

Reporting to the community:

industry environmental improvement project
in the Kilburn and Gepps Cross area



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For further information please contact:

Information Officer
Environment Protection Authority
GPO Box 2607
Adelaide SA 5001

Telephone: (08) 8204 2004
Facsimile: (08) 8204 2020
Free call (country): 1800 623 445

Web site: www.epa.sa.gov.au

E-mail: epainfo@epa.sa.gov.au

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EXECUTIVE SUMMARY

In response to community concern, the South Australian Environment Protection Authority (EPA) undertook air quality monitoring, an odour survey and an audit of 15 sites licensed by the EPA in the Kilburn and Gepps Cross area during 2005 and 2006. The study identified a range of areas for improvement in relation to potential environmental impacts.

Air quality monitoring indicated impacts to the local air shed as a result of localised sources, such as industry activity and vehicle traffic and to a lesser extent from regional sources such as a large dust event across the whole of metropolitan Adelaide. The quality of, and the impacts on, the local air shed are comparable to other areas in South Australia with similar industrial activity.

The odour survey confirmed that some industrial sites within the Kilburn and Gepps Cross area emit odours of varying intensity and type that may impact on surrounding properties under a variety of weather conditions.

Audits of licensed premises to determine compliance with EPA licence conditions identified potential sources of air quality and odour impacts, along with housekeeping issues such as storage of materials.

The Kilburn and Gepps Cross area study provided an opportunity to identify potential areas for improved performance by local industry that may reduce impacts on the local environment. The next stage of the project will involve developing programs in conjunction with industry and the community to work towards environmental improvements.

1 INTRODUCTION

Project area

The Kilburn and Gepps Cross area contains a number of major arterial roads, and land use is a mix of industrial, commercial and residential uses within close proximity. There are a large number of industrial premises undertaking a range of activities. There is potential for impacts on air quality, both from industry and diffuse sources such as motor vehicles travelling through the area.

The project area comprised a 2 km radius circle from the intersection of Grand Junction and Churchill roads (Figure 1). A large number of industrial sites operate within the project area including EPA licensed sites. Only those industries with a current EPA licence were included in the initial study.

