APPENDIX I.1
Geotextile

SKAPS INDUSTRIES, INC.

Engineered Synthetic Products, Inc.

GEONET / GEOCOMPOSITE TESTING PROCEDURES

QC Sampling Schedule

All tests are performed every 17,500 square feet of production except for compressibility and melt index, which are tested once per shift (approximately every 250,000 square feet of production). Transmissivity is done on a requested basis.

Weight / Area (ASTM D 5261)

The width is determined by measuring the sample in three places--once across each cut end and once across the center. The three measurements are then averaged and reported in inches. The length is also determined by measuring three places--along both edges and along the center. These values are averaged and reported in inches. Samples are then taken and weighed to the nearest .001 lb/sf. The weight is divided by the average width to obtain a weight per length value. The weight/length number is divided by the average width value to obtain weight per area. The value is reported in lbs/sf.

Thickness (ASTM D 5199)

Five specimens are cut from across the width of the lab sample. A thickness gauge with a ¾ inch presser foot is used to measure the thickness of each specimen. The values are recorded and reported as an average in inches.

Tensile Strength (ASTM D 5035)

Five specimens are cut from across the width of the lab sample. They are then placed in the jaws of the Instron Machine and a load is applied at a constant strain of 12 in/min until yield. The results of the tensile test are then averaged and recorded.

% Carbon Black (ASTM D 1603)

The carbon black test determines the percent by weight of the product that is carbon black. The percent of carbon black is the ratio of the residue weight after pyrolysis in a muffle furnace compared to the weight of input specimen. Two grams of the net are cut and placed in aluminum dishes. The samples are then placed in a muffle furnace for ten minutes at 600

degrees centigrade. The samples are removed and allowed to cool. The carbon black percentage is calculated and recorded.

Ply Adhesion (ASTM F 904)
Five specimens are cut from across the entire width of the composite sample, each measuring one inch wide by ten inches long. The strain rate for the test is 10 in/min. The fabric is clamped in one jaw of the Instron machine while the net is clamped in the other. The fabric is pulled away from the net to test the adhesion of the fabric to the net.

Transmissivity (ASTM D 4716)
The transmissivity test for the composite is identical to the test for the geonet.

Melt Index (ASTM D 1238)
The melt index determines the rate of the extrusion of the molten resin through a die of specified length and diameter at a temperature of 190 degrees centigrade under a load of 2.16 kg and is measured in g/10min. A sample of approximately 2.5 grams of geonet is then put through the melt plastometer to verify flow rates.

Density of Polymer (ASTM D 1505)
Taking samples from the melt index test, small strands are cut and measured in a density column. A mixture of distilled water and isopropyl alcohol is used as the suspension fluid.

Transmissivity (ASTM D 4716)
The transmissivity test measures the inplane flow of water across the net sample. In the standard test, the sample is placed between two steel plates with the water temperature at 20 degrees centigrade. Different gradients and loads are applied to the sample. The values are then calculated and converted to gallons per min/ft, or meters^2/sec. Transmissivity is not a standard manufacturing quality control test but rather a design indicator and is tested on a per project request basis.

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QUALITY CONTROL

PROGRAM OUTLINE

SKAPS Industries
Nonwovens
QUALITY CONTROL
PROGRAM OUTLINE

RAW MATERIAL QUALITY CONTROL

All raw materials used in the manufacturing of SKAPS Nonwoven products are certified by the supplier to meet the most stringent production standards in the industry. Each truckload of fiber received by SKAPS Nonwovens is certified by the resin supplier's Quality Control Manager to meet specifications as set by SKAPS Industries. All fiber released to production can be tracked by supplier and individual bale number for up to one year after the fiber is processed.

DEFINITION OF 'LOT'

A Lot is a planned production quantity satisfying all of the following:

- Manufactured under the same material specification.
- Identified as the same style (fabric designation).
- When tested, having physical characteristics consistent with published values.

QUALITY CONTROL CONFORMANCE SAMPLING OF EACH LOT

As a minimum, a number of production units shall be selected at random from each lot in accordance with TABLE 1.

TABLE 1
Number of Units Selected as Lot Samples
Specification Conformance

Number of Units in Lot	Number of Units Selected
1 to 2	1
3 to 8	2
9 to 27	3
28 to 64	4
65 to 125	5
126 to 216	6
217 to 343	7
344 to 512	8
513 to 729	9
730 to 1000	10
1001 or more	11

Note: A production unit is considered to be a shipment roll.

Typically, the first shipment roll from each line will be sampled. It will be necessary to consider the minimum planned production quantity to determine if more frequent sampling and testing is required.

Quality Control Testing of Each Sample:
Each quality control sample shall be sent to the quality control lab before the end of the shift during which the sample was taken. Full identification of the sampled roll will be provided with the sample.

