

Air Quality in Scotland

Welcome to the third Scottish Air Quality Database (SAQD) stakeholder's newsletter. This newsletter is produced on behalf of the Scottish Government by Ricardo Energy & Environment (Ricardo) and is designed to provide regular updates and news regarding the SAQD and local air quality matters to all stakeholders. This may include; updates to the network; new information on air quality issues; updates on changes in policy and procedures; new initiatives and events; technical reports; and how to access data using the Air Quality in Scotland website.

If you have any information which you think would be beneficial to include in a future newsletter, please email us at info@scottishairquality.co.uk.

NEWS

CONSULTATION LAUNCHED ON BUILDING SCOTLAND'S LOW EMISSION ZONES (LEZs)

In partnership with local authorities, the Scottish Government will introduce Low Emissions Zones (LEZs) into Scotland's four biggest cities between 2018 and 2020, and into all other Air Quality Management Areas (AQMAs) by 2023 where the National Low Emission Framework appraisals advocate such mitigation.

The Scottish Government are actively seeking your views on how best to put in place the new LEZs. For more information, visit the Transport Scotland and Citizen Space website. Please note that email/online submissions close on the **28th November 2017**.

Email	lezconsultation@transport.gov.scot
Online	https://consult.scotland.gov.uk/transport-scotland/building-scotlands-low-emission-zones/

IMPORTANT HEALTH AND SAFETY UPDATE ABOUT THE BETA ATTENUATION MONITOR

The Environment Agency (EA), UK Automated Urban and Rural Network (AURN) network contractors are in the process of updating the health and safety advice regarding the Met One 1020 Beta Attenuation Monitor (BAM) PM₁₀/PM_{2.5} monitoring instrument. As BAMs are

used within the SAQD this update is relevant to Scottish Local authority sites.

The BAM contains a small, sealed radioactive source of beta radiation (carbon 14, or ¹⁴C). Although carbon 14 is dangerous if it gets inside the body (if swallowed, inhaled or absorbed through the skin), that is **not** a risk here, because the source is sealed and safely contained inside the BAM.

However, it has recently come to our attention that, when the door of the case is open, a detectable amount of beta radiation emerges from the BAM, through the slit between the tape and the source, probably having been scattered by the tape and the material on it.

The beta radiation from ¹⁴C is of relatively low energy; it cannot penetrate through the case of the BAM, can only travel around 22 cm through air, and – most importantly - cannot penetrate even the outer layer of your skin.

When carrying out BAM maintenance tasks such as nozzle cleaning or tape changing, the operator will have the door open and may have their eyes close to the tape slit. While it is currently our understanding that any risk is very small, (because of the low energy of the beta radiation, and because such tasks are infrequent and do not take long), **as a precaution it has been recommended that safety glasses are worn when carrying out such tasks.**

The following recommendations are provided to Local Site Operators and others who carry out work on a BAM1020 that involves opening its door:

- Do not attempt to access, modify or remove the BAM's sealed beta source for any reason.
- It is recommended (but not essential) to wear safety glasses when working on the BAM1020 with its door open. As well as offering more than adequate protection for the extremely small risk of any eye damage from the beta source, this will also minimise any other eye risk from other maintenance activities such as cleaning nozzles etc.

The Air Quality Monitoring in Scotland Sites Operates Manual found on the Air Quality in Scotland [Website](#) is in the process of being updated with this information.

NEW MONITORING SITES

We are pleased to announce the addition of the following air quality monitoring station to the SAQD:

Renfrewshire Johnstone: this is a roadside monitoring station measuring PM₁₀ and PM_{2.5} (additional pollutants monitored PM₁, PM₄ & TSP).

