213-1
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JBA 2901-10/L13/pg

By Courier

Office of Licensing,
Environmental Protection Agency,
Johnstown Castle Estate,
County Wexford.

29th March 2005

Dear Sirs,

Re: Waste Licence Application No. 213-1:
Roadstone Dublin Ltd., Blessington – Addendum to Environmental Risk Assessment, Blessington March 2005.

Please find enclosed 4 no. copies of the Gas Risk Assessment Update for Roadstone Dublin's site at Blessington, Co. Wicklow. .

We submit the following;

- 4 no. hard copies of the certified results (1 original and 3 no. copies), and
- 1 no. digital copy (CD) of the addendum report (.pdf format).

The above information is submitted to update Appendix 6A of the Waste Licence Application: Environmental Impact Assessment Appendices Volume 2, submitted to the EPA on behalf of Roadstone Dublin Ltd., dated December 2004.

If you have any queries regarding our submission please contact Derek Luby.

Yours Sincerely
For John Barnett & Associates Ltd.

Peter Glanville

Environmental Protection Agency
Waste Licensing
Received 30 MAR 2005
Initials VB

Enc. 1 no. original and 3 no. copies of Addendum to Environmental Risk Assessment and 1 no. digital copy (CD) of same.
cc. Mr. Mark Prendergast (Roadstone Dublin Ltd.).

UPDATE to EIS and WASTE APPLICATION

Addendum to Environmental Risk Assessment

Gas Risk Assessment Update

Blessington

11 March 2005

Produced for
Roadstone Dublin Limited

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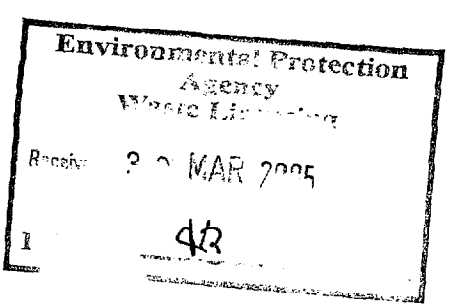

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1 Introduction

1.1 Project client

1.1.1 Terms of Reference

Roadstone Dublin Limited (RDL) requested Mouchel Parkman to update Section 5 of the Environmental Risk Assessment and Management Strategy (report reference 4000043/OR/03) for areas of unauthorised waste disposal at their landholding in Blessington on 22/01/2005.

The key objectives of the addendum are to:

- review the results of monitoring landfill gas in Areas 1, 4 and 6 and volatile organics in Area 6 since production of the Environmental Risk Assessment and Management Strategy, ERA, in August 2003 (report reference 4000043/OR/03). Particular focus is placed on Area 6 where the mitigation measures specified in the ERA have now been put in place; and
- provide an updated assessment of the gas risk to each area.

1.1.2 Scope of Works

The scope of this update is to revise where necessary the gas risk assessment report in the ERA.

1.1.3 Limitations

The limitations of this report remain as stated in Section 1.4 of the ERA.

2 Assessment of Landfill Gas Emissions to January 2005

2.1 Landfill Gas Monitoring Regime

2.1.1 Previous Gas Monitoring Regime (early 2003)

In 2003 JBA undertook three rounds of landfill gas monitoring at the Blessington site in and around Areas 1, 4 and 6 as reported in the ERA.

2.1.2 Subsequent Gas Monitoring (July 2003 to January 2005)

Subsequently a further ten rounds of monitoring have taken place from July 2003 to January 2005. The tabulated results for methane and carbon dioxide are given in Appendix 1, Tables A and B respectively. The results are also displayed graphically in Appendix 1 for each monitoring point in and around Area 6, and in summary for Areas 1 and 4. The results include the three monitoring rounds March – May 2003 reported in the ERA.

Three additional groundwater and gas monitoring boreholes GWR1 – GWR 3 were established in 2003 and monitored for gases from October 2003 onwards to January 2005, over a total of eight rounds of testing. These boreholes are located outside the RDL land boundary at significant distances from Area 6. The location of these and the other monitoring boreholes are shown on drawing DO1 in Appendix 1.

Following the installation of a gas venting trench between Area 6 and the new housing in late 2003 and gas venting boreholes in Area 6 as recommended in the ERA in 6.2.1.3, further gas monitoring boreholes were established. These were P1 – P4 and P6, boundary monitoring points and A4 – A6, venting boreholes in Area 6, locations of which are shown in the figure in Appendix 1. These locations were tested for gases during six rounds of monitoring between April 2004 and January 2005.

Additionally nine rounds of monitoring has taken place in boreholes located S/SE of Area 6 at GW 6/5 and BH 6/5A, also as recommended in the ERA in 6.2.1.3. Included in this was one borehole, GW 6/4, located just north of Area 6. At the same time two gas monitoring boreholes, GW6/6 and GW6/6A, were established west of Area 6 in the new housing area and monitored on eight occasions between July 2003 and January 2005. The location of these boreholes are shown on Plan DO1 in Appendix 1.

2.1.3 Monitoring at No.28 Woodleigh, Blessington (5th November 2004)

In November 2004 one gas monitoring round was undertaken at the above residence located just east of the Area 6 venting trench, as shown in the figure in Appendix 1.

3 Gas Monitoring Results

3.1 Area 6

3.1.1 Methane

The trend in methane results identified in the charts given in Appendix 1 show:

- That methane levels within Area 6 (BH 6/10 – BH 6/12) have decreased from well above the DOE guideline value of 1% (up to 30%) to well below or zero since the installation of passive venting boreholes in the first part of 2004. However the results for monitoring points A4 – A6 within the waste still show methane levels up to 6%, which are above the guidance level.

- The methane levels monitored at the edge of Area 6 in P1 – P3 and GW6/3 adjacent to the housing and P4, P6, EW 6/1 and GW 6/2, the southern boundary, show zero methane. This indicates that no methane is escaping laterally from the site.

- The methane levels measured outside Area 6, either in the housing estate (GW 6/6, BH 6/6a) or south west of Area 6, GW 6/5, BH 6/5A also show zero methane.

From this it can be concluded that the risk of methane escaping from Area 6 remains very low. The installation of the passive venting boreholes and the vent trench appears beneficial.

3.1.2 Carbon Dioxide

The trends for carbon dioxide identified in the charts given in Appendix 1 are:

- Carbon dioxide levels have fallen from above to below the 0.5% threshold in BH 6/10 and BH 6/11 but remained above by a factor of four in BH 6/12. The results for A4 – A6 show continued carbon dioxide generation within Area 6 well above threshold levels.

- The levels of carbon dioxide in P1 – P3 of the vent trench adjacent to the housing are well below the 0.5% threshold in the last five monitoring rounds. For the monitoring on the boundary south of Area 6 at P4, P6 – P7 and GW 6/2 – GW 6/2 carbon dioxide levels are occasionally up to four times above the threshold.

- The levels of carbon dioxide detected in the housing estate in BH 6/6 and 6/6A has on two occasions out of sixteen exceeded 0.5% but are generally well below.

- For the area south and south west of Area 6 at GW 6/5 and BH 6/5A carbon dioxide levels are showing a trend to increase from below threshold to above.

- In three of the last four monitoring rounds carbon dioxide has been up to a factor of six times above the threshold.

From this analysis we conclude the risk to the housing area from carbon dioxide has not increased from the previous assessment. It is possible some carbon dioxide is migrating in the ground to the south of Area 6. However given that gas flows are very low, as discussed in 3.1.4 below, the risk of this possible migration is also very low.

A further question is if carbon dioxide is migrating, why does methane not also (Comment: Is this related to the relative density of each gas – carbon dioxide being heavier. There are two possibilities. The first is that methane can oxidise to carbon dioxide when oxygen is present, a possible circumstance in this case. Secondly it is possible, for example at GW6/5 and BH 6/5A, the source of carbon dioxide is local to the boreholes, e.g. rotting vegetation, rather than Area 6. This is the likely explanation of carbon dioxide found in GWR/1 – GWR3 at above threshold levels.

3.1.3 *Landfill Gas Flow*

The gas flows out of each monitoring borehole has been measured and is reported in Appendix 1 in the bulk results. The gas flows on all occasions have been minimal, below a maximum of 3 litres per hour. A normal gassy landfill will produce 10,000 litres per hour (i.e. 10 m^3/hr (1 m^3 = 1000 litres)). Hence the biological activity in Area 6 was very low during the monitoring period in comparison.

3.1.4 *Carbon Monoxide*

Carbon monoxide was found in traces in April 2003 at 2 ppm in Area 6. However all subsequent monitoring rounds have not detected carbon monoxide. The April 2003 results have therefore been discounted as an anomaly.

3.1.5 *Hydrogen Sulphide*

Routine measurements have failed to detect hydrogen sulphide at the ppm level. It was measured to a ppb detection level in 2004 and the results from Odour Monitoring Ireland of 31st August 2004 are given in Appendix 2. The maximum level detected in Area 6 was 11 ppb (parts per billion) whilst at the boundary at 2 ppb. The results are tiny concentrations, some 2500 times below the long term occupational exposure limit published by the UK Health and Safety Executive in EH40/2002.

