Collex Pty Limited

Clyde Waste Transfer Terminal

Odour Audit IV

Draft Report

February 2006

THE ODOUR UNIT PTY LTD

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1 INTRODUCTION AND BACKGROUND

The Odour Unit Pty Ltd (TOU) was commissioned by Collex Pty Ltd (Collex) to undertake the fourth odour audit on the Clyde Waste Transfer Terminal on 31 August 2005. This followed an earlier TOU assessment of the Clyde facility, the findings of which are contained in the TOU report, *'Collex Pty Ltd – Odour Control System Design and Performance Review August 2005'*.

The fourth odour audit for the months June, July and August 2005 was carried out on 31 August 2005 required under the Conditions of Consent – *48(f)* outlined below.

48. The Odour Management Plan must address, but is not necessarily limited to, the following issues:

(f) An odour audit program which provides for a comprehensive odour audit of the premises and nearby commercial and residential areas, by an independent, appropriately qualified and experienced person, to be conducted 3-monthly for the initial 24 months of receiving un-containerised waste at the terminal, and 6-monthly thereafter, unless otherwise approved in writing by the Director-General.

1.1 Previous Odour Audit Results

Vipac Engineers & Scientists (VIPAC) were commissioned for the first three odour audits by Collex. Following VIPAC's second audit, four items recommended for corrective action

were investigated as part of the third audit. The status of these items following the third audit have been reproduced from the VIPAC report – *'Odour Audit III - 2 September 2005'* and are listed in **Table 1-1**.

Table 1-1: Corrective Action Summary Following VIPAC Odour Audit 3

Issue Description	Action Type	Corrective Action Required	Status Following Odour Audit 3
Standard Operating Practices (SOP's) need to consider the operational requirements for the minimisation of odour emissions.	NON-CONFORMANCE	Review SOP's in light of current operations. Formalise SOP's. Place documents on Hippo Station	COMPLETE COMPLETE COMPLETE
The time clock on the meteorological station is out by 30 minutes.	NON-CONFORMANCE	Reset clock.	COMPLETE
A register of change out of	MINOR	Establish a register of	COMPLETE

carbon filters for the ventilation system does not exist.	NON-CONFORMANCE	carbon filter change out.	
Fugitive odour has been detected in various locations. Some suggestions have been made on how to reduce these.	NON-CONFORMANCE	Design or operational changes may be required to mitigate those. SOP's may need to be reviewed to ensure that updated operational requirements are followed.	CORRECTIVE ACTIONS UNDERWAY

It was VIPAC's finding that since their second audit, significant work had gone into implementing the corrective action recommendations described in **Table 1-1**. Indeed, in the Odour Audit III report, VIPAC note that "Standard Operating Procedures (SOP's) have been reviewed and issued to all staff, and are issued to any new staff during inductions. Training of staff has been increased in the area of odour minimisation, and general knowledge of the odour minimisation policy and standard operating procedure was found to be very high".

It was also VIPAC's finding that the clock on the meteorological station had been reset to the correct time, and general record keeping had improved, with meteorological data along with terminal operating conditions and waste received data being available on request.

A change out register of the carbon filters of the waste containers was also evident used to replace the filters on a regular basis and despite continued problems with the exhaust ventilation system, a similar change out register had also been established.

1.2 Odour Audit IV Methodology

In discussions with Collex prior to Odour Audit IV and following the earlier site assessment undertaken by TOU (the findings of which were reported in *'Collex Pty Ltd – Odour Control System Design and Performance Review August 2005')*, it was agreed that Odour Audit IV should be focused more on issues relating to actual fugitive odour.

This approach was determined to be prudent as evidenced by VIPAC's corrective action summary following Odour Audit 3 which determined that fugitive odour was the single major non-conforming issue. In the three previous audits, VIPAC noted a marked improvement in adherence to the Odour Management Plan. As part of Odour Audit IV, TOU was also satisfied that site employees are aware both of their responsibilities under the plan and odour minimisation policy guidelines with training provided formally at inductions.

