

Ventilation Outlet Monitoring Reporting

Report on Ventilation Outlet above-limit reading WestConnex M4 East To be submitted to DPE within 20 days of the Report of Above-Limit Reading					
Details of the exceedance Attach relevant Notification of Above-limit Reading	<p>This report has been prepared to address the requirements under MCoA E16:</p> <p>“Should the results of monitoring show that any of the ventilation outlet limits specified in condition E14 have been exceeded, the proponent must immediately notify the Secretary, EPA and NSW Health. The notification must be followed up with a detailed report within 20 working days, which must be prepared by the proponent, reviewed by a suitably qualified and experienced independent specialist(s), and submitted to the Secretary, on the cause and major contributor of the exceedance and the options available to prevent recurrence.”</p> <p>The VOC parameter at Underwood Road Ventilation Facility (URVF), western ventilation facility, reported above-limit readings on 6th February 2020. The reading was as follows:</p> <ul style="list-style-type: none"> - VOC – hourly average of 12.23 mg/m³ at 1400 - 1700hr <p>The immediate notification of ventilation outlet above-limit reading was issued to the Secretary, EPA and NSW Health. (refer to Section 1 of this report).</p>				
Was the data valid? If invalid, include any details or justifications for the invalidity	<p>This report has been prepared to investigate the root cause of the above-limit reading and any other possible contributing factors.</p> <p>The data was invalid.</p> <p>The above limit VOC reading at URVF on 6th February 2020 at 1400 – 1700 Hrs occurred whilst routine maintenance on VOC automatic calibration system was being performed, resulting in the upload of invalid data to the operational management control system (OMCS).</p> <p>Section 4 provides supporting evidence from Ecotech (Maintenance engineer) verifying that during maintenance work “not all cables can be removed between the analyser and the logger and resultant readings got through during the process.”</p>				
Comparison with long term monitoring trends and background air quality data	<p>Not applicable for this report.</p>				
Cause or major contributor of the exceedance If the cause or major contributor are not able to be determined, then known facts of what was occurring at the time should be included (e.g. traffic information, ventilation outlet monitoring records etc)	<p>The Air Quality analysers at URVF reported exceedances (as noted in the Details of the exceedance) whilst technical engineers were attempting to repair VOC auto calibration issues with the analyser.</p> <p>Sections 2 and 3 of the report provide supporting evidence that no other westbound Air Quality monitoring parameters were abnormal or incidents (such as traffic congestions or accidents) occurred at the same date and time as the reported VOC exceedance.</p> <p>Section 4 of the report provides commination evidence from the maintenance technicians that the VOC exceedance occurred whilst working to repair defects, causing invalid VOC data to upload to the system.</p>				
Options to prevent recurrence This is to include consideration of improvements to the tunnel air quality management system to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under condition B5, and discussion of whether those improvements are feasible and reasonable					
Section 5 of this report details the recommendation to improve systems and prevent reporting invalid air quality exceedances to the M4 Tunnel website.					
Person responsible for report	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Name: Peter Redwin</td> </tr> <tr> <td style="padding: 2px;">Position: Head of Operations and Maintenance</td> </tr> <tr> <td style="padding: 2px;">Organisation: WestConnex Transurban</td> </tr> <tr> <td style="padding: 2px;">Date: 21.02.2020</td> </tr> </table>	Name: Peter Redwin	Position: Head of Operations and Maintenance	Organisation: WestConnex Transurban	Date: 21.02.2020
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1. Ventilation Outlet above-limit Reading Notification