For more information on this site, please visit http://www.scottishairquality.co.uk/latest/site-info?site_id=REN02&view=graphing



Figure 1. New Renfrewshire Johnstone site location

NEW TO THE AIR QUALITY SCOTLAND WEBSITE

As you are aware Scottish Air Quality Database sites have UKAS accredited QAQC audits carried out every six months. For reference, you can now access the UKAS Certificates of Calibration

for these audits via the Air Quality in Scotland website for audits carried out from Summer 2016 onwards. Please be advised that the Certificates of Calibration for Summer 2017 are not yet available. Once available we will let everyone know. If you are not able to locate a certificate for your local authority, please contact any of the Ricardo Energy and Environment Air Quality team. Please visit <http://www.scottishairquality.co.uk/laqm/certificates-calibration> for more information.

CAFS PROGRESS REPORT PUBLISHED 15TH JUNE 2017

First annual progress report setting out progress on actions in the Cleaner Air for Scotland (CAFS) strategy was published on the Scottish Government publications website and can be found at:

<http://www.gov.scot/Publications/2017/06/2881>

SCOTTISH ENVIRONMENT PROTECTION AGENCY (SEPA)

SCOTTISH GOVERNMENT AND SEPA NATIONAL CLEAN AIR DAY (15TH JUNE 2017)

Scottish Government and SEPA joined forces to bring Global Action Plan's 'National Clean Air Day' to a school in Edinburgh. Pupils at Sciennes Primary School, Edinburgh have always taken a keen interest in their local environment, from redeveloping the school carpark in to an all-purpose playground or creating a forest playpark and trail on land adjacent to the school.



Figure 2. Global Action Plan's National Clean Air Day logo

The pupils used SEPA's national teaching material, www.learnaboutair.com to understand and record air pollution around

their school. Pupils were keen to learn about what activities contributed to air pollution and deployed the free monitor just outside their playground to record changes in air pollution during the day. By finding higher levels during the morning and afternoon drop-off times the pupils were keen to see what simple changes they could make, and what the Scottish Government were doing to improve air quality.

As part of National Clean Air Day, Environment Secretary Roseanna Cunningham visited Sciennes Primary School and spoke directly with the pupils, answering questions and hearing about their activities. The Environment Secretary was keen to express that:

“National Clean Air Day is an opportunity to think about the small actions we can take, such as choosing to leave the car at home more often or avoiding leaving the engine idling when in the car. There are many challenges ahead, but by working together we can realise the vision of cleaner air in Scotland to create a better environment and healthier society for kids like those at Sciennes Primary.”



During the day, SEPA provided the pupils with

Figure 3. Sciennes primary school students discussing air quality with Roseanna Cunningham

some hands-on experiments taken from the teaching material to emphasise the issues around air pollution and to promote the actions that the school can adopt. The pupils investigated how their actions were contributing to improvements in air quality.

Contact: Colin Gillespie, SEPA

LOCAL AUTHORITY

In this section, we plan to showcase local authority's contribution to Local Air Quality Management (LAQM). The aim of this section will be to provide information on what air quality initiatives the local authority is undertaking and the experiences gained. If you would be interested in contributing, please send an email to info@scottishairquality.co.uk. Many thanks to Anne Prescott, Environmental Health Officer at East Dunbartonshire Council, for contributing to this issue!

EAST DUNBARTONSHIRE COUNCIL

East Dunbartonshire Council has undertaken a number of Clean Air Initiatives during 2016 to help improve air quality. A banner competition in primary schools in Bishopbriggs with the theme “Switch it Off” was successful and we hope to extend this to all our primary schools during 2017/2018. Patrols with Environmental Health staff and Police Scotland, with whom we are in partnership, took place to encourage the public to switch off vehicle engines and help improve air quality.

No new AQMAs were declared during 2016 however, dispersion modelling undertaken in Bishopbriggs has indicated that work can begin towards revoking the AQMA.

Dispersion modelling undertaken in Kirkintilloch during 2016 has indicated that an AQMA is not required however, new equipment capable of measuring PM₁₀ and PM_{2.5} was installed in early March 2017 and results to date indicate possible exceedances.

The Draft Bearsden Action Plan has been updated and will hopefully be presented to committee after the summer recess. This is appropriate timing as there was an unexpected exceedance of the NO₂ annual mean for 2016.

