URS

344004

May 6, 2003

Edward T. Dzurinko
Town of Ramapo
Department of Public Works
Pioneer Avenue
Tallman, New York 10982-0446

Re: Ramapo Landfill
Investigation of Geomembrane Liner Integrity

Dear Mr. Dzurinko:

Attached please find the soil gas survey report. This reports presents the findings from geomembrane liner investigation at the Ramapo Landfill which was conducted by URS Corporation on April 22 and 23, 2003.

Please feel free to call me with any questions or comments.

Sincerely,

URS Corporation

James Lanzo
Project Manager

cc: J. Schreyer, NYSDEC
J. Wokasien, URS
B. Steils, URS
File: 11173027 (C-1)

Attachments:

URS Soil Gas Survey Report – Ramapo Landfill

URS Corporation
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Buffalo, NY 14202-1805
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SOIL GAS SURVEY REPORT

RAMAPO LANDFILL

APRIL 2003

Background

On April 22 and 23, 2003, URS conducted a soil gas survey on a portion of the North Lobe of the Ramapo Landfill. This survey was performed to determine if there is any evidence of landfill gases present above the geomembrane liner in the area where damage to the liner was reported in July 2000. This survey was conducted in a manner consistent with that described in the "Soil Gas Survey Procedure for Locating Damaged Liner at the Ramapo Landfill" document (Attachment 1) which was distributed to NYSDEC and USEPA on April 3, 2003.

Findings

Soil gas data was collected in three types of areas. The specific locations were selected by the URS Resident Engineer, who was on-site during the landfill remediation and the subsequent stormwater controls improvement phases of the project, with input from senior Town of Ramapo staff. The survey team included an environmental technician and a civil engineering technician. The locations where soil gas data was collected are shown on Figures 1 and 2.

1. **Background Area** – The selected area is located away from the suspect area and was used to establish baseline soil gas concentrations. A 60' x 60' grid with 30' spacing intervals (9 test locations) was established. Samples were collected at the nodes and are identified by the use of letters in the north-south direction and numbers in the east-west direction, forming a matrix from A1' to C3'. The background area was located near two active landfill gas wells. This location was surveyed on April 22. The results are presented on the attached Background Area table, Table 1.

2. Suspect Area – The suspect area was identified based on the July 2000 descriptions and conversations with project personnel. The tested area was a 40' x 60' grid with 10' intervals (35 test locations at the nodes). The locations were identified by letters in the north-south direction and numbers in the east-west direction, forming a matrix from A'1 to G'5. During testing in the suspect area, which was completed on April 22, there were no signs of elevated soil gas readings. The data is presented on the attached Suspect Area table, Table 2.

