

ASSESSMENT OF LFG VERTICAL MIGRATION

RICHMOND LANDFILL

WASTE MANAGEMENT

TECHNICAL REPORT – MAY 2014

PROJECT N° 141-18060-00

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TABLE OF CONTENT

	Page
TABLE OF CONTENT	i
LIST OF FIGURES	ii
1. INTRODUCTION	1
2. METHODOLOGY	2
2.1 Location of measurements	2
2.2 Methodology	2
2.2.1 Instrumentation	2
2.2.2 Instrument calibration	3
2.2.3 Meteorological constraints	3
3. RESULTS	5
3.1 Regulations	5
3.2 Surface sampling results	5
3.3 Site configuration and well performance	7
3.4 Works since previous assessment	7
3.5 Wind speed	7
4. INTERPRETATION OF RESULTS	8

LIST OF FIGURES

	Page
FIGURE 2-1 : LOCATION OF MEASUREMENT POINTS – MAY 27 TH , 2014.....	4
FIGURE 3-1 : METHANE CONCENTRATIONS – MAY 27 TH , 2014	6

1. INTRODUCTION

Waste Management of Canada Corp. has given a mandate to WSP Canada inc. (previously known as GENIVAR) to edit the technical report for the assessment of methane emission at the surface of Richmond landfill.

According to the offer for professional services, the following tasks were performed :

- Mapping of results ;
- Technical report editing.

Field work was completed by Waste Management on May 27th, 2014.

2. METHODOLOGY

2.1 Location of measurements

Assessment of vertical migration of LFG was performed above the entire landfill. Location of the measurement points is shown on Figure 2-1.

2.2 Methodology

Methane concentrations above ground are measured and recorded on a continuous basis with a portable Flame Ionisation Detector (FID). Spatial location of the measurement points are defined and recorded by a Global Positioning System (GPS).

The sampling is done along the periphery of the waste cells and along a serpentine pattern, at a height of approximately 6 inches above ground.

Methane concentrations are then processed and spatial coordinates are transformed from the degree, minute, second format to the NAD83 MTM Zone 9 system. A map showing methane concentrations is prepared. The concentrations are overlaid on a map showing the landfill gas collection system general arrangement in order to be able to evaluate its efficiency and to identify areas where modifications or operation optimisation are required to reduce emissions to the atmosphere.

2.2.1 Instrumentation

Methane concentrations are determined with a Trimble SiteFID portable analyser by the flame ionisation method. This instrument is used for the measurements into ambient air of small concentrations of total volatile organic compounds, expressed as methane. The analytical range of the analyser is 0 to 50 000 ppmv with a lower detection limit at 0.1 ppmv.

Since the concentration of methane in landfill gases more than 100 times higher than non methane organic compounds and that the measured concentrations are low, the result given by the instrument is interpreted as methane alone.

Spatial co-ordinates are measured by a Nomad GPS-enabled hand held computer that is linked by bluetooth technology to the flame ionisation detector.

Wind speed is checked regularly during sampling with a portable anemometer.

2.2.2 Instrument calibration

Accuracy of the analytical instrument is verified on a regular basis with calibration gas having a known composition. Adjustments are made if required. For the Trimble SiteFID, the calibration gas is composed of : 500 ppmv of CH₄ in air.

2.2.3 Meteorological constraints

Average wind speed during sampling shouldn't exceed 8 km/hr with maximum peak speed at 20 km/hr.

