



This form will report compliance with your permit as determined by an NRW officer

Site	Chirk Landfill Site			Permit Ref	GP3830BG		
Operator/ Permit holder	FCC Waste Services (UK) Limited						
Date	17/06/2014			Time in	09:30	Out	16:00
What parts of the permit were assessed	Landfill Gas Emissions Audit						
Assessment	Audit	EPR Activity:	Installation	X	Waste Op		Water Discharge
Recipient's name/position	Colin Shaw (Site Manager)						
Officer's name	Stuart Ross, Tony Roberts			Date issued	26/06/2014		

Section 1 - Compliance Assessment Summary

This is based on the requirements of the permit under the Environmental Permitting Regulations. A detailed explanation and any action you may need to take are given in the "Detailed Assessment of Compliance" (section 3). This summary details where we believe any non-compliance with the permit has occurred, the relevant condition and how the non-compliance has been categorised using our Compliance Classification Scheme (CCS). CCS scores can be consolidated or suspended, where appropriate, to reflect the impact of some non-compliances more accurately. For more details of our CCS scheme, contact your local office.

Permit Conditions and Compliance Summary

			Condition(s) breached
a) Permitted activities	1. Specified by permit	N	
	1. Engineering for prevention & control of pollution	A	
	2. Closure & decommissioning	N	
	3. Site drainage engineering (clean & foul)	N	
	4. Containment of stored materials	N	
	5. Plant and equipment	A	
c) General management	1. Staff competency/ training	N	
	2. Management system & operating procedures	N	
	3. Materials acceptance	N	
	4. Storage handling, labelling, segregation	N	
d) Incident management	1. Site security	N	
	2. Accident, emergency & incident planning	N	
e) Emissions	1. Air	A	
	2. Land & Groundwater	N	
	3. Surface water	N	
	4. Sewer	N	
	5. Waste	N	
f) Amenity	1. Odour	N	
	2. Noise	N	
	3. Dust/fibres/particulates	N	
	4. Pests, birds & scavengers	N	
	5. Deposits on road	N	
g) Monitoring and records, maintenance and reporting	1. Monitoring of emissions & environment	N	
	2. Records of activity, site diary, journal & events	N	
	3. Maintenance records	N	
	4. Reporting & notification	N	
h) Resource efficiency	1. Efficient use of raw materials	N	
	2. Energy	N	

KEY: C1, C2, C3, C4 = CCS breach category (* suspended scores are marked with an asterisk),
A = Assessed (no evidence of non-compliance), N = Not assessed, NA = Not Applicable, O = Ongoing non-compliance – not scored

Number of breaches recorded

0

Total compliance score
(see section 5 for scoring scheme)

0

If the Total No Breaches is greater than zero, then please see Section 3 for details of our proposed enforcement response

Section 2 – Compliance Assessment Report Detail

This section contains a report of our findings and will usually include information on:

- the part(s) of the permit that were assessed (e.g. maintenance, training, combustion plant, etc)
- where the type of assessment was 'Data Review' details of the report/results triggering the assessment
- any non-compliances identified
- any non-compliances with directly applicable legislation
- details of any multiple non-compliances
- information on the compliance score accrued inc. details of suspended or consolidated scores.
- details of advice given
- any other areas of concern
- all actions requested
- any examples of good practice.
- a reference to photos taken

This report should be clear, comprehensive, unambiguous and normally completed within 14 days of an assessment.

In this document 'Natural Resources Wales' means the Natural Resources Body for Wales established by Article 3 of the Natural Resources Body for Wales (Establishment) Order 2012.

Please refer to the landfill gas emissions and audit reports dated 17/06/14 for full findings and required actions.

Some of the areas on the SE flank showed elevated emissions from capped areas. This seems to be due to the reduction in efficacy of the landfill gas extraction system in this area due to the issues highlighted in the audit report. Natural Resources Wales proposes to return to this area in 1 month from the date of this report to perform a specific methane emissions survey on this flank using the Gazomat and check pumping regimes and de-watering/well sealing and extraction efficiency in this part of the site.



