

Busta Triangle, Eversley Deposit for Recovery

784-B068370

Gas Screening Report

Environmental Permit Application

Collard Group Ltd

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Gas Screening Report

1.0 Introduction

1.1 Report Scope

- 1.1.1 This Environmental Permit application has been prepared by Tetra Tech on behalf of the Operator, Collard Group Ltd (Collard).
- 1.1.2 This document relates to Collard's site Eversley Quarry located at Coopers Hill, Eversley Common, Eversley, Hampshire, RG27 0QA, and is centred at approximate National Grid Reference (NGR) SU 78735 59566. The application site is detailed on Drawing Number COL/B068370/MON/01.
- 1.1.3 Collards are seeking an Environmental Permit for a deposit for recovery activity. Collards propose to import inert materials for the long-term restoration of Eversley Quarry, with the intention to eliminate and mitigate flooding issues at Busta Triangle. It is anticipated that a maximum of 55,000m³ per annum will be imported to the site for a three-year period, totalling a maximum of 165,000m³.
- 1.1.4 The objective of the Gas Screening Report is to assess the potential risk to sensitive receptors associated with gas.
- 1.1.5 The potential source of gas, potential pathways through the geosphere and atmosphere by which LFG can migrate and the potential receptors are identified.
- 1.1.6 The proposed waste types, which would be accepted at the site, are inert in nature. Consequently, a quantitative gas risk assessment (for example using the Environment Agency's (EA) approved GasSim software)) is not considered appropriate and has not been used. However, this qualitative gas risk assessment uses a number of sources of guidance, which include: -
- Environment Agency (2007), 'Potential Gas Production From Landfilling Of Inorganic Wastes', Report reference SC030144/SR, March 2007;
 - Environment Agency (2007), 'Investigation And Quantification Of Gas Produced From Landfilling Of Inorganic Wastes' Report reference P1-516/2b, August 2007; and,
 - Environment Agency, Landfill Technical Guidance 03 (LFTGN03) 'Guidance on the Management of Landfill Gas', September 2004.

1.2 Site Setting

- 1.2.1 The site is located at Eversley Quarry located at Coopers Hill, Eversley Common, Eversley, Hampshire, RG27 0QA, and is centred at approximate National Grid Reference (NGR) SU 78735 59566.
- 1.2.2 The site forms part of the wider Eversley Quarry, which is a former sand and gravel quarry located approximately 2.5km south-east of Eversley and 1 km north-west of Blackbushe Airport in the County of Hampshire.

- 1.2.3 The triangle is formed by two roads the A327 along the western boundary and the B3016 Cooper's Hill along the eastern boundary with agricultural land to the north.
- 1.2.4 The site is separated into distinct areas located north and south of Bridleway no. 11 which runs east-west through the site.
- 1.2.5 Access to the site will be achieved via the existing Eversley Quarry access point off Coopers Hill (B3016).

2.0 Conceptual Gas Model

- 2.1.1 The source, pathway, receptor approach has been used to derive a conceptual model showing the proposed engineering arrangements and to assess the potential risks of gas from the infilling at the site.

2.2 Source

Off-site Sources of Gas

- 2.2.1 The site forms part of the wider Eversley Quarry, which is a former sand and gravel quarry. The wider quarry has partially been restored monitoring of these areas is undertaken in accordance with their planning permission 24/00484/HCC and the requirements of the permit.

On Site Sources of Gas

- 2.2.2 The main potential source for this gas risk assessment is the waste that would be deposited at the site. The void will be infilled progressively and it is calculated that in order to complete the works a maximum of 55,000m³ per annum will be imported to the site for a three-year period, totalling a maximum of 165,000m³.
- 2.2.3 The site would only accept inert waste which is defined in Article 2 of the Landfill Directive 1999/31/EC (definition provided in Section 3.2.2).
- 2.2.4 Table 1 lists those wastes that may be accepted at the site which do not require Waste Acceptance Criteria (WAC) testing under Council Decision (2003/33/EC), provided that they are inert and from a single source only (mixed loads from more than one site cannot be accepted without testing).