3.1.6 *Volatiles*

Possible volatile and odorous chemicals arising in emissions from Area 6 and adjacent were monitored in 2004 by absorption on to tubes and subsequent testing. The detection limits used were extremely low. The results are reported in Appendix 2. Odour monitoring found that elevated Total Volatile Organic Compounds (TVOC) and benzene were detected compared to ambient monitoring. However all the emissions for individual chemicals were less than 1 mg/m^3. Benzene is likely to be

the most harmful of the gasses released, but the monitoring indicates the 'worst case' emissions from the Area 6 landfill of benzene is less than one quarter of the long term exposure limit in the UK Health and Safety Executive EH40/2002 Supplement 2003. The results on the boundary for benzene are below detection for the active monitoring (i.e. less than 0.026mg/m^3) and for the long term passive monitoring, at least 10,000 times below the long term exposure limit for benzene. On this basis benzene is not an exposure risk.

3.2 Area 1 and 4

The Gas Risk Assessment relating to these areas in the ERA found that these two areas were remote from buildings and fell outside the DoE guidelines.

3.2.1 Area 1

On going monitoring since May 2003 (see charts Appendix 1) indicates that the position is relatively unchanged from that prior to May 2003. The dominant source of landfill gas is from BH 1/13 which produces high levels of methane gas, generally 50% or more. However the flow rate from this borehole is less than 2.1 litres per hour, a tiny output of no real significance.

On the basis of intensive monitoring since the original ERA we have no reason to reconsider the landfill gas risk from Area 1, which remains very low.

3.2.2 Area 4

Carbon monoxide was found in traces in April 2003 at up to 20 ppm in Area 4. However all subsequent monitoring rounds have not detected carbon monoxide. The April 2003 results have therefore been discounted as an anomaly.

The gas regime for Area 4 is largely unchanged except that BH 4/12, in the heart of this area of waste deposition has started to show methane at the 15% level and carbon dioxide at 10% level, where as prior to October 2003 the levels of methane and carbon dioxide were within guideline values. However, given the remoteness of Area 4 from housing and buildings, this is not a cause for concern.

3.3 GasSim Modelling

During the GasSim Air Dispersion Modelling (report ref. 4000043/OR/5 version C) as enclosed in Appendix 3, the emission of landfill gas from the proposed engineered repository was considered in terms of volatile gas thresholds being exceeded at three receptors. GasSim default values were used for odorous trace gases and benzene. However, whenever gas monitoring levels recorded within Area 6 were shown to exceed the default level for specific trace gases, this greater value was input into the model to provide a more conservative prediction.

When the model was re-run using actual recorded levels from Area 6, all of the odorous trace gases and benzene were found to be well below threshold levels at the nearest site boundary to the proposed new landfill.

5 Conclusions

5.1 Monitoring

Roadstone has initiated very intensive gas monitoring since the original ERA and landfill gas assessment in August 2003. The independently conducted gas monitoring by John Barnett and Associates has comprised an extended monitoring network following the implementation of the recommended gas venting trench and gas venting boreholes in Area 6 as a precautionary measure. The scope of monitoring has also been extended geographically. Some work has also been done on measuring volatile organic compounds in Area 6 and adjacent land.

5.2 Area 6

We continue to hold the view that provided ongoing monitoring is continued there is very little risk from the landfill gas being produced in Area 6 migrating to the nearest receptor, i.e. adjacent occupied housing. This is because the precautionary venting trench and venting boreholes have been installed and monitoring does not indicate any significant gas flow to the houses. Additional gas volume measurements show only extremely small volumes of landfill gas are being produced, which should vent safely to atmosphere, and hence there is no pressure to drive gas laterally. Notwithstanding this, there is some evidence of elevated carbon dioxide levels to the south and south west of Area 6, which may be due to the landfill gas production or to a very local source.

We remain of the view that relocation of active waste from Area 6 to Area 1 into a designed repository is the preferred solution to this problem and this should occur as soon as possible to minimise the environmental and other impact on local residents.

5.3 Area 1 and 4

These areas are remote from people and buildings. Monitoring shows the production of landfill gas is at a very low stable rate and has a very low risk. We recommend only ongoing monitoring of these areas, prior to any relocation into a designed repository as Roadstone have proposed.

Location of No. 28. Woodleigh, Blessington. Location of residence at which gas monitoring was undertaken on the 5th November 2004 (refer to Section 3, Gas monitoring Results 5th Nov. 2004.

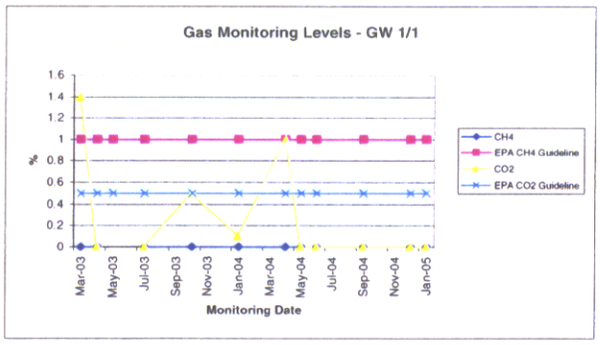
Appendix 1A

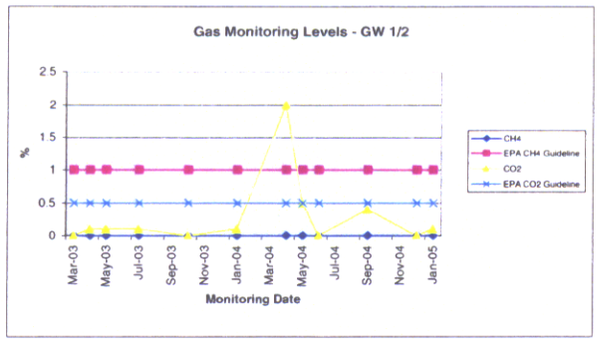
Gas Monitoring - Methane

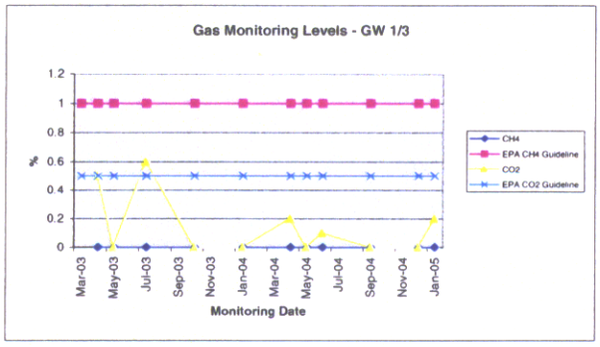
Methane	Mar-03	Apr-03	May-03	Jul-03	Oct-03	Jan-04	Apr-04	May-04	Jun-04	Sep-04	Dec-04	Jan-05
GW 1/1	0	0		0	0	0	0	0	0	0	0	0
GW 1/2	0	0	0	0	0	0	0	0	0	0	0	0
GW 1/3		0	0	0	0	0	0	0	0	0	0	0
GW 1/4		0	0	0	0	0	0	0	0	0	0	0
BH 1/10	12.2	0	3	5.5	6.5	15.5	19.7	11.4	0	13.8	18.4	0
BH 1/11	6	6	8.8	7.9	11.2	0	0	0	0	2.3	0	0
BH 1/12	2	1.7	20	0.8	2.1	20.2	35.2	8.3	1.1	17.2	30.7	7.1
BH 1/13	63.8	6.3	64	61	64.9	23.4	59	57.5	55	55.8	50.6	50.1
BH 1/14	0.2	0	1.1	0	0	0	0	0	0	0	0	0
GW 4/1							0	0	0			-
GW 4/2				0	0	0	0	0	0		0	0
GW 4/3	0	0	0.1	0	0	0	0	0	0	0	0	0
GW 4/4		0	0	0.2	1.1	1.6	0.3	0	0	3.4	0	0
BH 4/10	0	0	0.1	0.1	25.2	40.2	12.1	0	0	1.6	0	2.6
BH 4/11		0.9	54.3	44	20.8	35.3	40.1	34.5	29.5	31.7	3.8	30.1
BH 4/12		1.2	0.3	0.7	0	5.7	19.5	2.4	19.5	12.9	0	15.1
GW 6/1	0	0		0	0	0	0	0	0	0	0	0
GW 6/2	0	0		0	0	0	0	0	0	0	0	0
GW 6/3	0	0	0	0	0	0	0	0	0	0	0	0
GW 6/4				0	0	0	0	0	0	0	0	0
GW 6/5				0	0	0	0	0	0	0	0	0
GW 6/5A				0	0	0	0	0	0	0	0	0
GW 6/6				0	0	0	0	0	0		0	0
GW 6/6A				0	0	0	0	0	0		0	0
BH 6/10	30.3	17.1	14.9	24.1	6.4	7.9	0	0.1	0	0	0	-
BH 6/11	0	0.1	0.1	0	0	0	0	0	0	0	0	0
BH 6/12	1.4	1.2	6.5	2.7	3.1	1.2	1.6	0.2	0	0	0	0
GWR1					0	0	0	0	0	0	0	0
GWR2					0	0	0	0	0	0	0	0
GWR3					0	0	0	0	0	0	0	0
P1							0	0	0	0	0	0
P2							0	0	0	0	0	0
P3							0	0	0	0	0	0
P4							0	0	0	0	0	0
P6							0	0	0	0	0	0
P7							0	0	0	0	0	0
A4							0.2	9.1	14.4	6	0	5.2
A5							7.2	2.4	11	4.9	0	5.8
A6							19.1	6.6	20	1.5	0	5.7
A Guideline	1	1	1	1	1	1	1	1	1	1	1	1