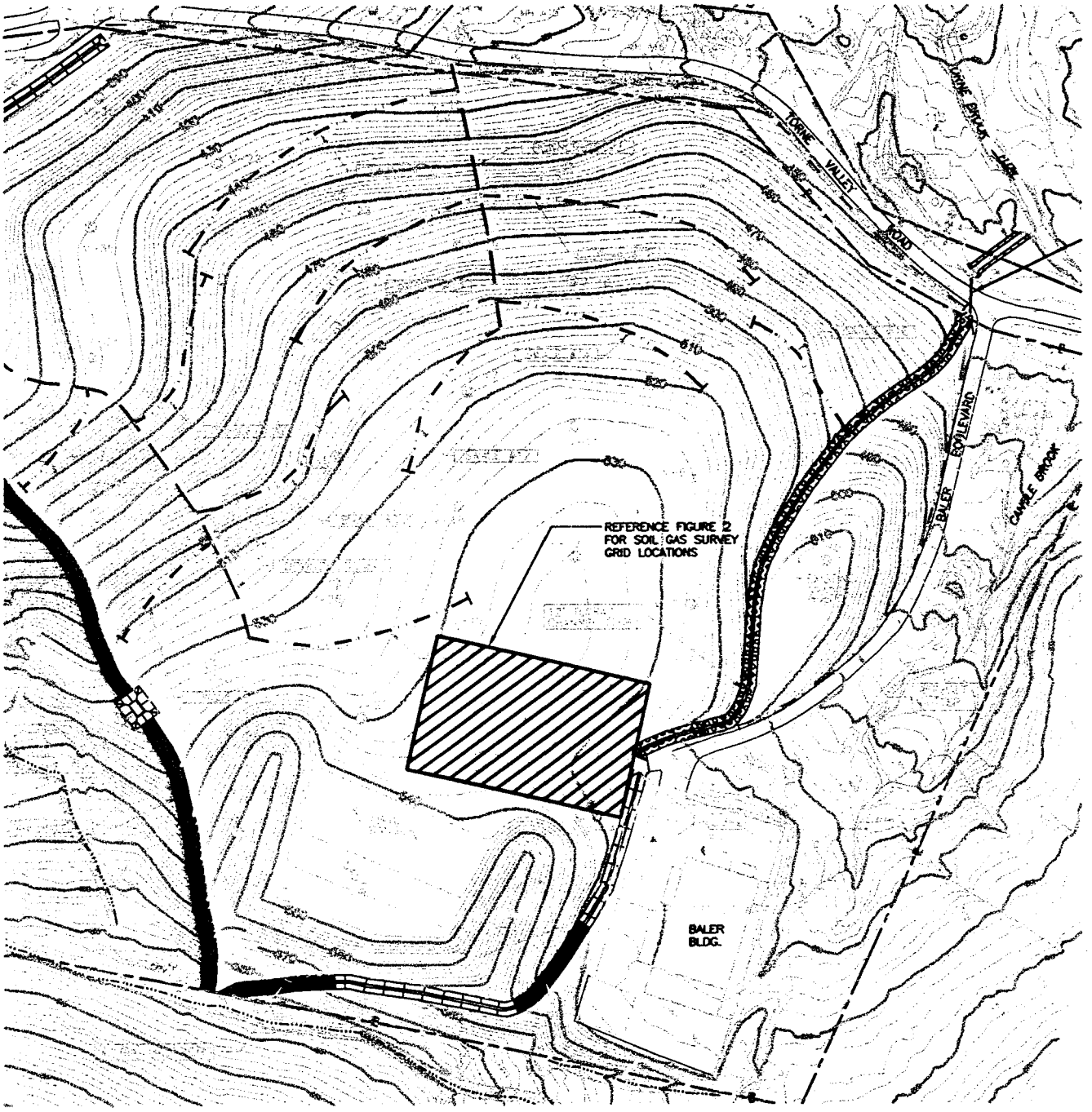
3. **General Test Area** – To provide further verification as to the possible presence of landfill gases above the geomembrane liner, a 120' x 210' grid with 30' intervals (34 test locations at the nodes) was surveyed. This area encircled the Suspect Area. The locations were identified by letters in the north-south direction and numbers in the east-west direction, forming a matrix from A1 to E8. During testing in this general area, which occurred on April 23, there were no sign of elevated soil gas readings. The data from this survey is presented on the attached General Area table, Table 3.

Miscellaneous

- Survey lath was used to mark the corners of the background and general areas in the field, with white and red spray paint used to identify all other test location points. These test locations were located at the measured locations described above.
- Readings were taken and recorded at each location for methane, oxygen, carbon dioxide and air (barometric) pressure.
- No elevated methane gas readings were observed at any of the sampling locations.
- All readings were collected using a pre-calibrated LandTec GA90 Gas Analyzer. Methane sensitivity was confirmed, each sampling day, by briefly placing the instrument downwind of a landfill gas vent.
- Tools used during this soil gas survey included: portable powered drill and two rechargeable battery packs (the battery packs were recharged regularly at the Town of Ramapo pistol range trailer which is located on-site); spare drill bits; tape measure and walk tape; slam bar; and hammer drill.
- Documentary photographs were collected with a disposable camera; one set of photos are available with the Town and one set is on file at URS.

Conclusion

Based on the findings, the geomembrane cap is performing to the design standards in the area of concern.



