



APPENDIX 5: GAS MANAGEMENT WORKS UNDERTAKEN BY LANDFILL OPERATORS

Further assessment or gas management works are being undertaken at the eight sites where methane was detected above EPA's investigation level of one per cent concentration. The following appendix to EPA's assessment report provides the technical detail surrounding those works.

CONTENTS

1.	LANDFILLS WITH METHANE POSSIBLY DERIVED FROM NATURAL SOURCES	1
1.1.	Landfill address: 274 Hallam Road, Hampton Park	1
1.2.	Landfill address: Bosworth Road, Bairnsdale	2
2.	LANDFILLS WITH METHANE DETECTED OF LANDFILL ORIGIN	2
2.1.	Landfill address: 890 Taylors Road, Lyndhurst	2
2.2.	Landfill address: 654-718 Clayton Road, Clayton South	3
2.3.	Landfill address: corner Deals Road & Heatherton Road, Clayton South.....	3
2.4.	Landfill address: Fraser Rd, Clayton South.....	3
2.5.	Landfill address: corner Clarke Road & Spring Road, Springvale.....	4
2.6.	Landfill address: Clarke Road, Springvale South	4

1 LANDFILLS WITH METHANE POSSIBLY DERIVED FROM NATURAL SOURCES

1.1 Landfill address: 274 Hallam Road, Hampton Park

Landfill licence: ES33144
Licence holder: SITA Environmental Solutions
Status: Licensed and operating site

Bores were constructed and monitored by SITA's technical consultants, so EPA has not constructed bores at this site. However, EPA has confidence in the information provided by SITA. SITA's data is presented in Appendix 4.

On 22/10/08, moderate to high methane levels (between 11 and 61 per cent concentration) were detected in two adjacent bores (Bores 1 and 1B) just outside a landfill cell. However, bores constructed further away from the landfill indicated that the methane had not moved offsite. Improvements to the gas extraction system appear to have resolved this issue and methane has not been detected in these bores above one per cent concentration since November 2008.

Another bore (Bore 8) detected methane at low levels (less than three per cent concentration) and only at more than seven metres below ground level. This bore is near a residential area, but five shallow bores closer to these residences have not detected methane, indicating methane is not present close to ground level. There are three shallow bores and one deep bore located between Bore 8 and the landfill, none of which have detected methane, indicating that the methane in Bore 8 may not be derived from the landfill.

Additional deep bores will need to be constructed between Bore 8 and the landfill to confirm absolutely that there is no methane present in the intervening space. Bore 8 is some distance from bores 1 and 1B and EPA considers that the detection of methane in these locations is unlikely to be related.

SITA has conducted gas chromatography testing to compare the gas in Bore 8 with gas taken directly from within the landfilled waste. The results of the gas chromatography show that the landfill gas sample contained a number of volatile organic compounds typically associated with landfill gas, which were not detected within the gas sample taken from bore 8. This may suggest that the two gases sampled are derived from different sources (in other words, the gas sampled in bore 8 may be naturally derived). However, volatile organic compounds can be lost by chemical reaction as landfill gas moves through soil. Thus the gas chromatography supports, but does not confirm, the proposition that the methane in Bore 8 may be naturally derived.

Methane can be generated naturally during the breakdown of organic matter in anaerobic conditions, and is commonly associated with organic peat soils or organic muds that produce 'swamp gas'. Bore 8 is located adjacent to a small pond and observations of the soil in the area suggest it is of a peaty nature, which supports the likelihood that the methane detected in Bore 8 may be of natural origin.

SITA has engaged an EPA-approved environmental auditor for the Hallam Road site. By 30/06/09 the auditor will assess the existing gas management system at the site and determine if further gas management works are necessary. The auditor will

make a final determination on the source of the methane detected in bore 8.

SITA is expanding its bore monitoring network to gather additional methane monitoring data.

1.2 Landfill address: Bosworth Road, Bairnsdale

Former landfill licence: LS169
Licence holder: East Gippsland Shire Council
Status: Site closed and rehabilitated, licence revoked

There are various industrial developments along the site's southern and western boundaries on Bosworth Road and Giles Street. Many of these developments are within approximately ten metres of the landfill boundary. However, EPA bores constructed along these boundaries have shown very low levels of methane (less than one per cent concentration).

Bore 3, located along the site's northern boundary (away from buildings), initially recorded very high concentrations of methane (up to 84 per cent). This bore has shown a gradual decline in methane concentrations and the last reading taken on 20/10/08 was less than one per cent concentration.

This gradual decline in methane level is potentially consistent with exposing peaty organic matter to air (as would occur within the bore). The high initial methane level in the bore may be from the anaerobic breakdown of the peat. However, once this peat was exposed to air, oxidation would occur, depleting the volume of methane generated. Once oxidised, the decaying peat would only produce a small volume of methane, potentially accounting for the gradual decline of the methane detected within bore 3.