SAQD QAQC ACTIVITIES

Ricardo have completed the summer six monthly audits. After each local authority audit, a summary of the auditor's findings should have

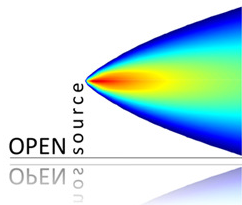
been emailed to you. If you have not received an audit summary, please contact info@airqualityscotland.co.uk.

HOW TO

This section gives advice to readers on all aspects of the website, including accessing/downloading data, as well as to address general site queries. If you have any requests that you would like included within the newsletter, please feel free to contact us.

[ACCESS AIR QUALITY IN SCOTLAND ANALYSIS TOOLS](#)

OPENAIR



CALENDAR PLOT

The Openair Calendar Plot tool allows for visualising trends in daily pollutant concentrations across a year in the form of a calendar. The pollutant concentrations are represented with a colour scale and the meteorological conditions can be represented using arrows giving the vector averaged wind direction, scaled according to the wind speed based on modelled wind speed and direction from data from the UK air quality forecast. In this way pollution episodes can be identified by date and sources.

One monitoring site can be selected from the drop down 'Site Name' list against one pollutant from the drop down 'Variable' list. Please note that calendar plots can only be produced for one site and one pollutant at a time on this website.

Data can be plotted by year (according to the availability of the pollutant data) and by two difference annotations. The options to annotate have been restricted to 'Date' or 'Wind speed and direction' on this website.

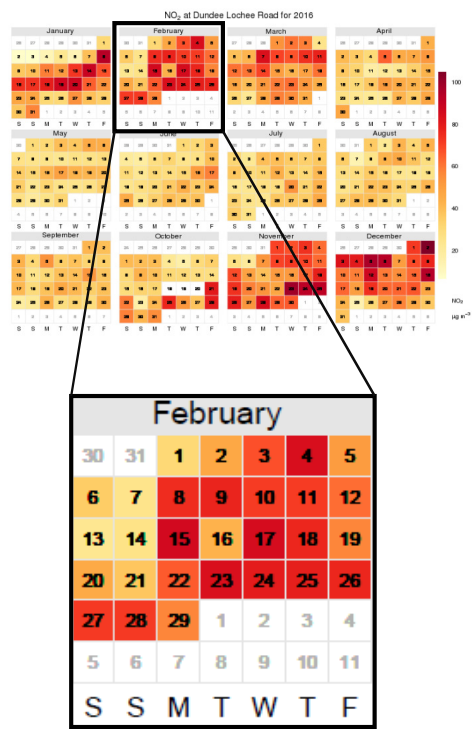


Figure 4. Dundee Lochee Road calendar plot for February 2016 using colour “heat”

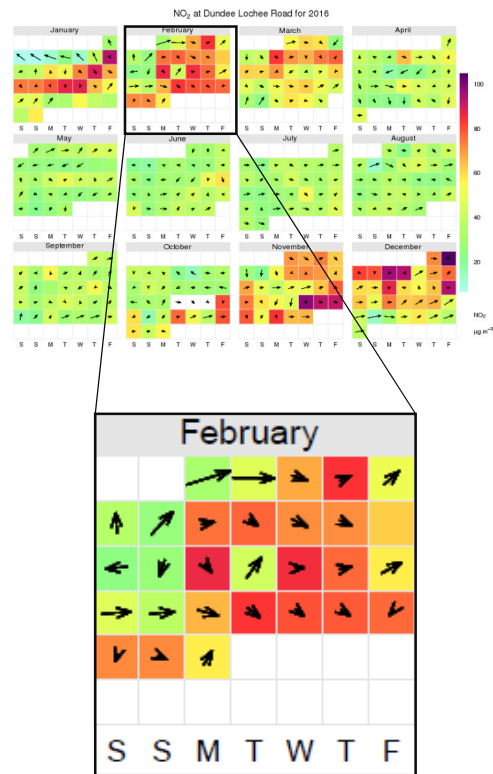
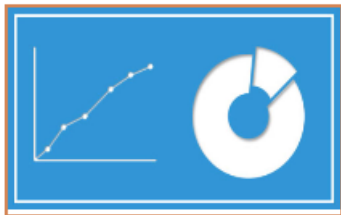


Figure 5. Dundee Lochee Road calendar plot illustrating the wind direction for February 2016 using colour “increment”

Finally, the 'Colours' drop-down menu allows the user more control over the colour scheme that is used to plot - which can be useful to highlight pollution episodes and a variety of colour palettes are available. The colour presented for a particular day on the calendar represents the daily mean (Openair default) on this website.

