Document Control

Revision History

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<td>001</td>
<td>07/6/2019</td>
<td>Diana Barnes</td>
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Report 6: In-Tunnel Air Quality Monitoring
Summary

This report is provided consistent with Exhibit 1 of the O&M Contract (SSR, Appendix 24, Item 21).

Roads and Maritime Services has instructed Ventia to change ventilation within the M5 Tunnel settings from automatic to time of day settings as pre-set within the operating system as a trial starting from 1st February 2018 to reduce electricity costs. This change took effect at approximately 3pm on the 31st January 2018 and an increase in CO levels in the main tunnel has occurred. Compared with November 2017, CO levels Main Tunnel WB are trending around 100% higher, 15ppm in November 2017 vs 30ppm in December 2018. In late 2018 Ventia was instructed by RMS that the trial was complete and the parameters for the trial situation would be maintained.

In addition to time of day ventilation, CCTV cameras are used to monitor conditions within the tunnels and jet fans are used to increase tunnel ventilation, in response to in-tunnel conditions, to ensure that tunnel air quality remains within specified limits.

Please note, peaks of CO related to maintenance activities during closure, such as calibration, have been removed from graphs however have been retained in the raw data set provided to RMS. In addition to this, if an instrument is in fault and giving erroneous data, this data has been removed from the graphs for clarity but is retained in the raw data set.

Key points related to air quality in May 2019.

- Visibility peaked during maintenance closures.
- AQS 404 CO had a PLC error between 21-30th May and has been repaired.
- AQS 406 Visibility had a PLC error between 20-22nd May and has been repaired.
- AQS303 NO2 in tunnel unit was repaired in the May closure.
- AQS304 NO2 is in fault and will be investigated in the next closure.
Preamble

Air Quality Report: In-Tunnel Air Quality Monitoring

This report shows the carbon monoxide (CO) and visibility levels in the M5 East Tunnel (Main Tunnel) and the Cooks River Tunnel (CRX).

Carbon Monoxide

Carbon monoxide (CO) is monitored in the tunnel because exposure to high levels can be harmful to people’s health. The limits in the tunnel are based on World Health Organisation guidelines for short term exposure to CO. The limit for CO in the tunnel is 87 parts per million (ppm) for 15 minutes and maintaining levels below this limit is a requirement under the Ministerial Conditions of Approval for the M5 East Motorway. The level of CO in the tunnel is continually measured and the ventilation system is adjusted to ensure that the concentration of CO within the tunnel remains below the required levels.

Visibility

Visibility is measured in the tunnel because poor visibility can make driving conditions dangerous. The major cause of reduced visibility or haze in the tunnel is from smoky vehicles, mainly for diesel trucks. Visibility limits used in the tunnel are taken from the World Road Association guidelines which recommend the tunnel is closed if the visibility reaches 0.012/m.

15-minute time-weighted average

This refers to the CO or visibility readings averaged over a 15-minute period with this reading being updated every 15 minutes.
M5 East Tunnel Ventilation System

The arrows show the direction of air flow.
- Red: Air flow in the western end of tunnels
- Black: Air flow in the eastern end of tunnels
- Orange: Fresh air in through western tunnel portals
- Grey: Fresh air in through eastern tunnel portals

AQS303
AQS304
AQS402
AQS403
AQS404
AQS301
PRINCESS HIGHWAY
EXIT RAMP
MARSH STREET
EXIT RAMP
MARSH STREET
TUNNEL PORTALS
MARSH STREET
ON RAMP
FRESH AIR ENTERS
THE TUNNELS THROUGH
THE INTAKE POINT
AIR EXITS THE TUNNEL
THROUGH THE
VENTILATION STACK

BEXLEY ROAD
TUNNEL PORTALS
Figure 1: Main tunnel westbound, CO results for May 2019 (15min time-weighted average)
Figure 2: Main tunnel eastbound, CO results for May 2019 (15min time-weighted average)
Figure 3: Cooks River tunnel, CO results for May 2019 (15min time-weighted average)
Figure 4: Main tunnel westbound, visibility results for May 2019.
Figure 5: Main tunnel eastbound, visibility results for May 2019
Figure 6: Cooks River tunnel, visibility results for May 2019