

Richmond landfill

# ASSESSMENT OF LFG VERTICAL MIGRATION

TECHNICAL REPORT –  
JULY 2015



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JULY 2015

Project n° : 151-01433-00  
Date : JULY 2015



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## REVISION HISTORY

VERSION	DATE	DESCRIPTION
00	2015-07-29	Final report



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# SIGNATURES

## PREPARED BY

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## REVIEWED BY

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Catherine Verrault, M.Sc., M.A.Sc.





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## WORKTEAM

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Editing

Marlène Demers, eng.

Revision

Catherine Verrault, M.Sc., M.A.Sc.

**Reference to cite :**

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WSP. 2015. *Assessment of LFG vertical migration. Technical report – July 2015*. Report product for Waste Management. 11 pages.



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# 1 INTRODUCTION

Waste Management of Canada Corp. has given a mandate to WSP Canada inc. 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 performed by Waste Management on July 23<sup>rd</sup>, 2015.





## 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 CH<sub>4</sub> 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  
WASTE MANAGEMENT  
RICHMOND LANDFILL

GPS/FID MEASUREMENT



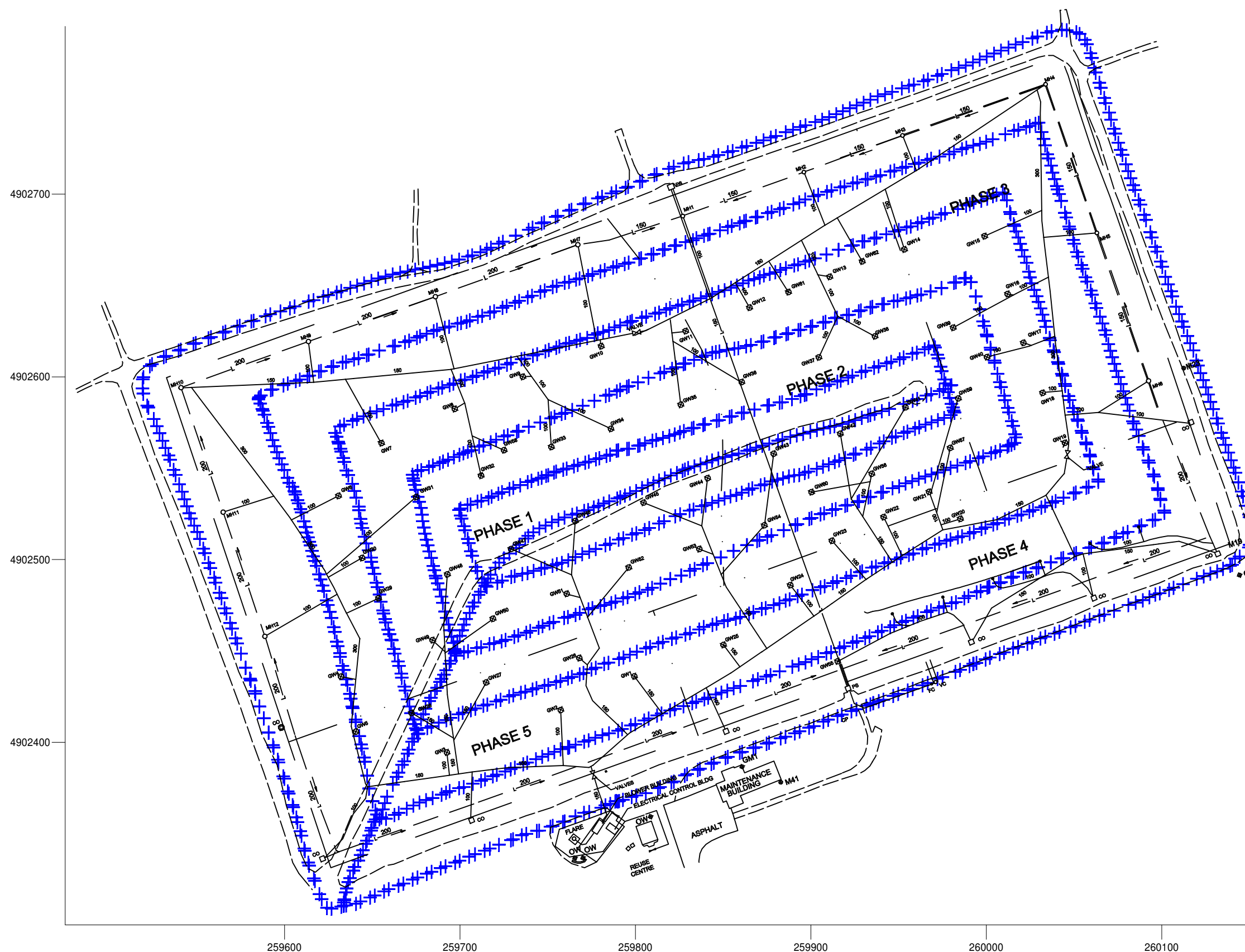
LEGEND

+ MEASUREMENT POINTS

FIGURE 2-1

LOCATION OF  
MEASUREMENT POINTS

JULY 23, 2015





## 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 121.2 ppmv at location (259789, 4902592) located on north of well GW34.