Although TOU proposed for odour sampling and dynamic olfactometry of the exhaust ventilation stacks be a component of Odour Audit IV, Collex elected for the scope of work to be in 'relative' keeping with the previous VIPAC audits.

2 ODOUR AUDIT IV FINDINGS AND RECOMMENDATIONS

2.1 Odour Complaints Handling

TOU determined that the Collex complaints handling procedure is both responsive and comprehensive. It was evident that complaints were immediately logged and investigated as soon as was practicable by the Collex Site Manager with corresponding building waste levels (tonnes on floor) and meteorological data included with the complaint. It was observed that as neighbouring Manildra is the only complainant, an arbitrary and informal intensity rating system had been developed to ensure that the complaints could be interpreted in relation to any change to normal operating conditions of the facility.

Table 2-1 shows the total number of documented complaints received by Collex in the months June through to August 2005.

Table 2-1: Odour Complaints Summary (June-August 2005)

Month	Dates	Complainant
June	14/06/05, 18/06/05	Manildra
July	05/07/05, 15/07/05, 25/07/05	Manildra
August	12/08/05, 16/08/05, 22/08/05	Manildra

2.2 Exhaust Ventilation Stacks

TOU's report *'Collex Pty Ltd – Odour Control System Design and Performance Review August 2005'*, details extensively the inter-relationship between the specific design of the Clyde waste transfer building, ventilation rates, stack heights and likely fugitive odour release.

As discussed in the aforementioned report, the forced ventilation system has been designed for seven air changes per hour, equivalent to a stack velocity of 17.7 m/s for each of the six stacks. It is TOU's experience that seven air changes per hour are insufficient to achieve negative pressure conditions, even with a building designed for negative pressure conditions.

TOU further examined the exhaust ventilation rates as part of Odour Audit IV.

As was the case for flow rate data collected by TOU on 5 August 2005, TOU again determined that large variations in flow rate (measured as stack exit velocity) were occurring depending on the condition of the dust filters. Despite Collex replacing dust filters (pre-filters) where necessary just prior to the audit, **Table 2-2** illustrates the impact on stack exit velocities where rapid and excessive dust build up has impeded the maximum possible discharge rate of untreated air from the facility.

Table 2-2: Stack Exit Velocities Measured (31 August 2005)		
Stack	**Av. Velocity**	**Comments**
Stack #1 (Western end)	15.7 m/s	Low flow through half of 8 pre-filters
Stack #2	16.8 m/s	Low flow through half of 8 pre-filters
Stack #3	17.8 m/s	Uniform flow through all 8 pre-filters
Stack #4	8.1 m/s	Low flow through 7 of 8 pre-filters
Stack #5	14.0 m/s	Low flow through half of 8 pre-filters
Stack #6	6.0 m/s	Low flow through 7 of 8 pre-filters
Total	**13.1 m/s**	**74% of design extraction rate**

As the previous TOU generic dispersion modelling showed, the current stack heights are insufficient to prevent plume down wash effects and as emissions are highly susceptible to building downwash influences under most wind conditions, it is likely that emissions are prematurely reaching ground level without the opportunity for maximum dispersion and dilution. Notwithstanding the removal of the unsuitable activated carbon filter system, it is clear that any decrease in stack exit velocities due to excessive dust build up in the pre-filters would further exacerbate any downwash effects that are occurring.

Contrary to previous advice provided to Collex, it is important to emphasise that the total odour emission rate from the stacks **cannot** be decreased by decreasing the ventilation

rate (slowing the fan speeds), on the basis that the odour concentration in the ventilated air will not change. Unfortunately the odour emission rate from the waste surface into the building air is not related to ventilation airflow, being dependent on the age and composition of the waste, its exposed surface area and other operational factors. Under a given set of processing conditions the odour emission rate can be expected to be constant. Any proposed fan speed decrease will therefore almost certainly result in a commensurate increase in odour concentration in the stack emissions, with little or no benefit to Collex.