EPR Compliance Assessment Report

Report ID: GP3830BG/0213275

This form will report compliance with your permit as determined by an NRW officer

Site	Chirk Landfill Site	Permit	GP3830BG
Operator/ Permit	FCC Waste Services (UK) Limited	Date	17/06/2014

Section 3- Enforcement Response

Only one of the boxes below should be ticked

You must take immediate action to rectify any non-compliance and prevent repetition.

Non-compliance with your permit conditions constitutes an offence and can result in criminal prosecutions and/or suspension or revocation of a permit. Please read the detailed assessment in Section 2 and the steps you need to take in Section 4 below.

Other than the provision of advice and guidance, at present we do not intend to take further enforcement action in respect of the non-compliance identified above. This does not preclude us from taking enforcement action if further relevant information comes to light or advice isn't followed.

In respect of the above non-compliance you have been issued with a warning. At present we do not intend to take further enforcement action. This does not preclude us from taking additional enforcement action if further relevant information comes to light or offences continue.

We will now consider what enforcement action is appropriate and notify you, referencing this form.

Section 4- Action(s)

Where non-compliance has been detected and an enforcement response has been selected above, this section summarises the steps you need to take to return to compliance and also provides timescales for this to be done.

Criteria Ref.	CCS Category	Action Required/Advised	Due Date
See Section 1 above			

Section 5 - Compliance notes for the Operator

To ensure you correct actual or potential non-compliance we may

- advise on corrective actions verbally or in writing
- require you to take specific actions in writing
- issue a notice
- require you to review your procedures or management system
- change some of the conditions of your permit
- decide to undertake a full review of your permit

Any breach of a permit condition is an offence and we may take legal action against you.

● We will normally provide advice and guidance to assist you to come back into compliance either after an offence is committed or where we consider that an offence is likely to be committed. This is without prejudice to any other enforcement response that we consider may be required.

● Enforcement action can include the issue of a formal caution, prosecution, the service of a notice and or suspension or revocation of the permit.

See our Enforcement and Civil Sanctions guidance for further information

This report does not relieve the site operator of the responsibility to

- ensure you comply with the conditions of the permit at all times and prevent pollution of the environment
- ensure you comply with other legislative provisions which may apply.

Non-compliance scores and categories

CCS category	Description	Score
C1	A non-compliance which could have a major environmental effect	60
C2	A non-compliance which could have a significant environmental effect	31
C3	A non-compliance which could have a minor environmental effect	4
C4	A non-compliance which has no potential environmental effect	0.1

Operational Risk Appraisal (Opra) - Compliance assessment findings may affect your Opra score and/or your charges. This score influences the resource we use to assess permit compliance.

Section 6 – General Information

Data protection notice

The information on this form will be processed by the Natural Resources Wales (NRW) to fulfill its regulatory and monitoring functions and to maintain the relevant public register(s). The NRW may also use and/or disclose it in connection with:

- offering/providing you with its literature/services relating to environmental matters
- consulting with the public, public bodies and other organisations (e.g. Health and Safety Executive, local authorities) on environmental issues
- carrying out statistical analysis, research and development on environmental issues
- providing public register information to enquirers
- investigating possible breaches of environmental law and taking any resulting action
- preventing breaches of environmental law
- assessing customer service satisfaction and improving its service
- Freedom of Information Act/Environmental Information Regulations request.

The NRW may pass it on to its agents/representatives to do these things on its behalf. You should ensure that any persons named on this form are informed of the contents of this data protection notice.

Disclosure of information

The NRW will provide a copy of this report to the public register(s). However, if you consider that any information contained in this report should not be released to the public register(s) on the grounds of commercial confidentiality, you must write to your local area office within twenty working days of receipt of this form indicating which information it concerns and why it should not be released, giving your reasons in full.

Customer charter

What can I do if I disagree with this compliance assessment report?

