT	EB	p		CAS
3/11/2010	14:07	20431	AM	f	3-018-019-0-62	62	CAS	0-62	AT	EB	p		CAS



Production Seam Log



Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type gml : 2 Specifications: Seam Pressure: 10 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Other SUBBASE Series: 3

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/Fus:	Seam No Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/11/2010	14:15	1110	GM	f	3-020-022-0-127	127	CAS	0-127	AT	EB	p		CAS
3/11/2010	14:36	1110	GM	f	3-021-022-0-83	83	CAS	0-83	AT	EB	p		CAS
3/11/2010	14:45	20431	AM	f	3-019-020-0-127	127	CAS	0-127	AT	EB	p		CAS
3/11/2010	14:45	20431	AM	f	3-022-023-0-104	104	CAS	0-104	AT	EB	p		CAS
3/11/2010	14:50	1110	GM	f	3-023-024-0-23	23	CAS	0-23	AT	EB	p		CAS
3/11/2010	14:55	20431	AM	f	3-022-024-0-98	98	CAS	0-98	AT	EB	p		CAS
3/11/2010	15:08	1110	GM	f	3-023-025-0-105	105	CAS	0-105	AT	EB	p		CAS
3/11/2010	15:20	20431	AM	f	3-025-026-0-113	113	CAS	0-113	AT	EB	p		CAS
3/11/2010	15:23	1110	GM	f	3-024-025-0-83	83	CAS	0-83	AT	EB	p		CAS
3/11/2010	15:40	20431	AM	f	3-025-027-0-70	70	CAS	0-70	AT	EB	p		CAS
3/11/2010	15:40	1110	GM	f	3-026-027-0-23	23	CAS	0-23	AT	EB	p		CAS
3/11/2010	15:55	20431	AM	f	3-026-028-0-115	115	CAS	0-115	AT	EB	p		CAS
3/11/2010	16:10	20431	AM	f	3-027-028-0-63	63	CAS	0-63	AT	EB	p		CAS
3/12/2010	12:00	20431	AM	f	3-028-029-0-116	116	CAS	0-116	AT	EB	p		CAS
3/12/2010	12:10	1110	GM	f	3-029-031-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	12:15	20431	AM	f	3-028-031-0-22	22	CAS	0-22	AT	EB	p		CAS

## Production Seam Log



Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Other SUBBASE Series: 3

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	Seam No Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/12/2010	12:18	1110	GM	f	3-030-031-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	12:20	20431	AM	f	3-028-030-0-37	37	CAS	0-37	AT	EB	p		CAS
3/12/2010	12:25	20431	AM	f	3-029-032-0-118	118	CAS	0-118	AT	EB	p		CAS
3/12/2010	12:40	20431	AM	f	3-031-032-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	12:48	20431	AM	f	3-030-032-0-35	35	CAS	0-35	AT	EB	p		CAS
3/12/2010	12:50	1110	GM	f	3-032-033-0-177	177	CAS	0-177	AT	EB	p		CAS
3/12/2010	12:55	20431	AM	f	3-033-034-0-176	176	CAS	0-176	AT	EB	p		CAS
3/12/2010	13:20	20431	AM	f	3-034-035-0-177	177	CAS	0-177	AT	EB	p		CAS
3/12/2010	13:22	1110	GM	f	3-036-037-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	13:27	1110	GM	f	3-037-038-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	13:40	1110	GM	f	3-035-038-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	13:55	20431	AM	f	3-040-041-0-25	25	CAS	0-25	AT	EB	p		CAS
3/12/2010	14:00	1110	GM	f	3-035-037-0-25	25	CAS	0-25	AT	EB	p		CAS
3/12/2010	14:05	1110	GM	f	3-035-036-0-45	45	CAS	0-45	AT	EB	p		CAS
3/12/2010	14:20	20431	AM	f	3-042-043-0-50	50	CAS	0-50	AT	EB	p		CAS
3/12/2010	14:40	1110	GM	f	3-039-040-0-23	23	CAS	0-23	AT	EB	p		CAS



## Production Seam Log

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: grml / 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Other SUBBASE Series: 3

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/Fus:	SeamNo Series-Seam1-Soam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/12/2010	14:44	1110	GM	f	3-039-041-0-22	22	CAS	0-22	AT	EB	p		CAS
3/12/2010	14:50	20431	AM	f	3-038-039-0-47	47	CAS	0-47	AT	EB	p		CAS
3/12/2010	14:55	1110	GM	f	3-045-046-0-16	16	CAS	0-16	AT	EB	p		CAS
3/12/2010	15:00	1110	GM	f	3-044-046-0-21	21	CAS	0-21	AT	EB	p		CAS
3/12/2010	15:07	1110	GM	f	3-044-045-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	15:10	1110	GM	f	3-043-045-0-23	23	CAS	0-23	AT	EB	p		CAS
3/12/2010	15:22	1110	GM	f	3-036-044-0-44	44	CAS	0-44	AT	EB	p		CAS
3/12/2010	15:28	1110	GM	f	3-036-043-0-5	5	CAS	0-5	AT	EB	p		CAS
3/12/2010	15:29	1110	GM	f	3-037-043-0-18	18	CAS	0-18	AT	EB	p		CAS
3/12/2010	15:32	1110	GM	f	3-037-042-0-8	8	CAS	0-8	AT	EB	p		CAS
3/12/2010	15:33	1110	GM	f	3-038-042-0-16	16	CAS	0-16	AT	EB	p		CAS
5/14/2010	9:55	1110	GM	f	3-042-047-0-50	50	CAS	0-50	AT	EB	p		CAS
5/14/2010	10:08	1110	GM	f	3-047-048-0-50	50	CAS	0-50	AT	EB	p		CAS
5/14/2010	10:10	1110	GM	f	3-038-047-0-23	23	CAS	0-23	AT	EB	p		CAS
5/14/2010	10:13	1110	GM	f	3-047-R43-0-5	5	CAS	0-5	AT	EB	p		CAS
5/14/2010	10:15	1110	GM	f	3-048-R43-0-5	5	CAS	0-5	AT	EB	p		CAS



Production Seam Log

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gmf : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Other SUBBASE Series: 3

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo <small>Series-Seam1 -Seam2-Begin-End</small>	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
5/14/2010	10:18	1110	GM	f	3-038-048-0-23	23	CAS	0-23	AT	EB	p		CAS
5/14/2010	10:20	1110	GM	f	3-039-048-0-23	23	CAS	0-23	AT	EB	p		CAS
5/14/2010	10:22	1110	GM	f	3-040-048-0-32	32	CAS	0-32	AT	EB	p		CAS

Total Length Fusion: 4610 Total Length Extrusion: 0

Comments:



**Production Seam Log**



Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gml : 2</u>	Specifications: <u>Seam Pressure: 30 psi / 5 min</u>	Vacuum Box: <u>5 psi / 10 sec.</u>
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Primary / Secondary: Secondary                      Series: 2

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo <small>Series-Seam1-Seam2-Begin-End</small>	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/15/2010	12:05	1110	GM	f	2-001-002-0-40	40	CAS	0-40	AT	EB	P		CAS
3/15/2010	12:10	1110	GM	f	2-001-004-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	12:14	1110	GM	f	2-001-005-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	12:18	1110	GM	f	2-001-006-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	12:22	1110	GM	f	2-001-007-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	12:45	1110	GM	f	2-001-008-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	12:50	1110	GM	f	2-001-009-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	13:00	1110	GM	f	2-001-010-0-33	33	CAS	0-33	AT	EB	P		CAS
3/15/2010	22:55	20431	AM	f	2-002-003-0-33	33	CAS	0-33	AT	EB	P		CAS
3/15/2010	23:10	20431	AM	f	2-004-005-0-40	40	CAS	0-40	AT	EB	P		CAS
3/15/2010	23:25	20431	AM	f	2-005-006-0-41	41	CAS	0-41	AT	EB	P		CAS
3/15/2010	23:33	20431	AM	f	2-002-004-0-23	23	CAS	0-23	AT	EB	P		CAS
3/15/2010	23:35	20431	AM	f	2-006-007-0-40	40	CAS	0-40	AT	EB	P		CAS
3/15/2010	23:37	20431	AM	f	2-003-004-0-16	16	CAS	0-16	AT	EB	P		CAS
3/15/2010	23:45	20431	AM	f	2-007-008-0-40	40	CAS	0-40	AT	EB	P		CAS
3/15/2010	23:45	1110	GM	f	2-010-011-0-17	17	CAS	0-17	AT	EB	P		CAS



**Production Seam Log**

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Secondary Series: 2

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/15/2010	23:50	20431	AM	f	2-008-009-0-40	40	CAS	0-40	AT	EB	P		CAS
3/15/2010	23:55	1110	GM	f	2-009-011-0-17	17	CAS	0-17	AT	EB	P		CAS
3/15/2010	23:58	1110	GM	f	2-009-010-0-23	23	CAS	0-23	AT	EB	P		CAS
3/18/2010	9:10	20431	AM	F	2-012-013-0-23	23	CAS	0-23	AT	EB	P		CAS
3/18/2010	9:25	20431	AM	F	2-001-012-0-124	124	CAS	0-124	AT	EB	P		CAS
3/18/2010	9:35	20431	AM	F	2-001-013-39-49	10	CAS	39-49	AT	EB	P		CAS
3/18/2010	9:40	20431	AM	F	2-001-013-0-38	38	CAS	0-38	AT	EB	P		CAS
3/18/2010	9:45	20431	AM	F	2-012-014-49-208	159	CAS	49-208	AT	EB	P		CAS
3/18/2010	10:30	20431	AM	F	2-013-014-0-48	48	CAS	0-48	AT	EB	P		CAS
3/18/2010	11:25	20431	AM	F	2-015-016-0-23	23	CAS	0-23	AT	EB	P		CAS
3/18/2010	11:30	20431	AM	F	2-014-015-0-146	146	CAS	0-146	AT	EB	P		CAS
3/18/2010	11:50	20431	AM	F	2-014-016-0-66	66	CAS	0-66	AT	EB	P		CAS
3/18/2010	13:25	20431	AM	F	2-016-017-0-66	66	CAS	0-66	AT	EB	P		CAS
3/18/2010	13:30	20431	AM	F	2-015-017-0-146	146	CAS	0-146	AT	EB	P		CAS
3/18/2010	14:25	20431	AM	F	2-018-019-0-23	23	CAS	0-23	AT	EB	p		CAS
3/18/2010	14:30	20431	AM	F	2-017-018-0-127	127	CAS	0-127	AT	EB	p		CAS

## Production Seam Log



Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy. Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Secondary Series: 2

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/18/2010	14:45	20431	AM	F	2-017-019-0-84	84	CAS	0-84	AT	EB	p		CAS
3/19/2010	8:50	20431	AM	F	2-024-025-0-23	23	CAS	0-23	AT	EB	p		CAS
3/19/2010	8:55	20431	AM	F	2-023-025-0-125	125	CAS	0-125	AT	EB	p		CAS
3/19/2010	9:10	20431	AM	F	2-023-024-0-79	79	CAS	0-79	AT	EB	p		CAS
3/19/2010	9:55	20431	AM	F	2-024-026-0-77	77	CAS	0-77	AT	EB	p		CAS
3/19/2010	10:10	20431	AM	F	2-025-026-0-109	109	CAS	0-109	AT	EB	p		CAS
3/19/2010	11:20	20431	AM	f	2-027-028-0-23	23	CAS	0-23	AT	EB	p		CAS
3/19/2010	11:30	20431	AM	f	2-026-028-0-105	105	CAS	0-105	AT	EB	p		CAS
3/19/2010	11:45	20431	AM	f	2-026-027-0-80	80	CAS	0-80	AT	EB	p		CAS
3/19/2010	12:00	20431	AM	f	2-027-029-0-80	80	CAS	0-80	AT	EB	p		CAS
3/19/2010	12:10	20431	AM	f	2-028-029-0-97	97	CAS	0-97	AT	EB	p		CAS
3/19/2010	14:30	20431	AM	f	2-029-030-0-119	119	CAS	0-119	AT	EB	p		CAS
3/19/2010	14:40	20431	AM	f	2-030-031-0-23	23	CAS	0-23	AT	EB	p		CAS
3/19/2010	14:45	20431	AM	f	2-029-031-0-56	56	CAS	0-56	AT	EB	p		CAS
3/19/2010	14:55	20431	AM	f	2-030-032-0-120	120	CAS	0-120	AT	EB	p		CAS
3/19/2010	15:53	20431	AM	f	2-033-034-0-23	23	CAS	0-23	AT	EB	p		CAS



**Production Seam Log**

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Secondary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/19/2010	16:00	20431	AM	f	2-019-020-0-84	84	CAS	0-84	AT	EB	p		CAS
3/19/2010	16:10	20431	AM	f	2-018-020-0-127	127	CAS	0-127	AT	EB	p		CAS
3/19/2010	16:10	20431	AM	f	2-032-033-0-165	165	CAS	0-165	AT	EB	p		CAS
3/19/2010	16:40	20431	AM	f	2-032-034-0-12	12	CAS	0-12	AT	EB	p		CAS
3/19/2010	16:45	20431	AM	f	2-033-035-0-165	165	CAS	0-165	AT	EB	p		CAS
3/19/2010	17:05	20431	AM	f	2-021-022-0-23	23	CAS	0-23	AT	EB	p		CAS
3/19/2010	17:10	20431	AM	f	2-020-022-0-109	109	CAS	0-109	AT	EB	p		CAS
3/19/2010	17:20	20431	AM	f	2-034-035-0-12	12	CAS	0-12	AT	EB	p		CAS
3/19/2010	17:25	20431	AM	f	2-020-021-0-102	102	CAS	0-102	AT	EB	p		CAS
3/19/2010	17:40	20431	AM	f	2-021-023-0-103	103	CAS	0-103	AT	EB	p		CAS
3/19/2010	18:00	20431	AM	f	2-022-023-0-106	106	CAS	0-106	AT	EB	p		CAS
3/22/2010	8:35	20431	AM	f	2-035-036-0-176	176	LKH	0-176	AT	EB	p		LKH
3/22/2010	9:30	20431	AM	f	2-036-037-0-176	176	LKH	0-176	AT	EB	p		LKH
3/22/2010	9:50	20431	AM	f	2-037-038-0-47	47	LKH	0-47	AT	EB	p		LKH
3/22/2010	10:20	20431	AM	f	2-038-039-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	10:25	20431	AM	f	2-038-040-0-24	24	LKH	0-24	AT	EB	p		LKH





Production Seam Log

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Secondary Series: 2

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/22/2010	10:55	20431	AM	f	2-041-042-0-47	47	LKH	0-47	AT	EB	p		LKH
3/22/2010	11:20	20431	AM	f	2-043-044-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	11:20	20431	AM	f	2-043-045-0-20	18	LKH	0-18	AT	EB	p		LKH
3/22/2010	11:25	20431	AM	f	2-044-045-0-18	20	LKH	0-20	AT	EB	p		LKH
3/22/2010	11:30	20431	AM	f	2-037-044-0-20	20	LKH	0-20	AT	EB	p		LKH
3/22/2010	11:35	20431	AM	f	2-037-043-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	11:40	20431	AM	f	2-037-042-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	11:45	20431	AM	f	2-037-041-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	11:50	20431	AM	f	2-042-043-0-47	47	LKH	0-47	AT	EB	p		LKH
5/14/2010	12:50	1110	GM	f	2-041-046-0-50	50	CAS	0-50	AT	EB	p		CAS
5/14/2010	12:55	1110	GM	f	2-046-047-0-50	50	CAS	0-50	AT	EB	p		CAS
5/14/2010	13:10	1110	GM	f	2-037-046-0-16	16	CAS	0-16	AT	EB	p		CAS
5/14/2010	13:12	1110	GM	f	2-046-R49-0-7	7	CAS	0-7	AT	EB	p		CAS
5/14/2010	13:16	1110	GM	f	2-047-R49-0-7	7	CAS	0-7	AT	EB	p		CAS
5/14/2010	13:18	1110	GM	f	2-037-047-0-13	13	CAS	0-13	AT	EB	p		CAS
5/14/2010	13:20	1110	GM	f	2-038-047-0-23	23	CAS	0-23	AT	EB	p		CAS



**Production Seam Log**

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Secondary Series: 2

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ FUS:	Seam No Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
5/14/2010	13:28	1110	GM	f	2-039-047-0-27	27	CAS	0-27	AT	EB	p		CAS

Total Length Fusion: 4654 Total Length Extrusion: 0

Comments:

## Production Seam Log



Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Primary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/22/2010	14:45	20431	AM	f	1-003-004-0-34	34	LKH	0-34	AT	EB	p		LKH
3/22/2010	14:50	20431	AM	f	1-002-003-0-22	22	LKH	0-22	AT	EB	p		LKH
3/22/2010	14:55	20431	AM	f	1-002-004-0-18	18	LKH	0-18	AT	EB	p		LKH
3/22/2010	15:00	20431	AM	f	1-002-005-0-40	40	LKH	0-40	AT	EB	p		LKH
3/22/2010	15:10	20431	AM	f	1-005-006-0-7	7	LKH	0-7	AT	EB	p		LKH
3/22/2010	15:15	20431	AM	f	1-005-006-8-40	40	LKH	0-40	AT	EB	p		LKH
3/22/2010	15:45	20431	AM	f	1-006-007-0-41	41	LKH	0-41	AT	EB	p		LKH
3/22/2010	15:50	20431	AM	f	1-007-008-0-41	41	LKH	0-41	AT	EB	p		LKH
3/22/2010	16:15	20431	AM	f	1-010-011-0-27	27	LKH	0-27	AT	EB	p		LKH
3/22/2010	16:23	20431	AM	f	1-009-011-0-18	18	LKH	0-18	AT	EB	p		LKH
3/22/2010	16:30	20431	AM	f	1-009-010-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	16:38	20431	AM	f	1-001-003-0-39	39	LKH	0-39	AT	EB	p		LKH
3/22/2010	16:40	20431	AM	f	1-001-002-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	16:45	20431	AM	f	1-001-005-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	16:50	20431	AM	f	1-008-009-0-41	41	LKH	0-41	AT	EB	p		LKH
3/22/2010	16:52	20431	AM	f	1-001-006-0-23	23	LKH	0-23	AT	EB	p		LKH



Production Seam Log

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunahii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Primary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo <small>Series-Seam1-Seam2-Begin-End</small>	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/22/2010	17:00	20431	AM	f	1-001-007-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	17:05	20431	AM	f	1-001-008-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	17:10	20431	AM	f	1-001-009-0-23	23	LKH	0-23	AT	EB	p		LKH
3/22/2010	17:15	20431	AM	f	1-001-010-0-33	33	LKH	0-33	AT	EB	p		LKH
3/23/2010	8:55	20431	AM	f	1-012-013-0-23	23	LKH	0-23	AT	EB	p		LKH
3/23/2010	9:00	20431	AM	f	1-001-013-0-98	98	LKH	0-98	AT	EB	p		LKH
3/23/2010	9:15	20431	AM	f	1-001-012-0-108	108	LKH	0-108	AT	EB	p		LKH
3/23/2010	9:55	20431	AM	f	1-012-014-0-110	110	LKH	0-110	AT	EB	p		LKH
3/23/2010	10:00	20431	AM	f	1-013-014-0-99	99	LKH	0-99	AT	EB	p		LKH
3/23/2010	11:00	20431	AM	f	1-015-016-0-23	23	LKH	0-23	AT	EB	p		LKH
3/23/2010	11:05	20431	AM	f	1-014-015-0-88	88	LKH	0-88	AT	EB	p		LKH
3/23/2010	11:15	20431	AM	f	1-014-016-0-121	121	LKH	0-121	AT	EB	p		LKH
3/23/2010	13:25	20431	AM	f	1-015-017-0-88	88	LKH	0-88	AT	EB	p		LKH
3/23/2010	13:35	20431	AM	f	1-016-017-0-121	121	LKH	0-121	AT	EB	p		LKH
3/23/2010	13:55	20431	AM	f	1-018-019-0-23	23	LKH	0-23	AT	EB	p		LKH
3/23/2010	14:10	20431	AM	f	1-017-019-0-149	149	LKH	0-149	AT	EB	p		LKH





Production Seam Log

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Primary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	SeamNo Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/23/2010	14:50	20431	AM	f	1-017-018-0-60	60	LKH	0-60	AT	EB	p		LKH
3/23/2010	15:05	20431	AM	f	1-018-020-0-61	61	LKH	0-61	AT	EB	p		LKH
3/23/2010	15:15	20431	AM	f	1-019-020-0-150	150	LKH	0-150	AT	EB	p		LKH
3/23/2010	16:05	20431	AM	f	1-020-021-0-211	211	LKH	0-211	AT	EB	p		LKH
3/24/2010	13:35	20431	AM	f	1-022-023-0-23	23	LKH	0-23	AT	EB	p		LKH
3/24/2010	13:45	20431	AM	f	1-021-023-0-27	27	LKH	0-27	AT	EB	p		LKH
3/24/2010	13:50	20431	AM	f	1-021-022-0-182	182	LKH	0-182	AT	EB	p		LKH
3/24/2010	14:15	20431	AM	f	1-022-024-0-182	182	LKH	0-182	AT	EB	p		LKH
3/24/2010	14:45	20431	AM	f	1-023-024-0-18	24	LKH	0-24	AT	EB	p		LKH
3/24/2010	15:00	20431	AM	f	1-025-026-0-23	23	LKH	0-23	AT	EB	p		LKH
3/24/2010	15:10	20431	AM	f	1-024-025-0-161	161	LKH	0-161	AT	EB	p		LKH
3/24/2010	15:30	20431	AM	f	1-024-026-0-30	30	LKH	0-30	AT	EB	p		LKH
3/24/2010	15:40	20431	AM	f	1-025-027-0-162	162	LKH	0-162	AT	EB	p		LKH
3/24/2010	16:00	20431	AM	f	1-026-027-0-21	21	LKH	0-21	AT	EB	p		LKH
3/25/2010	8:25	20431	AM	f	1-027-028-0-178	178	LKH	0-178	AT	EB	p		LKH
3/25/2010	8:55	20431	AM	f	1-028-029-0-174	174	LKH	0-174	AT	EB	p		LKH



**Production Seam Log**

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec

Primary / Secondary: Primary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	Seam No Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/25/2010	9:50	20431	AM	f	1-029-030-0-174	174	LKH	0-174	AT	EB	p		LKH
3/25/2010	10:30	20431	AM	f	1-031-032-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	10:40	20431	AM	f	1-030-031-0-39	39	LKH	0-39	AT	EB	p		LKH
3/25/2010	10:45	20431	AM	f	1-030-032-0-136	136	LKH	0-136	AT	EB	p		LKH
3/25/2010	11:15	20431	AM	f	1-031-033-0-39	39	LKH	0-39	AT	EB	p		LKH
3/25/2010	11:20	20431	AM	f	1-032-033-0-137	137	LKH	0-137	AT	EB	p		LKH
3/25/2010	12:05	20431	AM	f	1-033-034-0-80	80	LKH	0-80	AT	EB	p		LKH
3/25/2010	12:05	20431	AM	f	1-034-035-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	12:20	20431	AM	f	1-033-035-0-96	96	LKH	0-96	AT	EB	p		LKH
3/25/2010	14:15	20431	AM	f	1-034-036-0-81	81	LKH	0-81	AT	EB	p		LKH
3/25/2010	14:25	20431	AM	f	1-035-036-0-96	96	LKH	0-96	AT	EB	p		LKH
3/25/2010	14:40	20431	AM	f	1-036-037-0-49	49	LKH	0-49	AT	EB	p		LKH
3/25/2010	14:55	20431	AM	f	1-038-039-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	15:25	20431	AM	f	1-037-038-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	15:30	20431	AM	f	1-037-039-0-21	21	LKH	0-21	AT	EB	p		LKH
3/25/2010	15:35	20431	AM	f	1-040-041-0-46	46	LKH	0-46	AT	EB	p		LKH



**Production Seam Log**

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: Q2  
 Description: New Leachate Evaporation Pond Construction

Material Type gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Primary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/Fus:	Seam No <small>Series-Seam1-Seam2-Begin-End</small>	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID
3/25/2010	15:45	20431	AM	f	1-041-042-0-46	46	LKH	0-46	AT	EB	p		LKH
3/25/2010	15:50	20431	AM	f	1-043-044-0-17	17	LKH	0-17	AT	EB	p		LKH
3/25/2010	15:55	20431	AM	f	1-042-043-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	16:00	20431	AM	f	1-042-044-0-19	19	LKH	0-19	AT	EB	p		LKH
3/25/2010	16:05	20431	AM	f	1-036-043-0-20	20	LKH	0-20	AT	EB	p		LKH
3/25/2010	16:10	20431	AM	f	1-036-042-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	16:15	20431	AM	f	1-036-041-0-23	23	LKH	0-23	AT	EB	p		LKH
3/25/2010	16:20	20431	AM	f	1-036-040-0-23	23	LKH	0-23	AT	EB	p		LKH
5/14/2010	14:50	1110	GM	f	1-040-045-0-50	50	CAS	0-50	AT	EB	p		CAS
5/14/2010	14:55	1110	GM	f	1-045-046-0-50	50	CAS	0-50	AT	EB	p		CAS
5/14/2010	15:05	1110	GM	f	1-036-045-016	16	CAS	0-16	AT	EB	p		CAS
5/14/2010	15:08	1110	GM	f	1-045-R43-0-6	6	CAS	0-6	AT	EB	p		CAS
5/14/2010	15:10	1110	GM	f	1-046-R43-0-6	6	CAS	0-6	AT	EB	p		CAS
5/14/2010	15:12	1110	GM	f	1-036-046-0-10	10	CAS	0-10	AT	EB	p		CAS
5/14/2010	15:15	1110	GM	f	1-037-046-0-23	23	CAS	0-23	AT	EB	p		CAS
5/14/2010	15:17	1110	GM	f	1-038-046-0-27	27	CAS	0-27	AT	EB	p		CAS



**Production Seam Log**

Project: Kekaha Landfill ProjNo: WG1298  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction

Material Type: gml : 2 Specifications: Seam Pressure: 30 psi / 5 min Vacuum Box: 5 psi / 10 sec.

Primary / Secondary: Primary Series: 1

Production Seam					Location			Nondestructive Test					
Date	Time	Mach. ID	Oper. ID	Ext/ Fus:	Seam No Series-Seam1-Seam2-Begin-End	Length (ft.)	QA ID	Location	Detail	Oper.	Result	Action	QA ID

Total Length Fusion: 4750 Total Length Extrusion: 0

Comments:



**Appendix I-4**  
**Geomembrane Panel Placement**  
**and Repair Summary Logs**



Panel Placement Log

Project: Kekaha Landfill	ProjNo: WG1298
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752	TaskNo: 02
Description: New Leachate Evaporation Pond Construction	

Primary / Secondary: Other SUBBASE		Series: 3		Material Type: gml			
Panel	Batch-Roll	Date	Time	Placement/Location/Comments	Width (ft.)	Length (ft.)	QA ID
1	7291454-802474.10	3/11/2010	7:45		23	211	CAS
2	7291454-802474.10	3/11/2010	8:09		23	150	CAS
3	7291454-802346.10	3/11/2010	8:30		23	58	CAS
4	7291454-802346.10	3/11/2010	8:40		23	209	CAS
5	7291454-802474.10	3/11/2010	8:45		23	37	CAS
6	7291454-802346.10	3/11/2010	8:50		23	38	CAS
7	7291454-802346.10	3/11/2010	8:55		23	37	CAS
8	7291454-802346.10	3/11/2010	9:00		23	37	CAS
9	7291454-802237.10	3/11/2010	9:05		23	37	CAS
10	7291454-802237.10	3/11/2010	9:10		23	38	CAS
11	7291454-802237.10	3/11/2010	9:15		21	26	CAS
12	7291454-802237.10	3/11/2010	9:20		15	26	CAS
13	7291454-802237.10	3/11/2010	9:46		23	210	CAS
14	7291454-802469.10	3/11/2010	10:25		22	32	CAS
15	7291454-802237.10	3/11/2010	10:27		15	31	CAS
16	7291454-802469.10	3/11/2010	10:30		23	211	CAS
17	7291454-802469.10	3/11/2010	13:00		23	150	CAS
18	7291454-802468.10	3/11/2010	13:10		23	62	CAS
19	7291454-802468.10	3/11/2010	13:20		23	212	CAS
20	7291454-802468.10	3/11/2010	13:30		23	127	CAS
21	7291454-802342.10	3/11/2010	13:45		23	84	CAS
22	7291454-802342.10	3/11/2010	13:55		23	206	CAS
23	7291454-802342.10	3/11/2010	14:30		23	104	CAS
24	7291454-802348.10	3/11/2010	14:50		23	91	CAS
25	7291454-802348.10	3/11/2010	15:10		23	186	CAS
26	7291454-802348.10	3/11/2010	15:40		23	114	CAS
27	7291454-802341.10	3/11/2010	15:45		23	67	CAS
28	7291454-802341.10	3/11/2010	16:00		23	177	CAS
29	7291454-802341.10	3/12/2010	10:30		23	117	CAS
30	7291454-802341.10	3/12/2010	10:40		23	36	CAS
31	7291454-802345.10	3/12/2010	11:10		23	23	CAS



**Panel Placement Log**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Primary / Secondary: <u>Other SUBBASE</u>		Series: <u>3</u>		Material Type: <u>gml</u>			
Panel	Batch-Roll	Date	Time	Placement/Location/Comments	Width (ft.)	Length (ft.)	QA ID
32	7291454-802345.10	3/12/2010	11:40		23	177	CAS
33	7291454-802345.10	3/12/2010	11:50		23	177	CAS
34	7291454-802475.10	3/12/2010	0:40		23	177	CAS
35	7291454-802475.10	3/12/2010	0:45		23	176	CAS
36	7291454-802475.10	3/12/2010	0:50		23	45	CAS
37	7291454-802345.10	3/12/2010	13:30		23	25	CAS
38	7291454-802470.10	3/12/2010	13:50		23	105	CAS
39	7291454-802470.10	3/12/2010	14:10		23	46	CAS
40	7291454-802470.10	3/12/2010	14:30		23	27	CAS
41	7291454-802470.10	3/12/2010	14:50		15	23	CAS
42	7291454-802470.10	3/12/2010	14:55		23	50	CAS
43	7291454-802470.10	3/12/2010	15:10		23	51	CAS
44	7291454-802470.10	3/12/2010	15:30		23	42	CAS
45	7291454-802470.10	3/12/2010	15:40		23	24	CAS
46	7291454-802461.10	3/12/2010	15:45		13	16	CAS
47	7291467-801738.10	5/14/2010	9:00		23	50	CAS
48	7291467-801738.10	5/14/2010	9:00		23	50	CAS
Number of Panels: 48		Approx. Area (sq. ft):		100431			



**Panel Placement Log**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Primary / Secondary: Secondary      Series: 2      Material Type: gml

Panel	Batch-Roll	Date	Time	Placement/Location/Comments	Width (ft.)	Length (ft.)	QA ID
1	7291454-802461.10	3/15/2010	8:45		23	207	CAS
2	7291454-802461.10	3/15/2010	9:45		23	37	CAS
3	7291454-802461.10	3/15/2010	9:55		16	33	CAS
4	7291454-802461.10	3/15/2010	10:05		23	40	CAS
5	7291454-802461.10	3/15/2010	10:15		23	41	CAS
6	7291454-802240.10	3/15/2010	10:20		23	41	CAS
7	7291454-802240.10	3/15/2010	10:25		23	40	CAS
8	7291454-802240.10	3/15/2010	10:35		23	40	CAS
9	7291454-802240.10	3/15/2010	10:45		23	40	CAS
10	7291454-802240.10	3/15/2010	10:55		23	30	CAS
11	7291454-802240.10	3/15/2010	11:05		17	25	CAS
12	7291454-802240.10	3/18/2010	9:00		23	156	CAS
13	7291454-802343.10	3/18/2010	9:10		23	48	CAS
14	7291454-802343.10	3/18/2010	9:52		23	208	CAS
15	7291454-802343.10	3/18/2010	11:15		23	146	CAS
16	7291454-802471.10	3/18/2010	11:30		23	66	CAS
17	7291454-802471.10	3/18/2010	13:20		23	206	CAS
18	7291454-802471.10	3/18/2010	14:20		23	127	CAS
19	7291454-802462.10	3/18/2010	14:30		23	84	CAS
20	7291454-802462.10	3/18/2010	15:45		23	211	CAS
21	7291454-802462.10	3/18/2010	16:55		23	103	CAS
22	7291454-802239.10	3/18/2010	16:59		23	108	CAS
23	7291454-802239.10	3/18/2010	17:36		23	205	CAS
24	7291454-802239.10	3/19/2010	8:30		23	77	CAS
25	7291454-802347.10	3/19/2010	8:40		23	117	CAS
26	7291454-802347.10	3/19/2010	10:00		23	185	CAS
27	7291454-802347.10	3/19/2010	11:10		23	80	CAS
28	7291454-802349.10	3/19/2010	11:20		23	101	CAS
29	7291454-802349.10	3/19/2010	12:00		23	176	CAS
30	7291454-802349.10	3/19/2010	14:05		23	120	CAS
31	7291454-802359.10	3/19/2010	14:10		23	56	CAS





**Panel Placement Log**

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction

ProjNo: WG1298  
 TaskNo: 02

Primary / Secondary: Secondary			Series: 1		Material Type: gml		
Panel	Batch-Roll	Date	Time	Placement/Location/Comments	Width (ft.)	Length (ft.)	QA ID
32	7291454-802359.10	3/19/2010	14:15		23	177	CAS
33	7291454-802359.10	3/19/2010	15:30		23	165	CAS
34	7291454-802356.10	3/19/2010	15:35		23	14	CAS
35	7291454-802356.10	3/19/2010	16:45		23	177	CAS
36	7291454-802356.10	3/22/2010	8:15		23	176	LKH
37	7291454-802466.10	3/22/2010	9:30		23	176	LKH
38	7291454-802466.10	3/22/2010	10:00		23	50	LKH
39	7291454-802356.10	3/22/2010	10:10		23	28	LKH
40	7291454-802466.10	3/22/2010	10:15	Triangle Corner	23	20	LKH
41	7291454-802466.10	3/22/2010	10:30		23	47	LKH
42	7291454-802466.10	3/22/2010	10:40		23	47	LKH
43	7291454-802466.10	3/22/2010	10:50		23	46	LKH
44	7291454-802344.10	3/22/2010	11:05		23	19	LKH
45	7291454-802344.10	3/22/2010	11:10		15	16	LKH
46	7291467-802117.10	5/14/2010	12:40		23	50	CAS
47	7291467-802117.10	5/14/2010	12:45		23	50	CAS
Number of Panels: 47				Approx. Area (sq. ft.)		100967	



## Panel Placement Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Primary / Secondary: Primary		Series: I		Material Type: gml			
Panel	Batch-Roll	Date	Time	Placement/Location/Comments	Width (ft.)	Length (ft.)	QA ID
1	7291454-802344.10	3/22/2010	13:15		23	206	LKH
2	7291454-802344.10	3/22/2010	13:30		23	40	LKH
3	7291454-802344.10	3/22/2010	13:50		23	38	LKH
4	7291454-802344.10	3/22/2010	13:55		14	34	LKH
5	7291454-802353.10	3/22/2010	14:30		23	40	LKH
6	7291454-802353.10	3/22/2010	14:45		23	41	LKH
7	7291454-802353.10	3/22/2010	14:55		23	41	LKH
8	7291454-802353.10	3/22/2010	15:10		23	41	LKH
9	7291454-802353.10	3/22/2010	15:20		23	41	LKH
10	7291454-802353.10	3/22/2010	15:40		23	30	LKH
11	7291454-802353.10	3/22/2010	15:50		15	40	LKH
12	7291454-802353.10	3/23/2010	8:40		23	109	LKH
13	7291454-802350.10	3/23/2010	9:00		23	99	LKH
14	7291454-802350.10	3/23/2010	9:50		23	209	LKH
15	7291454-802350.10	3/23/2010	10:45		23	121	LKH
16	7291454-802463.10	3/23/2010	11:00		23	88	LKH
17	7291454-802463.10	3/23/2010	12:30		23	209	LKH
18	7291454-802463.10	3/23/2010	12:55		23	60	LKH
19	7291454-802238.10	3/23/2010	13:20		23	150	LKH
20	7291454-802238.10	3/23/2010	14:35		23	211	LKH
21	7291454-802236.10	3/23/2010	15:45		23	211	LKH
22	7291454-802236.10	3/24/2010	13:00		23	182	LKH
23	7291454-802351.10	3/24/2010	13:20		23	23	LKH
24	7291454-802351.10	3/24/2010	14:00		23	195	LKH
25	7291454-802351.10	3/24/2010	14:45		23	162	LKH
26	7291454-802231.10	3/24/2010	15:00		23	26	LKH
27	7291454-802231.10	3/24/2010	15:40		23	170	LKH
28	7291454-802231.10	3/25/2010	8:00		23	176	LKH
29	7291454-802360.10	3/25/2010	8:50		23	174	LKH
30	7291454-802360.10	3/25/2010	9:30		23	175	LKH
31	7291454-802360.10	3/25/2010	10:10		23	39	LKH



**Panel Placement Log**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Primary / Secondary: Primary      Series: 1      Material Type: gmi

Panel	Batch-Roll	Date	Time	Placement/Location/Comments	Width (ft.)	Length (ft.)	QA ID
32	7291454-802357.10	3/25/2010	10:25		23	136	LKH
33	7291454-802357.10	3/25/2010	11:10		23	176	LKH
34	7291454-802357.10	3/25/2010	11:45		23	80	LKH
35	7291454-802235.10	3/25/2010	12:00		23	96	LKH
36	7291454-802235.10	3/25/2010	14:15		23	176	LKH
37	7291454-802235.10	3/25/2010	14:20		23	46	LKH
38	7291454-802235.10	3/25/2010	14:30		23	23	LKH
39	7291454-802235.10	3/25/2010	14:40	Triangle Corner	21	23	LKH
40	7291454-802358.10	3/25/2010	15:10		23	46	LKH
41	7291454-802358.10	3/25/2010	15:30		23	46	LKH
42	7291454-802358.10	3/25/2010	15:45		23	44	LKH
43	7291454-802358.10	3/25/2010	15:55		23	18	LKH
44	7291454-802358.10	3/25/2010	16:00	Triangle Corner	17	19	LKH
45	7291467-802109.10	5/14/2010	14:50		23	50	CAS
46	7291467-802109.10	5/14/2010	14:55		23	50	CAS

Number of Panels: 46      Approx. Area (sq. ft): 100644



**Repair Summary Log**

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest Lining & Geotextile, Inc.

ProjNo: WG1298 TaskNo: 02

Primary / Secondary: Other **SUBBASE** Series: 3

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Weider I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/12/2010	3-001		P	3-005-014-015		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-002		P	3-001-005-014		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-003		P	3-001-005-006		INT		2	4		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-004	3-001	DS	3-005-006		15-W		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-005	3-003	DS	3-001-006		65-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-006		P	3-001-006-007		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-007		P	3-001-007-008		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-008		P	3-001-008-009		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-009		P	3-001-009-010		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-010		P	3-001-010-011		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-011		P	3-010-011-012		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-012		P	3-001-062-003		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-013	3-002	DS	3-002-003		10-W		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-014		P	3-002-003-004		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-015	3-004	DS	3-004-013		100-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-016		P	3-016-017-018		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS





Repair Summary Log

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest Lining & Geotextile, Inc.

ProjNo: WG1298 TaskNo: 02

Primary / Secondary: Other SUBBASE Series: 3

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Much ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/12/2010	3-017		P	3-017-018-019		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-018	3-005	DS	3-016-017		170-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-019		P	3-019-020-021		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-020	3-006	DS	3-020-021-022		INT		8	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-021		P	3-022-023-024		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-022		P	3-023-024-025		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-023	3-007	DS	3-023-025		135-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-024		P	3-025-026-027		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/12/2010	3-025	3-008	DS	3-026-027-028		INT		7	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-026		P	3-028-029-031		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-027		P	3-028-030-031		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-028		P	3-030-031-032		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-029		P	3-029-031-032		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-030	3-009	DS	3-032-033		107-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-031	3-010	DS	3-034-035		45-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-032	3-011	DS	3-038-039		26-N		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS



Repair Summary Log

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest lining & Geotextile, Inc.

ProjNo: WG1298      TaskNo: 02

Primary / Secondary: Other SUBBASE      Series: 3

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/13/2010	3-033		P	3-039-040-041		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-034		P	3-035-037-038		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-035		P	3-037-038-042		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-036		P	3-037-042-043		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-037	3-012	DS	3-036-037		4-W		6	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-038		P	3-035-036-037		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-039		P	3-036-037-043		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-040		P	3-036-043-044		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-041		P	3-043-044-045		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
3/13/2010	3-042		P	3-044-045-046		INT		2	2		5117	AM	CAS	3/13/2010	GM	p		CAS
5/14/2010	3-043		R	3-038-047-048		INT		24	12		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-044		P	3-042-047		5-E		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-045		P	3-042-047		10-E		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-046		P	3-038-042-047		INT		3	3		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-047		P	3-038-047-R43		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-048		P	3-047-048-049		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS

Repair Summary Log



Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest Lining & Geotextile, Inc.

ProjNo: WG1298 TaskNo: 02

Primary / Secondary: Other SUBBASE Series: 3

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/I)	Action	QA ID
5/14/2010	3-049		P	3-038-048-R43		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-050		P	3-038-048-049		INT		3	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	3-051		P	3-039-040-048		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS



## Repair Summary Log

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest Lining & Geotextile, Inc.

ProjNo: WG1298 TaskNo: 02

Primary / Secondary: Secondary Series: 2

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/17/2010	2-001		P	2-002-003		7-N		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/17/2010	2-002	2-001	DS	2-004-005		12-E		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/17/2010	2-003		P	2-009-010-011		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/17/2010	2-004	2-002	DS	2-009-010		20-E		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-005	2-006	DS	2-020-022		20-N		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-006		P	2-020-021-022		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-007		P	2-017-018-019		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-008	2-005	DS	2-018-019		7-E		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-009	2-004	DS	2-014-015		125-N		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-010		P	2-014-015-016		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-011		P	2-001-012-013		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-012		C	2-001		39-N		13	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-013		C	2-001		39-N		13	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-014	2-003	DS	2-001-012		173-N		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-015		C	2-001		178-N		13	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/19/2010	2-016		C	2-001-002-0-40		178-N		13	2		5117	AM	CAS	3/20/2010	GM	p		CAS





Repair Summary Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Installer: <u>Northwest lining &amp; Geotextile, Inc.</u>		

Primary / Secondary: <u>Secondary</u>	Series: <u>2</u>
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Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/20/2010	2-017		P	2-001-002		7-S		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-018		P	2-001-012		7-S		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-019		P	2-001-008-009		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-020		P	2-001-007-008		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-021		P	2-001-006-007		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-022		P	2-001-005-006		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-023		P	2-001-004-005		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-024		P	2-002-003-004		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-025		P	2-012-013-014		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-026		P	2-015-016-017		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-027		P	2-018-019-020		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-028		P	2-021-022-023		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-029		P	2-022-024-025		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-030		R		2-023	150-N	4-E	2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-031		DS	2-023-024		160-N		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-032		P	2-024-025-026		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS



**Repair Summary Log**

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest lining & Geotextile, Inc.

ProjNo: WQ1298      TaskNo: 02

Primary / Secondary: Secondary      Series: 2

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/20/2010	2-033		DS	2-026-027		107-N		6	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-034		P	2-027-028-029		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-035		P	2-029-030-031		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-036		DS	2-030-031-032		INT		8	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-037		P	2-032-033-034		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-038		P	2-033-034-035		INT		2	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/20/2010	2-039		R		2-024	10-S	2-W	3	2		5117	AM	CAS	3/20/2010	GM	p		CAS
3/24/2010	2-040	2-010	DS	2-035-036		INT		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-041		p	2-037-043-044		INT		2	1		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-042		p	2-043-044-045		INT		2	1		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-043		p	2-037-042-043		INT		2	1		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-044	2-012	DS	2-042-043		18E		4	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-045	2-013	DS	2-042-043		18E		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-046		p	2-037-041-042		INT		2	1		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-047		DS	2-037-41		SN of AT		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	2-048		p	2-038-039-040		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH



**Repair Summary Log**

Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest Lining & Geotextile, Inc.

ProjNo: WG1298      TaskNo: 02

Primary / Secondary: Secondary      Series: 2

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
5/14/2010	2-049		R	2-036-037-046-047		INT		24	12		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	2-050		P	2-037-041-046		INT		3	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	2-051		P	2-037-046-R49		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	2-052		P	2-046-047-R49		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	2-053		P	2-037-0467-R49		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	2-054		P	2-037-038-047		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	2-055		P	2-038-039-047		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS



## Repair Summary Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Installer: <u>Northwest lining &amp; Geotextile, Inc.</u>		

Primary / Secondary: <u>Primary</u>	Series: <u>I</u>
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Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/24/2010	1-001		P	1-002-003-004		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-002		P	1-001-002-003		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-003		P	1-001-002-005		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-004	1-002	DS	1-001-005		68-N		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-005		P	1-001-005-006		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-006		P	1-001-006-007		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-007	1-001	DS	1-006-007		14-N		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-008		P	1-001-007-008		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-009		P	1-001-008-009		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-010		P	1-001-009-010		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-011		P	1-009-010-011		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-012		P	1-001-012-013		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-013		P	1-012-013-014		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-014		P	1-014-015-016		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-015	1-003	DS	1-014-015		67-N		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-016		P	1-015-016-017		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH



## Repair Summary Log



Project: Kekaha Landfill  
 Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752 ProjNo: WG1298 TaskNo: 02  
 Description: New Leachate Evaporation Pond Construction  
 Installer: Northwest lining & Geotextile, Inc.