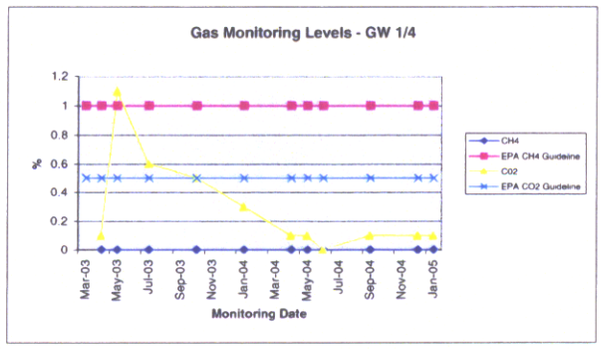
Gas Monitoring - CO2

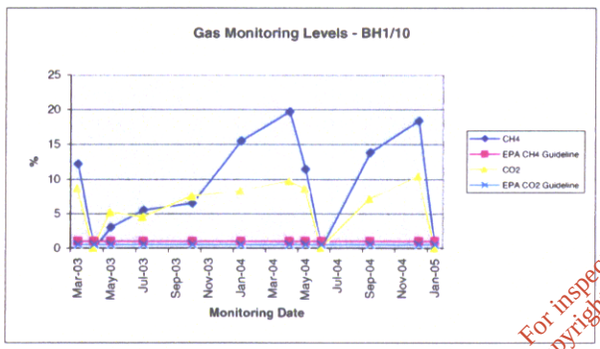
CO2	Mar-03	Apr-03	May-03	Jul-03	Oct-03	Jan-04	Apr-04	May-04	Jun-04	Sep-04	Dec-04	Jan-05
GW 1/1	1.4	0		0	0.5	0.1	1	0	0	0	0	0
GW 1/2	0	0.1	0.1	0.1	0	0.1	2	0.5	0	0.4	0	0.1
GW 1/3		0.5	0	0.6	0	0	0.2	0	0.1	0	0	0.2
GW 1/4		0.1	1.1	0.6	0.5	0.3	0.1	0.1	0	0.1	0.1	0.1
BH 1/10	8.7	0	5.2	4.5	7.6	8.3	9.7	8.6	0	7.1	10.4	0
BH 1/11	11.9	3.7	5.8	5.7	7.2	0.2	0.7	0.8	0.7	2.6	4	2.4
BH 1/12	0	0	0.5	0.3	1.3	1.1	2.02	2.6	1.8	3.6	1.9	2.5
BH 1/13	11.2	11	9.5	12.3	12.8	3.9	10.8	11	11.3	10.4	9.3	9.1
BH 1/14	3.1	0	2.4	0	2.4	0	0.1	0	3.2	3.1	0	0.1
GW 4/1							0.1	0	0			-
GW 4/2				0.3	0.5	0.1	1	0.6	0.8		0.9	0.9
GW 4/3	5.1	0.2	3	1.7	0	0	0.1	0	307	4	0	4
GW 4/4		0.2	0.2	0.1	2.9	0.9	0.2	0	0.8	2.1	1	0.9
BH 4/10	0.1	0	0.8	0	14.7	15.9	3.5	0	0	3.6	0	3.8
BH 4/11		0.8	16.6	15.6	11.3	14.9	12.7	12	11.5	12.1	2.9	9.9
BH 4/12		0.6	0.2	0.1	0.2	2.8	9.2	0.9	7	9.3	0	10.2
GW 6/1	1.1	1.7		0	0	0.2	1.2	1.1	1.3	0	1.2	0.9
GW 6/2	2.2	0.1		0	0	0	0.1	0	0.5	1.3	0.1	0
GW 6/3	1.7	0	0	0	2.4	3.9	1.7	0	0	0	0	0.8
GW 6/4				0	1.1	0	0.2	0	0	0	0	0
GW 6/5				0	0	0	0.1	0.2	0.5	2.3	0.1	1.8
GW 6/5A				2.1	0	0	0.1	1.6	2.4	3	0.1	2.3
GW 6/6				0	0	0	0	0	1.5		0	0.3
GW 6/6A				0.1	0	0	0.8	0	0.4		0	0
BH 6/10	15.1	9	7.8	20.4	9.6	10.4	0.4	0.3	0.1	0	0	-
BH 6/11	7.6	0	0.1	0	7	0	0.1	0	0	0	0	0.2
BH 6/12	0.1	0	1	0.6	2.3	0.6	1.2	0.2	0	1.3	0	1.7
GWR1					0.2	0.4	1	1.3	1.6	1.5	0	1.5
GWR2					1.7	0.1	2.6	2.2	2.9	3	0	3.3
GWR3					0.5	0	1.5	1.4	0.8	0.6	0.2	0.6
P1							0.2	0	0	0	0.1	0
P2							0.2	0.2	0	0	0	0.1
P3							0.5	0	0	0.3	0	0.2
P4							0.1	0.6	0.6	0	0.3	0.9
P6							0.1	0.2	0.9	1.8	0	0
P7							0.1	0	0	0	0	0.6
A4							1.4	16.3	18.8	10.1	0.8	14.2
A5							11.1	4.3	15.4	10.4	0	14.7
A6							18.7	6	22.9	4.1	0.1	7.7
EPA Guideline	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Atmospheric Pressure	997	981	989	995	987	965	978	996	984	964	990	998