200' 0 200'

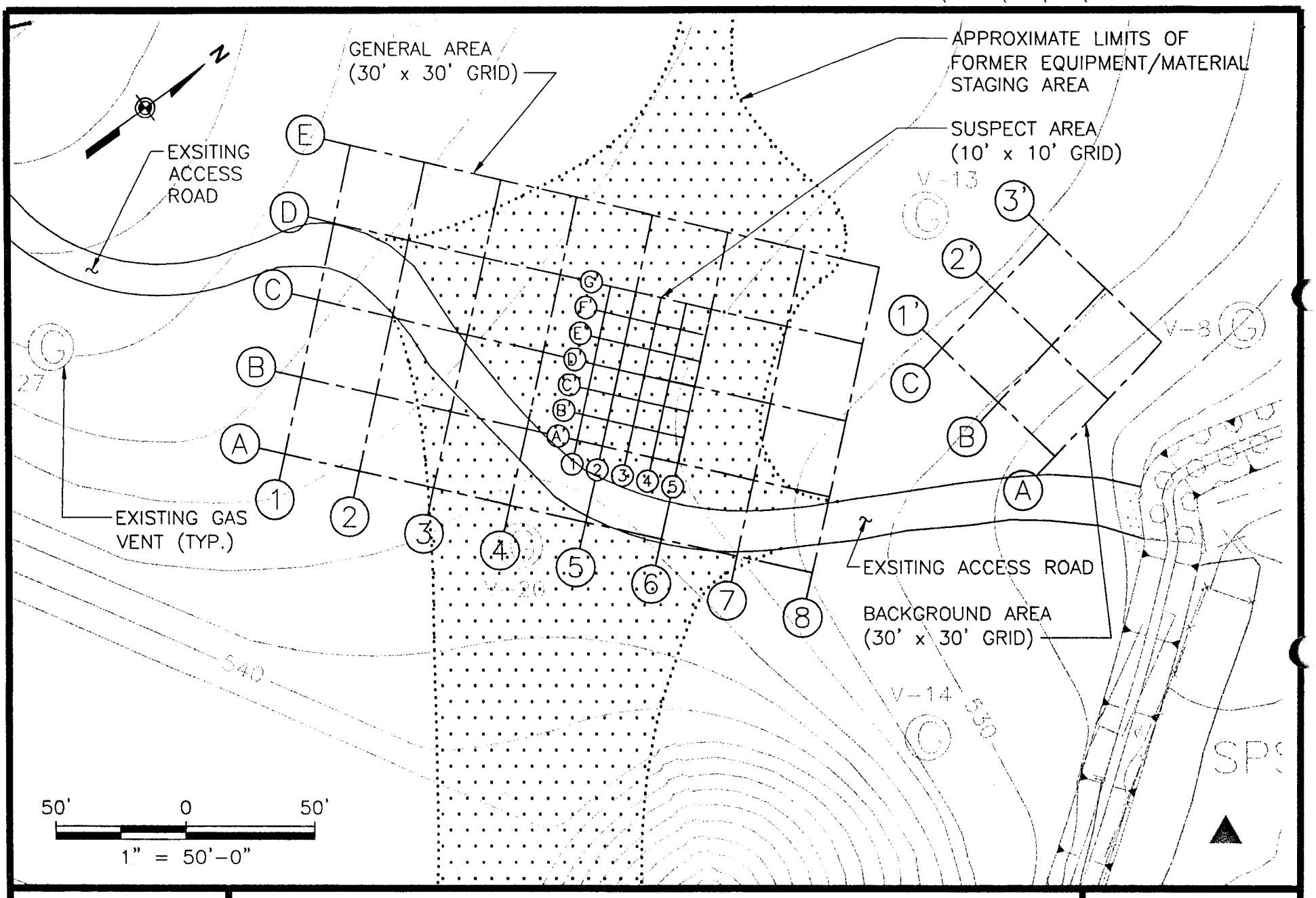
1" = 200'-0"

