C&S COMPANIES
ENGINEERS
DESIGN BUILD
TECHNICAL RESOURCES
OPERATIONS

C&S Engineers, Inc.
499 Col. Eileen Collins Boulevard
Syracuse, NY 13212
phone 315-455-2000
fax 315-455-9667
www.cscos.com

October 3, 2005

Mr. David M. Donoghue, P.E.
Deputy Commissioner
Broome County DPW
P.O. Box 1766
Binghamton, New York 13902

Re: Colesville Landfill Settlement Remediation Investigation Report

File: 157.020.001

Dear Mr. Donoghue:

C&S Engineers, Inc., recently completed a field investigation of the depressed area of the closed Colesville Landfill. The investigation was performed on August 10, 2005, and was conducted consistent with the remedial program outlined in our July 7, 2005 letter to you. This letter documents the results of the investigation.

During the investigation, the geomembrane liner of the landfill cap was exposed in six locations in the depressed area, and one location outside of the depressed area for comparison (baseline) analysis (see Attachment A for a site plan of the investigative locations). The exposed liner at each location was visually inspected for signs of damage or stress. Of the six inspection locations in the depressed area, three locations were selected for liner sampling and laboratory analysis. This analysis included material thickness, tensile strength, tensile elongation, and notched constant load testing. A sample from the baseline location was also obtained for the same laboratory analysis. After the field samples were extracted, the sample locations were repaired with new 40 mil thick Linear Low Density Polyethylene (LLDPE) liner material and the repairs were tested with a vacuum box for quality assurance. All inspection locations were backfilled with existing site material at the completion of the investigation. The results of the laboratory analyses are included in Attachment B. Photographs of the investigative program are included in Attachment C.

From this investigation, our observations are as follows:

a) The exposed liner in all seven locations appeared relaxed, and laid flat on the subgrade surface. There were no apparent signs of stress or tension, and no signs of undue wear or damage observed.

b) At locations COLE-2, COLE-3, and COLE-5 (locations surrounding the basin of the depressed area) standing water was observed in the sand layer above the liner.

c) From the measured depths of the various soil layers observed during the excavations, it appears that 12 to 18 inches of supplemental fill had previously been placed in the vicinity of the depressed area.

d) While obtaining the samples for laboratory analysis, no stress was observed on the liner at any of the sample locations during the cutting of the liner.

e) Upon reviewing the laboratory test results, it appears that no significant degradation of strength or thickness characteristics of the liner has occurred since the liner was installed in 1995.

From the results of this investigation, considering the visual observations and the laboratory test results, it is our opinion that the in-place liner is not under excessive stress due to the differential settlement that has occurred at the landfill. We do not believe that modifications to the geomembrane liner are warranted at this time. C&S recommends that the depressed area be filled with a silt-based soil, such as a sandy silt or a clayey silt, to provide positive surface water drainage to the south property line; and then topsoiled and seeded to re-establish vegetative growth.

I will be glad to discuss this matter with you in more detail at your convenience. In the meantime, if you have any questions, please don't hesitate to contact me.

Very truly yours,

C&S ENGINEERS, INC.