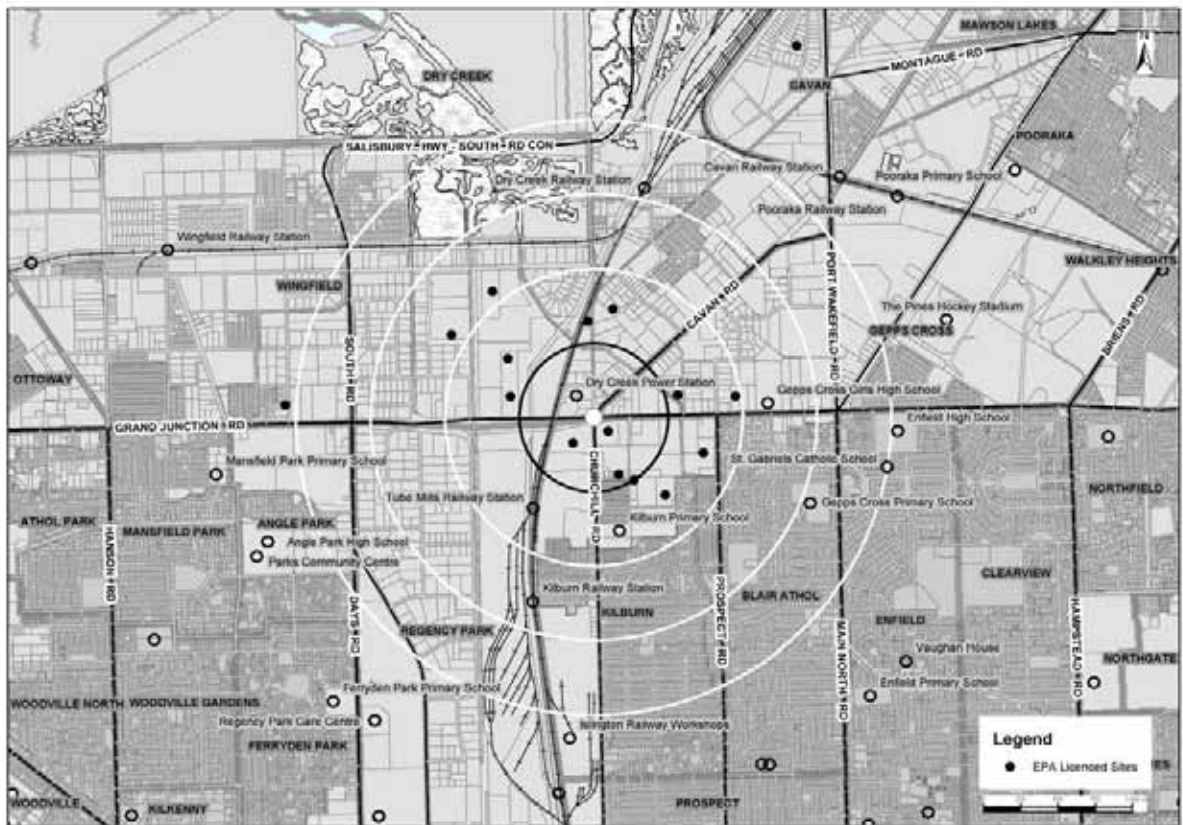


Figure 1 Map of Kilburn and Gepps Cross project area

Why the project is being undertaken

There has been concern within the Kilburn and Gepps Cross communities about the noise, odour and air quality impacts of industrial activities, including local foundry operations. These concerns relate to both EPA licensed and non-licensed premises, with the majority concerning noise, odour, smoke and dust pollution.

An odour survey was conducted in 1996 to assess community attitudes about odour and air pollution from local industry in the area west of Main North Road including Kilburn. The results indicated considerable concern as well as apprehension about possible health effects in relation to industrial exposure.¹ This situation has not changed to date and complaints to the local council, EPA and Department of Health indicate that air quality is an issue of ongoing concern in the Kilburn community.

The EPA wanted to gain a better understanding of local emission levels and their potential impact on local residents in the Kilburn and Gepps Cross area. The aims of the project are to:

1. better understand air quality in the area, focusing on particulates (dust), chemicals and odour
2. improve the environmental condition of the area
3. develop plans with local industry to improve environmental performance
4. put in place a local community awareness program.

Aims 1 and 2 have now been achieved. The results of the project so far provide the Kilburn and Gepps Cross communities with a clear assessment of their environment. Aims 3 and 4 will be the focus of subsequent stages of the project.

Purpose of this report

The Kilburn and Gepps Cross area study was undertaken to improve understanding of the air quality in the area, including particulates (dust), chemicals and odour. The study involved air quality monitoring, an odour survey and a series of compliance audits at a number of sites licensed by the EPA within the project area. This report provides a summary of the project to date.

¹ Rouse, K 1995 *'Problems of industrial odours in Western Enfield—towards an effective response by Enfield Council'*, Masters Thesis, University of Adelaide.

2 AMBIENT AIR MONITORING

The EPA had not previously undertaken ambient air monitoring of the Kilburn and Gepps Cross area and, therefore, a baseline of information was not available. Air quality monitoring was undertaken at two suitable locations (Figure 2) within the local area. Information was collected to provide an overview of levels of particulates (dust), benzene, metals and volatile organic compounds, which may affect the amenity of the area and potentially impact local residents.