Ventilation Outlet Notification and Report

Ventilation Outlet Monitoring Notification

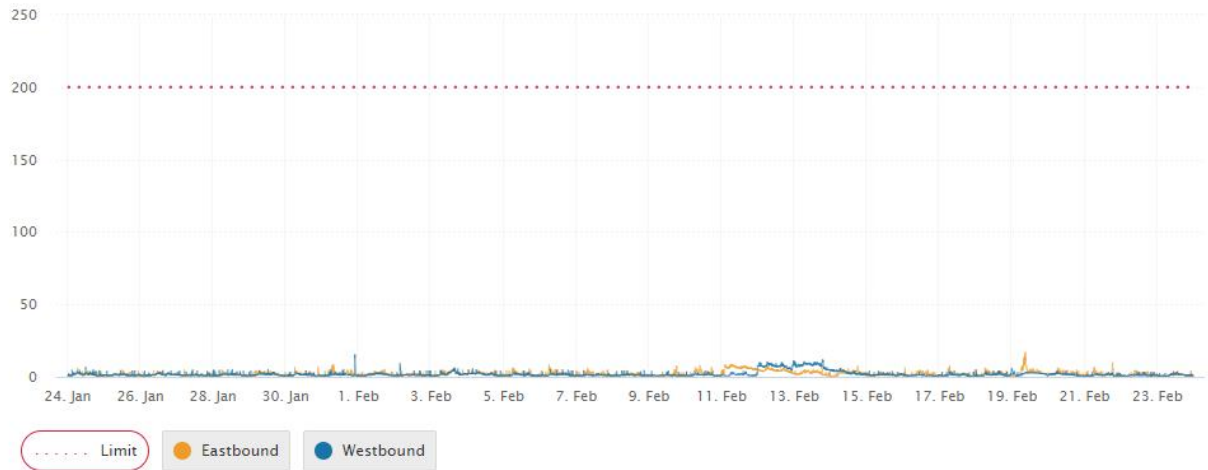
Notification of Ventilation Outlet above-limit reading WestConnex M4 East To be notified immediately to Project Company and RMS. Project Company is to notify DPE, EPA and NSW Health immediately	
Date	06 February 2020
Time (start and finish)	1400 – 1700
Relevant location	<input checked="" type="checkbox"/> Western Ventilation Facility <input type="checkbox"/> Eastern Ventilation Facility
Relevant limit	<input type="checkbox"/> Solid particles – 1 hour averaging period <input type="checkbox"/> NO ₂ or NO or both, as NO ₂ equivalent – 1 hour block averaging period <input type="checkbox"/> NO ₂ – 1 hour block averaging period <input type="checkbox"/> CO – 1 hour rolling averaging period <input checked="" type="checkbox"/> VOC – 1 hour rolling averaging period
Above-limit reading Detail the above-limit reading that was received	VOC hourly average reading of 12.23 mg/m ³
Duration Detail the duration of the above-limit reading or event	3 hrs
Nature of event Detail nature of the event that contributed to the above- limit reading	Initial indications show that the above-limit reading was the result of routine calibrations/maintenance data uploaded to the operational management control system and Link website.
Was the data valid? If unknown at this stage, please indicate.	No. Calibration data has been recorded and uploaded.
Was there an emergency? Refer section 6.5 of this Plan. If this is unknown at this stage, please indicate.	No.
Measures employed Detail measures employed to minimise the concentration levels	No.
Commitment to prepare and submit a Report on Above-Goal Reading A Report on Above-Goal Reading will be prepared for this notification. Please note that a Report is not required in the event of an emergency.	
Person responsible for notification	Name: Peter Redwin
	Position: Head of Operations and Maintenance
	Organisation: WestConnex Transurban

2. Air Quality Monitoring Results – In Tunnel

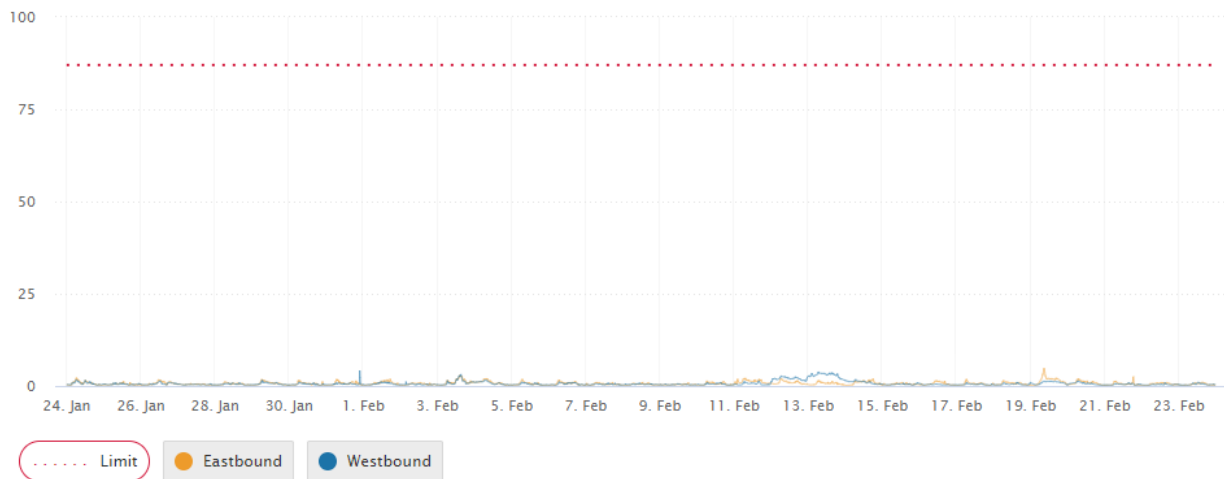
The following diagrams were captured from the official website for Air Monitoring on M4E. In tunnel data from 24th Jan to 23rd February 2020 are displayed. Readings for Carbon monoxide (CO), Nitrogen dioxide (NO₂) and visibility, westbound (blue), showed no limit exceedances on 6th Feb 2020.