If you are unable to resolve the issue with your site officer, you should firstly discuss the matter with the officer's line managers. If you wish to raise your dispute further through our official Complaints and Commendations procedure, phone our general enquiry number 0300 065 3000 (Mon to Fri 08.00–18.00) and ask for the Customer Contact team or send an email to enquiries@naturalresourceswales.gov.uk. If you are still dissatisfied you can make a complaint to the Public Services Ombudsman for Wales. For advice on how to complain to the Ombudsman phone their helpline on 0845 607 0987.



Natural Resources Wales Technical Review Of Landfill Gas Management Systems

Mr Colin Shaw (Site Manager)
FCC Environment Ltd
Pen y Bont Landfill
Pentre
Chirk
LL14 5AR

Pen Y Bont Landfill Gas Review and Methane Emissions Survey
Permit No: GP3830BG

20th June 2014

BACKGROUND

The U.K. Government has set a target of a unilateral 34% reduction of greenhouse gases (GHG) by 2020 compared to 1990. The Welsh Government climate change strategy includes a target to reduce greenhouse gas emissions by 3% every year.

Natural Resources Wales Corporate Plan for 2014-2017 makes a commitment to reduce GHG emissions in order to help meet the Government's overall GHG reduction target.

This technical audit has been carried out as a key part of the strategy to reduce methane emissions from active landfill sites in Wales.

As part of the ongoing audit and review programme an element of best practice and benchmarking of landfill in Wales will be included in our approach, to establish a consistent standard of operation and a better estimate of emissions and extraction efficiencies as well as to address sites with known local issues such as:

- i) significant numbers of odour complaints received from the general public;
- ii) evidence of lateral landfill gas migration beyond the site boundary.
- iii) other issues such as high trace gas levels and evidence of thermal events.
- iv) High Hydrogen Sulphide and associated health and safety issues
- v) Untimely Reduction in extraction efficiency
- vi) Increase in emissions

Please find the Landfill gas and Methane Emissions Survey conducted on the 17th of June 2014, with a list of comments and actions.



REVIEW

The site has had several follow up reviews by Officers from the Natural Resources Wales Specialist Landfill Gas Group, the lead Regulatory Officer accompanied by staff from FCC (The permit holder) and Infinis (The gas contractor). On this occasion the audit was performed by one member of the National Landfill gas Audit Team and the PPC compliance Officer for the site. A pre meeting with FCC management was held in the main site offices followed by a meeting with FCC Management and Infinis staff in the Gas Utilisation Compound offices. The team then inspected the gas treatment compound, followed by the gas field and working areas.

All sampling was performed with a calibrated Geotechnical Instruments GA2000+ and a Gazomat methane analyser.

Site Office Briefing and Meeting with FCC Management

1. 10 new pumps have been installed at the site. At the moment only two are rotated between wells. They are maintained once per month, they are monitored for cycling. If they are not cycling properly or have ceased pumping a contractor, (JSR) are called in to initiate repairs.
2. NRW have previously requested that re-charge rates are estimated to estimate the scale of de-watering required. As yet this information has not yet been provided.
3. FCC are monitoring leachate output. 2 extra tankers per day have been utilised coming from the gas wells and drainage sumps. This is producing approximately 60m³/day (wells and sumps) of extra leachate to be removed from site. There are 4 leachate sumps which have a stone drain approximately 3 metres into waste to drain the weeps from the perched leachate draining from the side of the site.
4. The leachate export levels have gone down slightly which may indicate a steady reduction in the perched leachate entrained in the site.
ACTION FCC: cross check export volumes of leachate for decline in production of perching levels at the site.
5. The FCC site management commented that the Infinis site Gas Technician was much happier with the way the wells were performing and the system was performing as a whole since the installation of the new pumps and removal of leachate from wells.