Table 1: Proposed Waste Types

EWC Code	Description	Restriction
01	WASTE RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS	
01 01	Wastes from mineral excavation	
01 01 02	Waste glass-based fibrous materials	Restricted to waste overburden and interburden only
01 04	Wastes from physical and chemical processing of non-metalliferous minerals	
01 04 08	Waste gravel and crushed rocks other than those mentioned in 04 04 06	
01 04 09	Waste sand and clay	
10	WASTES FROM THERMAL PROCESSES	
10 12	Wastes from manufacture of ceramic goods, bricks, tiles and construction products	
10 12 08	Waste ceramics, brick, tiles and construction products (after thermal processing)	

17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)	
17 01	Concrete, bricks, tiles and ceramics	
17 01 01	Concrete	Selected C&D waste only
17 01 02	Bricks	Selected C&D waste only
17 01 03	Tiles and ceramics	Selected C&D waste only
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	Selected C&D waste only. Metal from reinforced concrete must have been removed.
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil	
17 05 04	Soil and stones other than those mentioned in 17 05 03	Excluding topsoil, peat; excluding soil and stones from contaminated sites
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE	
19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified	
19 12 09	Minerals only	Wastes from the treatment of waste aggregates that are otherwise naturally occurring minerals. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS	
20 02	Garden and park wastes (including cemetery waste)	
20 02 02	Soil and stones	Only from garden and parks waste; excluding topsoil, peat.

2.2.5 In addition to the wastes that are listed in Table q, Collard propose to accept the waste codes listed in Table 2 below and will be subject to WAC testing.

Table 2: Proposed Waste Types that Will Require WAC Testing

EWC Code	Description	Restriction
10	WASTES FROM THERMAL PROCESSES	
10 13	Wastes from manufacture of cement, lime and plaster and articles and products made from them	
10 13 14	Waste concrete	
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTEWATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE	

19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified	
19 12 12	Other wastes from mechanical treatment of wastes other than those mentioned in 19 12 12	Restricted to crushed bricks, tiles, concrete and ceramics only. Metal from reinforced concrete must be removed. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.

2.2.6 Waste types for the construction of the Attenuation Layer will be restricted to the following waste codes in Table 3 below. The attenuation layer will be constructed with a minimum thickness of 1m with a hydraulic permeability of 1×10^{-7} m/s.

Table 3: Permitted Waste Types in the Attenuation Layer Only

EWG Code	Description	Restriction
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)	
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil	
17 05 04	Soil and stones other than those mentioned in 17 05 03*	

* This specifically excludes excavated soil from contaminated sites.

2.2.7 Gas is produced by the biological degradation of organic components. Microbial processes degrade organic matter in the absence of oxygen and produce methane and carbon dioxide. In terms of gas generation at the site, no organic matter will be present, and it is therefore considered that the inert waste materials deposited at the site will not give rise to significant quantities of gas. The potential for the generation of gas is therefore considered to be negligible.

2.2.8 The site will have strict waste acceptance procedures in place to ensure that only inert wastes are accepted at the site. This will minimise the risk of acceptance of non-conforming wastes, such as biodegradable wastes, which would have the potential to cause the generation of gas.

2.2.9 Considering the above, it is determined unlikely that there will be any source of significant gas generation at the proposed site.

2.3 Pathways

2.3.1 A number of potential pathways exist which would provide a link between the sensitive receptors and gas generated within the site. The EA's guidance document LFTGN03 entitled 'Guidance on the Management of Landfill Gas' (September 2004) identifies the following generic potential pathways: -

- Direct release to atmosphere;

- Sub-surface migration, through the ground or along service ducts or pipelines;
- Indirect release to atmosphere e.g. from sub-surface gas migration; and,
- Direct release of combustion products to atmosphere e.g. from flares/engines.

2.3.2 The primary pathway for gas generated within the site would be vertically to atmosphere through unrestored areas of waste. Pathways that are considered to be less preferential would be vertically through the restored areas of the site or laterally through the engineered side slope liner.