URS	RAMPO LANDFILL SITE LOCATION MAP	FIGURE 1

L:\35704\CAD\100\EC-4062A-FIG-1.DWG

L:\35704\CAD\100\EC-4062A-FIG-1.dwg, Layout1, 05/06/03 03:24:09 PM

L:\35704\CAD\100\EC-4075A-NEW-GRID.DWG



URS

RAMPO LANDFILL
SOIL GAS SURVEY GRID AREAS

FIGURE 2

L:\35704\CAD\100\ec-4075A-new-grid.dwg, FIGURE 1, 05/06/03 03:22:54 PM

Date:	4/22/03
Weather:	Sunny
Temp:	57^0
Eng/Tech:	Cofield/ Gorzynski

URS Buffalo

Buffalo, New York

BACKGROUND AREA

TABLE 1

Test Location	Methane (%)	Oxygen (%)	Carbon Dioxide (%)	Air Pressure (in. of Hg)	Time Data Taken
A1'	0	20.8	0	28.9	3:45 PM
A2'	0	20.8	0	28.9	3:57 PM
A3'	0	20.7	0	28.9	3:55 PM
Test Location	**Methane (%)**	**Oxygen (%)**	**Carbon Dioxide (%)**	**Air Pressure (in. of Hg)**	**Time Data Taken**
B1'	0	20.8	0	28.9	3:45 PM
B2'	0	20.7	0	28.9	3:59 PM
B3'	0	20.7	0	28.9	3:50 PM
Test Location	**Methane (%)**	**Oxygen (%)**	**Carbon Dioxide (%)**	**Air Pressure (in. of Hg)**	**Time Data Taken**
C1'	0	20.8	0	28.9	3:48 PM
C2'	0	20.8	0	28.9	3:49 PM
C3'	0	20.8	0	28.9	3:50 PM

Date:	4/22/03
Weather:	Cloudy
Temp:	57°
Eng/Tech:	Cofield/ Gorzynski

SUSPECT AREA

TABLE 2

URS Buffalo

Buffalo, New York

Test Location	Methane	Oxygen	Carbon Dioxide	Air Pressure	Time Data Taken
A'1	0	20.8	0	28.9	4:15 PM
A'2	0	20.7	0.1	28.9	4:12 PM
A'3	0	20.7	0	28.9	4:10 PM
A'4	0	20.7	0	28.9	4:07 PM
A'5	0	20.6	0	28.9	4:05 PM
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Time Data Taken**
B'1	0	20.7	0	28.9	4:15 PM
B'2	0	20.9	0	28.9	4:17 PM
B'3	0	20.9	0	28.9	4:18 PM
B'4	0	20.8	0	28.9	4:20 PM
B'5	0	20.8	0	28.9	4:21 PM
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Time Data Taken**
C'1	0	20.9	0	28.9	4:28 PM
C'2	0	20.8	0	28.9	4:27 PM
C'3	0	20.8	0	28.9	4:25 PM
C'4	0	20.7	0	28.9	4:24 PM
C'5	0	20.7	0	28.9	4:23 PM
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Time Data Taken**
D'1	0	20.8	0	28.9	4:30 PM
D'2	0	20.8	0	28.9	4:32 PM
D'3	0	20.8	0	28.9	4:32 PM
D'4	0	20.8	0	28.9	4:33 PM
D'5	0	20.8	0	28.9	4:34 PM
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Time Data Taken**
E'1	0	20.9	0	28.9	4:39 PM
E'2	0	20.9	0	28.9	4:38 PM
E'3	0	20.8	0	28.9	4:37 PM
E'4	0	20.8	0	28.9	4:36 PM
E'5	0	20.8	0.3	28.9	4:35 PM
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Time Data Taken**
F'1	0	21	0	28.9	4:40 PM
F'2	0	20.9	0	28.9	4:42 PM
F'3	0	20.9	0	28.9	4:43 PM
F'4	0	21	0	28.9	4:44 PM
F'5	0	20.8	0	28.9	5:02 PM
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Time Data Taken**
G'1	0	20.9	0	28.9	5:08 PM
G'2	0	20.9	0	28.9	5:07 PM
G'3	0	20.9	0	28.9	5:06 PM
G'4	0	20.9	0	28.9	5:05 PM
G'5	0	20.9	0	28.9	5:04 PM