Over the past 18 Months FCC have committed the following resources to improve gas extraction efficiency and emissions control at the site:

1. Provision of 10 new leachate pumps
2. Provision of drainage sumps
3. Removal and tankering of up to 60m³/day of leachate off site for treatment and disposal
4. A commitment to work with the landfill gas contractor to de-water the extraction system and improve efficiency at the site.
5. Monthly FID surveys (non permit requirement)
6. Running repairs post FID
7. 2 Flux box surveys
8. A Whole site full flux box survey is proposed for the capped areas. (permit condition)
9. Additional capping with more proposed in July and August.
10. The standard falls recommended by NRW in previous audits have now been incorporated into the LFG management plan.

Existing waste streams will continue to be imported into the site due to the delay in the commissioning the new MRF in Wrexham. This will aid with establishing final profiles at the site but will mean that original final proposed levels will not be able to be met. The final levels were due to go to 107m AOD but now will finish at 92m AOD.

No methane has been detected in perimeter boreholes for at least 6 months which is a welcome development from a gas migration standpoint.

During the meeting further issues were discussed; The Regulatory Position Statement for monitoring of gas and groundwater was discussed and its potential application at FCC sites. This is not a statutory position and NRW would prefer any changes to such regimes to be the subject of risk assessment and may apply to certain parts of the site as well as the whole.

ACTION NRW: Stuart Ross will speak to the NRW permitting lead for guidance on the interpretation and implementation of the RPS. Stuart Ross discussed the odour complaint received on Friday the 13th June with the site manager. The site manager reported that the odour may have been caused by an odorous load of filter cake which had been delivered from a local industrial site although this has been disputed by the waste producer.



GAS SYSTEM DEVELOPMENT MEETING WITH INFINIS AND FCC – GAS UTILISATION COMPOUND OFFICES.

Extraction efficiency at the site has received a significant boost due to the works undertaken jointly by Infinis and FCC. Gas flow (as measured at the SCADA readout screen) has increased and the gas volume is now reading 1401m³/hr with 262m³/hr going to the flare and both of the engines operating at full load. **This is a significant improvement in extraction efficiency at the site and is a very welcome outcome of the commitment of manpower and resources by both Infinis and FCC over the past 12 months.**

The official handover of Allen and Bradley GUP control system took place on Friday the 13th June. This system has now been replaced by a Haase control system enabling Infinis to achieve better control over the entire LFG system.

Further improvements to the Gas Treatment and utilisation Compound include:

1. New Haase control system uses set point suction pressure
2. New continental duty and standby boosters
3. New main system knockout pot on entry to the Gas Management Compound
4. New analyser
5. New compressor

Major Improvements in the infrastructure on the gas management field were also discussed, these included;

1. Installation of 20 new deep gas wells
2. New field connection pipe-work
3. 12 wells installed last year on previously un-extracted flanks
4. Temporary increase in balancing and monitoring regimen.

Wells were all dipped a day after drilling and then again 2 weeks ago some wells are still not draining quickly so it seems reasonable to assume a significant volume of perching still remains.

Outstanding balancing and dipping data to be sent to FCC and then to NRW within 14 days of the date of the audit.



GAS MANAGEMENT COMPOUND (Actions in bold)

1. Gas flow and quality were read from the digital readout in the site office. The results are presented in table 1 below

Table 1 Gas Management Compound Readings

	CH4	CO2	O2	BAL	DP	CO	H2S	Flow (m3/hr)
Engine	51.9		0.2%		-96			1126
Flare (average)								276
Total Flow								1402

2. Flow to the flare was 276m3/hr at the quality shown in the table above. The flare remains de-rated as it has a capacity of 2000m3/hr at 50% CH4 NTP. **ACTION: Please provide the current rating in M3/hr and how de-rating will affect the turndown ratio.**
3. The flame was burning steadily and cleanly with no evidence of flame lick or poor combustion.
4. The new Haase Gas Control System was inspected long with the boosters (Duty and Standby) new pipework and housing. This finally replaces the Allen and Bradley System.
5. The differential pressure being applied to the vacuum system was -96 which seems to be slightly high. **Action: Is there a set point of pressure beyond which it will not rise further? If the pressure rises by a certain increment, is the field re-balanced to take into account the new pressure regimen?**



