



# Rhodes Remediation Projects

## Monitoring of VOCs in Air on the Lednez Project Site

### What are VOCs?

The most odorous chemicals contaminating the Rhodes peninsula sites belong to a group known as volatile organic compounds (VOCs). When soil or sediment that contains VOCs is excavated, the compounds 'volatilise', or become vapour, causing odour to be emitted to the atmosphere. Hours after excavation activities have finished, volatilisation may still be occurring, although at a reduced rate. Odour levels can also be affected by humidity and rapid temperature change, which is why odour is sometimes noticeable in the early morning and evening. By their very nature, volatilised chemical compounds or odours can be difficult to control.

Since the Rhodes Remediation Projects commenced, Thiess Services has monitored the level of volatile organic compounds found in the air as part of its Air Quality Management Plan. VOC monitoring occurs daily at site boundaries and where excavation works are underway.

### Website Graphs

The graphs shown on this website depict the daily average concentration levels of volatile organic compounds found in the air. Levels are measured at the northern, southern and eastern Lednez site boundaries using equipment that operates continuously. Measurements are shown in parts per million (ppm). The graphs also show either:

- a) the Thiess Services occupational health and safety "response level 1" (RL1) for monitoring at the excavation face (graphs for June 2007 to March 2008); or
- b) the Thiess Services public health based "response levels 1, 2 & 3" (RL1, RL2 & RL3) for monitoring at site boundaries (graphs for April 2008 onwards).

*Note: RLs were adjusted in May 2010. See page 3 of these notes.*



## **The VOC Monitoring Program**

Two forms of VOC monitoring are undertaken on the Rhodes Remediation Projects: "attended" and "continuous". "Attended" VOC monitoring has been conducted at regular intervals throughout the day by Environmental Officers using photo-ionisation detectors (PIDs) since the projects started. It has its advantages because the portability of equipment means that an Environmental Officer can take readings right where excavations are taking place; however, because the Environmental Officer needs to operate the equipment, it is limited to hours when the worksite is open. In contrast, "continuous" VOC monitoring provides data 24 hours a day, seven days a week, without an environmental officer needing to be present. It was introduced on the Lednez project when VOC emissions from a particular soil excavation area intensified during May and June 2007. In response to the elevated emissions and the community's complaints about odour, Thiess Services immediately slowed down the excavation work and expanded air quality monitoring activities. The present air quality monitoring program for VOCs consists of both attended PID monitoring across all areas of the site and continuous monitoring on the northern, southern and eastern boundaries.

## **Response Levels (RLs) for Continuous VOC Monitoring**

Thiess Services formally incorporated the continuous VOC monitoring protocols into the Air Quality Management Plan for the Lednez project in April 2008. This involved setting community-focused "response levels" that would supplement the occupational health and safety response levels already in place.

A "response level" is a level at which particular actions will occur should the level be reached. In the case of on-site VOC monitoring, it is when VOCs in air reach a particular concentration level as measured in parts per million (ppm). Three community-focused response levels were set for the project after consulting NSW Health, independent health risk consultants and the Department of Environment, Climate Change and Water (DECCW). They are designed to constrain VOC emissions to levels below those which may exceed acute public health risk advisories in the short term and chronic public health risk advisories in the long term.



The three community-focused response levels are based on:

- Guidelines from the California Environmental Protection Authority.
- Guidelines from the Texas Commission on Environmental Quality.
- A review of emissions from the Lednez site that was undertaken by Dr Kerry Holmes of Holmes Air Sciences. (The review modelled off-site impacts at the most sensitive residential and commercial locations.)
- A health-based risk assessment that was completed by Dr Garry Smith of ENSR Australia (now AECOM): *Screening Human Health Risk Assessment: Volatile Organic Compounds in Air at the Lednez Remediation Site*, October 2007 (to view the report, go to the Health & Safety section of this website).

The response levels relate to measurements taken at a boundary, not at an excavation face, as a boundary is where the worksite adjoins the residential and commercial neighbourhood. Engineers are notified when a response level is reached through a remote alarm system.

### **Adjustment of the Response Levels (RLs) in May 2010**

The response levels for total boundary VOC concentrations in air were formally amended in the DECCW-issued Environmental Protection Licence for the Lednez project in May 2010. The following changes were made:

<b>Response Level (RL)</b>	<b>Original RL</b>	<b>Updated RL</b>
RL1	1ppm*	0.5ppm
RL2	2ppm	0.75ppm
RL3	3ppm	1ppm

\* ppm - parts per million

It was decided that the RLs should be made more conservative due to an increase in the levels of a particular compound, 1,2,4-trichlorobenzene, in some air quality samples. The implementation of the updated RLs during the monitoring of total VOC concentrations, in conjunction with the "speciated" analysis of air samples, aims to ensure the World Health Organisation (WHO) annual exposure limit for 1,2,4-trichlorobenzene will not be exceeded.



**If RL1 is triggered (a 0.5 ppm average over 60 minutes):**

- Continuous VOC monitoring is maintained at site boundaries;
- A ten-minute attended PID reading of VOC levels occurs in the area of the exceedance;
- Thiess Services investigates the source of the VOC emission;
- The DECC and NSW Health are notified on the day of the exceedance;
- Within three business days, continuous monitoring results from the day of the exceedance are provided to the DECC and NSW Health; and
- If RL1 is exceeded for longer than 24 hours, an e-mail notification is sent to community members who are registered for the "odour alert" service\*.

Possible measures to reduce the VOC emissions and odour level include (but are not limited to):

- a reduction in the pace of work;
- a delay until wind conditions are more favourable;
- the use of odour suppressants;
- a minimisation of the excavation area; or
- a relocation of the excavation area.

**If RL2 is triggered (a 0.75 ppm average over 30 minutes):**

- Continuous VOC monitoring is maintained at site boundaries;
- The measures to reduce VOC emissions and odour listed for RL1 are implemented or maintained; and
- The advisories to the DECC and NSW Health are maintained.

Additionally:

- Attended PID monitoring of VOC levels is undertaken continuously at the excavation area;
- Cover is applied to trucks transporting loads of excavated material on site; or, transportation is reduced or stopped;
- Exposed excavation faces are covered with tarpaulins, clean soil, mulch or a special foam; and
- If RL2 is exceeded for longer than eight hours, an e-mail notification is sent to community members who are registered for the "odour alert" service.

**If RL3 is triggered (a 1 ppm average over 30 minutes):**

- Continuous VOC monitoring is maintained at site boundaries; and
- The measures to reduce the VOC emissions and odour listed for RL2 are implemented or maintained;



Additionally:

- VOC samples are collected at the site boundaries for a period of 24 hours so that the individual chemicals contained within the samples can be assessed;
- A sample is collected over a 72-hour period at the site boundary affected by the exceedance and analysed for semi-volatile organic compounds (SVOCs);
- Works deemed to be contributing to VOC emissions stop;
- The DECC and NSW Health are notified within three hours.
- Within one business day, continuous monitoring results from the day of the exceedance are provided to the DECC and NSW Health; and
- If RL3 is exceeded for longer than four hours, an e-mail notification is sent to community members who are registered for the "odour alert" service.

## **Resumption of Normal Work Practices**

Work will only be permitted to resume following an exceedance of RL3 when the total VOC emission levels have fallen below RL1 for a period of 30 minutes i.e. 0.5 ppm measured at the site boundary.

\* To register for the "odour alert" service, people should send their name, address, phone number and e-mail address to: [rhodesremediation@thiess-services.com.au](mailto:rhodesremediation@thiess-services.com.au)