The following tests are performed on each sample:

TEST PROPERTY	TEST METHOD
Weight	ASTM D 5261
Thickness	ASTM D 5199
Grab Tensile	ASTM D 4632
Grab Elongation	ASTM D 4632
Trapezoid Tear Strength	ASTM D 4533
Puncture Resistance	ASTM D 4833
Mullen Burst Strength	ASTM D 3786
Water Flow Rate	ASTM D 4491
Permeability	ASTM D 4491
Permittivity	ASTM D 4491
U.V. Resistance	ASTM D 4355
Apparent Opening Size (AOS)	ASTM D 4751

Quality Control Test Results:
All quality control test results will be maintained by the Quality Control Manager along with the corresponding shipment roll identification.

The Quality Control Manager will make lot testing summaries available upon request detailing the individual test results and aggregate mean, minimum and standard deviations of each test property for the shipment rolls under consideration.

SKAPS NONWOVENS
QUALITY CONTROL PLAN

The Quality Control Department tests nonwoven fabrics at the following frequencies. The tests for these properties are routine with test results reported representing each roll of fabric produced.

MINIMUM TESTING FREQUENCY IN SQUARE YARDS

PROPERTY	UNITS	TEST METHOD	MINIMUM FREQUENCY SQUARE YARDS
Mass/Unit Area	oz/yd	ASTM D 5261	10,000
Thickness	mils	ASTM D 5199	10,000
Grab Tensile Strength	lbs	ASTM D 4632	10,000
Grab Elongation	%	ASTM D 4632	10,000
Trapezoidal Tear Strength	lbs	ASTM D 4533	15,000
Puncture Strength	lbs	ASTM D 4833	15,000
Mullen Burst	psi	ASTM D 3786	15,000
Apparent Opening Size	U.S. Sieve	ASTM D 4751	65,000
Permittivity	sec^{-1}	ASTM D 4491	65,000
Permeability	cm/sec	ASTM D 4491	65,000
Water Flow	gpm/ft^2	ASTM D 4491	65,000

Additional testing is conducted on non-routine properties in the SKAPS Quality Control Lab or at a reputable independent test lab. Examples of non-routine tests include:

PROPERTY	UNITS	TEST METHOD
Abrasion-Sliding Block	% strength retention	ASTM D 4886
Abrasion-Rotary Platform	lbs	ASTM D 3884
U.V. Resistance-Fluorescent Type	% strength retention	ASTM G 53
U.V. Resistance-Xenon Type	% strength retention	ASTM D 4355
Wide Width	lbs/in	ASTM D 4595

SKAPS conforms and adheres to the following additional ASTM Test Methods relating to fabric identification, sampling and specification conformance:

ASTM D 4873 Identification, Storage and Handling of Geotextiles
ASTM D 4354 Sampling of Geosynthetics for Testing
ASTM D 4759 Determining Specification Conformance of Geosynthetics

SKAPS

CIVIL PRODUCTS

Product	GT131	GT135	GT140	GT142	GT160	GT170	GT180	GT110	GT112	GT116
Square Yard	500/600	500/600	500/600	500/600	500	500	500	500	500	250
Testing Frequency, Number of Rolls										
Mass/Unit Area	20/15	20/15	20/15	20/15	20	20	20	20	20	40
Thickness	20/15	20/15	20/15	20/15	20	20	20	20	20	40
Grab Tensile Strength	20/15	20/15	20/15	20/15	20	20	20	20	20	40
Grab Elongation	20/15	20/15	20/15	20/15	20	20	20	20	20	40
Trapezoidal Tear Strength	30/25	30/25	30/25	30/25	30	30	30	30	30	60
Puncture Strength	30/25	30/25	30/25	30/25	30	30	30	30	30	60
Mullen Burst	30/25	30/25	30/25	30/25	30	30	30	30	30	60
AOS	130	130	130	130	130	130	130	130	130	260
Permittivity	130	130	130	130	130	130	130	130	130	260
Permeability	130	130	130	130	130	130	130	130	130	260
Water Flow	130	130	130	130	130	130	130	130	130	260

ENVIRONMENTAL PRODUCTS

Product	GE140	GE160	GE170	GE180	GE110	GE112	GE114	GE116
Square Yard	2250	1500	1300	1150	950	800	650	600
Testing Frequency, Number of Rolls								
Mass/Unit Area	4	6	7	8	10	12	15	16
Thickness	4	6	7	8	10	12	15	16
Grab Tensile Strength	4	6	7	8	10	12	15	16
Grab Elongation	4	6	7	8	10	12	15	16
Trapezoidal Tear Strength	6	10	11	13	15	18	23	25
Puncture Strength	6	10	11	13	15	18	23	25
Mullen Burst	6	10	11	13	15	18	23	25
AOS	28	43	50	56	68	80	100	108
Permittivity	28	43	50	56	68	80	100	108
Permeability	28	43	50	56	68	80	100	108
Water Flow	28	43	50	56	68	80	100	108

ROUTINE CHECKS

The following checks of SKAPS nonwoven fabrics are routine during manufacturing:

1. Visual inspection – Line Inspector inspects fabric for good selvages, weight verification, correct take-up and needle streaks.