GAS EXTRACTION FIELD

(Actions in bold- refer to table 2 below for detailed findings and actions concerning sampled gas wells)

1. The South Eastern Flank of the site has had historical problems with perched levels, emissions and odour. Odour was detected as we walked halfway up the flank and approached well GW 81. Please see table 2 below for findings and required actions.
2. Gas emissions on the SE flank were high and several of the wells in this area had high readings and some of the pumps were not working or were requiring some form of maintenance. (Please refer to table 2 below and the attached methane emissions survey for complete findings and actions)
3. Wells GW 81,80 and 79 on the South Eastern flank showed signs of being blocked or partially blocked with leachate. 2 of the wells had boot detail emissions of 100ppm and 250ppm (see Gazomat Survey attached and Table 2 below). **ACTION:** It is essential that these wells are de-watered and re-sealed following dewatering as necessary. Please provide details of a dewatering plan and provide the latest dip data for these wells within 14 days of the date of this report.
4. Well GW80 demonstrated pulsing flow and a bubbling/foaming sound was audible at the well head which could be indicative of gas pushing through leachate from below. Extraction pressure at the well head was almost at mains pressure so it is likely that the well is blinded with leachate. There was no pump cycle over the 5 minute period that the well was tested therefore the pump is presumed not to be working. **ACTION: Please investigate and inform NRW of the findings within 7 Days of receipt of this report. With the valve closed the well pressure increased from -81 to +60 within 3 minutes. A 139mb change in relative pressure. This well requires urgent de-watering**
5. The pump maintenance schedule discussed in the pre meeting with FCC requires amending to improve the checking procedure for the in well pumps and to enable the pumps to be working at maximum pump efficacy which is vital to establish and maintain control in this area.
6. Some of the pumps were cycling but more slowly than would be expected where wells are suspected to contain high levels of perching. According to the Site Manager this may have been caused by a lack of air pressure from the existing system. The site Manager suggested using the Infinis air line pressure to augment the existing line pressure and amend checking procedure to target the slope and de-water. **ACTION: Site manager to amend pump maintenance and checking procedure and check air pressure supply to in well pumps. Please report findings to NRW within 14 days of the date of this report.**



7. Sumps along the top of last year's capping have pumps which can be transferred to the gas wells in question to help with the de-watering process. **Action: Provide details of pumps to be moved and the rationale for installing them in any particular well. The rationale should include the dip to water, available slotting and depth to base of well.**
8. Gas well 0079 has a pneumatic pump inserted. It is not in working order and needs removal for servicing. This cannot be performed manually. (See table 2 below for full findings and action) **ACTION: Remove the pump from this well, initiate repairs and provide an updated report to NRW when the work is complete. The bentonite seal around the base of the well may require re-sealing once the liquid levels are reduced.**
9. Some of the areas on the SE flank showed high emissions from capped areas. This seems to be due to the reduction in efficacy of the landfill gas extraction system in this area due to the issues highlighted in this report. NRW propose to return to this area in 1 month from the date of this report to perform a specific methane emissions survey on this flank using the Gazomat and check pumping regimes and de-watering/well sealing and extraction efficiency in this part of the site.
10. Positive pressure in a well with high H₂S was not reported to NRW by site staff when the question was raised. **ACTION: Please review site procedures to update NRW staff upon arrival on site.**
11. Gas well numbers, 40 and 115 are both new wells and had 1:1 CH₄/CO₂ ratios and increased CO. This could be causing semi aerobic conditions in the waste mass due to over extraction or poor well sealing or a combination of both. Such conditions could lead to a thermal event. **ACTION: Please re-analyse all wells showing high CO with a H₂S filter in place and report the findings to NRW within 14 days.**
12. Well 87 requires pumping to enable GW 119 to be brought on line. The cross interference from the older well when the slots are filled causes negative pressure to be detected in the new well. When this is pumped down the positive pressure regimen resumes. **ACTION: Please insert a pump into this well and check sealing to enable extraction to commence within 14 days of the date of this report.**



PERIMETER MONITORING

1. Perimeter monitoring wells were not inspected during this audit. However it was noted that the Operators results show no Methane breaches for over 6 months.
2. Dieback of vegetation at the landfill perimeter seems to have reduced which may be due to improved gas control in this area after the installation of 12 new wells on the northern flank which runs parallel to the River Dee.

