



Air Quality Monitoring at King's Lynn Bus Station Taxi Rank August 2019

1 Introduction

Following further concerns raised in June 2019 by licensed hackney carriage drivers, with respect to carbon monoxide levels, members of the Environmental Quality Team recently carried out monitoring to assess air quality levels at the undercover taxi rank located on the ground level of Vancouver (Sainsbury's) car park. The Council used passive Dräger tubes, which sample the air over an 8 hour period, to perform long term monitoring for carbon monoxide. This gives an idea of the pollution concentrations people would be exposed to when present in the taxi rank for long periods of time. The Council previously carried out air quality monitoring within the taxi rank in 2015.

2 Background

Monitoring for carbon monoxide (CO) was undertaken at 10 locations within the town centre; 7 on the ground floor of the Vancouver car park (TR1-TR7), 1 at Bay D of the bus station (BS1), and 2 within St James multi-storey carpark (MS1, MS2). At each location, a Dräger tube was attached to an appropriate surface (e.g. concrete column) at a relevant receptor height for up to 8 hours, to provide the most precise measurement possible.

Figure 1 illustrates the monitoring locations chosen within the Vancouver car park ground floor. Locations TR1-TR7 were selected to provide a comprehensive investigation of conditions within the taxi rank and car park. TR2, TR3, and TR4 were located along the length of the taxi rank to monitor the effect of idling vehicles on air quality within the rank itself. Locations TR1, TR5, TR6, and TR7 were chosen to investigate the potential difference in results from separate areas of the car park.

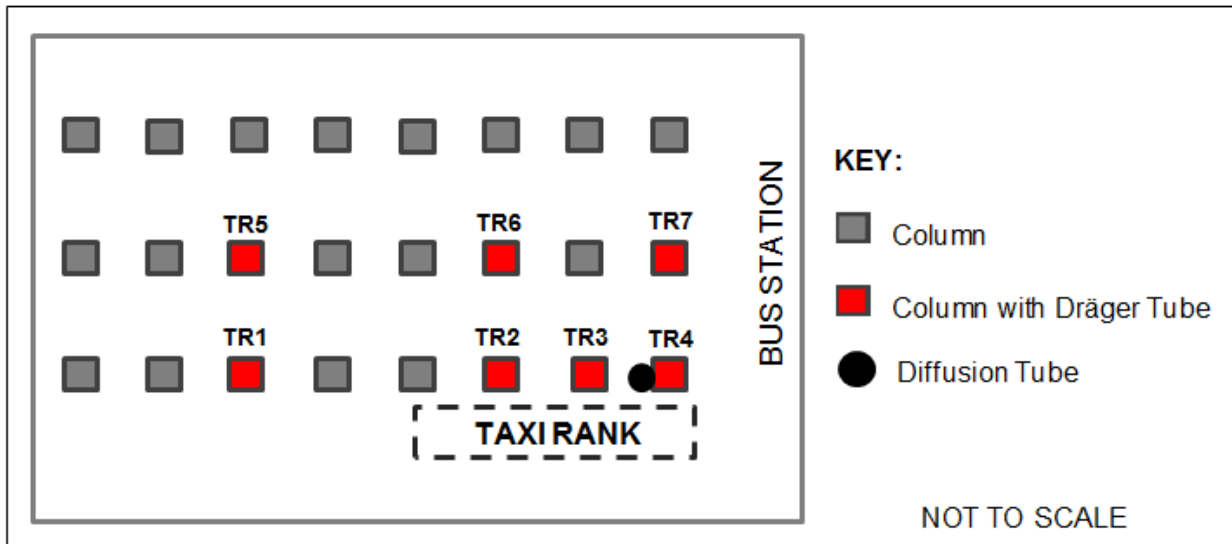


Figure 1: Location of Dräger tubes within the ground floor of the Vancouver car park with associated location codes.

Furthermore, the two locations selected within St James multi-storey carpark: the middle of the ground floor (MS1), and the exit (MS2), were chosen to undertake a comparison with another enclosed carpark with idling vehicles. MS2 was selected as a 'worst case' location to monitor emissions from vehicles queuing to leave the car park. Lastly, BS1 was selected to investigate emissions from idling buses. The results of this monitoring are shown in Table 1 the Appendix.