Primary / Secondary: Primary

Series: 1

Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/24/2010	1-017		P	1-017-018-019		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-018	1-004	DS	1-018-019		11-W		5	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-019		P	1-018-019-020		INT		2	2		5117	AM	LKH	3/24/2010	GM	p		LKH
3/24/2010	1-020		R	1-005-006		7-W		2	1		5117	AM	LKH	3/24/2010	GM	p		LKH
3/26/2010	1-021	1-011	DS	1-037-038-039		INT		6	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-022		R		1-040	41-E	14-N	1	1		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-023	1-012	DS	1-040-041		8-W		5	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-024		P	1-036-040-041		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-025		P	1-036-041-042		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-026		P	1-042-043-044		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-027		P	1-036-042-043		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-028		P	1-034-035-036		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-029		R	1-033-035		87-N		3	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-030	1-010	DS	1-033-034		94-N		7	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-031		P	1-031-032-033		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-032	1-009	DS	1-031-032		8-W		5	2		5117	AM	LKH	3/26/1010	GM	p		LKH



Repair Summary Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Installer: <u>Northwest Lining &amp; Geotextile, Inc.</u>		

Primary / Secondary: <u>Primary</u>	Series: <u>1</u>
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Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
3/26/2010	1-033		P	1-030-031-032		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-034	1-008	DS	1-028-029		16-N		5	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-035		P	1-025-026-027		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-036		P	1-024-025-026		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-037	1-007	DS	1-024-025		108-N		5	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-038		P	1-022-023-024		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-039		P	1-021-022-023		INT		2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-040	1-005	DS	1-021-022		57.5-N		5	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-041	1-006	DS	1-021-022		57.5-N		5	2		5117	AM	LKH	3/26/1010	GM	p		LKH
3/26/2010	1-042		R		1-022	3-S	5-E	2	2		5117	AM	LKH	3/26/1010	GM	p		LKH
5/14/2010	1-043		R	1-036-045-046		INT		24	12		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	1-044		P	1-036-045-R43		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	1-045		P	1-036-040-045		INT		6	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	1-046		P	1-045-046-R43		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	1-047		P	1-036-046-R43		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	1-048		P	1-037-038-046		INT		2	2		5117	AM	CAS	5/14/2010	GM	p		CAS



Repair Summary Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>	TaskNo: <u>02</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>		
Description: <u>New Leachate Evaporation Pond Construction</u>		
Installer: <u>Northwest Lining &amp; Geotextile, Inc.</u>		

Primary / Secondary: <u>Primary</u>	Series: <u>1</u>
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Repair Date	Repair ID	DS No	Repair Type	Location				Size			Welder I.D.		QA ID	Non-Destructive Testing				
				Seam	Panel	Distance (ft.)	Offset (ft.)	Length (ft.)	Width (ft.)	Dia. (ft.)	Mach ID	Oper ID		Date	Oper ID	Result (p/f)	Action	QA ID
5/14/2010	1-049		P	1-036-038-046		INT		4	2		5117	AM	CAS	5/14/2010	GM	p		CAS
5/14/2010	1-050	1-013	DS	1-045-046		12-E		6	2		5117	AM	CAS	5/14/2010	GM	p		CAS

**Appendix I-5**  
**Geomembrane Destructive Sample Logs**





## Destructive Test Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Test Reqs:	Fusion:	Peel Inside: <u>91</u>	Peel Outside: <u>91</u>	Shear: <u>120</u>
	Extrusion:	Peel: <u>78</u>	Shear: <u>120</u>	

Primary / Secondary: <u>Opt SUBBASE</u>	Series: <u>3</u>	MaterialType: <u>2</u>
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Sample Data								Test Data						Re test	Re test	
Samp No	Weld Type	Track Type	Location		Mach ID	Oper ID	Date Samp	Peel		Shear	Unit ppi/psi	Result (P/F)	QA ID	1	2	
			Seam	Dist. (ft.)				Inside	Outside							
3-001	f	d	3-005-006	15-W	20431	AM	3/11/2010	Lab	126	134	177	ppi	p	CAS	-	-
								Field	122	126	170	ppi	P	CAS		
								Field	125	130	168	ppi	P	CAS		
3-002	f	d	3-002-003	10-W	1110	GM	3/11/2010	Lab	138	142	162	ppi	p	CAS	-	-
								Field	138	147	156	ppi	P	CAS		
								Field	137	131	157	ppi	P	CAS		
3-003	f	d	3-001-006	65-N	1110	GM	3/11/2010	Lab	135	147	159	ppi	p	CAS	-	-
								Field	141	148	150	ppi	P	CAS		
								Field	133	147	152	ppi	P	CAS		
3-004	f	d	3-004-013	100-N	20431	AM	3/11/2010	Lab	138	125	179	ppi	p	CAS	-	-
								Field	129	124	172	ppi	P	CAS		
								Field	131	135	173	ppi	P	CAS		
3-005	f	d	3-016-017	170-N	20431	AM	3/11/2010	Lab	127	145	178	ppi	p	CAS	-	-
								Field	138	130	170	ppi	P	CAS		
								Field	138	125	165	ppi	P	CAS		
3-006	f	d	3-020-022	86-N	1110	GM	3/11/2010	Lab	129	129	179	ppi	p	CAS	-	-
								Field	128	132	159	ppi	P	CAS		
								Field	127	132	163	ppi	P	CAS		
3-007	f	d	3-023-025	135-N	1110	GM	3/11/2010	Lab	124	120	182	ppi	p	CAS	-	-
								Field	129	128	170	ppi	P	CAS		
								Field	121	128	166	ppi	P	CAS		



## Destructive Test Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Test Reqs:	Fusion:	Peel Inside: <u>91</u>	Peel Outside: <u>91</u>	Shear: <u>120</u>
	Extrusion:	Peel: <u>78</u>	Shear: <u>120</u>	

Primary / Secondary: <u>Other SUBBASE</u>	Series: <u>3</u>	MaterialType: <u>2</u>
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Sample Data								Test Data						Re test 1	Re test 2	
Samp No	Weld Type	Track Type	Location		Mach ID	Oper ID	Date Samp	Peel		Shear	Unit ppi/psi	Result (P/F)	QA ID			
			Seam	Dist. (ft.)				Inside	Outside							
3-008	f	d	3-027-028	58-N	20431	AM	3/11/2010	Lab	122	122	182	ppi	p	CAS	-	-
								Field	126	125	167	ppi	P	CAS		
								Field	124	127	169	ppi	P	CAS		
3-009	f	d	3-032-033	107-N	1110	GM	3/12/2010	Lab	130	126	179	ppi	p	CAS	-	-
								Field	124	130	174	ppi	P	CAS		
								Field	124	132	167	ppi	P	CAS		
3-010	f	d	3-034-035	45-W	20431	AM	3/12/2010	Lab	121	122	179	ppi	p	CAS	-	-
								Field	132	129	169	ppi	P	CAS		
								Field	129	131	164	ppi	P	CAS		
3-011	f	d	1-038-039	26-N	20431	AM	3/12/2010	Lab	124	125	178	ppi	p	CAS	-	-
								Field	132	133	170	ppi	P	CAS		
								Field	132	135	168	ppi	P	CAS		
3-012	f	d	1-036-037	4-W	1110	GM	3/12/2010	Lab	144	140	153	ppi	p	CAS	-	-
								Field	141	135	160	ppi	P	CAS		
								Field	139	142	153	ppi	P	CAS		

Comments:



## Destructive Test Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Test Reqs:	Fusion:	Peel Inside: <u>91</u>	Peel Outside: <u>91</u>	Shear: <u>120</u>
	Extrusion:	Peel: <u>78</u>	Shear: <u>120</u>	

Primary / Secondary: <u>Secondary</u>	Series: <u>2</u>	MaterialType: <u>2</u>
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Sample Data								Test Data						Re test 1	Re test 2	
Samp No	Weld Type	Track Type	Location		Mach ID	Oper ID	Date Samp	Peel		Shear	Unit ppi/psi	Result (P/F)	QA ID			
			Seam	Dist. (ft.)				Inside	Outside							
2-001	f	d	2-004-005	12-E	20431	AM	3/15/2010	Lab	134	133	181	ppi	p	CAS	+	-
								Field	120	123	164	ppi	P	CAS		
								Field	127	118	161	ppi	P	CAS		
2-002	f	d	2-009-010	20-E	1110	GM	3/15/2010	Lab	129	142	167	ppi	p	CAS	-	-
								Field	129	121	158	ppi	P	CAS		
								Field	127	131	154	ppi	P	CAS		
2-003	f	d	2-001-012	173-N	20431	AM	3/18/2010	Lab	125	121	184	ppi	p	CAS	-	-
								Field	122	131	161	ppi	P	CAS		
								Field	117	131	154	ppi	P	CAS		
2-004	f	d	2-014-015	125-N	20431	AM	3/18/2010	Lab	125	130	185	ppi	p	CAS	-	-
								Field	139	118	150	ppi	P	CAS		
								Field	131	116	160	ppi	P	CAS		
2-005	f	d	2-018-019	7-E	20431	AM	3/18/2010	Lab	145	143	162	ppi	p	CAS	-	-
								Field	136	137	157	ppi	P	CAS		
								Field	133	142	161	ppi	P	CAS		
2-006	f	d	2-020-022	20-N	20431	AM	3/12/2010	Lab	128	123	183	ppi	p	CAS	-	-
								Field	128	124	165	ppi	P	CAS		
								Field	126	129	161	ppi	P	CAS		
2-007	f	d	2-023-024	160-N	20431	AM	3/19/2010	Lab	121	124	187	ppi	p	CAS	-	-
								Field	131	128	167	ppi	P	CAS		
								Field	129	126	165	ppi	P	CAS		



## Destructive Test Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Test Reqs:	Fusion:	Peel Inside: <u>91</u>	Peel Outside: <u>91</u>	Shear: <u>120</u>
	Extrusion:	Peel: <u>78</u>	Shear: <u>120</u>	

Primary / Secondary: <u>Secondary</u>	Series: <u>2</u>	MaterialType: <u>2</u>
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Sample Data								Test Data						Re test 1	Re test 2	
Samp No	Weld Type	Track Type	Location		Mach ID	Oper ID	Date Samp	Peel		Shear	Unit pp/psi	Result (P/F)	QA ID			
			Seam	Dist. (ft.)				Inside	Outside							
2-008	f	d	2-026-027	107-N	20431	AM	3/19/2010	Lab	125	147	188	ppi	p	CAS	-	-
								Field	133	129	162	ppi	P	CAS		
								Field	130	128	165	ppi	P	CAS		
2-009	f	d	2-030-032	60-N	20431	AM	3/19/2010	Lab	123	122	182	ppi	p	CAS	-	-
								Field	131	130	166	ppi	P	CAS		
								Field	133	131	164	ppi	P	CAS		
2-010	f	d	2-035-036	120-N	20431	AM	3/22/2010	Lab	132	121	180	ppi	p	CAS	-	-
								Field	130	135	164	ppi	P	LKH		
								Field	127	132	163	ppi	P	LKH		
2-011	f	d	2-037-041	93-N	20431	AM	3/22/2010	Lab	125	122	172	ppi	p	CAS	-	-
								Field	143	141	155	ppi	P	LKH		
								Field	148	136	158	ppi	P	LKH		
2-012	f	d	2-042-043	18-E	20431	AM	3/22/2010	Lab	145	133	183	ppi	p	CAS	-	-
								Field	132	138	166	ppi	P	LKH		
								Field	134	135	165	ppi	P	LKH		
2-013	e	s	2-042-043	18-E	5117	AM	3/24/2010	Lab	N/A	112	172	ppi	p	CAS	-	-
								Field	N/A	118	151	ppi	P	LKH		
								Field	N/A	107	141	ppi	P	LKH		

Comments:





## Destructive Test Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Test Reqs:	Fusion:	Peel Inside: <u>91</u>	Peel Outside: <u>91</u>	Shear: <u>120</u>
	Extrusion:	Peel: <u>78</u>	Shear: <u>120</u>	

Primary / Secondary: <u>Primary</u>	Series: <u>1</u>	MaterialType: <u>2</u>
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Samp No	Weld Type	Track Type	Sample Data					Lab	Test Data					Re test 1	Re test 2	
			Location		Mach ID	Oper ID	Date Samp		Peel		Shear	Unit ppi/psi	Result (P/F)			QA ID
			Seam	Dist. (ft.)					Inside	Outside						
1-001	f	d	1-006-007	14-W	20431	AM	3/22/2010	Lab	134	124	187	ppi	p	LKH	-	-
								Field	128	122	162	ppi	P	LKH		
								Field	131	124	154	ppi	P	LKH		
1-002	f	d	1-001-005	68-N	20431	AM	3/22/2010	Lab	141	152	170	ppi	p	LKH	-	-
								Field	135	132	158	ppi	P	LKH		
								Field	137	129	163	ppi	P	LKH		
1-003	f	d	1-014-015	67-N	20431	AM	3/23/2010	Lab	117	125	186	ppi	p	LKH	-	-
								Field	124	133	150	ppi	P	LKH		
								Field	127	132	167	ppi	P	LKH		
1-004	f	d	1-018-019	11-W	20431	AM	3/23/2010	Lab	144	147	162	ppi	p	LKH	-	-
								Field	138	140	148	ppi	P	LKH		
								Field	129	133	151	ppi	P	LKH		
1-005	f	d	1-021-022	58-N	20431	AM	3/24/2010	Lab	127	130	188	ppi	p	LKH	-	-
								Field	137	148	166	ppi	P	LKH		
								Field	139	132	166	ppi	P	LKH		
1-006	c	s	1-021-022	58-N	5117	AM	3/26/2010	Lab	N/A	127	164	ppi	p	LKH	-	-
								Field	N/A	109	158	ppi	P	LKH		
								Field	N/A	105	155	ppi	P	LKH		
1-007	f	d	1-024-025	108-N	20431	AM	3/24/2010	Lab	126	122	187	ppi	p	LKH	-	-
								Field	134	129	167	ppi	P	LKH		
								Field	134	130	164	ppi	P	LKH		



## Destructive Test Log

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Test Reqs:	Fusion:	Peel Inside: <u>91</u>	Peel Outside: <u>91</u>	Shear: <u>120</u>
	Extrusion:	Peel: <u>78</u>	Shear: <u>120</u>	

Primary / Secondary: <u>Primary</u>	Series: <u>1</u>	MaterialType: <u>2</u>
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Sample Data								Test Data					Re test 1	Re test 2	
Samp No	Weld Type	Track Type	Location		Mach ID	Oper ID	Date Samp	Peel		Shear	Unit ppi/psi	Result (P/F)			QA ID
			Seam	Dist. (ft.)				Inside	Outside						

1-008	f	d	1-028-029	16-N	20431	AM	3/25/2010	Lab	123	120	186	ppi	p	LKH	-	-
								Field	135	136	168	ppi	P	LKH		
								Field	135	132	164	ppi	P	LKH		

1-009	f	d	1-031-032	8-W	20431	AM	3/25/2010	Lab	135	147	161	ppi	p	LKH	-	-
								Field	143	140	155	ppi	P	LKH		
								Field	146	140	152	ppi	P	LKH		

1-010	f	d	1-033-034	94-N	20431	AM	3/25/2010	Lab	124	134	187	ppi	p	LKH	-	-
								Field	136	132	154	ppi	P	LKH		
								Field	137	128	160	ppi	P	LKH		

1-011	f	d	1-037-038	21-N	20431	AM	3/25/2010	Lab	155	145	167	ppi	p	LKH	-	-
								Field	145	138	162	ppi	P	LKH		
								Field	146	138	158	ppi	P	LKH		

1-012	f	d	1-040-041	8-W	20431	AM	3/25/2010	Lab	129	122	182	ppi	p	LKH	-	-
								Field	133	134	165	ppi	P	LKH		
								Field	135	132	166	ppi	P	LKH		

1-013	f	d	1-045-046	12-E	1110	AM	5/14/2010	Lab	127	132	191	ppi	p	CAS	-	-
								Field	130	132	148	ppi	P	CAS		
								Field	125	130	150	ppi	P	CAS		

Comments:



**Appendix J**  
**Geomembrane Destructive Sample Test Results**





# Precision Geosynthetic Laboratories



March 13, 2010

Mike Minch  
*Geosyntec Consultants*  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: *Kekaha LF Seam Testing*

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the testing of eight (8) HDPE Seam samples specified on the proceeding sheet which were received on March 13, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. *Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.* On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100163)



# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

**VERIFICATION OF MATERIAL PROPERTIES**  
(PGL Job No. G100163)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 13, 2010

**DATE REPORTED:** March 13, 2010

**SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS B-1 B6/B5	64985
DS B-2 B2/B3	64986
DS B-3 B6/B1	64987
DS B-4 B4/B13	64988
DS B-5 B17/B16	64989
DS B-6 B22/B20	64990
DS B-7 B25/B23	64991
DS B-8 B27/B28	64992

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:**

The test results are summarized in Tables 1 to 4.

**PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director

**TAB # 1.**  
**SEAM PEEL AND R TEST RESULTS**

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **13-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100163**

QC'd By: **Byer**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **13-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS B-1 B6/B5	64985	181	> 50%	BRK		1 Outside	127	0	SE1				
		177	> 50%	BRK		2 Outside	132	0	SE1				
		176	> 50%	BRK		3 Outside	119	0	SE1				
		174	> 50%	BRK		4 Outside	154	0	SE1				
		175	> 50%	BRK		5 Outside	140	0	SE1				
		AVG:		177			121	AVG:	134				91
		STD. DEV.		3				STD. DEV.	13				
								1 Inside	126		0	SE1	
								2 Inside	125		0	SE1	
								3 Inside	125		0	SE1	
								4 Inside	125		0	SE1	
					5 Inside	127	0	SE1					
AVG:		177		121	AVG:	126			91				
STD. DEV.		3			STD. DEV.	1							
DS B-2 B2/B3	64986	160	> 50%	BRK		1 Outside	155	0	SE1				
		164	> 50%	BRK		2 Outside	130	0	SE1				
		162	> 50%	BRK		3 Outside	145	0	SE1				
		163	> 50%	BRK		4 Outside	141	0	SE1				
		160	> 50%	BRK		5 Outside	140	0	SE1				
		AVG:		162			121	AVG:	142				91
		STD. DEV.		2				STD. DEV.	9				
								1 Inside	138		0	SE1	
								2 Inside	136		0	SE1	
								3 Inside	142		0	SE1	
								4 Inside	139		0	SE1	
					5 Inside	137	0	SE1					
AVG:		162		121	AVG:	138			91				
STD. DEV.		2			STD. DEV.	2							

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD: ADHESION FAILURE.  
 BRK: BREAK IN SHEETING.  
 SE1: BREAK AT OUTER EDGE OF SEAM.  
 SE2: BREAK AT INNER EDGE OF SEAM.  
 AD-BRK: BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP: SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1: ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
 AD2: ADHESION FAILURE.  
 AD-WLD: BREAK THROUGH THE FILLET.  
 SE1: BREAK AT BOTTOM EDGE OF SEAM.  
 SE2: BREAK AT TOP EDGE OF SEAM.  
 SE3: BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BRK1: BREAK IN BOTTOM SHEETING.  
 BRK2: BREAK IN TOP SHEETING.  
 AD-BRK: BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 HT: BREAK AT EDGE OF HOT TACK  
 SIP: SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, in the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



**Precision Geosynthetic Laboratories**



**TABLE 2.  
SEAM PEEL AND SHEAR TEST RESULTS**



CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **13-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100163**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **13-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS B-3 B6/B1	64987	159	> 50%	BRK		1 Outside	139	0	SE1				
		160	> 50%	BRK		2 Outside	152	0	SE1				
		161	> 50%	BRK		3 Outside	143	0	SE1				
		156	> 50%	BRK		4 Outside	151	0	SE1				
		161	> 50%	BRK		5 Outside	148	0	SE1				
		AVG:						147					91
		STD. DEV.						6					
								1 Inside	137		0	SE1	
								2 Inside	141		0	SE1	
								3 Inside	122		0	SE1	
					4 Inside	135	0	SE1					
					5 Inside	139	0	SE1					
AVG:		159			121	135			91				
STD. DEV.		2				7							
DS B-4 B4/B13	64988	183	> 50%	BRK		1 Outside	120	0	SE1				
		173	> 50%	BRK		2 Outside	134	0	SE1				
		178	> 50%	BRK		3 Outside	124	0	SE1				
		183	> 50%	BRK		4 Outside	122	0	SE1				
		180	> 50%	BRK		5 Outside	125	0	SE1				
		AVG:						125					91
		STD. DEV.						5					
								1 Inside	145		0	SE1	
								2 Inside	124		0	SE1	
								3 Inside	148		0	SE1	
					4 Inside	141	0	SE1					
					5 Inside	132	0	SE1					
AVG:		179			121	138			91				
STD. DEV.		4				10							

**BREAK DESCRIPTION (ASTM D6392 FUSION);**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION;**

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
 AD2 ADHESION FAILURE.  
 AD-WLD BREAK THROUGH THE FILLET.  
 SE1 BREAK AT BOTTOM EDGE OF SEAM.  
 SE2 BREAK AT TOP EDGE OF SEAM.  
 SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BRK1 BREAK IN BOTTOM SHEETING.  
 BRK2 BREAK IN TOP SHEETING.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 HT BREAK AT EDGE OF HOT TACK  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

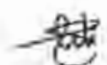


**Precision Geosynthetic Laboratories**





**TAF 7.**  
**SEAM PEEL AND TAP TEST RESULTS**



CLIENT: **Geosyntec Consultants**  
PROJECT: **Kekaha LF Seam Testing**  
DATE REC'D: **13-Mar-10**

MATERIAL: **HDPE SEAM**  
SEAM TYPE: **Fusion Weld**  
PGL JOB #: **G100163**

QC'd By: **Byeo**  
TEST METHOD: **ASTM D6392**  
DATE REPORT: **13-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS B-5 B17/B16	64989	179	> 50%	BRK		1 Outside	138	0	SE1				
		180	> 50%	BRK		2 Outside	141	0	SE1				
		180	> 50%	BRK		3 Outside	144	0	SE1				
		175	> 50%	BRK		4 Outside	148	0	SE1				
		179	> 50%	BRK		5 Outside	154	0	SE1				
		AVG:		178				AVG:	145				91
		STD. DEV.		2				STD. DEV.	6				
								1 Inside	128		0	SE1	
								2 Inside	120		0	SE1	
								3 Inside	139		0	SE1	
					4 Inside	123	0	SE1					
					5 Inside	129	0	SE1					
AVG:		178			AVG:	127			91				
STD. DEV.		2			STD. DEV.	8							
DS B-6 B22/B20	64990	175	> 50%	BRK		1 Outside	130	0	SE1				
		180	> 50%	BRK		2 Outside	130	0	SE1				
		182	> 50%	BRK		3 Outside	125	0	SE1				
		180	> 50%	BRK		4 Outside	132	0	SE1				
		179	> 50%	BRK		5 Outside	127	0	SE1				
		AVG:		179				AVG:	129				91
		STD. DEV.		3				STD. DEV.	3				
								1 Inside	131		0	SE1	
								2 Inside	130		0	SE1	
								3 Inside	128		0	SE1	
					4 Inside	128	0	SE1					
					5 Inside	127	0	SE1					
AVG:		179			AVG:	129			91				
STD. DEV.		3			STD. DEV.	2							

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD ADHESION FAILURE.  
BRK BREAK IN SHEETING.  
SE1 BREAK AT OUTER EDGE OF SEAM.  
SE2 BREAK AT INNER EDGE OF SEAM.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
SIF SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
AD2 ADHESION FAILURE.  
AD-WLD BREAK THROUGH THE FILLET.  
SE1 BREAK AT BOTTOM EDGE OF SEAM.  
SE2 BREAK AT TOP EDGE OF SEAM.  
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).  
BRK1 BREAK IN BOTTOM SHEETING.  
BRK2 BREAK IN TOP SHEETING.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
HT BREAK AT EDGE OF HOT TACK.  
SIF SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories



**TABLE 4.  
SEAM PEEL AND SHEAR TEST RESULTS**

*[Signature]*  
QC'd By: **Byeo**

CLIENT: **Geosyntec Consultants**  
PROJECT: **Kekaha LF Seam Testing**  
DATE REC'D: **13-Mar-10**

MATERIAL: **HDPE SEAM**  
SEAM TYPE: **Fusion Weld**  
PGL JOB #: **G100163**

TEST METHOD: **ASTM D6392**  
DATE REPORT: **13-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS B-7 B25/B23	64991	182	> 50%	BRK		1 Outside	114	0	SE1				
		179	> 50%	BRK		2 Outside	124	0	SE1				
		183	> 50%	BRK		3 Outside	120	0	SE1				
		183	> 50%	BRK		4 Outside	124	0	SE1				
		183	> 50%	BRK		5 Outside	118	0	SE1				
		AVG:		120					91				
		STD. DEV.		4									
AVG:		121				91							
STD. DEV.		2											
DS B-8 B27/B28	64992	183	> 50%	BRK		1 Outside	122	0	SE1				
		185	> 50%	BRK		2 Outside	124	0	SE1				
		176	> 50%	BRK		3 Outside	120	0	SE1				
		182	> 50%	BRK		4 Outside	120	0	SE1				
		183	> 50%	BRK		5 Outside	122	0	SE1				
		AVG:		122					91				
		STD. DEV.		2									
AVG:		121				91							
STD. DEV.		4											

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
BRK BREAK IN SHEETING.  
SE1 BREAK AT OUTER EDGE OF SEAM.  
SE2 BREAK AT INNER EDGE OF SEAM.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
AD2 ADHESION FAILURE.  
AD-WLD BREAK THROUGH THE FILLET.  
SE1 BREAK AT BOTTOM EDGE OF SEAM.  
SE2 BREAK AT TOP EDGE OF SEAM.  
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
BRK1 BREAK IN BOTTOM SHEETING.  
BRK2 BREAK IN TOP SHEETING.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
HT BREAK AT EDGE OF HOT TACK.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report, and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





# Precision Geosynthetic Laboratories



March 16, 2010

Mike Minch  
*Geosyntec Consultants*  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: *Kekaha LF Seam Testing*

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the testing of four (4) HDPE Seam samples specified on the proceeding sheet which were received on March 16, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. *Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.* On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100169)



# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

**VERIFICATION OF MATERIAL PROPERTIES**  
(PGL Job No. G100169)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 16, 2010

**DATE REPORTED:** March 16, 2010

**SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS-B9 B33/B32	65012
DS-B10 B35/B34	65013
DS-B11 B39/B38	65014
DS-B12 B36/B37	65015

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:**

The test results are summarized in Tables 1 and 2.

**PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director



# SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **16-Mar-10**

SEAM TYPE: **HDPE SEAM**  
 TYPE: **Fusion Weld**  
 PGL JOB #: **G100169**

QC'd By: **Byl**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **16-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS-B9 B33/B32	65012	182	> 50%	BRK		1 Outside	128	0	SE1				
		174	> 50%	BRK		2 Outside	132	0	SE1				
		184	> 50%	BRK		3 Outside	122	0	SE1				
		173	> 50%	BRK		4 Outside	123	0	SE1				
		184	> 50%	BRK		5 Outside	126	0	SE1				
		<b>AVG:</b>						<b>126</b> ✓					91
		<b>STD. DEV.</b>						<b>4</b>					
								1 Inside	129		0	SE1	
								2 Inside	132		0	SE1	
								3 Inside	126		0	SE1	
					4 Inside	135	0	SE1					
					5 Inside	129	0	SE1					
<b>AVG:</b>		<b>179</b> ✓			<b>121</b>	<b>130</b> ✓				91			
<b>STD. DEV.</b>		<b>6</b>				<b>3</b>							
DS-B10 B35/B34	65013	178	> 50%	BRK		1 Outside	122	0	SE1				
		175	> 50%	BRK		2 Outside	123	0	SE1				
		182	> 50%	BRK		3 Outside	118	0	SE1				
		180	> 50%	BRK		4 Outside	126	0	SE1				
		180	> 50%	BRK		5 Outside	120	0	SE1				
		<b>AVG:</b>						<b>122</b> ✓					91
		<b>STD. DEV.</b>						<b>3</b>					
								1 Inside	119		0	SE1	
								2 Inside	122		0	SE1	
								3 Inside	122		0	SE1	
					4 Inside	119	0	SE1					
					5 Inside	122	0	SE1					
<b>AVG:</b>		<b>179</b> ✓			<b>121</b>	<b>121</b> ✓				91			
<b>STD. DEV.</b>		<b>3</b>				<b>1</b>							

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
 AD2 ADHESION FAILURE.  
 AD-WLD BREAK THROUGH THE FILLET.  
 SE1 BREAK AT BOTTOM EDGE OF SEAM.  
 SE2 BREAK AT TOP EDGE OF SEAM.  
 SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).  
 BRK1 BREAK IN BOTTOM SHEETING.  
 BRK2 BREAK IN TOP SHEETING.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 HT BREAK AT EDGE OF HOT TACK.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

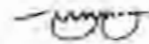
By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories



### SEAM PEEL AND SHEAR TEST RESULTS



CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **16-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100169**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **16-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-B11 B39/B38	65014	180	> 50%	BRK		1 Outside	122	0	SE1	
		179	> 50%	BRK		2 Outside	118	0	SE1	
		181	> 50%	BRK		3 Outside	120	0	SE1	
		172	> 50%	BRK		4 Outside	125	0	SE1	
		179	> 50%	BRK		5 Outside	140	0	SE1	
		AVG:		178				121	125	
STD. DEV.		4				9				
DS-B12 B36/B37	65015	153	> 50%	BRK		1 Inside	128	0	SE1	
		152	> 50%	BRK		2 Inside	123	0	SE1	
		154	> 50%	BRK		3 Inside	124	0	SE1	
		150	> 50%	BRK		4 Inside	127	0	SE1	
		155	> 50%	BRK		5 Inside	115	0	SE1	
		AVG:		153				121	124	
STD. DEV.		2				5				
AVG:		153			121	144			91	
STD. DEV.		2				4				

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

**ADHESION FAILURE: SPECIMENS DELAMINATED UNDER THE BEAD.**

ADHESION FAILURE.  
 BREAK THROUGH THE FILLET.  
 BREAK AT BOTTOM EDGE OF SEAM.  
 BREAK AT TOP EDGE OF SEAM.  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).  
 BREAK IN BOTTOM SHEETING.  
 BREAK IN TOP SHEETING.  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 BREAK AT EDGE OF HOT TACK.  
 SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report, and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





# Precision Geosynthetic Laboratories



March 18, 2010

Mike Minch  
**Geosyntec Consultants**  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: **Kekaha LF Seam Testing**

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the testing of two (2) HDPE Seam samples specified on the proceeding sheet which were received on March 18, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100177)



# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

**VERIFICATION OF MATERIAL PROPERTIES**  
(PGL Job No. G100177)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 18, 2010

**DATE REPORTED:** March 18, 2010

**SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS-S-1 S5/S4	65036
DS-S-2 S10/S9	65037

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:**

The test results are summarized in Table 1.

**PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director



## SEAM PEEL AND SHFAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **18-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100177**

QC'd By: **Bye**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **18-Mar-10**

Crosshead Speed: 2 in/min					Crosshead Speed: 2 in/min					
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION			PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	PEEL EVALUATION			PROJECT SPEC. (lb/in width)
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break			MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	
DS-S-1 S5/S4	65036	180	> 50%	BRK		1 Outside	141	0	SE1	
		183	> 50%	BRK		2 Outside	134	0	SE1	
		181	> 50%	BRK		3 Outside	137	0	SE1	
		182	> 50%	BRK		4 Outside	124	0	SE1	
		180	> 50%	BRK		5 Outside	130	0	SE1	
		<b>AVG:</b>	<b>181</b> ✓				<b>121</b>	<b>AVG:</b>	<b>133</b> ✓	
<b>STD. DEV.</b>	<b>1</b>				<b>STD. DEV.</b>	<b>7</b>				
DS-S-2 S10/S9	65037	168	> 50%	BRK		1 Inside	137	0	SE1	
		164	> 50%	BRK		2 Inside	135	0	SE1	
		168	> 50%	BRK		3 Inside	132	0	SE1	
		167	> 50%	BRK		4 Inside	134	0	SE1	
		167	> 50%	BRK		5 Inside	134	0	SE1	
		<b>AVG:</b>	<b>167</b> ✓				<b>121</b>	<b>AVG:</b>	<b>134</b> ✓	
<b>STD. DEV.</b>	<b>2</b>				<b>STD. DEV.</b>	<b>2</b>				
		168	> 50%	BRK		1 Outside	144	0	SE1	
		164	> 50%	BRK		2 Outside	137	0	SE1	
		168	> 50%	BRK		3 Outside	143	0	SE1	
		167	> 50%	BRK		4 Outside	146	0	SE1	
		167	> 50%	BRK		5 Outside	142	0	SE1	
		<b>AVG:</b>	<b>167</b> ✓				<b>121</b>	<b>AVG:</b>	<b>142</b> ✓	
<b>STD. DEV.</b>	<b>2</b>				<b>STD. DEV.</b>	<b>3</b>				
<b>AVG:</b>		<b>167</b> ✓			<b>121</b>	<b>AVG:</b>	<b>129</b> ✓			<b>91</b>
<b>STD. DEV.</b>		<b>2</b>				<b>STD. DEV.</b>	<b>3</b>			

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
 AD2 ADHESION FAILURE.  
 AD-WLD BREAK THROUGH THE FILLET.  
 SE1 BREAK AT BOTTOM EDGE OF SEAM.  
 SE2 BREAK AT TOP EDGE OF SEAM.  
 SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BRK1 BREAK IN BOTTOM SHEETING.  
 BRK2 BREAK IN TOP SHEETING.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 HT BREAK AT EDGE OF HOT TACK  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or issues, due to the use of this data, to the cost for the respective tests presented in this report and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





# Precision Geosynthetic Laboratories



March 20, 2010

Mike Minch  
**Geosyntec Consultants**  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: **Kekaha LF Seam Testing**

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the **final** laboratory report for the testing of four (4) HDPE Seam samples specified on the proceeding sheet which were received on March 20, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. **Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100192)



# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

**VERIFICATION OF MATERIAL PROPERTIES**  
(PGL Job No. G100192)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 20, 2010

**DATE REPORTED:** March 20, 2010

**SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS-S-3 S1/S12	65082
DS-S-4 S14/S15	65083
DS-S-5 S18/S19	65084
DS-S-6 S20/S22	65085

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:**

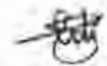
The test results are summarized in Tables 1 to 2.

**PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director

**TAB 1**  
**SEAM PEEL AND R TEST RESULTS**



CLIENT: **Geosyntec Consultants**  
PROJECT: **Kekaha LF Seam Testing**  
DATE REC'D: **20-Mar-10**

MATERIAL: **HDPE SEAM**  
SEAM TYPE: **Fusion Weld**  
PGL JOB #: **G100192**

QC'd By: **Byeo**  
TEST METHOD: **ASTM D6392**  
DATE REPORT: **20-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS-S-3 S1/S12	65082	181	> 50%	BRK	121	1 Outside	120	0	SE1	91			
		182	> 50%	BRK		2 Outside	128	0	SE1				
		188	> 50%	BRK		3 Outside	118	0	SE1				
		187	> 50%	BRK		4 Outside	123	0	SE1				
		185	> 50%	BRK		5 Outside	120	0	SE1				
		AVG:		184 ✓				AVG:	121 ✓				
		STD. DEV.		3				STD. DEV.	3				
		1 Inside	120	0		SE1							
		2 Inside	132	0		SE1							
		3 Inside	127	0		SE1							
		4 Inside	127	0		SE1							
5 Inside	121	0	SE1										
AVG:		184 ✓			AVG:	125 ✓			91				
STD. DEV.		3			STD. DEV.	5							
DS-S-4 S14/S15	65083	188	> 50%	BRK	121	1 Outside	133	0	SE1	91			
		183	> 50%	BRK		2 Outside	132	0	SE1				
		187	> 50%	BRK		3 Outside	125	0	SE1				
		184	> 50%	BRK		4 Outside	126	0	SE1				
		186	> 50%	BRK		5 Outside	132	0	SE1				
		AVG:		185 ✓				AVG:	130 ✓				
		STD. DEV.		2				STD. DEV.	4				
		1 Inside	144	0		SE1							
		2 Inside	123	0		SE1							
		3 Inside	114	0		SE1							
		4 Inside	123	0		SE1							
5 Inside	122	0	SE1										
AVG:		185 ✓			AVG:	125 ✓			91				
STD. DEV.		2			STD. DEV.	11							

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
BRK BREAK IN SHEETING.  
SE1 BREAK AT OUTER EDGE OF SEAM.  
SE2 BREAK AT INNER EDGE OF SEAM.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
AD2 ADHESION FAILURE.  
AD-WLD BREAK THROUGH THE FILLET.  
SE1 BREAK AT BOTTOM EDGE OF SEAM.  
SE2 BREAK AT TOP EDGE OF SEAM.  
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
BRK1 BREAK IN BOTTOM SHEETING.  
BRK2 BREAK IN TOP SHEETING.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
HT BREAK AT EDGE OF HOT TACK.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





**TABLE 2.  
SEAM PEEL AND SHEAR TEST RESULTS**

CLIENT: **Geosyntec Consultants**  
PROJECT: **Kekaha LF Seam Testing**  
DATE REC'D: **20-Mar-10**

MATERIAL: **HDPE SEAM**  
SEAM TYPE: **Fusion Weld**  
PGL JOB #: **G100192**

QC'd By: **Byeo**  
TEST METHOD: **ASTM D6392**  
DATE REPORT: **20-Mar-10**



Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS-S-5 S18/S19	65084	158	> 50%	BRK	121	1 Outside	140	0	SE1	91			
		161	> 50%	BRK		2 Outside	140	0	SE1				
		165	> 50%	BRK		3 Outside	150	0	SE1				
		163	> 50%	BRK		4 Outside	145	0	SE1				
		162	> 50%	BRK		5 Outside	140	0	SE1				
		AVG:		143				AVG:	143				
		STD. DEV.		4				STD. DEV.	4				
								1 Inside	144		0	SE1	
								2 Inside	141		0	SE1	
								3 Inside	146		0	SE1	
								4 Inside	143		0	SE1	
					5 Inside	151	0	SE1					
AVG:		162			AVG:	145			91				
STD. DEV.		2			STD. DEV.	4							
DS-S-6 S20/S22	65085	183	> 50%	BRK	121	1 Outside	119	0	SE1	91			
		184	> 50%	BRK		2 Outside	123	0	SE1				
		179	> 50%	BRK		3 Outside	118	0	SE1				
		186	> 50%	BRK		4 Outside	120	0	SE1				
		184	> 50%	BRK		5 Outside	136	0	SE1				
		AVG:		183				AVG:	123				
		STD. DEV.		2				STD. DEV.	7				
								1 Inside	126		0	SE1	
								2 Inside	128		0	SE1	
								3 Inside	124		0	SE1	
								4 Inside	130		0	SE1	
					5 Inside	132	0	SE1					
AVG:		183			AVG:	128			91				
STD. DEV.		2			STD. DEV.	3							

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
BRK BREAK IN SHEETING.  
SE1 BREAK AT OUTER EDGE OF SEAM.  
SE2 BREAK AT INNER EDGE OF SEAM.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
AD2  
AD-WLD  
SE1  
SE2  
SE3  
BRK1  
BRK2  
AD-BRK  
HT  
SIP

ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
ADHESION FAILURE.  
BREAK THROUGH THE FILLET.  
BREAK AT BOTTOM EDGE OF SEAM.  
BREAK AT TOP EDGE OF SEAM.  
BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
BREAK IN BOTTOM SHEETING.  
BREAK IN TOP SHEETING.  
BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
BREAK AT EDGE OF HOT TACK  
SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



**Precision Geosynthetic Laboratories**





# Precision Geosynthetic Laboratories



March 23, 2010

Mike Minch  
**Geosyntec Consultants**  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: **Kekaha LF Seam Testing**

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the testing of three (3) HDPE Seam samples specified on the proceeding sheet which were received on March 23, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. **Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100198)



# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

**VERIFICATION OF MATERIAL PROPERTIES**  
(PGL Job No. G100198)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 23, 2010

**DATE REPORTED:** March 23, 2010

**SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS-S-7 S24/S23	65117
DS-S-8 S26/S27	65118
DS-S-9 S32/S30	65119

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:**

The test results are summarized in Tables 1 and 2.

**PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director

## SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **23-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100198**

QC'd By: **By**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **23-Mar-10**

Crosshead Speed: 2 in/min					Crosshead Speed: 2 in/min					
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION			PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	PEEL EVALUATION			PROJECT SPEC. (lb/in width)
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break			MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	
DS- 7 S24/S23	65117	188	> 50%	BRK		1 Outside	118	0	SE1	
		189	> 50%	BRK		2 Outside	130	0	SE1	
		188	> 50%	BRK		3 Outside	120	0	SE1	
		186	> 50%	BRK		4 Outside	128	0	SE1	
		184	> 50%	BRK		5 Outside	124	0	SE1	
		AVG:		124				AVG:		
STD. DEV.		5			STD. DEV.		5			
		116	0	SE1		1 Inside	116	0	SE1	
		120	0	SE1		2 Inside	120	0	SE1	
		121	0	SE1		3 Inside	121	0	SE1	
		126	0	SE1		4 Inside	126	0	SE1	
		122	0	SE1		5 Inside	122	0	SE1	
		AVG:		121				AVG:		
STD. DEV.		4			STD. DEV.		4			
DS- 8 S26/S27	65118	188	> 50%	BRK		1 Outside	148	0	SE1	
		186	> 50%	BRK		2 Outside	152	0	SE1	
		187	> 50%	BRK		3 Outside	150	0	SE1	
		188	> 50%	BRK		4 Outside	146	0	SE1	
		190	> 50%	BRK		5 Outside	140	0	SE1	
		AVG:		147				AVG:		
STD. DEV.		5			STD. DEV.		5			
		122	0	SE1		1 Inside	122	0	SE1	
		140	0	SE1		2 Inside	140	0	SE1	
		122	0	SE1		3 Inside	122	0	SE1	
		124	0	SE1		4 Inside	124	0	SE1	
		116	0	SE1		5 Inside	116	0	SE1	
		AVG:		125				AVG:		
STD. DEV.		9			STD. DEV.		9			

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
 ADHESION FAILURE.  
 BREAK THROUGH THE FILLET.  
 BREAK AT BOTTOM EDGE OF SEAM.  
 BREAK AT TOP EDGE OF SEAM.  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BREAK IN BOTTOM SHEETING.  
 BREAK IN TOP SHEETING.  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 BREAK AT EDGE OF HOT TACK.  
 SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or issues, due to the use of this data, to the cost for the respective tests presented in this report, and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

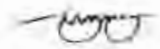


Precision Geosynthetic Laboratories





## SEAM PEEL AND SHEAR TEST RESULTS



CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **23-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100198**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6382**  
 DATE REPORT: **23-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-9 S32/S30	65119	180	> 50%	BRK		1 Outside	120	0	SE1	
		181	> 50%	BRK		2 Outside	138	0	SE1	
		183	> 50%	BRK		3 Outside	120	0	SE1	
		184	> 50%	BRK		4 Outside	126	0	SE1	
		182	> 50%	BRK		5 Outside	108	0	SE1	
				AVG: 182 ✓				AVG: 122 ✓		
		STD. DEV. 2		121	STD. DEV. 11					
		AVG: 182 ✓			1 Inside	130	0	SE1		
		STD. DEV. 2			2 Inside	115	0	SE1		
					3 Inside	120	0	SE1		
					4 Inside	126	0	SE1		
					5 Inside	122	0	SE1		
		AVG: 123 ✓			AVG: 123 ✓					91
		STD. DEV. 6			STD. DEV. 6					

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE  
 BRK BREAK IN SHEETING  
 SE1 BREAK AT OUTER EDGE OF SEAM  
 SE2 BREAK AT INNER EDGE OF SEAM  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE  
 SIP SEPARATION IN THE PLANE OF THE SHEET

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

ADHESION FAILURE: SPECIMENS DELAMINATED UNDER THE BEAD.  
 ADHESION FAILURE  
 BREAK THROUGH THE FILLET  
 BREAK AT BOTTOM EDGE OF SEAM  
 BREAK AT TOP EDGE OF SEAM  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BREAK IN BOTTOM SHEETING  
 BREAK IN TOP SHEETING  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE  
 BREAK AT EDGE OF HOT TACK  
 SEPARATION IN THE PLANE OF THE SHEET

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



**Precision Geosynthetic Laboratories**





# Precision Geosynthetic Laboratories



March 25, 2010

Mike Minch  
**Geosyntec Consultants**  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: **Kekaha LF Seam Testing**

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the testing of eight (8) HDPE Seam samples specified on the proceeding sheet which were received on March 25, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. *Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.* On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100210)



# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

## VERIFICATION OF MATERIAL PROPERTIES (PGL Job No. G100210)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 25, 2010

**DATE REPORTED:** March 25, 2010

### **SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS DP-P-1 P7/P6	65166
DS DP-P-2 P5/P1	65167
DS DP-P-3 P15/P14	65168
DS DP-P-4 P18/P19	65169
DS-S-10 S36/S35	65170
DS-S-11 S41/S37	65171
DS-S-12 S42/S43	65172
DS-S-13 P42/P43	65173

### **TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

### **TEST RESULTS:**

The test results are summarized in Tables 1 to 4.