ADVANCED DATA ANALYSIS



LIVE AIR QUALITY DATA ANALYSIS

The Live Air Quality Data Analysis tool allows users to access and visualise a range of information associated with Air Quality in Scotland. This tool is particularly aimed at showing how concentrations of air pollutants have changed over the recent past.

The tool consists of four tabs, which are located at the top of the webpage:

1. POLLUTANT TIME SERIES
2. MET OFFICE DATA
3. DAILY AIR QUALITY INDEX
4. FLAG POTENTIAL OUTLIERS

Under the "Pollutant Time Series" tab you can select the site(s) of interest from a specific local authority from the dropdown list. Once the data is available, the symbol in the bottom-left hand

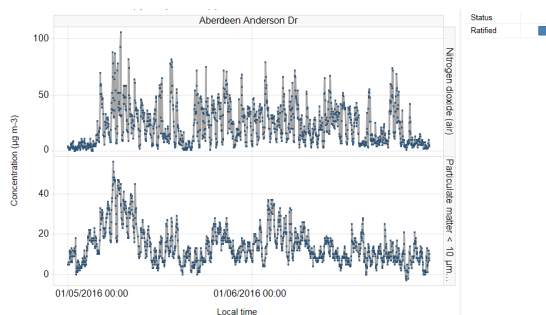


Figure 6. Aberdeen Anderson Drive, Time Period: 01/05/2016 – 30/06/2016, Trellis: "Site name & pollutant", Marker size: 2

side of the screen will change from "Processing" to "Ready".

The "Met Office Data" tab data is based on the site(s) and time period that was set under the "Pollutant Time Series" tab, please ensure that this page is up to date with the relevant information before continuing.

First, select a Met Office site from the dropdown list on the left-hand side, this will automatically retrieve the closest, relevant meteorological conditions. The site map will then reflect the distance between your chosen Met Office and site(s) (see Figure 7).



Figure 7. Aviemore Met Office to Aberdeen Anderson Drive AQ site

Then, select the desired meteorological data (i.e. wind speed, temperature, pressure and air quality forecast) to plot, this will update the bar/line graph at the bottom of the screen based on the previously selected time period.

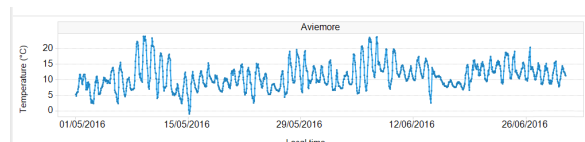


Figure 8. Aviemore Met Office temperature data, Time Period: 01/05/2016 – 30/06/2016

The "Wind Rose" plot summaries wind speed by wind direction, based on the selected Met Office direction, based on the selected Met Office location and the selected time period.

Wind rose produced for Aviemore Valid for the period 01/05/2016 - 30/06/2016

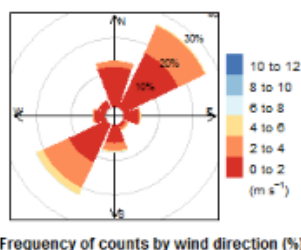


Figure 9. Aviemore wind rose for 01/05/2016 – 30/06/2016

The “Daily Air Quality Index” tab highlights information related to the Daily Air Quality Index (DAQI) at the selected site. The top graphs identify the DAQI at the selected site for the desired time period.