2.3 Fugitive Odour Emissions

Due to the specific design of the Clyde facility and the large number of truck movements, it is acknowledged that there could be a tendency for 'pressurisation' of the building to occur due to wind pressure on the open doorway. To illustrate this point, and given that the extraction system capacity is 40.8 m^3/s and the area of the doorway opening is 63 square metres, any wind blowing towards the doorway from the west at a velocity greater than 0.65 m/s will tend to pressurise the building and result in untreated air leaving the building by a route other than the stack system if the building is not fully sealed. It is therefore essential that continued work is performed on sealing the breezeways and ensuring that other 'gaps' in the building are totally sealed.

For wind conditions other than from the general western direction it may be possible to use an 'air curtain' on the doorway opening to minimise the flow of building air out through the

doorway. However, any measure is obviously dependant upon not unduly disrupting the large number of waste truck movements.

An inspection of the container packing area suggested that this area is kept clean and tidy with operators on hand to ensure any spilled waste is cleaned up as soon as possible. The containers themselves appeared to be in good condition and carbon filters are changed on a regular basis. It is clear that the container packing area would

be a source of minor and localised odour only.

General housekeeping also appeared to be of a high standard with the tipping floor being cleared as soon as possible and site access roads kept clean. Collex advised TOU that these roads are hosed down and washed every night.

2.4 Smoke Testing

Smoke testing was again carried out as part of Odour Audit IV to further investigate natural air flow patterns within the building .

The weather conditions during the testing were fine, with a 4-8 m/s wind blowing from the north-west (300 degrees). There was a noticeable flow of air through the doorway, into the building, although the concrete wall to the south of the building curtailed the impact of

the recorded wind. The surging and changing airflows prevented accurate measurement of wind velocity through the doorway.

The smoke was released at floor level at several locations in the north-western end of the building, including a location approximately five metres inside the northern end of the doorway.

The principal finding of the smoke testing confirmed what was found on 5 August 2005 and 23 August 2005 that there was minimal visible airflow towards the extraction fans. The smoke dispersed inside the building as if there were little mechanically-induced air movement circulating slowly around the building in a counter-clockwise direction. The predominantly westerly airflow through the doorway was the main influencing factor in this airflow pattern.

In addition, and despite this westerly wind some smoke was clearly leaving the building through the doorway simultaneously with an inflow of air through the doorway. This condition was not continuous and the out flow area was smaller than that that of the incoming air but it was evident that odorous outflows were occurring despite the adverse wind from the north-west.

There was insufficient smoke volume to detect whether air was leaving the building through the sealed breezeways or gaps between the roof and walls. It was determined that smoke testing on an even larger scale may be able to clarify the extent of fugitive emissions and this should be considered.

A further smoke test was carried out in one of the exhaust ventilation stacks (stack 6). Smoke was injected into the stack, through the filter enclosure inlet. This test showed some evidence of a plume downwash effect whereby the lower portion of the near-horizontal smoke plume was seen to be being drawn towards the ground within 50 metres of the building. There was insufficient smoke volume to assess this effect beyond this distance.

2.5 Ambient Odour Assessment

At present, no Australian Standard exists for field based ambient odour assessment surveys. Consequently, The Odour Unit utilises a method for assessing the ground level impacts of odour emissions using a modified version of the German Standard VDI 3940 (1993) – 'Determination of Odorants in Ambient Air by Field Inspections'.

Field based ambient odour surveys are considered a valuable odour impact assessment tool as previous experience with ambient odour sampling and subsequent olfactometry testing suggests that accurate and useful ambient odour concentration data is difficult to

obtain. Therefore, TOU has adopted a more practical approach based on the field measurement of odour intensity. With this method, calibrated and experienced odour specialists traverse the downwind surrounds of odour sources in a strategically mapped pattern, assessing the presence, character and intensity of any odours encountered and recording these observations along with wind speed and direction.