2.3.3 The EA's Report 'Investigation and Quantification of Gas Produced from Landfilling of Inorganic Wastes' (August 2007) considers the potential for gas to migrate from an inorganic or low carbon site. The report acknowledges that inorganic waste does not generate substantial quantities of gas, and that there will generally be an insufficient pressure differential to drive the gas through low permeability waste. Thus, as there will be only inert wastes accepted and deposited, it is considered that there will be an insufficient driving pressure for the gas to create a viable pathway.

2.3.4 Furthermore, the waste will be deposited within a site with an attenuation layer constructed with a minimum thickness of 1m with a hydraulic permeability of 1×10^{-7} m/s.

2.3.5 In addition to the limitations for gas migration because of the negligible quantities of organic/biodegradable waste, which will be deposited, the proposed engineering design will further limit the potential for any viable pathways.

2.4 Receptors

2.4.1 Receptors within 1km of the site, including those identified in the Nature and Heritage Conservation Screen (EPR/JP3323LE/P001), have been listed in Table 4 and are shown on Drawing Number COL/B068370/REC/01. The Nature and Heritage Screen is appended in the Environmental Risk Assessment which is supplied as Appendix D of this Environmental Permit Application. The main pathway for the identified sources will be atmosphere and as such, atmospheric conditions can affect dispersion rates and hence potential risk. As a result, the location of each receptor in relation to the site may influence the potential impact of the risk, as summarised in Table 4.

Table 4: Location of potential receptors within 1km of the Site

ID	Receptor	Direction from Operational Area	Minimum Distance from the Permit Application Boundary (approx. m)
Domestic Dwellings			
1	Hill House	N	Adjacent
2	Properties off Coopers Hill	NE	300
3	Properties off access road off Coopers Hill	NE	170

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4	Properties off Kits Croft	NE	880
5	Properties off A327	NW	945
6	Properties off Wood Farm	N	625
7	Properties off A327	N	845
8	St Richard's Ride Property	S	70
Commercial and Industrial Premises			
9	Wood Farm Industry	N	510
10	A P T Systems	NE	305
11	R. Collard Limited Warren Heath Recycling Facility (EPR/GB3933DZ)	W	50
12	R. Collard Limited Waste Transfer Station (EPR/QP3490EA) & Amiante STR	SE	20
13	Biffa and Hartley Witney Roofing	SW	585
14	BCA Blackbushe	SE	835
15	Blackbushe Airport	SE	975
16	CEMEX Bramshill Quarry	W	230
17	Industrial and Commercial Properties off A327	N	250
18	Valley Roofing UK	N	880
Schools / Hospitals / Shops/Amenities			
19	Little Forest Adventures Education Centre		
Recreation			
20	Leisure Matters	NW	510
21	Gunman Airsoft	NW	525
Highways/Minor Roads/Railways			
22	Coopers Hill (B3016)	E	Adjacent
23	A327	W	Adjacent
24	A30	S	720
Listed Buildings and Scheduled Monuments			
25	Brick House (Listed II Building)	N	1,000
Surface Water e.g. rivers and streams			
26	Pond	E	345
27	Bramshill Quarry Ponds	W	460
28	Stream	E	240
29	Coombes Wood Stream	NW	430

30	Stream	S	255
31	Ponds	-	On-Site
Sensitive Land Uses			
32	Copse Farm	N	540
33	Busta Farm	N	230
34	Westfield Farm	NE	315
Protected Habitats			
35	Castle Bottom (NNR)	E	25
36	Bramshill (SSSI)	-	On-site and Adjacent West
37	Castle Bottom to Yateley and Hawley Commons (SSSI)	E	25
38	Thames Basin Heaths (SPA)	-	On-site and Adjacent E/W/S
39	Hill House – Deciduous Woodland	N	Adjacent
40	Coopers Hill - Deciduous Woodland	E	20
41	Castle Bottom - Deciduous Woodland	E	505
42	Coombes Wood - Deciduous Woodland	NW	535
43	Busta Farm - Deciduous Woodland	N	255
44	Copse Farm - Deciduous Woodland	N	655
45	Lower Copse House - Deciduous Woodland	N	970
46	Hartford Bridge Flats - Deciduous Woodland	S	705
47	BAP Priority Habitat	-	On-site and Adjacent E/W/S