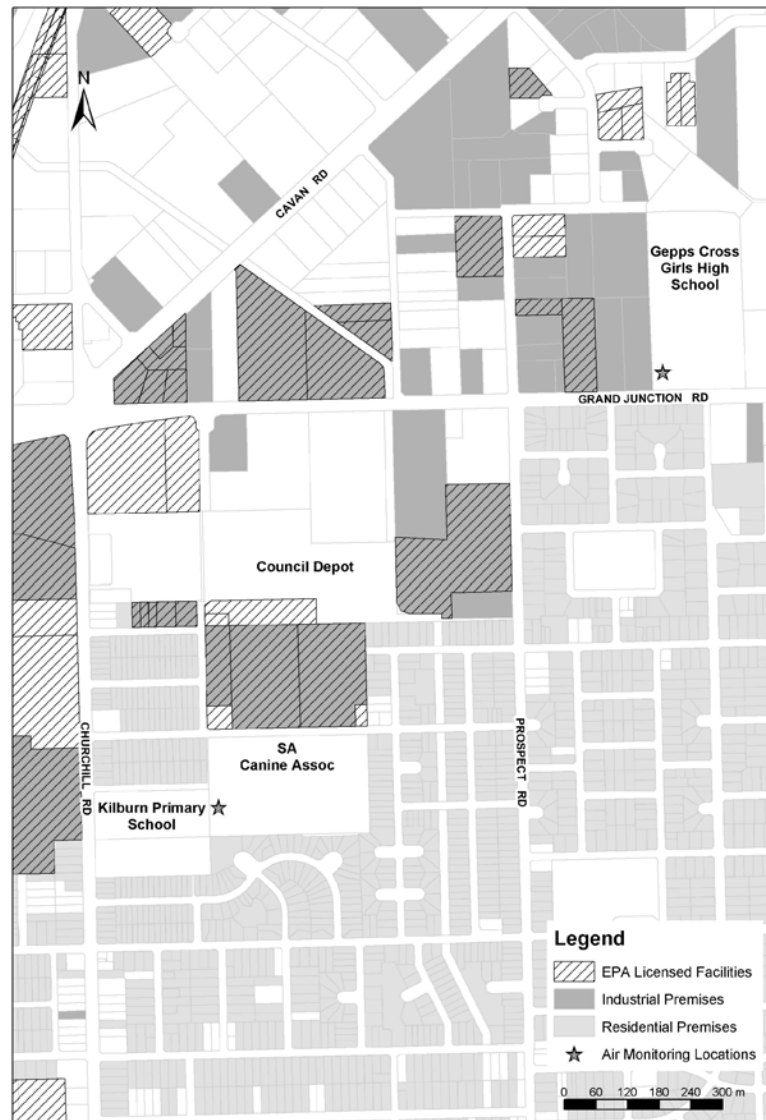


Figure 2 Map showing ambient air monitoring site locations

Method used

The EPA 'Hot Spot Caravan' was placed at the two monitoring sites during the study to gather data on a range of potential pollutants. The Hot Spot Caravan houses instrumentation that can measure a range of air pollutants and local meteorology. A list and description of the parameters monitored is provided in Table 1.

Monitoring for these parameters was carried out using continuous analysis—continuously collecting material and analysing it, or using High Volume Sampling (HVS)—feeding air through a filter for 24 hours. Some 'snap shot' samples were also taken by collecting air for one hour. Monitoring was carried out at both sites at varying times between December 2004 and May 2006.



Figure 3 The 'Hot Spot Caravan'

Table 1 Parameters used for air quality monitoring

Parameter	Description
PM ₁₀	Particles or particulates in the air that are less than 10µm. A wide range of materials may be present from many sources such as soil, dust and combustion of petrol or diesel.
Carbon monoxide	A gas formed by the incomplete combustion of fuels containing carbon. The main source is motor vehicles. Some industrial processes are also a source.
Nitric oxide	Both are oxides of nitrogen produced through combustion processes. Motor vehicles make up 70% of total Adelaide emissions. Other sources include electricity generation, domestic wood burning and industrial processes.
Nitrogen dioxide	
Sulfur dioxide	A gas formed during fuel combustion. Motor vehicles contribute 90% of sulfur dioxide in Adelaide. Other sources include industrial processes.
Benzene	A volatile organic compound. The main source is from combustion of petrol. Motor vehicles contribute up to 70% of benzene in Adelaide. Other sources include industry.
Toluene	A colourless liquid that is a byproduct of many manufacturing processes and is present in motor vehicle emissions.
Formaldehyde	An industrial chemical used to make other chemicals, building materials and household products. Sources include industrial processes, motor vehicle emissions and wood combustion.
Zinc	Can be used to ascertain the source of particulates and determine if any health impacts exist.
Iron	Can be used to ascertain the source of particulates and determine if any health impacts exist.
Lead	Sources of lead in air include the refining and manufacturing of products that contain lead.
Weather conditions	Used to determine regional wind patterns that assist with identifying industry sources of pollutants.

