

## Kilburn Odour Study Report





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*Environment Protection Authority  
South Australia*

## Kilburn Odour Study

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## TABLE OF CONTENTS

SUMMARY .....	IV
INTRODUCTION .....	1
RESULTS .....	4
CONCLUSION .....	6
REFERENCES .....	7
APPENDIX 1: ODOUR CHECKSHEET .....	9
APPENDIX 2: ODOUR DESCRIPTORS .....	10

### List of Figures

Figure 1: Nasal Ranger® diagram.....	2
Figure 2: Odour survey map.....	3

### List of Tables

Table 1: Industries surveyed .....	1
Table 2: Date sampled and meteorological conditions.....	4
Table 3: Results of odour survey .....	5

## SUMMARY

As part of air quality investigations in the Kilburn area, the Air Quality Unit undertook an observer-based odour survey in May-June 2005. The survey was a preliminary investigation to identify sources of odour and to enable the Environment Protection Authority (EPA) to take a focused approach on further work in the area.

The survey used EPA staff as observers. The Nasal Ranger® field olfactometer was used to give a quantitative measure of odour, and observations on the intensity of the odour at the sites were taken to ensure that odours fitted with the type of emissions expected from individual industries.

Observations both upwind and downwind assisted in assessing individual sites. Days were selected when there was low wind speed and no rain. Sites for investigation were selected after consultation with Air Quality staff and a client coordinator for the area, and on the basis that there had been previous odour complaints from the public. Eleven industries in the Kilburn, Wingfield and Gepps Cross areas were selected for examination by volunteers who had taken a pre-screening process for suitability and training in the use of the Nasal Ranger® before the study.

All 11 industries surveyed produced some odour, indicating the possibility of an impact on local residents. In particular, Bradken Resources and the Master Butchers Co-Operative both exhibited high odour intensity and an unpleasant hedonic tone. Further investigation of the industries will include an on-site audit to determine sources and strength of odour emissions.

## INTRODUCTION

The Air Quality Unit of the Environment Protection Authority (EPA) recently undertook an odour survey of industries within a 3 km radius of its particle and meteorological site at the South Australian Canine Association at Kilburn. In consultation with a licensing coordinator for this area, the unit chose the 11 industries (see Table 1) on the basis that there had been previous odour complaints about these industries from the public and of the type of emissions expected from the industries.

Days were selected when there was low wind speed and no rain, as these are ideal conditions for ambient odour sampling.

Table 1: Industries surveyed

Company name	Activities
Bitumax Pty Ltd	Hot mix asphalt preparation
Bradken Resources Pty Ltd	Ferrous and non-ferrous metal melting
Fletcher & Sons	Ferrous and non-ferrous metal melting
Collex Pty Ltd	Incineration: chemical wastes
Distinctive Diecasters Pty Ltd	Ferrous and non-ferrous metal melting
Korvest Ltd	Surface coating: hot dip galvanising
LF Jeffries Nominees Pty Ltd	Recycling depot (garden waste)
Master Butchers Co-Operative Ltd	Rendering and/or fat extraction works
McKechnie Iron Foundry Pty Ltd	Abrasive blasting
Plastics Granulating Services (Scherer Trading Pty Ltd)	Recycling depot (plastic containers)
Solver Paints (WP Crowhurst Pty Ltd)	Chemical storage and warehousing facilities

## Volunteers selection

The human nose is still the only method suitable for measuring odour but not all people can reliably distinguish odours. Hence the first step in the odour study was to test a pool of volunteers for suitability.

In this test, solutions of two different odorants are prepared at six different concentrations. The prospective volunteer must smell six groups of three solutions at the same concentration—two solutions are the same odorant and one is a different odorant—and nominate the odorant they believe is the odd one out of each group. If they correctly identify the different odorant in at least four of the six groups they are deemed suitable as an observer (Air Quality Branch 1990).

## Equipment

Although the human nose is the only suitable method for detecting odours, you cannot quantify the intensity of odours using the nose alone. All odour intensity values were obtained using the Nasal Ranger® field olfactometer (Figure 1) which volunteers breathed through. The Nasal Ranger® provides a quantitative measure of odour by mixing odorous ambient air with odour free filtered air at selectable dilution ratios,

called 'dilution-to-threshold' (D/T) ratios. The D/T ratio is a measure of the number of dilutions needed to make the odorous ambient air 'non-odorous' (St Croix Sensory 2004).