Methane can be generated naturally during the breakdown of organic matter in anaerobic conditions, and is commonly associated with organic peat soils or organic muds that produce 'swamp gas'. Bore 3 is located adjacent to McGees Gully (a creek) and was installed into local peat soils. The landfill site is bounded to the east by a large swamp (Macleod Morass), which supports the proposition that the methane detected in Bore 3 may be of natural origin.

East Gippsland Shire Council has engaged an EPA-approved environmental fuditor for the Bosworth Road site. By 31/07/09, the auditor will assess the existing gas management system at the site and determine whether further gas management works are necessary. The auditor will make a final determination on the source of the methane detected in Bore 3.

East Gippsland Shire Council will be constructing its own bore monitoring network to gather additional methane monitoring data.

2 LANDFILLS WITH METHANE DETECTED OF LANDFILL ORIGIN

2.1 Landfill address: 890 Taylors Road, Lyndhurst

Landfill licence: ES511
Licence holder: SITA Environmental Solutions
Status: Licensed and operating site

Following the closure of the Tullamarine landfill in 2008, Taylors Road landfill became the only remaining landfill in Victoria licensed to receive Category B prescribed industrial (hazardous) waste. This prescribed waste is treated before being received onsite, to reduce the likelihood of adverse environmental impacts, and is unlikely to generate significant quantities of methane.

The landfill licence for this landfill requires that no more than 35 per cent of the waste in the landfill is prescribed waste. Hence, municipal biodegradable waste is the dominant waste type contained within the landfill cells. This landfill has received large volumes of organic waste since the 1990's, which means the landfill produces significant volumes of methane. Current cells are designed above best practice standards, with double liners, an extensive groundwater and gas monitoring network and a gas extraction system in filled cells. However, the older cells at the landfill that contain the most biodegradable waste were designed to standards that predate EPA's best practice guidelines. These cells have been closed and a gas extraction system collects the gas generated from organic waste and uses it to generate electricity.

Seven monitoring bores detected methane above 1 per cent concentration around the boundary. Methane was detected in three locations, on the northern, western and southern boundaries, outside of landfill cells but within the landfill boundary. In the northern location, methane was also detected outside the boundary. The landfill cells adjacent to where methane was detected contain biodegradable waste and are all closed cells that have a clay liner predating EPA's best practice guidelines. Methane movement at this site is a legacy of historical landfill design methods.

Northern landfill boundary

High levels of methane were detected in four bores established on, and one bore just outside of, the northern landfill boundary. A cut-off trench has been constructed in this area to intercept the methane. Shallow monitoring bores further beyond the boundary have not detected methane, indicating methane in surface soils does not extend to industrial buildings further north.

Western and southern landfill boundaries

Methane was detected in one bore on the western boundary and one on the southern boundary. These

bores may be located in historical landfill areas, explaining the methane detected. Adjacent bores constructed just outside the landfill boundary did not detect any methane. This suggests that methane is unlikely to have moved beyond the landfill boundary at these locations

SITA is undertaking a number of actions at this site, which include the following:

- The perimeter landfill gas monitoring network has been expanded between October and December 2008.
- The onsite gas extraction system was improved to increase gas extraction (14 new gas wells installed by 10/12/08).
- Engagement of an EPA-approved environmental auditor to oversee the works and to conduct an environmental audit of air by 30/06/09.
- Gas management plan, detailing all management actions being taken, to be produced by 28/02/09.
- A landfill gas cut-off trench has been installed to intercept gas escaping the landfill and return it to the onsite gas extraction system (completed 04/12/08).

2.2 Landfill address: 654-718 Clayton Road, Clayton South

Landfill licence: ES20872
Licence holder: Clayton Road Landfill Joint Venture
Status: Licensed and operating site

There is an industrial development near the northern boundary of the operating landfill on Ryan's Road, and bores along this perimeter show high concentrations of methane. However, bores within the industrial development itself show very low levels of methane (less than 1 per cent concentration). Methane monitoring in fibre optic cable pits on Ryan's Road also did not detect methane, indicating methane is not moving via this service conduit. There is a residential development further to the north-west of the site, and bores adjacent to the development show very low levels of methane (less than one per cent concentration).

Clayton Road Landfill Joint Venture is undertaking a number of actions at this site. These include the following:

- The establishment of a perimeter gas monitoring network. This work is anticipated to be complete by 28/02/09.
- Improvements to the onsite gas extraction network to increase gas volumes extracted. Six additional gas wells have been installed at the Clayton Road site during November/December 2008.
- Installation of a gas cut-off trench designed to intercept gas escaping from the landfill and to return this to the extraction system. Installation of

a landfill gas cut-off trench is currently being completed (January 2008) at this site.

- Engagement of an EPA-approved environmental auditor, to oversee the works and conduct an environmental audit of air by 30/06/09.
- Development of a gas management plan, covering all management actions being undertaken at the site. The gas management plan is to be completed by 28/02/09.
- The landfill operator will offer to install methane monitoring equipment in adjacent buildings if warranted from further monitoring.