Groundwater (sensitivity)

According to the Multi-Agency Geographic Information for the Countryside's (MAGIC) website, the site is not situated within a Groundwater Source Protection Zone. The MAGIC website also indicates that the site is designated as a Secondary A Bedrock and Superficial Drift Aquifer

2.5 Current Monitoring

- 2.5.1 Three boreholes have been installed in the periphery of the site and their location are shown on Drawing Number COL/B068370/MON/01. Gas will be monitored over a period of 12 months prior to the commencement of operations in order to establish background concentrations and the setting of EAL's.

2.6 Environmental Assessment Levels (EALS)

2.6.1 For the sub-surface migration of gas, Technical Guidance Note LFTGN03 'Guidance on the Management of Landfill Gas' considers that an appropriate environmental benchmark for methane and carbon dioxide is 1% and 1.5% by volume above background respectively. A suitable site specific Environmental Assessment Levels (EALS) for methane at the site is considered to be 1.0% by volume for all gas monitoring boreholes.

2.6.2 In terms of compliance levels for carbon dioxide, industry guidance document 'Perimeter soil gas emissions criteria and associated management' (January 2011) states:-

'Carbon dioxide is a poor choice of gas to regulate emissions from landfills because there are alternative sources in the sub-surface. Because emission based regulation of a gas generated naturally in the environment at concentrations 0 -20% is not logical, carbon dioxide should not be used for regulating the sub-surface strata outside a landfill unless there is a site specific high risk receptor nearby, such as an underground confined space....'

'An alternative to regulating on compliance limits is to regulate on the reaction to exceeding a carbon dioxide action level'.

2.6.3 This is also addressed in the EA's Position Statement 'Industry code of practice on perimeter soil gas' (August 2011) which states:-

'We will require operators to set action levels as part of their gas management plan and to monitor perimeter boreholes and assess carbon dioxide concentrations against the action level to prompt investigatory action and inform regular reviews of the conceptual model'

2.6.4 The above document considers that for background Carbon Dioxide concentrations between 0 to 20% by volume, it is appropriate in this circumstance to set limits in accordance with the ICoP and therefore Carbon Dioxide action levels have been proposed based on monitoring data obtained to date. The site specific EALS for methane and carbon dioxide are shown in Table 5 below.

2.6.5 The industry guidance document 'Perimeter soil gas emissions criteria and associated management' (January 2011) states for:-

- For every well the action level will be 1% carbon dioxide above the highest carbon dioxide concentration if the highest carbon dioxide concentration is less than 5%;
- For every well the action level will be 2% carbon dioxide above the highest carbon dioxide concentration if the highest carbon dioxide concentration is between 5 - 10%; and
- For every well the action level will be 3% carbon dioxide above the highest carbon dioxide concentration if the highest carbon dioxide concentration is between 10 - 20%.

2.6.6 Gas EAL's will be set for methane and carbon dioxide upon assessment of 12 months of background monitoring data.

3.0 Gas Risk Assessment

- 3.1.1 Landfill Technical Guidance Note LFTGN03 provides guidance on the level of risk assessment that is considered appropriate for different types of sites and states that Tier 1 Hazard Identification and Risk Screening should be sufficient to deal with most of the risks from inert sites. However, this is also dependent on the level of risk and uncertainty specific to the site.
- 3.1.2 The site is predicted to generate negligible quantities of gas due to the inert nature of the waste. Furthermore, the operator's detailed waste acceptance procedures and Environmental Management Plan will ensure that only inert waste is deposited at the site, thus removing any uncertainty with respect to the potential for the deposition of non-inert wastes. Taking these factors into consideration, it is concluded that the overall level of risk associated with the site is low. A qualitative risk assessment is therefore considered appropriate in order to determine the level of risk from gas at the site.