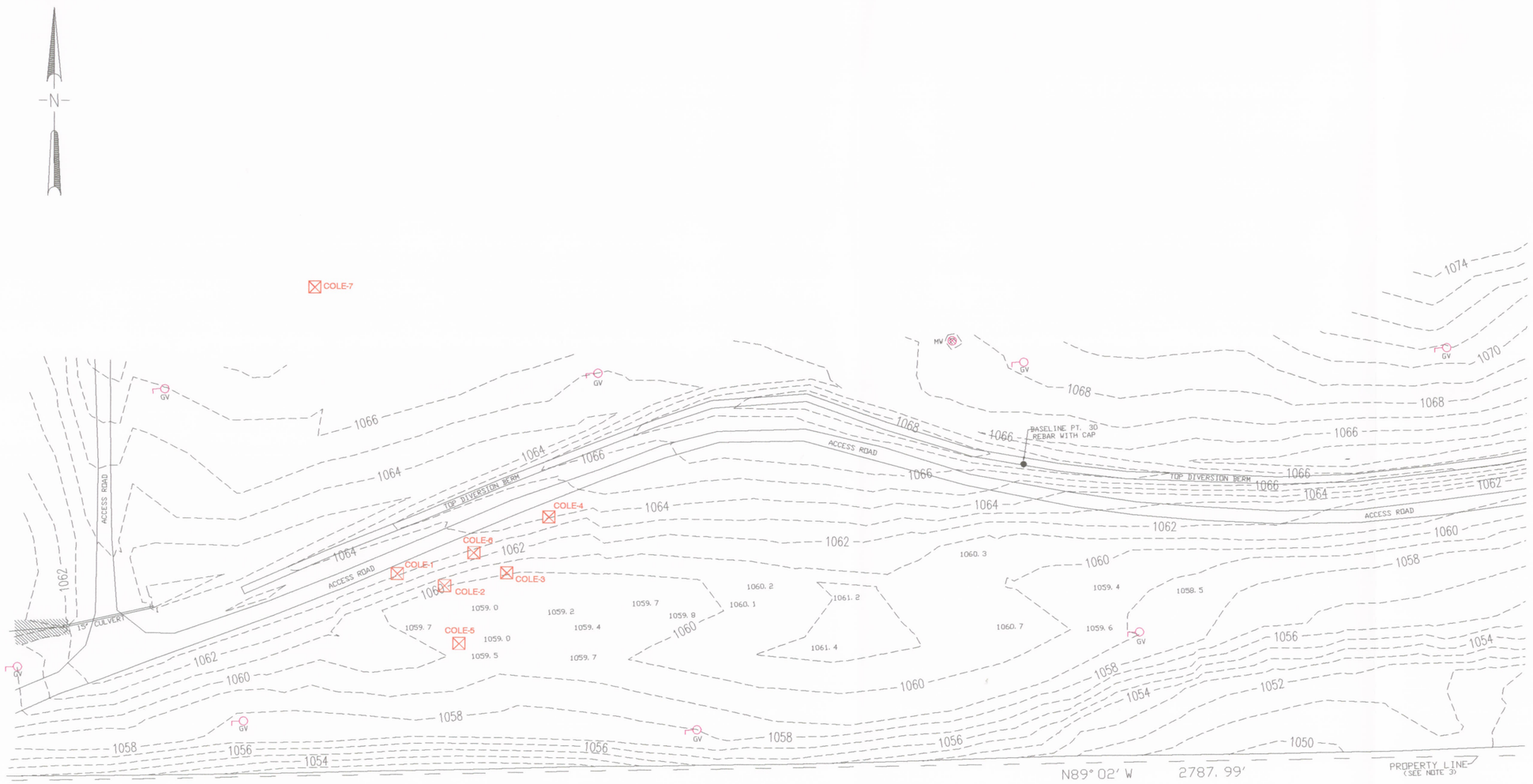
Larry Celeste

Lawrence M. Celeste, P.E.
Sr. Project Engineer

/lmc

Attachment

Attachment A



LEGEND

GV - GAS VENT

COLE-4 - SETTLEMENT INVESTIGATION LOCATION (TYP. 7)

- RIP RAP

80' 40' 0 80'

C&S ENGINEERS, INC.

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Syracuse, New York 13212
Phone 315-455-2000
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www.cscos.com

COLESVILLE LANDFILL
SETTLEMENT
SEPTEMBER 2005

MARK	DATE	DESCRIPTION
		REVISIONS
PROJECT NO:		157.020.001
DATE:		9-29-05
SCALE:		AS SHOWN
DRAWN BY:		
DESIGNED BY:		
CHECKED BY:		L. CELESTE

GENERAL

SITE PLAN OF INVESTIGATION LOCATIONS

ATTACHMENT A

Sep 29, 2005 - 10:34am
F:\Project\157 - BROOME COUNTY\157020001\cad\157020001\COLEFILL04(REV-9-29-05).dwg

Attachment B

COLESVILLE LANDFILL
SETTLEMENT INVESTIGATION

			Field Samples			
	Project Specification Minimum Properties	Manufacturer's Minimum Average Values	COLE - 7 (Baseline Sample)	COLE - 1	COLE - 4	COLE - 6
Thickness (mils)	36	36	40	40	40	37
Tensile Strength at Break (lbs./in - width)	128	144	223	203	158	181
Tensile Elongation at Break (%)	625	950	1,209	1,144	780	935
Notched Constant Load Test	N/A	> 300 hours	> 300 hours	> 300 hours	> 300 hours	> 300 hours

Precision Geosynthetic Laboratories

September 26, 2005

Larry M. Celeste
C & S ENGINEERS, INC.
499 Col. Eileen Collins Boulevard
Syracuse, NY 13212

Dear Mr. Celeste: RE: ***Colesville Landfill***

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of four (4) 40mil Smooth VLDPE Geosynthetic liner sample(s) received August 12, 2005.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, 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 test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information shall be held in confidence, not to be reproduced except in full and disclosed to other parties with the authorization of the client.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Maria Espitia
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. G050890)

Precision Geosynthetic Laboratories

CLIENT: *C & S ENGINEERS, INC.*
PROJECT: Colesville Landfill

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G050890)

MATERIAL DESCRIPTION: 40mil Smooth VLDPE Geosynthetic liner

SAMPLES SENT BY: M. Goodeve, C & S Engineers, Inc.