(<https://www.linkt.com.au/sydney/using-toll-roads/about-sydney-toll-roads/westconnex-m4/tunnel-air-quality>)

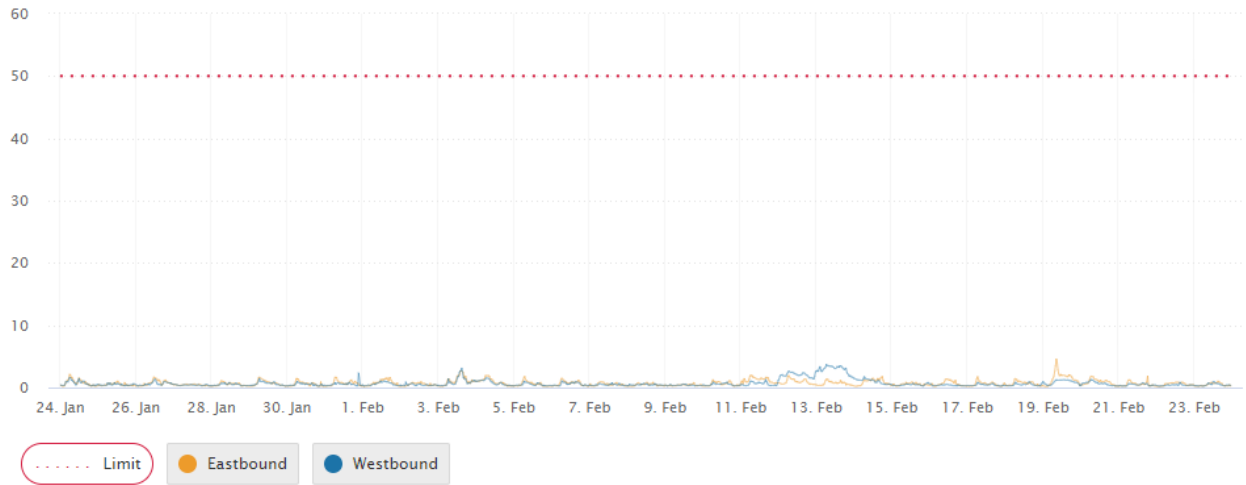
2.1 CO (ppm) – 3 min maximum



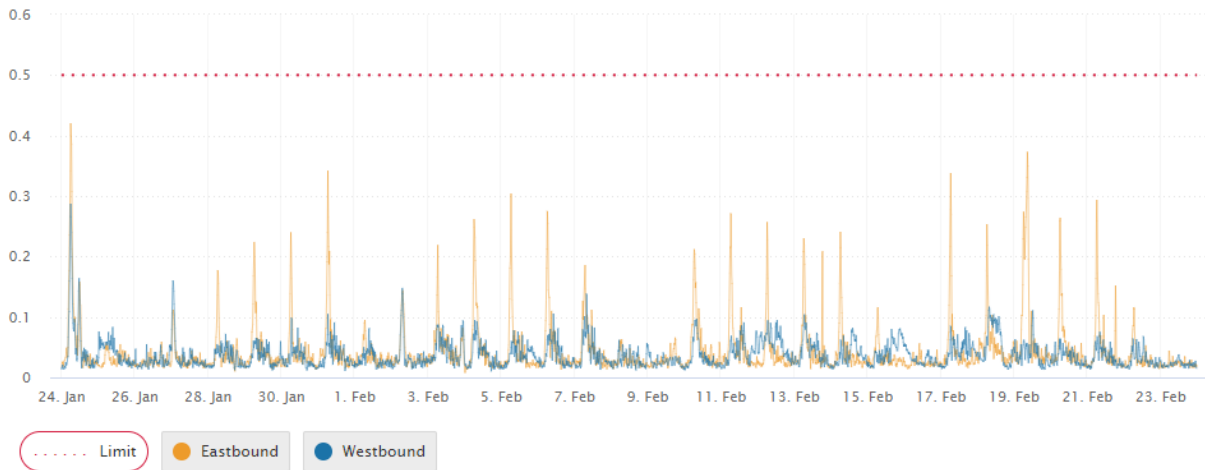
2.2 CO (ppm) – 15 min maximum