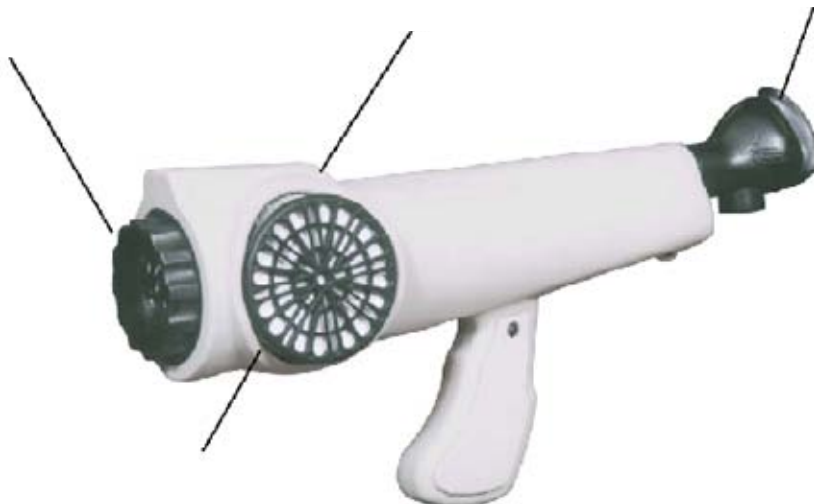


Figure 1: Nasal Ranger® diagram  
*Photo courtesy of St Croix Sensory*

A precision electronic flow meter built into the Nasal Ranger® barrel measures the total volume of mixed airflow travelling down the barrel on the way to the nasal mask. The readout display recessed on top of the Nasal Ranger® housing shows the user when the inhalation flow rate is within the required 16-20 litres per minute (St Croix Sensory 2004).

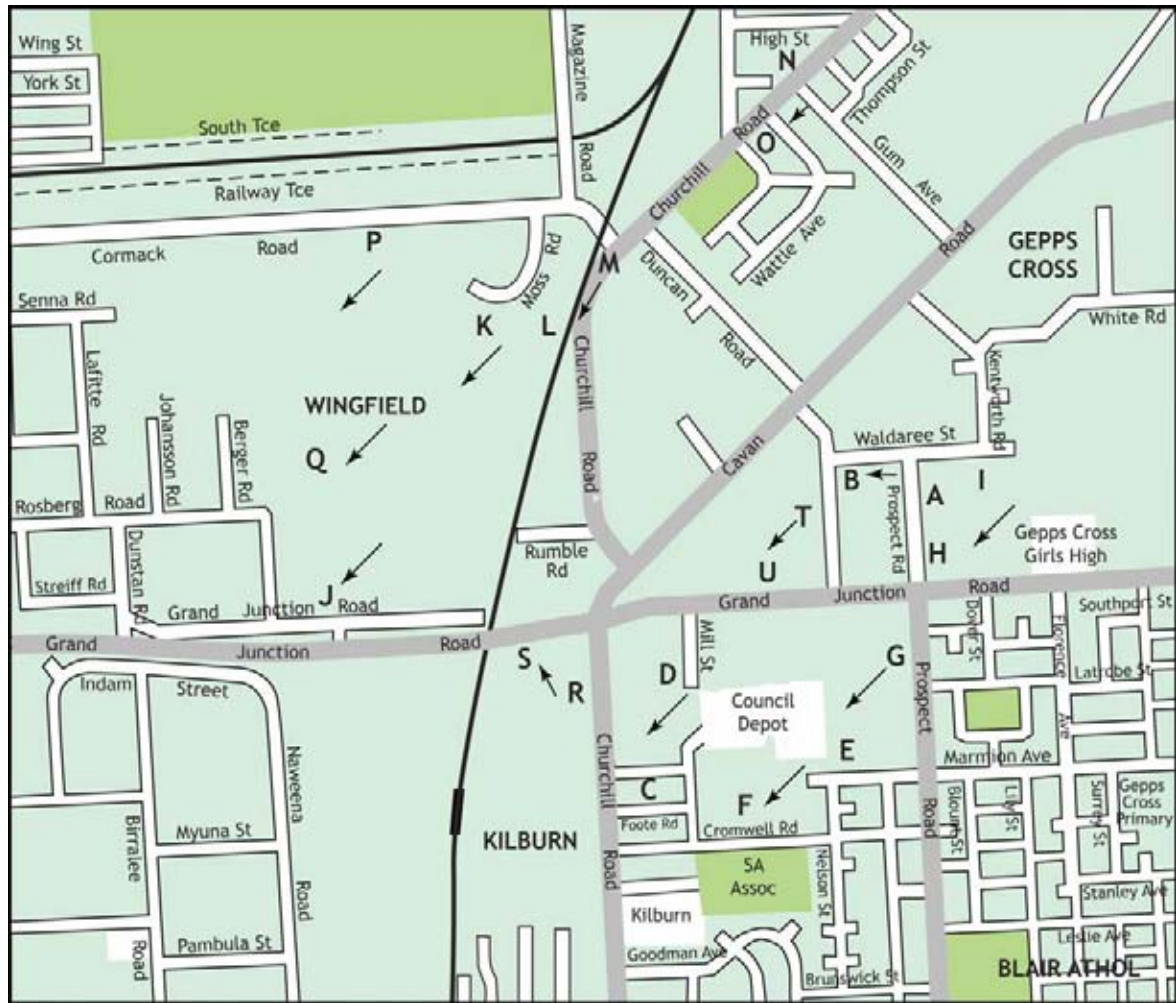
The rotational position of the Nasal Ranger® D/T dial determines the orifice size and therefore the volume of odorous air that enters through the selected orifice. The principle of field olfactometry calculates the D/T ratio as:

$$D/T = \frac{\text{Volume of carbon-filtered air}}{\text{Volume of odorous air}}$$

(St Croix Sensory 2004).

The selected observers (all EPA staff) were trained for using the Nasal Ranger® before going into the field to ensure they were able to breathe through the instrument at the required 16-20 L/min and that they could discern an odour through the instrument. The observers were asked to take a reading using the Nasal Ranger® and describe the odour using a list of descriptors of hedonic tone (see Appendices 1 and 2). Upwind and downwind readings helped determine the source of the odours (see Figure 2).





0 600 m

KEY

- |  |   |
|--|---|
| A Bitumax upwind                         | B Bitumax downwind                                  |
| C Plastics Granulating Services downwind | D Plastics Granulating Services upwind              |
| E Bradken upwind/Korvest downwind        | F Bradken downwind                                  |
| G Korvest upwind                         | H McKechnie downwind                                |
| I McKechnie upwind                       | J Master Butchers downwind                          |
| K Master Butchers upwind                 | L Collex downwind                                   |
| M Collex upwind                          | N Distinctive Diecasters                            |
| O Distinctive Diecasters downwind        | P Jefferies upwind                                  |
| Q Jefferies downwind                     | R Solver Paints upwind                              |
| S Solver Paints downwind                 | T Fletcher & Sons upwind                            |
| U Fletcher & Sons downwind               | ↙ Approximate wind direction at time of observation |

Figure 2: Odour survey map

## RESULTS

Sampling was carried out on four days in May and June 2005 when wind speed was low and there was no rain (Table 2).

Wind direction was predominantly from north-east to east, except during sampling at Solver Paints, when the wind direction changed to south-west towards the end of the morning (meteorological data sourced at SA Canine Association site, Kilburn).

Table 2: Date sampled and meteorological conditions

Industry	Date (2005), time sampled	Wind speed (m/s)	Wind direction (deg)	Approx. distance to nearest residence (m)
Bitumax	12 May, 10:20	2.8	77	330
Plastics Granulating Services	20 May, 9:00	1.6	34	35
Bradken	20 May, 9:20	3	27	30
Korvest	20 May, 9:30	2.8	26	144
McKechnie Iron Foundry	20 May, 9:50	3.3	22	120
Master Butchers Cooperative	20 May, 10:20	3	24	860
Collex	26 May, 9:00	0.7	12	550-600
Distinctive Diecasters	26 May, 9:20	0.7	17	39
L F Jeffries Nominees	26 May, 9:40	0	25	1057
Solver Paints	26 May, 10:30	1.4	171	294-330
Fletcher & Sons	24 June, 9:30	0	59	320-373

In this initial study, industries were only sampled on one occasion. Odours detected upwind of sites (Table 3) were inconsistent with the activity at the industry. The asphalt odour upwind of Fletcher & Sons was most probably from Bitumax, which was upwind of the sample site that day.

The odour from the fence line at Bitumax was measured at 4 D/T; approximately 10 metres further down Walderee Street the odour was undetectable. On the day of sampling at Fletcher & Sons, asphalt odour was detected. This suggests a variance in odour emissions from Bitumax.