PM₁₀ data was also collected from sites at Kensington, Netley, Le Fevre Peninsula and Whyalla during the same period of time and comparisons between those results and the results from Kilburn and Gepps Cross were made.

National Environment Protection Measure standards for air quality

Comparison of monitored air quality with the National Environment Protection Measure (NEPM) standards for air quality² was used as a guide to the level of pollution found in the study area.

Air toxics investigation limits

Air toxics investigation limits have been developed nationally and are concentrations of air toxics (also known as volatile organic compounds [VOCs]) above which further investigation is required. This enables the EPA to better understand VOC levels in the ambient air.

Monitoring results

Particulates—PM₁₀ (dust)

The NEPM standard for PM₁₀ is 50µgm⁻³, with a goal of no more than five events above the standard per annum. Continuous monitoring revealed measurements generally below the standard. However, four exceedences of the standard were recorded at both Kilburn and Gepps Cross during the monitoring periods.

The air monitoring results show that levels in Kilburn, Gepps Cross and Netley are a result of contributions from local industrial and traffic sources, not metropolitan-wide dust events. Dust levels appear to be higher in Kilburn and Gepps Cross when the wind is from a north-west to north-easterly direction.

² Environment Protection and Heritage Council, 'NEPMs explained', <http://www.ephc.gov.au/index.html> as at 18 September 2006.