LANDFILL GAS EMISSION
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GPS/FID MEASUREMENT



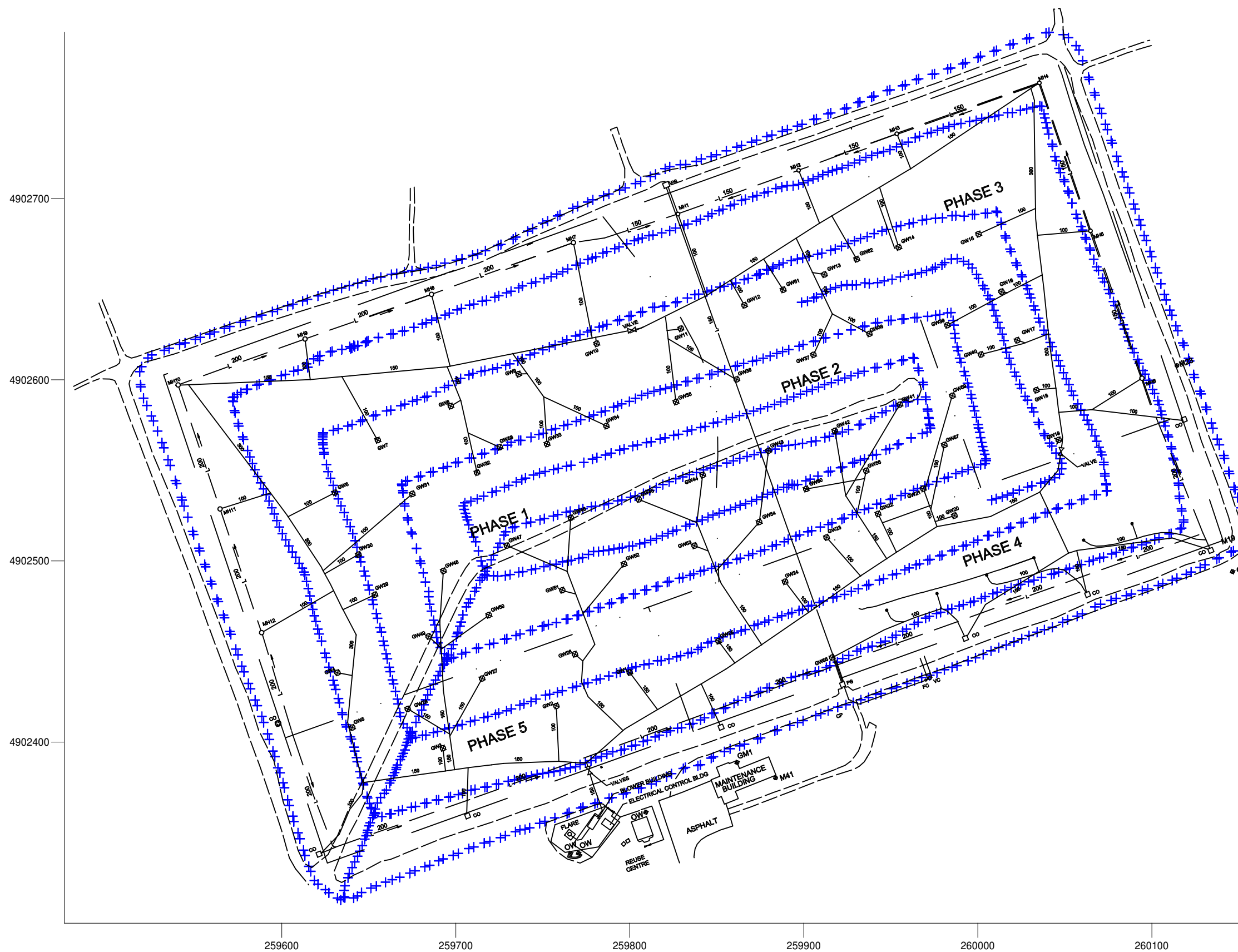
LEGEND

+ MEASUREMENT POINTS

FIGURE 2-1

LOCATION OF
MEASUREMENT POINTS

MAY 27, 2014



3. RESULTS

3.1 Regulations

In Ontario, owners of landfill sites need an approval if their facilities “may discharge or from which may be discharged a contaminant into any part of the natural environment other than water » (Environmental Protection Act, R.S.O. 1990, CHAPTER E.19, part II General Provisions, section 9 Approval of Director, plant or production process). However, no specific maximum acceptable concentration of methane above the surface is defined.

On the other hand, US EPA has enacted operational standards in "Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills", into effect since March 12th, 1996 (40 CFR Parts 51, 52 and 60). This rule stipulates that methane concentrations measured at the surface of the landfill shall be less than 500 ppmv.

EPA standard will be used for the assessment of methane emissions to the atmosphere.

3.2 Surface sampling results

Results show that there is no point having a methane concentration above 500 ppmv. The highest concentration obtained is 294.3 ppmv at location (259966, 4902766) located down the north slope, north-east of the well MH3.

Figure 3-1 presents detailed results.