3.2 Accidents and other Consequences

- 3.2.1 The EA's guidance (LFTGN03) requires a number of accident and failure scenarios to be assessed in order to quantify the impact of given events. The reliability of gas control measures and site engineering should be assessed in the risk assessment and the main hazards that could lead to accidental emissions should be identified. LFTGN03 provides examples of general categories of accidents that may potentially affect gas control:-
- Loss of containment e.g. leakage, liner failure, spillage;
 - Loss of collection and/or treatment capability e.g. failure of pipework, control system, etc;
 - Explosions and fires e.g. deep seated fire; and
 - Failure of leachate extraction system and the effect on gas extraction.
- 3.2.2 These scenarios have been assessed as part of the gas risk screening process.

3.3 Qualitative Gas Risk Assessment

- 3.3.1 The potential hazards that exist from gas are:
- Toxicity (acute and chronic);
 - Ecotoxicity;
 - Fire and explosion;
 - Asphyxiation; and
 - Odour.

3.3.2 The trace components of gas pose an odour and toxicity risk whilst the bulk gases pose a risk of explosion and asphyxiation, although carbon dioxide is also toxic and should be considered in the assessment of toxicity. Explosion and asphyxiation risk is generally related to sub-surface migration and accumulations in enclosed spaces, such as residential or commercial properties, or underground services. EA document LFTGN03 states that whilst this is more difficult to quantify, for the risk screening stage, the impact assessment should be based on:-

- The presence of potential pathways and site specific receptors; and
- A qualitative assessment of the severity of the consequences.

3.3.3 The qualitative assessment for each receptor is provided in Table 5.

Table 5: Qualitative Risk Assessment

Receptor	Hazard	Sensitivity of Receptor	Likelihood of Exposure
Occupiers of domestic dwellings and farmhouses listed in Table 4.	Odour, toxicity, asphyxiation	High	Very Unlikely
Workforce and customers in commercial and industrial properties listed in Table 4.	Odour, toxicity, asphyxiation	High	Very Unlikely
Recreational areas listed in Table 4.	Odour, toxicity, asphyxiation	High	Very Unlikely
Priority Habitats, Local Wildlife Sites, Designated Sites and agricultural land listed in Table 4.	Eco-toxicity	Low	Very Unlikely

3.3.4 Table 6 details the qualitative risk assessment which has been undertaken for the accident and failure scenarios using the risk assessment process and scoring system set out within EA document LFTGN03. Table 7 provides a justification of the 'likelihood' scores for each of the accident or failure scenarios set out in Table 6.

Table 6: Qualitative Risk Assessment for Accident and Failure Scenarios

Accident/Failure Scenario	Likelihood	Severity of Consequence	Score	Magnitude of Risk
Loss of containment (e.g. leakage, spillage)	Extremely unlikely (1)	Minor (1)	1	Insignificant
Explosions and fires	Very unlikely (2)	Significant (3)	6	Insignificant
Biodegradable Waste Input	Unlikely (3)	Significant (3)	9	Acceptable

Table 7: Justification for Assigned ‘Likelihood’ Scores

Accident/Failure Scenario	Justification for ‘likelihood’ score
Loss of containment (e.g. leakage, liner failure, spillage)	The site will be engineered to a high standard and the containment system will be subject to Construction Quality Assurance (CQA) supervision and testing. It is therefore extremely unlikely that the containment system will fail or leak.
Explosions and fires	The proposed waste types are inert in nature and therefore will not be combustible or explosive. Waste acceptance procedures will ensure that potentially flammable or explosive materials are not accepted at the site.
Biodegradable Waste Input	The proposed waste types are inert in nature. However, all wastes entering the site will be subject to detailed waste acceptance procedures. Wastes will only be accepted onto the site if they comply with the list of wastes included in the permit. Basic characterisation will ensure that the waste is suitable for acceptance at the regulated facility however if there is uncertainty regarding the acceptance of wastes at the site, testing may be required. No wastes will be accepted onto the site if there is uncertainty as to its source, conformance with the conditions in the permit and/or its suitability for the intended use. Consequently, it is considered unlikely that biodegradable waste will be accepted at the site.