Date:	4/23/03
Weather:	Cloudy
Temp:	42°
Eng/Tech:	Cofield/ Gorzynski

GENERAL AREA

TABLE 3

URS Buffalo

Buffalo, New York

Test Location	Methane (%)	Oxygen (%)	Carbon Dioxide (%)	Air Pressure (in. of Hg)	Time Data Taken
A1	0	20.8	0	29.1	7:55 AM
A2	0	20.9	0	29.1	8:12 AM
A3	0	20.6	0	29.1	8:13 AM
A4	0	20.9	0	29.1	8:27 AM
A5	0	20.8	0	29.1	8:28 AM
A6	0	20.8	0	29.1	8:31 AM
A7	0	20.6	0	29.1	8:33 AM
A8	0	20.9	0	29.1	8:47 AM
Test Location	**Methane (%)**	**Oxygen (%)**	**Carbon Dioxide (%)**	**Air Pressure (in. of Hg)**	**Time Data Taken**
B1	0	20.8	0	29.1	7:59 AM
B2	0	21.1	0	29.1	8:07 AM
B3	0	21	0	29.1	8:15 AM
B4	0	20.9	0	29.1	8:26 AM
B5	SEE	SUSPECT	AREA	FORM	
B6	SEE	SUSPECT	AREA	FORM	
B7	0	20.8	0	29.1	8:35 AM
B8	0	20.7	0	29.1	8:46 AM
Test Location	**Methane (%)**	**Oxygen (%)**	**Carbon Dioxide (%)**	**Air Pressure (in. of Hg)**	**Time Data Taken**
C1	0	21.2	0	28.7	8:03 AM
C2	0	21.2	0	28.7	8:05 AM
C3	0	21.1	0	29.1	8:16 AM
C4	0	20.9	0	29.1	8:25 AM
C5	SEE	SUSPECT	AREA	FORM	
C6	SEE	SUSPECT	AREA	FORM	
C7	0	20.8	0	29.1	8:36 AM
C8	0	20.7	0	29.1	8:45 AM
Test Location	**Methane (%)**	**Oxygen (%)**	**Carbon Dioxide (%)**	**Air Pressure (in. of Hg)**	**Time Data Taken**
D1	0	21.2	0	28.7	8:05 AM
D2	0	21.2	0	28.7	8:08 AM
D3	0	21	0	29.1	8:20 AM
D4	0	20.9	0	29.1	8:23 AM
D5	SEE	SUSPECT	AREA	FORM	
D6	SEE	SUSPECT	AREA	FORM	
D7	0	20.6	0	29.1	8:39 AM
D8	0	20.9	0	29.1	8:44 AM
Test Location	**Methane (%)**	**Oxygen (%)**	**Carbon Dioxide (%)**	**Air Pressure (in. of Hg)**	**Time Data Taken**
E1	0	21.2	0	28.7	8:07 AM
E2	0	21.2	0	28.7	8:09 AM
E3	0	21	0	29.1	8:21 AM
E4	0	20.9	0	29.1	8:22 AM
E5	0	20.8	0	29.1	8:30 AM
E6	0	20.6	0	29.1	8:32 AM
E7	0	20.6	0	29.1	8:40 AM
E8	0	20.8	0	29.1	8:42 AM

ATTACHMENT 1

SOIL GAS SURVEY PROCEDURE FOR LOCATING DAMAGED LINER AT THE RAMAPO LANDFILL

1.0 Purpose

In July 2000, shortly after beginning work on the Surface Water Controls Improvement project at the Ramapo Landfill, the contractor (PT&L) damaged the landfill's geomembrane liner. The damage occurred when a backhoe inadvertently scraped the liner during site preparation activities on the north lobe of the landfill. Several small holes were reportedly punctured through the liner and the damage was not repaired or surveyed by PT&L prior to the placement of final landfill cap materials. The purpose of the soil gas survey is to locate any holes which are actively venting and could be allowing water to seep into the landfill.

2.0 Soil Gas Survey Area

URS proposes to conduct a soil gas survey as described below to locate the damaged area.

1. The area where the soil gas survey will take place will be outlined by senior Town of Ramapo and URS personnel based on their knowledge of the events that resulted in the damage.

2. A 60' x 60' **Background Area** shall be established on the north lobe, west of the former construction trailer location, to obtain baseline soil gas concentrations. This grid will contain 30' intervals providing 9 test locations. Test locations shall be identified by letters in the north-south direction and numbers in the east-west direction, forming a matrix from A1 to C3 (see Soil Gas Survey Drawing 1). The background area shall also be located near an active landfill well. Soil gas readings will be measured at each grid node (intersection) using a Lantec Landfill Gas Monitor (LGM). The LGM measures methane, oxygen, carbon dioxide and air pressure.