## **PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director

### SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **25-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100210**

QC'd By: **Bye**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **25-Mar-10**

Crosshead Speed: 2 In/min					Crosshead Speed: 2 In/min								
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION			PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	PEEL EVALUATION			PROJECT SPEC. (lb/in width)			
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break			MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK				
DS-P-1 P7/P6	65166	188	> 50%	BRK		1 Outside	126	0	SE1				
		186	> 50%	BRK		2 Outside	124	0	SE1				
		187	> 50%	BRK		3 Outside	122	0	SE1				
		190	> 50%	BRK		4 Outside	122	0	SE1				
		187	> 50%	BRK		5 Outside	125	0	SE1				
		AVG.		124				AVG:			124	91	
		STD. DEV.		2				STD. DEV.			2		
								1 Inside	157		0	SE1	
								2 Inside	120		0	SE1	
								3 Inside	126		0	SE1	
					4 Inside	116	0	SE1					
					5 Inside	152	0	SE1					
AVG.		187			AVG:		134	91					
STD. DEV.		2			STD. DEV.		19						
DS-P-2 P5/P1	65167	169	> 50%	BRK		1 Outside	160	0	SE1				
		171	> 50%	BRK		2 Outside	158	0	SE1				
		168	> 50%	BRK		3 Outside	156	0	SE1				
		170	> 50%	BRK		4 Outside	137	0	SE1				
		170	> 50%	BRK		5 Outside	150	0	SE1				
		AVG.		152				AVG:			152	91	
		STD. DEV.		9				STD. DEV.			9		
								1 Inside	142		0	SE1	
								2 Inside	148		0	SE1	
								3 Inside	144		0	SE1	
					4 Inside	136	0	SE1					
					5 Inside	138	0	SE1					
AVG.		170			AVG:		141	91					
STD. DEV.		1			STD. DEV.		4						

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

**ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD:**

ADHESION FAILURE.  
 BREAK THROUGH THE FILLET.  
 BREAK AT BOTTOM EDGE OF SEAM.  
 BREAK AT TOP EDGE OF SEAM.  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).  
 BREAK IN BOTTOM SHEETING.  
 BREAK IN TOP SHEETING.  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 BREAK AT EDGE OF HOT TACK.  
 SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the point for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





### SEAM PEEL AND SHEAR TEST RESULTS

*MOJ*

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **25-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100210**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **25-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min						
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION						
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)		
DS-P-3 P15/P14	65168	188	> 50%	BRK		1 Outside	125	0	SE1			
		188	> 50%	BRK		2 Outside	123	0	SE1			
		181	> 50%	BRK		3 Outside	122	0	SE1			
		184	> 50%	BRK		4 Outside	132	0	SE1			
		188	> 50%	BRK		5 Outside	122	0	SE1			
		AVG:		125				91				
		STD. DEV.		4								
		118	0	SE1								
		118	0	SE1								
		118	0	SE1								
		118	0	SE1								
		114	0	SE1								
AVG:		117			91							
STD. DEV.		2										
DS-P-4 P18/P19	65169	162	> 50%	BRK		1 Outside	145	0	SE1			
		163	> 50%	BRK		2 Outside	154	0	SE1			
		162	> 50%	BRK		3 Outside	142	0	SE1			
		163	> 50%	BRK		4 Outside	151	0	SE1			
		162	> 50%	BRK		5 Outside	141	0	SE1			
		AVG:		147				91				
		STD. DEV.		6								
		138	0	SE1								
		144	0	SE1								
		146	0	SE1								
		148	0	SE1								
		143	0	SE1								
AVG:		144			91							
STD. DEV.		4										

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

- AD ADHESION FAILURE.
- BRK BREAK IN SHEETING.
- SE1 BREAK AT OUTER EDGE OF SEAM.
- SE2 BREAK AT INNER EDGE OF SEAM.
- AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
- SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

- AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
- AD2 ADHESION FAILURE.
- AD-WLD BREAK THROUGH THE FILLET.
- SE1 BREAK AT BOTTOM EDGE OF SEAM.
- SE2 BREAK AT TOP EDGE OF SEAM.
- SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).
- BRK1 BREAK IN BOTTOM SHEETING.
- BRK2 BREAK IN TOP SHEETING.
- AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
- HT BREAK AT EDGE OF HOT TACK.
- SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the extent for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories



# SEAM PEEL AND SHEAR TEST RESULTS



CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **25-Mar-10**

SEAM TYPE: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100210**

QC'd By: **Bye**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **25-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS-S-10 S36/S35	65170	181	> 50%	BRK		1 Outside	122	0	SE1				
		180	> 50%	BRK		2 Outside	122	0	SE1				
		181	> 50%	BRK		3 Outside	122	0	SE1				
		180	> 50%	BRK		4 Outside	122	0	SE1				
		178	> 50%	BRK		5 Outside	116	0	SE1				
		AVG:		180 ✓				AVG:	121 ✓				91
		STD. DEV.		1			121	STD. DEV.	3				
								1 Inside	134		0	SE1	
								2 Inside	126		0	SE1	
								3 Inside	124		0	SE1	
					4 Inside	154	0	SE1					
					5 Inside	121	0	SE1					
AVG:		180 ✓			AVG:	132 ✓			91				
STD. DEV.		1			STD. DEV.	13							
DS-S-11 S41/S37	65171	170	> 50%	BRK		1 Outside	118	0	SE1				
		171	> 50%	BRK		2 Outside	126	0	SE1				
		172	> 50%	BRK		3 Outside	118	0	SE1				
		174	> 50%	BRK		4 Outside	130	0	SE1				
		171	> 50%	BRK		5 Outside	120	0	SE1				
		AVG:		172 ✓				AVG:	122 ✓				91
		STD. DEV.		1			121	STD. DEV.	5				
								1 Inside	126		0	SE1	
								2 Inside	120		0	SE1	
								3 Inside	118		0	SE1	
					4 Inside	141	0	SE1					
					5 Inside	120	0	SE1					
AVG:		172 ✓			AVG:	125 ✓			91				
STD. DEV.		1			STD. DEV.	9							

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1 ADHESION FAILURE: SPECIMENS DELAMINATED UNDER THE BEAD.  
 AD2 ADHESION FAILURE.  
 AC-WLD BREAK THROUGH THE FILLET.  
 SE1 BREAK AT BOTTOM EDGE OF SEAM.  
 SE2 BREAK AT TOP EDGE OF SEAM.  
 SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).  
 BRK1 BREAK IN BOTTOM SHEETING.  
 BRK2 BREAK IN TOP SHEETING.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 HT BREAK AT EDGE OF HOT TACK.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories



# SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **25-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100210**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **25-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-S-12 S42/S43  Fusion	65172	181	> 50%	BRK	121	1 Outside	122	0	SE1	91
		182	> 50%	BRK		2 Outside	126	0	SE1	
		183	> 50%	BRK		3 Outside	150	0	SE1	
		184	> 50%	BRK		4 Outside	149	0	SE1	
		186	> 50%	BRK		5 Outside	118	0	SE1	
		AVG: 183 ✓					AVG: 145 ✓			
STD. DEV. 2					STD. DEV. 18					
DS-S-13 P42/P43  Extrusion	65173	173	> 50%	BRK	121	1 Outside	108	0	SE3	78
		172	> 50%	BRK		2 Outside	118	0	SE3	
		171	> 50%	BRK		3 Outside	104	0	SE3	
		171	> 50%	BRK		4 Outside	120	0	SE3	
		172	> 50%	BRK		5 Outside	112	0	SE3	
		AVG: 172 ✓					AVG: 112 ✓			
STD. DEV. 1					STD. DEV. 7					
					1 Inside	N/A				
					2 Inside					
					3 Inside					
					4 Inside					
					5 Inside					
AVG: 172 ✓					AVG: 112 ✓					
STD. DEV. 1					STD. DEV. 7					

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

**ADHESION FAILURE SPECIMENS DELAMINATED UNDER THE BEAD:**

ADHESION FAILURE.  
 BREAK THROUGH THE FILLET.  
 BREAK AT BOTTOM EDGE OF SEAM.  
 BREAK AT TOP EDGE OF SEAM.  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BREAK IN BOTTOM SHEETING.  
 BREAK IN TOP SHEETING.  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 BREAK AT EDGE OF HOT TACK  
 SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





# Precision Geosynthetic Laboratories



March 27, 2010

Mike Minch  
**Geosyntec Consultants**  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612

RE: **Kekaha LF Seam Testing**

Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the testing of eight (8) HDPE Seam samples specified on the proceeding sheet which were received on March 27, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. **Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

**PRECISION GEOSYNTHETIC LABORATORIES**

Carmelo V. Zantua  
Technical/Laboratory Director

Enclosure: (Job No. G100217)





# Precision Geosynthetic Laboratories



CLIENT: *GEOSYNTEC CONSULTANTS*  
PROJECT: *Kekaha LF Seam Testing*

**VERIFICATION OF MATERIAL PROPERTIES**  
(PGL Job No. G100217)

**MATERIAL DESCRIPTION:** HDPE seams

**SAMPLES SENT BY:** Chris Scott, Geosyntec Consultants

**DATE RECEIVED:** March 27, 2010

**DATE REPORTED:** March 27, 2010

**SAMPLE IDENTIFICATIONS:**

SAMPLE ID	PGL CONTROL NUMBER
DS-P-5 P21/P22	65190
DS-P-6 P21/P22	65191
DS-P-7 P24/P25	65192
DS-P-8 P28/P29	65193
DS-P-9 P31/P32	65194
DS-P-10 P34/P33	65195
DS-P-11 P37/P38	65196
DS-P-12 P40/P41	65197

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bonded Strength
ASTM D6392	Peel Adhesion

**TEST CONDITIONS:** The samples were conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:**

The test results are summarized in Tables 1 to 4.

**PRECISION GEOSYNTHETIC LABORATORIES**



Carmelo V. Zantua  
Technical/Laboratory Director

## SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosynlec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **27-Mar-10**

TITLE: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100217**

QC'd By: **By**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **27-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-P-5 P21/P22  Fusion	65190	188	> 50%	BRK		1 Outside	120	0	SE1	
		188	> 50%	BRK		2 Outside	132	0	SE1	
		189	> 50%	BRK		3 Outside	140	0	SE1	
		187	> 50%	BRK		4 Outside	134	0	SE1	
		189	> 50%	BRK		5 Outside	126	0	SE1	
		AVG:		188 ✓				121	130 ✓	
STD. DEV.		1				8				
DS-P-6 P21/P22  Extrusion	65191	160	> 50%	BRK		1 Outside	131	0	SE3	
		172	> 50%	BRK		2 Outside	126	0	SE3	
		164	> 50%	BRK		3 Outside	122	0	SE3	
		157	> 50%	BRK		4 Outside	126	0	SE3	
		168	> 50%	BRK		5 Outside	131	0	SE3	
		AVG:		164 ✓				121	127 ✓	
STD. DEV.		6				4				
AVG:		164 ✓			121	127 ✓			78	
STD. DEV.		6				4				

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE  
 BRK BREAK IN SHEETING  
 SE1 BREAK AT OUTER EDGE OF SEAM  
 SE2 BREAK AT INNER EDGE OF SEAM  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE  
 SIP SEPARATION IN THE PLANE OF THE SHEET

**EXTRUSION:**

AD1 ADHESION FAILURE SPECIMENS DELAMINATED UNDER THE BEAD.  
 AD2 ADHESION FAILURE  
 AD-WLD BREAK THROUGH THE FILLET  
 SE1 BREAK AT BOTTOM EDGE OF SEAM  
 SE2 BREAK AT TOP EDGE OF SEAM  
 SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BRK1 BREAK IN BOTTOM SHEETING  
 BRK2 BREAK IN TOP SHEETING  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE  
 HT BREAK AT EDGE OF HOT TACK  
 SIP SEPARATION IN THE PLANE OF THE SHEET

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories



## SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **27-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100217**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **27-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-P-7 P24/P25	65192	180	> 50%	BRK		1 Outside	122	0	SE1	
		189	> 50%	BRK		2 Outside	123	0	SE1	
		188	> 50%	BRK		3 Outside	125	0	SE1	
		189	> 50%	BRK		4 Outside	135	0	SE1	
		189	> 50%	BRK		5 Outside	122	0	SE1	
AVG:						126 ✓				91
STD. DEV.						6				
AVG:		187 ✓			121	AVG:		122 ✓		91
STD. DEV.		4				STD. DEV.		1		
DS-P-8 P28/P29	65193	187	> 50%	BRK		1 Outside	121	0	SE1	
		186	> 50%	BRK		2 Outside	120	0	SE1	
		190	> 50%	BRK		3 Outside	131	0	SE1	
		183	> 50%	BRK		4 Outside	123	0	SE1	
		182	> 50%	BRK		5 Outside	121	0	SE1	
AVG:						123 ✓				91
STD. DEV.						4				
AVG:		186 ✓			121	AVG:		120 ✓		91
STD. DEV.		3				STD. DEV.		1		

- |   |   |  |
|---|---|--|
| <p><b>BREAK DESCRIPTION (ASTM D6392 FUSION):</b></p> <ul style="list-style-type: none"> <li>AD ADHESION FAILURE</li> <li>BRK BREAK IN SHEETING</li> <li>SE1 BREAK AT OUTER EDGE OF SEAM</li> <li>SE2 BREAK AT INNER EDGE OF SEAM</li> <li>AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE</li> <li>SIP SEPARATION IN THE PLANE OF THE SHEET</li> </ul> | <p><b>EXTRUSION:</b></p> <ul style="list-style-type: none"> <li>AD1</li> <li>AD2</li> <li>AD-WLD</li> <li>SE1</li> <li>SE2</li> <li>SE3</li> <li>BRK1</li> <li>BRK2</li> <li>AD-BRK</li> <li>HT</li> <li>SIP</li> </ul> | <p><b>ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.</b></p> <ul style="list-style-type: none"> <li>ADHESION FAILURE</li> <li>BREAK THROUGH THE FILLET</li> <li>BREAK AT BOTTOM EDGE OF SEAM</li> <li>BREAK AT TOP EDGE OF SEAM</li> <li>BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)</li> <li>BREAK IN BOTTOM SHEETING</li> <li>BREAK IN TOP SHEETING</li> <li>BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE</li> <li>BREAK AT EDGE OF HOT TACK</li> <li>SEPARATION IN THE PLANE OF THE SHEET</li> </ul> |
|---|---|--|

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

## SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
 OBJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **27-Mar-10**

Trial: **HDPE SEAM**  
 Seam TYPE: **Fusion Weld**  
 PGL JOB #: **G100217**

QC'd By: **By**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **27-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min				
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION				
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DS-P-9 P31/P32	65194	158	> 50%	BRK		1 Outside	140	0	SE1	
		163	> 50%	BRK		2 Outside	146	0	SE1	
		164	> 50%	BRK		3 Outside	149	0	SE1	
		158	> 50%	BRK		4 Outside	148	0	SE1	
		163	> 50%	BRK		5 Outside	149	0	SE1	
		AVG:		161 ✓				121	AVG:	
STD. DEV.		3				STD. DEV.		4		
DS-P-10 P34/P33	65195	186	> 50%	BRK		1 Outside	119	0	SE1	
		185	> 50%	BRK		2 Outside	121	0	SE1	
		189	> 50%	BRK		3 Outside	123	0	SE1	
		188	> 50%	BRK		4 Outside	126	0	SE1	
		186	> 50%	BRK		5 Outside	132	0	SE1	
		AVG:		187 ✓				121	AVG:	
STD. DEV.		2				STD. DEV.		5		
AVG:		161 ✓			121	AVG:		135 ✓		91
STD. DEV.		3				STD. DEV.		4		
AVG:		187 ✓			121	AVG:		134 ✓		91
STD. DEV.		2				STD. DEV.		9		

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
 BRK BREAK IN SHEETING.  
 SE1 BREAK AT OUTER EDGE OF SEAM.  
 SE2 BREAK AT INNER EDGE OF SEAM.  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
 ADHESION FAILURE.  
 BREAK THROUGH THE FILLET.  
 BREAK AT BOTTOM EDGE OF SEAM.  
 BREAK AT TOP EDGE OF SEAM.  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only).  
 BREAK IN BOTTOM SHEETING.  
 BREAK IN TOP SHEETING.  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 BREAK AT EDGE OF HOT TACK.  
 SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims or issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories





### SEAM PEEL AND SHEAR TEST RESULTS



CLIENT: **Geosyntec Consultants**  
 PROJECT: **Kekaha LF Seam Testing**  
 DATE REC'D: **27-Mar-10**

MATERIAL: **HDPE SEAM**  
 SEAM TYPE: **Fusion Weld**  
 PGL JOB #: **G100217**

QC'd By: **Byeo**  
 TEST METHOD: **ASTM D6392**  
 DATE REPORT: **27-Mar-10**

Crosshead Speed: 2 in/min						Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION				PEEL EVALUATION							
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)			
DS-P-11 P37/P38	65196	163	> 50%	BRK		1 Outside	155	0	SE1				
		168	> 50%	BRK		2 Outside	156	0	SE1				
		166	> 50%	BRK		3 Outside	154	0	SE1				
		170	> 50%	BRK		4 Outside	157	0	SE1				
		168	> 50%	BRK		5 Outside	153	0	SE1				
		AVG:		157 ✓			121	AVG:	155 ✓				91
		STD. DEV.		3				STD. DEV.	1				
								1 Inside	139		0	SE1	
								2 Inside	145		0	SE1	
								3 Inside	150		0	SE1	
								4 Inside	150		0	SE1	
					5 Inside	143	0	SE1					
AVG:		167 ✓		121	AVG:	145 ✓			91				
STD. DEV.		3			STD. DEV.	5							
DS-P-12 P40/P41	65197	177	> 50%	BRK		1 Outside	139	0	SE1				
		182	> 50%	BRK		2 Outside	127	0	SE1				
		184	> 50%	BRK		3 Outside	129	0	SE1				
		184	> 50%	BRK		4 Outside	132	0	SE1				
		181	> 50%	BRK		5 Outside	118	0	SE1				
		AVG:		182 ✓			121	AVG:	129 ✓				91
		STD. DEV.		3				STD. DEV.	8				
								1 Inside	127		0	SE1	
								2 Inside	122		0	SE1	
								3 Inside	119		0	SE1	
								4 Inside	122		0	SE1	
					5 Inside	120	0	SE1					
AVG:		182 ✓		121	AVG:	122 ✓			91				
STD. DEV.		3			STD. DEV.	3							

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE  
 BRK BREAK IN SHEETING  
 SE1 BREAK AT OUTER EDGE OF SEAM  
 SE2 BREAK AT INNER EDGE OF SEAM  
 AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE  
 SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1  
 AD2  
 AD-WLD  
 SE1  
 SE2  
 SE3  
 BRK1  
 BRK2  
 AD-BRK  
 HT  
 SIP

**ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.**

ADHESION FAILURE  
 BREAK THROUGH THE FILLET.  
 BREAK AT BOTTOM EDGE OF SEAM.  
 BREAK AT TOP EDGE OF SEAM.  
 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
 BREAK IN BOTTOM SHEETING.  
 BREAK IN TOP SHEETING.  
 BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
 BREAK AT EDGE OF HOT TACK.  
 SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims in issues, due to the use of this data, to the cost for the respective tests presented in this report) and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



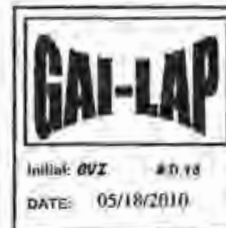
Precision G

thetic Laboratories





Mike Minch  
Geosyntec Consultants  
475 14<sup>th</sup> Street, Suite 400  
Oakland, CA 94612



Dear Mr. Minch:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the *final* laboratory report for the seam testing of one (1) HDPE Seam sample.

**PROJECT NAME:** Kekaha Landfill NLEP

**REFERENCE PGL JOB NO.:** G100509

**DATE RECEIVED:** May 18, 2010

**DATE REPORTED:** May 18, 2010

**SAMPLE SENT BY:** Chris Scott, Geosyntec Consultants

**SAMPLE IDENTIFICATIONS:**

**SAMPLE ID**  
DS-P-13 P46/P45

**PGL CONTROL NUMBER**  
66577

**TESTS REQUIRED:**

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bond Strength
ASTM D6392	Peel Bond Adhesion

**TEST CONDITIONS:** The sample was conditioned for a minimum of one hour in the laboratory at  $22 \pm 2^{\circ}\text{C}$  ( $71.6 \pm 3.6^{\circ}\text{F}$ ) and at  $60 \pm 10\%$  relative humidity prior to test.

**TEST RESULTS:** The test results are summarized in Table 1.

**PRECISION GEOSYNTHETIC LABORATORIES**

Bolinda Jade R. Yeo  
Quality Assurance


Carmelo V. Zantua  
Technical/Laboratory Director

It shall be noted that the sample tested is believed to be true representative of the material produced under the designation herein stated. In addition, the attached laboratory test results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material. The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent, duly duly authorized by the respective client or from the client itself. It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. *Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.* On the other hand, should you need us to keep them at finger line, please advise us in writing.

TAI  
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Geosyntec Consultants**  
PROJECT: **Kekaha LF NLEP**  
DATE REC'D: **18-May-10**

MATERIAL: **HDPE SEAM**  
SEAM TYPE: **Fusion Weld**  
PGL JOB #: **G100509**

  
QC'd By: **B. Yeo**  
TEST METHOD: **ASTM D6392**  
DATE REPORT: **18-May-10**

Crosshead Speed: 2 in/min					Crosshead Speed: 2 in/min							
SAMPLE ID	PGL CONTROL #	SHEAR EVALUATION			PROJECT SPEC. (lb/in width)	PEEL EVALUATION						
		MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break		SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)		
DS-P-13 P46/P45	66577	193	> 50%	BRK		1 Outside	132	0	SE1			
		191	> 50%	BRK		2 Outside	126	0	SE1			
		192	> 50%	BRK		3 Outside	134	0	SE1			
		190	> 50%	BRK		4 Outside	136	0	SE1			
		190	> 50%	BRK		5 Outside	132	0	SE1			
		AVG:						132				91
		STD. DEV.						4				
								1 Inside	121		0	SE1
								2 Inside	124		0	SE1
								3 Inside	126		0	SE1
					4 Inside	128	0	SE1				
					5 Inside	137	0	SE1				
AVG.		191			121	127			91			
STD. DEV.		1				6						

**BREAK DESCRIPTION (ASTM D6392 FUSION):**

AD ADHESION FAILURE.  
BRK BREAK IN SHEETING.  
SE1 BREAK AT OUTER EDGE OF SEAM.  
SE2 BREAK AT INNER EDGE OF SEAM.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

**EXTRUSION:**

AD1 ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.  
AD2 ADHESION FAILURE.  
AD-WLD BREAK THROUGH THE FILLET.  
SE1 BREAK AT BOTTOM EDGE OF SEAM.  
SE2 BREAK AT TOP EDGE OF SEAM.  
SE3 BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)  
BRK1 BREAK IN BOTTOM SHEETING.  
BRK2 BREAK IN TOP SHEETING.  
AD-BRK BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.  
HT BREAK AT EDGE OF HOT TACK.  
SIP SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report, and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.



Precision Geosynthetic Laboratories







**Appendix K**  
**Manufacturer's Roll Certificates**  
**and Roll Inventory**



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gcl: 1</u>	Manufacturer: <u>CETCO</u>	Product Type: <u>Bentonat FLW</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ck	Result	QAID

Accepted Rolls

3/2/2010	201004CV-257	15	150	CAS	1/29/2010	257	p	KH	1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-258	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-260	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-261	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-262	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-263	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-264	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-265	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-266	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-267	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-268	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-269	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-270	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-271	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-272	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-273	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-274	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-275	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-276	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-277	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-278	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-279	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-280	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-281	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-282	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-283	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-284	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-285	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-286	15	150	CAS					1/29/2010	1/31/2010	p	MM



**Material Inventory**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunapali Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> gcl: 1	<b>Manufacturer:</b> CETCO	<b>Product Type:</b> Bentomat FLW
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/1/2010	201004CV-287	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-288	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-289	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-290	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-291	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-292	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-293	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-294	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-296	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-297	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-298	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-299	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-300	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-301	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-302	15	150	CAS	1/29/2010	302	p	KH	1/29/2010	1/31/2010	p	MM
1/4/2010	201004CV-303	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-304	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-305	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-306	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-307	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-308	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-309	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-310	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-312	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-313	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-314	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-315	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-316	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-317	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-318	15	150	CAS					1/29/2010	1/31/2010	p	MM



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunaulii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> gel; I	<b>Manufacturer:</b> CETCO	<b>Product Type:</b> Bcptomat FLW
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/4/2010	201004CV-319	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-320	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-321	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-322	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-324	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-325	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-326	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-327	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-328	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-329	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-330	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-331	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-332	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-333	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-334	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-335	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-336	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-337	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-338	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-339	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-340	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-341	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-342	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-343	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-344	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-345	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-346	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-347	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-348	15	150	CAS	1/29/2010	348	p	KH	1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-349	15	150	CAS					1/29/2010	1/31/2010	p	MM





## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gcl: 1</u>	Manufacturer: <u>CETCO</u>	Product Type: <u>Bentomat FLW</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

3/2/2010	201004CV-350	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-351	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-352	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-353	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-354	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-356	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/1/2010	201004CV-357	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-358	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-359	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-360	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-361	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-362	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-364	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-365	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-366	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-367	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-368	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-369	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-370	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-371	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-372	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-373	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-374	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-375	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-376	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-377	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-378	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-379	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-380	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-381	15	150	CAS					1/29/2010	1/31/2010	p	MM



**Material Inventory**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> gcl: I	<b>Manufacturer:</b> CETCO	<b>Product Type:</b> Beutomat FLW
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/4/2010	201004CV-382	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-385	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-386	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-387	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-388	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-389	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-392	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-396	15	150	CAS	1/29/2010	396	p	KH	1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-398	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-399	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-400	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-401	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-402	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-403	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-404	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-405	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-406	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-407	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-408	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-409	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-410	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-411	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-412	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-413	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-414	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-415	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-416	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-417	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-418	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-419	15	150	CAS					1/29/2010	1/31/2010	p	MM



## Material Inventory

Project: Kekaha Landfill	ProjNo: WG1298
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752	TaskNo: 02
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: gcl: I	Manufacturer: CETCO	Product Type: Bentomat FLW
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/2/2010	201004CV-420	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-421	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-422	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-423	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-424	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-425	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-426	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-427	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-428	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-429	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-430	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-431	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-432	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-433	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-434	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-435	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-436	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-437	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-438	15	150	CAS	1/29/2010	438	p	KH	1/31/2010	1/31/2010	p	MM
2/22/2010	201004CV-439	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-440	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-441	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-442	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-443	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-444	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-445	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-446	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-447	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-448	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-449	15	150	CAS					1/29/2010	1/31/2010	p	MM



**Material Inventory**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gcl 1</u>	Manufacturer: <u>CETCO</u>	Product Type: <u>Benomat FLW</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/2/2010	201004CV-450	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-451	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-452	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-453	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-454	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-455	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-456	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-457	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-458	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-459	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-460	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-461	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-462	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-463	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-464	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-465	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-466	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-467	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-468	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-469	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-472	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-473	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-474	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-475	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-476	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-477	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-478	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-479	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-480	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-481	15	150	CAS					1/29/2010	1/31/2010	p	MM





## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunaulii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gel: 1</u>	Manufacturer: <u>CETCO</u>	Product Type: <u>Bentomat FLW</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/3/2010	201004CV-483	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-484	15	150	CAS	1/29/2010	484	p	KH	1/31/2010	1/31/2010	p	MM
3/3/2010	201004CV-485	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-486	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-487	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-488	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-490	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-491	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-492	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-493	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-494	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-495	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-496	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/4/2010	201004CV-497	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-498	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-499	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-500	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-501	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-502	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-503	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-504	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-505	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-506	15	150	CAS					1/29/2010	1/31/2010	p	MM
2/22/2010	201004CV-507	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-508	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-509	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-510	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-511	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/2/2010	201004CV-512	15	150	CAS					1/29/2010	1/31/2010	p	MM
3/3/2010	201004CV-513	15	150	CAS					1/29/2010	1/31/2010	p	MM



**Material Inventory**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> gcl: I	<b>Manufacturer:</b> CETCO	<b>Product Type:</b> Bentomat FLW
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<i>Inventory</i>					<i>Q.A. Conformance</i>				<i>Q.C. Documents</i>			
<i>Inv Date</i>	<i>Batch-Roll</i>	<i>Width (ft.)</i>	<i>Length (ft.)</i>	<i>QA ID</i>	<i>Date</i>	<i>Samp No</i>	<i>Result</i>	<i>QAID</i>	<i>Date Rec</i>	<i>Date CkK</i>	<i>Result</i>	<i>QAID</i>

<i>Average Roll Width(ft.): 15</i>	<i>Average Roll Length(ft.): 150</i>
<i>Total Number of Rolls: 239</i>	<i>Cumulative Area(sq.ft.): 537750</i>
<i>Total Number of Conformance Tests: 6</i>	

Comments:



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gml: 2</u>	Manufacturer: <u>Agru</u>	Product Type: <u>60-mil DST</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

### Accepted Rolls

2/24/2010	7291454-802119.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802120.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802221.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802222.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802223.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802224.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802225.10	23	410	CAS	1/18/2010	2225	p	MM	1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802226.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802227.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802228.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802229.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802230.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802231.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802232.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802233.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802234.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802235.10	23	410	CAS	1/19/2010	2235	p	MM	1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802236.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802237.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802238.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802239.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802240.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802341.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802342.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802343.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802344.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802345.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802346.10	23	410	CAS	1/19/2010	2346	p	MM	1/26/2010	1/26/2010	p	MM



## Material Inventory

Project: Kekaha Landfill	ProjNo: WG1298
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752	TaskNo: 02
Description: New Leachate Evaporation Pond Construction	

Material Type: gml : 2	Manufacturer: Agru	Product Type: 60-mil DST
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

3/1/2010	7291454-802347.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802348.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802349.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802350.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802351.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802352.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802353.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802354.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802355.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802356.10	23	410	CAS	1/20/2010	2356	p	MM	1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802357.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802358.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802359.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802360.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802461.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802462.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802463.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802464.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802465.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/1/2010	7291454-802466.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291454-802467.10	23	410	CAS	1/20/2010	2467	p	MM	1/26/2010	1/26/2010	p	MM
3/10/2010	7291454-802468.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/10/2010	7291454-802469.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/10/2010	7291454-802470.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/10/2010	7291454-802471.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802472.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291454-802473.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/10/2010	7291454-802474.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
3/10/2010	7291454-802475.10	23	410	CAS					1/26/2010	1/26/2010	p	MM





## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gml: 2</u>	Manufacturer: <u>Agro</u>	Product Type: <u>60-mil DST</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

1/24/2010	7291467-801613.10	23	410	CAS	1/18/2010	1613	p	MM	1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801614.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801615.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801616.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801617.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801618.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801619.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801620.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801721.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801722.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801723.10	23	410	CAS	1/18/2010	1723	p	MM	1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801724.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801725.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801726.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801727.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801728.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801729.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801730.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801731.10	32	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801732.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801733.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801734.10	23	410	CAS	1/18/2010	1734	p	MM	1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801735.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801736.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/23/2010	7291467-801737.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801738.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801739.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801740.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-801741.10	23	410	CAS					1/26/2010	1/26/2010	p	MM



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gml : 2</u>	Manufacturer: <u>Agro</u>	Product Type: <u>60-mil DST</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

2/24/2010	7291467-802101.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802102.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802103.10	23	410	CAS	1/18/2010	2103	p	MM	1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802104.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802105.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802106.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802107.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802108.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802109.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802110.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802111.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802112.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802113.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802114.10	23	410	CAS	1/18/2010	2114	p	MM	1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802115.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802116.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802117.10	23	410	CAS					1/26/2010	1/26/2010	p	MM
2/24/2010	7291467-802118.10	23	410	CAS					1/26/2010	1/26/2010	p	MM

<b>Average Roll Width(ft.): 23</b>	<b>Average Roll Length(ft.): 410</b>
<b>Total Number of Rolls: 104</b>	<b>Cumulative Area(sq.ft.): <del>980,720</del> 980,720</b>
<b>Total Number of Conformance Tests: 10</b>	

Comments:



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kōnūmālii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> <u>gmi - 3</u>	<b>Manufacturer:</b> <u>Agro</u>	<b>Product Type:</b> <u>80-mil DST</u>
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<i>Inventory</i>					<i>Q.A. Conformance</i>				<i>Q.C. Documents</i>			
<i>Inv Date</i>	<i>Batch-Roll</i>	<i>Width (ft.)</i>	<i>Length (ft.)</i>	<i>QA ID</i>	<i>Date</i>	<i>Samp No</i>	<i>Result</i>	<i>QAID</i>	<i>Date Rec</i>	<i>Date Ckk</i>	<i>Result</i>	<i>QAID</i>

Accepted Rolls

3/10/2010	7291467-801611.10	23	328	CAS	1/18/2010	1611	p	MM	1/26/2010	1/26/2010	p	MM
3/10/2010	7291467-801612.10	23	328	CAS					1/26/2010	1/26/2010	p	MM

<b>Average Roll Width(ft.):</b> <u>23</u>	<b>Average Roll Length(ft.):</b> <u>328</u>
<b>Total Number of Rolls:</b> <u>2</u>	<b>Cumulative Area(sq.ft.):</b> <u>15088</u>
<b>Total Number of Conformance Tests:</b> <u>1</u>	

Comments:



## Material Inventory

Project: Kekaha Landfill	ProjNo: WG1298
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752	TaskNo: 02
Description: New Leachate Evaporation Pond Construction	

Material Type: gt - 4	Manufacturer:	Product Type: 6-oz geotextile
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

Accepted Rolls

2/22/2010	E060-300293929	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293930	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293931	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293932	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293938	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293939	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293940	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293941	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300293942	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294086	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294087	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294088	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294089	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294090	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294607	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294613	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294614	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294615	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294616	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294617	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294618	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294619	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294620	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294621	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294622	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294623	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294624	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294625	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300294626	12	360	CAS					1/26/2010	1/26/2010	p	CS





## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gt: 4</u>	Manufacturer: _____	Product Type: <u>6-oz geotextile</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
2/22/2010	E060-300294627	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295419	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295420	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295421	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295422	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295423	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295424	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295425	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295426	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295427	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295428	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295429	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295430	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295431	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295432	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295433	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295434	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295435	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295436	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295440	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295441	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295442	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295443	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295444	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295445	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295446	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295447	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295448	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295449	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295450	12	360	CAS					1/26/2010	1/26/2010	p	CS



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: <u>gl: 4</u>	Manufacturer:	Product Type: <u>6-oz geotextile</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

2/22/2010	E060-300295451	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295452	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295453	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295454	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295455	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295456	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295457	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295458	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295459	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295460	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295461	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295462	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295463	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295464	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295465	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295466	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295467	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295468	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295469	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295470	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295471	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295472	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295473	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295474	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E060-300295475	12	360	CAS					1/26/2010	1/26/2010	p	CS

<b>Average Roll Width(ft.): 12</b>	<b>Average Roll Length(ft.): 360</b>
<b>Total Number of Rolls: 84</b>	<b>Cumulative Area(sq.ft.): 36288#</b>
<b>Total Number of Conformance Tests: 0</b>	



**Material Inventory**

Project: <u>Kekaha Landfill</u> Location: <u>6900 D Kaunuaibi Hwy, Kekaha, HI 96752</u> Description: <u>New Leachate Evaporation Pond Construction</u>	ProjNo: <u>WG1298</u> TaskNo: <u>02</u>
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Material Type: <u>gt: 4</u>	Manufacturer: _____	Product Type: <u>6-oz geotextile</u>
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<i>Inventory</i>				<i>Q.A. Conformance</i>				<i>Q.C. Documents</i>				
<i>Inv Date</i>	<i>Batch-Roll</i>	<i>Width (ft.)</i>	<i>Length (ft.)</i>	<i>QA ID</i>	<i>Date</i>	<i>Samp No</i>	<i>Result</i>	<i>QAID</i>	<i>Date Rec</i>	<i>Date Ckk</i>	<i>Result</i>	<i>QAID</i>

Comments:



## Material Inventory

Project: Kekaha Landfill	ProjNo: WG1298
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752	TaskNo: 02
Description: <u>New Leachate Evaporation Pond Construction</u>	

Material Type: gt-5	Manufacturer:	Product Type: 16-oz geotextile
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

Accepted Rolls

2/23/2010	E160-2020174353	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020579616	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020579618	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626841	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626842	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626848	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626852	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626853	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626855	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626856	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626857	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626860	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626867	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626868	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626870	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626872	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626873	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626875	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626877	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626878	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626880	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626881	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626882	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626883	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626885	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626886	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626887	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/10/2010	E160-2020626888	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626893	12	360	CAS					1/26/2010	1/26/2010	p	CS





## Material Inventory

Project: Kekaha Landfill	ProjNo: WG1298
Location: 6900 D Kaunualii Hwy, Kekaha, HI 96752	TaskNo: 02
Description: New Leachate Evaporation Pond Construction	

Material Type: gt: 5	Manufacturer:	Product Type: 16-oz geotextile
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
3/10/2010	E160-2020626895	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626898	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626899	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626900	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626901	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626902	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626903	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626904	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626905	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626906	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626907	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626908	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626909	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626910	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626911	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626912	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626913	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626914	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626915	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626916	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626917	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626918	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626919	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626920	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626921	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626922	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626923	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626924	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626925	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626926	12	360	CAS					1/26/2010	1/26/2010	p	CS



**Material Inventory**

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> <u>gt: 5</u>	<b>Manufacturer:</b>	<b>Product Type:</b> <u>16-oz geotextile</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID

2/23/2010	E160-2020626927	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626928	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626929	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626930	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626931	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/23/2010	E160-2020626932	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626933	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626934	12	360	CAS					1/26/2010	1/26/2010	p	CS
2/22/2010	E160-2020626935	12	360	CAS					1/26/2010	1/26/2010	p	CS
3/30/2010	E160-2020656819	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656821	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656825	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656828	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656829	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656831	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656832	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656833	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020656834	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660913	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660914	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660915	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660917	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660918	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660919	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660920	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660921	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660922	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660923	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660924	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660925	12	360	CAS					4/5/2010	4/5/2010	p	LKH



## Material Inventory

Project: <u>Kekaha Landfill</u>	ProjNo: <u>WG1298</u>
Location: <u>6900 D Kaunualii Hwy, Kekaha, HI 96752</u>	TaskNo: <u>02</u>
Description: <u>New Leachate Evaporation Pond Construction</u>	

<b>Material Type:</b> <u>gt: 5</u>	<b>Manufacturer:</b>	<b>Product Type:</b> <u>16-oz geotextile</u>
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Inventory					Q.A. Conformance				Q.C. Documents			
Inv Date	Batch-Roll	Width (ft.)	Length (ft.)	QA ID	Date	Samp No	Result	QAID	Date Rec	Date Ckk	Result	QAID
1/30/2010	E160-2020660929	12	360	CAS					4/5/2010	4/5/2010	p	LKH
1/30/2010	E160-2020660930	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660931	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660932	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660958	12	360	CAS					4/5/2010	4/5/2010	p	LKH
3/30/2010	E160-2020660960	12	360	CAS					4/5/2010	4/5/2010	p	LKH

<b>Average Roll Width(ft.):</b> 12	<b>Average Roll Length(ft.):</b> 360
<b>Total Number of Rolls:</b> 95	<b>Cumulative Area(sq.ft.):</b> 410400
<b>Total Number of Conformance Tests:</b> 0	

Comments:

**NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.**

• 21000 77<sup>th</sup> Avenue South • Kent, WA 98032 •  
Phone: (253) 872-0244 • Fax: (253) 872-0245  
[www.northwestlinings.com](http://www.northwestlinings.com)

**LETTER OF TRANSMITTAL**

TO: MMinch@Geosyntec.com  
CC: jeffg@goodfellowbros.com  
JFrey@wm.com

DATE: 1/29/2010	JOB NO.: N09150
ATTENTION: : Geosyntec	
RE: Kekaha LF Phase II Lateral Expansion Cell 1 - CETCO Geosynthetic Clay Liner MQC	

WE ARE SENDING YOU:  Attached  Under Separate Cover via \_\_\_\_\_ the following items:

- Shop Drawings     Prints     Plans     Specifications     Samples  
 Copy of Letter     Change Order     Submittals     Warranties     Other

Copies	Specification #	Description
1	Sec. 02074-1.02	<b>CETCO</b> - Geosynthetic Clay Liner Packing Slips & MQC Certificates

These are transmitted as checked below:

- For Approval     Approved as submitted     Resubmit     Copies for Approval  
 For your use     Approved as noted     Submit     Copies for distribution  
 For review and comment     Returned for corrections     Return     Corrected Prints  
 For bids due \_\_\_\_\_     Other \_\_\_\_\_

Remarks:

COPY TO: FILE SIGNED: Richard Kamienski





Date: 1/29/2010  
Purchase Order: C-4089  
ORDER NUMBER: 000258364

Kirk and Karen  
Northwest Linings  
21000 77th Ave. South  
Kent, WA 98032  
kirk1@northwestlinings.com cc. karent@northwestlinings.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Northwest Linings.

The enclosed data package includes results of all the MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once per production lot (once per week), unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO accepts responsibility for our GCL should the index flux/hydraulic conductivity tests produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO will replace the nonconforming material at no charge.

Questions regarding this information should be directed to Chris Athanassopoulos, Technical Support Engineer, at (847) 851-1831.