- 3.3.5 The results of the qualitative risk assessment show that the most significant accident /failure scenario is the acceptance of biodegradable waste into the site which would arise from a failure in the operator’s waste acceptance procedures.
- 3.3.6 As set out in the Operating Techniques (Appendix C of the Environmental Permit Application), there will be strict waste acceptance procedures in place to minimise the risk of non-compliant wastes being accepted. All site staff will be made aware of the procedures and the requirements of the company Environmental Management System. Furthermore, the Operating Techniques details the measures to be taken in the event that unauthorised waste is identified within a load.
- 3.3.7 As such, it is considered unlikely that biodegradable waste will be deposited within the site.

4.0 Gas Management and Monitoring

4.1 Gas Management

- 4.1.1 Negligible quantities of gas are predicted to be generated from the site and no active gas management is therefore proposed within the site. The negligible quantities of gas generated would vent passively to atmosphere from the body of waste.

4.2 Gas Monitoring

- 4.2.1 In accordance with the EA's 'Waste recovery plans and deposit for recovery permits' guidance, if an operator intends to deposit waste more than 2m below the surrounding the ground surface, they must monitor the waste for methane, carbon dioxide and oxygen. The atmospheric pressure must also be recorded when taking gas readings.
- 4.2.2 Gas monitoring boreholes have been installed around the site, as shown on the site monitoring plan. The boreholes are currently monitored on a monthly basis for concentrations of methane, carbon dioxide and oxygen.
- 4.2.3 The proposed monitoring programme is detailed in the table below.

Monitoring Programme

Borehole Reference	Parameter	Monitoring Frequency
BH01, BH02, BH03	Methane, carbon dioxide, oxygen, atmospheric pressure, differential pressure, temperature.	Monthly for 12 months (i.e., 12 data sets) then quarterly.

- 4.2.4 In accordance with the EA's 'Waste recovery plans and deposit for recovery permits' guidance, if an operator intends to deposit waste more than 2m below the surrounding the ground surface, they must monitor the waste for methane, carbon dioxide and oxygen. The atmospheric pressure must also be recorded when taking gas readings.

4.3 Compliance Levels

- 4.3.1 Compliance Levels will be set for each borehole, based on guidance set out in EA Technical Guidance Note 03 (LFTGN03). Compliance and action levels for the new boreholes will be finalised following 12 months of sampling.
- 4.3.2 This Gas Risk Screening Report has demonstrated that the potential for the generation of gas is low. However, an appropriate Action Plan is required in the unlikely event that Action Levels set for each borehole are exceeded. Action Levels will be set at a level which enables the site management to take timely and appropriate action, so that Compliance Levels are not exceeded.

Further actions are however documented, in the event that both Action Levels and Compliance Levels are exceeded. The following sections set out the proposed Action Plan for the site.

4.4 Action Plan

4.4.1 In the event that both Action Levels and Compliance Limits are exceeded. The following sections set out the proposed Action Plan for the site.

Investigation Procedure

4.4.2 The procedures for the assessment of gas monitoring results in relation to trigger limits are as follows:

1. For methane and carbon dioxide concentrations below the Action Level - allow as normal variability.
2. If methane or carbon dioxide concentrations exceed the Action Level then check previous two readings from the gas database and:
 - i) If the previous readings do not exceed the Action Level then no further action is required other than to note that a breach has occurred.
 - ii) If the previous two readings do exceed the Action Level, then increase monitoring frequency to fortnightly in affected and adjacent boreholes; and assess the possible cause of the increase in concentrations by problem solving described in Section 5.4.4.
3. If methane concentrations exceed the Compliance Level then check the previous reading from the gas database and:
 - i) If the previous reading in the affected borehole was below the Action Level then take no further action except to note that the compliance level has been breached.
 - ii) If the previous reading was above Action Level, then increase monitoring frequency to fortnightly in affected boreholes until concentrations reduce below Compliance Level %.
 - iii) Assess the possible cause of the increase in concentrations by problem solving described in Section 5.4.4 and review previous monitoring results to see if there is any indication of a trend.
 - iv) Monitor borehole pressure to determine likelihood of significant gas flow rates.