3 Additional Monitoring

The Borough Council monitors levels of nitrogen dioxide (NO₂) around the bus station and taxi rank in King's Lynn using diffusion tubes as part of its ongoing statutory duty to review and assess air quality across the Borough. When the taxi rank moved to its current location, a diffusion tube (tube 86) was placed at the head of the new rank in January 2015. No exceedance of the annual mean NO₂ objective has been recorded since the tube was commissioned.

Additionally, monitoring is undertaken at the bus station (tube 5), and follows the statutory guidance for a location where members of the public may stay for up to one hour adjacent to a source of NO₂. Therefore the relevant air quality objective is the one hour short term objective (200 ug/m³), rather than the annual mean objective (40 ug/m³). No exceedances of either the one hour, or annual mean objective have been recorded since the re-design of the bus station in 2015.

These results are shown in Table 2 in the Appendix.

4 Conclusions

The results from the long term passive Dräger tubes are displayed in Table 1.

This recent monitoring found the levels of CO within the taxi rank and surrounding Vancouver car park to be below the limit of detection only; a result which mirrors that of our last investigation. The results from St James multi-storey car park also follow this trend, with levels of CO found to be below the limit of detection at both monitoring locations. Finally, with regard to the Dräger tube located adjacent to tube 5 at bay D, the levels of CO were also found to be below the limit of detection.

EH40 states that the work place exposure limit for CO over an 8 hour time weighted average is 20 ppm. Therefore, the results of the investigate show that there is no impact on human health from carbon monoxide at the taxi rank or any other location monitored.

The annual mean NO₂ concentrations recorded using diffusion tubes 5 and 86 are shown in Table 2. These annual mean concentrations indicate that there are no exceedances of either the annual mean objective or short term objective for NO₂ within either the taxi rank or bus station; with higher concentrations of NO₂ actually recorded outside the taxi rank (in the bus station) than within it. These levels indicate therefore, that there is no impact on human health from NO₂.

The minimal concentrations of CO recorded within this investigation were expected, and are due to a number of causes. Firstly, whilst a small concentration of CO is released from vehicle exhausts ordinarily, this concentration only increases if the supply of oxygen is limited. When the oxygen supply is plentiful, carbon dioxide (CO₂) primarily forms instead of CO. Therefore, although stationary and idling cars are present within both the Vancouver and St James Multi-story car park, due to the ample ventilation and air flow, CO is unlikely to be emitted, with CO₂ released instead. We have previously monitored for CO₂ within the taxi rank in 2015, with results showing no impact on human health.

Secondly, any pollutants released from vehicular exhausts will be dispersed effectively due to the large volume and free movement of air within the Vancouver and St James multi-story carparks. Lastly, whilst the taxi rank is located within a covered part of the Vancouver car park, it is not enclosed; thus allowing ventilation and air flow through the taxi rank.

Appendix- Monitoring Results

Date	Tube Number	Location	Time Out	Time In	Duration	Result (ppm)	Notes
07.08.2019	1	TR 1	08:44	16:39	7:39	0	0= below the limit of detection
07.08.2019	2	TR 2	08:42	16:38	7:56	0	
07.08.2019	3	TR 3	08:39	16:36	7:57	0	
07.08.2019	4	TR 4	08:35	16:34	7:59	0	
07.08.2019	5	TR 5	08:48	16:42	7:54	0	
07.08.2019	6	TR 6	08:50	16:42	7:52	0	
07.08.2019	7	TR 7	08:53	16:44	7:51	0	
07.08.2019	8	BS 1	08:32	16:31	7:59	0	
07.08.2019	9	MS 1	08:22	16:23	8:01	0	
07.08.2019	10	MS 2	08:25	16:25	8:00	0	

Notes:
The above results do not indicate a breach of the air quality standards
Workplace exposure limit for CO is 20 ppm (8 hour time weighted average)

Tube	Year			
	2015	2016	2017	2019
5 - Bus Station Bay D	*	32.4	30.4	28.8
86 - Taxi Rank	27.6	27.7	27.6	27.1

Notes:
* Diffusion tube was relocated due to bus station re-design
NO₂ short term objective is 200 ug/m³ not to be exceeded more than 18 times in any year. This equates to an annual mean of 60 ug/m³ or more. The above results do not indicate a breach of the air quality standard for NO₂.

Air quality monitoring has been undertaken at this location previously, with the results available at https://www.west-norfolk.gov.uk/info/20137/air_quality/171/air_pollution_levels.