Two ambient odour assessments were performed downwind of the Clyde facility on 31 August 2005 (at approx. 9:30-10:15 am and 14:00-14:30). TOU assessors firstly determined the wind direction and then assessed downwind locations attempting to cover as much territory as possible, given that the area was essentially private industrial land or rail tracks. This restricted the survey's assessment locations and those points assessed were labelled in a grid-like system.

The assessors spent between one and several minutes at each assessment location in order to gauge the effects of any odour impact. At each location, wind velocity was measured using a TSI Model 8330 Velocicheck anemometer, while wind direction was determined using a compass. If an odour was detected at a location, the assessors attempted to characterise it and define its source. The general aim was to determine the extent of the impact of odours off-site and rank their intensity. The ranking scale for the German Standard VDI 3940 'Determination of Odorants in Ambient Air by Field

Inspections' was used for the intensity assessments. The standard's ranking system is based on the following seven-point intensity scale.

VDI 3940 – Intensity Scale

0	Not Detectable
1	Very Weak
2	Weak
3	Distinct
4	Strong
5	Very Strong
6	Extremely Strong

The results of the ambient assessment surveys are depicted in two principal ways. The field log sheets completed by the assessors contain the unprocessed data for each location and the derived result of the survey is illustrated as an odour impact map. The map illustrates the locations assessed, and the level of odour intensity detected downwind of the Clyde facility.

As **Appendix A** illustrates, the characteristic garbage smell was clearly evident particularly during the morning survey, eliciting a peak intensity score of 4 (strong) up to 300m from

the south western corner of the main building adjacent to the rail lines. Milder garbage odours were experienced in the afternoon survey at distances much closer to the facility.

Appendix A

Ambient Assessment Log Sheets and Location Map

Client: ***Collex Pty Limited***

Client Contact: *Eric Le Provost*

Survey Site: *Collex Clyde Waste Transfer Terminal*

Survey Date: *31 August 2005*

Survey Time: *14:00-14:30*

Weather Conditions: Overcast, Mild - NW winds

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ASSESSMENT LOCATION	TIME	WIND DIRECTION (Degrees)	WIND VELOCITY (m/s)	ODOUR PRESENT	ODOUR CHARACTER	GERMAN INTENSITY STANDARD VDI3882 SCALE (0-6)	COMMENTS
1A	14:00	300	2.2 - 3.8	Yes	Garbage	1	Southern fenceline adjacent to rail lines (behind waste containers - 50m from SE corner of transfer building)
1B	14:05	300	2.2 - 3.8	Yes	Garbage	2	Southern fenceline adjacent to rail lines (100m from SE corner of transfer building)
1C	14:09	300	2.2 - 3.8	Yes	Garbage	1	Southern fenceline adjacent to rail lines (150m from SE corner of transfer building)
1D	14:12	300	2.2 - 3.8	No	N/A	0	Southern fenceline adjacent to rail lines (200m from SE corner of transfer building)
1E	14:15	300	2.2 - 3.8	No	N/A	0	Southern fenceline adjacent to rail lines (250m from SE corner of transfer building)
1F	14:17	300	2.2 - 3.8	No	N/A	0	Northern fenceline adjacent to 1E
1G	14:19	300	2.2 - 3.8	No	N/A	0	Northern fenceline adjacent to 1D
1H	14:21	300	2.2 - 3.8	No	N/A	0	Northern fenceline adjacent to 1C
1I	14:23	300	2.2 - 3.8	No	N/A	0	Halfway between 1C and 1H
1J	14:24	300	2.2 - 3.8	No	N/A	0	Northern fenceline adjacent to 1B
1K	14:26	300	2.2 - 3.8	No	N/A	0	Halfway between 1B and 1J
1L	14:28	300	2.2 - 3.8	Yes	Garbage	1	Adjacent to compactor pit (localised odour only)
1M	14:30	300	2.2 - 3.8	Yes	Garbage	1	Adjacent to compactor pit (localised odour only)