Sincerely,

Melanie King  
Quality Assurance Coordinator  
CETCO Cartersville Plant



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

PROJECT NAME: Kekaha Sanitary LF  
CUSTOMER P.O.: C-4089  
ORDER NUMBER: 000258364  
PREPARED FOR: Northwest Linings

**CONTENTS:**

- Product Certifications
- GCL Order packing list and MQA tracking form
- GCL manufacturing quality control test data
- Bentonite clay certification
- Raw material test results

PREPARED BY: Melanie King  
Quality Assurance Coordinator  
CETCO  
218 Industrial Park

Cartersville, GA 30121  
Telephone: (770) 387-7773  
E-Mail: melanie.king@cetco.com

239 ROLLS TOTAL = 7,750 sf = 59,750 sq

GCL PACKING LIST AND MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 000258364

Order	GCL Loc #	GCL Roll #	Length	Width	Weight	sq ft	Roll # Tested	N/W/WIDE		WOVEN		BLK N/W-WIDE	
								Cap Lot #	Cap Roll #	Roll # Tested	Inner Base Roll #	Outer Base Roll #	Clay Lot #
258364	201004CV	257 *	150	15	2736	2250	257	201004CV	195	192	2020514739	2011147335	942539A
258364	201004CV	258	150	15	2650	2250	257	201004CV	195	192	2020514739	2011147335	942539A
258364	201004CV	260	150	15	2656	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	261	150	15	2726	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	262	150	15	2740	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	263	150	15	2738	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	264	150	15	2710	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	265	150	15	2718	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	266	150	15	2716	2250	257	201004CV	196	192	2020514739	2011147335	942539A
258364	201004CV	267	150	15	2738	2250	257	201004CV	216	215	2020514739	2011147335	942539A
258364	201004CV	268	150	15	2736	2250	257	201004CV	216	215	2020514739	2011147335	942539A
258364	201004CV	269	150	15	2728	2250	257	201004CV	216	215	2020514739	2011147335	942539A
258364	201004CV	270	150	15	2728	2250	257	201004CV	216	215	2020514739	2011147335	942539A
258364	201004CV	271	150	15	2732	2250	257	201004CV	216	215	2020514739	2011147335	942539B
258364	201004CV	272 *	150	15	2942	2250	272	201004CV	216	215	2020514739	2011147335	942539B
258364	201004CV	273	150	15	2758	2250	272	201004CV	216	215	2020514739	2020542836	942539B
258364	201004CV	274	150	15	2702	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	275	150	15	2708	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	276	150	15	2700	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	277	150	15	2694	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	278	150	15	2690	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	279	150	15	2688	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	280	150	15	2706	2250	272	201004CV	215	215	2020514739	2020542836	942539B
258364	201004CV	281	150	15	2708	2250	272	201004CV	217	215	2020514739	2020542836	942539B
258364	201004CV	282	150	15	2708	2250	272	201004CV	217	215	2020514739	2020542836	942539B
258364	201004CV	283	150	15	2694	2250	272	201004CV	217	215	2020514739	2020542836	942539B
258364	201004CV	284	150	15	2934	2250	272	201004CV	217	215	WEA013043-2	2020542836	942539B
258364	201004CV	285	150	15	2724	2250	272	201004CV	217	215	WEA013043-2	2020542836	942539B
258364	201004CV	286	150	15	2746	2250	272	201004CV	217	215	WEA013043-2	2020542836	942539B
258364	201004CV	287 *	150	15	2776	2250	287	201004CV	217	215	WEA013043-2	2020542836	942539B
258364	201004CV	288	150	15	2734	2250	287	201004CV	218	215	WEA013043-2	2020542836	942539B
258364	201004CV	289	150	15	2954	2250	287	201004CV	218	215	WEA013043-2	2020542836	942539B
258364	201004CV	290	150	15	2748	2250	287	201004CV	218	215	WEA013043-2	2020541834	942539B
258364	201004CV	291	150	15	2740	2250	287	201004CV	218	215	WEA013043-2	2020541834	942539B
258364	201004CV	292	150	15	2754	2250	287	201004CV	218	215	WEA013043-2	2020541834	942539B
258364	201004CV	293	150	15	2746	2250	287	201004CV	218	215	WEA013043-2	2020541834	942539B
258364	201004CV	294	150	15	2912	2250	287	201004CV	218	215	WEA013043-2	2020541834	942539B
258364	201004CV	295	150	15	2750	2250	287	201004CV	204	200	WEA013043-2	2020541834	942539B
258364	201004CV	297	150	15	2726	2250	287	201004CV	204	200	WEA013043-2	2020541834	942539B
258364	201004CV	298	150	15	2744	2250	287	201004CV	204	200	WEA013043-2	2020541834	942539B
258364	201004CV	299	150	15	2732	2250	287	201004CV	204	200	WEA013043-2	2020541834	942539B
258364	201004CV	300	150	15	2748	2250	287	201004CV	204	200	WEA013043-2	2020541834	942539B

(42)

Ord#	GCL Lot #	GCL Roll #	Length	Width	Weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Inner Base Roll #	Outer Base Roll #	Clay Lot #
258364	201004CV	301	150	15	2740	2250	301	201004CV	204	200	WEA013043-2	2020542764	942539B
258364	201004CV	302	150	15	2740	2250	302	201004CV	204	200	WEA013043-2	2020542764	942539B
258364	201004CV	303	150	15	2754	2250	302	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	304	150	15	2744	2250	302	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	305	150	15	2748	2250	302	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	306	150	15	2752	2250	302	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	307	150	15	2746	2250	302	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	308	150	15	2746	2250	300	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	309	150	15	2760	2250	302	201004CV	219	215	WEA013043-2	2020542764	942539B
258364	201004CV	310	150	15	2754	2250	302	201004CV	220	215	WEA013043-2	2020542764	942539B
258364	201004CV	312	150	15	2764	2250	302	201004CV	220	215	WEA012199-6	2020542764	942539B
258364	201004CV	313	150	15	2760	2250	302	201004CV	220	215	WEA012199-6	2020542764	942539B
258364	201004CV	314	150	15	2762	2250	302	201004CV	220	215	WEA012199-6	2020542764	942539B
258364	201004CV	315	150	15	2756	2250	302	201004CV	220	215	WEA012199-6	2020542764	942539B
258364	201004CV	316	150	15	2770	2250	302	201004CV	220	215	WEA012199-6	2020542764	942539B
258364	201004CV	317	150	15	2758	2250	302	201004CV	220	215	WEA012199-6	2020542764	942539B
258364	201004CV	318	150	15	2802	2250	318	201004CV	221	215	WEA012199-6	2020542764	942539B
258364	201004CV	319	150	15	2740	2250	311	201004CV	221	215	WEA012199-6	2020542764	942539B
258364	201004CV	320	150	15	2750	2250	311	201004CV	221	215	WEA012199-6	2020541827	942543A
258364	201004CV	321	150	15	2762	2250	311	201004CV	221	215	WEA012199-6	2020541827	942543A
258364	201004CV	322	150	15	2818	2250	318	201004CV	221	215	WEA012199-6	2020541827	942543A
258364	201004CV	324	150	15	2762	2250	318	201004CV	221	215	WEA012199-6	2020541827	942543A
258364	201004CV	325	150	15	2992	2250	318	201004CV	221	215	WEA012199-6	2020541827	942543A
258364	201004CV	326	150	15	2772	2250	318	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	327	150	15	2764	2250	311	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	328	150	15	2763	2250	311	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	329	150	15	2766	2250	318	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	330	150	15	2764	2250	318	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	331	150	15	2776	2250	318	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	332	150	15	2758	2250	318	201004CV	222	215	WEA012199-6	2020541827	942543A
258364	201004CV	333	150	15	2752	2250	318	201004CV	224	215	WEA012199-6	2020541827	942543A
258364	201004CV	334	150	15	2768	2250	334	201004CV	224	215	WEA012199-6	2020541827	942543A
258364	201004CV	335	150	15	2750	2250	334	201004CV	224	215	WEA012199-6	2020541827	942543A
258364	201004CV	336	150	15	2748	2250	334	201004CV	224	215	WEA012199-6	2020541827	942543A
258364	201004CV	337	150	15	2762	2250	334	201004CV	224	215	WEA012199-6	2020541827	942543A
258364	201004CV	338	150	15	2960	2250	334	201004CV	224	215	WEA012199-6	2020541827	942543A
258364	201004CV	339	150	15	2740	2250	334	201004CV	224	215	WEA013043-15	2020541832	942543A
258364	201004CV	340	150	15	2726	2250	334	201004CV	198	192	WEA013043-15	2020541832	942543A
258364	201004CV	341	150	15	2738	2250	334	201004CV	198	192	WEA013043-15	2020541832	942543A
258364	201004CV	342	150	15	2732	2250	334	201004CV	198	192	WEA013043-15	2020541832	942543A
258364	201004CV	343	150	15	2748	2250	334	201004CV	198	192	WEA013043-15	2020541832	942543A
258364	201004CV	344	150	15	2738	2250	334	201004CV	198	192	WEA013043-15	2020541832	942543A
258364	201004CV	345	150	15	2714	2250	334	201004CV	198	192	WEA013043-15	2020541832	942543A
258364	201004CV	346	150	15	2728	2250	334	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	347	150	15	2724	2250	334	201004CV	225	225	WEA013043-15	2020541832	942543A

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Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll W Tested	Inner Base Roll #	Outer Base Roll #	Clay Lot #
258364	201004CV	348	150	15	2760	2250	348	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	349	150	15	2778	2250	348	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	350	150	15	2728	2250	348	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	351	150	15	2734	2250	348	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	352	150	15	2724	2250	348	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	353	150	15	2740	2250	348	201004CV	225	225	WEA013043-15	2020541832	942543A
258364	201004CV	354	150	15	2720	2250	348	201004CV	226	225	WEA013043-15	2020541832	942543A
258364	201004CV	356	150	15	2748	2250	348	201004CV	226	225	WEA013043-15	2020541839	942543A
258364	201004CV	357	150	15	2738	2250	348	201004CV	226	225	WEA013043-15	2020541839	942543A
258364	201004CV	358	150	15	2742	2250	348	201004CV	226	225	WEA013043-15	2020541839	942543A
258364	201004CV	359	150	15	2750	2250	348	201004CV	226	225	WEA013043-15	2020541839	942543A
258364	201004CV	360	150	15	2744	2250	348	201004CV	226	225	WEA013043-15	2020541839	942543A
258364	201004CV	361	150	15	2742	2250	348	201004CV	223	215	WEA013043-15	2020541839	942543A
258364	201004CV	362	150	15	2546	2250	348	201004CV	223	215	WEA013043-15	2020541839	942543A
258364	201004CV	364	150	15	2940	2250	363	201004CV	223	215	WEA013043-3	2020541839	942543A
258364	201004CV	365	150	15	2722	2250	363	201004CV	223	215	WEA013043-3	2020541839	942543A
258364	201004CV	366	150	15	2716	2250	363	201004CV	223	215	WEA013043-3	2020541839	942543A
258364	201004CV	367	150	15	2730	2250	363	201004CV	223	215	WEA013043-3	2020541839	942543A
258364	201004CV	368	150	15	2734	2250	363	201004CV	227	225	WEA013043-3	2020541839	942543A
258364	201004CV	369	150	15	2744	2250	363	201004CV	227	225	WEA013043-3	2020541839	942543B
258364	201004CV	370	150	15	2736	2250	363	201004CV	227	225	WEA013043-3	2020541839	942543B
258364	201004CV	371	150	15	2960	2250	363	201004CV	227	225	WEA013043-3	2020541839	942543B
258364	201004CV	372	150	15	2748	2250	363	201004CV	227	225	WEA013043-3	2020631896	942543B
258364	201004CV	373	150	15	2738	2250	363	201004CV	227	225	WEA013043-3	2020631896	942543B
258364	201004CV	374	150	15	2748	2250	363	201004CV	227	225	WEA013043-3	2020631896	942543B
258364	201004CV	375	150	15	2748	2250	363	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	376	150	15	2756	2250	363	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	377	150	15	2744	2250	363	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	378	150	15	2760	2250	378	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	379	150	15	2740	2250	378	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	380	150	15	2766	2250	378	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	381	150	15	2748	2250	378	201004CV	236	232	WEA013043-3	2020631896	942543B
258364	201004CV	382	150	15	2744	2250	378	201004CV	231	225	WEA013043-3	2020631896	942543B
258364	201004CV	385	150	15	2838	2250	378	201004CV	231	225	WEA013043-3	2020631896	942543B
258364	201004CV	386	150	15	2740	2250	378	201004CV	231	225	WEA013043-3	2020631896	942543B
258364	201004CV	387	150	15	2742	2250	378	201004CV	231	225	WEA013043-3	2020631896	942543B
258364	201004CV	388	150	15	2966	2250	378	201004CV	231	225	WEA013043-3	2020631897	942543B
258364	201004CV	389	150	15	2744	2250	378	201004CV	231	225	WEA013043-3	2020631897	942543B
258364	201004CV	392	150	15	2852	2250	398	201004CV	230	225	WEA012199-5	2020631897	942543B
258364	201004CV	396	150	15	2750	2250	398	201004CV	230	225	WEA012199-5	2020631897	942543B
258364	201004CV	398	150	15	2848	2250	398	201004CV	229	225	WEA012199-5	2020631897	942543B
258364	201004CV	399	150	15	2768	2250	398	201004CV	229	225	WEA012199-5	2020631897	942543B
258364	201004CV	400	150	15	2778	2250	398	201004CV	229	225	WEA012199-5	2020631897	942543B
258364	201004CV	401	150	15	2788	2250	398	201004CV	229	225	WEA012199-5	2020631897	942543B
258364	201004CV	402	150	15	2784	2250	398	201004CV	229	225	WEA012199-5	2020631897	942543B

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Order	GCL Lot #	GCL Roll #	Length	Width	Weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Inner Base Roll #	Outer Base Roll #	Clay Lot #
258364	201004CV	403	150	15	2790	2250	394	201004CV	229	225	WEA012199-5	2020631897	942543B
258364	201004CV	404	150	15	2772	2250	394	201004CV	229	225	WEA012199-5	2020631897	942543B
258364	201004CV	405	150	15	2770	2250	394	201004CV	228	225	WEA012199-5	2020631897	942543B
258364	201004CV	406	150	15	2990	2250	394	201004CV	228	225	WEA012199-5	2020631889	942543B
258364	201004CV	407	150	15	2762	2250	394	201004CV	228	225	WEA012199-5	2020631889	942543B
258364	201004CV	408	150	15	2706	2250	394	201004CV	228	225	WEA012199-5	2020631889	942543B
258364	201004CV	409	150	15	2732	2250	409	201004CV	228	225	WEA012199-5	2020631889	942543B
258364	201004CV	410	150	15	2712	2250	409	201004CV	228	225	WEA012199-5	2020631889	942543B
258364	201004CV	411	150	15	2714	2250	409	201004CV	228	225	WEA012199-5	2020631889	942543B
258364	201004CV	412	150	15	2692	2250	409	201004CV	197	192	WEA012199-5	2020631889	942543B
258364	201004CV	413	150	15	2704	2250	409	201004CV	197	192	WEA012199-5	2020631889	942543B
258364	201004CV	414	150	15	2710	2250	409	201004CV	197	192	WEA012199-5	2020631889	942543B
258364	201004CV	415	150	15	2732	2250	409	201004CV	197	192	WEA012199-5	2020631889	942543B
258364	201004CV	416	150	15	2704	2250	409	201004CV	197	192	WEA012199-5	2020631889	942543B
258364	201004CV	417	150	15	2704	2250	409	201004CV	197	192	WEA012199-5	2020631889	942543B
258364	201004CV	418	150	15	1892	2250	409	201004CV	197	192	WEA012199-5	2020631889	942544A
258364	201004CV	419	150	15	2720	2250	409	201004CV	190	182	WEA013043-14	2020631889	942544A
258364	201004CV	420	150	15	2706	2250	409	201004CV	190	182	WEA013043-14	2020631889	942544A
258364	201004CV	421	150	15	2702	2250	409	201004CV	190	182	WEA013043-14	2020631889	942544A
258364	201004CV	422	150	15	2968	2250	409	201004CV	190	182	WEA013043-14	2020631895	942544A
258364	201004CV	423	150	15	2708	2250	409	201004CV	190	182	WEA013043-14	2020631895	942544A
258364	201004CV	424	150	15	2746	2250	424	201004CV	190	182	WEA013043-14	2020631895	942544A
258364	201004CV	425	150	15	2700	2250	424	201004CV	190	182	WEA013043-14	2020631895	942544A
258364	201004CV	426	150	15	2720	2250	424	201004CV	163	161	WEA013043-14	2020631895	942544A
258364	201004CV	427	150	15	2712	2250	424	201004CV	163	161	WEA013043-14	2020631895	942544A
258364	201004CV	428	150	15	2714	2250	424	201004CV	163	161	WEA013043-14	2020631895	942544A
258364	201004CV	429	150	15	2716	2250	424	201004CV	163	161	WEA013043-14	2020631895	942544A
258364	201004CV	430	150	15	2722	2250	424	201004CV	163	161	WEA013043-14	2020631895	942544A
258364	201004CV	431	150	15	2718	2250	424	201004CV	163	161	WEA013043-14	2020631895	942544A
258364	201004CV	432	150	15	2724	2250	424	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	433	150	15	2704	2250	424	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	434	150	15	2710	2250	424	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	435	150	15	2710	2250	424	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	436	150	15	2718	2250	424	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	437	150	15	2700	2250	424	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	438	150	15	2934	2250	438	200950CV	4966	4961	WEA013043-14	2020631895	942544A
258364	201004CV	439	150	15	2722	2250	438	201004CV	210	210	WEA013043-14	2020631895	942544A
258364	201004CV	440	150	15	2697	2250	438	201004CV	210	210	WEA013043-14	2020631895	942544A
258364	201004CV	441	150	15	2688	2250	438	201004CV	210	210	WEA013043-14	2020631895	942544A
258364	201004CV	442	150	15	2710	2250	438	201004CV	210	210	WEA013043-14	2020631895	942544A
258364	201004CV	443	150	15	2698	2250	438	201004CV	210	210	WEA013043-14	2020631895	942544A
258364	201004CV	444	150	15	2886	2250	438	201004CV	210	210	WEA013043-14	2020631895	942544A
258364	201004CV	445	150	15	2708	2250	438	201004CV	210	210	WEA012199-4	2020631895	942544A
258364	201004CV	446	150	15	2696	2250	438	201004CV	210	210	WEA012199-4	2020631895	942544A
258364	201004CV	447	150	15	2692	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A

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Order	GCL Lot #	GCL Roll #	Length	Width	Weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Inner Base Roll #	Outer Base Roll #	Clay Lot #
258364	201004CV	448	150	15	2690	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A
258364	201004CV	449	150	15	2704	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A
258364	201004CV	450	150	15	2700	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A
258364	201004CV	451	150	15	2682	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A
258364	201004CV	452	150	15	2680	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A
258364	201004CV	453	150	15	2720	2250	438	201004CV	211	210	WEA012199-4	2020631895	942544A
258364	201004CV	454	150	15	2828	2250	438	201004CV	245	242	WEA012199-4	2020631895	942544A
258364	201004CV	455	150	15	2716	2250	438	201004CV	245	242	WEA012199-4	2020631892	942544A
258364	201004CV	456	150	15	2686	2250	438	201004CV	245	242	WEA012199-4	2020631892	942544A
258364	201004CV	457	150	15	2652	2250	438	201004CV	245	242	WEA012199-4	2020631892	942544A
258364	201004CV	458	150	15	2664	2250	438	201004CV	245	242	WEA012199-4	2020631892	942544A
258364	201004CV	459	150	15	2676	2250	438	201004CV	245	242	WEA012199-4	2020631892	942544A
258364	201004CV	460	150	15	2686	2250	438	201004CV	241	232	WEA012199-4	2020631892	942544A
258364	201004CV	461	150	15	2664	2250	438	201004CV	241	232	WEA012199-4	2020631892	942544A
258364	201004CV	462	150	15	2667	2250	438	201004CV	241	232	WEA012199-4	2020631892	942544A
258364	201004CV	463	150	15	2668	2250	438	201004CV	241	232	WEA012199-4	2020631892	942544A
258364	201004CV	464	150	15	2662	2250	438	201004CV	241	232	WEA012199-4	2020631892	942544A
258364	201004CV	465	150	15	2664	2250	438	201004CV	241	232	WEA012199-4	2020631892	942544A
258364	201004CV	466	150	15	2662	2250	438	201004CV	240	232	WEA012199-4	2020631892	942544A
258364	201004CV	467	150	15	2668	2250	438	201004CV	240	232	WEA012199-4	2020631892	942544B
258364	201004CV	468	150	15	2662	2250	438	201004CV	240	232	WEA012199-4	2020631892	942544B
258364	201004CV	469	150	15	2664	2250	438	201004CV	240	232	WEA012199-4	2020631892	942544B
258364	201004CV	472	150	15	2708	2250	438	201004CV	240	232	WEA013043-16	2020632003	942544B
258364	201004CV	473	150	15	2678	2250	438	201004CV	240	232	WEA013043-16	2020632003	942544B
258364	201004CV	474	150	15	2667	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	475	150	15	2674	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	476	150	15	2674	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	477	150	15	2678	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	478	150	15	2678	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	479	150	15	2678	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	480	150	15	2702	2250	438	201004CV	244	242	WEA013043-16	2020632003	942544B
258364	201004CV	481	150	15	2464	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	483	150	15	2760	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	484	150	15	2694	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	485	150	15	2646	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	486	150	15	2678	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	487	150	15	2634	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	488	150	15	2832	2250	438	201004CV	243	242	WEA013043-16	2020632003	942544B
258364	201004CV	490	150	15	2660	2250	438	201004CV	261	258	WEA013043-16	2020631885	942544B
258364	201004CV	491	150	15	2660	2250	438	201004CV	261	258	WEA013043-16	2020631885	942544B
258364	201004CV	492	150	15	2660	2250	438	201004CV	261	258	WEA013043-16	2020631885	942544B
258364	201004CV	493	150	15	2668	2250	438	201004CV	261	258	WEA013043-16	2020631885	942544B
258364	201004CV	494	150	15	2668	2250	438	201004CV	261	258	WEA013043-16	2020631885	942544B
258364	201004CV	495	150	15	2668	2250	438	201004CV	261	258	WEA013043-16	2020631885	942544B
258364	201004CV	496	150	15	2670	2250	438	201004CV	260	258	WEA013043-16	2020631885	942544B

(45)

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Inner Base Roll #	Outer Base Roll #	Clay Lot #
258364	201004CV	497	150	15	2670	2250	484	201004CV	260	258	WEA013043-16	2020631885	942544B
258364	201004CV	498	150	15	2686	2250	484	201004CV	260	258	WEA013043-16	2020631885	942544B
258364	201004CV	499	150	15	2908	2250	484	201004CV	260	258	WEA013043-16	2020631885	942544B
258364	201004CV	500	150	15	2701	2250	500	201004CV	260	258	WEA013043-10	2020631885	942544B
258364	201004CV	501	150	15	2688	2250	500	201004CV	260	258	WEA013043-10	2020631885	942544B
258364	201004CV	502	150	15	2704	2250	500	201004CV	259	258	WEA013043-10	2020631885	942544B
258364	201004CV	503	150	15	2684	2250	500	201004CV	259	258	WEA013043-10	2020631885	942544B
258364	201004CV	504	150	15	2710	2250	500	201004CV	259	258	WEA013043-10	2020631885	942544B
258364	201004CV	505	150	15	2956	2250	500	201004CV	259	258	WEA013043-10	2020632005	942544B
258364	201004CV	506	150	15	2704	2250	500	201004CV	259	258	WEA013043-10	2020632005	942544B
258364	201004CV	507	150	15	2694	2250	500	201004CV	259	258	WEA013043-10	2020632005	942544B
258364	201004CV	508	150	15	2704	2250	500	201004CV	259	258	WEA013043-10	2020632005	942544B
258364	201004CV	509	150	15	2690	2250	500	201004CV	259	258	WEA013043-10	2020632005	942544B
258364	201004CV	510	150	15	2700	2250	500	201004CV	258	258	WEA013043-10	2020632005	942544B
258364	201004CV	511	150	15	2706	2250	500	201004CV	258	258	WEA013043-10	2020632005	942544B
258364	201004CV	512	150	15	2712	2250	500	201004CV	258	258	WEA013043-10	2020632005	942544B
258364	201004CV	513	150	15	2722	2250	500	201004CV	258	258	WEA013043-10	2020632005	942544B
(17)						Total sq ft	537750	Total Number of Rolls Certified: 239 ✓					





## PRODUCT CERTIFICATIONS

PROJECT NAME: Kekaha Sanitary LF  
 CUSTOMER P.O.: C-4089  
 ORDER NUMBERS: 000258364  
 PREPARED FOR: Northwest Linings

The GCL manufactured for the above-referenced order number(s) is certified to meet the values listed in the tables below:

### GCL PROPERTY SPECIFICATIONS FOR BENTOMAT FLW

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 Min ✓
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons ✓	24 ml/2g Min ✓
ASTM D 6768	GCL Grab Strength	200,000 sq ft (20,000 sq m)	45 lbs/in MARV ✓
ASTM D 6243	GCL Hydrated Internal Shear Strength	Periodic	500 psf typ @ 200 psf normal load
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5.0E-9 cm/s Max ✓
ASTM D 5887	GCL Index Flux	Weekly	1.0E-8 m <sup>3</sup> /m <sup>2</sup> /s Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m) ✓	3.5 lb/in min ✓

### SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT FLW

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 5887	GCL Hydraulic Conductivity	1/270,000sf ✓	5x10 <sup>-9</sup> cm/sec ✓	Standard
ASTM D 5993	Bentonite Mass/Area	1/40,000sf ✓	.82lb/sf ✓	Standard

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 using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

### NEEDLE DETECTION AND REMOVAL PROCEDURE

CETCO hereby affirms that all Bentomat<sup>®</sup> geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO certifies Bentomat<sup>®</sup> to be essentially free of broken needles and fragments of needles that would negatively effect the performance of the final product.

Melanie King  
 Quality Assurance Coordinator



**GCL MANUFACTURING QUALITY CONTROL TEST DATA**

The following rolls in GCL certification package number 000258364 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength 6496
ASTM Test Method:			D 5993 ✓	D 6768 ✓	D 6496 ✓
Required Value:			0.82 lb /sq ft Min	45 lbs/in MARV	3.5 lb/in min
CV-BENTOMAT FLW	201004CV	257	0.85 ✓	63.0 ✓	11.1 ✓
CV-BENTOMAT FLW	201004CV	272	0.83 ✓	63.0 ✓	6.7 ✓
CV-BENTOMAT FLW	201004CV	287	0.85 ✓	63.0 ✓	5.8 ✓
CV-BENTOMAT FLW	201004CV	302	0.83 ✓	63.0 ✓	5.4 ✓
CV-BENTOMAT FLW	201004CV	318	0.87 ✓	63.0 ✓	5.4 ✓
CV-BENTOMAT FLW	201004CV	354	0.85 ✓	63.0 ✓	4.7 ✓
CV-BENTOMAT FLW	201004CV	348	0.82 ✓	88.2 ✓	4.1 ✓
<del>CV-BENTOMAT FLW</del>	<del>201004CV</del>	<del>363</del>	<del>1.02</del>	<del>88.2</del>	<del>5.6</del>
CV-BENTOMAT FLW	201004CV	378	0.95 ✓	88.2 ✓	6.2 ✓
<del>CV-BENTOMAT FLW</del>	<del>201004CV</del>	<del>394</del>	<del>0.83</del>	<del>88.2</del>	<del>12.7</del>
CV-BENTOMAT FLW	201004CV	409	0.83 ✓	88.2 ✓	11.5 ✓
CV-BENTOMAT FLW	201004CV	424	0.84 ✓	88.2 ✓	8.2 ✓
CV-BENTOMAT FLW	201004CV	438	0.99 ✓	96.7 ✓	5.9 ✓
CV-BENTOMAT FLW	201004CV	453	0.85 ✓	96.7 ✓	5.1 ✓
CV-BENTOMAT FLW	201004CV	468	0.84 ✓	96.7 ✓	5.5 ✓
CV-BENTOMAT FLW	201004CV	484	0.84 ✓	96.7 ✓	5.5 ✓
CV-BENTOMAT FLW	201004CV	500	0.82 ✓	96.7 ✓	6.2 ✓

NOT IN ORDER

NOT IN ORDER

(15 TOTAL)



### BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 000258364

has been tested by American Colloid Company and yielded the following test results.

Clay Lot #	Moist	Swell	Fluid Loss
ASTM Test Method:	D 2216	D 5890 ✓	D 5891 ✓
Required Value:	12% Max	24 ml/2g Min	18 ml Max
942544A ✓	11.60	26.00 ✓	15.60 ✓
942544B ✓	11.60	24.00 ✓	15.80 ✓
942543A ✓	11.60	25.00 ✓	15.00 ✓
942543B ✓	11.20	24.00 ✓	15.40 ✓
942539A ✓	12.00	26.00 ✓	14.60 ✓
942539B ✓	11.60	27.00 ✓	15.00 ✓

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 000258364 was manufactured with geotextiles which were tested with the following results.

INNER BASE GEOTEXTILE				COVER GEOTEXTILE (N/W-WHITE)				INNER BASE GEOTEXTILE (BLK N/W-2.7 WIDE)			
Material	Roll Number	Area Area sq/ycd	Grav. Strength lb	Material	Roll Number	Max. Area sq/ycd	Grav. Strength lb	Material	Roll Number	Area Area sq/ycd	Grav. Strength lb
PPX 827EX	2020514723	3.6	151.1	CV-NON-WOVEN	4961	7.5	41	PPX 827EX	2011147115	3.26	85.52
MTX 1213	WEA012199-4	3.6	155.5	CV-NON-WOVEN	161	6.7	44.8	PPX 311C	2020541827	3.41	77.77
MTX 1213	WEA012199-5	3.6	155.5	CV-NON-WOVEN	181	6.9	45.4	PPX 311C	2020541832	3.45	76.69
MTX 1213	WEA012199-6	3.6	155.5	CV-NON-WOVEN	191	6.8	44.2	PPX 311C	2020541834	3.56	83.72
MTX 1213	WEA012045-10	3.6	180.8	CV-NON-WOVEN	200	6.8	42.1	PPX 311C	2020541889	3.59	89.18
MTX 1213	WEA012045-14	3.6	178.1	CV-NON-WOVEN	210	6.7	41.3	PPX 311C	2020542764	3.33	80.41
MTX 1213	WEA012045-23	3.6	178.1	CV-NON-WOVEN	215	6.6	43.3	PPX 311C	2020542836	3.57	106.57
MTX 1213	WEA012045-16	3.5	179.0	CV-NON-WOVEN	225	6.3	41.3	PPX 311C	2020631885	4.49	130.93
MTX 1213	WEA012043-1	3.6	170.2	CV-NON-WOVEN	231	6.6	37.7	PPX 311C	2020631889	3.25	90.28
MTX 1213	WEA012043-3	3.6	170.2	CV-NON-WOVEN	242	6.7	41.7	PPX 311C	2020631892	3	92.95
				CV-NON-WOVEN	258	6.5	38.5	PPX 311C	2020631895	3	92.95
								PPX 311C	2020631896	3	92.95
								PPX 311C	2020631897	3	92.95
								PPX 311C	2020632003	3.89	91.91
								PPX 311C	2020632005	3.89	91.91

(11 TOTAL)



NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.

• 21000 77<sup>th</sup> Avenue South • Kent, WA 98032 •

Phone: (253) 872-0244 • Fax: (253) 872-0245

[www.northwestlinings.com](http://www.northwestlinings.com)

LETTER OF TRANSMITTAL

TO: MMinch@Geosyntec.com

DATE: 2/3/2010

JOB NO.: N09150

CC: jeffg@goodfellowbros.com

ATTENTION: : Geosyntec

JFrey@wm.com

RE: Kekaha LF Phase II Lateral Expansion Cell 1 - CETCO  
Geosynthetic Clay Liner Index Flux / Perm Test Results

WE ARE SENDING YOU:  Attached  Under Separate Cover via \_\_\_\_\_ the following items:

Shop Drawings  Prints  Plans  Specifications  Samples

Copy of Letter  Change Order  Submittals  Warranties  Other

Copies	Specification #	Description
1	Sec. 02074-1.02	<u>CETCO</u> - Geosynthetic Clay Liner Index Flux / Permeability Test Results

These are transmitted as checked below:

For Approval  Approved as submitted  Resubmit  Copies for Approval

For your use  Approved as noted  Submit  Copies for distribution

For review and comment  Returned for corrections  Return  Corrected Prints

For bids due \_\_\_\_\_  Other \_\_\_\_\_

Remarks:

COPY TO: FILE

SIGNED: Richard Kamienski

**INDEX FLUX AND PERMEABILITY OF GCL's  
TEST RESULTS  
ASTM D-5887 / D-5084**



Client : CETCO  
Project Location : Kekaha Landfill  
Sample Number : Roll 363  
Description : Bentomat FLW

Date : 02/03/10  
Job No. : 10LG2078.01  
Tested By : RL  
Checked By : JB

Permeant Fluid : De-Aired Water

Physical Property Data

	Total Sample		Total Sample
Initial Clay Height ( in )	: 0.21	Final Height of Clay ( in )	: 0.27
Initial Diameter ( in )	: 4.00	Final Diameter of Clay ( in )	: 4.00
Initial Wet Weight ( g )	: 62.40	Final Wet Weight(Clay) (g)	: 81.70
Wet Density ( pcf )	: 90.00	Wet Density ( pcf )	: 91.65
Moisture Content %	: 39.50	Moisture Content %	: 92.30
Dry Density ( pcf )	: 64.52	Dry Density ( pcf )	: 47.66

Test Parameters

Fluid	: De-Aired Water	Average Effective	
Cell Pressure ( psi )	: 80.00	Confining Pressure (psi)	: 4
Head Water ( psi )	: 77.00	Gradient	: 204.44
Tail Water ( psi )	: 75.00	Effective Stress at Base	: 5

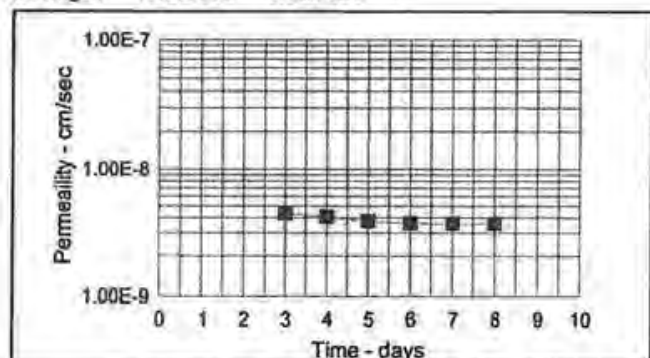
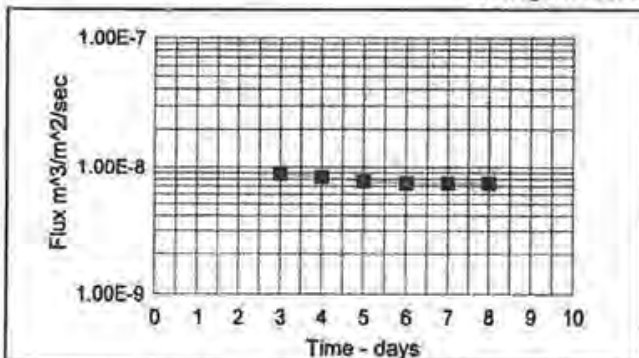
Flux and Permeability Input Data

Minimum Saturation Time is 48 hours

Area, A = 0.00811 m<sup>2</sup>  
Thickness, t = 0.27 in

Days	Date	Flow cc	Time min	Elapsed Time (sec)	Flux (m <sup>3</sup> /m <sup>2</sup> /sec)	k cm/sec
1	01/27/2010	48 hours of hydration per ASTM				
2	01/28/2010					
3	01/29/2010	6.30	1440	86400	6.99E-009	4.40E-009
4	01/30/2010	5.90	1444	86640	8.40E-009	4.11E-009
5	01/31/2010	5.40	1436	86160	7.73E-009	3.78E-009
6	02/01/2010	5.20	1439	86340	7.43E-009	3.63E-009
7	02/02/2010	5.20	1441	86460	7.42E-009	3.63E-009
8	02/03/2010	5.20	1442	86520	7.41E-009	3.63E-009

Average of Last 3 Test Readings : 7.42E-009 3.63E-009 ✓



J.T Laboratories, Inc.

938 S Central Ave, Canonsburg, Pa. 15317 Tel 724-745-4441, Fax 724-745-4261

**INDEX FLUX AND PERMEABILITY OF GCL's  
TEST RESULTS  
ASTM D-5887 / D-5084**



Client	: CETCO	Date	: 02/03/10
Project Location	: Kekaha Landfill	Job No.	: 10LG2078.01
Sample Number	: Roll 453 ✓	Tested By	: RL
Description	: Bentomat FLW	Checked By	: JB
Permeant Fluid	: De-Aired Water		

Physical Property Data

	Total Sample		Total Sample
Initial Clay Height ( in )	: 0.18	Final Height of Clay ( in )	: 0.27
Initial Diameter ( in )	: 4.00	Final Diameter of Clay ( in )	: 4.00
Initial Wet Weight ( g )	: 50.10	Final Wet Weight(Clay) (g)	: 79.70
Wet Density ( pcf )	: 84.30	Wet Density ( pcf )	: 89.41
Moisture Content %	: 36.10	Moisture Content %	: 117.20
Dry Density ( pcf )	: 61.94	Dry Density ( pcf )	: 41.16

Test Parameters

Fluid	: De-Aired Water	Average Effective	
Cell Pressure ( psi )	: 80.00	Confining Pressure (psi)	: 4
Head Water ( psi )	: 77.00	Gradient	: 204.44
Tail Water ( psi )	: 75.00	Effective Stress at Base	: 5

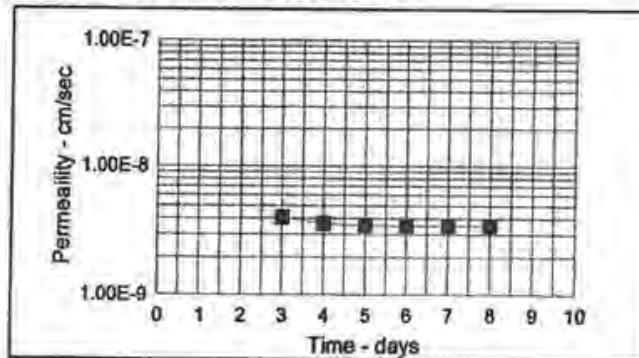
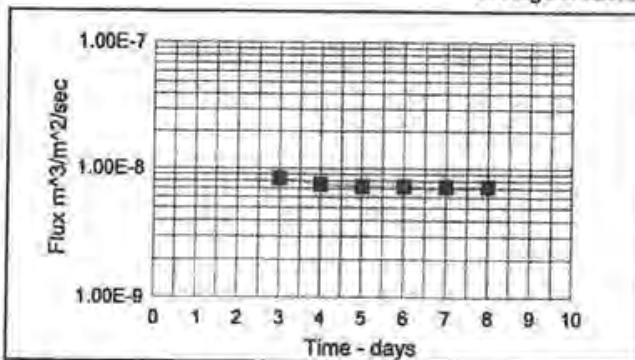
Flux and Permeability Input Data

Minimum Saturation Time is 48 hours

Area, A = 0.00811 m<sup>2</sup>  
Thickness, t = 0.27 in

Days	Date	Flow	Time	Elapsed	Flux	k	
		cc	min	Time (sec)	(m <sup>3</sup> /m <sup>2</sup> /sec)	cm/sec	
1	01/27/2010	48 hours of hydration per ASTM					
2	01/28/2010						
3	01/29/2010	5.90	1440	86400	6.42E-009	4.12E-009	
4	01/30/2010	6.30	1444	86640	7.55E-009	3.89E-009	
5	01/31/2010	5.10	1438	86160	7.30E-009	3.57E-009	
6	02/01/2010	5.10	1439	86340	7.29E-009	3.56E-009	
7	02/02/2010	5.10	1441	86460	7.28E-009	3.56E-009	
8	02/03/2010	5.10	1442	86520	7.27E-009	3.56E-009	

Average of Last 3 Test Readings : 7.28E-009 3.56E-009 ✓



**JLT Laboratories, Inc.**

938 S Central Ave, Canonsburg, Pa. 15317 Tel 724-746-4441, Fax 724-746-4261

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www.northwestlinings.com

**LETTER OF TRANSMITTAL**

TO: MMinch@Geosyntec.com

CC: jeffg@goodfellowbras.com

JFrey@wm.com

DATE: 1/25/2010

JOB NO.: N09150

ATTENTION: : Geosyntec

RE: Kekaha LF Phase II Lateral Expansion Cell 1 - AGRU 60 & 80 mil HD Microspike Submittals

WE ARE SENDING YOU:  Attached  Under Separate Cover via \_\_\_\_\_ the following items:

Shop Drawings  Prints  Plans  Specifications  Samples

Copy of Letter  Change Order  Submittals  Warranties  Other

Copies	Specification #	Description
1	Sec. 02072-1.02A.2,3	<b>AGRU America</b> - 60 & 80 mil HD Microspike QC certificates issued by resin supplier
1	Sec. 02072-1.02A.8	<b>AGRU America</b> - 60 & 80 mil HD Microspike QC certificates and test results

These are transmitted as checked below:

For Approval  Approved as submitted  Resubmit  Copies for Approval

For your use  Approved as noted  Submit  Copies for distribution

For review and comment  Returned for corrections  Return  Corrected Prints

For bids due \_\_\_\_\_  Other \_\_\_\_\_

Remarks:

COPY TO: FILE

SIGNED: Richard Kamienski



micro

NW Linings KEKAHA LF Doc 13317

PO#

C-4083

HDPE

CPU, HI

METRIC DIMENSIONS

2 rolls 80 HD microspike	2	left
104 rolls 60 HD microspike	104	left

23' x 410' x 104 = 980,720 SF

ROLL #	wid	len	AREA		wgt		lot #
(K)801611 .10	7	100	700.0	80HD micro 2 tot 1	3154	sq + 2ft fric	7291467
(K)801612 .10	7	100	700.0	80HD micro 2 tot 2	3163		7291467
(K)801613 .10	7	125	875.0	60HD micro 104 tot 1	2974	sq + 2ft fric	7291467
(K)801614 .10	7	125	875.0	60HD micro 104 tot 2	3007		7291467
(K)801615 .10	7	125	875.0	60HD micro 104 tot 3	3010		7291467
(K)801616 .10	7	125	875.0	60HD micro 104 tot 4	3009		7291467
(K)801617 .10	7	125	875.0	60HD micro 104 tot 5	3012		7291467
(K)801618 .10	7	125	875.0	60HD micro 104 tot 6	3015		7291467
(K)801619 .10	7	125	875.0	60HD micro 104 tot 7	3016		7291467
(K)801620 .10	7	125	875.0	60HD micro 104 tot 8	3018		7291467
(K)801721 .10	7	125	875.0	60HD micro 104 tot 9	3022		7291467
(K)801722 .10	7	125	875.0	60HD micro 104 tot 10	3022		7291467
(K)801723 .10	7	125	875.0	60HD micro 104 tot 11	3019	sq	7291467
(K)801724 .10	7	125	875.0	60HD micro 104 tot 12	3020		7291467
(K)801725 .10	7	125	875.0	60HD micro 104 tot 13	3020		7291467
(K)801726 .10	7	125	875.0	60HD micro 104 tot 14	3022		7291467
(K)801727 .10	7	125	875.0	60HD micro 104 tot 15	3024		7291467
(K)801728 .10	7	125	875.0	60HD micro 104 tot 16	3018		7291467
(K)801729 .10	7	125	875.0	60HD micro 104 tot 17	3021		7291467
(K)801730 .10	7	125	875.0	60HD micro 104 tot 18	3025		7291467
(K)801731 .10	7	125	875.0	60HD micro 104 tot 19	3029		7291467
(K)801732 .10	7	125	875.0	60HD micro 104 tot 20	3027		7291467
(K)801733 .10	7	125	875.0	60HD micro 104 tot 21	3025		7291467
(K)801734 .10	7	125	875.0	60HD micro 104 tot 22	3022	sq	7291467
(K)801735 .10	7	125	875.0	60HD micro 104 tot 23	3023		7291467
(K)801736 .10	7	125	875.0	60HD micro 104 tot 24	3023		7291467
(K)801737 .10	7	125	875.0	60HD micro 104 tot 25	3024		7291467
(K)801738 .10	7	125	875.0	60HD micro 104 tot 26	3023		7291467
(K)801739 .10	7	125	875.0	60HD micro 104 tot 27	3025		7291467
(K)801740 .10	7	125	875.0	60HD micro 104 tot 28	3021		7291467
(K)801741 .10	7	125	875.0	60HD micro 104 tot 29	3023		7291467
(K)802101 .10	7	125	875.0	60HD micro 104 tot 30	3023		7291467
(K)802102 .10	7	125	875.0	60HD micro 104 tot 31	3027		7291467
(K)802103 .10	7	125	875.0	60HD micro 104 tot 32	3026	sq	7291467
(K)802104 .10	7	125	875.0	60HD micro 104 tot 33	3023		7291467
(K)802105 .10	7	125	875.0	60HD micro 104 tot 34	3038		7291467
(K)802106 .10	7	125	875.0	60HD micro 104 tot 35	3056		7291467
(K)802107 .10	7	125	875.0	60HD micro 104 tot 36	3054		7291467
(K)802108 .10	7	125	875.0	60HD micro 104 tot 37	3056		7291467
(K)802109 .10	7	125	875.0	60HD micro 104 tot 38	3048		7291467
(K)802110 .10	7	125	875.0	60HD micro 104 tot 39	3040		7291467
(K)802111 .10	7	125	875.0	60HD micro 104 tot 40	3041		7291467
(K)802112 .10	7	125	875.0	60HD micro 104 tot 41	3042		7291467
(K)802113 .10	7	125	875.0	60HD micro 104 tot 42	3037		7291467
(K)802114 .10	7	125	875.0	60HD micro 104 tot 43	3038	sq	7291467
(K)802115 .10	7	125	875.0	60HD micro 104 tot 44	3037		7291467
(K)802116 .10	7	125	875.0	60HD micro 104 tot 45	3037		7291467
(K)802117 .10	7	125	875.0	60HD micro 104 tot 46	3037		7291467
(K)802118 .10	7	125	875.0	60HD micro 104 tot 47	3043		7291467
(K)802119 .10	7	125	875.0	60HD micro 104 tot 48	3039		7291454
(K)802120 .10	7	125	875.0	60HD micro 104 tot 49	3044		7291454
(K)802221 .10	7	125	875.0	60HD micro 104 tot 50	3041		7291454
(K)802222 .10	7	125	875.0	60HD micro 104 tot 51	3042		7291454
(K)802223 .10	7	125	875.0	60HD micro 104 tot 52	3038		7291454

HDPE

CPU, HI

METRIC DIMENSIONS

2 rolls 80 HD microspike	2	left
104 rolls 60 HD microspike	104	left

ROLL #	wid	len	AREA		wgt		lot #
(K)802224 .10	7	125	875.0	60HD micro	104 tot 53	3038	7291454
(K)802225 .10	7	125	875.0	60HD micro	104 tot 54	3042	7291454
(K)802226 .10	7	125	875.0	60HD micro	104 tot 55	3041	7291454
(K)802227 .10	7	125	875.0	60HD micro	104 tot 56	3041	7291454
(K)802228 .10	7	125	875.0	60HD micro	104 tot 57	3040	7291454
(K)802229 .10	7	125	875.0	60HD micro	104 tot 58	3039	7291454
(K)802230 .10	7	125	875.0	60HD micro	104 tot 59	3037	7291454
(K)802231 .10	7	125	875.0	60HD micro	104 tot 60	3034	7291454
(K)802232 .10	7	125	875.0	60HD micro	104 tot 61	3030	7291454
(K)802233 .10	7	125	875.0	60HD micro	104 tot 62	3029	7291454
(K)802234 .10	7	125	875.0	60HD micro	104 tot 63	3028	7291454
(K)802235 .10	7	125	875.0	60HD micro	104 tot 64	3030	7291454
(K)802236 .10	7	125	875.0	60HD micro	104 tot 65	3036	7291454
(K)802237 .10	7	125	875.0	60HD micro	104 tot 66	3034	7291454
(K)802238 .10	7	125	875.0	60HD micro	104 tot 67	3035	7291454
(K)802239 .10	7	125	875.0	60HD micro	104 tot 68	3029	7291454
(K)802240 .10	7	125	875.0	60HD micro	104 tot 69	3036	7291454
(K)802341 .10	7	125	875.0	60HD micro	104 tot 70	3036	7291454
(K)802342 .10	7	125	875.0	60HD micro	104 tot 71	3036	7291454
(K)802343 .10	7	125	875.0	60HD micro	104 tot 72	3035	7291454
(K)802344 .10	7	125	875.0	60HD micro	104 tot 73	3033	7291454
(K)802345 .10	7	125	875.0	60HD micro	104 tot 74	3032	7291454
(K)802346 .10	7	125	875.0	60HD micro	104 tot 75	3030	7291454
(K)802347 .10	7	125	875.0	60HD micro	104 tot 76	3032	7291454
(K)802348 .10	7	125	875.0	60HD micro	104 tot 77	3033	7291454
(K)802349 .10	7	125	875.0	60HD micro	104 tot 78	3039	7291454
(K)802350 .10	7	125	875.0	60HD micro	104 tot 79	3037	7291454
(K)802351 .10	7	125	875.0	60HD micro	104 tot 80	3037	7291454
(K)802352 .10	7	125	875.0	60HD micro	104 tot 81	3037	7291454
(K)802353 .10	7	125	875.0	60HD micro	104 tot 82	3035	7291454
(K)802354 .10	7	125	875.0	60HD micro	104 tot 83	3015	7291454
(K)802355 .10	7	125	875.0	60HD micro	104 tot 84	3024	7291454
(K)802356 .10	7	125	875.0	60HD micro	104 tot 85	3030	7291454
(K)802357 .10	7	125	875.0	60HD micro	104 tot 86	3029	7291454
(K)802358 .10	7	125	875.0	60HD micro	104 tot 87	3029	7291454
(K)802359 .10	7	125	875.0	60HD micro	104 tot 88	3035	7291454
(K)802360 .10	7	125	875.0	60HD micro	104 tot 89	3032	7291454
(K)802461 .10	7	125	875.0	60HD micro	104 tot 90	3035	7291454
(K)802462 .10	7	125	875.0	60HD micro	104 tot 91	3033	7291454
(K)802463 .10	7	125	875.0	60HD micro	104 tot 92	3031	7291454
(K)802464 .10	7	125	875.0	60HD micro	104 tot 93	3033	7291454
(K)802465 .10	7	125	875.0	60HD micro	104 tot 94	3034	7291454
(K)802466 .10	7	125	875.0	60HD micro	104 tot 95	3032	7291454
(K)802467 .10	7	125	875.0	60HD micro	104 tot 96	3030	7291454
(K)802468 .10	7	125	875.0	60HD micro	104 tot 97	3030	7291454
(K)802469 .10	7	125	875.0	60HD micro	104 tot 98	3027	7291454
(K)802470 .10	7	125	875.0	60HD micro	104 tot 99	3025	7291454
(K)802471 .10	7	125	875.0	60HD micro	104 tot 100	3025	7291454
(K)802472 .10	7	125	875.0	60HD micro	104 tot 101	3027	7291454
(K)802473 .10	7	125	875.0	60HD micro	104 tot 102	3047	7291454
(K)802474 .10	7	125	875.0	60HD micro	104 tot 103	3058	7291454
(K)802475 .10	7	125	875.0	60HD micro	104 tot 104	3057	7291454