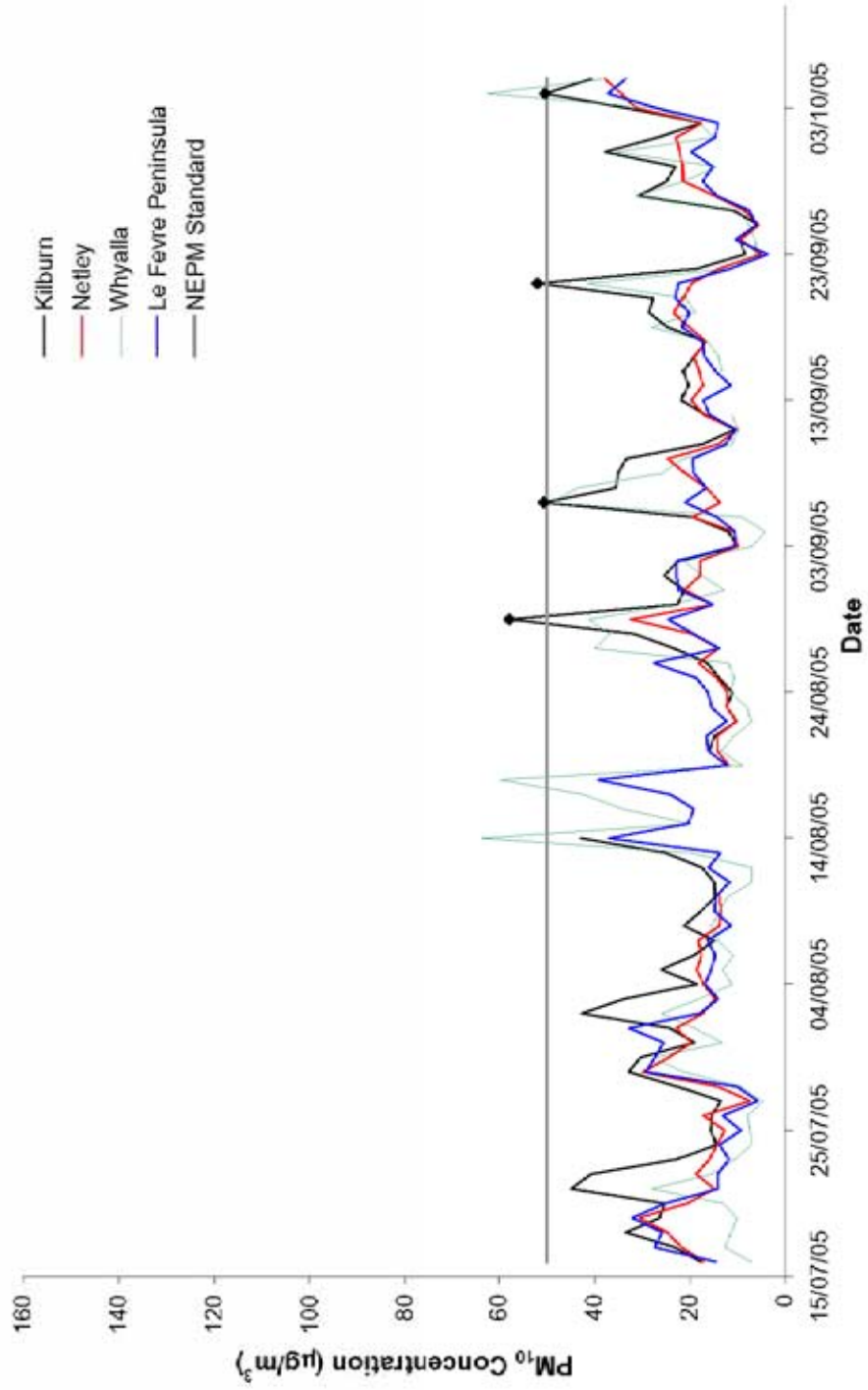


Figure 4 Kilburn, Netley, Le Fevre Peninsula and Whyalla continuous data

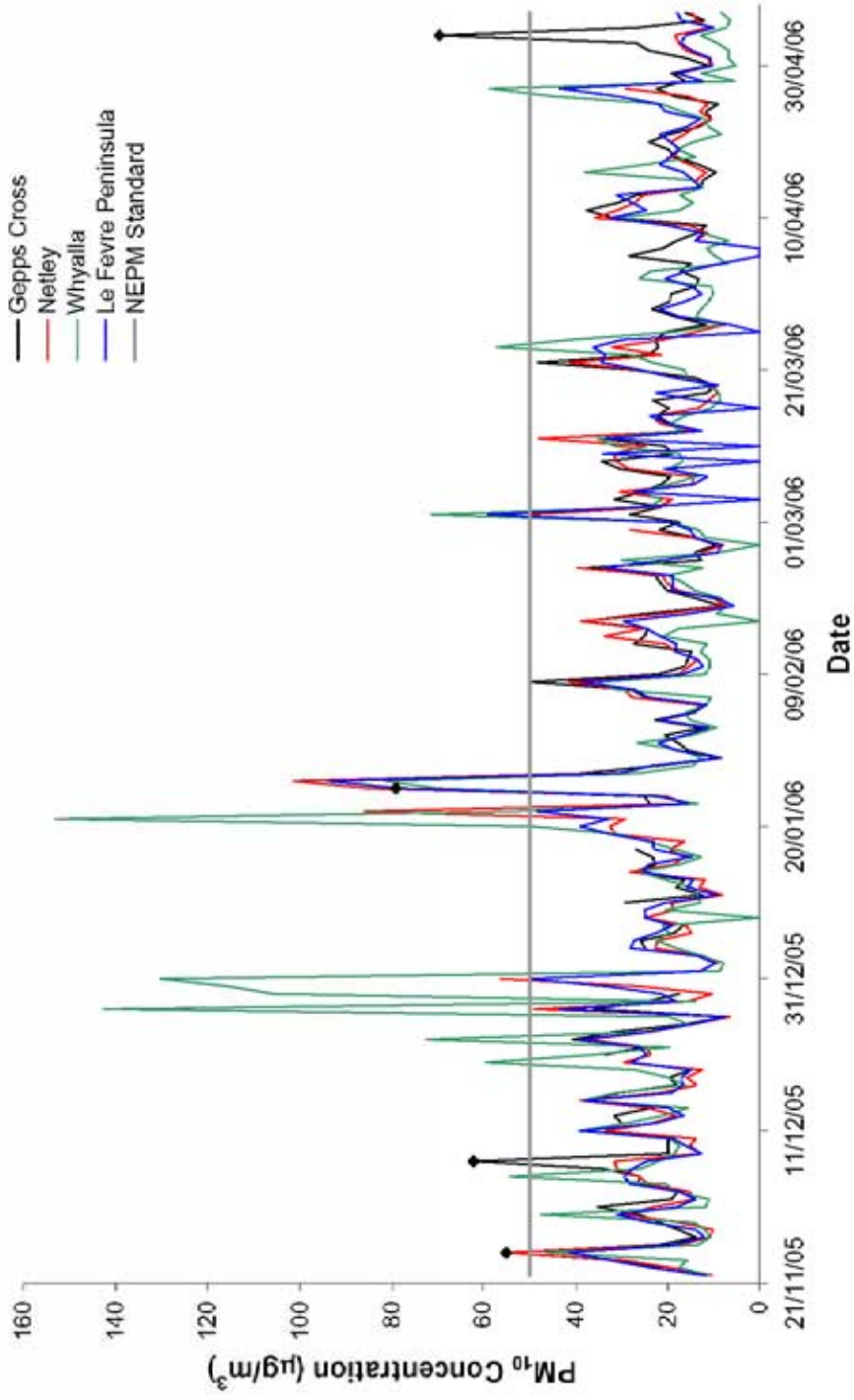


Figure 5 Gepps Cross, Netley, Le Fevre Peninsula and Whyalla continuous data

The NEPM goal is for exceedences of the standard to occur on no more than five days per year. Therefore, if the sixth-highest daily maximum concentration in a calendar year is greater than the standard of $50\mu\text{g}\text{m}^{-3}$, then in combination with maximum measurements, it can provide an indication of the magnitude of the dust problem in an area.

Tables 2 and 3 compare results from Kilburn and Gepps Cross with measurements taken at Netley, Whyalla, Le Fevre Peninsula and Kensington. Kilburn results were most similar to those collected in Whyalla, while Gepps Cross results were more comparable to those from Le Fevre Peninsula.

Table 2 Comparing results at Kilburn with measurements from other areas

	Kilburn ³	Netley	Whyalla	Le Fevre Peninsula	Kensington
Number of times the standard was exceeded during the three month period	4	0	3	0	0
Sixth-highest measurement ($\mu\text{g}\text{m}^{-3}$)	42.7	29.9	42.3	32.0	21.7
Maximum ($\mu\text{g}\text{m}^{-3}$)	57.8	37.7	63.5	39.2	35.8

Table 3 Comparing results at Gepps Cross with measurements from other areas

	Gepps Cross ²	Netley	Whyalla	Le Fevre Peninsula	Kensington
Number of times the standard was exceeded during the four month period	4	5	14	3	3
Sixth-highest measurement ($\mu\text{g}\text{m}^{-3}$)	48.0	49.9	81.4	43.3	27.7
Maximum ($\mu\text{g}\text{m}^{-3}$)	79.2	101.4	153.0	94.0	73.2

³ Continuous monitoring results used for comparative analysis

Benzene

The average benzene levels recorded were below the Air Toxics NEPM investigation limit at Kilburn (0.002 parts per million [ppm]) and at the limit at Gepps Cross (0.003 ppm). No elevated levels of the other monitored hydrocarbons were detected. Wind direction did not appear to effect benzene levels.

Benzene levels at various other monitoring sites in the past have been detected at a similar order of magnitude to those measured at Kilburn. There is the potential for the annual average Air Toxics NEPM investigation limit of 0.003 ppm to be reached. However, further monitoring for a continuous 12-month period would be required to provide conclusive results.