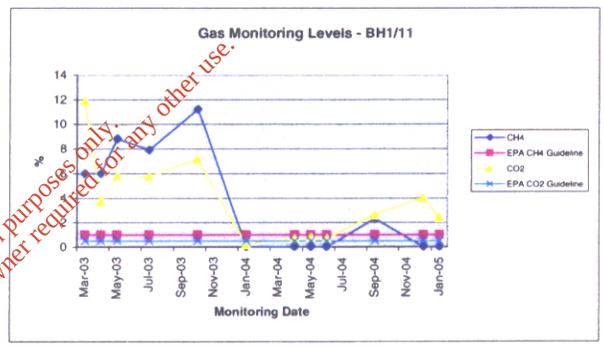


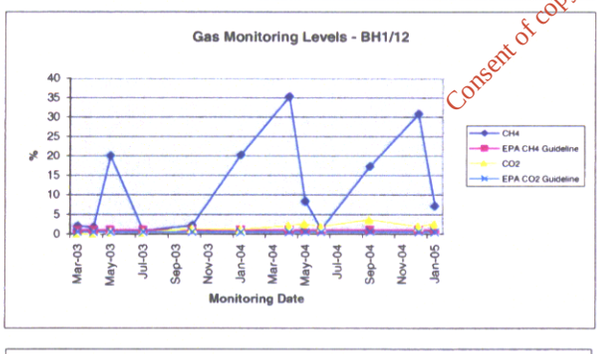


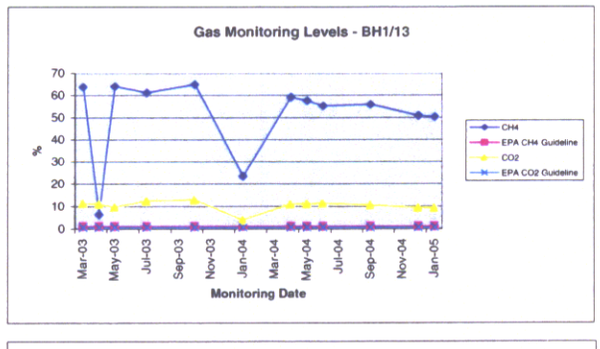


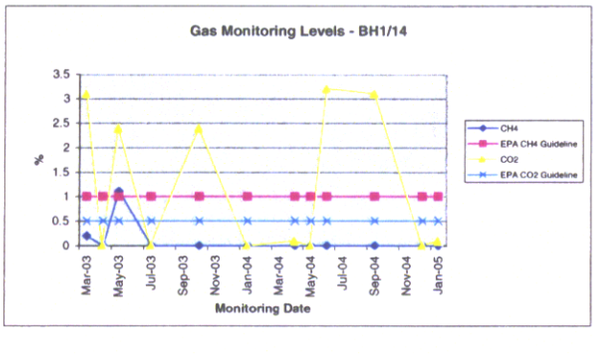


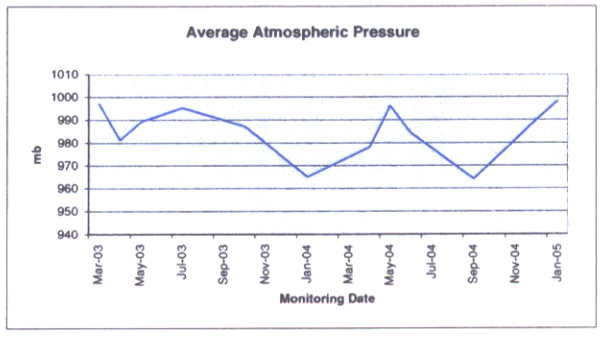


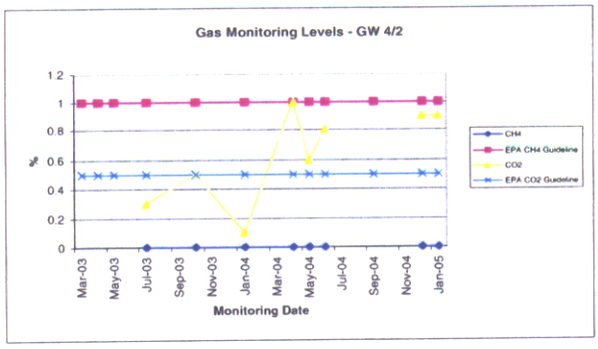


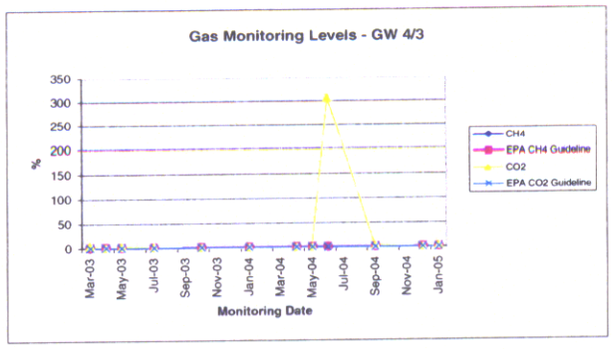


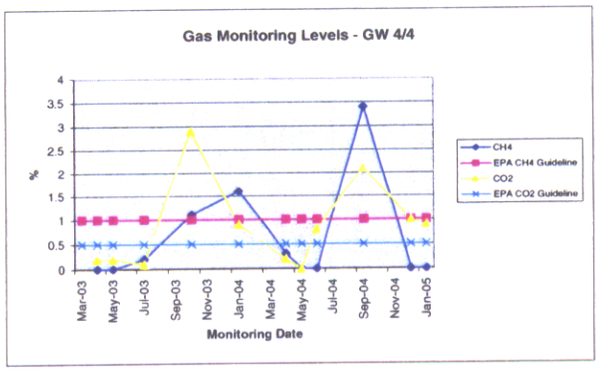


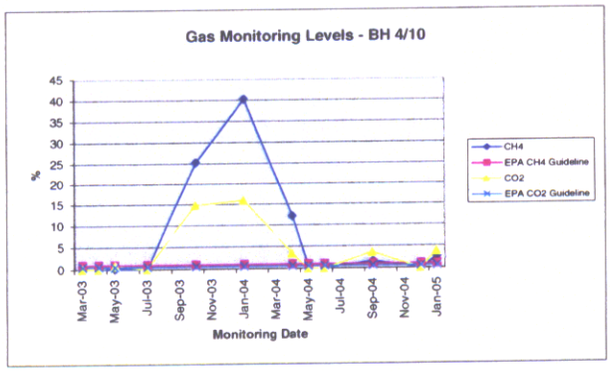


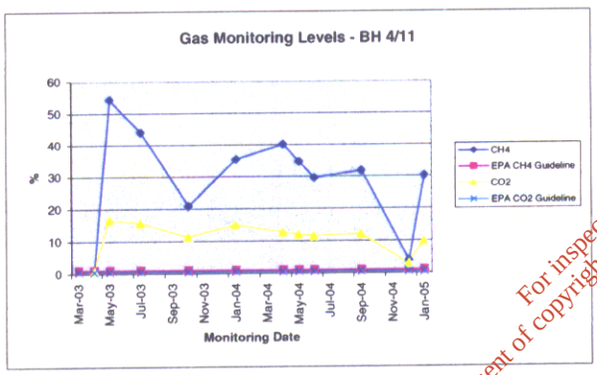


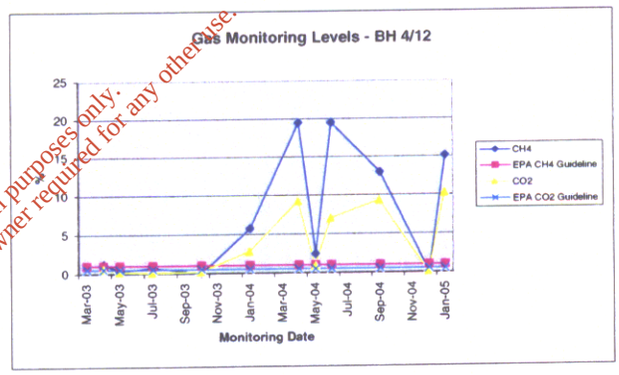


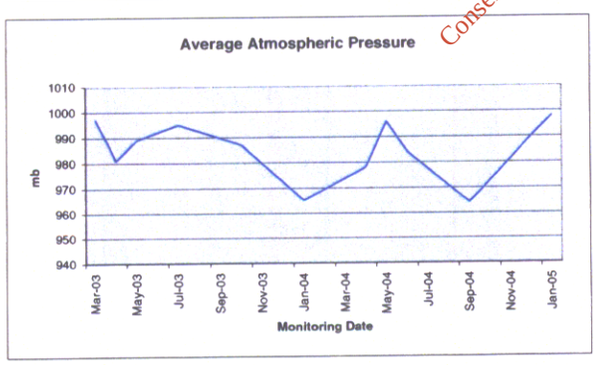


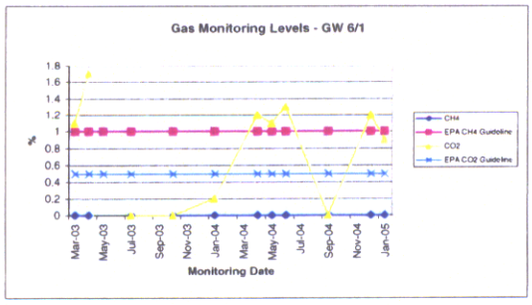


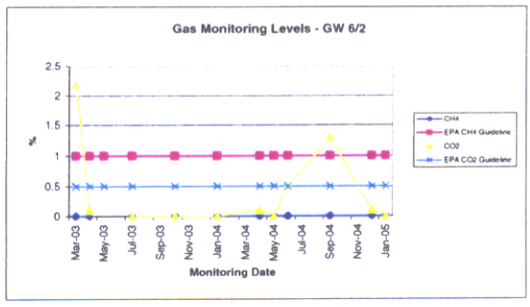


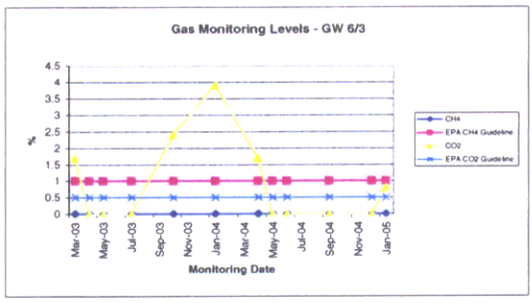


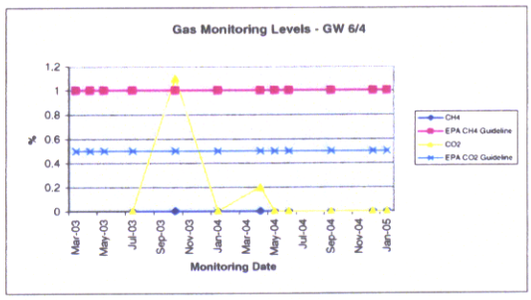


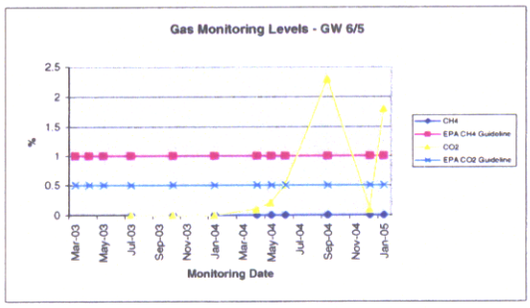


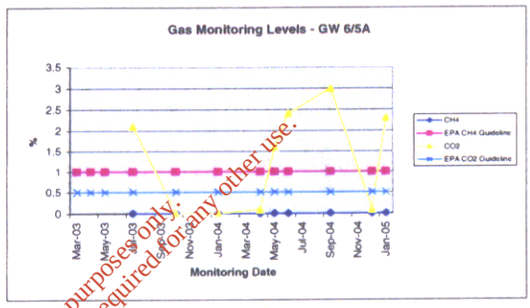


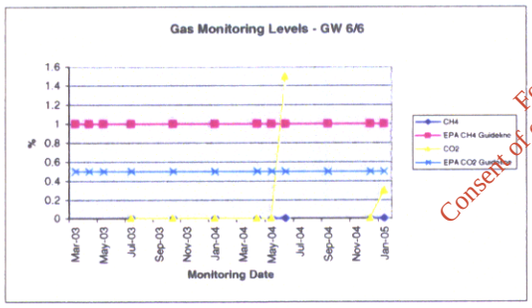


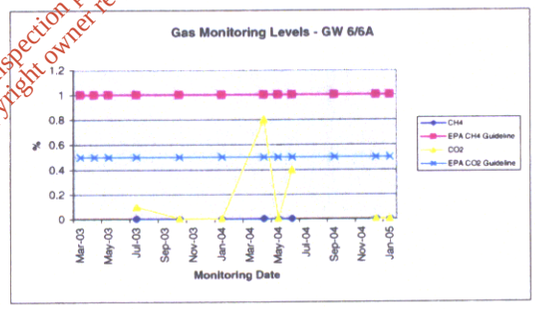


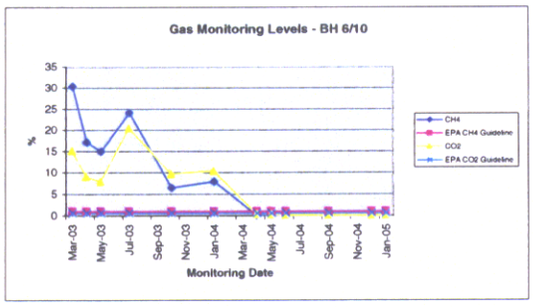


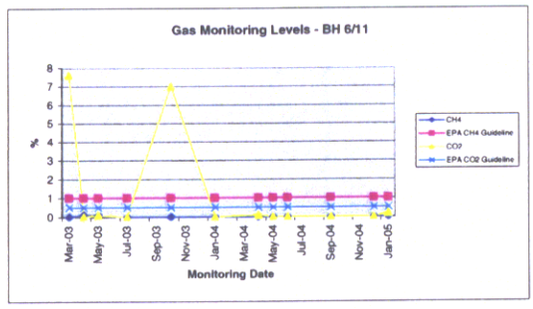


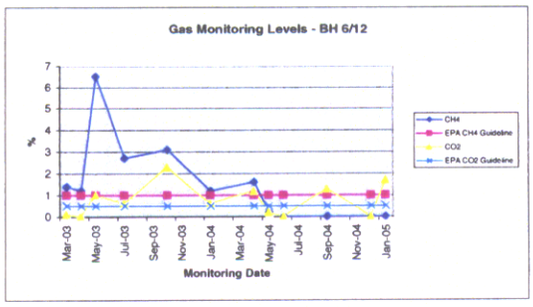


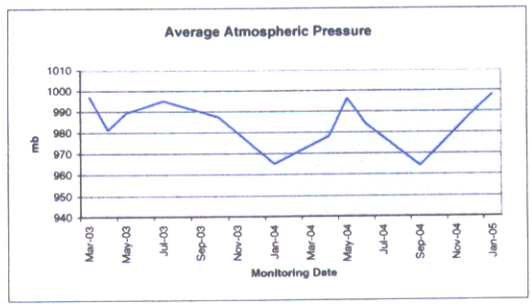


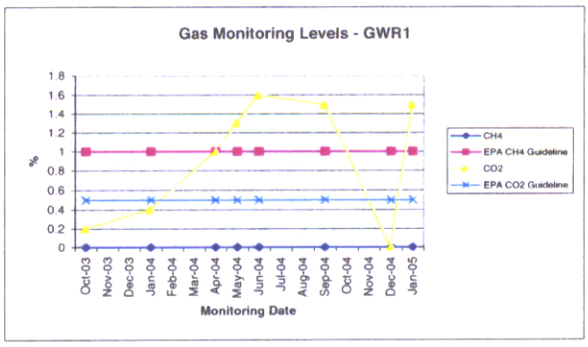


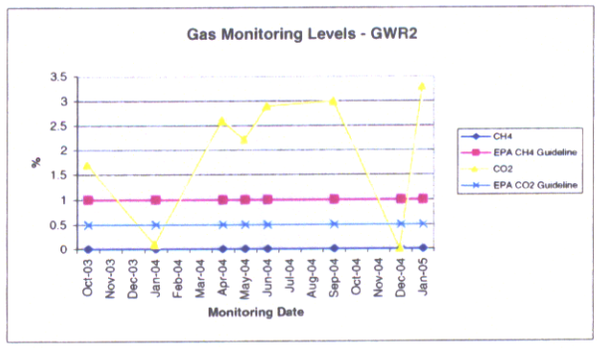


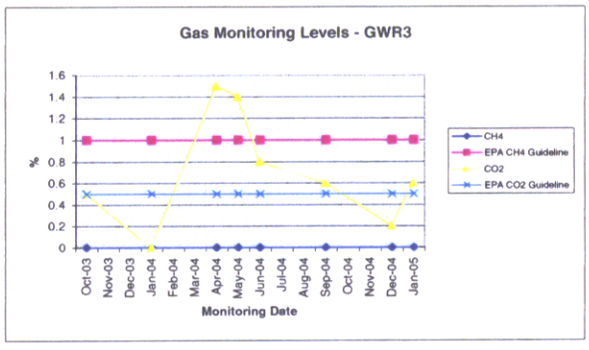


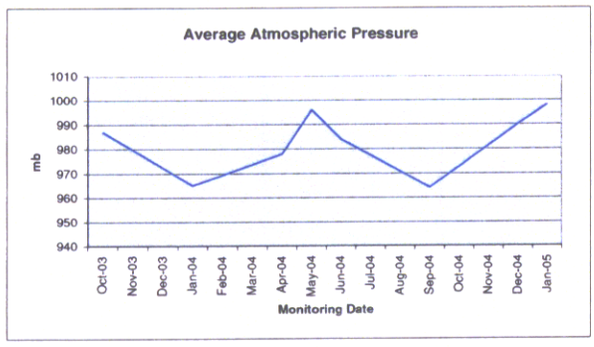












Appendix 2 **Gas Monitoring Results- Volatiles**

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 20th August 2004 Monitoring undertaken by JBA PG/DG

Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
GW 1/1	0	0	22.2	0	0	977	na	0	0
GW 1/2	0	0	22	0	0	977	1.9-2	0	0
GW 1/3	0	0	22	0	0	977	1.6-2.4	0	0