# quality certificate

ROLL # **801613-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.39 mm	55 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 31 ✓ mil	AVE:	1.46 mm	57 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>206 ✓</b> <b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM						

Specific Gravity ASTM D792	Density	g/cc	<b>.945 ✓</b>
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
Carbon Black Content ASTM D4218	Range	%	<b>2.35 ✓</b>
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>27 N/mm</b>	<b>152 ppi ✓</b> <b>2,642 psi</b>
	Average Strength @ Break	<b>33 N/mm</b>	<b>190 ppi ✓</b> <b>3,298 psi</b>
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.08 ✓</b>
	Average Elongation @ Break	%	<b>507.2 ✓</b>
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>215.0 N</b>	<b>✓48.334 lbs</b>
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>411.4 N</b>	<b>92.500 lbs</b>
Puncture Resistance ASTM D4833 (Modified)	Load	<b>595.2 N</b>	<b>✓133.80 lbs</b>
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

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# quality certificate

ROLL # **801614-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.44 mm	57	✓	mil
	MAX:	1.58 mm	62		mil
	AVE:	1.50 mm	59	✓	mil
Asperity GRI GM12: <b>31</b> ✓ mil ODD #: TOP EVEN #: BOTTOM			Length.....	125 m	410.1 feet
				Width.....	7.00 m; 23.0 feet
					<b>TEST RESULTS</b>
OIT(Standard) ASTM D3895 minutes					206 ✓

Specific Gravity ASTM D792	Density	g/cc	<b>.945</b> ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>	
Carbon Black Content ASTM D4218	Range	%	<b>2.35</b> ✓	
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>27 N/mm</b>	<b>156 ppi</b> ✓	<b>2,642 psi</b>
	Average Strength @ Break	<b>34 N/mm</b>	<b>195 ppi</b> ✓	<b>3,298 psi</b>
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.08</b> ✓	
	Average Elongation @ Break	%	<b>507.2</b> ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>215.0 N</b>	<b>✓ 48.334 lbs</b>	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>411.4 N</b>	<b>92.500 lbs</b>	
Puncture Resistance ASTM D4833 (Modified)	Load	<b>595.2 N</b>	<b>/ 133.80 lbs</b>	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>	

Customer: **Northwest Linings**  
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 Destination **CPU, (HI)**

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ROLL # **801615-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.56 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	35 ✓ mil	AVE:	1.49 mm	59 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	206 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density		g/cc		.945 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g		g/10 min		.23
Carbon Black Content ASTM D4218	Range		%		2.35 ✓
Carbon Black Dispersion ASTM D5596	Category				10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	155 ppi ✓	2,642 psi	
	Average Strength @ Break	34 N/mm	193 ppi ✓	3,298 psi	
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		16.08 ✓	
	Average Elongation @ Break	%		507.2 ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		-0.24	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	215.0 N		✓ 48.334 lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.4 N		92.500 lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	595.2 N		✓ 133.80 lbs	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

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# quality certificate

ROLL # **801616-10** Lot # **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.54 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 30 ✓ mil	AVE:	1.48 mm	58 ✓ mil			
QDD #: TOP EVEN # BOTTOM				OIT(Standard) ASTM D3895 minutes:	206 ✓	TEST RESULTS

Specific Gravity	Density	g/cc	.945 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE: <b>K307</b>			

Carbon Black Content	Range	%	2.35 ✓
ASTM D4218			

Carbon Black Dispersion	Category	10 IN CAT 1 ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	27 N/mm	154 ppi ✓	2,642 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	34 N/mm	192 ppi ✓	3,298 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	16.08 ✓
ASTM D638 (Modified)			
( 2 inches / minute )			
Lo = 1.3" Yield	Average Elongation @ Break	%	507.2 ✓
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.24
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	215.0 N	48.334 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	411.4 N	92.500 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	595.2 N	133.80 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

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ROLL # **801617-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.45 mm	57 ✓	mil	
	MAX:	1.50 mm	59	mil	
Asperity GRI GM12: <b>32</b> ✓ mil	AVE:	1.47 mm	58 ✓	mil	
ODD# TOP EVEN# BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	<b>.945 ✓</b>	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>	
Carbon Black Content ASTM D4218	Range	%	<b>2.35 ✓</b>	
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	153 ppi ✓	2,642 psi
	Average Strength @ Break	33 N/mm	191 ppi ✓	3,298 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.08 ✓</b>	
	Average Elongation @ Break	%	<b>507.2 ✓</b>	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	215.0 N	<b>48.334 lbs ✓</b>	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.4 N	<b>92.500 lbs</b>	
Puncture Resistance ASTM D4833 (Modified)	Load	595.2 N	<b>133.80 lbs ✓</b>	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>	

Customer: **Northwest Linings**  
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ROLL # **801618-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness .....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	30 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	206 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc		.945 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min		.23
Carbon Black Content ASTM D4218	Range	%		2.32 ✓
Carbon Black Dispersion ASTM D5596	Category			10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,583 psi
	Average Strength @ Break	31 N/mm	175 ppi ✓	3,018 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		15.78 ✓
	Average Elongation @ Break	%		455.4 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	215.0 N		✓ 48.334 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.4 N		92.500 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	595.2 N		✓ 133.80 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/9/2010**

Signature: *[Handwritten Signature]*  
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# quality certificate

ROLL # **801619-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.53 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes 206 ✓	
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	<b>.945 ✓</b>
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
Carbon Black Content ASTM D4218	Range	%	<b>2.32 ✓</b>
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26 N/mm</b>	<b>151 ppi ✓</b> <b>2,583 psi</b>
	Average Strength @ Break	<b>31 N/mm</b>	<b>176 ppi ✓</b> <b>3,018 psi</b>
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.78 ✓</b>
	Average Elongation @ Break	%	<b>455.4 ✓</b>
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>215.0 N</b>	<b>48.334 lbs ✓</b>
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>411.4 N</b>	<b>92.500 lbs</b>
Puncture Resistance ASTM D4833 (Modified)	Load	<b>595.2 N</b>	<b>133.80 lbs ✓</b>
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/9/2010**  
 Signature: *[Handwritten Signature]*  
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ROLL # **801620-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
	AVE:	1.48 mm	58 ✓ mil			
Asperity GRI GM12: <b>29</b> ✓ mil						
ODD # TOP	EVEN # BOTTOM			OTT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.32 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	151 ppi ✓ 2,583 psi
	Average Strength @ Break	31 N/mm	176 ppi ✓ 3,018 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.78 ✓
	Average Elongation @ Break	%	455.4 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	215.0 N	✓ 48.334 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.4 N	92.500 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	595.2 N	✓ 133.80 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/9/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
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# quality certificate

ROLL # **801721-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.43 mm	56 mil ✓	Length.....	125 m	410.1 feet
	MAX:	1.56 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>35</b> mil ✓	AVE:	1.48 mm	58 mil ✓			
ODD #: TOP EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc			<b>.945</b> ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min			<b>.23</b>
Carbon Black Content ASTM D4218	Range	%			<b>2.32</b> ✓
Carbon Black Dispersion ASTM D5596	Category				<b>10 IN CAT 1</b> ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26</b> N/mm	<b>151</b> ppi ✓	<b>2,583</b> psi	
	Average Strength @ Break	<b>31</b> N/mm	<b>176</b> ppi ✓	<b>3,018</b> psi	
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%			<b>15.78</b> ✓
	Average Elongation @ Break	%			<b>455.4</b> ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			<b>-0.24</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>215.0</b> N			<b>48.334</b> lbs ✓
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>411.4</b> N			<b>92.500</b> lbs
Puncture Resistance ASTM D4833 (Modified)	Load	<b>595.2</b> N			<b>133.80</b> lbs ✓
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **801722-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GR1 GM12: 30 ✓ mil	AVE:	1.47 mm	58 ✓ mil			
ODD #: TOP EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.32 ✓
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Carbon Black Dispersion ASTM D5596	Category	10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,583 psi
	Average Strength @ Break	31 N/mm	175 ppi ✓	3,018 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.78 ✓
	Average Elongation @ Break	%	455.4 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	215.0 N	✓ 48.334 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.4 N	92.500 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	595.2 N	✓ 133.80 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date:..... **1/10/2010**  
 Signature: *[Signature]*  
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# quality certificate

ROLL # **801723-10**

Lot # **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	<b>1.38 mm</b>	<b>54</b> ✓ mil
MAX:	<b>1.49 mm</b>	<b>59</b> mil
AVE:	<b>1.45 mm</b>	<b>57</b> ✓ mil

Thickness.....	<b>1.5 mm</b>	<b>60 mil</b>
Length.....	<b>125 m</b>	<b>410.1</b> feet
Width.....	<b>7.00 m</b>	<b>23.0</b> feet

Asperity GRI GM12: **34** ✓ mil  
ODD # : TOP EVEN # : BOTTOM

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.943** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.29** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**26 N/mm**

**150 ppi** ✓

**2,635** psi

Average Strength @ Break

**33 N/mm**

**186 ppi** ✓

**3,255** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**15.62** ✓

Average Elongation @ Break

%

**495.4** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.24**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**217.6 N**

✓ **48.913** lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**398.5 N**

**89.593** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**610.6 N**

✓ **137.28** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer:  
PO:  
Destination

Date: **1/10/2010**

Signature: *[Signature]*  
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# quality certificate

ROLL # **801724-10**

Lot # **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.39 mm	55 ✓	mil	Length..... 125 m 410.1 feet
	MAX:	1.51 mm	59	mil	Width..... 7.00 m 23.0 feet
Asperity GRI GM12: 29 ✓ mil	AVE:	1.45 mm	57 ✓	mil	
ODD #: TOP EVEN #: BOTTOM					OIT(Standard) ASTM D3895 minutes 206 ✓

## TEST RESULTS

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.29 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	150 ppi ✓	2,635 psi
	Average Strength @ Break	33 N/mm	186 ppi ✓	3,255 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.62 ✓
	Average Elongation @ Break	%	495.4 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	✓ 48.913 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	✓ 137.28 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**

Signature: *[Handwritten Signature]*  
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# quality certificate

ROLL # **801725-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.42 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.48 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.29 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	154 ppi ✓ 2,635 psi
	Average Strength @ Break	33 N/mm	190 ppi ✓ 3,255 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.62 ✓
	Average Elongation @ Break	%	495.4 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	✓ 48.913 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	✓ 137.28 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**

Signature: *[Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **801726-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.40 mm	55 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>32</b> ✓ mil	AVE:	1.47 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM						
				OIT(Standard) ASTM D3895 minutes	206 ✓	

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.29 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	152 ppi ✓	2,635 psi
	Average Strength @ Break	33 N/mm	188 ppi ✓	3,255 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.62 ✓
	Average Elongation @ Break	%	495.4 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	✓ 48.913 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	✓ 137.28 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date:..... **1/10/2010**  
 Signature: *[Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **801727-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 mil	AVE:	1.47 mm	58 mil		
ODD # : TOP	EVEN # : BOTTOM			OT(Standard) ASTM D3895	minutes	206

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.943	✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.29	✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1	✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	152 ppi	✓ 2,635 psi
	Average Strength @ Break	33 N/mm	188 ppi	✓ 3,255 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.62	✓
	Average Elongation @ Break	%	495.4	✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	48.913	✓ lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	137.28	✓ lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**  
 Signature: *[Handwritten Signature]*  
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# quality certificate

ROLL # **801728-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.42 mm	56 mil ✓	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 ✓ mil	AVE:	1.48 mm	58 mil ✓		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	206 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.33 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	25 N/mm	145 ppi ✓ 2,495 psi
	Average Strength @ Break	33 N/mm	186 ppi ✓ 3,187 psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.24 ✓
	Average Elongation @ Break	%	505.8 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	✓ 48.913 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	✓ 137.28 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **801729-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.42 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.46 mm	57 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	206 ✓	

Specific Gravity ASTM D792	Density		g/cc			<b>.943</b> ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g		g/10 min			<b>.23</b>
Carbon Black Content ASTM D4218	Range		%			<b>2.33</b> ✓
Carbon Black Dispersion ASTM D5596	Category					<b>10 IN CAT 1</b> ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield		25 N/mm	143 ppi ✓		<b>2,495</b> psi
	Average Strength @ Break		32 N/mm	183 ppi ✓		<b>3,187</b> psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		%			<b>15.24</b> ✓
	Average Elongation @ Break		%			<b>505.8</b> ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			<b>-0.24</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance		217.6 N			✓ <b>48.913</b> lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load		398.5 N			<b>89.593</b> lbs
Puncture Resistance ASTM D4833 (Modified)	Load		610.6 N			✓ <b>137.28</b> lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs				<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs				<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/10/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **801730-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.47 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 31 ✓ mil	AVE:	1.45 mm	57 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.26 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	142 ppi ✓ 2,495 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓ 3,187 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.24 ✓
	Average Elongation @ Break	%	505.8 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	✓ 48.913 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	✓ 137.28 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 12/23/05





# quality certificate

ROLL # **801731-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	
ASTM D5994 (Modified)	MIN:	1.44 mm	57 mil	✓
	MAX:	1.48 mm	58 mil	
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.47 mm	58 mil	✓

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.943	✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.26	✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1	✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	144 ppi	✓ 2,495 psi
	Average Strength @ Break	32 N/mm	184 ppi	✓ 3,187 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.24	✓
	Average Elongation @ Break	%	505.8	✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	217.6 N	48.913	✓ lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	398.5 N	89.593	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	610.6 N	137.28	✓ lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/10/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 60HDMic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **801732-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	<b>1.40 mm</b>	<b>55 ✓ mil</b>
MAX:	<b>1.50 mm</b>	<b>59 mil</b>
AVE:	<b>1.47 mm</b>	<b>58 ✓ mil</b>

Thickness.....	<b>1.5 mm</b>	<b>60 mil</b>
Length.....	<b>125 m</b>	<b>410.1 feet</b>
Width.....	<b>7.00 m</b>	<b>23.0 feet</b>

Asperity GRI GM12: **31 ✓ mil**  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **206 /** **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.943 ✓**

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.26 ✓**

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1 ✓**

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**25 N/mm**

**144 ppi ✓**

**2,495 psi**

Average Strength @ Break

**32 N/mm**

**184 ppi ✓**

**3,187 psi**

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**15.24 ✓**

Average Elongation @ Break

%

**505.8 ✓**

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.24**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**217.6 N**

**48.913 lbs ✓**

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**398.5 N**

**89.593 lbs**

Puncture Resistance  
ASTM D4833 (Modified)

Load

**610.6 N**

**137.28 lbs ✓**

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

**1500 hrs**

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

**300 hrs**

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/10/2010**

Signature:   
Quality Control Department

80HDmic.FRM  
REV 03  
12/23/05



# quality certificate

ROLL # **801733-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.44 mm	57	✓	mil
	MAX:	1.49 mm	59		mil
	AVE:	1.46 mm	57	✓	mil
Asperity GRI GM12: <b>31</b> ✓ mil ODD #: TOP EVEN #: BOTTOM	OIT(Standard) ASTM D3895 minutes			206	✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.945	✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.24	✓
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Carbon Black Dispersion ASTM D5596	Category	10 IN CAT 1	✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	147 ppi	✓	2,556 psi
	Average Strength @ Break	33 N/mm	188 ppi	✓	3,277 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.26	✓
	Average Elongation @ Break	%	502.0	✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	218.3 N	✓	49.077 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	409.7 N	92.100 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	619.1 N	✓	139.18 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/11/2010**  
Signature: *[Handwritten Signature]*  
Quality Control Department

60HDmic FRM  
REV 03  
12/23/05



# quality certificate

ROLL # **801734-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	
ASTM D5994	MIN:	1.46 mm	57 mil	✓
(Modified)	MAX:	1.50 mm	59 mil	
Asperity GRI GM12:	AVE:	1.48 mm	58 mil	✓
30 mil				
ODD # TOP				
EVEN # BOTTOM				

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity ASTM D792 Density g/cc **.945** ✓

MFI ASTM D1238 COND. E GRADE: **K307** Melt Flow Index 190°C /2160 g g/10 min **.23**

Carbon Black Content ASTM D4218 Range % **2.24** ✓

Carbon Black Dispersion ASTM D5596 Category **10 IN CAT 1** ✓

Tensile Strength	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,556 psi
ASTM D6693				
ASTM D638 (Modified)	Average Strength @ Break	33 N/mm	191 ppi ✓	3,277 psi
( 2 inches / minute )				

Elongation ASTM D6693	Average Elongation @ Yield	%	<b>15.26</b> ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	<b>502.0</b> ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability ASTM D1204 (Modified) Average Dimensional change % **-0.24**

Tear Resistance ASTM D-1004 (Modified) Average Tear Resistance **218.3** N ✓ **49.077** lbs

Puncture Resistance FTMS 101 Method 2065 (Modified) Load **409.7** N **92.100** lbs

Puncture Resistance ASTM D4833 (Modified) Load **619.1** N ✓ **139.18** lbs

ESCR ASTM D1693 Minimum Hrs w/o Failures 1500 hrs **CERTIFIED**

Notched Constant Tensile Load ASTM D5397 pass / fail @ 30% 300 hrs **ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/11/2010**  
Signature: *[Handwritten Signature]*  
Quality Control Department

06HDmkc.FRM  
REV 03  
12/23/05





# quality certificate

ROLL # **801735-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 ✓ mil	AVE: 1.46 mm	57 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	
Specific Gravity ASTM D792	Density		g/cc		.945 ✓
MFI ASTM D1238 COND. E GRADE: K307	Melt Flow Index 190°C /2160 g		g/10 min		.23
Carbon Black Content ASTM D4218	Range		%		2.24 ✓
Carbon Black Dispersion ASTM D5596	Category				10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield		26 N/mm	147 ppi ✓	2,556 psi
	Average Strength @ Break		33 N/mm	188 ppi ✓	3,277 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Elongation @ Yield		%		15.26 ✓
Lo = 1.3" Yield					
Lo = 2.0" Break	Average Elongation @ Break		%		502.0 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%		-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance		218.3 N		49.077 lbs ✓
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load		409.7 N		92.100 lbs
Puncture Resistance ASTM D4833 (Modified)	Load		619.1 N		139.18 lbs ✓
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			ONGOING

Customer: Northwest Linings  
 PO: C-4083 Kekaha LF  
 Destination CPU, (HI)

Date: 1/11/2010  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60MD/116-FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **801736-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: <b>1.46</b> mm	57 ✓ mil	Length.....	<b>125</b> m	410.1 feet
	MAX: <b>1.49</b> mm	59 mil	Width.....	<b>7.00</b> m	23.0 feet
Asperity GRI GM12: <b>29</b> ✓ mil	AVE: <b>1.48</b> mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	<b>206</b> ✓	

Specific Gravity ASTM D792	Density	g/cc	<b>.945</b> ✓
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MF) ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.24</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26</b> N/mm	<b>149</b> ppi ✓	<b>2,556</b> psi
	Average Strength @ Break	<b>33</b> N/mm	<b>191</b> ppi ✓	<b>3,277</b> psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.26</b> ✓
	Average Elongation @ Break	%	<b>502.0</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>218.3</b> N	✓ <b>49.077</b> lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>409.7</b> N	<b>92.100</b> lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	<b>619.1</b> N	✓ <b>139.18</b> lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/11/2010**  
 Signature: *[Signature]*  
 Quality Control Department

60H0mic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **801737-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	206 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.24 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓ 2,556 psi
	Average Strength @ Break	33 N/mm	190 ppi ✓ 3,277 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.26 ✓
	Average Elongation @ Break	%	502.0 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	218.3 N	✓ 49.077 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	409.7 N	92.100 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	619.1 N	✓ 139.18 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/11/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60HDmc-FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **801738-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	29 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	206 ✓

**TEST RESULTS**

Specific Gravity	Density	g/cc	.945 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.24 ✓
ASTM D4218			

Carbon Black Dispersion	Category		10 IN CAT 1 ✓
ASTM D5596			

Tensile Strength	Average Strength @ Yield	26 N/mm	150 ppi ✓	2,597 psi
ASTM D6693				
ASTM D638 (Modified)	Average Strength @ Break	33 N/mm	188 ppi ✓	3,242 psi
( 2 inches / minute )				

Elongation ASTM D6693	Average Elongation @ Yield	%	16.62 ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	503.3 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.24
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	218.3 N	✓	49.077 lbs
ASTM D-1004 (Modified)				

Puncture Resistance	Load	409.7 N		92.100 lbs
FTMS 101 Method 2065 (Modified)				

Puncture Resistance	Load	619.1 N	✓	139.18 lbs
ASTM D4833 (Modified)				

ESCR	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
ASTM D1693				

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs		ONGOING
ASTM D5397				

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/11/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 60HDmic.FRM  
 REV 03  
 12/23/05





# quality certificate

ROLL # **801739-10** Lot # **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.40 mm	55 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 31 ✓ mil	AVE: 1.48 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP	EVEN #: BOTTOM		Off(Standard) ASTM D3895 minutes	206 ✓	
Specific Gravity ASTM D792	Density		g/cc		.945 ✓
MFI ASTM D1238 COND. E GRADE: K307	Melt Flow Index 190°C /2160 g		g/10 min		.23
Carbon Black Content ASTM D4218	Range		%		2.24 ✓
Carbon Black Dispersion ASTM D5596	Category				10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield		26 N/mm	151 ppi ✓	2,597 psi
	Average Strength @ Break		33 N/mm	189 ppi ✓	3,242 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Elongation @ Yield		%		16.62 ✓
Lo = 1.3" Yield	Average Elongation @ Break		%		503.3 ✓
Lo = 2.0" Break					
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%		-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance		218.3 N		✓ 49.077 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load		409.7 N		92.100 lbs
Puncture Resistance ASTM D4833 (Modified)	Load		619.1 N		✓ 139.18 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/11/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 00HDmic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **801740-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	30 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OT(Standard) ASTM D3895	minutes	206 ✓

**TEST RESULTS**

Specific Gravity	Density	g/cc	.945 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.24 ✓
ASTM D4218			

Carbon Black Dispersion	Category		10 IN CAT 1 ✓
ASTM D5596			

Tensile Strength	Average Strength @ Yield	26 N/mm	150 ppi ✓	2,597 psi
ASTM D6693				
ASTM D638 (Modified)	Average Strength @ Break	33 N/mm	188 ppi ✓	3,242 psi
( 2 inches / minute )				

Elongation ASTM D6693	Average Elongation @ Yield	%	16.62 ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	503.3 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.24
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	218.3 N	✓	49.077 lbs
ASTM D-1004 (Modified)				

Puncture Resistance	Load	409.7 N		92.100 lbs
FTMS 101 Method 2065 (Modified)				

Puncture Resistance	Load	619.1 N	✓	139.18 lbs
ASTM D4833 (Modified)				

ESCR	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
ASTM D1693				

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs		ONGOING
ASTM D5397				

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/11/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

QC/DMC FRM  
 REV 03  
 1/22/05



# quality certificate

ROLL # **801741-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.44 mm	57 ✓ mil
MAX:	1.51 mm	59 mil
AVE:	1.48 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **35** ✓ mil  
 ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.945** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.26** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**26** N/mm

**151** ppi ✓

**2,597** psi

Average Strength @ Break

**33** N/mm

**189** ppi ✓

**3,242** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**16.62** ✓

Average Elongation @ Break

%

**503.3** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.24**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**218.3** N

✓

**49.077** lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**409.7** N

**92.100** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**619.1** N

✓

**139.18** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/11/2010**

Signature: *[Signature]*  
 Quality Control Department

60HDmic.FRM  
 REV 03  
 1/23/05



# quality certificate

ROLL # **802101-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	
(Modified)	MAX:	1.50 mm	59 ✓ mil	
Asperity GRI GM12:	AVE:	1.48 mm	58 ✓ mil	

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

ODD # TOP EVEN # BOTTOM

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	<b>.945</b> ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
Carbon Black Content ASTM D4218	Range	%	<b>2.26</b> ✓
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26 N/mm</b>	<b>151 ppi</b> ✓ <b>2,597 psi</b>
	Average Strength @ Break	<b>33 N/mm</b>	<b>189 ppi</b> ✓ <b>3,242 psi</b>
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.62</b> ✓
	Average Elongation @ Break	%	<b>503.3</b> ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>218.3 N</b>	✓ <b>49.077 lbs</b>
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>409.7 N</b>	<b>92.100 lbs</b>
Puncture Resistance ASTM D4833 (Modified)	Load	<b>619.1 N</b>	✓ <b>139.18 lbs</b>
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/11/2010**  
Signature: *[Signature]*  
Quality Control Department

60HDmic FRM  
REV 03  
12/23/05





# quality certificate

ROLL # **802102-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.48 mm	58 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	<b>.944</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.18</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,536 psi
	Average Strength @ Break	31 N/mm	180 ppi ✓	3,086 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.90</b> ✓
	Average Elongation @ Break	%	<b>497.6</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.9 N	✓	50.120 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.9 N		92.606 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.1 N	✓	137.16 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60HDmic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802103-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.47 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>32</b> ✓ mil	AVE:	1.46 mm	57 ✓ mil			
DDD # TOP EVEN # BOTTOM				OT(Standard) ASTM D3895 minutes	206 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.18 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	146 ppi ✓	2,536 psi
	Average Strength @ Break	31 N/mm	177 ppi ✓	3,086 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.90 ✓
	Average Elongation @ Break	%	497.6 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.9 N	✓ 50.120 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.9 N	92.606 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.1 N	✓ 137.16 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60HDmic FRM  
 REV 03  
 12/23/06



# quality certificate

ROLL # **802104-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	27 ✓ mil	AVE:	1.48 mm	58 ✓ mil		
ODD # TOP	EVEN #	BOTTOM	OIT(Standard) ASTM D3895 minutes <b>206 ✓</b>			

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	<b>.944 ✓</b>	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>	
Carbon Black Content ASTM D4218	Range	%	<b>2.18 ✓</b>	
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26 N/mm</b>	<b>148 ppi ✓</b>	<b>2,536 psi</b>
	Average Strength @ Break	<b>31 N/mm</b>	<b>180 ppi ✓</b>	<b>3,086 psi</b>
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.90 ✓</b>	
	Average Elongation @ Break	%	<b>497.6 ✓</b>	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>222.9 N</b>	<b>50.120 lbs ✓</b>	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>411.9 N</b>	<b>92.606 lbs</b>	
Puncture Resistance ASTM D4833 (Modified)	Load	<b>610.1 N</b>	<b>137.16 lbs ✓</b>	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802105-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.40 mm	55 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.47 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 31 ✓ mil	AVE:	1.44 mm	57 ✓ mil	OIT(Standard) ASTM D3895 minutes 206 ✓		
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.29 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	144 ppi ✓	2,536 psi
	Average Strength @ Break	31 N/mm	175 ppi ✓	3,086 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.90 ✓
	Average Elongation @ Break	%	497.6 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.9 N	✓ 50.120 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.9 N	92.606 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.1 N	✓ 137.16 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**  
Signature: *[Handwritten Signature]*  
Quality Control Department

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REV 03  
12/23/05





# quality certificate

ROLL # **802106-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.42 mm	56 mil	Length.....	125 m	410.1 feet
	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>30</b> ✓ mil	AVE:	1.49 mm	59 mil			
ODD #: TOP	EVEN #: BOTTOM			Off(Standard) ASTM D3895 minutes	206	✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc		<b>.944</b> ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min		<b>.23</b>
Carbon Black Content ASTM D4218	Range	%		<b>2.29</b> ✓
Carbon Black Dispersion ASTM D5596	Category			<b>10 IN CAT 1</b> ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,536 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓	3,086 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		<b>15.90</b> ✓
	Average Elongation @ Break	%		<b>497.6</b> ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		<b>-0.24</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.9 N	✓	<b>50.120</b> lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.9 N		<b>92.606</b> lbs
Puncture Resistance ASTM D4833 (Modified)	Load	610.1 N	✓	<b>137.16</b> lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

B01Dmic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802107-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.45 mm	57 mil ✓
MAX:	1.49 mm	59 mil
AVE:	1.48 mm	58 mil ✓

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **31** mil ✓  
 ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.944** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.23** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**26** N/mm

**151** ppi ✓

**2,587** psi

Average Strength @ Break

**34** N/mm

**192** ppi ✓

**3,298** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**15.12** ✓

Average Elongation @ Break

%

**508.0** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.24**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**222.9** N

✓

**50.120** lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**411.9** N

**92.606** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**610.1** N

✓

**137.16** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**

Signature: *[Handwritten Signature]*  
 Quality Control Department

SDHD/mic FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802108-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes 206 /	
ODD # TOP	EVEN # BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.23 ✓
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Carbon Black Dispersion ASTM D5596	Category	10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	151 ppi ✓	2,587 psi
	Average Strength @ Break	34 N/mm	192 ppi ✓	3,298 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.12 ✓
	Average Elongation @ Break	%	508.0 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.9 N	✓	50.120 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.9 N	92.606 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.1 N	✓	137.16 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: Northwest Linings  
PO: C-4083 Kekaha LF  
Destination CPU, (HI)

Date: 1/12/2010  
Signature: *[Handwritten Signature]*  
Quality Control Department

3010mic.FRM  
REV 03  
12/29/05



# quality certificate

ROLL # **802109-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.47 mm	58 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.56 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 ✓ mil	AVE: 1.51 mm	59 ✓ mil	<b>TEST RESULTS</b>		
ODD # TOP EVEN # BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.23 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	154 ppi ✓	2,587 psi
	Average Strength @ Break	34 N/mm	196 ppi ✓	3,298 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.12 ✓
	Average Elongation @ Break	%	508.0 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.9 N	✓	50.120 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.9 N		92.606 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	610.1 N	✓	137.16 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60H0mic.FRM  
 REV 03  
 12/23/05





# quality certificate

ROLL # **802110-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.45 mm	57 ✓ mil
MAX:	1.50 mm	59 mil
AVE:	1.48 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **32** ✓ mil  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	<b>.944</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.23</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26</b> N/mm	<b>151</b> ppi ✓	<b>2,587</b> psi
	Average Strength @ Break	<b>34</b> N/mm	<b>192</b> ppi ✓	<b>3,298</b> psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.12</b> ✓
	Average Elongation @ Break	%	<b>508.0</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>222.9</b> N	✓ <b>50.120</b> lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>411.9</b> N	<b>92.606</b> lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	<b>610.1</b> N	✓ <b>137.16</b> lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/12/2010**  
Signature: *[Signature]*  
Quality Control Department

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12/23/05



# quality certificate

ROLL # **802111-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.47 mm	58 ✓ mil
MAX:	1.50 mm	59 mil
AVE:	1.48 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **32** mil ✓  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **206** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.944** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.23** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**26** N/mm

**151** ppi ✓

**2,587** psi

Average Strength @ Break

**34** N/mm

**192** ppi ✓

**3,298** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**15.12** ✓

Average Elongation @ Break

%

**508.0** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.24**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**222.9** N

✓

**50.120** lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**411.9** N

**92.606** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**610.1** N

✓

**137.16** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**

Signature:   
Quality Control Department

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REV 03  
12/23/05



# quality certificate

ROLL # **802112-10** Lot #: **7291467** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 ✓ mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	34 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>206 ✓</b>	
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	.944 ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.33 ✓	
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	151 ppi ✓	2,592 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓	3,127 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.60 ✓	
	Average Elongation @ Break	%	480.7 ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.4 N	✓ 50.008 lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	416.7 N	93.687 lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	612.0 N	✓ 137.58 lbs	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**  
Signature: *[Handwritten Signature]*  
Quality Control Department  
S0HDmic FRM  
REV 03  
12/23/05



# quality certificate

ROLL # **802113-10**

Lot # **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	33 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>206 ✓</b>	
ODD #: TOP EVEN # BOTTOM					<b>TEST RESULTS</b>	

Specific Gravity	Density	g/cc	<b>.944 ✓</b>
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
COND. E			
GRADE: <b>K307</b>			

Carbon Black Content	Range	%	<b>2.33 ✓</b>
ASTM D4218			

Carbon Black Dispersion	Category	<b>10 IN CAT 1 ✓</b>
ASTM D5596		

Tensile Strength	Average Strength @ Yield	26 N/mm	151 ppi ✓	2,592 psi
ASTM D6693				
ASTM D638 (Modified)	Average Strength @ Break	32 N/mm	182 ppi ✓	3,127 psi
( 2 inches / minute )				

Elongation ASTM D6693	Average Elongation @ Yield	%	<b>15.60 ✓</b>
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	<b>480.7 ✓</b>
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	<b>-0.24</b>
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.4 N	✓	50.008 lbs
ASTM D-1004 (Modified)				

Puncture Resistance	Load	416.7 N		93.687 lbs
FTMS 101 Method 2065 (Modified)				

Puncture Resistance	Load	612.0 N	✓	137.58 lbs
ASTM D4833 (Modified)				

ESCR	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802114-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.48 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	33 ✓ mil	AVE:	1.46 mm	57 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>206 ✓</b>	
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity	Density	g/cc	<b>.944 ✓</b>
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	<b>2.33 ✓</b>
ASTM D4218			

Carbon Black Dispersion	Category	<b>10 IN CAT 1 ✓</b>
ASTM D5596		

Tensile Strength	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,592 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	31 N/mm	180 ppi ✓	3,127 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	<b>15.60 ✓</b>
ASTM D638 (Modified)			
( 2 inches / minute )			
Lo = 1.3" Yield	Average Elongation @ Break	%	<b>480.7 ✓</b>
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	<b>-0.24</b>
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.4 N	<b>50.008 lbs ✓</b>
ASTM D-1004 (Modified)			

Puncture Resistance	Load	416.7 N	<b>93.687 lbs</b>
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	612.0 N	<b>137.58 lbs ✓</b>
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
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 REV 03  
 12/23/05



# quality certificate

ROLL # **802115-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.42 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 31 ✓ mil	AVE: 1.47 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	206 ✓	

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.33 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	150 ppi ✓	2,592 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓	3,127 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.60 ✓
	Average Elongation @ Break	%	480.7 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.4 N	✓ 50.008 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	416.7 N	93.687 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	612.0 N	✓ 137.58 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802116-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.42 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	30 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD# TOP	EVEN#	BOTTOM				
					OIT(Standard) ASTM D3895 minutes	206 ✓
						<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.33 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	150 ppi ✓ 2,592 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓ 3,127 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.60 ✓
	Average Elongation @ Break	%	480.7 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.24
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.4 N	✓ 50.008 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	416.7 N	93.687 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	612.0 N	✓ 137.58 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802117-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.40 mm	55 mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.54 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 mil	AVE:	1.49 mm	59 mil		
ODD # - TOP	EVEN #	BOTTOM	OIT(Standard) ASTM D3895		minutes	206

**TEST RESULTS**

Specific Gravity	Density	g/cc	.944
ASTM D792			✓

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.32
ASTM D4218			✓

Carbon Black Dispersion	Category		10 IN CAT 1
ASTM D5596			✓

Tensile Strength	Average Strength @ Yield	27 N/mm	157 ppi	2,674 psi
ASTM D6693			✓	
ASTM D638 (Modified)	Average Strength @ Break	34 N/mm	193 ppi	3,283 psi
( 2 inches / minute )			✓	

Elongation ASTM D6693	Average Elongation @ Yield	%	16.38
ASTM D638 (Modified)			✓
( 2 inches / minute )	Average Elongation @ Break	%	501.8
Lo = 1.3" Yield			✓
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.24
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.4 N	50.008 lbs
ASTM D-1004 (Modified)			✓

Puncture Resistance	Load	416.7 N	93.687 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	612.0 N	137.58 lbs
ASTM D4833 (Modified)			✓

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 12/23/05





# quality certificate

ROLL # **802118-10**

Lot #: **7291467**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.43 mm	56 ✓ mil
MAX:	1.50 mm	59 ✓ mil
AVE:	1.46 mm	57 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **29 ✓ mil**  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **206 ✓** **TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	<b>.944 ✓</b>
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.32 ✓</b>
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>27 N/mm</b>	<b>154 ppi ✓</b>	<b>2,674 psi</b>
	Average Strength @ Break	<b>33 N/mm</b>	<b>189 ppi ✓</b>	<b>3,283 psi</b>

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.38 ✓</b>
	Average Elongation @ Break	%	<b>501.8 ✓</b>

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.24</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>222.4 N</b>	<b>50.008 lbs ✓</b>
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>416.7 N</b>	<b>93.687 lbs</b>
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Puncture Resistance ASTM D4833 (Modified)	Load	<b>612.0 N</b>	<b>137.58 lbs ✓</b>
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**  
Signature: *[Signature]*  
Quality Control Department

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REV 03  
12/29/05



# quality certificate

ROLL # **802119-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.46 mm	57 ✓ mil
MAX:	1.50 mm	59 mil
AVE:	1.48 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **31** ✓ mil  
ODD # TOP EVEN # BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.944** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.32** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**27** N/mm

**156** ppi ✓

**2,674** psi

Average Strength @ Break

**33** N/mm

**191** ppi ✓

**3,283** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**16.38** ✓

Average Elongation @ Break

%

**501.8** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.31**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**222.4** N

✓

**50.008** lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**416.7** N

**93.687** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**612.0** N

✓

**137.58** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

**1500** hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

**300** hrs

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/12/2010**

Signature:   
Quality Control Department

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REV 03  
12/23/05



# quality certificate

ROLL # **802120-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.53 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 30 ✓ mil	AVE:	1.48 mm	58 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc		<b>.944</b> ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min		<b>.23</b>
Carbon Black Content ASTM D4218	Range	%		<b>2.32</b> ✓
Carbon Black Dispersion ASTM D5596	Category			<b>10 IN CAT 1</b> ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	27 N/mm	156 ppi ✓	<b>2,674</b> psi
	Average Strength @ Break	33 N/mm	191 ppi ✓	<b>3,283</b> psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		<b>16.38</b> ✓
	Average Elongation @ Break	%		<b>501.8</b> ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		<b>-0.31</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.4 N		✓ <b>50.008</b> lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	416.7 N		<b>93.687</b> lbs
Puncture Resistance ASTM D4833 (Modified)	Load	612.0 N		✓ <b>137.58</b> lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures.	1500 hrs		<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

9010mic FRM  
 REV 03  
 12/2/05



# quality certificate

ROLL # **802221-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.47 mm	58 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	37 ✓ mil	AVE:	1.49 mm	59 ✓ mil		
ODD #: TOP	EVEN #	BOTTOM		OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity	Density	g/cc	.944 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.32 ✓
ASTM D4218			

Carbon Black Dispersion	Category		10 IN CAT 1 ✓
ASTM D5596			

Tensile Strength	Average Strength @ Yield	27 N/mm	157 ppi ✓	2,674 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	34 N/mm	193 ppi ✓	3,283 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	16.38 ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	501.8 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.4 N	50.008 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	416.7 N	93.687 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	612.0 N	137.58 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802222-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.47 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>205</b> ✓		<b>TEST RESULTS</b>
ODD #: TOP EVEN #: BOTTOM						

Specific Gravity ASTM D792	Density	g/cc	<b>.942</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.21</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	147 ppi ✓	2,538 psi
	Average Strength @ Break	31 N/mm	177 ppi ✓	3,061 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.16</b> ✓
	Average Elongation @ Break	%	<b>488.4</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N	✓ <b>50.447</b> lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N	<b>94.368</b> lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N	✓ <b>141.33</b> lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
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# quality certificate

ROLL # **802223-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	35 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity	Density	g/cc	.942 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.21 ✓
ASTM D4218			

Carbon Black Dispersion	Category		10 IN CAT 1 ✓
ASTM D5596			

Tensile Strength	Average Strength @ Yield	26 N/mm	147 ppi ✓	2,538 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	31 N/mm	177 ppi ✓	3,061 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	16.16 ✓
ASTM D638 (Modified)			
( 2 inches / minute )			
Lo = 1.3" Yield	Average Elongation @ Break	%	488.4 ✓
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	224.4 N	✓ 50.447 lbs
ASTM D-1004 (Modified)			

Puncture Resistance	Load	419.7 N	94.368 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	628.7 N	✓ 141.33 lbs
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/d Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
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# quality certificate

ROLL # **802224-10** Lot #: **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 28 ✓ mil	AVE:	1.49 mm	59 ✓ mil			
ODD #: TOP EVEN #: BOTTOM				Off(Standard) ASTM D3895 minutes	205 ✓	TEST RESULTS

Specific Gravity ASTM D792	Density	g/cc	.942 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.21 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,538 psi
	Average Strength @ Break	31 N/mm	180 ppi ✓	3,061 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.16 ✓
	Average Elongation @ Break	%	488.4 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N	✓ 50.447 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N	94.368 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N	✓ 141.33 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
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# quality certificate

ROLL # **802225-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.45 mm	57 mil ✓
MAX:	1.52 mm	60 mil
AVE:	1.48 mm	58 mil ✓

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **34** mil ✓  
DDD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity ASTM D792 Density g/cc **.942** ✓

MFI ASTM D1238 COND. E GRADE: **K307** Melt Flow Index 190°C /2160 g g/10 min **.23**

Carbon Black Content ASTM D4218 Range % **2.21** ✓

Carbon Black Dispersion ASTM D5596 Category **10 IN CAT 1** ✓

Tensile Strength ASTM D6893 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>26</b> N/mm	<b>148</b> ppi ✓	<b>2,538</b> psi
	Average Strength @ Break	<b>31</b> N/mm	<b>178</b> ppi ✓	<b>3,061</b> psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.16</b> ✓
	Average Elongation @ Break	%	<b>488.4</b> ✓

Dimensional Stability ASTM D1204 (Modified) Average Dimensional change % **-0.31**

Tear Resistance ASTM D-1004 (Modified) Average Tear Resistance **224.4** N ✓ **50.447** lbs

Puncture Resistance FTMS 101 Method 2065 (Modified) Load **419.7** N **94.368** lbs

Puncture Resistance ASTM D4833 (Modified) Load **628.7** N ✓ **141.33** lbs

ESCR ASTM D1693 Minimum Hrs w/o Failures 1500 hrs **CERTIFIED**

Notched Constant Tensile Load ASTM D5397 pass / fail @ 30% 300 hrs **ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**  
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Quality Control Department

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# quality certificate

ROLL # **802226-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	33 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes 205 ✓	
ODD # - TOP EVEN # - BOTTOM		<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	.942 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.21 ✓
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Carbon Black Dispersion ASTM D5596	Category	10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,538 psi
	Average Strength @ Break	31 N/mm	178 ppi ✓	3,061 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.16 ✓
	Average Elongation @ Break	%	488.4 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N	✓ 50.447 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N	94.368 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N	✓ 141.33 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**  
Signature: *[Signature]*  
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# quality certificate

ROLL # **802227-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.42 mm	56 mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 mil	AVE:	1.47 mm	58 mil		
ODD #: TOP						
EVEN #: BOTTOM						
				DIT(Standard) ASTM D3895 minutes	205	TEST RESULTS

Specific Gravity	Density	g/cc	.942
ASTM D792			✓

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE: <b>K307</b>			

Carbon Black Content	Range	%	2.36
ASTM D4218			✓

Carbon Black Dispersion	Category		10 IN CAT 1
ASTM D5596			✓

Tensile Strength	Average Strength @ Yield	26 N/mm	147 ppi	✓	2,547 psi
ASTM D6693					
ASTM D638 (Modified)					
( 2 inches / minute )	Average Strength @ Break	33 N/mm	188 ppi	✓	3,243 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	15.40	✓
ASTM D638 (Modified)				
( 2 inches / minute )				
Lo = 1.3" Yield	Average Elongation @ Break	%	509.1	✓
Lo = 2.0" Break				

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	224.4 N	✓	50.447 lbs
ASTM D-1004 (Modified)				

Puncture Resistance	Load	419.7 N	94.368 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	628.7 N	✓	141.33 lbs
ASTM D4833 (Modified)				

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802228-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.53 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 ✓ mil	AVE:	1.48 mm	58 ✓ mil			
DDD # TOP EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.942 ✓
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MFI ASTM D1238 COND. E GRADE <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.36 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,547 psi
	Average Strength @ Break	33 N/mm	189 ppi ✓	3,243 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.40 ✓
	Average Elongation @ Break	%	509.1 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N	50.447 lbs ✓
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N	94.368 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N	141.33 lbs ✓
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**  
Signature: *[Signature]*  
Quality Control Department