Figure 3-1 presents detailed results.

### 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 15.9 km/hr on July 23<sup>rd</sup>.



LANDFILL GAS EMISSION  
WASTE MANAGEMENT  
RICHMOND LANDFILL

GPS/FID MEASUREMENT



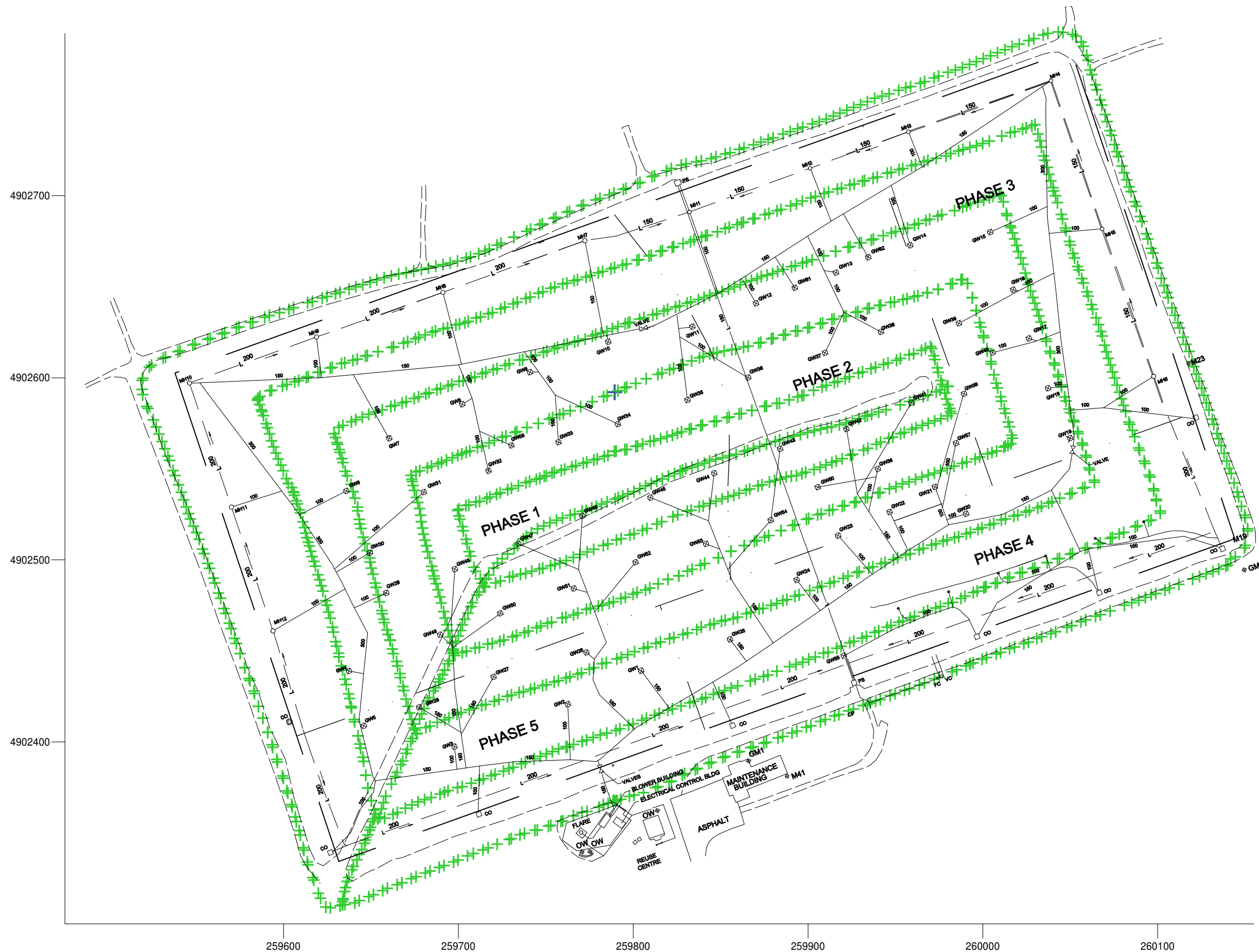
LEGEND

- + 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

JULY 23, 2015







## 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 121.2 ppmv at location (259789, 4902592).