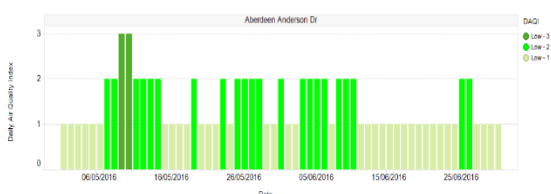


Figure 10. DAQI for Aberdeen Anderson Drive for 01/05/2016 – 30/06/2016

The lower graph illustrates the number of days a pollutant determined the overall DAQI during the selected period.

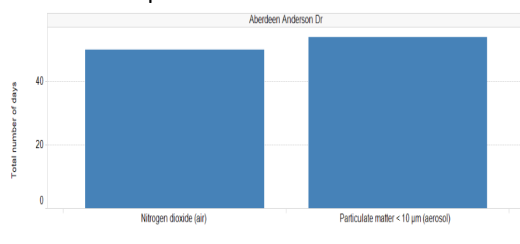


Figure 11. Aberdeen Anderson Drive, LHS NO₂ pollutant RHS PM₁₀ pollutant

The “Flag Potential Outliers” tab will run a statistical function to test whether a data point is statically distant from the other points in the time series (an outlier), which will be highlighted red. Note: this test is run on daily average concentrations.

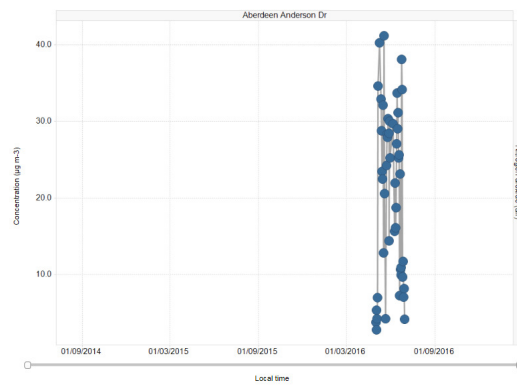


Figure 12. Aberdeen Anderson Drive, NO₂ Channel tested for outlier for period 01/05/2016 – 30/06/2016

For more information, please visit <http://analysistools.scottishairquality.co.uk/advanced.html>. If you have any questions regarding the Advanced Air Quality tools please email SAQD_Spotifre@sepa.org.uk.

LAQM POLLUTANT OVERVIEW

Within LAQM there are eight pollutants of concern, these are nitrogen dioxide (NO₂), fine particles (PM₁₀ & PM_{2.5}), benzene (C₆H₆), 1,3-Butadiene (C₄H₆), Lead (Pb), sulphur dioxide (SO₂) and carbon monoxide (CO). These major ambient air pollutants are known to have a significant impact on human health and have been set legally binding limits. Two of these pollutants are described below.

BENZENE

Benzene is a Volatile Organic Compound (VOC) which is a minor constituent of petrol. The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source (70% of total emissions). Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

1,3-BUTADIENE

1,3-butadiene, like benzene, is a VOC emitted into the atmosphere principally from fuel combustion of petrol and diesel vehicles. 1,3-

butadiene is also an important chemical in certain industrial processes, particularly the manufacture of synthetic rubber. Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

QUESTION AND ANSWERS SECTION

This section will provide answers to frequently asked questions that relate to different aspects of LAQM ranging from LSO duties to advanced data analysis queries. If you have a question you would like to be answered in this section please contact info@scottishairquality.co.uk.

Q: What is the difference between the 'provisional' and 'ratified' data on the website?

A: Provisional Data

Monitoring data from each Scottish air quality site is uploaded to the database as provisional data every day. These figures undergo basic screening criteria to exclude clearly faulty data as far as possible. However, the objective of the exercise is to provide data for human health concerns on a near real-time basis, so the checks must be essentially automatic and rapid. This means that full QA/QC procedures cannot be applied and the data are therefore likely to be of lower accuracy and reliability than that required for final reporting. Provisional data and statistics are clearly marked with a "P" flag in the database to indicate their status.

Data Verification

Data Verification is carried out on an ongoing basis and is normally a process to "clean-up" the initial provisional data. Any corrections to the data made during the verification process are automatically uploaded (still as PROVISIONAL at this stage) to the SAQD.