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# quality certificate

ROLL # **802229-10** Lot #: **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 ✓ mil	AVE: 1.49 mm	59 ✓ mil	OIT(Standard) ASTM D3895 minutes 205 ✓		

## TEST RESULTS

Specific Gravity ASTM D792	Density	g/cc	.942 ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.36 ✓	
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,547 psi
	Average Strength @ Break	33 N/mm	190 ppi ✓	3,243 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.40 ✓	
	Average Elongation @ Break	%	509.1 ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N	✓ 50.447 lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N	94.368 lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N	✓ 141.33 lbs	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: Northwest Linings  
PO: C-4083 Kekaha LF  
Destination CPU, (HI)

Date: 1/12/2010

Signature: *[Handwritten Signature]*  
Quality Control Department

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# quality certificate

ROLL # **802230-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN: 1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX: 1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 ✓ mil	AVE: 1.48 mm	58 ✓ mil	<b>TEST RESULTS</b>		
DDD # TOP EVEN # BOTTOM			OIT(Standard) ASTM D3895 minutes	205 ✓	

Specific Gravity ASTM D792	Density	g/cc	<b>.942 ✓</b>
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.22 ✓</b>
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,547 psi
	Average Strength @ Break	33 N/mm	189 ppi ✓	3,243 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.40 ✓</b>
	Average Elongation @ Break	%	<b>509.1 ✓</b>

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N	✓ <b>50.447 lbs</b>
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N	<b>94.368 lbs</b>
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Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N	✓ <b>141.33 lbs</b>
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802231-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.47 mm	58 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 ✓ mil	AVE:	1.49 mm	59 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc		<b>.942</b> ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min		<b>.23</b>
Carbon Black Content ASTM D4218	Range	%		<b>2.22</b> ✓
Carbon Black Dispersion ASTM D5596	Category			<b>10 IN CAT 1</b> ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	149 ppi ✓	2,547 psi
	Average Strength @ Break	33 N/mm	190 ppi ✓	3,243 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		<b>15.40</b> ✓
	Average Elongation @ Break	%		<b>509.1</b> ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		<b>-0.31</b>
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	224.4 N		<b>50.447</b> lbs ✓
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.7 N		<b>94.368</b> lbs
Puncture Resistance ASTM D4833 (Modified)	Load	628.7 N		<b>141.33</b> lbs ✓
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60HDmic-FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802232-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.48 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 ✓ mil	AVE:	1.46 mm	57 ✓ mil			
ODD # TOP EVEN # BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	TEST RESULTS

Specific Gravity	Density	g/cc	.944 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE: <b>K307</b>			

Carbon Black Content	Range	%	2.23 ✓
ASTM D4218			

Carbon Black Dispersion	Category	10 IN CAT 1 ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,514 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	33 N/mm	187 ppi ✓	3,261 psi

Elongation	Average Elongation @ Yield	%	16.22 ✓
ASTM D6693			
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	493.6 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.5 N	50.029 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	407.0 N	91.507 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	608.4 N	136.77 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/2005



# quality certificate

ROLL # **802233-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>31</b> ✓ mil	AVE:	1.47 mm	58 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.23 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,514 psi
	Average Strength @ Break	33 N/mm	189 ppi ✓	3,261 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.22 ✓
	Average Elongation @ Break	%	493.6 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.5 N	✓	50.029 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	407.0 N		91.507 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	608.4 N	/	136.77 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date:..... **1/12/2010**  
Signature: *[Handwritten Signature]*  
Quality Control Department

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REV 00  
12/23/05





# quality certificate

ROLL # **802234-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.45 mm	57 ✓ mil
MAX:	1.51 mm	59 mil
AVE:	1.48 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **29** ✓ mil  
ODD # : TOP EVEN # : BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.944** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.23** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**26** N/mm

**146** ppi ✓

**2,514** psi

Average Strength @ Break

**33** N/mm

**190** ppi ✓

**3,261** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**16.22** ✓

Average Elongation @ Break

%

**493.6** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.31**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**222.5** N

**50.029** lbs ✓

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**407.0** N

**91.507** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**608.4** N

**136.77** lbs ✓

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/12/2010**

Signature: *[Signature]*  
Quality Control Department

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REV 03  
12/23/05



# quality certificate

ROLL # **802235-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil	
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet	
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet	
Asperity GRI GM12:	32 ✓ mil	AVE:	1.49 mm	59 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM				OIT(Standard) ASTM D3895	minutes 205 ✓	TEST RESULTS

Specific Gravity	Density	g/cc	.944 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.23 ✓
ASTM D4218			

Carbon Black Dispersion	Category	10 IN CAT 1 ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	26 N/mm	147 ppl ✓	2,514 psi
ASTM D6693				
ASTM D638 (Modified)	Average Strength @ Break	34 N/mm	191 ppl ✓	3,261 psi
( 2 inches / minute )				

Elongation ASTM D6693	Average Elongation @ Yield	%	16.22 ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	493.6 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.5 N	50.029 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	407.0 N	91.507 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	608.4 N	136.77 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures:	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802236-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	29 ✓ mil	AVE:	1.47 mm	58 ✓ mil	TEST RESULTS	
ODD # TOP	EVEN # BOTTOM			OTT(Standard) ASTM D3895	minutes	205 ✓

Specific Gravity	Density	g/cc	.944 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.23 ✓
ASTM D4218			

Carbon Black Dispersion	Category		10 IN CAT 1 ✓
ASTM D5596			

Tensile Strength	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,514 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	33 N/mm	189 ppi ✓	3,261 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	16.22 ✓
ASTM D638 (Modified)			
( 2 inches / minute )			
Lo = 1.3" Yield	Average Elongation @ Break	%	493.6 ✓
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.5 N	✓	50.029 lbs
ASTM D-1004 (Modified)				

Puncture Resistance	Load	407.0 N		91.507 lbs
FTMS 101 Method 2065 (Modified)				

Puncture Resistance	Load	608.4 N	✓	136.77 lbs
ASTM D4833 (Modified)				

ESCR	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
ASTM D1693				

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs		ONGOING
ASTM D5397				

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802237-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.48 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	AVE:	1.46 mm	57 ✓ mil			
32 ✓ mil						
ODD #: TOP						
EVEN #: BOTTOM						

TEST RESULTS  
OIT(Standard) ASTM D3895 minutes **205 ✓**

Specific Gravity	Density	g/cc	<b>.944 ✓</b>
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
COND. E			
GRADE: <b>K307</b>			

Carbon Black Content	Range	%	<b>2.29 ✓</b>
ASTM D4218			

Carbon Black Dispersion	Category	<b>10 IN CAT 1 ✓</b>
ASTM D5596		

Tensile Strength	Average Strength @ Yield	25 N/mm	146 ppi ✓	2,548 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	32 N/mm	185 ppi ✓	3,219 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	<b>16.78 ✓</b>
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	<b>506.5 ✓</b>
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	<b>-0.31</b>
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.5 N	<b>50.029 lbs ✓</b>
ASTM D-1004 (Modified)			

Puncture Resistance	Load	407.0 N	<b>91.507 lbs</b>
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	608.4 N	<b>136.77 lbs ✓</b>
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **GPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05





# quality certificate

ROLL # **802238-10** Lot #: **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes 205 ✓	
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity	Density	g/cc	.944 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.29 ✓
ASTM D4218			

Carbon Black Dispersion	Category		10 IN CAT 1 ✓
ASTM D5596			

Tensile Strength	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,548 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	33 N/mm	188 ppi ✓	3,219 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	16.78 ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	506.5 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.5 N	✓	50.029 lbs
ASTM D-1004 (Modified)				

Puncture Resistance	Load	407.0 N		91.507 lbs
FTMS 101 Method 2065 (Modified)				

Puncture Resistance	Load	608.4 N	✓	136.77 lbs
ASTM D4833 (Modified)				

ESCR	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
ASTM D1693				

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs		ONGOING
ASTM D5397				

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 60HDmic.FRM  
 REV 03  
 12/2/05



# quality certificate

ROLL # **802239-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	AVE:	1.48 mm	58 ✓ mil			
32 ✓ mil						
ODD # TOP						
EVEN # BOTTOM						

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity	Density	g/cc	<b>.944</b> ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	<b>2.29</b> ✓
ASTM D4218			

Carbon Black Dispersion	Category	<b>10 IN CAT 1</b> ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,548 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	33 N/mm	188 ppi ✓	3,219 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	<b>16.78</b> ✓
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	<b>506.5</b> ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	<b>-0.31</b>
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	222.5 N	<b>50.029</b> lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	407.0 N	<b>91.507</b> lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	608.4 N	<b>136.77</b> lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 6010mic FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802240-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>32</b> ✓ mil	AVE:	1.48 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD # TOP EVEN # BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.29 ✓
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Carbon Black Dispersion ASTM D5596	Category	10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,548 psi
	Average Strength @ Break	33 N/mm	188 ppi ✓	3,219 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.78 ✓
	Average Elongation @ Break	%	506.5 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.5 N	✓ 50.029 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	407.0 N	91.507 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	608.4 N	✓ 136.77 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/12/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802341-10** Lot #: **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.59 mm	63 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	35 mil	AVE:	1.48 mm	58 mil		
DDD #: TOP	EVEN #	BOTTOM		OIT(Standard) ASTM D3895	minutes	205

## TEST RESULTS

Specific Gravity ASTM D792	Density	g/cc	.944	✓
MFI ASTM D1238 COND. E GRADE: K307	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.29	✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1	✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi	✓
	Average Strength @ Break	33 N/mm	188 ppi	✓
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.78	✓
	Average Elongation @ Break	%	506.5	✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	222.5 N	50.029	✓ lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	407.0 N	91.507	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	608.4 N	136.77	✓ lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: Northwest Linings  
PO: C-4083 Kekaha LF  
Destination CPU, (HI)

Date: 1/12/2010  
Signature: *[Handwritten Signature]*  
Quality Control Department

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REV 03  
12/23/05





# quality certificate

ROLL # **802342-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement

ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.43 mm	56 mil ✓
MAX:	1.49 mm	59 mil
AVE:	1.46 mm	57 mil ✓

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **33** mil ✓  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.943** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.20** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**25** N/mm

**144** ppi ✓

**2,506** psi

Average Strength @ Break

**31** N/mm

**180** ppi ✓

**3,123** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**15.77** ✓

Average Elongation @ Break

%

**491.7** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.31**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**219.1** N

**49.268** lbs ✓

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**411.6** N

**92.544** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**603.4** N

**135.65** lbs ✓

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/13/2010**

Signature: *[Signature]*  
Quality Control Department

90HDmic.FRM  
REV 03  
12/23/05



# quality certificate

ROLL # **802343-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.45 mm	57 ✓ mil
MAX:	1.51 mm	59 ✓ mil
AVE:	1.47 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **33** ✓ mil  
DDD #: TOP EVEN # BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	<b>.943</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.20</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,506 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓	3,123 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.77</b> ✓
	Average Elongation @ Break	%	<b>491.7</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N	<b>49.268</b> lbs ✓
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N	<b>92.544</b> lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N	<b>135.65</b> lbs ✓
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/13/2010**  
Signature: *[Signature]*  
Quality Control Department

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REV 03  
12/23/06



# quality certificate

ROLL # **802344-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil	
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet	
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet	
Asperity GRI GM12:	30 ✓ mil	AVE:	1.47 mm	58 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	TEST RESULTS

Specific Gravity	Density	g/cc	.943 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.20 ✓
ASTM D4218			

Carbon Black Dispersion	Category	10 IN CAT 1 ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,506 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	32 N/mm	181 ppi ✓	3,123 psi

Elongation	Average Elongation @ Yield	%	15.77 ✓
ASTM D6693			
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	491.7 ✓
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	219.1 N	49.268 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	411.6 N	92.544 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	603.4 N	135.65 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/29/05



# quality certificate

ROLL # **802345-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	36 ✓ mil	AVE:	1.48 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.20 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	146 ppi ✓ 2,506 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓ 3,123 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.77 ✓
	Average Elongation @ Break	%	491.7 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N	✓ 49.268 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N	92.544 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N	✓ 135.65 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05





# quality certificate

ROLL # **802346-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.41 mm	56 mil ✓	Length.....	125 m	410.1 feet
	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 32 mil ✓	AVE:	1.47 mm	58 mil ✓			
ODD# - TOP EVEN# - BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.20 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,506 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓	3,123 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.77 ✓
	Average Elongation @ Break	%	491.7 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N	✓	49.268 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N		92.544 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N	✓	135.65 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: Northwest Linings  
 PO: C-4083 Kekaha LF  
 Destination CPU, (HI)

Date: 1/13/2010

Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802347-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 ✓ mil	AVE:	1.48 mm	58 ✓ mil		
ODD # . TOP	EVEN # . BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density		g/cc		.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g		g/10 min		.23
Carbon Black Content ASTM D4218	Range		%		2.30 ✓
Carbon Black Dispersion ASTM D5596	Category				10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	141 ppi ✓	2,425 psi	
	Average Strength @ Break	33 N/mm	189 ppi ✓	3,247 psi	
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		17.02 ✓	
	Average Elongation @ Break	%		527.8 ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		-0.31	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N		49,268 lbs ✓	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N		92.544 lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N		135.65 lbs ✓	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802348-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.40 mm	55 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.48 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	34 ✓ mil	AVE:	1.44 mm	57 ✓ mil		
ODD # - TOP				OIT(Standard) ASTM D3895	minutes	205 ✓
						<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	<b>.943 ✓</b>
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.30 ✓</b>
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1 ✓</b>
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	24 N/mm	137 ppi ✓	2,425 psi
	Average Strength @ Break	32 N/mm	184 ppi ✓	3,247 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>17.02 ✓</b>
	Average Elongation @ Break	%	<b>527.8 ✓</b>

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N	✓	49.268 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N		92.544 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N	✓	135.65 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Signature]*  
 Quality Control Department

6010 mc FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802349-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.41 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD # - TOP	EVEN # - BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.30 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	140 ppi ✓ 2,425 psi
	Average Strength @ Break	33 N/mm	188 ppi ✓ 3,247 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	17.02 ✓
	Average Elongation @ Break	%	527.8 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N	✓ 49.268 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N	92.544 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N	✓ 135.65 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05





# quality certificate

ROLL # **802350-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.40 mm	55 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	30 ✓ mil	AVE:	1.46 mm	57 ✓ mil		
ODD # - TOP	EVEN # - BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity	Density	g/cc	.943 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	2.30 ✓
ASTM D4218			

Carbon Black Dispersion	Category	10 IN CAT 1 ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	24 N/mm	139 ppi ✓	2,425 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	33 N/mm	187 ppi ✓	3,247 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	17.02 ✓
ASTM D638 (Modified)			
( 2 inches / minute )			
Lo = 1.3" Yield	Average Elongation @ Break	%	527.8 ✓
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	219.1 N	49.268 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	411.6 N	92.544 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	603.4 N	135.65 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures.	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: Northwest Linings  
 PO: C-4083 Kekaha LF  
 Destination CPU, (HI)

Date: 1/13/2010  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

50HDmic FRM  
 REV 00  
 12/23/05



# quality certificate

ROLL # **802351-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5894	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.54 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 ✓ mil	AVE:	1.49 mm	59 ✓ mil		
ODD # TOP EVEN # BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.30 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	142 pli ✓	2,425 psi
	Average Strength @ Break	33 N/mm	190 pli ✓	3,247 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	17.02 ✓
	Average Elongation @ Break	%	527.8 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	219.1 N	✓	49.268 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	411.6 N		92.544 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	603.4 N	✓	135.65 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 12/23/05



# quality certificate

ROLL # **802352-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.42 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.48 mm	58 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>30</b> ✓ mil	AVE:	1.45 mm	57 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM	OIT(Standard) ASTM D3895 minutes <b>205</b> ✓				<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	<b>.943</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.28</b> ✓
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Carbon Black Dispersion ASTM D5596	Category	<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>25</b> N/mm	<b>141</b> ppi ✓	<b>2,478</b> psi
	Average Strength @ Break	<b>33</b> N/mm	<b>186</b> ppi ✓	<b>3,255</b> psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.45</b> ✓
	Average Elongation @ Break	%	<b>499.4</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>201.4</b> N	<b>45.281</b> lbs ✓
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>414.6</b> N	<b>93.205</b> lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	<b>559.8</b> N	<b>125.84</b> lbs ✓
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

5010mic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802353-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.47 mm	58 ✓ mil
MAX:	1.52 mm	60 mil
AVE:	1.49 mm	59 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **31** ✓ mil  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.943** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.28** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**25** N/mm

**145** ppi ✓

**2,478** psi

Average Strength @ Break

**33** N/mm

**191** ppi ✓

**3,255** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**16.45** ✓

Average Elongation @ Break

%

**499.4** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.31**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**201.4** N

✓ **45.281** lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

**414.6** N

**93.205** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**559.8** N

✓ **125.84** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/13/2010**  
Signature: *[Handwritten Signature]*  
Quality Control Department

50110mic-PRM  
REV 03  
12/23/05





# quality certificate

ROLL # **802354-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>31</b> ✓ mil	AVE:	1.48 mm	58 ✓ mil			
ODD #: TOP EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.28 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	144 ppi ✓ 2,478 psi
	Average Strength @ Break	33 N/mm	190 ppi ✓ 3,255 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.45 ✓
	Average Elongation @ Break	%	499.4 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	201.4 N	✓ 45.281 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.6 N	93.205 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	559.8 N	✓ 125.84 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60HDmic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802355-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	
ASTM D5994	MIN:	1.46 mm	57 mil	✓
(Modified)	MAX:	1.51 mm	59 mil	
Asperity GRI GM12:	AVE:	1.49 mm	59 mil	✓
34 mil				
ODD #: TOP	EVEN #: BOTTOM			

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.943	✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.28	✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1	✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	145 ppi	✓ 2,478 psi
	Average Strength @ Break	33 N/mm	191 ppi	✓ 3,255 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.45	✓
	Average Elongation @ Break	%	499.4	✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	201.4 N	45.281	✓ lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.6 N	93.205	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	559.8 N	125.84	✓ lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**

Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/06



# quality certificate

ROLL # **802356-10**

Lot # **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	31 ✓ mil	AVE:	1.48 mm	58 ✓ mil		
ODD # TOP	EVEN # BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity	Density	g/cc	<b>.943 ✓</b>		
ASTM D792					
MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>		
COND. E					
GRADE:	<b>K307</b>				
Carbon Black Content	Range	%	<b>2.28 ✓</b>		
ASTM D4218					
Carbon Black Dispersion	Category		<b>10 IN CAT 1 ✓</b>		
ASTM D5696					
Tensile Strength	Average Strength @ Yield	25 N/mm	144 ppi ✓	2,478 psi	
ASTM D6693					
ASTM D638 (Modified)	Average Strength @ Break	33 N/mm	190 ppi ✓	3,255 psi	
( 2 inches / minute )					
Elongation ASTM D6693	Average Elongation @ Yield	%	<b>16.45 ✓</b>		
ASTM D638 (Modified)					
( 2 inches / minute )	Average Elongation @ Break	%	<b>499.4 ✓</b>		
Lo = 1.3" Yield					
Lo = 2.0" Break					
Dimensional Stability	Average Dimensional change	%	<b>-0.31</b>		
ASTM D1204 (Modified)					
Tear Resistance	Average Tear Resistance	201.4 N	<b>45.281 lbs ✓</b>		
ASTM D-1004 (Modified)					
Puncture Resistance	Load	414.6 N	<b>93.205 lbs</b>		
FTMS 101 Method 2065 (Modified)					
Puncture Resistance	Load	559.8 N	<b>125.84 lbs ✓</b>		
ASTM D4833 (Modified)					
ESCR	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>		
ASTM D1693					
Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	<b>ONGOING</b>		
ASTM D5397					

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802357-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.47 mm	58 ✓ mil
MAX:	1.50 mm	59 mil
AVE:	1.48 mm	58 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **31** ✓ mil  
QDD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

.943 ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

.23

Carbon Black Content  
ASTM D4218

Range

%

2.24 ✓

Carbon Black Dispersion  
ASTM D5596

Category

10 IN CAT 1 ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

26 N/mm

147 ppi ✓

2,516 psi

Average Strength @ Break

33 N/mm

186 ppi ✓

3,201 psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

15.85 ✓

Average Elongation @ Break

%

521.3 ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

-0.31

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

201.4 N

✓ 45.281 lbs

Puncture Resistance  
FTMS 101 Method 2065 (Modified)

Load

414.6 N

93.205 lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

559.8 N

✓ 125.84 lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

CERTIFIED

Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

ONGOING

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/13/2010**

Signature: *[Handwritten Signature]*  
Quality Control Department

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# quality certificate

ROLL # **802358-10** Lot #: **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.43 mm	56 mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	33 mil	AVE:	1.47 mm	58 mil	OIT(Standard) ASTM D3895 minutes <b>205</b> ✓	
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.24 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	146 ppi ✓	2,516 psi
	Average Strength @ Break	32 N/mm	185 ppi ✓	3,201 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.85 ✓
	Average Elongation @ Break	%	521.3 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	201.4 N	✓	45.281 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.6 N		93.205 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	559.8 N	✓	125.84 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802359-10** Lot # **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.50 mm	59 ✓ mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 33 ✓ mil	AVE:	1.47 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>
ODD # : TOP EVEN # : BOTTOM						

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.24 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	146 ppi ✓	2,516 psi
	Average Strength @ Break	32 N/mm	185 ppi ✓	3,201 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.85 ✓
	Average Elongation @ Break	%	521.3 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	201.4 N	✓ 45.281 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.6 N	93.205 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	559.8 N	✓ 125.84 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
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 12/23/05



# quality certificate

ROLL # **802360-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 33 ✓ mil	AVE: 1.46 mm	57 ✓ mil	OIT(Standard) ASTM D3895 minutes 205 ✓ <b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM					

Specific Gravity ASTM D792	Density	g/cc	.943 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.24 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,516 psi
	Average Strength @ Break	32 N/mm	184 ppi ✓	3,201 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.85 ✓
	Average Elongation @ Break	%	521.3 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	201.4 N	✓ 45.281 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.6 N	93.205 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	559.8 N	✓ 125.84 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **GPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802461-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.47 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>205</b> ✓		
ODD #: TOP EVEN #: BOTTOM				<b>TEST RESULTS</b>		

Specific Gravity ASTM D792	Density	g/cc	<b>.943</b> ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>	
Carbon Black Content ASTM D4218	Range	%	<b>2.24</b> ✓	
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	146 ppi ✓	2,516 psi
	Average Strength @ Break	32 N/mm	185 ppi ✓	3,201 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.85</b> ✓	
	Average Elongation @ Break	%	<b>521.3</b> ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	201.4 N	✓	45.281 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.6 N	93.205 lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	559.8 N	✓	125.84 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/13/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 6010mic FRM  
 REV 03  
 12/23/05





# quality certificate

ROLL # **802462-10** Lot # **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.45 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.47 mm	58 ✓ mil			
ODD #: TOP: EVEN #: BOTTOM				OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.22 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	147 ppi ✓	2,536 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓	3,128 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.29 ✓
	Average Elongation @ Break	%	490.1 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	✓	50.261 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N		91.120 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	✓	131.05 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 REV 03  
 12/23/05



# quality certificate

ROLL # **802463-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.42 mm	56 / mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.51 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	34 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
Carbon Black Content ASTM D4218	Range	%	2.22 ✓
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	147 ppi ✓ 2,536 psi
	Average Strength @ Break	32 N/mm	181 ppi ✓ 3,128 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.29 ✓
	Average Elongation @ Break	%	490.1 ✓
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	✓ 50.261 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N	91.120 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	✓ 131.05 lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date:..... **1/18/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department  
 6040mic.FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802464-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
	AVE:	1.48 mm	58 ✓ mil			
Asperity GRI GM12: <b>30</b> ✓ mil						
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895	minutes	205 ✓

**TEST RESULTS**

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.22 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,536 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓	3,128 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	15.29 ✓
	Average Elongation @ Break	%	490.1 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	✓	50.261 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N		91.120 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	✓	131.05 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING
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Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination: **CPU, (HI)**

Date: **1/18/2010**  
Signature: *[Signature]*  
Quality Control Department

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REV 03  
12/23/05



# quality certificate

ROLL # **802465-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.43 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
	AVE:	1.48 mm	58 ✓ mil			
Asperity GRI GM12: <b>33</b> ✓ mil	ODD #: TOP	EVEN #: BOTTOM		OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	<b>.945</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.28</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,536 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓	3,128 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.29</b> ✓
	Average Elongation @ Break	%	<b>490.1</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	<b>50.261</b> lbs ✓
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N	<b>91.120</b> lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	<b>131.05</b> lbs ✓
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date:..... **1/18/2010**  
 Signature: *[Signature]*  
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 12/23/05





# quality certificate

ROLL # **802466-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.53 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>33</b> ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>205</b> ✓		
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity ASTM D792	Density	g/cc	<b>.945</b> ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
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Carbon Black Content ASTM D4218	Range	%	<b>2.28</b> ✓
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Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	148 ppi ✓	2,536 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓	3,128 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>15.29</b> ✓
	Average Elongation @ Break	%	<b>490.1</b> ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	✓	50.261 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N		91.120 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	✓	131.05 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		<b>CERTIFIED</b>
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		<b>ONGOING</b>
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/18/2010**

Signature: *[Handwritten Signature]*

Quality Control Department

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REV 03  
12/23/05



# quality certificate

ROLL # **802467-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil	
	MIN:	1.39 mm	55 mil	Length.....	125 m	410.1 feet	
	MAX:	1.54 mm	61 mil	Width.....	7.00 m	23.0 feet	
Asperity GRI GM12:	32 mil	AVE:	1.47 mm	58 mil			
ODD #: TOP	EVEN #: BOTTOM	DIT(Standard) ASTM D3895 minutes				205	TEST RESULTS

Specific Gravity ASTM D792	Density	g/cc	.945
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.26
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Carbon Black Dispersion ASTM D5596	Category	10 IN CAT 1
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	143 ppi	2,469 psi
	Average Strength @ Break	34 N/mm	191 ppi	3,309 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.05
	Average Elongation @ Break	%	494.2

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	50.261 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N	91.120 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	131.05 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: Northwest Linings  
PO: C-4083 Kekaha LF  
Destination CPU, (HI)

Date: 1/18/2010  
Signature: *[Handwritten Signature]*  
Quality Control Department

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12/23/05



# quality certificate

ROLL # **802468-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.44 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	32 ✓ mil	AVE:	1.47 mm	58 ✓ mil		
ODD # - TOP				OIT(Standard) ASTM D3895	minutes	205 ✓
						<b>TEST RESULTS</b>

Specific Gravity	Density	g/cc	.945 ✓
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	.23
COND. E			
GRADE: <b>K307</b>			

Carbon Black Content	Range	%	2.26 ✓
ASTM D4218			

Carbon Black Dispersion	Category	10 IN CAT 1 ✓
ASTM D5596		

Tensile Strength	Average Strength @ Yield	25 N/mm	143 ppi ✓	2,469 psi
ASTM D6693				
ASTM D638 (Modified)				
( 2 inches / minute )	Average Strength @ Break	34 N/mm	191 ppi ✓	3,309 psi

Elongation ASTM D6693	Average Elongation @ Yield	%	16.05 ✓
ASTM D638 (Modified)			
( 2 inches / minute )			
Lo = 1.3" Yield	Average Elongation @ Break	%	494.2 ✓
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	-0.31
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	223.6 N	50.261 lbs ✓
ASTM D-1004 (Modified)			

Puncture Resistance	Load	405.3 N	91.120 lbs
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	582.9 N	131.05 lbs ✓
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	ONGOING
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Signature]*  
 Quality Control Department

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# quality certificate

ROLL # **802469-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.42 mm	56 mil	Length.....	125 m	410.1 feet
	MAX: 1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 31 mil	AVE: 1.46 mm	57 mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	205	

Specific Gravity ASTM D792	Density	g/cc	.945 ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23	
Carbon Black Content ASTM D4218	Range	%	2.26 ✓	
Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	142 ppi ✓	2,469 psi
	Average Strength @ Break	33 N/mm	190 ppi ✓	3,309 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.05 ✓	
	Average Elongation @ Break	%	494.2 ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	✓ 50.261 lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N	91.120 lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	✓ 131.05 lbs	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

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 12/23/05





# quality certificate

ROLL # **802470-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement	METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN: 1.42 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX: 1.52 mm	60 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: 33 ✓ mil	AVE: 1.47 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	205 ✓	

Specific Gravity ASTM D792	Density	g/cc	.945 ✓
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MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
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Carbon Black Content ASTM D4218	Range	%	2.26 ✓
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Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
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Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	143 ppi ✓	2,469 psi
	Average Strength @ Break	34 N/mm	191 ppi ✓	3,309 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	16.05 ✓
	Average Elongation @ Break	%	494.2 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
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Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	223.6 N	✓ 50.261 lbs
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Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	405.3 N	91.120 lbs
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Puncture Resistance ASTM D4833 (Modified)	Load	582.9 N	✓ 131.05 lbs
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ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	CERTIFIED
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Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	ONGOING
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Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Signature]*  
 Quality Control Department  
 60HDmic FRM  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802471-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement  
ASTM D5994  
(Modified)

	METRIC	ENGLISH
MIN:	1.41 mm	56 ✓ mil
MAX:	1.49 mm	59 ✓ mil
AVE:	1.44 mm	57 ✓ mil

Thickness.....	1.5 mm	60 mil
Length.....	125 m	410.1 feet
Width.....	7.00 m	23.0 feet

Asperity GRI GM12: **32** ✓ mil  
ODD #: TOP EVEN #: BOTTOM

OIT(Standard) ASTM D3895 minutes **205** ✓ **TEST RESULTS**

Specific Gravity  
ASTM D792

Density

g/cc

**.945** ✓

MFI ASTM D1238  
COND. E  
GRADE: **K307**

Melt Flow Index 190°C /2160 g

g/10 min

**.23**

Carbon Black Content  
ASTM D4218

Range

%

**2.26** ✓

Carbon Black Dispersion  
ASTM D5596

Category

**10 IN CAT 1** ✓

Tensile Strength  
ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )

Average Strength @ Yield

**25** N/mm

**140** ppi ✓

**2,469** psi

Average Strength @ Break

**33** N/mm

**188** ppi ✓

**3,309** psi

Elongation ASTM D6693  
ASTM D638 (Modified)  
( 2 inches / minute )  
Lo = 1.3" Yield  
Lo = 2.0" Break

Average Elongation @ Yield

%

**16.05** ✓

Average Elongation @ Break

%

**494.2** ✓

Dimensional Stability  
ASTM D1204 (Modified)

Average Dimensional change

%

**-0.31**

Tear Resistance  
ASTM D-1004 (Modified)

Average Tear Resistance

**223.6** N

✓ **50.261** lbs

Puncture Resistance  
FTMS 101 Method 2085 (Modified)

Load

**405.3** N

**91.120** lbs

Puncture Resistance  
ASTM D4833 (Modified)

Load

**582.9** N

✓ **131.05** lbs

ESCR  
ASTM D1693

Minimum Hrs w/o Failures

1500 hrs

**CERTIFIED**

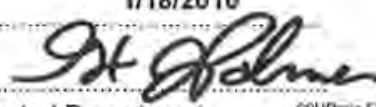
Notched Constant Tensile Load  
ASTM D5397

pass / fail @ 30%

300 hrs

**ONGOING**

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **CPU, (HI)**

Date: **1/18/2010**  
Signature:   
Quality Control Department

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REV 00  
12/23/05



# quality certificate

ROLL # **802472-10** Lot # **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.41 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>31</b> ✓ mil	AVE:	1.47 mm	58 ✓ mil	<b>TEST RESULTS</b>		
ODD #: TOP EVEN #: BOTTOM						

OIT(Standard) ASTM D3895 minutes: **205** ✓

Specific Gravity ASTM D792	Density	g/cc	<b>.944</b> ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>	
Carbon Black Content ASTM D4218	Range	%	<b>2.30</b> ✓	
Carbon Black Dispersion ASTM D5596	Category		<b>10 IN CAT 1</b> ✓	
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	25 N/mm	145 ppi ✓	2,513 psi
	Average Strength @ Break	32 N/mm	182 ppi ✓	3,153 psi
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.36</b> ✓	
	Average Elongation @ Break	%	<b>501.1</b> ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	220.6 N	✓ <b>49.589</b> lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.3 N	<b>93.147</b> lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	491.2 N	✓ <b>110.43</b> lbs	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>	

Customer: **Northwest Linings**  
PO: **C-4083 Kekaha LF**  
Destination **GPU, (HI)**

Date: **1/18/2010**  
Signature: *[Signature]*  
Quality Control Department  
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12/23/05



# quality certificate

ROLL # **802473-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
	MIN:	1.41 mm	56 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.49 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>34</b> ✓ mil	AVE:	1.45 mm	57 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	<b>.944</b> ✓	
MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>	
Carbon Black Content ASTM D4218	Range	%	<b>2.30</b> ✓	
Carbon Black Dispersion ASTM D5596	Category	<b>10 IN CAT 1</b> ✓		
Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	<b>25 N/mm</b>	<b>143 ppi</b> ✓	<b>2,513 psi</b>
	Average Strength @ Break	<b>32 N/mm</b>	<b>180 ppi</b> ✓	<b>3,153 psi</b>
Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%	<b>16.36</b> ✓	
	Average Elongation @ Break	%	<b>501.1</b> ✓	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	<b>-0.31</b>	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	<b>220.6 N</b>	<b>49.589 lbs</b> ✓	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	<b>414.3 N</b>	<b>93.147 lbs</b>	
Puncture Resistance ASTM D4833 (Modified)	Load	<b>491.2 N</b>	<b>110.43 lbs</b> ✓	
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs	<b>CERTIFIED</b>	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs	<b>ONGOING</b>	

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

50HDmic.FRM  
 REV 03  
 12/23/05





# quality certificate

ROLL # **802474-10** Lot #: **7291454** Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994 (Modified)	MIN:	1.47 mm	58 ✓ mil	Length.....	125 m	410.1 feet
	MAX:	1.54 mm	61 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12: <b>29</b> ✓ mil	AVE:	1.49 mm	59 ✓ mil			
ODD #: TOP	EVEN #: BOTTOM			OIT(Standard) ASTM D3895 minutes	205 ✓	<b>TEST RESULTS</b>

Specific Gravity ASTM D792	Density	g/cc	.944 ✓
-------------------------------	---------	------	--------

MFI ASTM D1238 COND. E GRADE: <b>K307</b>	Melt Flow Index 190°C /2160 g	g/10 min	.23
---	-------------------------------	----------	-----

Carbon Black Content ASTM D4218	Range	%	2.30 ✓
------------------------------------	-------	---	--------

Carbon Black Dispersion ASTM D5596	Category		10 IN CAT 1 ✓
---------------------------------------	----------	--	---------------

Tensile Strength ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute )	Average Strength @ Yield	26 N/mm	147 ppl ✓	2,513 psi
	Average Strength @ Break	32 N/mm	185 ppl ✓	3,153 psi

Elongation ASTM D6693 ASTM D638 (Modified) ( 2 inches / minute ) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		16.36 ✓
	Average Elongation @ Break	%		501.1 ✓

Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%	-0.31
--	----------------------------	---	-------

Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	220.6 N	✓	49.589 lbs
---	-------------------------	---------	---	------------

Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	414.3 N		93.147 lbs
--	------	---------	--	------------

Puncture Resistance ASTM D4833 (Modified)	Load	491.2 N	✓	110.43 lbs
--	------	---------	---	------------

ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs		CERTIFIED
--------------------	--------------------------	----------	--	-----------

Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs		ONGOING
---	-------------------	---------	--	---------

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination: **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

601 Dmic F/1M  
 REV 03  
 12/23/05



# quality certificate

ROLL # **802475-10**

Lot #: **7291454**

Liner Type: **MICROSPIKE™ HDPE**

Measurement		METRIC	ENGLISH	Thickness.....	1.5 mm	60 mil
ASTM D5994	MIN:	1.46 mm	57 ✓ mil	Length.....	125 m	410.1 feet
(Modified)	MAX:	1.50 mm	59 mil	Width.....	7.00 m	23.0 feet
Asperity GRI GM12:	34 ✓ mil	AVE:	1.48 mm	58 ✓ mil	OIT(Standard) ASTM D3895 minutes <b>205 ✓</b>	
ODD #: TOP	EVEN #: BOTTOM	<b>TEST RESULTS</b>				

Specific Gravity	Density	g/cc	<b>.944 ✓</b>
ASTM D792			

MFI ASTM D1238	Melt Flow Index 190°C /2160 g	g/10 min	<b>.23</b>
COND. E			
GRADE:	<b>K307</b>		

Carbon Black Content	Range	%	<b>2.30 ✓</b>
ASTM D4218			

Carbon Black Dispersion	Category	<b>10 IN CAT 1 ✓</b>
ASTM D5596		

Tensile Strength	Average Strength @ Yield	26 N/mm	146 ppi ✓	2,513 psi
ASTM D6693				
ASTM D638 (Modified)	Average Strength @ Break	32 N/mm	184 ppi ✓	3,153 psi
( 2 inches / minute )				

Elongation ASTM D6693	Average Elongation @ Yield	%	<b>16.36 ✓</b>
ASTM D638 (Modified)			
( 2 inches / minute )	Average Elongation @ Break	%	<b>501.1 ✓</b>
Lo = 1.3" Yield			
Lo = 2.0" Break			

Dimensional Stability	Average Dimensional change	%	<b>-0.31</b>
ASTM D1204 (Modified)			

Tear Resistance	Average Tear Resistance	220.6 N	<b>49.589 lbs ✓</b>
ASTM D-1004 (Modified)			

Puncture Resistance	Load	414.3 N	<b>93.147 lbs</b>
FTMS 101 Method 2065 (Modified)			

Puncture Resistance	Load	491.2 N	<b>110.43 lbs ✓</b>
ASTM D4833 (Modified)			

ESCR	Minimum Hrs w/o Failures.	1500 hrs	<b>CERTIFIED</b>
ASTM D1693			

Notched Constant Tensile Load	pass / fail @ 30%	300 hrs	<b>ONGOING</b>
ASTM D5397			

Customer: **Northwest Linings**  
 PO: **C-4083 Kekaha LF**  
 Destination **CPU, (HI)**

Date: **1/18/2010**  
 Signature: *[Handwritten Signature]*  
 Quality Control Department

60HDmic FRM  
 REV 03  
 12/23/05



## Certificate of Analysis

Shipped To: AGRU AMERICA INC  
2000 EAST NEWLANDS  
FERNLEY NV 89408  
USA

Recipient: PALMER  
Fax:

CPC Delivery #: 87963605  
PO #: 005205  
Weight: 191300 LB  
Ship Date: 11/29/2009  
Package: BULK  
Mode: Hopper Car  
Car #: CHVX889542  
Seal No: 272682

Product:  
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7291467

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.230	g/10mi
Flow Rate	ASTM D1238	20.00	g/10mi
Density	D1505 or D4883	0.9370	g/cm3
Pellet Count	P02.08.03	34.000	pel/g
Production Date		11/26/2009	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP. However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

Troy Griffin  
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637



### Certificate of Analysis

Shipped To: AGRU AMERICA INC  
2000 EAST NEWLANDS  
FERNLEY NV 89408  
USA

CPC Delivery #: 87962914  
PO #: 005205  
Weight: 193900 LB  
Ship Date: 11/28/2009  
Package: BULK  
Mode: Hopper Car  
Car #: PSPX003162  
Seal No: 272924

Recipient: PALMER  
Fax:

Product:  
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7291454

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.230	g/10mi
HLMI Flow Rate	ASTM D1238	20.00	g/10mi
Density	D1505 or D4883	0.9370	g/cm3
Pellet Count	P02.08.03	35.000	pel/g
Production Date		11/23/2009	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP. However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

Troy Griffin  
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637





Rex L. Bobsein, Ph.D., Polyethylene Materials and Applications Development  
 Room 109 PTC ■ Bartlesville, OK 74004 ■  
 918-661-0089 ■ bobsein@cpchem.com ■ Fax: 918-662-2550 ■ www.cpchem.com

January 16, 2006

Grant Palmer  
 Agru America  
 600 Garrison Road  
 Georgetown, SC 29440

Dear Grant:

This letter is to re-report the results of oven aging and UV aging testing (according to GRI-GM13 and GRI-GM17) on Agru America sheet samples that you provided to us in 2004. A graphical summary of the results was sent to you on 4/1/2005. The testing was performed by CPChem's Evaluation Laboratory in Bartlesville, OK. Oven-aging tests were completed 12/17/2004. UV-aging tests were completed on 12/13/2004.

GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) durability testing was done according to the following procedures.

Test	Exposure	Method
Std. OIT	200°C, atmospheric pressure oxygen	D3895
HP-OIT	150°C, 500 psi oxygen	D5885
Oven Aging	90 days, 85°C	D5721 ✓
UV Aging	1600 UV hrs (Conditions were 20 hours UVA-340 at 75°C followed by 4 hrs dark with condensation at 60°C. Irradiance was 0.72 W/m <sup>2</sup> at 340nm.)	GRI-GM11 ✓

**Oven Aging Results**

Sample	Initial HP-OIT (min.)	HP-OIT Value after Oven Aging (min.)	% HP-OIT Retained	GRI-GM13 or GRI-GM17 % Retained Requirement
40 mil LLDPE Roll # 312588 from Marlex® 7104 Lot # CPN811170	514	396	77	60
60 mil HDPE Roll # 315103-04 from Marlex® K307 Lot # 71-3-1465	1461	1547	106 ✓	80

Sample	Initial Std. OIT (min.)	Std. OIT Value after Oven Aging (min.)	% Std. OIT Retained	GRI-GM13 or GRI-GM17 % Retained Requirement
40 mil LLDPE Roll # 312588 from Marlex® 7104 Lot # CPN811170	151	58	38	35
60 mil HDPE Roll # 315103-04 from Marlex® K307 Lot # 71-3-1465	201	127	63 ✓	55

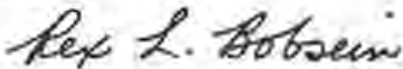
UV Aging Results

Sample	Initial HP-OIT (min.)	HP-OIT Value after UV Aging (min.)	% HP-OIT Retained	GRI-GM13 or GRI-GM17 % Retained Requirement
40 mil LLDPE Roll # 312588 from Marlex® 7104 Lot # CPN811170	514	460	89	35
60 mil HDPE Roll # 315103-04 from Marlex® K307 Lot # 71-3-1465	1461	1513	104 ✓	50

According to these test results, the durability requirements are met.

If you have any questions, please call me at 918-661-0089.

Sincerely,



Rex L. Bobsein, Ph.D.  
Polyethylene Materials and Applications Development

*Any technical advice, recommendations, results, or analysis ("Information") contained herein, including, without limitation, information as it may relate to the selection of a specific product ("Product") for your use and application, is given **without warranty or guarantee** and is accepted at your sole risk. It is imperative that you test the Information (and Product, if applicable) to determine to your own satisfaction whether the Information (and Product, if applicable) are suitable for your intended use and application. You expressly assume, and release Chevron Phillips Chemical Company, from all risk and liability, whether based in contract, tort or otherwise, in connection with the use of, or results obtained from, such information (and Product, if applicable).*



**GEOMEMBRANE TEST RESULTS**

TRI Client: Agru America (Kekaha LF)

Material: Agru 60 mil Microspike HDPE Geomembrane  
 Sample Identification: Roll # 801613-10  
 TRI Log #: E2339-10-09

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
<b>Multi-axial Tensile (ASTM D 5617)</b>													
<b>Test Method A: Centerpoint Deflection Versus Pressure</b>													
Thickness (mils)	64	65	63									64	1
Maximum Stress (psi)	2515	2353	2460									2443	82
% Elongation @ Rupture (%)	17.2	21.1	20.0									19.4	2.0
Failure Description:	H-CAT N-EF	H-CAT N-EF	H-CAT N-EF										
MDT	A tear in the machine direction.												
H	Circular or elliptical hole in the specimen.												
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.												
N-EF	No edge failure												

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.



### GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Project: MQC

Material: Geomembrane  
 Sample Identification: 7291454 ✓  
 TRI Log #: E2339-53-02  
 Test Date: 25-Jan-10

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Low Temperature Brittleness (ASTM D 746, NSF 54, -60C) ✓						% passing
MD (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	100
TD (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	100

MD Machine Direction      TD Transverse Direction

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.





## GEOMEMBRANE TEST RESULTS

TRI Client: Agru America  
 Project: MQC

Material: Geomembrane  
 Sample Identification: 7291467 ✓  
 TRI Log #: E2339-53-02  
 Test Date: 25-Jan-10

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Low Temperature Brittleness (ASTM D 746, NSF 54, -60C) ✓						% passing
MD (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	100
TD (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	100

MD Machine Direction      TD Transverse Direction

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.



SP NOTCHED CONSTANT TENSILE LOAD ASTM D 5397- APPENDIX A

LOT #: 7291454 ✓

MATERIAL: K307 ✓

DATE 1/12/10

ROLL # 802119-10

LINER TYPE 60 HD MICRO

REF #: F241

FORMULA FOR APPLIED LOAD: Load = (str@yld x %test x ( 80% of nom. thickness ) x width) - CF

where : MA  
str@yld = Tensile strength @ yield (Transverse Direction) from ASTM D-638 in psi

thickness = Thickness of sample at notch point in inches

width = Width of sample in inches (.125" constant)

MA = Mechanical Advantage Used (1:1, 3:1, 4:1, or 5:1)

CF = Correction Factor for MA Stations is 77g (weight of arm with empty holder attached to other end)

Therefore, for each sample, load = (str@yld x nom. thickness x .0300\* -> ([%TEST] x .8 x .125)) - CF/MA

\* This number may change due to customer specifications. Formula will be changed also.