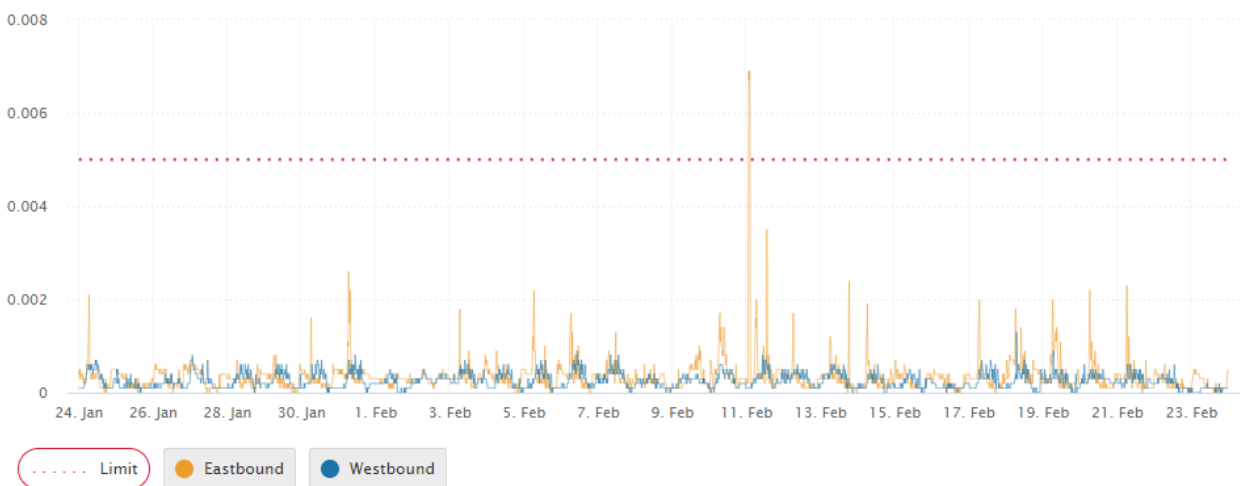
2.3 CO (ppm) – 30 min maximum



2.4 NO₂ (ppm) – 15 min maximum



2.5 Visibility (per m) – 15 min maximum



3. Report from OMCS

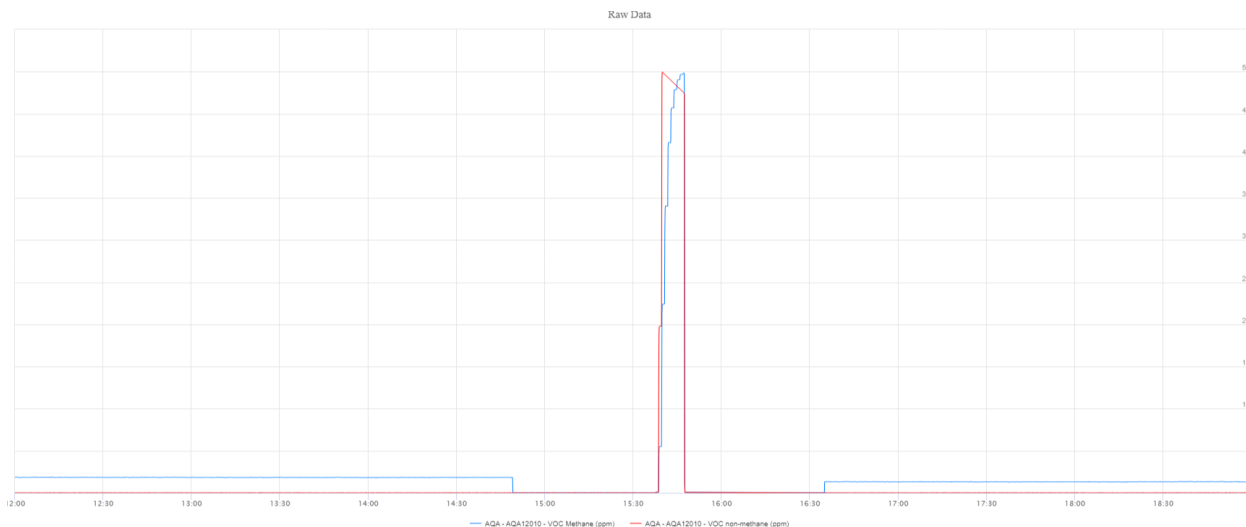
Operations Management Control System (OMCS)