POST AUDIT SITE MEETING WITH FCC AND INFINIS – GUP **(Actions in bold)**

The sustainability of gas flow within normal degradation parameters were discussed and markers for upgrading and keeping the infrastructure fit for purpose. Infinis have an initiatives team that look at an adapted model as a reference point. **ACTION: If possible please provide NRW with a rational for the timings of new infrastructure, well replacement, flow consistency and response to increasing emissions or indicative balancing data**

The requested the data from the new wells including dip readings and additional balancing etc., has not been supplied to FCC at the moment. **ACTION: This is to be supplied to NRW, by Infinis through FCC within 14 days of the date of this report.**

FCC/Infinis to provide an as built drawing of the upgraded extraction infrastructure.

Tony Roberts (NRW) will contact Mike Williams of Infinis regarding the operation of the new Haase control system.

Table 2 Extraction and Leachate Well Readings and Comments GA2000+ (Wells with no flow or off are marked in yellow)

Monitor ID	CH4 %	CO2 %	O2 %	Balance	Diff mBar	CO ppm	H2S ppm	Findings
GW 81	60	42.1	0.2	0	-82	8	475	A smell was noted downwind of the well. The installed pump was cycling approximately once per minute. The gas technician suspects that the water levels are still high and the pump should be cycling at a greater rate. The well pressure was very close to mains pressure indicating blinding of extraction slots with leachate. The well dips should be crossed referenced and any defects in the pump require urgent attention within 14 days of the date of this report.
GW80	61.9	40.8	0.3	0	-81.35	20	425	Pulsing flow and a bubbling/foaming sound was audible at the well head which could be indicative of gas pushing through leachate from below. Extraction pressure at the well head was almost at mains pressure so it is likely that the well is blinded with

Monitor ID	CH4 %	CO2 %	O2 %	Balance	Diff mBar	CO ppm	H2S ppm	Findings
0079	55.4	41.7	1.1	1.7	+33	30	348	leachate. There was no pump cycle over the 5 minute period that the well was tested therefore the pump is presumed not to be working. Please investigate and inform NRW of the findings within 14 Days of receipt of this report. With the valve closed the well pressure increased from -81 to +60 within 3 minutes. A 139mb change in relative pressure. This well requires urgent de-watering
								!800ppm emission from boot detail and +33 positive pressure in this well. Infinis Technician stated that the well crashes when opening. This may be due to blockage with perched leachate. Gas seems to be pushing through leachate at such a rate as to enable limited flow. The pump was not working and is stuck in the well. FCC site manager stated it may be able to be removed using a machine and this would be attempted

Monitor ID	CH4 %	CO2 %	O2 %	Balance	Diff mBar	CO ppm	H2S ppm	Findings
GW78	56.1	40.5	0.2	3.2	-73	13	330	shortly. Positive pressure in a well with high H2S was not reported to NRW by site staff when the question was raised. This well must be urgently investigated the pump removed and serviced within 14 days of the date of this report, dipped and de-watered if necessary. This well exhibited good flow characteristics a +9mb drop from mains pressure, strong audible flow and good methane concentration and methane to carbon dioxide ratio.
GW89	58.6	43.8	0.3	0		48	402	Good flow if a little rich in methane concentration. This may be contributing to the emissions detected with the Gazomat detector which peaked at 1200ppm. Please re-seal this well within 14 days of receipt of this report. The well should also be cross referenced with dip data to check for perched levels due to gas concentration which is high.

Monitor ID	CH4 %	CO2 %	O2 %	Balance	Diff mBar	CO ppm	H2S ppm	Findings
110								Very little apparent flow. Please investigate the cause of the poor performance of this well and report any findings or actions within 14 days of the date of this report.