GW 1/4	0	0	21.5	0	0	977	1.6-2.3	0	0
BH 1/10	0.3	0.8	20.9	0.4	7	977	1.4-2.9	0	0
BH 1/11	0	2.2	17.8	0	0	977	1.3-2	0	0
BH 1/12	33.9	3.9	6.3	34	>>>	977	1.4-2.3	0	0
BH 1/13	45.8	9.5	3.7	45.8	>>>	977	1.4-2.2	0	0
BH 1/14	0	0	22	0	0	977	1.3	0	0
GW 4/1	na.								
GW 4/2	0	0.2	21.8	0	0	978	1.6	0	0
GW 4/3	0	0	21.9	0	0	978	1.8-3	0	0
GW 4/4	0	0	22.1	0	0	978	3.3	0	0
BH 4/10	0	0	22.1	0	0	978	1.5	0	0
BH 4/11	18.3	8.1	11	19.4	>>>	978	1.4-2.2	0	0
BH 4/12	0	0	22.2	0	0	978	1.4-2.2	0	0
GW 6/1	0	0.2	23.8	0	0	980	1.4	0	0
GW 6/2	0	0.1	24.1	0	0	980	1.5	0	0
GW 6/3	0	0	24.5	0	0	980	1	0	0
GW 6/4	0	0	24.6	0	0	980	na.	0	0
GW 6/5	0	0	24.5	0	0	980	1.5	0	0
GW 6/5A	0	0	24.5	0	0	980	1.5	0	0
GW 6/6	0	0	24.6	0	0	980	0	0	0
GW 6/6A	0	0.1	24.4	0	0	980	na.	0	0
BH 6/10	0	0	24.5	0	0	980	1.3	0	0
BH 6/11	0	0	24.5	0	0	980	1.4	0	0
BH 6/12	0	0	24.4	0.3	0	980	1.6-2.2	0	0
GWR1	0	0	22.2	0	0	980	na.	0	0
GWR2	0	2.6	22.2	0	0	980	na	0	0
GWR3	0	1	23.5	0	0	980	0.9	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2 **Gas Monitoring Results- Volatiles**

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 20th August 2004. Monitoring undertaken by JBA
Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
P1	0	0	24.5	0	0	980	na.	0	0
P2	0	2	24.4	0	0	980	na.	0	0
P3	0	0	24.6	0	0	980	na.	0	0
P4	0	1	24.1	0	0	980	na.	0	0
P6	0	1.4	23	0	0	980	na.	0	0
P7	0	0.2	24.4	0	0	980	na.	0	0
A4	15	18.7	4.1	16.6	>>>	980	na.	0	0
A5	0	0	24.7	0	0	980	na.	0	0
A6	0.1	0.6	23.9	0.3	5	980	na.	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2