The Operations Management Control System (OMCS) is the overall governing control system that ensures; the motorway operates safely, mitigates the effects of incidents, safeguards from damage and improve situational awareness. The OMCS controls the road closure as an automated and orderly integrated process and ensures the sequencing of actions on multiple devices. The OMCS encompasses the following:

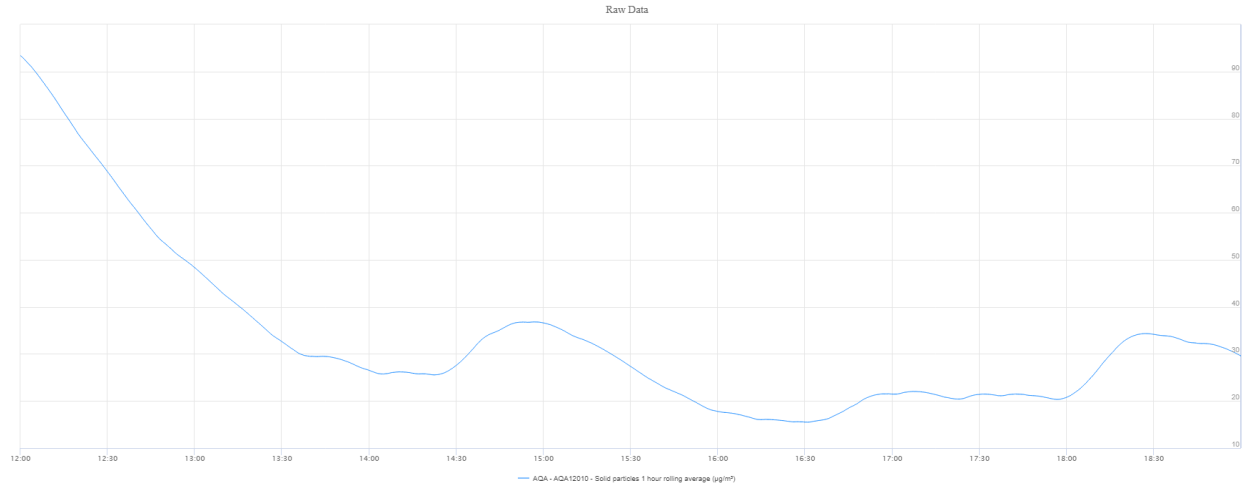
- Traffic Monitoring and Control System (TMCS) – represents the hardware and software systems and equipment that monitor and control all traffic-related devices on the Motorway, in real time. The TMCS enables the operators to control and observe the status of traffic control devices
- Plant Monitoring and Control System (PMCS) – represents the hardware and software systems and equipment that monitor and control Motorway plant, sub-systems and equipment in real time. The PMCS enables the MCC Operator to observe the status and control of tunnel including pumps, lighting, ventilation, drainage and fire protection systems as required to provide effective response to incidents
- Incident Management System (IMS) – provided as part of the PMCS/TMCS control system software. The IMS provides the interface through which operators will manage events. The system will:
 - o Ensure that an operator’s actions are consistent with agreed pre-planned ITPs and TCPs
 - o Automate operator tasks
 - o Control sub-systems
 - o Record details of actions and incident information for incident de-briefing

The Air Quality Analyser (AQA) used in URVF is AQA12010. The data captured from the OMCS AQA12010 two hours before, during and two hours after the exceedance event on 6th February 2020 (1200hr to 1900hrs) are displayed below.