DATE RECEIVED: August 12, 2005 **DATE REPORTED:** September 26, 2005

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
COLE-1	13622
COLE-4	13623
COLE-6	13624
COLE-7	13625

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D5199	Thickness
ASTM D638	Tensile Strength
ASTM D5397	NTCL (300hrs)

TEST CONDITIONS: The samples were conditioned for a minimum one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

TEST RESULTS:

The test results are summarized in Table(s) 1 to 4. The units in which the data are reported are included on these tables.

PRECISION GEOSYNTHETIC LABORATORIES

Maria Espitia
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax# 714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: C & S ENGINEERS, INC.

PROJECT: COLESVILLE LANDFILL

Date Received: **8/12/2005**
Date Reported: **9/26/2005**
Client Sample ID: **COLE -1**
Material Description: **VLDPE Geosynthetic liner**

QC'd By: _____
PGL Job No.: **G050890**
PGL Control No.: **13622**

		SPECIMENS													Proj.
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Specs.
METHOD	**DESCRIPTION**															
ASTM D5199	Thickness (mils)															
	Apparatus:Dead weight dial Micrometer with 6.35 mm (0.250 in) dia presser foot and a pressure of 43.10 kPA (6.25 psi) provided by a 142 gm weight. Loading time: 5 sec Specimen Size 4 sq in.															
		40	**40**	**40**	**41**	**40**	**40**	**40**	**41**	**40**	**41**	**40**	**1**	**40**	**41**	
ASTM D638 Type IV	Tensile Properties:															
	Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2^0 C (73.4+/-3.6^0 F, and 50+/-5% relative humidity. Rate of Separation: 2"/min (HDPE) 20"/min (VLDPE/LLDPE)															
	Tensile Strength at Break (lbs/ in.- width)															
	MD	**217**	**176**	**206**	**222**	**208**						**206**	**18**	**176**	**222**	
	TD	**212**	**180**	**205**	**199**	**221**						**203**	**16**	**180**	**221**	
	Elongation at Break (percent) *Gauge Length = 2.0 in. (GRI-GM13 Mod)*															
	MD	**1,225**	**949**	**1,157**	**1,208**	**1,182**						**1,144**	**112**	**949**	**1225**	
	TD	**1,238**	**1,063**	**1,209**	**1,206**	**1,299**						**1,203**	**87**	**1063**	**1299**	
ASTM D5397	Notched Constant Tensile Load (300 hours)**															
		>300	**>300**	**>300**	**>300**	**>300**						***>300***	N/A	N/A	N/A	

*** Sub To Sageos*
MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1987 Record #268

TABLE 2.

MATERIAL PROPERTIES

CLIENT: C & S ENGINEERS, INC.

PROJECT: COLESVILLE LANDFILL

Date Received: **8/12/2005**
Date Reported: **9/26/2005**
Client Sample ID: **COLE-4**
Material Description: **VLDPE Geosynthetic liner**

QC'd By: _____
PGL Job No.: **G050890**
PGL Control No.: **13623**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs.
ASTM D5199	Thickness (mils)															
	Apparatus:Dead weight dial Micrometer with 6.35 mm (0.250 in) dia presser foot and a pressure of 43.10 kPA (6.25 psi) provided by a 142 gm weight. Loading time: 5 sec Specimen Size 4 sq in.															
		40	**42**	**42**	**40**	**40**	**39**	**39**	**38**	**40**	**38**	**40**	**1**	**38**	**42**	
ASTM D638 Type IV	Tensile Properties:															
	Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2^0 C (73.4+/-3.6^0 F, and 50+/-5% relative humidity. Rate of Separation: 2"/min (HDPE) 20"/min (VLDPE/LLDPE)															
	Tensile Strength at Break (lbs/ in.- width)															
	MD	**136**	**200**	**187**	**118**	**150**						**158**	**34**	**118**	**200**	
	TD	**205**	**208**	**229**	**230**	**227**						**220**	**12**	**205**	**230**	
	Elongation at Break (percent) *Gauge Length = 2.0 in. (GRI-GM13 Mod)*															
	MD	**673**	**976**	**901**	**590**	**760**						**780**	**159**	**590**	**976**	
	TD	**1,175**	**1,193**	**1,266**	**1,281**	**1,257**						**1,234**	**47**	**1175**	**1281**	
ASTM D5397	Notched Constant Tensile Load (300 hours)**															
		>300	**>300**	**>300**	**>300**	**>300**						***>300***	N/A	N/A	N/A	

*** Sub To Sageos*
MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1987 Record #268

TABLE 3.

MATERIAL PROPERTIES

CLIENT: C & S ENGINEERS, INC.