Gas Monitoring Results- Volatiles

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 10th March 2004. Monitoring undertaken by JBA
Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
GW 1/1	0.5	0	23.8	0.5	10	998		0	0
GW 1/2	0.6	0.3	22.9	0.7	12	997		0	0
GW 1/3	0.6	0	23.8	0.7	12	997		0	0
GW 1/4	0.6	0.1	23.8	0.7	12	998		0	0
BH 1/10	4.2	3.2	16.6	4.2	84	998		0	0
BH 1/11	0.5	0.7	23.4	0.5	10	998		0	0
BH 1/12	1.2	2.3	3.5	1.7	24	997		0	0
BH 1/13	67.3	9.6	0.7	67.4	>>>	997		0	0
BH 1/14	0.6	2.6	10.1	1.3	12	997		0	0
GW 4/1	0.7	0	23.9	0.7	14	1000		0	0
GW 4/2	0.7	0.7	23.5	0.7	14	998		0	0
GW 4/3	0.7	0.7	23.7	0.8	14	998		0	0
GW 4/4	0.7	0.2	23.8	0.7	14	997		0	0
BH 4/10	13.7	2.4	6.4	13.7	>>>	998		0	0
BH 4/11	43	10.7	2.2	43.3	>>>	997		0	0
BH 4/12	15.4	5.2	14.5	16.1	>>>	997		0	0
GW 6/1	0.8	0.8	22	0.9	16	996		0	0
GW 6/2	0.9	0.1	24	0.9	18	996		0	0
GW 6/3	0.9	2.4	17.5	0.9	18	996		0	0
GW 6/4	0.9	0.2	23	2.1	18	996		0	0
GW 6/5	0.9	0.8	23.5	0.9	18	996		0	0
GW 6/5A	0.9	2.4	21.4	0.9	18	996		0	0
GW 6/6	0.9	0.7	22.5	0.9	18	996		0	0
GW 6/6A	0.9	1.5	21.7	0.9	18	996		0	0
BH 6/10	1.4	0.8	22.9	1.8	28	997		0	0
BH 6/11	0.9	2.2	20.1	0.9	18	996		0	0
BH 6/12	5.1	1.8	1.3	5.1	>>>	997		0	0
GWR1	0.8	0.7	23.1	1.6	16	998		0	0
GWR2	0.8	0.1	23.5	0.8	16	995		0	0
GWR3	0.8	1.3	22.8	0.8	16	996		0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2 **Gas Monitoring Results -Volatiles**

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 19th April 2004. Monitoring undertaken by JBA
Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
GW 1/1	0	1	21	0	0	995	0	0	0
GW 1/2	0	2	20.5	0	0	995	0	0	0
GW 1/3	0	0.2	20.3	0	0	995	0	0	0
GW 1/4	0	0.1	20.9	0	0	995	0	0	0
BH 1/10	19.7	9.7	3.9	19.7	>>>	995	0.5-0.5	0	0
BH 1/11	0	0.7	20.4	0	0	979	0.2-1.1	0	0
BH 1/12	35.2	2.02	6.8	35.3	>>>	995	0.2-0.7	0	0
BH 1/13	59	10.8	1.9	59.1	>>>	995	1.2	0	0
BH 1/14	0	0.1	20.9	0	0	995	0	0	0
GW 4/1	0	0.1	21	0	0	980	0	0	0
GW 4/2	0	1	20.5	0	0	980	0	0	0
GW 4/3	0	0.1	20.9	0	0	980	0	0	0
GW 4/4	0.3	0.2	19.9	0.3	0.6	980	0	0	0
BH 4/10	12.1	3.5	0.8	12.1	>>>	980	0	0	0
BH 4/11	40.1	12.7	2.7	40.2	>>>	980	0.2-0.9	0	0
BH 4/12	19.5	9.2	1.9	19.8	>>>	980	0.3-1.4	0	0
GW 6/1	0	1.2	18.2	0	0	958	0	0	0
GW 6/2	0	0.1	20.8	0	0	958	0	0	0
GW 6/3	0	1.7	16.7	0	0	980	0	0	0
GW 6/4	0	0.2	21.2	0	0	980	0	0	0
GW 6/5	0	0.1	20.6	0	0	958	0	0	0
GW 6/5A	0	0.1	20.6	0	0	958	0	0	0
GW 6/6	0	0	21	0	0	958	0	0	0
GW 6/6A	0	0.8	20.5	0	0	958	0	0	0
BH 6/10	0	0.4	20.5	0	0	980	0	0	0
BH 6/11	0	0.1	20.8	0	0	980	0	0	0
BH 6/12	1.6	1.2	9.3	1.7	32	980	0.2-0.4	0	0
GWR1	0	1	20.9	0	0	958	0	0	0
GWR2	0	2.6	17.8	0	0	958	0	0	0
GWR3	0	1.5	18.6	0	0	958	0	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2

Gas Monitoring Results -Volatiles

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 19th April 2004. Monitoring undertaken by JBA

Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
P1	0	0.2	20.7	0	0	980	-	0	0
P2	0	0.2	20.9	0	0	980	-	0	0
P3	0	0.5	20.7	0	0	980	-	0	0
P4	0	0.1	21.2	0	0	980	-	0	0
P6	0	0.1	21.3	0	0	980	-	0	0
P7	0	0.1	21.4	0	0	980	-	0	0
A4	0.2	1.4	19.6	0.3	4	980	-	0	0
A5	7.2	11.1	6.8	58.1	>>>	980	-	0	0
A6	19.1	18.7	5.3	19.1	>>>	980	-	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2 **Gas Monitoring Results - Volatiles**

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 21st May 2004. Monitoring undertaken by JBA

Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
P1	0	0	22.1	0	0	985	-	0	0
P2	0	0	22.1	0	0	985	-	0	0
P3	0	0	22.2	0	0	985	-	0	0
P4	0	0.6	21.6	0	0	985	-	0	0
P6	0	0.9	21.3	0	0	985	-	0	0
P7	0	0	22.3	0	0	985	-	0	0
A4	14.4	18.8	2	14.4	>>>	985		0	0
A5	11	15.4	3.6	11.1	>>>	985		0	0
A6	20	22.9	3.1	21.8	>>>	985		0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2

Gas Monitoring Results - Volatiles

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 21st May 2004 Monitoring undertaken by JBA

Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
GW 1/1	0	0	22.5	0	0	994	na.	0	0
GW 1/2	0	0.5	21.6	0	0	994	0.3-1.1	0	0
GW 1/3	0	0	22.4	0	0	994	0.1-1.7	0	0
GW 1/4	0	0.1	22.5	0	0	994	0.1-1.2	0	0
BH 1/10	11.4	8.6	4.9	11.5	<<<	994	0.3	0	0
BH 1/11	0	0.8	23.2	0	0	994	0.1-0.5	0	0
BH 1/12	8.3	2.6	15.7	8.11	<<<	994	0.2-1.1	0	0
BH 1/13	57.5	11	1.5	57.6	<<<	994	1-1.5	0	0
BH 1/14	0	0	22.3	0	0	994	0.2-0.5	0	0
GW 4/1	0	0	22.4	0	0	996	0.2-0.4	0	0
GW 4/2	0	0.6	21.9	0	0	996	0.1-0.8	0	0
GW 4/3	0	0	22.2	0	0	996	0.1-0.5	0	0
GW 4/4	0	0	22.5	0	0	996	0.1	0	0
BH 4/10	0	0	22.5	0	0	994	0.1-1	0	0
BH 4/11	34.5	12	5.6	34.7	<<<	994	0.1-0.7	0	0
BH 4/12	2.4	0.9	20.6	17.5	<<<	994	0.1	0	0
GW 6/1	0	1.1	20.4	0	0	996	0.2-0.8	0	0
GW 6/2	0	0	22.6	0	0	998	0.2-1.1	0	0
GW 6/3	0	0	21.1	0	0	998	0.4-2	0	0
GW 6/4	0	0	21.2	0	0	998	na.	0	0
GW 6/5	0	0.2	22.3	0	0	996	0.1	0	0
GW 6/5A	0	1.6	21.6	0	0	996	0.1-0.8	0	0
GW 6/6	0	0	22.4	0	0	996	0.2-0.8	0	0
GW 6/6A	0	0	22.5	0	0	996	na.	0	0
BH 6/10	0.1	0.3	20.3	0.1	2	998	0.2-0.8	0	0
BH 6/11	0	0	20.4	0	0	998	0.2-1.1	0	0
BH 6/12	0.2	0.2	19.3	0.2	3	998	0.1	0	0
GWR1	0	1.3	21.7	0	0	996	0.1	0	0
GWR2	0	2.2	19	0	0	996	na.	0	0
GWR3	0	1.4	20.4	0	0	996	0.1-0.8	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2 **Gas Monitoring Results - Volatiles**