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GPS/FID MEASUREMENT



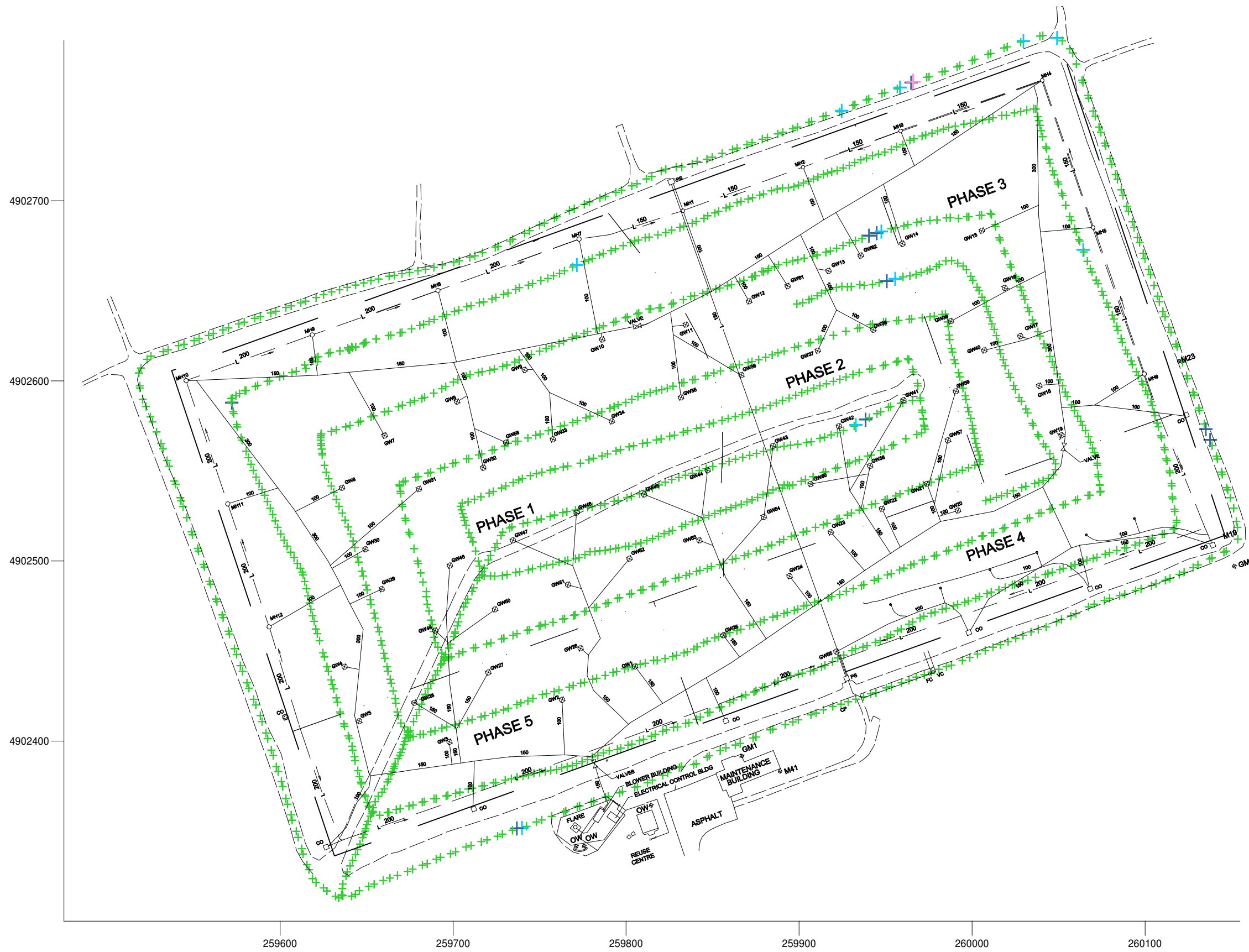
LEGEND

- + 0 ppmv to 50 ppmv
- + 50 ppmv to 100 ppmv
- + 100 ppmv to 250 ppmv
- + 250 ppmv to 500 ppmv
- + 500 ppmv to 50000 ppmv

FIGURE 3-1

METHANE CONCENTRATIONS

MAY 27, 2014



3.3 Site configuration and well performance

The landfill gas collection system at Richmond landfill is composed of 47 vertical wells. The leachate toe drain, which consists of 4 manholes and 5 cleanouts, is also connected to the LFG collection system.

3.4 Works since previous assessment

No modifications were made on the gas collection system since the last surface survey sampling. The LFG collection system has been maintained and calibrated on a regular basis.

3.5 Wind speed

Sampling was done when the winds were under specifications described at 2.2.3. The average velocity of the wind was 3 km/hr and gust of the wind was 12 km/h on May 27th.

4. INTERPRETATION OF RESULTS

The results indicate that the emissions of methane to the atmosphere are under the USEPA regulation. The highest concentration obtained is 294.3 ppmv at location (259966, 4902766).