

## Kilburn Odour Study Report





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*Environment Protection Authority  
South Australia*

## Kilburn Odour Study

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## 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<br>(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).

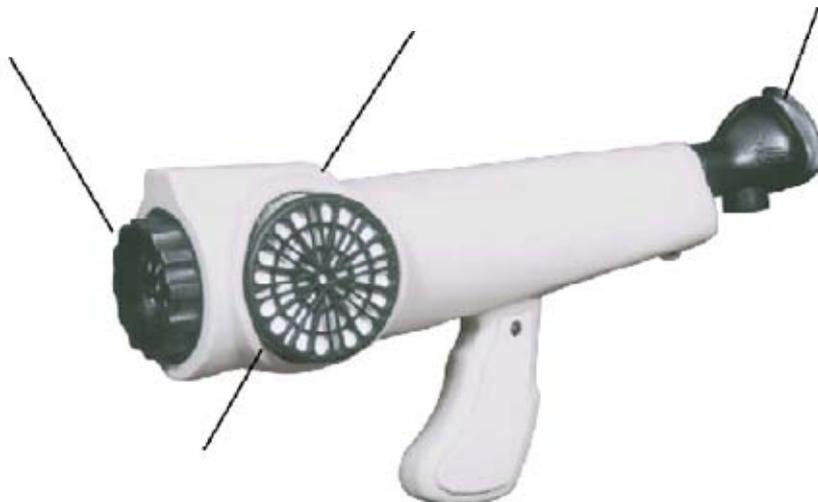


Figure 1: Nasal Ranger® diagram  
*Photo courtesy of St Croix Sensory*

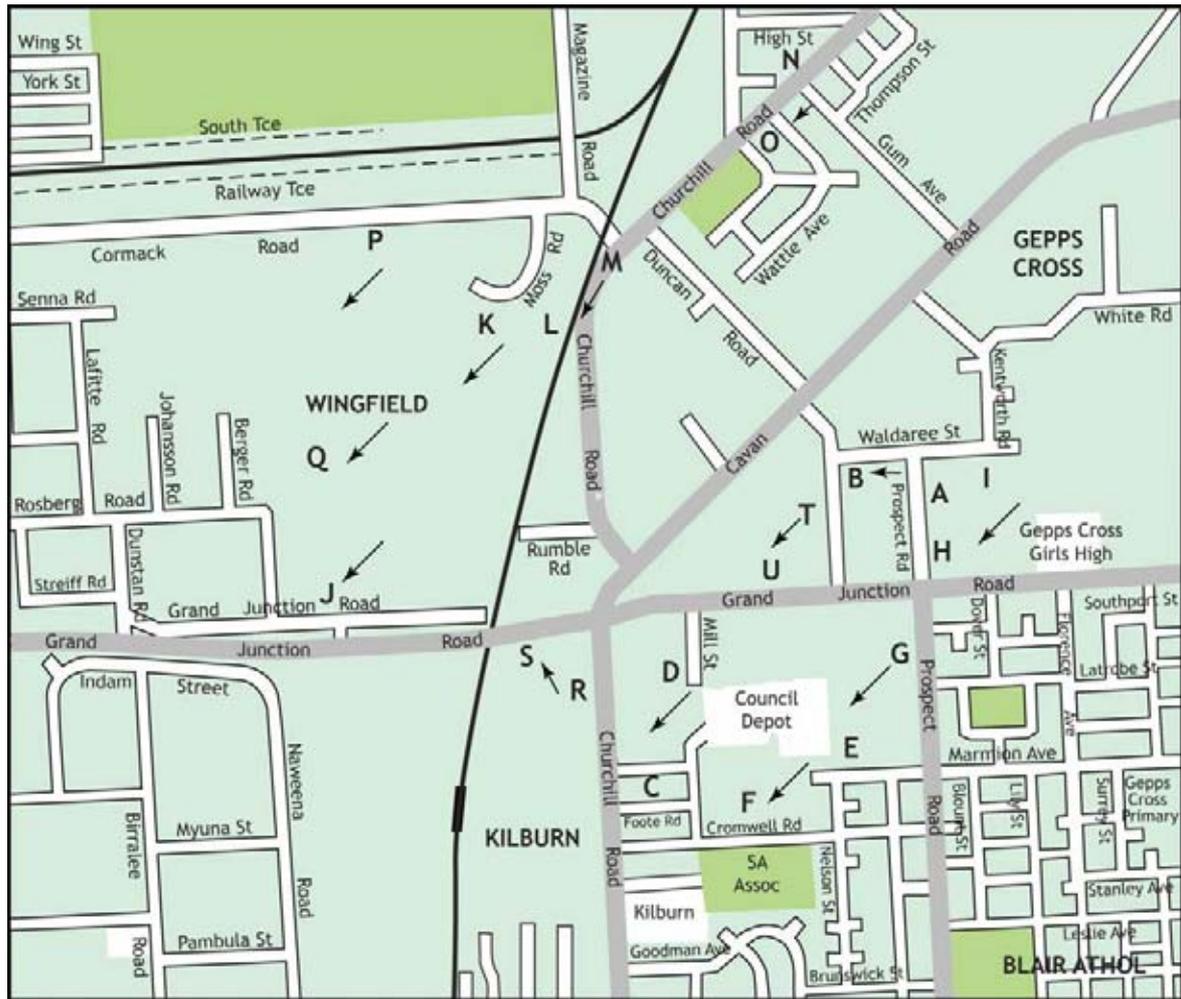
A precision electronic flow meter built into the Nasal Ranger® barrel measures the total volume of mixed airflow travelling down the barrel on the way to the nasal mask. The readout display recessed on top of the Nasal Ranger® housing shows the user when the inhalation flow rate is within the required 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),<br>time sampled | Wind speed<br>(m/s) | Wind direction<br>(deg) | Approx. distance to<br>nearest residence (m) |
|----------------------------------|------------------------------|---------------------|-------------------------|--|
| Bitumax                          | 12 May, 10:20                | 2.8                 | 77                      | 330  |
| Plastics Granulating<br>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<br>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 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    |                     |                        |           |