Air quality report for Lush, Oxford & Lush, South Molton Street in London

A comparison of nitrogen dioxide pollution in June 2013

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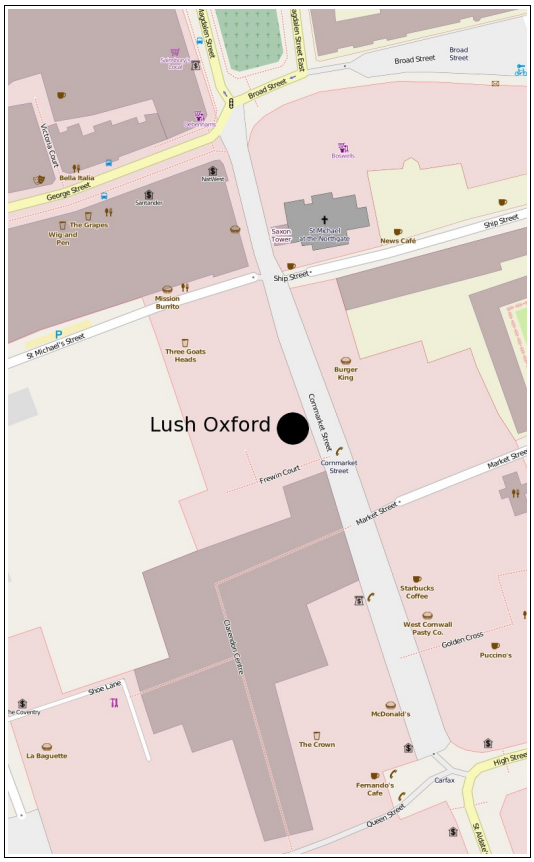
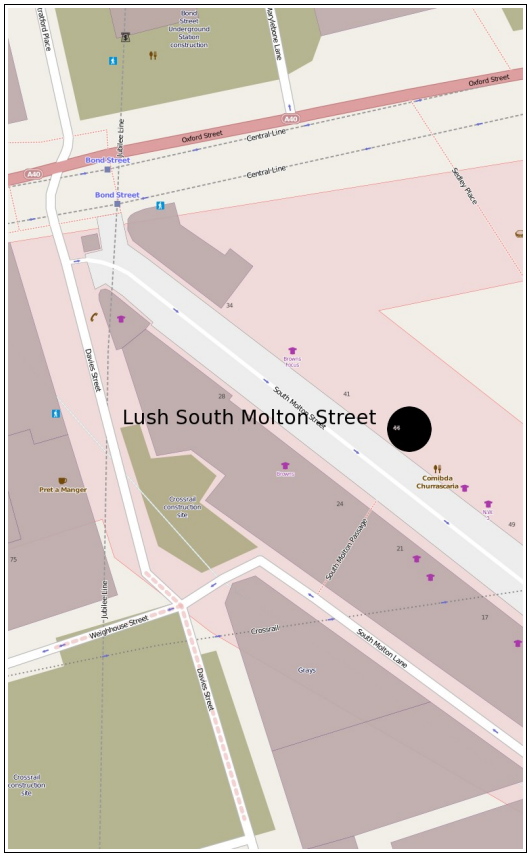
Pictures: Mounting gas diffusion tubes at Lush – Oxford (above), and South Molton Street (right)

Introduction

Network for Clean Air conducted a number of 'Community Air Campaign' projects to measure air pollution and air quality in 2013, including working with communities in Greenwich and Newham in London, and Winchester in Hampshire. These projects and others were supported with a grant from Lush Charity Pot. We also asked two Lush shops if they wanted to participate although they were not part of the project described in the funding application. The two Lush shops could be considered as a part of a community-of-interest rather than a community-of-place; they're also both in shopping streets.

Location of sites





Site Comparison shows similar locational aspects of the Lush shops in Oxford, and London. Note how both are on pedestrian streets with roads carrying buses nearby: Oxford Street to the north of Lush South Molton Street in London, and the High Street to the south of Lush Oxford.