Table 3 ranks industries according to the highest D/T value detected downwind of the industry on the Nasal Ranger®. Some industries had an obvious odour present that was not detectable when diluted through the Nasal Ranger®, although observers still detected an intense odour when the odorant was undiluted.

Of the 11 industries, the most odorous were Bradken Resources (highest reading 60 D/T) and the Master Butchers Co-Operative. However, the distance between the Bradken sample site and the odour source (approximately 100 metres), was much less than that at the Master Butchers Co-Operative (approximately 300 metres). Bradken is much

closer to a residential area than Master Butchers Co-Operative (see Table 2). This may make odour from Bradken more likely to lead to public concern.

Table 3: Results of odour survey

Industry	Nasal Ranger® readings		Descriptors		Comments	
	Downwind	Upwind	Downwind	Upwind	Downwind	Upwind
Bradken	60, 30, 30	no reading	burnt metallic	smoky	constant very strong unpleasant	
Master Butchers Co-operative	30, <60, 30	no odour	sharp pungent cooked meat putrid foul meat		very unpleasant foul	
McKechnie Iron Foundry	2, no reading, 15	no odour	metallic camphor burnt		Intermittent noticeable	
Bitumax	4, 2, 2	faint	asphalt	solvent petrol	unpleasant	
Collex	no reading	no odour	burnt sharp pungent smoky rubbish stale		intermittent comes in burst every 1-2 minutes	
Fletcher & Sons	no reading	negligible	metallic burnt burnt rubber	asphalt	intermittent	slight asphalt odour
Plastics Granulating Services	no reading	no odour	plastic	burnt rubber	weak intermittent	very faint odour
Solver Paints	no reading	no odour	paint solvent ether aromatic sweet		very slight not strong smell intermittent	
Distinctive Diecasters	no reading, just detectable	no odour	burnt hot metal			
Korvest	no odour	no reading		weak burnt plastic		very weak
L F Jeffries Nominees	no reading	no odour	musty earthy			

## CONCLUSION

The two highest D/T readings were detected at Bradken Resources and the Master Butchers Co-Operative. This high odour intensity combined with the hedonic tone of the odours being described as 'unpleasant' and 'foul' indicates these industries present an odour concern in the Kilburn area. These industries should have the highest priority of the listed industries for further investigation as sources of odour.

Field observations have shown that the other industries are not entirely odour free and variance in odour intensity indicates the potential for odour issues in the Kilburn area.

## REFERENCES

Air Quality Branch (EPA Victoria) 1990, *A practical guide to sampling and analysis*, unpublished, Technical Services Section Standard Analytical Procedure Number B-1, EPA, Victoria.

St. Croix Sensory 2004, The Nasal Ranger® Field Olfactometer—Operation manual version 6, <[www.nasalranger.com](http://www.nasalranger.com)><sup>1</sup>.

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<sup>1</sup> Web link current at time of publication



## Appendix 1: Odour checksheet

Name:
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Date	Site	Time sample started	Time sample ended	Description of odour From descriptors list	Strength of odour 2-60	Comments

## Appendix 2: Odour descriptors

	Floral	Fruity	Earthy	Offensive	Chemical	Medicinal
almond	fruity (citrus)	ashes, burnt wood	burnt, smoky	burnt plastic	ammonia	
cinnamon	fruity (other)	woody, resinous	burnt rubber	car exhaust	medicinal	
coconut	cloves	chalky	rotten egg	coal	camphor	
eucalyptus	maple	cut grass	rancid	diesel	soapy	
herbal	sweet	musty, earthy	sweaty	molasses	disinfectant, carbolic	
lavender	ether-aromatic	stale	household gas	plastic	sour, acid, vinegar	
liquorice	minty	mushroom	blood, raw, meat	vinyl	alcohol	
marigolds		animal	faecal, manure	tar	disinfectant	
perfume	Vegetable	burnt wood	putrid, foul	moth balls	menthol	
rose-like	dill	mouse-like	urinal	petrol, solvent	chlorinous	
musky	garlic, onion	mould	garbage	new rubber		
fragrant	tomato	dry, powdery, dusty	vomit	sour, acid, vinegar	Other	
aromatic	cooked vegetables	coffee	spoiled milk	kerosene	cooked meat	
spicy	nutty	pine	sour	oily, fatty	sharp, pungent	
vanilla	potato	swampy	Fishy	sulfidic	sickening	
		yeast	green pond	metallic	wet wool	
			fishy	paint		
			perm solution			