Strength @ yield for this roll : 2,611 psi % of yield tested : 30 %

Station used: Mechanical Advantage Used: 5 CF = 77 g

Nominal Thickness (in): 0.0600

LOAD = str@yld x nominal thickness x formula

LOAD = 2,611 x 0.060 x formula

LOAD = 411 g

PASS @ 300 HRS

Specimen Thickness	Notch Depth	PASS / FAIL ?	Failure at
#1 0.0640	#1 0.0160	PASS	_____ hours
#2 0.0638	#2 0.0158	PASS	_____ hours
#3 0.0637	#3 0.0157	PASS	_____ hours
#4 0.0634	#4 0.0154	PASS	_____ hours
#5 0.0631	#5 0.0151	PASS	_____ hours

Comments: ALL SPECIMENS PASSED AND REMOVED AT 318 HOURS

Tested By: CHRIS ADAMS

Checked By: Comp

Test Conditions Temp: 70  
(At Notching) Humidity: 25

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.

• 21000 77th Avenue South • Kent, WA 98032 •

Phone: (253) 872-0244 • Fax: (253) 872-0245

[www.northwestlinings.com](http://www.northwestlinings.com)

LETTER OF TRANSMITTAL

TO: MMinch@Geosyntec.com  
 CC:  jeffg@goodfellowbros.com  
 JFrey@wm.com

DATE: 1/25/2010	JOB NO.:
ATTENTION: - Geosyntec	
RE: Kekaha LF Phase II Lateral Expansion Cell 1 - Geotextile Submittals	

WE ARE SENDING YOU:  Attached  Under Separate Cover via \_\_\_\_\_ the following items:

Shop Drawings  Prints  Plans  Specifications  Samples

Copy of Letter  Change Order  Submittals  Warranties  Other

Copies	Date:	Description
1	1/25/2010	<u>Crown Resources Geotextile Memo Concerning Spec. Sec. 02075</u>
1	1/25/2010	<u>TNS Advanced Technologies - Style E160 Geotextile Specifications</u>
1	1/25/2010	<u>TNS Advanced Technologies - Style E160 Test Results</u>
1	1/25/2010	<u>TNS Advanced Technologies - Style E160 Certification</u>
1	1/25/2010	<u>TNS Advanced Technologies - Style E060 Geotextile Specifications</u>
1	1/25/2010	<u>TNS Advanced Technologies - Style E060 Test Results</u>
1	1/25/2010	<u>TNS Advanced Technologies - Style E060 Certification</u>
1	1/25/2010	<u>DRAKE Extrusion Inc. - Batch #W108728 Certificate of Analysis</u>
1	1/25/2010	<u>DRAKE Extrusion Inc. - Batch #W108856 Certificate of Analysis</u>

These are transmitted as checked below:

For Approval  Approved as submitted  Resubmit  Copies for Approval

For your use  Approved as noted  Submit  Copies for distribution

For review and comment  Returned for corrections  Return  Corrected Prints

For bids due \_\_\_\_\_  Other \_\_\_\_\_

Remarks:

COPY TO: FILE SIGNED: Richard Kamienski

84 ROLLS OF 60E/SY NW GT

KeKaha Landfill  
E060 150"x360'

		Weight	AOS	PERT	PERM
		oz/sqyd	US Sieve	1/S	cm/sec
		D-5261	D-4751	D-4491	D-4491
1	300293929	6.4	70	2.30	0.53
2	300293930	6.4	70	2.30	0.53
3	300293931	6.4	70	2.30	0.53
4	300293932	6.4	70	2.30	0.53
5	300293938	6.4	70	2.30	0.53
6	300293939	6.4	70	2.30	0.53
7	300293940	6.4	70	2.30	0.53
8	300293941	6.4	70	2.30	0.53
9	300293942	6.4	70	2.30	0.53
* 10	300294086	6.4	70	1.88	0.43
11	300294087	6.4	70	1.88	0.43
12	300294088	6.4	70	1.88	0.43
13	300294089	6.4	70	1.88	0.43
14	300294090	6.4	70	1.88	0.43
15	300294607	6.4	70	1.88	0.43
16	300294613	6.4	70	1.88	0.43
17	300294614	6.4	70	1.88	0.43
* 18	300294615	6.1	70	2.00	0.46
19	300294616	6.1	70	2.00	0.46
20	300294617	6.1	70	2.00	0.46
21	300294618	6.1	70	2.00	0.46
22	300294619	6.1	70	2.00	0.46
23	300294620	6.1	70	2.00	0.46
24	300294621	6.1	70	2.00	0.46
25	300294622	6.1	70	2.00	0.46
26	300294623	6.1	70	2.00	0.46
* 27	300294624	6.3	70	2.33	0.48
28	300294625	6.3	70	2.33	0.48
29	300294626	6.3	70	2.33	0.48
30	300294627	6.3	70	2.33	0.48
31	300295419	6.3	70	2.33	0.48
32	300295420	6.3	70	2.33	0.48
33	300295421	6.3	70	2.33	0.48
34	300295422	6.3	70	2.33	0.48
35	300295423	6.3	70	2.33	0.48
36	300295424	6.3	70	2.33	0.48
37	300295425	6.3	70	2.33	0.48
38	300295426	6.3	70	2.33	0.48
39	300295427	6.3	70	2.33	0.48
40	300295428	6.3	70	2.33	0.48
41	300295429	6.3	70	2.33	0.48
42	300295430	6.3	70	2.33	0.48
43	300295431	6.3	70	2.33	0.48
44	300295432	6.3	70	2.33	0.48
45	300295433	6.3	70	2.33	0.48
46	300295434	6.3	70	2.33	0.48

		Weight	AOS	PERT	PERM
		oz/sqyd	US Sieve	1/S	cm/sec
		D-5261	D-4751	D-4491	D-4491
47	300295435	6.0	70	2.12	0.50
48	300295436	6.0	70	2.12	0.50
49	300295440	6.0	70	2.12	0.50
50	300295441	6.0	70	2.12	0.50
51	300295442	6.0	70	2.12	0.50
52	300295443	6.0	70	2.12	0.50
53	300295444	6.0	70	2.12	0.50
54	300295445	6.0	70	2.12	0.50
55	300295446	6.0	70	2.12	0.50
56	300295447	6.0	70	2.12	0.50
57	300295448	6.2	70	2.33	0.53
58	300295449	6.2	70	2.33	0.53
59	300295450	6.2	70	2.33	0.53
60	300295451	6.2	70	2.33	0.53
61	300295452	6.2	70	2.33	0.53
62	300295453	6.2	70	2.33	0.53
63	300295454	6.2	70	2.33	0.53
64	300295455	6.2	70	2.33	0.53
65	300295456	6.2	70	2.33	0.53
66	300295457	6.2	70	2.33	0.53
67	300295458	6.2	70	2.33	0.53
68	300295459	6.2	70	2.33	0.53
69	300295460	6.1	70	2.00	0.47
70	300295461	6.1	70	2.00	0.47
71	300295462	6.1	70	2.00	0.47
72	300295463	6.1	70	2.00	0.47
73	300295464	6.1	70	2.00	0.47
74	300295465	6.1	70	2.00	0.47
75	300295466	6.1	70	2.00	0.47
76	300295467	6.1	70	2.00	0.47
77	300295468	6.1	70	2.00	0.47
78	300295469	6.1	70	2.00	0.47
79	300295470	6.1	70	2.00	0.47
80	300295471	6.1	70	2.00	0.47
81	300295472	6.1	70	2.00	0.47
82	300295473	6.1	70	2.00	0.47
83	300295474	6.1	70	2.00	0.47
84	300295475	6.1	70	2.00	0.47

\* INTERFACE TESTING



TNS Advanced Technologies by Crown Resources  
681 DeYoung Rd.  
Greer, SC 29651

**Regarding:**

- Kekaha LF Phase II Lateral Expansion Cell 1
- Specification Section 02075 Geotextile Submittals & Source QC.

For the Kekaha Landfill SECTION 02075 GEOTEXTILE Section 1.02 SUBMITTALS section A, #1,#2,#3, and #4, the fiber certifications are attached. We are using fiber as our raw material in place of resin for the required information submittal package due to fiber being our raw material to manufacture the E060 and E160 geotextile. The origin and identification of the fiber is listed on the certifications. The fiber Quality Control Certificates supplied to us by the fiber manufacturer are dated. The fiber property test results are listed on the fiber certification. There is no reclaimed fiber added with the fiber supplied by the fiber supplier during the geotextile manufacturing process. The #5,#6,#7,#8, and #9 submittal requirements are reported on the fabric certifications, specifications, and test reports submitted last week. Please let me know if any additional information is needed regarding the submittal package for the Kekaha Landfill.

Thank you,

Marshall Gaddy  
Quality Control Manager  
[mgaddy@crowresources.net](mailto:mgaddy@crowresources.net)  
(864)968-0592 x130

# certificate of analysis



P.O. Box 4868, Martinsville, VA 24115-4868 Phone (276) 632-0159 Fax (276) 632-0981

CUSTOMER: CROWN RESOURCES

DATE: 01/19/10

PRODUCT CODE: 253

BATCH: W108856

COLOR NAME: OFF BLACK

COLOR NUMBER: R1234

PROPERTY	SPECIFICATION		AVERAGE	MIN	MAX	SD
	MIN	MAX				
Denier	4.50	5.50	5.19	5.02	5.37	.24
Spin Finish (%)	.80	1.30	1.05	1.01	1.08	.03
Crimp Level (CPI)	8.00	10.00	9.30	9.00	9.60	.21
Fiber Length (mm)	95.00	115.00	101.96	100.80	103.00	.89
Tenacity (GPD)	4.50	5.50	5.11	4.87	5.43	.28
Elongation (%)	80.00	160.00	111.56	102.81	128.76	14.89
Color	CMC DE	1.00	1.25	.96	1.44	.21

ALL ABOVE DATA WAS COLLECTED AT THE TIME OF PRODUCTION.

# TNS Advanced Technologies

681 DeYoung Road  
Greenville, SC 29651

(864) 968-0592 Tel  
(864) 879-4639 Fax

1/25/2010

REF: TNS E060  
Kekaha Sanitary Landfill

Northwest Linings & Geotextile Products, Inc.

Dear Sir/Madam:

This is to certify that TNS E060 is a polypropylene, nonwoven, needle-punched fabric. The fabric is comprised of 98% Polypropylene, and 2% Carbon Black and other additives. TNS E060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. TNS E060 has been continuously inspected for needles and found to be needle free. Polypropylene is stable within a pH range of 2 to 13. TNS E060 conforms to the physical properties listed in the following table:

<u>FABRIC PROPERTY</u>	<u>TEST METHOD</u>	<u>UNITS</u>	<u>M.A.R.V</u>
Weight	ASTM D 5261	oz/sqyd	6.0
A.O.S.	ASTM D 4751	U.S. Sieve	70
Permittivity	ASTM D 4491	l/sec	1.5
Permeability	ASTM D 4491	cm/sec	.30

*Marshall O. Gaddy*

Marshall O. Gaddy  
Quality Control Manager



681 DeYoung Rd.  
Greer, SC 29651  
(864)968-0592

Geotextile Product Description Sheet

**Style TNS E060**  
**Kekaha Sanitary Landfill**

TNS E060 is a nonwoven geotextile produced by needlepunching synthetic staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a ph range of 2 to 13. TNS E060 conforms to the physical property values listed below:

Fabric Property	Test Method	Units	Minimum Average Roll Value
Weight	ASTM D 5261	oz/sq.yd.	6.0
Permittivity*	ASTM D 4491	1/sec	1.5
AOS	ASTM D 4751	U.S. Sieve	70
Permeability*	ASTM D 4491	cm/sec	.30
<b>Packaging</b>			
Roll Dimensions-Feet			12.5 x360
Square Yards Per Roll			500
Estimated Roll Weight-Lbs.			220

\* At time of manufacturing, handling may change these properties.

\*\* Modified

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies cannot anticipate all conditions under which TNS product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.



# NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.

• 21000 77<sup>th</sup> Avenue South • Kent, WA 98032 •

Phone: (253) 872-0244 • Fax: (253) 872-0245

[www.northwestlinings.com](http://www.northwestlinings.com)

## LETTER OF TRANSMITTAL

TO: MMinch@Geosyntec.com

CC: jeffg@goodfellowbros.com

JFrey@wm.com

DATE: 1/25/2010

JOB NO.:

ATTENTION: : Geosyntec

RE: Kekaha LF Phase II Lateral Expansion Cell I - Geotextile Submittals

WE ARE SENDING YOU:  Attached  Under Separate Cover via \_\_\_\_\_ the following items:

Shop Drawings  Prints  Plans  Specifications  Samples

Copy of Letter  Change Order  Submittals  Warranties  Other

Copies	Date:	Description
1	1/25/2010	<u>Crown Resources Geotextile Memo Concerning Spec. Sec. 02075</u>
1	1/25/2010	<u>TNS Advanced Technologies</u> - Style E160 Geotextile Specifications
1	1/25/2010	<u>TNS Advanced Technologies</u> - Style E160 Test Results
1	1/25/2010	<u>TNS Advanced Technologies</u> - Style E160 Certification
1	1/25/2010	<u>TNS Advanced Technologies</u> - Style E060 Geotextile Specifications
1	1/25/2010	<u>TNS Advanced Technologies</u> - Style E060 Test Results
1	1/25/2010	<u>TNS Advanced Technologies</u> - Style E060 Certification
1	1/25/2010	<u>DRAKE Extrusion Inc.</u> - Batch #W108728 Certificate of Analysis
1	1/25/2010	<u>DRAKE Extrusion Inc.</u> - Batch #W108856 Certificate of Analysis

These are transmitted as checked below:

For Approval  Approved as submitted  Resubmit  Copies for Approval

For your use  Approved as noted  Submit  Copies for distribution

For review and comment  Returned for corrections  Return  Corrected Prints

For bids due \_\_\_\_\_  Other \_\_\_\_\_

Remarks:

COPY TO: FILE

SIGNED: Richard Kamienski

Kekaha Landfill  
E160 150"x360'

97 ROLLS OF  
16 0254 NW 9T

		WGHT	GTMD	GTXMD	GEMD	GEXMD	TTMD	TTXMD	PUNC	UV
		OSY	LB	LB	%	%	LB	LB	LB	%
		D-5261	D-4632	D-4632	D-4632	D-4632	D-4533	D-4533	D-4833	D-4355
1	2020174353	16.5	471	588	87	90	158	224	321	70
2	2020579613	16.5	471	588	87	90	158	224	321	70
3	2020579632	16.5	471	588	87	90	158	224	321	70
4	2020579627	16.5	471	588	87	90	158	224	321	70
5	2020579615	16.5	471	588	87	90	158	224	321	70
6	2020579616	16.5	471	588	87	90	158	224	321	70
7	2020579635	16.5	471	588	87	90	158	224	321	70
8	2020579618	16.5	471	588	87	90	158	224	321	70
9	2020626841	19.4	464	820	93	78	184	273	315	70
10	2020626842	19.4	464	820	93	78	184	273	315	70
11	2020626848	19.4	464	820	93	78	184	273	315	70
12	2020626852	19.4	464	820	93	78	184	273	315	70
13	2020626898	19.2	450	694	96	92	165	261	315	70
14	2020626899	19.2	450	694	96	92	165	261	315	70
15	2020626900	19.2	450	694	96	92	165	261	315	70
16	2020626901	19.2	450	694	96	92	165	261	315	70
17	2020626902	19.2	450	694	96	92	165	261	315	70
18	2020626903	19.2	450	694	96	92	165	261	315	70
19	2020626904	19.2	450	694	96	92	165	261	315	70
20	2020626905	19.2	450	694	96	92	165	261	315	70
21	2020626906	19.2	450	694	96	92	165	261	315	70
22	2020626907	19.2	450	694	96	92	165	261	315	70
23	2020626908	19.2	450	694	96	92	165	261	315	70
24	2020626909	19.2	450	694	96	92	165	261	315	70
25	2020626910	19.2	450	694	96	92	165	261	315	70
26	2020626911	19.2	450	694	96	92	165	261	315	70
27	2020626912	19.2	450	694	96	92	165	261	315	70
28	2020626913	19.2	450	694	96	92	165	261	315	70
29	2020626914	19.2	450	694	96	92	165	261	315	70
30	2020626915	19.2	450	694	96	92	165	261	315	70
31	2020626916	19.2	450	694	96	92	165	261	315	70
32	2020626917	18.3	467	787	101	84	167	309	315	70
33	2020626918	18.3	467	787	101	84	167	309	315	70
34	2020626919	18.3	467	787	101	84	167	309	315	70
35	2020626920	18.3	467	787	101	84	167	309	315	70
36	2020626921	18.3	467	787	101	84	167	309	315	70
37	2020626922	18.3	467	787	101	84	167	309	315	70
38	2020626923	18.3	467	787	101	84	167	309	315	70
39	2020626924	18.3	467	787	101	84	167	309	315	70
40	2020626925	18.3	467	787	101	84	167	309	315	70
41	2020626926	18.3	467	787	101	84	167	309	315	70
42	2020626927	18.3	467	787	101	84	167	309	315	70
43	2020626928	18.3	467	787	101	84	167	309	315	70
44	2020626929	18.3	467	787	101	84	167	309	315	70
45	2020626930	18.3	467	787	101	84	167	309	315	70
46	2020626931	18.3	467	787	101	84	167	309	315	70
47	2020626932	18.3	467	787	101	84	167	309	315	70
48	2020626933	18.3	467	787	101	84	167	309	315	70
49	2020626934	18.3	467	787	101	84	167	309	315	70

		WGHT	GTMD	GTXMD	GEMD	GEXMD	TTMD	TTXMD	PUNC	UV
		OSY	LB	LB	%	%	LB	LB	LB	%
		D-5261	D-4632	D-4632	D-4632	D-4632	D-4533	D-4533	D-4833	D-4355
50	2020626935	18.3	467	787	101	84	167	309	315	70
51	2020626845	19.4	464	820	93	78	184	273	315	70
52	2020626846	19.4	464	820	93	78	184	273	315	70
53	2020626847	19.4	464	820	93	78	184	273	315	70
54	2020626849	19.4	464	820	93	78	184	273	315	70
55	2020626850	19.4	464	820	93	78	184	273	315	70
56	2020626851	19.4	464	820	93	78	184	273	315	70
57	2020626853	19.4	464	820	93	78	184	273	315	70
*58	2020626855	19.4	464	820	93	78	184	273	315	70
59	2020626856	19.4	464	820	93	78	184	273	315	70
60	2020626857	18.5	478	805	102	88	160	293	315	70
61	2020626858	18.5	478	805	102	88	160	293	315	70
62	2020626859	18.5	478	805	102	88	160	293	315	70
63	2020626860	18.5	478	805	102	88	160	293	315	70
64	2020626861	18.5	478	805	102	88	160	293	315	70
65	2020626865	18.5	478	805	102	88	160	293	315	70
66	2020626866	18.5	478	805	102	88	160	293	315	70
67	2020626867	18.5	478	805	102	88	160	293	315	70
68	2020626868	18.5	478	805	102	88	160	293	315	70
69	2020626869	18.5	478	805	102	88	160	293	315	70
70	2020626870	18.5	478	805	102	88	160	293	315	70
*71	2020626871	18.5	478	805	102	88	160	293	315	70
72	2020626872	18.5	478	805	102	88	160	293	315	70
73	2020626873	18.5	478	805	102	88	160	293	315	70
74	2020626874	18.5	478	805	102	88	160	293	315	70
75	2020626875	18.5	478	805	102	88	160	293	315	70
76	2020626876	18.5	478	805	102	88	160	293	315	70
77	2020626877	20.4	536	826	103	93	179	299	315	70
78	2020626878	20.4	536	826	103	93	179	299	315	70
79	2020626879	20.4	536	826	103	93	179	299	315	70
80	2020626880	20.4	536	826	103	93	179	299	315	70
81	2020626881	20.4	536	826	103	93	179	299	315	70
82	2020626882	20.4	536	826	103	93	179	299	315	70
83	2020626883	20.4	536	826	103	93	179	299	315	70
84	2020626884	20.4	536	826	103	93	179	299	315	70
85	2020626885	20.4	536	826	103	93	179	299	315	70
86	2020626886	20.4	536	826	103	93	179	299	315	70
87	2020626887	20.4	536	826	103	93	179	299	315	70
88	2020626888	20.4	536	826	103	93	179	299	315	70
89	2020626889	20.4	536	826	103	93	179	299	315	70
90	2020626890	20.4	536	826	103	93	179	299	315	70
91	2020626891	20.4	536	826	103	93	179	299	315	70
92	2020626892	20.4	536	826	103	93	179	299	315	70
93	2020626893	20.4	536	826	103	93	179	299	315	70
94	2020626894	20.4	536	826	103	93	179	299	315	70
95	2020626895	20.4	536	826	103	93	179	299	315	70
96	2020626896	20.4	536	826	103	93	179	299	315	70
97	2020626897	19.2	450	694	96	92	165	261	315	70

\* INTERFACE TESTING

TNS Advanced Technologies by Crown Resources  
681 DeYoung Rd.  
Greer, SC 29651

**Regarding:**

- **Kekaha LF Phase II Lateral Expansion Cell 1**
- **Specification Section 02075 Geotextile Submittals & Source QC**

For the Kekaha Landfill SECTION 02075 GEOTEXTILE Section 1.02 SUBMITTALS section A, #1,#2,#3, and #4, the fiber certifications are attached. We are using fiber as our raw material in place of resin for the required information submittal package due to fiber being our raw material to manufacture the E060 and E160 geotextile. The origin and identification of the fiber is listed on the certifications. The fiber Quality Control Certificates supplied to us by the fiber manufacturer are dated. The fiber property test results are listed on the fiber certification. There is no reclaimed fiber added with the fiber supplied by the fiber supplier during the geotextile manufacturing process. The #5,#6,#7,#8, and #9 submittal requirements are reported on the fabric certifications, specifications, and test reports submitted last week. Please let me know if any additional information is needed regarding the submittal package for the Kekaha Landfill.

Thank you,

Marshall Gaddy  
Quality Control Manager  
[mgaddy@crowresources.net](mailto:mgaddy@crowresources.net)  
(864)968-0592 x130



# certificate of analysis



P.O. Box 4868, Martinsville, VA 24115-4868 Phone (276) 632-0159 Fax (276) 632-0981

CUSTOMER: CROWN RESOURCES

DATE: 01/16/10

PRODUCT CODE: 253

BATCH: W108728

COLOR NAME: OFF BLACK

COLOR NUMBER: R1234

PROPERTY	SPECIFICATION		AVERAGE	MIN	MAX	SD
	MIN	MAX				
Denier	4.50	5.50	5.24	5.24	5.25	.01
Spin Finish (%)	.80	1.30	.95	.91	.99	.03
Crimp Level (CPI)	8.00	10.00	9.48	9.20	10.00	.30
Fiber Length (mm)	95.00	115.00	108.00	103.40	112.00	4.07
Tenacity (GPD)	4.50	5.50	5.17	4.99	5.35	.24
Elongation (%)	80.00	160.00	88.17	82.03	94.31	8.67
Color	CMC DE	1.00	1.32	1.14	1.72	.21

ALL ABOVE DATA WAS COLLECTED AT THE TIME OF PRODUCTION.

# TNS Advanced Technologies

681 DeYoung Road  
Greenville, SC 29651

(864) 968-0592 Tel  
(864) 879-4639 Fax

1/25/2010

REF: TNS E160  
Kekaha Sanitary Landfill

Northwest Linings & Geotextile Products, Inc.

Dear Sir/Madam:

This is to certify that TNS E160 is a polypropylene, nonwoven, needle-punched fabric. The fabric is comprised of 98% Polypropylene, and 2% Carbon Black and other additives. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. TNS E160 has been continuously inspected for needles and found to be needle free. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

<u>FABRIC PROPERTY</u>	<u>TEST METHOD</u>	<u>UNITS</u>	<u>M.A.R.V</u>
Weight	ASTM D 5261	oz/sqyd	16.0 ✓
Grab Tensile	ASTM D 4632	lbs	370 ✓
Grab Tensile Elongation	ASTM D 4632	%	50 ✓
Trap Tear	ASTM D 4533	lbs	145 ✓
Puncture	ASTM D 4833	lbs	170 ✓
UV Resistance(500 hrs)	ASTM D 4355	% retained	70 ✓

*Marshall O. Gaddy*

Marshall O. Gaddy  
Quality Control Manager



681 DeYoung Rd.  
Greer, SC 29651  
(864)968-0592

Geotextile Product Description Sheet

## Style TNS E160 Kekaha Sanitary Landfill

TNS E160 is a nonwoven geotextile produced by needlepunching 100% polypropylene staple fibers in a random network to form a high strength dimensionally stable fabric. The polypropylene fibers are specially formulated to resist ultraviolet light deterioration, and are inert to commonly encountered soil chemicals. The fabric will not rot or mildew, is non-biodegradable, and is resistant to damage from insects and rodents. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical property values listed below:

Fabric Property	Test Method	Units	Minimum Average Roll Value
Weight	ASTM D 5261	oz/sq.yd.	16.0
Grab Tensile	ASTM D 4632	lbs.	370
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs.	145
Puncture	ASTM D 4833	lbs	170
UV Resistance after 500 hrs.	ASTM D 4355	% Strength Retained	70
Packaging			
Roll Dimensions-Feet			15 x 360
Square Yards Per Roll			600
Estimated Roll Weight-Lbs.			620

\* At time of manufacturing, handling may change these properties.

\*\* Modified

To the best of our knowledge, the information contained herein is accurate. However, TNS Advanced Technologies cannot anticipate all conditions under which TNS product information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety or suitability of our products either alone or in combination with other products. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents is the sole responsibility of the user.

# NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.

• 21000 77<sup>th</sup> Avenue South • Kent, WA 98032 •

Phone: (253) 872-0244 • Fax: (253) 872-0245

[www.northwestlinings.com](http://www.northwestlinings.com)

## LETTER OF TRANSMITTAL

TO: GEOSYNTEC

CC: [MMich@Geosyntec.com](mailto:MMich@Geosyntec.com)

[KHuynh@Geosyntec.com](mailto:KHuynh@Geosyntec.com)

[jeffg@goodfellowbros.com](mailto:jeffg@goodfellowbros.com)

DATE: 4/5/2010

JOB NO.: N09150

ATTENTION: Kim Huynh

RE: Kekaha LF Phase II Lateral Expansion Cell 1 - TNS E160  
Geotextile Certifications & Test Results (27 Rolls)

WE ARE SENDING YOU:  Attached  Under Separate Cover via \_\_\_\_\_ the following items:

Shop Drawings  Prints  Plans  Specifications  Samples

Copy of Letter  Change Order  Submittals  Warranties  Other

Copies	Date:	Description
1	4/5/2010	<u>TNS Advanced Technologies</u> - Style E160 Geotextile Test Results
1	4/5/2010	<u>TNS Advanced Technologies</u> - Style E160 Geotextile Certification

These are transmitted as checked below:

For Approval  Approved as submitted  Resubmit  Copies for Approval

For your use  Approved as noted  Submit  Copies for distribution

For review and comment  Returned for corrections  Return  Corrected Prints

For bids due \_\_\_\_\_  Other \_\_\_\_\_

Remarks:

COPY TO: FILE

SIGNED: Richard Kamienski



Kekaha Landfill  
E160 150"x360'

		WGHT	GTMD	GTXMD	GEMD	GEXMD	TTMD	TTXMD	PUNC	UV
		OSY	LB	LB	%	%	LB	LB	LB	%
		D-5261	D-4632	D-4632	D-4632	D-4632	D-4533	D-4533	D-4833	D-4355
✓1	2020656819	17.6	522	590	82	101	197	240	263	70
✓2	2020656821	17.6	522	590	82	101	197	240	263	70
✓3	2020656825	17.6	522	590	82	101	197	240	263	70
✓4	2020656828	16.9	532	654	87	96	188	274	263	70
✓5	2020656829	16.9	532	654	87	96	188	274	263	70
✓6	2020656831	16.9	532	654	87	96	188	274	263	70
✓7	2020656832	16.9	532	654	87	96	188	274	263	70
✓8	2020656833	16.9	532	654	87	96	188	274	263	70
✓9	2020656834	16.9	532	654	87	96	188	274	263	70
✓10	2020660913	18.4	419	684	82	96	163	279	263	70
✓11	2020660914	18.4	419	684	82	96	163	279	263	70
✓12	2020660915	18.4	419	684	82	96	163	279	263	70
✓13	2020660917	18.4	419	684	82	96	163	279	263	70
✓14	2020660918	18.4	419	684	82	96	163	279	263	70
✓15	2020660919	18.4	419	684	82	96	163	279	263	70
✓16	2020660920	18.4	419	684	82	96	163	279	263	70
✓17	2020660921	18.4	419	684	82	96	163	279	263	70
✓18	2020660922	18.4	419	684	82	96	163	279	263	70
✓19	2020660923	18.4	419	684	82	96	163	279	263	70
✓20	2020660924	18.4	419	684	82	96	163	279	263	70
✓21	2020660925	18.4	419	684	82	96	163	279	263	70
✓22	2020660929	18.4	419	684	82	96	163	279	263	70
✓23	2020660930	18.4	419	684	82	96	163	279	263	70
✓24	2020660931	18.4	419	684	82	96	163	279	263	70
✓25	2020660932	18.5	565	607	75	91	230	294	263	70
✓26	2020660958	20.1	540	658	86	98	297	400	263	70
✓27	2020660960	20.1	540	658	86	98	297	400	263	70

# TNS Advanced Technologies

681 DeYoung Road  
Greenville, SC 29651

(864) 968-0592 Tel  
(864) 879-4639 Fax

4/5/2010

REF: TNS E160  
Kekaha Sanitary Landfill

Northwest Linings & Geotextile Products, Inc.

Dear Sir/Madam:

This is to certify that TNS E160 is a polypropylene, nonwoven, needle-punched fabric. The fabric is comprised of 98% Polypropylene, and 2% Carbon Black and other additives. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. TNS E160 has been continuously inspected for needles and found to be needle free. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

<u>FABRIC PROPERTY</u>	<u>TEST METHOD</u>	<u>UNITS</u>	<u>M.A.R.V</u>
Weight	ASTM D 5261	oz/sqyd	16.0 ✓
Grab Tensile	ASTM D 4632	lbs	370 ✓
Grab Tensile Elongation	ASTM D 4632	%	50 ✓
Trap Tear	ASTM D 4533	lbs	145 ✓
Puncture	ASTM D 4833	lbs	170 ✓
UV Resistance(500 hrs)	ASTM D 4355	% retained	70 ✓

*Marshall O. Gaddy*

Marshall O. Gaddy  
Quality Control Manager



**Appendix L**  
**Red-lined Construction Drawings**



# CONSTRUCTION DRAWINGS PHASE II LATERAL EXPANSION CELL 1 BASE LINER CONSTRUCTION KEKAHA SANITARY LANDFILL

KAUAI, HAWAII

April 2009

*RED-LINED DRAWINGS  
FOR NLEP  
(AS OF 24 MAY 2010)*



VICINITY MAP

DRAWING NO.	TITLE
-	TITLE SHEET/INDEX
1	EXISTING SITE CONDITIONS AND PHASE I STAGING AREAS
2	PROJECT OVERVIEW
3	LEACHATE EVAPORATION POND GRADES AND CROSS SECTIONS
4	CELL 1 SUBBASE GRADES
5	CELL 1 CROSS SECTIONS
6	CELL 1 LEACHATE MANAGEMENT SYSTEM
7	CELL 1 LEACHATE MANAGEMENT SYSTEM PIPING PROFILES
8	FINAL COVER GRADES (NOT IN CONTRACT)
9	INFILTRATION BASIN GRADES AND CROSS SECTIONS
10	EXISTING LEACHATE EVAPORATION POND DETAILS
11	LEACHATE EVAPORATION POND DETAILS
12	LEACHATE EVAPORATION POND DETAILS
13	LEACHATE EVAPORATION POND DETAILS
14	EXISTING AND NEW LEACHATE EVAPORATION POND ELECTRICAL DETAILS
15	CELL 1 BASE LINER DETAILS
16	FINAL COVER LINER DETAILS (NOT IN CONTRACT)
17	CELL 1 LEACHATE MANAGEMENT SYSTEM DETAILS
18	CELL 1 LEACHATE MANAGEMENT SYSTEM DETAILS
19	EXISTING LEACHATE MANAGEMENT SYSTEM AND MODIFICATION DETAILS
20	EXISTING LEACHATE MANAGEMENT SYSTEM AND MODIFICATION DETAILS
21	SURFACE WATER MANAGEMENT SYSTEM DETAILS (NOT IN CONTRACT)
22	MISCELLANEOUS DETAILS
23	PERIMETER ROAD ENHANCEMENTS AND DETAILS
24	PERIMETER ROAD ENHANCEMENT DETAILS
25	MDOF PAVEMENT MODIFICATION DETAILS
26	SECURITY FENCE DETAILS



SOURCE: BASE MAP TAKEN FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE: KAUAI QUADRANGLE, HAWAII

LOCATION MAP

PREPARED FOR  
COUNTY OF KAUAI, DEPARTMENT OF PUBLIC WORKS  
4444 Rice Street  
Lihue, Kauai, 96766  
KEKAHA LANDFILL  
6900-D Kaunualii Highway  
Kekaha, Hawaii  
808-337-1416

APPROVED:

*Bernard P. Carvalho, Jr.*  
BERNARD P. CARVALHO, JR.  
MAYOR, COUNTY OF KAUAI

*Donald A. Kumano*  
DONALD A. KUMANO  
COUNTY ENGINEER, COUNTY OF KAUAI

*C/S for*

COUNTY ENGINEER, COUNTY OF KAUAI

PREPARED BY

AECOM

841 BISHOP STREET  
SUITE 500  
HONOLULU, HAWAII 96813-5920  
808-523-8874



THIS WORK WAS PREPARED BY THE FIRM OF AECOM

DATE: 04/20/09  
DRAWN BY: [Signature]  
CHECKED BY: [Signature]  
SCALE: AS SHOWN

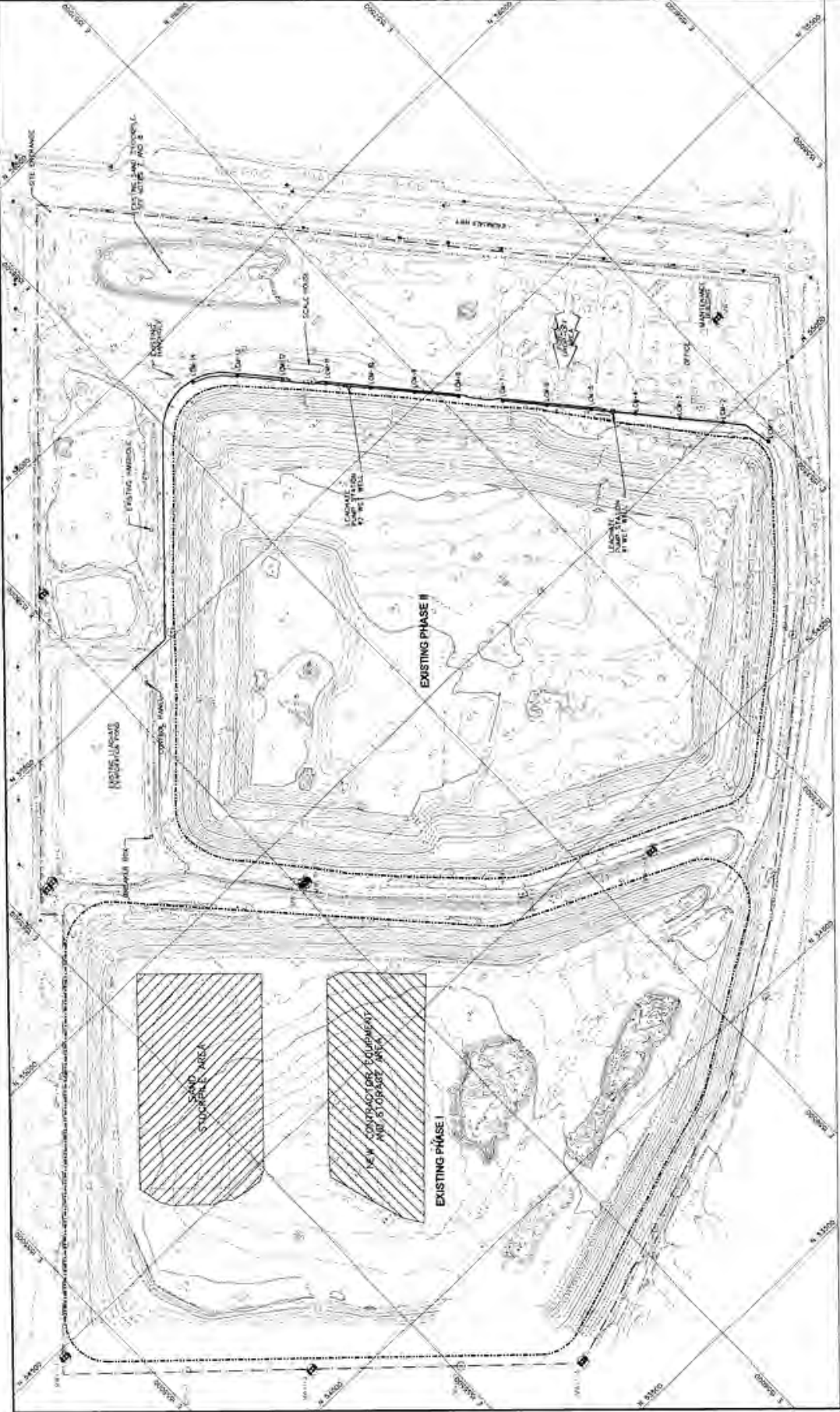
NO.	DATE	REVISION
01		
02		
03		
04		


  
**AECOM**

PROJECT NO.   
 SHEET NO.   
 DATE:

### EXISTING SITE CONDITIONS AND PHASE I STAGING AREAS

PROJECT NO.   
 SHEET NO.   
 DATE:



**LEGEND**

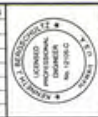
EXISTING TOPOGRAPHY  
 PROPERTY LINE  
 EXISTING LIMITS OF WASTE  
 EXISTING GROUNDWATER MONITORING WELL  
 EXISTING LEACHATE COLLECTION MANHOLE  
 EXISTING GAS TRENCH  
 EXISTING LEACHATE PUMP STATION (VERTICAL)  
 EXISTING LEACHATE TRENCHES

- NOTES**
1. TOPOGRAPHIC MAP PROVIDED BY OWNER AND ACCORDING TO THE SURVEYING RECORDS ON FILE AT THE SURVEYOR'S OFFICE. THE LOCATION OF ALL MONITORING WELLS, LEACHATE COLLECTION MANHOLES AND EXISTING TRENCHES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
  2. DESIGNATED STAGING AREAS SHALL BE MAINTAINED OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.
  3. CONTRACTOR SHALL MAINTAIN EXISTING MONITORING WELLS AND LEACHATE COLLECTION MANHOLES TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.
  4. CONTRACTOR SHALL MAINTAIN EXISTING GROUNDWATER MONITORING WELLS AND LEACHATE COLLECTION MANHOLES TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.

5. LOCATE EXISTING MONITORING WELLS AND LEACHATE COLLECTION MANHOLES AND ACCORDING TO THE SURVEYING RECORDS ON FILE AT THE SURVEYOR'S OFFICE. THE LOCATION OF ALL MONITORING WELLS, LEACHATE COLLECTION MANHOLES AND EXISTING TRENCHES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
6. CONTRACTOR SHALL MAINTAIN EXISTING MONITORING WELLS AND LEACHATE COLLECTION MANHOLES TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.
7. CONTRACTOR SHALL MAINTAIN EXISTING GROUNDWATER MONITORING WELLS AND LEACHATE COLLECTION MANHOLES TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.
8. CONTRACTOR SHALL MAINTAIN EXISTING TRENCHES TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.
9. CONTRACTOR SHALL MAINTAIN EXISTING TRENCHES TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.



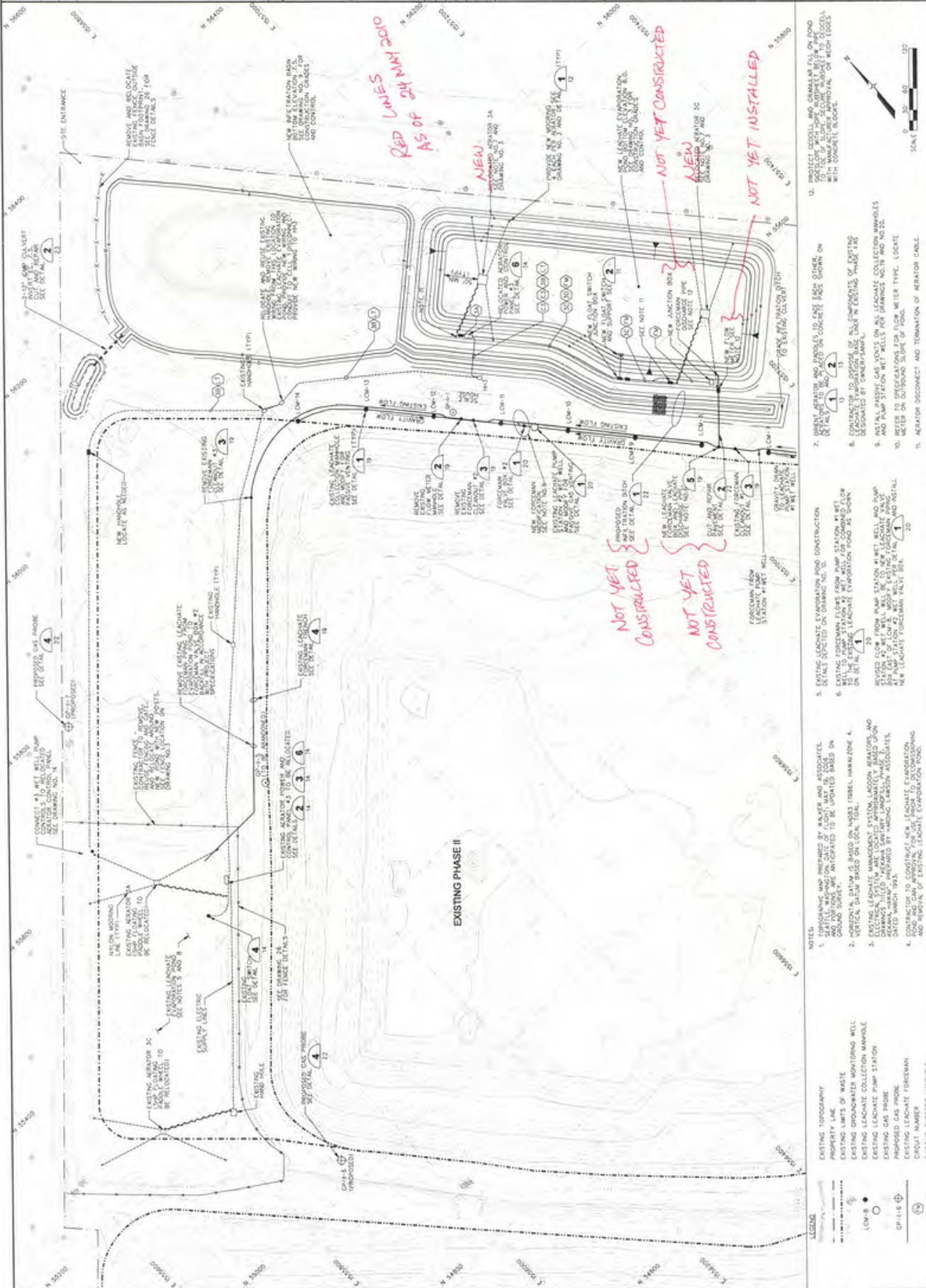
NO.	REV.	DATE



PROJECT NO. 2009-0001  
 SHEET NO. 2  
 DATE: APRIL 2009  
 DRAWING NO. 2

**AECOM**  
 PROJECT OVERVIEW  
 CONSTRUCTION DRAWINGS  
 PHASE I LATERAL EXPANSION  
 CELL BASE LINE TO CONSTRUCTION  
 KAUAI, HAWAII

DATE	APRIL 2009
PROJECT NO.	2009-0001
CLIENT	State of Hawaii
DESIGNER	AECOM
CHECKER	J. [Name]
DATE	APRIL 2009



- NOTES:**
1. TOPOGRAPHIC AND REMOVED BY WALKER AND ASSOCIATES. SEE DETAIL 10 FOR REMOVAL AND RELOCATION. SEE DETAIL 11 FOR REMOVAL AND RELOCATION. SEE DETAIL 12 FOR REMOVAL AND RELOCATION.
  2. HORIZONTAL DRAIN IS BASED ON HULLS HULLS HAWAII ZONE 4. SEE DETAIL 13 FOR HORIZONTAL DRAIN. SEE DETAIL 14 FOR HORIZONTAL DRAIN.
  3. EXISTING LEACHATE COLLECTION MANHOLE IS BASED ON DRAWINGS FILED WITH THE STATE OF HAWAII ARCHIVES AND DATED MARCH 1993.
  4. CONTRACTOR TO CONSTRUCT NEW LEACHATE, EVAPORATION AND REMOVAL OF EXISTING LEACHATE EVAPORATION POOL.
- LEGEND:**
- EXISTING TOPOGRAPHY
  - PROPERTY LINE
  - EXISTING GROUNDWATER MONITORING WELL
  - EXISTING LEACHATE COLLECTION MANHOLE
  - EXISTING GAS PROBE
  - PROPOSED GAS PROBE
  - EXISTING LEACHATE FOREMAN CROUT NUMBER
  - EXISTING ELECTRIC MANHOLE
- NOT YET CONSTRUCTED:**
- 1. EXISTING LEACHATE EVAPORATION AND CONSTRUCTION DETAIL SPECIFIED ON DRAWING NO. 10.
  - 2. EXISTING FOREMAN FLOWS FROM PUMP STATION TO THE EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 3. EXISTING FOREMAN FLOWS FROM PUMP STATION TO THE EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 4. EXISTING FOREMAN FLOWS FROM PUMP STATION TO THE EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 5. EXISTING FOREMAN FLOWS FROM PUMP STATION TO THE EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 6. EXISTING FOREMAN FLOWS FROM PUMP STATION TO THE EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 7. EXISTING FOREMAN FLOWS FROM PUMP STATION TO THE EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 8. CONTRACTOR TO VERIFY THE COMPONENTS OF EXISTING LEACHATE EVAPORATION POOL AS SHOWN ON DETAIL 11.
  - 9. INSTALL PASSIVE GAS VENTS ON ALL LEACHATE COLLECTION MANHOLES AND PUMP STATION WET WELLS PER DRAWINGS NO. 19 AND NO. 20.
  - 10. REFER TO SPECIFICATIONS FOR FLOW METER TYPE, LOCATE METER ON OUTSLOPE OF FLOW.
  - 11. REPARATOR DISCONNECT AND TERMINATION OF REPARATOR CABLE.