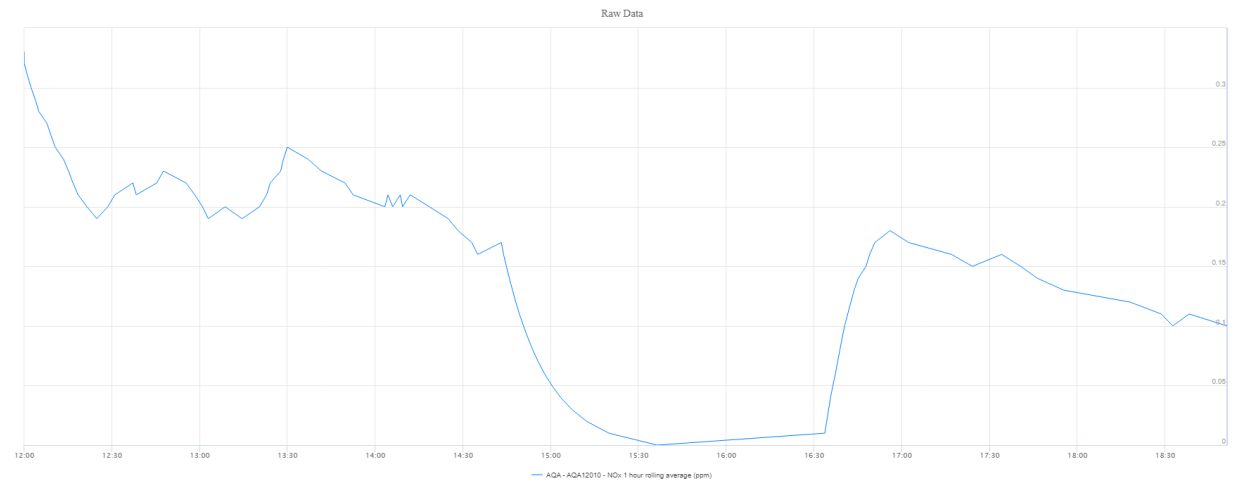
3.1 AQA12010 VOC (ppm) 6.2.2020 1200 hr – 1900hr



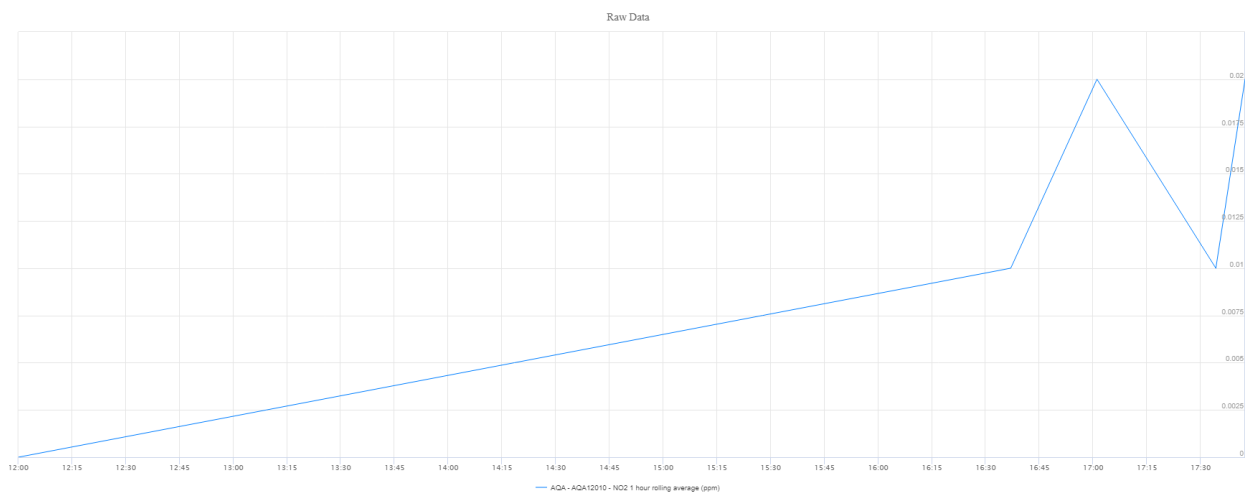
3.2 AQA12010 Solid particles 1200 hr – 1900hr