3. **Suspect Area** – In July 2000, URS Resident Engineer Romulus Celan noted liner damage from PT&L construction activities in preparation of the laydown/staging area. URS field notes indicate the damage may have included some tears in the geomembrane. Based on these notes and subsequent conversations with Mr. Celan, the suspected tears are near the location of PT&L's former screening operation. A 60' x 60' region around the suspect area shall be tested at 10' intervals (49 test locations).

4. A 300' x 300' **General Area** (around and including the suspect area) shall be established and contain 30' intervals (112 additional test locations). The locations shall be identified by letters in the north-south direction and numbers in the east-west direction, forming a matrix from A1 to K11 (see Soil Gas Drawing 1). Test locations near any area showing elevated soil gas readings may be broken down further to 10' intervals if deemed necessary.

5. Survey lath shall be used to mark the corners of the three grids in the field, with orange paint used to identify all other test location points.

6. Readings taken for methane, oxygen, carbon dioxide and air pressure at each location shall be recorded on the attached "SOIL GAS READINGS" form.

7. Locations where methane readings are significantly elevated above background levels shall be marked out with orange paint and #4 rebar.

3.0 Soil Gas Survey Measurement Procedures

Subsequent to the July 2000 event that caused the damage, much of the area where the liner may have been damaged was covered with crushed stone. As a result, URS proposes to use two slightly different methods for obtaining soil gas readings based on the cover system. The two methods are described below.

- **Topsoil as top layer** – In these areas, the cover material is generally 18 inches thick. A ½-inch diameter hole will be drilled to a depth of approximately 9 inches using a portable hand drill. A soil vapor probe will be immediately inserted into the drilled hole and the LGM will be connected to the soil vapor probe using vinyl tubing. Soil gas will pass through the LGM for one minute and both the peak and average methane, oxygen, and carbon dioxide readings will be recorded.

- **Crushed stone as the top layer** – In these areas, the cover material is also generally 18 inches thick, but the top 6-to-8 inches consists of crushed stone. A ½-inch diameter hole will be drilled to a depth of approximately 4 inches using a portable hand drill. A soil vapor probe will be immediately inserted into the drilled hole and the LGM will be connected to the soil vapor probe using vinyl tubing. Soil gas will pass through the LGM for one minute and both the peak and average methane, oxygen, and carbon dioxide readings will be recorded.

4.0 Liner Repair Procedures

Any area found to have elevated soil gas readings will be subjected to physical inspection of the liner. Any such areas will require implementation of the following procedure:

1. Town forces shall carefully remove the cover system over an approximate 10' x 10' area under the supervision of URS personnel.

2. URS will visually inspect the liner for damage; any small holes shall be repaired by beading with a leister by certified geomembrane technicians. Large holes will require the liner technicians to patch the hole.