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 21st May 2004. Monitoring undertaken by JBA
Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
P1	0	0	20.4	0	0	998	na.	0	0
P2	0	0.2	20.4	0	0	998	na.	0	0
P3	0	0	20.5	0	0	998	na.	0	0
P4	0	0.6	20.3	0	0	998	na.	0	0
P6	0	0.2	20.6	0	0	998	na.	0	0
P7	0	0	20.8	0	0	998	na.	0	0
A4	9.1	16.3	1.6	9.1	<<<	998	na.	0	0
A5	2.4	4.3	15.2	2.4	49	998	na.	0	0
A6	6.6	6	115.3	18.2	<<<	998	na.	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2 **Gas Monitoring Results - Volatiles**

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 17/18 June 2004 Monitoring undertaken by JBA

Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
GW 1/1	0	0	21.7	0	0	981	-	0	0
GW 1/2	0	0	21.7	0	0	981	0.8	0	0
GW 1/3	0	0.1	21.7	0	0	981	1.3-2.2	0	0
GW 1/4	0	0	21.8	0	0	981	1.3	0	0
BH 1/10	0	0	21.9	0	0	981	0.2	0	0
BH 1/11	0	0.7	21.2	0	0	981	1.3-2.2	0	0
BH 1/12	1.1	1.8	4.6	1.2	24	981	0.2-0.3	0	0
BH 1/13	55	11.3	0.9	55	>>>	981	0.8-1.2	0	0
BH 1/14	0	3.2	8.4	0	0	981	0.1-0.8	0	0
GW 4/1	0	0	22.1	0	0	982	0.1-0.4	0	0
GW 4/2	0	0.8	21.3	0	0	982	0.2	0	0
GW 4/3	0	307	14.4	0	0	981	1.4	0	0
GW 4/4	0	0.8	19.3	0	0	981	1.5	0	0
BH 4/10	0	0	22	0	0	981	0.1-0.5	0	0
BH 4/11	29.5	11.5	7.1	29.7	>>>	981	0.2-1	0	0
BH 4/12	19.5	7	6.5	19.6	>>>	981	0.4-1.2	0	0
GW 6/1	0	1.3	19.6	0	0	983	0	0	0
GW 6/2	0	0.5	21.5	0	0	983	0.1	0	0
GW 6/3	0	0	22.2	0	0	985	1	0	0
GW 6/4	0	0	22.1	0	0	985	0	0	0
GW 6/5	0	0.5	21.9	0	0	983	0.1-0.4	0	0
GW 6/5A	0	2.4	20.7	0	0	983	0.1-0.4	0	0
GW 6/6	0	1.5	18.8	0	0	983	0.2	0	0
GW 6/6A	0	0.4	21.8	0	0	983	0	0	0
BH 6/10	0	0.1	21.7	0	0	985	1.7-0.8	0	0
BH 6/11	0	0	21.7	0	0	985	0.8-1.5	0	0
BH 6/12	0	0	21.8	0	0	985	0.8-1.4	0	0
GWR1	0	1.6	21.2	0	0	983	-	0	0
GWR2	0	2.9	19	0	0	983	-	0	0
GWR3	0	0.8	21.1	0	0	983	0.1	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

Appendix 2

Gas Monitoring Results -Volatiles

Gas Monitoring Results at Boreholes GW+BH, RDL Blessington

Monitoring date: 13th January 2004 Monitoring undertaken by IGSL

Instrument: Geotechnical Instruments GA2000 Gas analyser

BOREHOLE	METHANE CH_4 %	CARBON DIOXIDE CO_2 %	OXYGEN O_2 %	Peak CH_4 %	LEL CH_4 %	BAROMETRIC PRESSURE (mb)	Flow L/H	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)
GW1/1	0	0.1	19.4	0.0	0.0	962	0.1	0	0
GW1/2	0	0.1	20.4	0.0	0.0	963	0.1	0	0
GW1/3	0	0	19.9	0.0	0.0	963	-0.2	0	0
GW1/4	0	0.3	20.1	0.0	0.0	962	0	0	0
BH1/10	15.5	8.3	7.5	15.8	>>>	962	1	0	1
BH1/11	0	0.2	20.2	0.0	0.0	962	0	0	0
BH1/12	20.2	1.1	12.1	20.8	>>>	962	0.1	0	0
BH1/13	23.4	3.9	12.8	24.7	>>>	962	-0.8	0	0
BH1/14	0	0	19.7	0.0	0.0	962	0	0	0
GW4/1	na.	na.	na.	na.	na.	na.	na.	na.	na.
GW4/2	0	0.1	20.2	0.0	0.0	965	0	0	0
GW4/3	0	0	19.9	0.0	0.0	963	-0.2	0	0
GW4/4	1.6	0.9	14.5	1.6	32.0	964	-0.1	0	0
BH4/10	40.2	15.9	0.1	40.3	40.3	965	0	0	0
BH4/11	35.3	14.9	0.0	35.8	>>>	965	0	0	0
BH4/12	5.7	2.8	6.9	5.8	>>>	965	-0.5	0	0
GW6/1	0	0.2	20.4	0.0	0.0	966	0	0	0
GW6/2	0	0	20.8	0.0	0.0	966	0	0	0
GW6/3	0	3.9	17.4	0.0	0.0	966	-0.2	0	0
GW6/4	0	0	20.0	0.0	0.0	966	0	0	0
GW6/5 North	0	0	21.0	0.0	0.0	966	0	0	0
GW6/5 South	0	0	21.0	0.0	0.0	966	0	0	0
GW6/6 West	0	0	20.9	0.0	0.0	966	0	0	0
GW6/6 East	0	0	21.0	0.0	0.0	966	0	0	0
BH6/9	7.9	10.4	12.6	9.2	>>>	966	0	0	0
BH6/11	0	0	20.1	0.0	0.0	966	0.1	0	0
BH6/12	1.2	0.6	14.3	1.2	2.3	964	0	0	0
GWR1	0	0.4	0.0	0.0	0.0	966	0	0	0
GWR2	0	0.1	20.4	0.0	0.0	966	0	0	0
GWR3	0	0	21.1	0.0	0.0	966	0	0	0

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H2S in ppmand O_2 in % by internal electrochemical cell measurement.

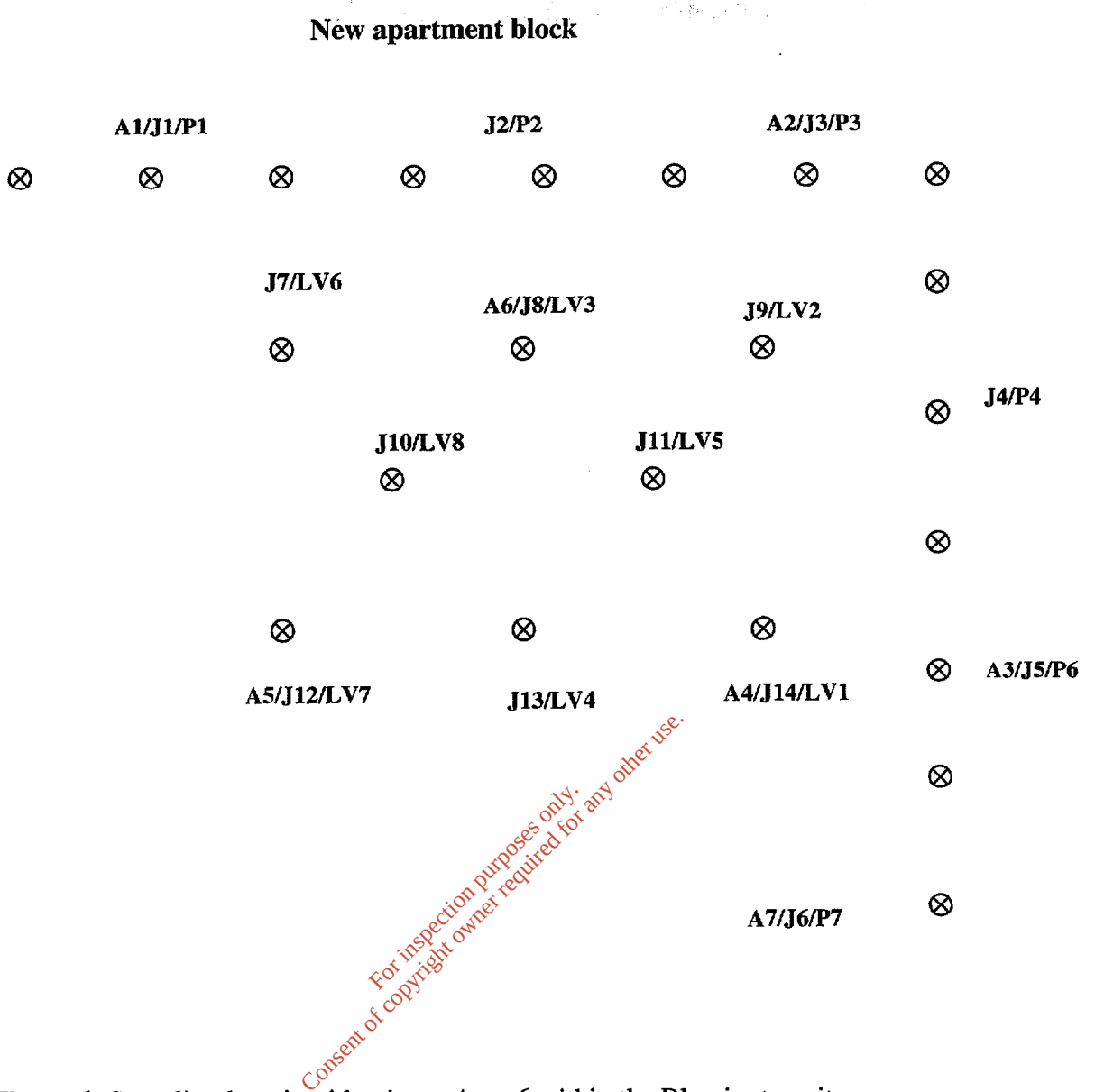


Figure 1. Sampling location identity at Area 6 within the Blessington site.