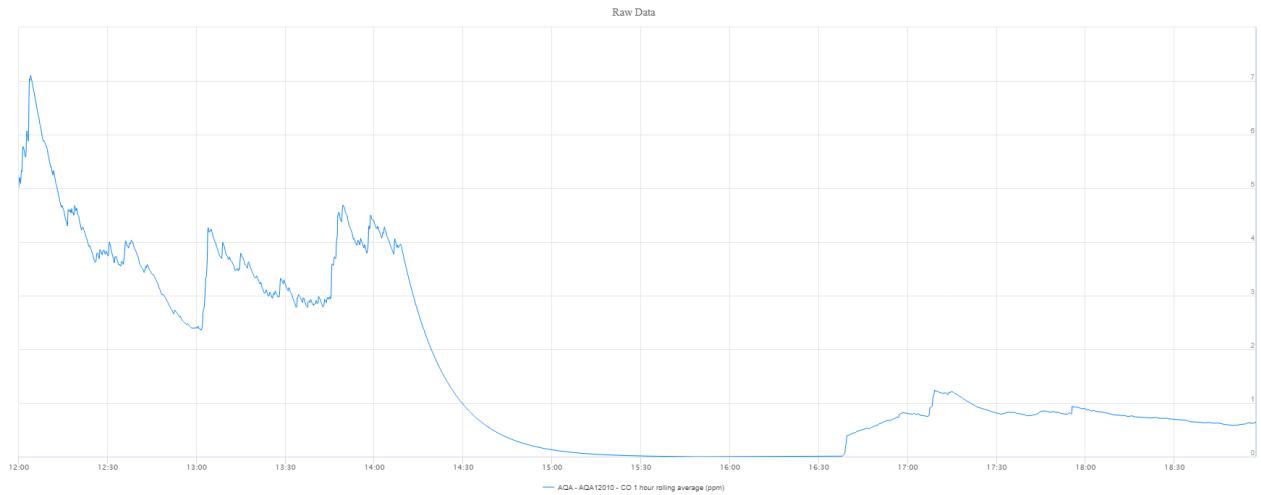
3.3 AQA12010 NOx 1200 – 1900 hr



3.4 AQA12010 NO₂ 1200 – 1900 hr



3.5 AQA12010 CO 1200-1900hr



3.6 Events report

The events report extracted from the OMCS on M4E westbound on the 6th February 2020, 1200 hrs to 1900hrs period was examined. This period covers primarily the lead up to the exceedance and two hours after the exceedance. No incidents, including traffic congestion, stopped vehicles, vehicle accidents or spills, occurred and further support that the root cause of the VOC exceedance on 6th February at URVF was due to the maintenance work on the analyser.

4. Statements from Ecotech Engineer (Root Cause)

4.1 Email Correspondance

From: Chris WHITE
Sent: Thursday, 6 February 2020 6:28 PM
To: Justin Hazelbrook
Cc: Phillip Nott; Aedan Hewitt; Michael Preston; Atesh RAM
Subject: Explanation regarding VOCs maintenance exceedance at Underwood Rd

Justin

As discussed on the phone, please find a brief explanation of what occurred. Sincere apologies for the inconvenience caused.

One of the defects with both CEMs systems as handed over to Ecotech is that the VOC automatic zero and span sequences at both PRVF and URVF are not working, although the systems are capable of doing it.

Why is this important? In order for VOC data by method AS3580.11 to pass the validation criteria, a calibration sequence must be run at least every 7 days (typically daily), which is not occurring. We were attempting to get these working so we can report on some VOC data for you. Unfortunately, to do this they are activated through the station data logger, which means that not all the cables can be removed from between the analyser and the logger and the resultant readings got through during this process. At the moment, whenever a calibration sequence is activated manually at site, we have to remove all the signal cables from between the instrument and the logger.

Compounding this issue, we therefore cannot run remote calibrations and adjustments on the systems (which we consider as standard practise). The systems should be capable of recognising that a calibration sequence is active and flag the data as invalid so it does not make it up to the website. This is another critical defect, which is significantly hampering our ability to maintain these systems. Do you think that there would be some other way of filtering these readings in your systems before they get to the website so we can perform adjustments remotely? As these instruments do seem to drift a lot, this would enable us to increase data capture rates which is our goal with any project.