3. URS will be on site for any necessary repairs to the geomembrane liner and will visually inspect the repairs.

4. Town forces shall replace the cover system following the repair.

URS

Job RAMAPO | Project No. | Page ___ of ___

Description SOIL GAS SURVEY (NORTH LOBE) | Computed by BSS | Date 4/1/03

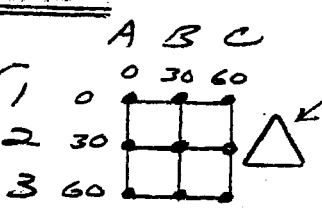
Checked by | Date | Reference

Sheet 1 of ___

DRAWING 1

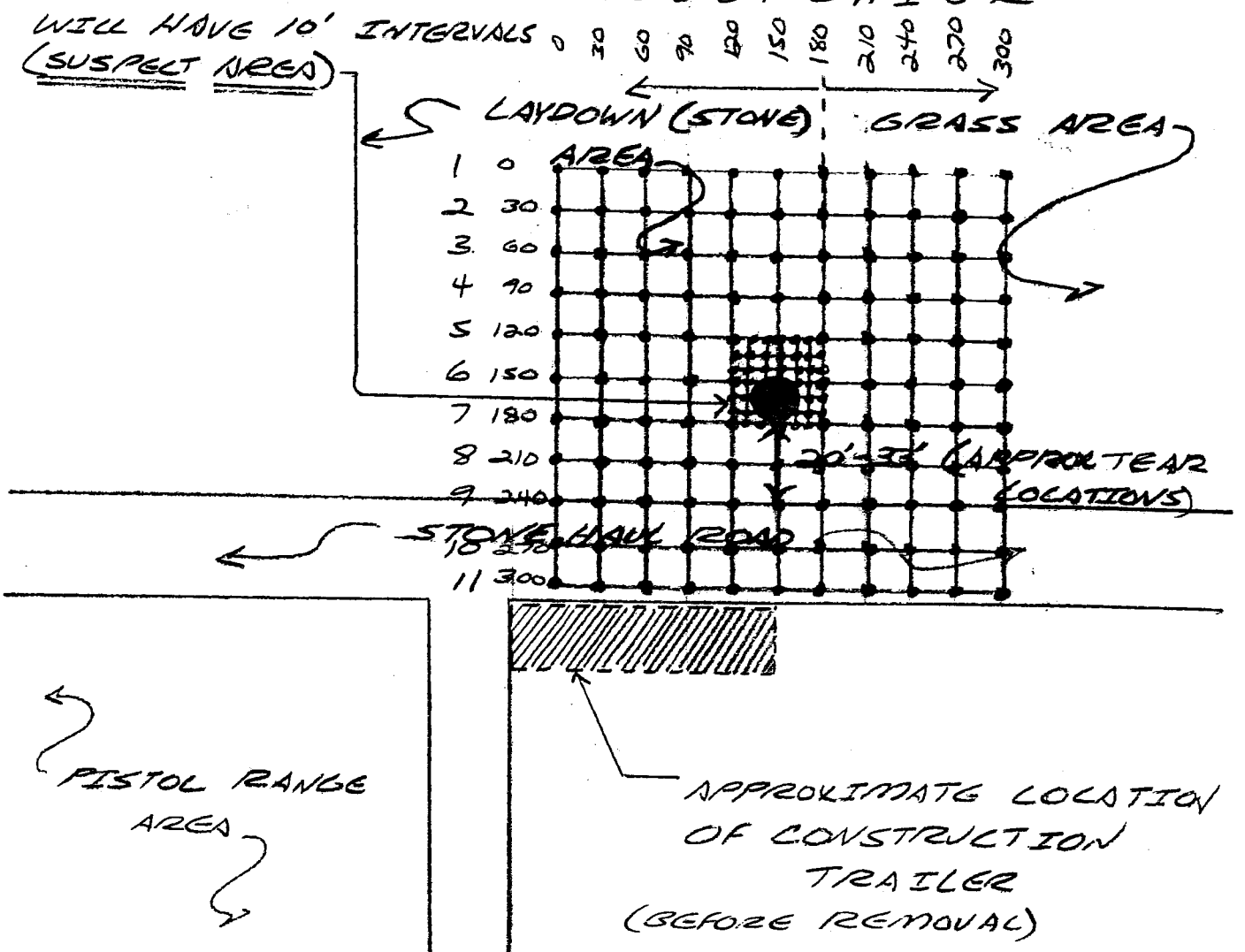
N (N.T.S.)

BACKGROUND AREA



* THE GRID LOCATIONS SHOWN ARE TENTATIVE AND MAY BE SHIFTED IN THE FIELD IF DEEMED NECESSARY.

* MATRIX E5-7 G7 WILL HAVE 10' INTERVALS (SUSPECT AREA)



Date:
Weather:
Temp:
Eng/Tech:

SOIL GAS SURVEY

Ramapo Landfill

GENERAL AREA

SOIL GAS READINGS

URS Buffalo
Buffalo, New York

Test Location	Methane	Oxygen	Carbon Dioxide	Air Pressure	Notes
A1					
A2					
A3					
A4					
A5					
A6					
A7					
A8					
A9					
A10					
A11					
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Notes**
B1					
B2					
B3					
B4					
B5					
B6					
B7					
B8					
B9					
B10					
B11					
Test Location	**Methane**	**Oxygen**	**Carbon Dioxide**	**Air Pressure**	**Notes**
C1					
C2					
C3					
C4					
C5					
C6					
C7					
C8					
C9					
C10					
C11					