Methane Emissions Survey Sheet

Site	Pen y Bont Landfill	Date	17/06/14	Time	in: 09:30 out: 16:00
Instrument	Gazomat Inspectra TDL (Serial No.: 1470311)	Test gas reading	N/A	Time	N/A
Next Calibration due	2015	Background reading	2.4ppm	Time	10:00
Weather conditions:	Overcast , warm, light breeze			Atm. Press.	
Survey Undertaken by:	S.Ross / T. Roberts				

General comments / observations

This technical review is being carried out as a key part of Natural Resources Wales Strategy to reduce methane emissions from landfill sites in England and Wales. The objectives of the site review include ensuring that the site is being operated and maintained so as to maximise gas collection efficiency and minimise fugitive landfill gas emissions. Treating the gas in a manner that minimises point source emissions.

An ATEX certified, Gazomat Inspectra Laser Methane Analyser was used to perform emissions testing at the site. Surface capping and structures (all landfill gas & leachate extraction wells) on the site were tested in order to establish potential sources of methane egress.

NB: For the purposes of the table below 1000ppm is the equivalent to 0.1% ambient methane.

Point ref.	Methane Reading	Feature and / or Grid Reference	Description / Comment	Key
1	17ppm	Capped Flank Nr. GW81	Slight odour detected in this area	0 - 50ppm
2	1100ppm	GW81	Detected at well ground seal. Pump installed and cycling.	50 - 100ppm
3	250ppm	GW80	Detected at well ground seal.	101 - 500ppm
4	68ppm	Capped Flank between GW 80 & 79	Slight odour (possibly arising upwind of flank)	501 - 1000ppm
5	1800ppm	GW79	Detected at well ground seal. Pump installed but not pumping. FCC report that pump is stuck in well. Well positive pressure + 33mbar. Infinis reported that gas quality will crash when well extracted.	1001 - 5000ppm
6	542ppm	Capped Flank between GW79 & GW78	Capped area – ground level measurement.	5001 - 10000ppm
7	18.5ppm	GW78	Detected at well ground seal. No pump installed. Good gas flow.	>1% v/v
8	2.7ppm	Sump 2	No emissions detected from sump or immediate area.	



9	9ppm	Pin well to South of Sump 2	
10	1300ppm	GW80	Gas bubbling through liquid within well. Pump installed but not working. Suspect flooded well. Gas pressure initially equal to mains pressure. Upon closing valve there was an upward pressure shift of 139 mbar to +60mbar within 3 minutes.
11	117ppm	Flank between GW79 & GW78	Capped flank
12	48ppm	5m up capped flank from GW78	Capped flank
13	130ppm	GW69	At well ground seal. Good gas flow.
14	17ppm	GW70	New gas well. Measurement at well ground seal.
15	108ppm	GW71	New gas well. With fresh hydrated bentonite. Measurement at well seal. Good flow.
16	320ppm	GW89	Measurement taken at well ground seal. 1200ppm on flank within 1m of GW.
17	650ppm	GW88	Measurement taken at well seal. Hydrated bentonite on surface.
18	420ppm	GW110	New gas well – well shut off since installation at NRW request. +12mbar static pressure
19	9ppm	GW114	New gas well. Measurement taken at well ground seal. Excellent flow & gas quality
20	4ppm	GW115	New gas well. Measurement taken at well ground seal. CO2/methane ratio 1:1. 78ppm CO
21	20ppm	GW40	New well? Measurement taken at well ground seal. Elevated CO.
22	6ppm	Waste surface nr. GW37	GW 37 suction reduced – filed measurements indicate over extraction. 68ppm CO
23	25ppm	Waste surface on new haul road nr. GW55	Peak 25ppm. Steady 20ppm. Slight odour.
24	Background	Sump 2	Sump 2 and surrounding flank.

Pen y Bont Landfill Site

**Surface Emissions Survey
17/06/2014**