Zinc, iron, lead and chromium

Measurements for heavy metals were minor and did not exceed criteria set by the World Health Organization or the United States EPA. Metal analysis was carried out on a number of filters during HVS monitoring at the Kilburn and Gepps Cross sites. Zinc particulate found was very fine and therefore probably sourced from smoke or vehicle fumes. The highest zinc loading recorded for the Kilburn area was recorded when wind was blowing from the north.

Formaldehyde, carbon monoxide and oxides of nitrogen

Moderate levels of formaldehyde, carbon monoxide and oxides of nitrogen were recorded at the Gepps Cross site. The monitoring identified that emissions were most likely from motor vehicles on Grand Junction Road. The results are consistent with those typically found at other sites monitored in metropolitan Adelaide.

Other pollutants and volatile organic compounds

Other pollutants and volatile organic compound (VOC) concentrations recorded at the Kilburn and Gepps Cross sites were found to be low and below the standards set by the World Health Organization or United States EPA. Moderate levels of pollutants were measured at the Gepps Cross site, mostly coinciding with wind from the south.

Table 4 Kilburn and Gepps Cross area monitoring results

Parameter and how measured	Average measured		Maximum measured		Ambient air quality standard or air toxics investigation level
	Kilburn	Gepps Cross	Kilburn	Gepps Cross	
Carbon monoxide (ppm as an 8 hr average)	0.230	0.130	2.470	1.800	9.0
Nitrogen dioxide (ppm as a 1 hr average)	0.011	0.009	0.044	0.037	0.12
Sulfur dioxide (ppm as a 1 hr average)	0.001	0.001	0.017	0.004	0.20
Benzene ⁴ (ppm as an average)	0.002	0.003	Average only	Average only	0.003
Toluene (ppm as a 24 hr average)	0.004	0.012	0.007	0.020	1.0
Formaldehyde (ppm as a 24 hr average)	0.010	0.005	0.013	0.019	0.04

⁴ Due to benzene monitoring being undertaken for less than a year the study average was used for comparison with the National Environment Protection (Air Toxics) Measure investigation level.

3 ODOUR SURVEY

Method

An odour survey was undertaken of 11 EPA licensed industrial sites within a 3 km radius of the Kilburn air quality monitoring site. The surveyed industries were chosen in relation to complaints about odour previously logged with the EPA. The surveyed industry types include galvanisers, foundries, agricultural products, incinerators, surface-coaters and recycling depots. The survey was undertaken on four non-consecutive days during May and June 2005 in ideal weather conditions when wind speeds were low and there was no rain.

The Nasal Ranger® field olfactometer helps people measure odour intensity. The survey of odour was taken upwind and downwind of each site to ascertain the source of odours. Surveyors were asked to describe the odour using a list of descriptors of odour type to ensure consistency of reporting.



Figure 6 The Nasal Ranger® field olfactometer

Results

The odour survey revealed that the 11 surveyed EPA licensed sites in the Kilburn area are not entirely odour free, results that were expected. Surveyed industries were ranked according to the highest value detected downwind of the industry by the EPA officer using the Nasal Ranger® on the day of sampling. The most odorous industry types were foundries and agricultural production. The high odour intensities recorded and described as 'unpleasant' and 'foul' indicate an odour problem in the project area.

4 EPA COMPLIANCE AUDIT

Fifteen EPA licensed sites were audited with regard to their compliance with licence conditions and the *Environment Protection Act 1993*.

Audit method

The audit process typically involved:

- an entry interview to explain the audit process and provide background information
- a site inspection
- taking of photographs
- completion of an audit checklist
- completion of a licence condition checklist
- a debrief interview providing feedback on the site inspection findings.

Following the audit, a letter was forwarded to site management detailing the audit findings. A debrief of the audit findings was provided to the EPA Licence Coordinator for those sites to inform them of non-compliance issues identified during the audit and to ensure necessary follow-up is carried out.

While the audits were focused on emissions to air, they did assess compliance with other environmental aspects including storage of materials.