Oxford shop address: Lush, 51 Cornmarket St, Oxford, OX1 3HA

London shop address: Lush Cosmetics, 44 South Molton Street, London, W1K 5RT

(Images: www.openstreetmap.org)

The two stores have similar aspects: both are in pedestrian streets near to roads which are closed to traffic except public services vehicles (buses, taxis, etc) for at least part of the time. The London site which is near to Oxford Street in west London, carries considerably more traffic (bus traffic) than the High Street in Oxford which is situated near to The High Street in Oxford. It has similar traffic restrictions but much lower levels of traffic – fewer buses. (Photos on last page show site aspects.)

Measuring nitrogen dioxide pollution

Nitrogen Dioxide is an air pollutant. It is present in our towns and cities from various sources but emissions from motor vehicles especially diesel engined vehicles (directly and indirectly), are often the primary source. The law sets limits for the levels of nitrogen dioxide pollution in ambient air. These limits are established via Directives from the European Union for its member states. This report documents measurement of pollution in the shopping streets outside the two Lush stores in June 2013.

Methodology

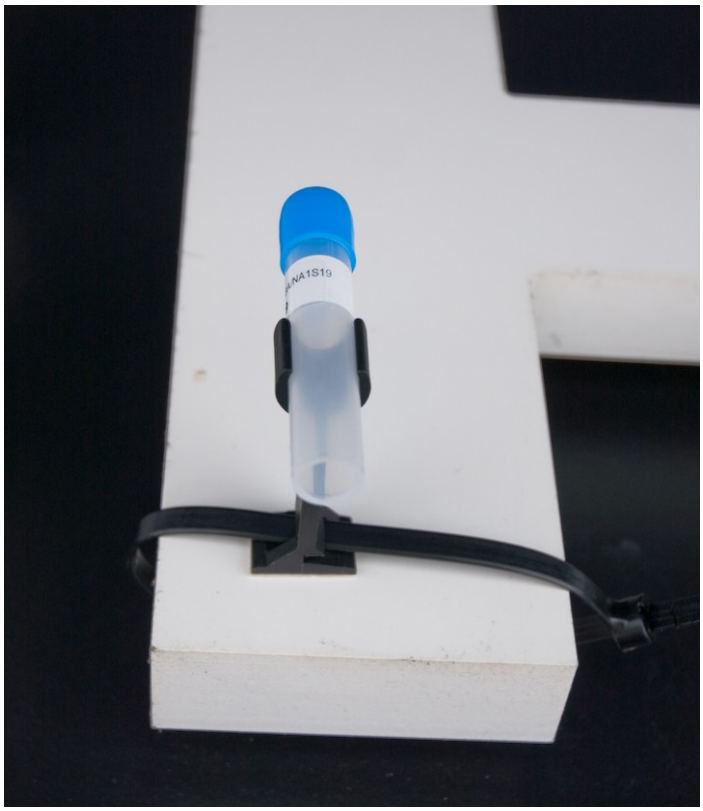


Photo: *Gas diffusion tube attached to the Lush sign in London*

Measurement of nitrogen dioxide was undertaken using gas diffusion tubes. These are plastic tubes about 7cm long with a chemical which is sensitive to nitrogen dioxide pollution, inside them. The sensors are passive: the air diffuses into them (no circulating fan, etc). The tubes are supplied with a cap to seal them from exposure to air. Measurement of air pollution starts when the cap is removed and it is exposed to air. When the cap is replaced then exposure stops. The tube is then analysed at a laboratory which reports the average level of nitrogen dioxide given the duration of exposure. The diffusion tubes which were used at Lush, Oxford and Lush, South Molton Street were from the same batch and supplied by an accredited laboratory (ESG).

Sitting of diffusion tubes

Lush, Oxford: A diffusion tube was attached to the Lush sign hanging outside the shop front. The diffusion tube was held perpendicularly in a clip attached by a cable tie and tape, to the signs metal hanger. This situated it above and to the side of shop awning; the tube was exposed to the sky. The height of the tube was 3.3 meters above the ground.