Data Ratification

Data Ratification is a detailed manual check of the dataset carried out on a quarterly basis. It requires a longer-term view of the dataset

incorporating the results from independent QA/QC audits of the monitoring stations.

Data ratification reviews all LSO calibration data, ESU visits and any other information available for a particular site or analyser over the whole ratification period. In addition, the results from the independent QA/QC audits are incorporated to take account of any problems detected during the QA/QC audits such as:

- Faulty NO_x converters.
- Drifts in calibration cylinder concentrations.
- Instrument leaks or flow faults.
- Faulty instrument configuration.

Incorporation of the QA/QC audits ensures that ratified data are traceable to UK national and international gas calibration standards. For all the Scottish air quality monitoring stations (both AURN and non-AURN) QA/QC audits are carried out on a six-monthly basis.

Once the data has undergone QA/QC procedures the downloadable .csv file dataset will display a status of "R" (ratified), rather than "P".

Q: Why is it important to ensure the cabinet inlets are sealed?

A: Occasionally, it is noted that there has not been a good seal around the inlet tube (where the sample line of the analyser leaves the cabinet). The concentrations of pollutants in the cabinet are usually slightly different from those in the ambient air. This is partly due to small amounts of calibration gases from site cylinders and permeation sources being released into the cabinet; also, ozone from NO_x analysers.

If there is not a good seal around the inlet pipe in the roof, some 'indoor' air will escape by that route. This will mean that the air being sampled via the inlet pipe is not pure outdoor air, but a mixture of outdoor air and air from inside the hut, therefore this can affect the measurements (see Figure 13). Also, if water can leak in around

the inlet pipe, electrical equipment can become wet.

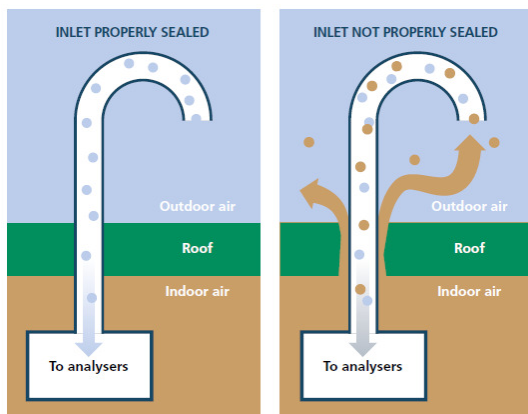


Figure 13. Diagram demonstrating inlets that are sealed and inlets that are not properly sealed

The hole around the inlet pipe therefore needs to be properly sealed, to prevent 'indoor' air escaping and contaminating the sample. It is recommended that this is done using expanding foam (products such as tape or 'blu-tack' do not do the job properly). The inlet pipes are checked during the six monthly QAQC audits, however if you note anything at site, please comment in the electronic LSO calibration sheet and inform your ESU.

STAY CONNECTED

<p>SAQD PROJECT MANAGEMENT</p> <p>David Hector Tel: 01235 753523 E-mail: david.hector@ricardo.com</p> <p>Stuart Sneddon Tel: 01235 753015 Email: stuart.sneddon@ricardo.com</p> <p>SAQD PROJECT DATA MANAGEMENT</p> <p>Stephen Stratton Tel: 01235 753072 Email: stephen.stratton@ricardo.com</p>	<p>SCOTTISH GOVERNMENT</p> <p>Andrew Taylor Email: andrew.taylor2@gov.scot</p>
<p>RICARDO ENERGY & ENVIRONMENT FIELD OPERATIVES</p> <p>Susannah Telfer Tel: 01235 753434 E-mail: susannah.telfer@ricardo.com</p> <p>Sam Copsey Tel: 01235 753153 E-mail: sam.copsey@ricardo.com</p>	<p>Ashleigh Norrie Tel: 01235 753663 E-mail: ashleigh.norrie@ricardo.com</p> <p>Stephen Gray Tel: 01235 753525 E-mail: stephen.gray@ricardo.com</p>
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