Findings

The compliance audit findings are described in Table 5 based upon industry type (galvanisers, foundries, agricultural products and other) and activities undertaken at the sites.

The compliance audit program identified two sites that have potential regional air quality impacts, nine sites with potential local air quality impacts, 10 sites with liquid storage issues and one site with potential site contamination issues.

Table 5 Key issues identified in the compliance audits against industry type

Industry type (showing number of sites audited)	Key issues identified
Galvanisers (3)	<ul style="list-style-type: none"> ▪ potential emission of fumes to air from molten zinc baths ▪ potential risk from inappropriate storage of hazardous liquids ▪ integrity and adequacy of hazardous liquid storage areas ▪ general housekeeping
Foundries (4)	<ul style="list-style-type: none"> ▪ effectiveness of emission capture systems ▪ potential for nuisance dust from outside storage ▪ integrity of hazardous liquid storage areas
Agricultural products (3)	<ul style="list-style-type: none"> ▪ odour emissions ▪ potential risk from inappropriate storage of hazardous liquids ▪ integrity of liquid storage areas ▪ elevated noise levels ▪ lack of spill control equipment
Other (5)	<ul style="list-style-type: none"> ▪ potential for inadequate pollution control on incineration equipment ▪ potential risk from inappropriate storage of liquids ▪ capacity and adequacy of liquid storage areas ▪ potential for stormwater pollution ▪ odour emissions

5 WHERE TO FROM HERE?

Air quality and odour

Air quality monitoring indicated impacts to the local air shed as a result of localised sources and further air quality monitoring will be carried out by the EPA during the next stages of the project and will include:

- further monitoring of particulates and VOCs to support the findings and provide conclusive evidence of where NEPM standards and investigation levels may be exceeded
- particle speciation of zinc and iron to determine the source of particulates
- EPA planning for working collaboratively with industry to identify key sources of odour on a site by site basis and encourage improvements to minimise odour where this is possible and practicable.

Audit follow-up

The compliance of a licensed site with the Environment Protection Act and related legislation is reflective of the age of the site and its equipment, the level of interaction between managers of the site and the EPA and the mindset and behaviour of site managers and the workforce.

Follow-up will be carried out over the coming months by the EPA licence coordinators for sites audited in the study. This follow-up will:

- ensure compliance with legislation and licence conditions
- encourage further environmental improvements
- include free EPA eco-efficiency training where requested
- investigate the use of environmental improvement plans to achieve improved environmental performance.

Forming the Regional Industry Group

A meeting with local industry has been held to provide them with appropriate feedback from the study findings so far. Positive feedback has been received from these industry representatives and a Regional Industry Group has been formed. The Regional Industry Group will make possible a collaborative approach to environmental improvements within the project area and a greater appreciation by industry of the quality of the region's environment and the pressures on the local community.

Community involvement

Local community awareness programs will now be developed to raise awareness of the key issues identified in this report. These programs may include (but not be limited to):

- regular articles in the local press
- updates via email
- encouraging the formation of a Community Awareness Group.

Emerging issues—Bradken Resources Pty Ltd proposed expansion

The proposed foundry expansion by Bradken Resources Pty Ltd at Kilburn has been declared a Major Development by the State government. This will ensure a thorough assessment of the possible impacts of the proposed foundry expansion before any decision is made on whether the proposal can proceed or not.

If you would like to know more, copies of an Issues Paper about this proposal is available free of charge at the following locations:

Planning SA	City of Port Adelaide Enfield—Council Office
5th Floor Public Counter	163 St Vincent Street
136 North Terrace	PORT ADELAIDE SA 5085
ADELAIDE SA 5000	

The Conservation Centre	Enfield Library—Council Office
120 Wakefield Street	1 Kensington Crescent
ADELAIDE SA 5000	ENFIELD SA 5085

Greenacres Library—Council Office
2 Fosters Road
GREENACRES SA 5085

A copy of the Issues Paper can also be viewed on the Planning SA website at the following address:

http://www.planning.sa.gov.au/md_panel