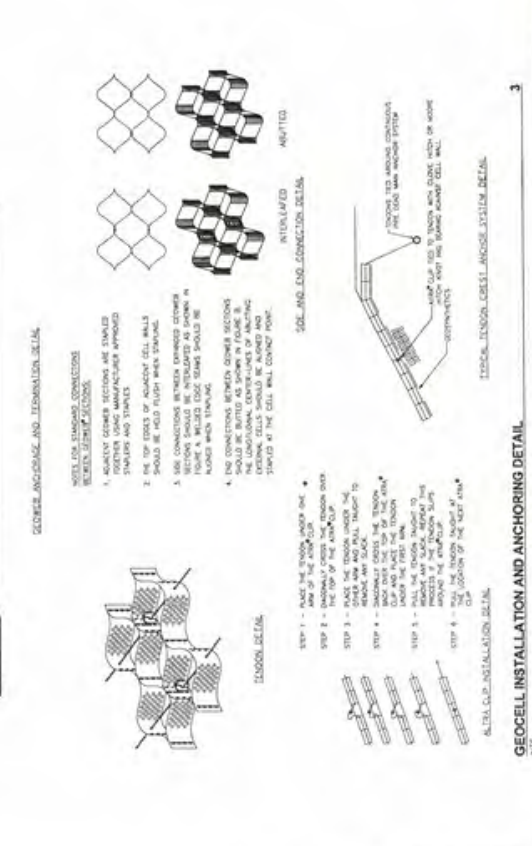
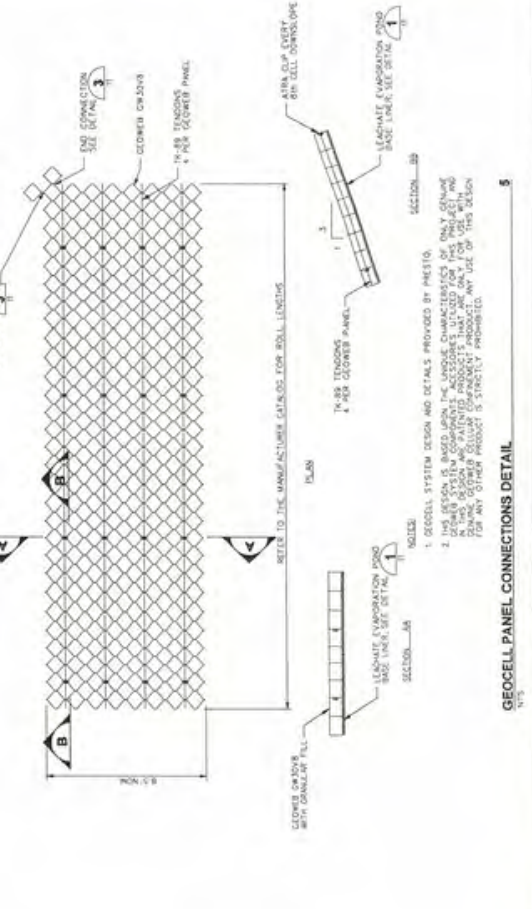
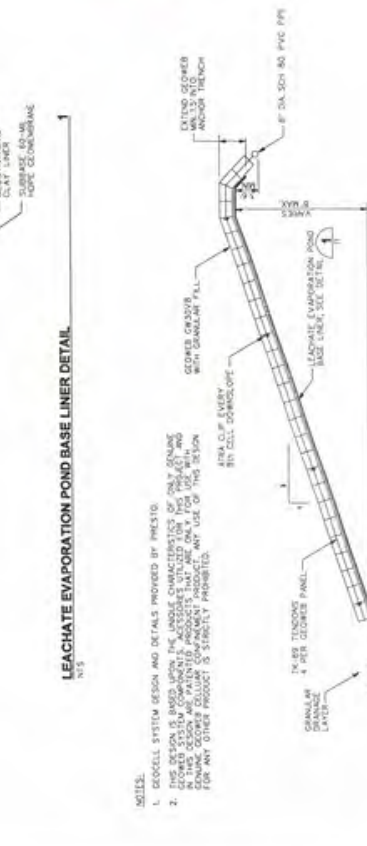
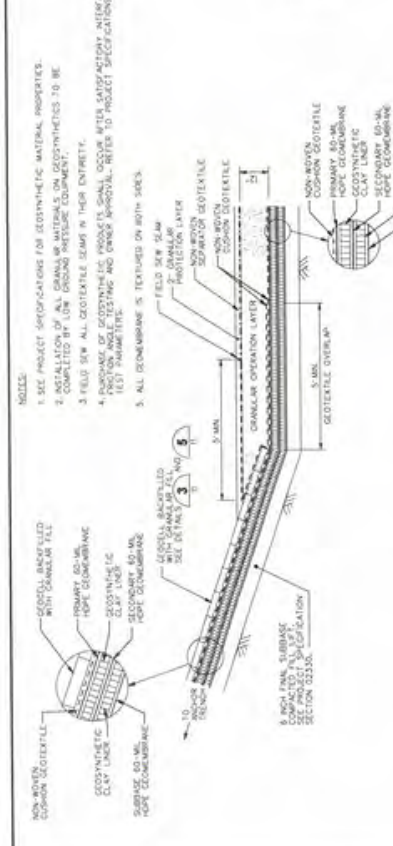
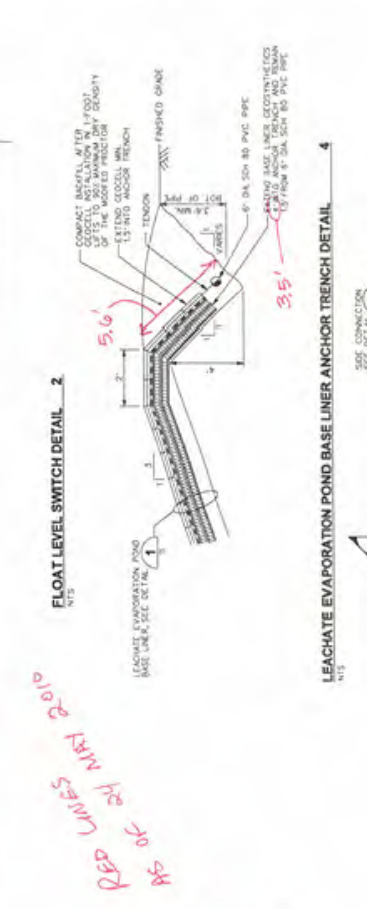
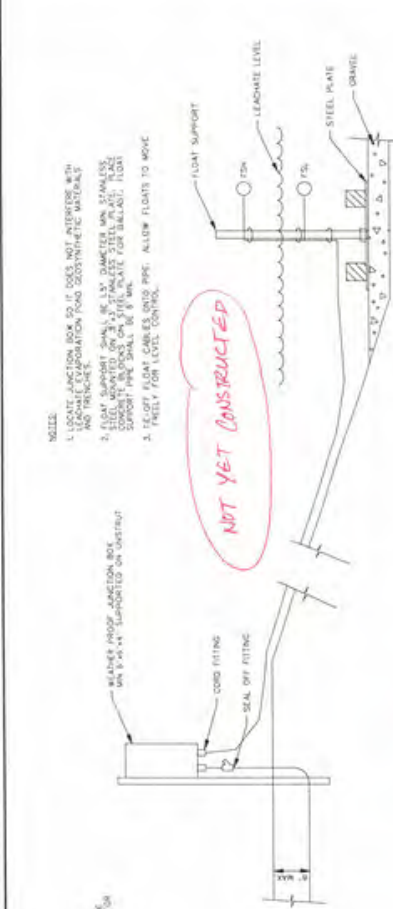
NO.	1	REVISIONS
DATE	7/2/00	
BY	KLB	
CHK	CM	

DATE	APRIL 2009
PROJECT NO.	905501
FILE NAME	leachate.pdr
SHEET NO.	
DRAWING NO.	11



PREPARED BY: AECOM  
 ENGINEER: [Signature]  
 DATE: 10/10/00  
 PROJECT NO.: 905501  
 SHEET NO.: 11

CONSTRUCTION DRAWINGS  
 PHASE II LATERAL EXPANSION  
 CELL TRUCK LEACHATE COLLECTION  
 KUALA, HAWAII  
**LEACHATE EVAPORATION POND DETAILS**



- NOTES:**
1. LOCATE ANCHOR BOX SO IT DOES NOT INTERFERE WITH LEACHATE EVAPORATION POND GEOSYNTHETIC MATERIALS.
  2. FLOAT SUPPORT SHALL BE LAY BARRIER WITH SPACERS.
  3. FLOAT ANCHOR BOX SHALL BE 3" MINIMUM STEEL PLATE PLATE SUPPORT AND SHALL BE 1/2" MINIMUM FOR BRACKET FLAT.
  4. FLOAT CABLES SHALL BE 1/4" MINIMUM.
  5. FLOAT CABLES SHALL BE 1/4" MINIMUM.
  6. FLOAT CABLES SHALL BE 1/4" MINIMUM.
  7. FLOAT CABLES SHALL BE 1/4" MINIMUM.
  8. FLOAT CABLES SHALL BE 1/4" MINIMUM.
  9. FLOAT CABLES SHALL BE 1/4" MINIMUM.
  10. FLOAT CABLES SHALL BE 1/4" MINIMUM.

- NOTES:**
1. SEE PROJECT SPECIFICATIONS FOR GEOSYNTHETIC MATERIAL PROPERTIES.
  2. COMPACTED BY LOW DRUMMING MEASURE EQUIPMENT.
  3. FIELD SEW ALL GEOTEXTILE SEAMS IN THEIR ENTIRETY.
  4. EXCHANGE OF GEOSYNTHETIC PRODUCTS SHALL OCCUR AFTER SATISFACTORY INTERFERENCE TESTS HAVE BEEN COMPLETED.
  5. ALL GEOMEMBRANE IS TESTED ON BOTH SECS.

- NOTES:**
1. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  2. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  3. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  4. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  5. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  6. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  7. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  8. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  9. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  10. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.

- NOTES:**
1. GEOCELL SYSTEM DESIGN AND DETAILS PROVIDED BY PRESTO.
  2. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
  3. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
  4. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
  5. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
  6. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
  7. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
  8. THIS DESIGN IS BASED UPON THE UNDER CHARACTERISTICS OF ONLY GEONET.
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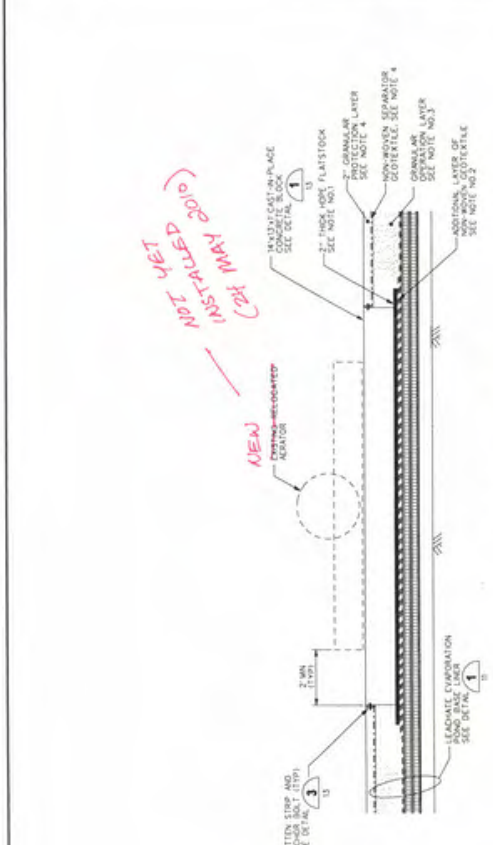
DATE	APRIL 2009
PROJECT NO	56541
DATE	APRIL 2009
DRAWING NO	13
SHEET NO	

**AECOM**

PREPARED BY

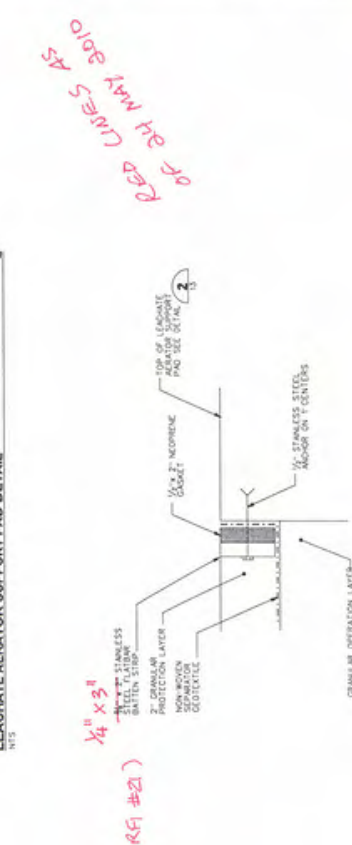
**LEACHATE EVAPORATION POND DETAILS**

CONSTRUCTION DRAWINGS  
CELL 1 BASE LINER CONSTRUCTION  
PHASE II METABOLIC EXPANSION  
KEMAH SANITARY LANDFILL  
KEMAH, KANAWA



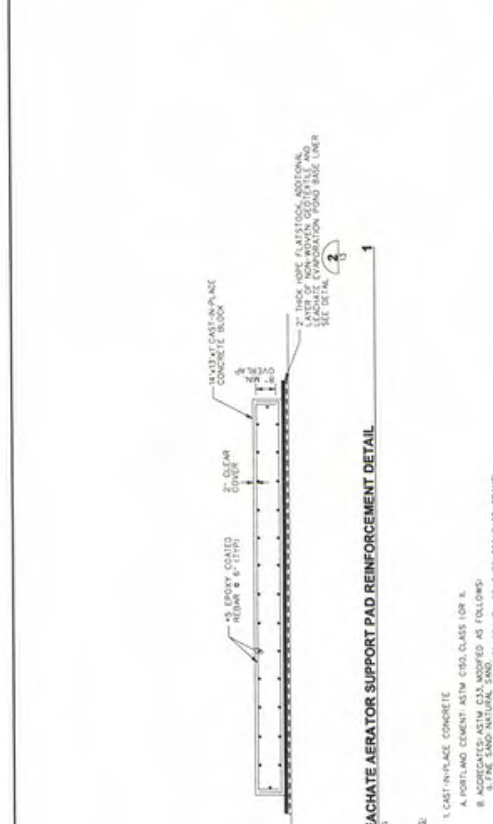
- NOTES**
1. EXTEND FLATSTOCK A MINIMUM OF 6" PAST CONCRETE BLOCK FIELD END. LEACHATE EVAPORATION BATTEN STRIP SHALL BE INSTALLED AS SHOWN.
  2. EXTEND ADDITIONAL LAYER OF NON-WOVEN GEOTEXTILE A MINIMUM OF 6" PAST FLATSTOCK DOSE. OVERLAP ADDITIONAL LAYER OF NON-WOVEN GEOTEXTILE TO OVERLAP FLATSTOCK DOSE.
  3. ANY FUTURE WORK SHALL BE DONE IN ACCORDANCE WITH THE MATERIAL SPECIFICATIONS FOR ALL ITEMS AND SHALL BE DONE AFTER THE LEACHATE EVAPORATION BATTEN STRIP HAS BEEN INSTALLED.
  4. ANY FUTURE WORK SHALL BE DONE IN ACCORDANCE WITH THE MATERIAL SPECIFICATIONS FOR ALL ITEMS AND SHALL BE DONE AFTER THE LEACHATE EVAPORATION BATTEN STRIP HAS BEEN INSTALLED.

**LEACHATE AERATOR SUPPORT PAD DETAIL**  
NTS



- NOTES**
1. INSTALL BATTEN STRIP AND ANCHOR ON ALL SIDES OF LEACHATE AERATOR SUPPORT PAD.

**BATTEN STRIP AND ANCHOR DETAIL**  
NTS



- NOTES**
1. CAST IN-PLACE CONCRETE
  - A. PORTLAND CEMENT ASTM C595 CLASS OR 4.
  - B. AGGREGATE ASTM C33, GRADED AS FOLLOWS:
    1. 3/4" MAXIMUM SIZE
    2. 100% SAND
    3. 100% SAND
  - C. WATER POTABLE.
  - D. CONCRETE MIX:
    1. 1 PART CEMENT TO 1.5 PARTS SAND TO 2.5 PARTS AGGREGATE
    2. 1 PART CEMENT TO 1.5 PARTS SAND TO 2.5 PARTS AGGREGATE
    3. 1 PART CEMENT TO 1.5 PARTS SAND TO 2.5 PARTS AGGREGATE
    4. 1 PART CEMENT TO 1.5 PARTS SAND TO 2.5 PARTS AGGREGATE
  - E. MIXING AND DELIVERY:
    1. USE A PORTLAND CEMENT AND AGGREGATE WHICH MEETS ALL THE REQUIREMENTS OF MIXING AND DELIVERY.
    2. USE A PORTLAND CEMENT AND AGGREGATE WHICH MEETS ALL THE REQUIREMENTS OF MIXING AND DELIVERY.
    3. USE A PORTLAND CEMENT AND AGGREGATE WHICH MEETS ALL THE REQUIREMENTS OF MIXING AND DELIVERY.
    4. USE A PORTLAND CEMENT AND AGGREGATE WHICH MEETS ALL THE REQUIREMENTS OF MIXING AND DELIVERY.
  - F. PROTECTION AND CURING:
    1. PROVIDE PROTECTION OF THE TOP SURFACE OF THE CONCRETE FROM DRAINAGE WATER, FRESH CONCRETE, AND OTHER REINFORCEMENTS IN ACCORDANCE WITH ASTM A755.
    2. PROVIDE PROTECTION OF THE TOP SURFACE OF THE CONCRETE FROM DRAINAGE WATER, FRESH CONCRETE, AND OTHER REINFORCEMENTS IN ACCORDANCE WITH ASTM A755.
    3. PROVIDE PROTECTION OF THE TOP SURFACE OF THE CONCRETE FROM DRAINAGE WATER, FRESH CONCRETE, AND OTHER REINFORCEMENTS IN ACCORDANCE WITH ASTM A755.
    4. PROVIDE PROTECTION OF THE TOP SURFACE OF THE CONCRETE FROM DRAINAGE WATER, FRESH CONCRETE, AND OTHER REINFORCEMENTS IN ACCORDANCE WITH ASTM A755.
  - G. REINFORCEMENT:
    1. PROVIDE COVER FOR REINFORCEMENT AS FOLLOWS: 2 INCHES.
    2. PROVIDE COVER FOR REINFORCEMENT AS FOLLOWS: 2 INCHES.
    3. PROVIDE COVER FOR REINFORCEMENT AS FOLLOWS: 2 INCHES.
    4. PROVIDE COVER FOR REINFORCEMENT AS FOLLOWS: 2 INCHES.

**LEACHATE AERATOR SUPPORT PAD DETAIL**  
NTS



- NOTES**
1. INSTALL BATTEN STRIP AND ANCHOR ON ALL SIDES OF LEACHATE AERATOR SUPPORT PAD.

**BATTEN STRIP AND ANCHOR DETAIL**  
NTS

(SEE RF #2)

1/4" X 3/4"

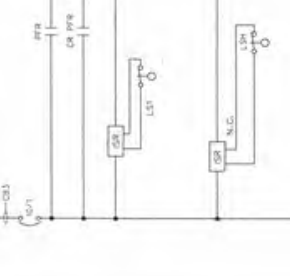
(SEE RF #2)

NEW - RECORDED

INSTALL MAY BE SOILD NOT HERE

RED LINES AS OF 31 MAY 2010

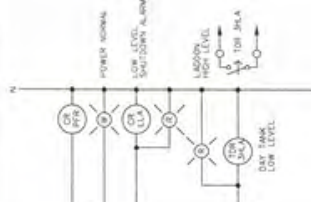
DATE	APRIL 2009
PROJECT NO	56541
DATE	APRIL 2009
DRAWING NO	13
SHEET NO	



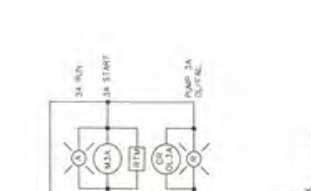
**EXISTING AERATOR P.S. #3 CONTROL WIRING DIAGRAM**  
 N15 FOR REFERENCE



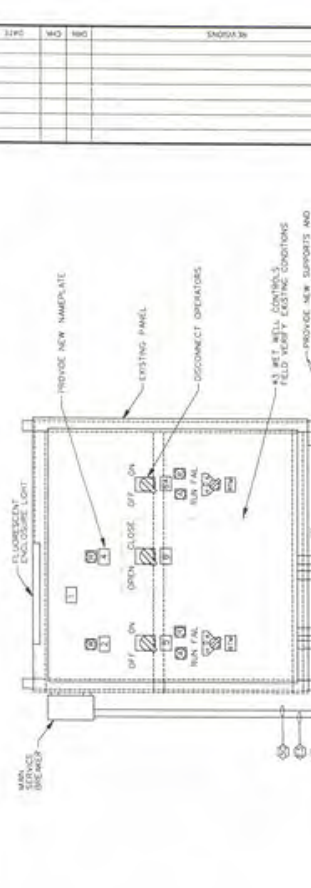
**EXISTING AERATOR POWER & CONTROL PANEL INTERNAL ELEVATION**  
 N15



**EXISTING AERATOR #3A CONTROL WIRING DIAGRAM**  
 N15 FOR REFERENCE



**EXISTING AERATOR #3B CONTROL WIRING DIAGRAM**  
 N15 FOR REFERENCE



**MODIFICATIONS TO EXISTING AERATOR POWER CONTROL PANEL ELEVATION**  
 N15

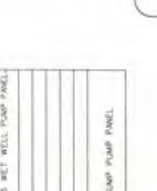
1. RELOCATE EXISTING CONTROL PANEL TO EXISTING EVAPORATION POND AS SHOWN.  
 2. PROVIDE NEW 240V AC SERVICE TO EXISTING CONTROL PANEL.  
 3. PROVIDE NEW 240V AC SERVICE TO EXISTING CONTROL PANEL.  
 4. PROVIDE NEW 240V AC SERVICE TO EXISTING CONTROL PANEL.  
 5. PROVIDE NEW 240V AC SERVICE TO EXISTING CONTROL PANEL.  
 6. PROVIDE NEW 240V AC SERVICE TO EXISTING CONTROL PANEL.  
 7. PROVIDE NEW 240V AC SERVICE TO EXISTING CONTROL PANEL.



**EXISTING EVAPORATION POND LEVEL SWITCH INSTALLATION**  
 N15

**KEKAMA CONDUIT & WIRE SCHEDULE**

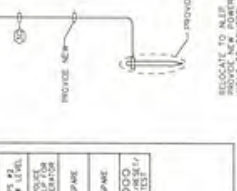
TAG	CONDUIT	CABLE	FROM	TO
E3	1-1/2" PVC	302 & 302 D	ESP	DP No. 3
SA	1-1/2" C	302 & 302 D	ASA	FLOORS
JOP	1-1/2" C	302 & 302 D	DP No. 3	ASA
SC	1-1/2" C	302 & 302 D	DP No. 3	ASA
SC	1-1/2" C	302 & 302 D	DP No. 3	ASA
SC	1-1/2" C	302 & 302 D	DP No. 3	ASA
SC	1-1/2" C	302 & 302 D	DP No. 3	ASA
SC	1-1/2" C	302 & 302 D	DP No. 3	ASA
SC	1-1/2" C	302 & 302 D	DP No. 3	ASA



**CENTRAL ALARM PANEL ARRANGEMENT DIAGRAM**  
 N15



**CENTRAL ALARM PANEL WIRING DIAGRAM**  
 N15



**EXISTING AERATOR POWER & CONTROL PANEL INTERNAL ELEVATION**  
 N15

**EXISTING AERATOR POWER & CONTROL PANEL INTERNAL ELEVATION**  
 N15

**EXISTING AERATOR POWER & CONTROL PANEL INTERNAL ELEVATION**  
 N15

GENERAL NOTE: SEE BASED UPON DRAWING N15.15.  
 PREPARED BY HARRISON LAPSIN ASSOCIATES.  
 DATED WHICH THE.

CONSTRUCTION DRAWINGS  
 CELL 1 BASE LINE CONSTRUCTION  
 KEMAR & HARBOR EXPANSION  
 KUALA HARAU

EXISTING AND NEW LEACHATE  
 EVAPORATION POND  
 ELECTRICAL DETAILS

DATE: APRIL 2009  
 PROJECT NO.: 3501  
 SHEET NO.: 14

PREPARED BY: **AECOM**







## **Appendix M**

### **Record Drawings**

**Subbase As-built Survey**

**Top of Granular Operations Layer As-Built Survey**

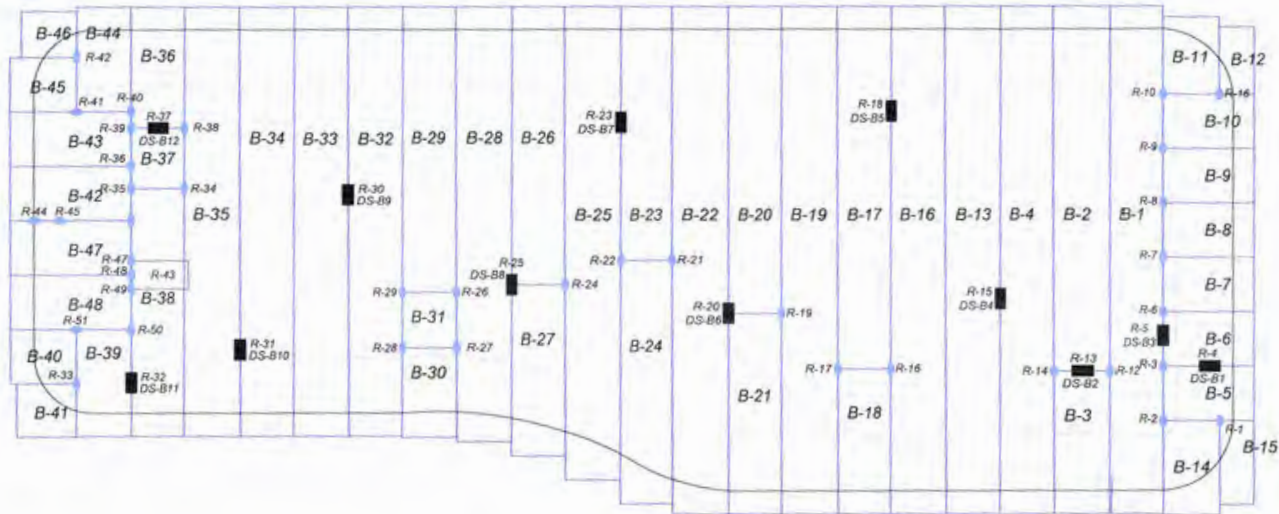
**Subbase 60 mil HDPE Geomembrane As-Built Panel Layout**

**Secondary 60 mil HDPE Geomembrane As-Built Panel Layout**

**Primary 60 mil HDPE Geomembrane As-Built Panel Layout**



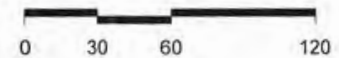
22.5



X Bead repair  
 ● Patch repair

■ Destructive test repair  
 ⊙ Pipe boot

**New Leachate Evaporation Pond**  
 As-built sub base 60-mil Textured HDPE liner panel layout



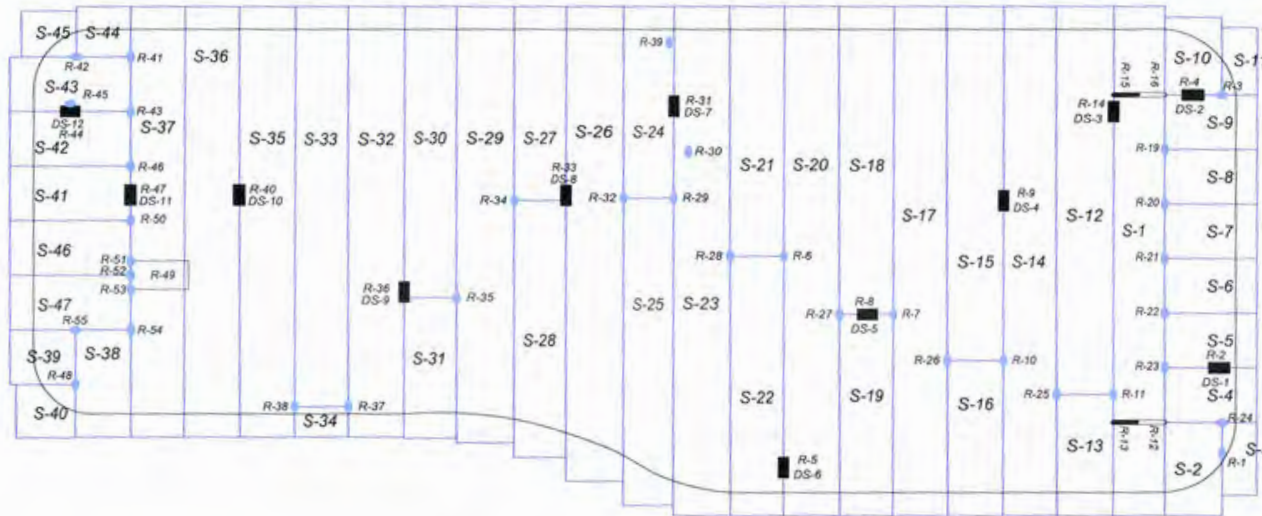
SHEET NO.	DETAIL 	<b>NORTHWEST LININGS &amp; GEOTEXTILE PRODUCTS, Inc.</b> www.northwestlinings.com 21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX		JOB NAME: <b>Kekaha Sanitary Landfill</b>	
				JOB NO. N 0 9 1 5 0	
				DATE: 5 25 10	CHECKED: KL
				BY: SG	SCALE: AS SHOWN





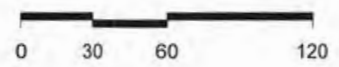


22.5



X Bead repair  
 Patch repair  
 Destructive test repair  
 Pipe boot

**New Leachate Evaporation Pond**  
**As-built Secondary 60-mil Textured HDPE liner panel layout**

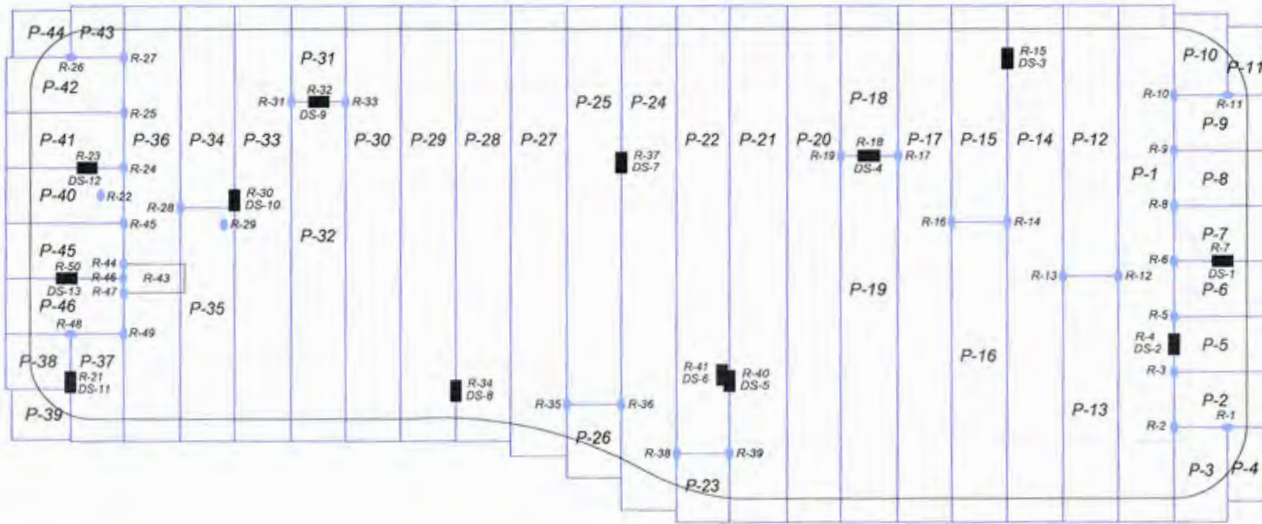


SHEET NO.	DETAIL		<b>NORTHWEST LININGS &amp; GEOTEXTILE PRODUCTS, Inc.</b> www.northwestlinings.com 21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX		JOB NAME: <b>Kekaha Sanitary Landfill</b>	
			JOB NO. <b>N 0 9 1 5 0</b>		DATE: <b>5 25 10</b>	CHECKED: <b>KL</b>
				BY: <b>SG</b>	SCALE: <b>AS SHOWN</b>	



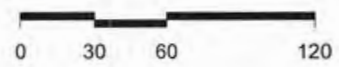


22.5



- X Bead repair
- Patch repair
- Destructive test repair
- Pipe boot

**New Leachate Evaporation Pond**  
**As-built Primary 60-mil Textured HDPE liner panel layout**




SHEET NO.	DETAIL 	<b>NORTHWEST LININGS &amp; GEOTEXTILE PRODUCTS, Inc.</b> www.northwestlinings.com 21000 7TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX		JOB NAME:	Kekaha Sanitary Landfill		
				JOB NO.	N 0 9 1 5 0		
			DATE:	5 25 10	CHECKED:	KL	
			BY:	SG	SCALE:	AS SHOWN	





**Appendix N**  
**Geosynthetic Samples**



CETCO BENTOMAT® FLW GEOSYNTHETIC CLAY LINER

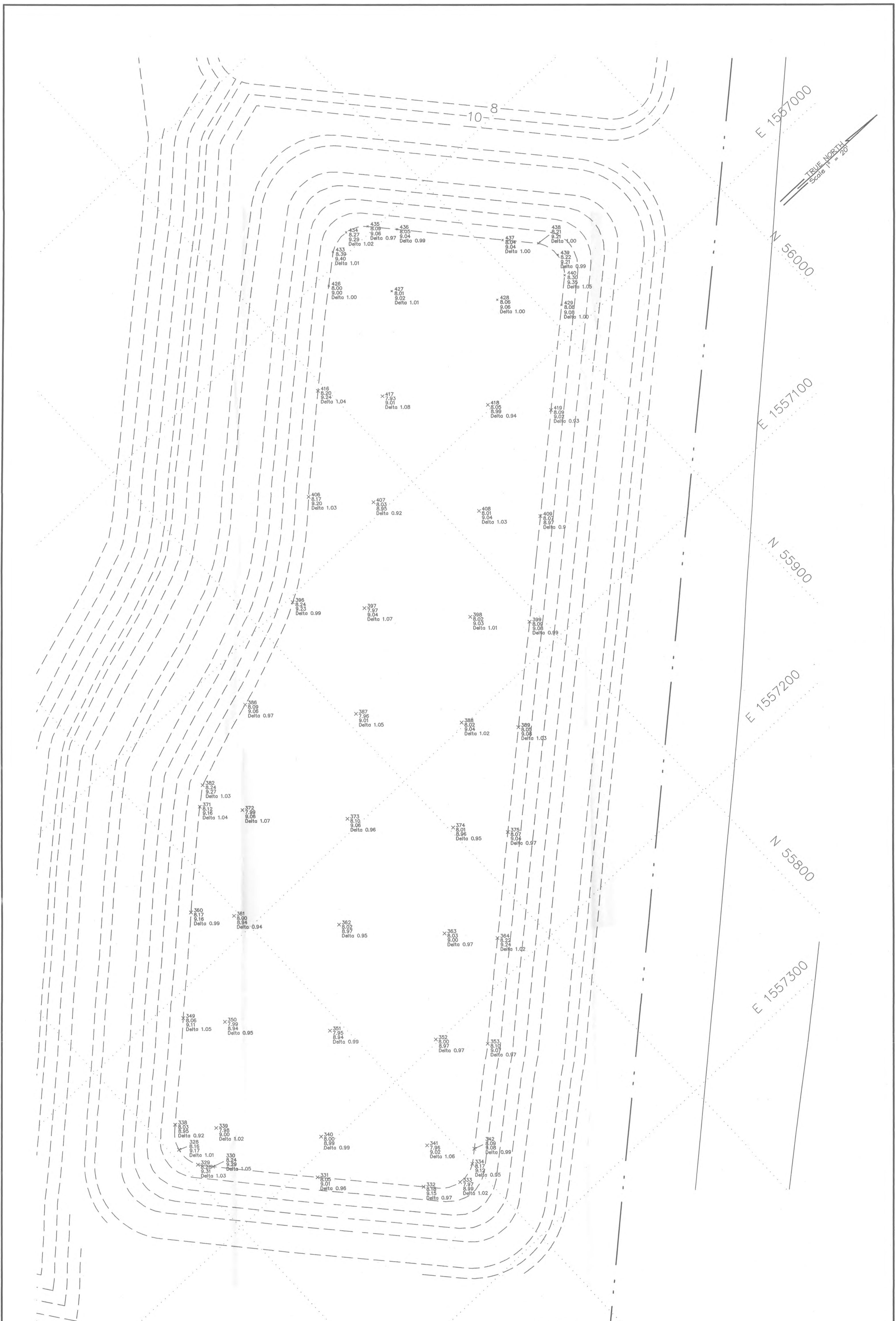
AGRU 60-MIL MICRO SPIKE® HDPE DOUBLE-SIDED  
TEXTURED GEOMEMBRANE

C-Lins.com  
816.623.854 / 888.660.8120

TNS E160 16 OZ/YD<sup>2</sup> NON-WOVEN GEOTEXTILE

TNS E060 6 OZ/YD<sup>2</sup> NON-WOVEN GEOTEXTILE





TRUE NORTH  
Scale 1" = 20'

E 1557000

N 56000

E 1557100

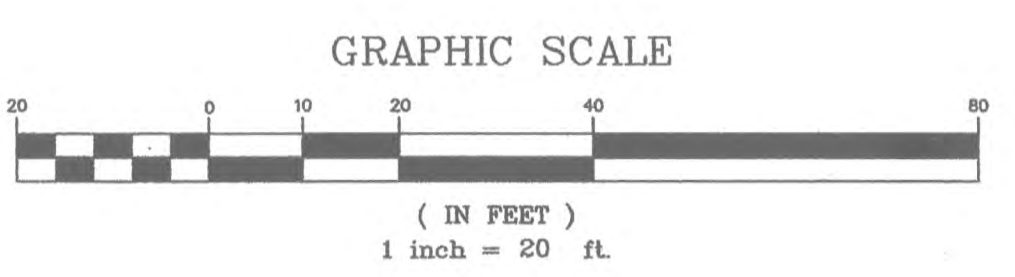
N 55900

E 1557200

N 55800

E 1557300

10-8



Legend

300	Point Number
8.00	Subgrade As-Built Elevation
8.05	3/4" Gravel As-Built Elevation
Delta 0.05	Delta (Gravel - Subgrade) Value



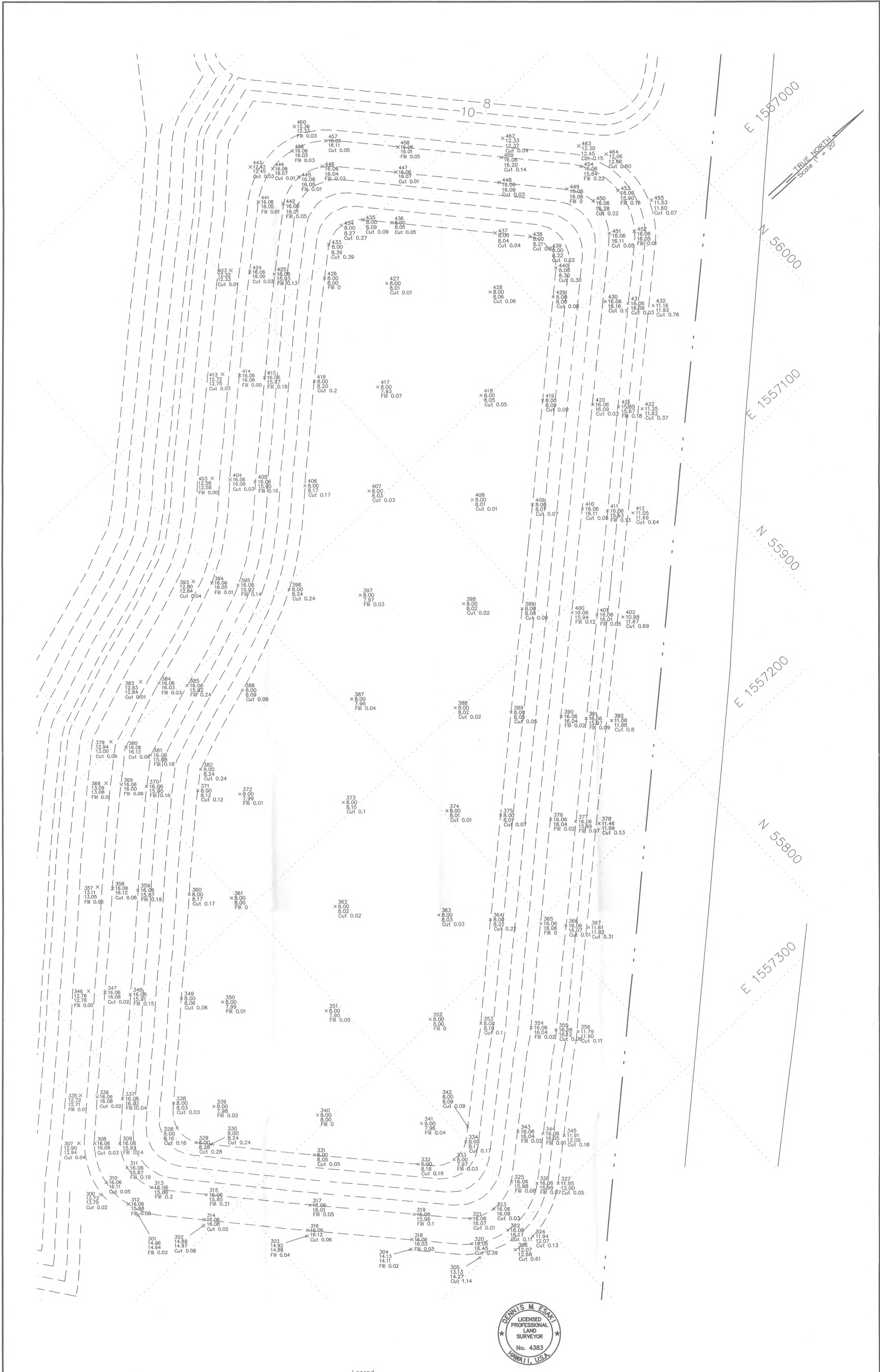
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

*[Signature]*

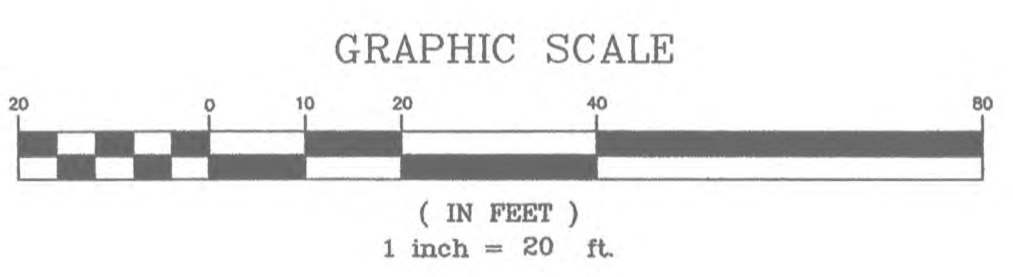
Signature  
ESAKI SURVEYING & MAPPING, INC.  
EXPIRES: APRIL 30, 2012

MAP SHOWING  
LEACHATE EVAPORATION POND TOP OF  
GRANULAR OPERATIONS LAYER ELEVATIONS  
DATES OF SURVEY - APRIL 28, 2010  
MAY 19, 2010  
KEKAHA, KAUAI, HAWAII  
Prepared For: Goodfellow Bros.





TRUE NORTH  
Scale 1" = 20'



Legend  
 300 Point Number  
 8.00 Design Elevation  
 8.05 As-Built Elevation  
 Cut 0.05 Cut/Fill Value



THIS WORK WAS PREPARED BY ME  
 OR UNDER MY SUPERVISION  
 Signature  
 ESAKI SURVEYING & MAPPING, INC.  
 EXPIRES: APRIL 30, 2012

MAP SHOWING  
**NEW LEACHATE EVAPORATION POND SUBBASE ELEVATIONS**  
 DATES OF SURVEY - FEBRUARY 26, 2010  
 MARCH 3, 2010  
 MAY 13, 2010  
 KEKAHA, KAUAI, HAWAII  
 Prepared For: Goodfellow Bros.