Lush, South Molton Street: A diffusion tube was attached to the facade of the shop (above the shop window). The facade has the letters 'Lush' set in relief on the shop front. The diffusion tube was held in a clip attached by a cable tie to the 'H' of 'LUSH'. As the relief lettering is set at a slight angle then the diffusion tube was also at an angle and not perpendicular to the vertical. The relief lettering was set below the shop awning which meant that above it was not open to the sky. The height of the tube was 2.2 meters above the ground.

Exposure times and dates for diffusion tubes

Both the tubes were put-up (exposed) on Saturday 1 June 2013, and both were collected (exposure stopped) on Saturday 29 June 2013 within a few hours of each other i.e exposure of 28 days (4 weeks). The exact times for starting and stopping exposure are given in the results table below.

Results

Sample Number	Site	Date and Time ON	Date and Time OFF	Exposure Time (Hours)	Total µg	µg m^{-3}	ppb	Bias adjusted (0.83) µg m^{-3}
EGG3/13A/NA1S1	Lush Oxford, 5 Commarket St	6/1/2013 9:27	6/29/2013 9:21	671.9	1.25	26.7	13.9	22.161
SILVER/13A/NA1S19	Lush 44 South Molton Street	6/1/2013 12:40	6/29/2013 11:32	670.87	2.39	51.1	26.6	42.413

When the diffusion tubes were collected from the Lush shops then there was nothing unusual in the collected tubes. For example – disturbance, obstruction of tube by spiders web or nesting insect, etc. The results are summarised in the table above.

The results shown include an adjustment or bias which is applied to take account of standard deviation from the mean. This application of a bias is intended to remove the inherent errors which occur with gas diffusion tubes. The bias applied is based on the laboratories deviation from the mean for its results from the year 2000 to 2012: 0.83 % or SD 4.6%. The use of a bias is normal.

Conclusion

The average concentration of nitrogen dioxide pollution is 22.161 µg m-3 for the street outside Lush, Oxford and 42.413 for µg m-3 for the street outside Lush, South Molton Street over their exposure periods. In relative terms, the nitrogen dioxide pollution in Lush, South Molton Street is 1.91 times that of Lush, Oxford for a very similar period. Note: the exposure start and stop times/dates were within about 3 hours of each other.

In this study, nitrogen dioxide pollution levels for the Lush shop in London (South Molton Street), were <u>about</u> twice that of the Lush shop in Oxford (Corn Market Street).

The results for Lush South Molton Street are indicative of levels of pollution in excess of statutory limits for Nitrogen Dioxide air pollution.

The results for the Oxford shop are similarly indicative of pollution levels below the statutory limits.

Discussion

Why are the pollution levels different at the two shops?

There were a number of differences in the set-up between Lush, Oxford and Lush, South Molton Street. Notably, one was positioned under the shop awning which was not open to the sky while the other was above the awning and open to the sky; one was vertically positioned and the other slightly off vertical. However, these differences are probably insignificant compared to the considerable differences in levels of NO2 pollution between the localities. The atmospheric levels of nitrogen dioxide pollution outside Lush South Molton Street are greater than Lush Oxford. i.e more pollution. This is probably due to higher background levels of this pollutant in London, and also the considerable bus traffic on Oxford Street which are mostly driven by diesel engines – many more than in Oxford.

What next?

Further research using data from the relevant local authorities in London and Oxford, and other sources (London Air Quality Network/ Defra) are likely to collaborate the relatively high levels of NO2 pollution in London and off Oxford Street in London.

If this study of the air quality outside the Oxford and London Lush shops were repeated on a monthly basis over a year then the average mean levels of NO2 could be found for each of the two locations. This which would make comparison with legal limits relatively straight forward. Confidence could also be increased by siting two or three tubes at each location when taking measurements.

Lush Oxford: *James Atherton (Lush) and Andrew (Network for Clean Air) in Corn Market, Oxford*

Lush South Molton Street, London: *Andrew (Network for Clean Air) and Luise Wiehmann (Lush)*

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