Please dont hesitate to contact me for any further information.

Regards

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Chris White
NZCS & DipMgt
Eastern Branch Operations Manager
Ecotech Pty Ltd



4.2 Ecotech Maintenance Report



Maintenance Report
Prepared For

Fulton Hogan Egis
Ecotech Service and Maintenance Reports



Visit Date / Time Start	6/02/2020 8:00:00 AM	Visit Date / Time End	6/02/2020 5:30:00 PM
Service Type	6	Service Engineers:	Scott Xie

Job Details

DESCRIPTION OF WORK COMPLETED

On site UVRF to perform level 1 span/zero calibration on VOC, NOX and CO gas analyser.
Replaced the deionisation cartridge
There is a motor speed alarm occasionally in CO analyser, need to keep an eye on it.

OUTSTANDING ITEMS

5. Conclusions

The above-limit VOC reading at Underwood Road Road Ventilation Facility of 12.23 mg/m³ on the 6th of February 2020 can be attributed to maintenance work on the analyser resulting in the uploading of invalid data to the operational management control system (OMCS). At the time, the upload of invalid data was unpreventable during repair works by Ecotech maintenance engineers as all cables cannot be removed from between the analyser and the logger.

In section 4.2 – Ecotech Maintenance Report, the period of exceedance corresponds with the maintenance log. The Ecotech maintenance technician was on site at URVF from 0800 – 1730 whilst the above-limit VOC reading was between 1400-1700. This further contributes to the fact that the reading was a result of planned maintenance.

In tunnel CO, NO₂ and visibility air quality data from linkt, as well as no event reports from the OMCS at URVF two hours before the VOC exceedance event, during the event and two hours post event, support the conclusion that the maintenance work attributed to the above-limit VOC reading.

The immediate notification of ventilation outlet above-limit reading was issued to Secretary, EPA and NSW Health on 6th February, as outlined in the requirements under MCoA E16.

Discussion with Ecotech technical engineers and OMCS system operators are ongoing as to how best to filter invalid data so defect repairs on the Air Quality Analyser may continue.

6. Recommendations

Current defects present within URVF are resulting in continual instrument drift of the VOC analyser and requires frequent attention from Ecotech maintenance technicians. Issues with the zero span/daily check are the primary driver. Compounding the issue, maintenance data has previously been allowed to upload directly onto the OMCS and hence the Linkt website. Rolling out of maintenance mode across all air quality assets is the overarching resolution to stop maintenance related exceedances.

The main recommendation is to ensure the reliability of maintenance mode on air quality assets, this is currently being looked into by the senior systems control engineer.

7. Definition and Acronyms

	Description
AQA	Air Quality Analyser
AQS	Air Quality Sensor
IMS	Incident Management System
NOx	The total concentration of all nitrogen oxide gases.
NO2	Nitrogen Dioxide
OMCS	Operation Management Control System
PMCS	Plant Monitoring and Control System
PRVF	Parramatta Road Ventilation Facility
TMCS	Traffic Monitoring and Control System
URVF	Underwood Road Ventilation Facility
VOC	Volatile Organic Compounds, including Benzene, Toluene, Xylenes, 1,3-Butadiene

8. Reference Documents

Document Number	Document Title	Rev.
M4E-CP-OPM-PWD-09062	M4 East Operation & Maintenance Manual (Vol. 5) - Part 1. OMCS – SIDERA	B
M4E-CP-OPM-PWD-09950	M4 East Operation & Maintenance Manual (Vol. 5) - Part 4.1. PMCS – Tunnel Ventilation System	B
M4E-CP-OPM-PWD-08774	M4 East Operation & Maintenance Manual (Vol. 4) - Part 6. Tunnel Ventilation System	B
M4E-CP-OPM-PWD-08726	M4 East Operation & Maintenance Manual (Vol. 2) - Part 11. Air Quality Monitoring System	B
M4E-60-657a-T015-00003-A-PD6	Operation and Maintenance Manual (Tunnel Sensors)	V1.5
M4E-60-673-T012-00005-00	Envista ARM Software	
M4E-60-673-T015-00001-00	Ventilation Stack Monitoring Operation and Maintenance Manual – Continuous Emission Monitoring Systems (CEMS)	0
M4E-60-673-T012-00003-00	EnviroNics 6100 Gas Dilution Calibrator	