PROJECT: COLESVILLE LANDFILL

Date Received: **8/12/2005**
Date Reported: **9/26/2005**
Client Sample ID: **COLE-6**
Material Description: **VLDPE Geosynthetic liner**

QC'd By: _____
PGL Job No.: **G050890**
PGL Control No.: **13624**

		SPECIMENS													Proj.
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Specs.
METHOD	**DESCRIPTION**															
ASTM D5199	Thickness (mils)															
	Apparatus:Dead weight dial Micrometer with 6.35 mm (0.250 in) dia presser foot and a pressure of 43.10 kPA (6.25 psi) provided by a 142 gm weight. Loading time: 5 sec Specimen Size 4 sq in.															
		37	**37**	**37**	**37**	**37**	**37**	**37**	**37**	**37**	**37**	**37**	**0**	**37**	**37**	
ASTM D638 Type IV	Tensile Properties:															
	Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2^0 C (73.4+/-3.6^0 F, and 50+/-5% relative humidity. Rate of Separation: 2"/min (HDPE) 20"/min (VLDPE/LLDPE)															
	Tensile Strength at Break (lbs/ in.- width)															
	MD	**170**	**162**	**174**	**204**	**194**						**181**	**17**	**162**	**204**	
	TD	**173**	**127**	**154**	**356**	**171**						**196**	**91**	**127**	**356**	
	Elongation at Break (percent) *Gauge Length = 2.0 in. (GRI-GM13 Mod)*															
	MD	**1,084**	**985**	**1,122**	**1,227**	**1,188**						**1,121**	**94**	**985**	**1227**	
	TD	**1,139**	**745**	**951**	**701**	**1,138**						**935**	**209**	**701**	**1139**	
ASTM D5397	Notched Constant Tensile Load (300 hours)**															
		>300	**>300**	**>300**	**>300**	**>300**						***>300***	N/A	N/A	N/A	

*** Sub To Sageos*
MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1987 Record #268

TABLE 4.

MATERIAL PROPERTIES

CLIENT: C & S ENGINEERS, INC.

PROJECT: COLESVILLE LANDFILL

Date Received: **8/12/2005**
Date Reported: **9/26/2005**
Client Sample ID: **COLE-7**
Material Description: **VLDPE Geosynthetic liner**

QC'd By: _____
PGL Job No.: **G050890**
PGL Control No.: **13625**

		SPECIMENS													Proj.
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Specs.
METHOD	**DESCRIPTION**															
ASTM D5199	Thickness (mils)															
	Apparatus:Dead weight dial Micrometer with 6.35 mm (0.250 in) dia presser foot and a pressure of 43.10 kPA (6.25 psi) provided by a 142 gm weight. Loading time: 5 sec Specimen Size 4 sq in.															
		42	**39**	**39**	**39**	**39**	**40**	**40**	**40**	**41**	**40**	**40**	**1**	**39**	**42**	
ASTM D638 Type IV	Tensile Properties:															
	Test Specimens: Type IV, Width of narrow section:0.25in, Length of narrow section:1.3in, Width Overall:0.75in, Length Overall: 4.5in Conditioning: Conducted test in standard laboratory atmosphere of 23+/-2^0 C (73.4+/-3.6^0 F, and 50+/-5% relative humidity. Rate of Separation: 2"/min (HDPE) 20"/min (VLDPE/LLDPE)															
	Tensile Strength at Break (lbs/ in.- width)															
	MD	**226**	**233**	**233**	**195**	**226**						**223**	**16**	**195**	**233**	
	TD	**227**	**228**	**230**	**225**	**233**						**229**	**3**	**225**	**233**	
	Elongation at Break (percent) *Gauge Length = 2.0 in. (GRI-GM13 Mod)*															
	MD	**1,181**	**1,241**	**1,279**	**1,115**	**1,230**						**1,209**	**63**	**1115**	**1279**	
	TD	**1,232**	**1,266**	**1,297**	**1,297**	**1,316**						**1,281**	**33**	**1232**	**1316**	
ASTM D5397	Notched Constant Tensile Load (300 hours)**															
		>300	**>300**	**>300**	**>300**	**>300**						***>300***	N/A	N/A	N/A	

*** Sub To Sageos*
MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1987 Record #268

Attachment C

COLE-1 Investigation Location
Liner Exposed

COLE-1 Investigation Location
Sample Preparation

COLE-2 Investigation Location
Standing Water in Drainage Layer Above Liner

COLE-4 Investigation Location
Liner Exposed

COLE-4 Investigation Location
Liner Repair Welding

COLE-4 Investigation Location
Liner Repair

COLE-4 Investigation Location
Liner Repair Vacuum Box QA Test

Backfilled Test Pits