2. Metal Detection - Three metal detectors are positioned on the production line to detect needles or other contaminates. If needles are detected, the line automatically shuts down and needles are located and removed.

Certifications are required on all fiber purchases to control raw material properties. SPC data is required for each shipment.

In SKAPS' SPC system of quality reporting, a request for corrective action is issued resulting from any property failing to meet specification for three sequential occurrences.

This system has been implemented to correct all non-conforming material. It is SKAPS Industries' policy to ship only fabric meeting or exceeding specification. A Quality Report is issued daily summarizing manufacturing production.

APPENDIX I.2
Geotextile Conformance Test

CONFORMANCE TEST RESULTS

CLIENT: RICHARDSON, SMITH, GARDNER & ASSOCIATES INC.
CLIENT PROJ. NO.: IP RIEGELWOOD MILL
CELL 1 SOUTH EXPANSION
PROJECT NO.: L08102-01
LAB ID NO.: L08102-01-02
MATERIAL: GEOTEXTILE
GEOTEXTILE ROLL NO: 2997.03 (SIDE A)
GEOCOMPOSITE ROLL NO.: 299710001

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
GRAB STRENGTH	D 4632	MD-lbs	212.9	148.3	207.7	133.0	145.6	180.3	185.8	166.3	232.8	259.6	**187.2**	**40.92**
		CD-lbs	214.3	216.5	201.5	195.2	204.3	213.0	245.6	173.0	239.5	207.8	**211.1**	**20.80**
GRAB ELONGATION	D 4632	MD-%	90.0	93.3	96.7	90.0	90.0	96.7	93.3	93.3	90.0	96.7	**93.0**	**2.92**
		CD-%	106.7	106.7	96.7	96.7	100.0	100.0	103.3	96.7	96.7	106.7	**101.0**	**4.46**
TRAPEZOIDAL TEAR	D 4533	MD-lbs	81.8	79.9	91.6	74.9	72.4	88.2	100.1	101.1	97.9	116.4	**90.4**	**13.73**
		CD-lbs	119.9	110.3	105.1	108.1	94.8	105.4	100.3	111.6	122.8	119.8	**109.8**	**9.03**
PUNCTURE	D 4833	lbs	159.1	132.6	126.7	146.0	119.3	114.1	115.8	112.8	102.9	110.6		
		lbs	105.2	97.9	96.6	132.8	116.6						**119.3**	**17.56**

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Geotechnics

CONFORMANCE TEST RESULTS

CLIENT: RICHARDSON, SMITH, GARDNER & ASSOCIATES INC.
CLIENT PROJ. NO.: IP RIEGELWOOD MILL
CELL 1 SOUTH EXPANSION
PROJECT NO.: L08102-01
LAB ID NO.: L08102-01-03
MATERIAL: GEOTEXTILE
GEOTEXTILE ROLL NO: 2997.08 (SIDE B)
GEOCOMPOSITE ROLL NO.: 299710001

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
GRAB STRENGTH	D 4632	MD-lbs	290.9	179.4	185.2	176.5	165.6	152.2	177.5	175.5	179.8	213.5	**189.6**	**38.79**
		CD-lbs	246.7	249.8	220.3	222.5	247.5	220.1	228.8	235.9	221.1	176.0	**226.9**	**21.50**
GRAB ELONGATION	D 4632	MD-%	100.0	83.3	90.0	96.7	90.0	93.3	96.7	100.0	93.3	86.7	**93.0**	**5.54**
		CD-%	100.0	105.3	100.0	103.3	96.7	100.0	106.7	103.3	103.3	113.3	**103.2**	**4.63**
TRAPEZOIDAL TEAR	D 4533	MD-lbs	100.7	81.3	97.2	95.1	90.1	101.3	85.6	89.6	89.2	126.8	**95.7**	**12.68**
		CD-lbs	120.0	100.7	101.6	101.9	111.4	118.2	101.4	107.6	101.7	112.9	**107.7**	**7.44**
PUNCTURE	D 4833	lbs	144.7	135.6	150.9	130.7	92.6	94.3	91.8	116.9	92.0	90.2		
		lbs	106.8	82.2	80.2	85.3	96.4						**106.0**	**23.66**

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