4.4.3 The procedures for the assessment of gas flow monitoring results in relation to compliance limits are as follows:

1. If significant flow rates are absent then continue monitoring fortnightly until gas concentrations reduce below Compliance Level.
2. If significant flow rates are absent but methane concentrations do not reduce below the Compliance Level within three months and the source of the gas has been identified as the

permitted site, then consider the initiation of appropriate gas control measures in association with the EA.

3. If significant flow rates are present and readings persist above the Compliance Level % for more than 6 weeks with no signs of decreasing levels then carry out a gas survey of street services (for methane and carbon dioxide). Dependent on the results of the street survey, consider carrying out a gas survey of potentially affected properties after discussion with the EA.
4. The Company will make immediate arrangements to install gas control measures after consultation with the EA.

Problem Solving

4.4.4 In the preceding section, the first course of action proposed following any breach of compliance limits is to “assess the possible cause of the increase in gas concentrations”. The routine to be followed to perform this instruction is set out below:

1. Check whether the barometric pressure was rising, falling or steady on the day and in the day(s) preceding the date of monitoring.
2. Check the results against those of other site monitoring boreholes to determine if the result is part of a general deterioration in the gas levels in the area, or a localised occurrence.
3. Check oxygen and carbon dioxide concentrations to determine if these correlate to a deterioration in methane concentrations.
4. Ensure that monitoring equipment is functioning effectively, check with an alternative gas machine, and consider taking a confirmatory sample for gas-chromatographic analysis if in any doubt.
5. Attempt to identify the most likely source of methane, in relationship to the history of the site, and previous monitoring results.
6. Investigate the surrounding area for signs of gas or leachate escape.

4.4.5 If a problem is identified, it will be rectified as soon as possible. The Site Manager or his nominee will be informed immediately, and he will co-ordinate any action required.

4.4.6 Record all actions in the Site Diary.

Gas Control procedure

4.4.7 Gas control measures may include one or more of the following: -

- Cut-off barrier;
- Passive vent trench;
- Passive venting or Pumped wells.

4.4.8 The selection of the appropriate control measures will be discussed with the Agency prior to installation and will take into account the nature and depth of the waste deposited. As this site contains only inert waste, it is highly unlikely that gas control procedures will be required, however if

they were a passive vent trench or passive venting boreholes would probably be the most effective remedy.

- 4.4.9 Increased gas monitoring in the affected boreholes will continue throughout and after installation of the control measures and until values drop below the Action Level. Monthly monitoring will then resume unless the Action Level is exceeded again.

5.0 Conclusion

- 5.1.1 The proposed waste types will be inert in nature and will not give rise to significant quantities of gas. The negligible quantities of gas generated are unlikely to be under significant pressure which will minimise the likelihood of gas migration. Furthermore, the site will be engineered with a low permeability clay side slope and basal liner, which will further reduce the risk of lateral gas migration. The risk to nearby sensitive receptors associated with the generation and migration of gas is therefore considered to be low.
- 5.1.2 Detailed waste acceptance criteria will be used to ensure that only inert wastes are accepted at the site. This will prevent unauthorised wastes being accepted. The absence of biodegradable material within the site shall ensure that significant quantities of gas are not produced within the site from waste and the risk to receptors remains low. Furthermore, this shall ensure that odour nuisance, vegetation stress and global atmospheric damage are also avoided.
- 5.1.3 This Gas Screening Report has determined that the site will not give rise to significant quantities of gas due to the inert nature of the proposed waste types. The site will be engineered in accordance with the requirements of the Landfill Directive 1999/31/EC, although this is not a requirement for waste recovery sites. It is considered that, with respect to gas, the site will be compliant with the requirements of the EA.