2.3 Landfill address: Corner Deals Road & Heatherton Road, Clayton South

Landfill licence: ES49849
Licence holder: Transpacific Industries Group Ltd (TPI)
Status: Licensed and operating site

Gas bores in the vicinity of two plant nurseries and three isolated houses have recorded high levels of underground methane. However, monitoring near the houses and in the stormwater drains (which can act as potential methane movement pathways) has shown negligible methane levels (less than one per cent concentration), apart from one domestic gas supply service pit. There are no other residential developments nearby.

Transpacific Industries is undertaking a number of actions at this site, including the following:

- The establishment of a perimeter gas monitoring network. This work is anticipated to be complete by 28/02/09.
- Additional gas wells are to be installed along the site's southern boundary at the Deal's Road site.
- Installation of a gas cut-off trench designed to intercept gas escaping from the landfill and to return this to the extraction system. Installation of a landfill gas cut-off trench was completed between October and November 2008.
- Engagement of an EPA-approved environmental auditor, to oversee the works and conduct an environmental audit of air by 30/06/09.
- Development of a gas management plan, covering all management actions being undertaken at the site. The gas management plan is to be completed by 28/02/09.
- The landfill operator will offer to install methane monitoring equipment in adjacent buildings if warranted from further monitoring.

2.4 Landfill address: Fraser Rd, Clayton South

Landfill licence: EM28818
Licence holder: Transpacific Industries Group Ltd (TPI)
Status: Licensed and operating site

Gas bores adjacent to an industrial development recorded low levels of underground methane (3.5 per cent concentration). However, these buildings are well ventilated and it is considered unlikely that methane will accumulate indoors. Monitoring bores near industrial developments to the north of Osborne Avenue have shown very low levels of methane (0 per cent or less than one per cent concentration). There are no residential developments nearby.

Transpacific Industries is undertaking a number of actions at this site, which include the following:

- The establishment of a perimeter gas monitoring network. This work is anticipated to be complete by 28/02/09.
- Engagement of an EPA-approved environmental auditor, to oversee the works and conduct an environmental audit of air by 30/06/09.
- Development of a gas management plan, covering all management actions being undertaken at the site. The gas management plan is to be completed by 28/02/09.
- The landfill operator will offer to install methane monitoring equipment in adjacent buildings if warranted from further monitoring.

2.5 Landfill address: corner Clarke Road & Spring Road, Springvale

Former landfill licence: ES109
Licence holder: Glynlee Pty Ltd
Status: Site closed and being rehabilitated, licence revoked

High levels of methane were detected in bores located in waste material adjacent to two isolated houses on the eastern site boundary (waste material was located close to the site boundary in this area). However, further monitoring around one of these houses did not detect any methane. Bores along other boundaries indicated that no other residential areas have been affected.

Glynlee Pty Ltd is undertaking a number of actions at this site. These include the following:

- The establishment of a perimeter gas monitoring network. This work is anticipated to be complete by 28/02/09.
- The efficiency of the onsite gas extraction system at the site is to be reviewed.
- Engagement of an EPA-approved environmental auditor, to oversee the works and conduct an environmental audit of air by 30/06/09.
- Development of a gas management plan, covering all management actions being undertaken at the

site. The gas management plan is to be completed by 28/02/09.

- The landfill operator will offer to install methane monitoring equipment in adjacent buildings if warranted from further monitoring.

2.6 Landfill address: Clarke Road, Springvale South

Former landfill licence: ES553
Licence holder: City of Greater Dandenong
Status: Site closed and rehabilitated, licence revoked

High levels of methane have been detected in bores adjacent to a community building and residences on the southern boundary. Monitoring under the buildings and in electrical pipes and stormwater drains (which can act as potential methane pathways), has shown negligible methane levels (0 per cent or less than one per cent concentration). One stormwater drain that is not near the community building or residences showed high levels of methane. However, this drain has since been fitted with grated lids to allow gas venting and subsequent monitoring has shown significantly reduced levels of detected methane.

Monitoring was conducted by both the City of Greater Dandenong and EPA, and some bores were constructed by the City of Greater Dandenong's technical consultants. EPA has reviewed and has confidence in the data supplied by the City of Greater Dandenong (this data is presented in Appendix 4).

City of Greater Dandenong is undertaking a number of actions at this site, including the following:

- Expanding the existing perimeter gas monitoring network during December 2008.
- The onsite gas extraction system will be expanded at the Clarke Road site to improve the efficiency of gas extraction by January 2009.
- Engagement of an EPA-approved environmental auditor, to oversee the works and to conduct an environmental audit of air by 30/06/09.
- Development of a gas management plan, covering all management actions being undertaken at the site. The gas management plan is to be completed by 28/02/09.
- The landfill operator will offer to install methane monitoring equipment in adjacent buildings if warranted from further monitoring.
- A landfill gas cut-off trench is being designed to intercept gas escaping the landfill and to return it to the onsite gas extraction system.
- Nearby stormwater drains were fitted with grated lids during late October 2008 to allow methane venting. Following this action, the levels of detected methane appear to have been successfully reduced within these drains.