Table 1. Characteristics of active sampling of identified monitoring locations A1 to A7.

Sample Number	Sample Location	Pumping Rate of tube (mls/min)	Start Time	Airflow rate well head (litre/hr)[1]	Sampling duration (hr)
BL A1	Boundary/Ambient	99	09:30	-	4
BL A2	Boundary/Ambient	100	09:30	-	4
BL A3	Boundary/Ambient	98	09:30	-	4
BL A4	Well Head	94.9	13:45	5.694	1
BL A5	Well Head	113.9	13:50	6.834	1
BL A6	Well Head	151.9	13:55	9.114	1
BL A7	Background/Ambient	100	15:00	-	3

[1]denotes 0.150 m wellhead diameter; volume calculation based on airflow rate and radius of well head.

Table 2. Compound concentration at Monitoring location A1.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	<LOD	<LOD
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	<LOD	<LOD
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	<LOD	<LOD
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	<LOD	<LOD
1H-Indole-3-carboxylic acid, 5-hydroxy-	1.69	17.05
Benzoic Acid	1.51	15.25
3-Buten-2-ol, 1-bromo-2-methyl-	1.11	11.21
Nonanal	1.07	10.80
Benzaldehyde	1.01	10.21
Eicosane	1.01	10.18
2-Methyl-5-nitro-2H-indazole	0.93	9.40
Trimethylsilyl methyl sulfide	0.85	8.56
Acetonitrile, 1-(6-chloro-2-pyridyl)-1-(4-cyanomethylphenyl)-	0.68	6.83
Decanal	0.65	6.62
Total Voc's	**34.25**	**345.93**

Table 3. Compound concentration at Monitoring location A2.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	<LOD	<LOD
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	<LOD	<LOD
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	<LOD	<LOD
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	<LOD	<LOD
Toluene	3.54	35.43
Benzaldehyde	1.93	19.29
Decane	1.46	14.60
Nonanal	1.39	13.86
Nonane	1.23	12.33
1-Hexanol, 2-ethyl-	1.20	12.03
p-Xylene	0.94	9.37
Pyrrolidine, 2,5-dimethyl-1-nitroso-	0.93	9.35
Acetophenone	0.87	8.71
Cyclohexane, propyl-	0.85	8.53
Total Voc's	**64.89**	**648.90**

Table 4. Compound concentration at Monitoring location A3.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	<LOD	<LOD
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	<LOD	<LOD
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	<LOD	<LOD
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	<LOD	<LOD
2-mercapto-3-benzol (b) thienylidene)-4-methylaniline	0.52	5.31
1,3-Bis(trimethylsilyl)benzene	15.50	158.18
Toluene	3.88	39.62
Benzaldehyde	1.20	12.26
Hydrazine, 1,1-dimethyl-	1.20	12.25
Nonanal	0.66	6.78
p-Xylene	0.62	6.36
Oxime-, methoxy-phenyl-	0.61	6.21
Decanal	0.55	5.65
Acetophenone	0.48	4.88
Eicosane	0.32	3.32
Total Voc's	**42.37**	**432.39**

Table 5. Compound concentration at Monitoring location A4.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	**88.48**	**932.40**
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	<LOD	<LOD
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	<LOD	<LOD
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	<LOD	<LOD
Nonane, 4-methyl-	136.87	1442.23
Cyclohexane, propyl-	116.93	1232.19
Decane, 4-methyl-	115.25	1214.45
Benzene, 1,2,3-trimethyl-	114.54	1207.00
Nonane, 3-methyl-	102.49	1079.93
Benzene, 1-ethyl-2-methyl-	93.69	987.20
Octane, 2,6-dimethyl-	89.89	947.17
2-Hexene, 3-methyl-, (Z)-	78.25	824.54
Nonane	74.11	780.90
Octane, 3-methyl-	73.90	778.73
Total Voc's	**3712.27**	**39117.75**

Table 6. Compound concentration at Monitoring location A5.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	31.99	280.83
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	9.56	83.94
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	7.85	68.91
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	282.52	2480.45
Benzene, 1-methyl-2-(1-methylethyl)-	189.23	1661.34
.alpha.-Pinene	143.17	1257.02
3-Carene	130.64	1146.94
Toluene	124.80	1095.71
Nonane	114.17	1002.41
Ethylbenzene	113.43	995.88
Octane, 2,6-dimethyl-	95.78	840.92
Cyclohexane, propyl-	91.85	806.38
Nonane, 4-methyl-	91.28	801.42
Ethane, 1,1,1-trichloro-	90.37	793.38
Total Voc's	**3649.38**	**32040.25**

Table 7. Compound concentration at Monitoring location A6.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	<LOD	<LOD
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	<LOD	<LOD
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	<LOD	<LOD
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	<LOD	<LOD
Benzene, 1-methyl-2-(1-methylethyl)-	685.43	4512.40
Bicyclo[4.1.0]heptane, 3,7,7-trimethyl-	337.85	2224.15
Decane, 4-methyl-	286.89	1888.66
Nonane	254.05	1672.51
4-Octene, 2,6-dimethyl-, [S-(Z)]-	230.82	1519.57
Octane, 2,5-dimethyl-	210.69	1387.03
Decane	168.06	1106.41
3-Carene	167.74	1104.27
Cyclohexane, propyl-	166.79	1098.04
1-Methyl-4-(1-methylethyl)-cyclohexane	160.27	1055.10
Total Voc's	**5956.63**	**39214.16**

Table 8. Compound concentration at Monitoring location A7.

Compound identity	Amount adsorbed (ng on tube)	Location BLA1 concentration ($\mu g\ m^{-3}$)
Chloroethane	<LOD	<LOD
Chloroethene (Vinyl chloride)	<LOD	<LOD
Benzene	<LOD	<LOD
2-butoxy ethanol	<LOD	<LOD
1,1-dichloroethane	<LOD	<LOD
Trichloroethene	<LOD	<LOD
Tetrachloromethane	<LOD	<LOD
Hydrogen sulphide	<LOD	<LOD
1,1 dichloroethene	<LOD	<LOD
1,2-dichloroethene	<LOD	<LOD
Carbon disulphide	<LOD	<LOD
Methanethiol	<LOD	<LOD
Butyric acid	<LOD	<LOD
Ethanal (acetaldehyde)	<LOD	<LOD
Ethyl butyrate	<LOD	<LOD
1-propanethiol	<LOD	<LOD
Dimethyl disulphide	<LOD	<LOD
Ethanethiol	<LOD	<LOD
1-pentene	<LOD	<LOD
1-butanethiol	<LOD	<LOD
Dimethyl sulphide	<LOD	<LOD
Limonene	<LOD	<LOD
1,3-Bis(trimethylsilyl)benzene	0.19	1.92
Silicic acid, diethyl bis(trimethylsilyl) ester	0.20	2.04
2,4-Cyclohexadien-1-one, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-	0.12	1.16
N-Methyl-1-adamantaneacetamide	0.09	0.94
Indole-2-one, 2,3-dihydro-N-hydroxy-4-methoxy-3,3-dimethyl-	0.05	0.50
2-Ethylacridine	0.05	0.49
Arsenous acid, tris(trimethylsilyl) ester	0.05	0.46
5-Methyl-2-phenylindolizine	0.04	0.45
Silanamine, N-[2,6-dimethyl-4-[(trimethylsilyl)oxy]phenyl]-1,1,1-trimethyl-	0.04	0.43
Acetaldehyde, chloro-	0.04	0.39
Total Voc's	**5.57**	**55.71**

Sample Number	Sample Location	Sample Time	H_2S (ppb)
J1	Boundary/Ambient	15:35	2
J2	Boundary/Ambient	15:37	2
J3	Boundary/Ambient	15:39	2
J4	Boundary/Ambient	15:42	2
J5	Boundary/Ambient	15:45	2
J6	Boundary/Ambient	15:50	<LOD
J7	Well Head	16:10	13
J8	Well Head	16:13	6
J9	Well Head	16:16	4
J10	Well Head	16:20	1
J11	Well Head	16:22	10
J12	Well Head	16:25	3
J13	Well Head	16:27	17
J14	Well Head	16:30	6