



The UK Urban NO₂ Network (UUNN)
The UKs newest national air quality monitoring network

Jamie Clayton
28th September 2021



Move Forward with Confidence

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- The UK Urban NO₂ Network
 - Who, What, Where, When & How

- 2020 Results summary
 - UK perspective
 - Welsh perspective

- UUNN future
 - Affiliation programme
 - Could inform future LAQM diffusion tube monitoring

What is the UK Urban NO₂ Network?

- The UK Urban NO₂ Network (UUNN) is a nitrogen dioxide (NO₂) monitoring network that has been developed to provide additional monitoring data for the national compliance assessment for NO₂.
- Led by the Defra and the Environment Agency.
- UUNN monitoring locations are initially focused in areas where Local Authorities are working with the Joint Air Quality Unit (JAQU) or the Devolved Administrations to reduce NO₂ concentrations in line with the UK plan for tackling roadside NO₂ concentrations.
- The UUNN is managed and delivered by Bureau Veritas with assistance from Ricardo, NPL, Gradko and a host of Local Site Operators (including Cardiff & Caerphilly).

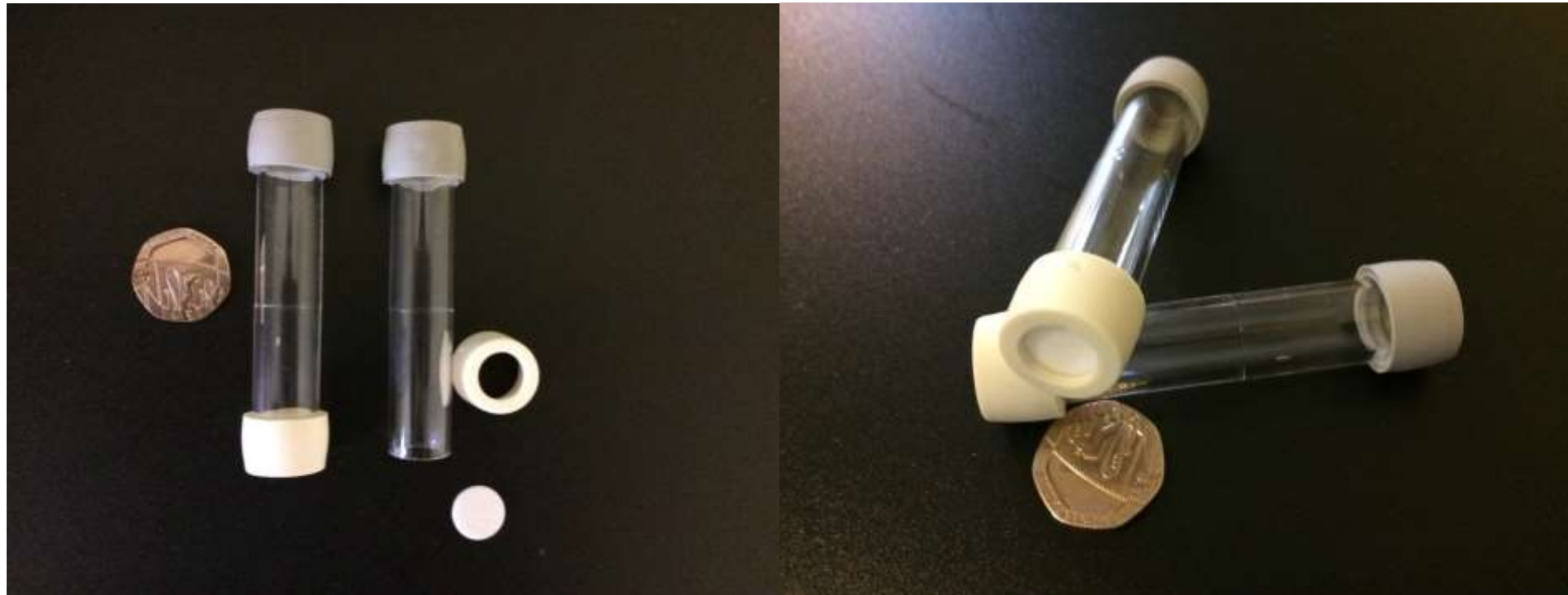


What is the UK Urban NO₂ Network?

- Diffusion Tube Monitoring.....but not as we know it!
- National compliance focus, rather than LAQM
- Focus on improving data quality
 - Slightly modified tubes
 - Site specific temperature correction
 - UUNN specific tube change calendar
 - All tubes in triplicate
 - Validation through co-location studies at AURN sites



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UUNN Tube Change Calendar



Year	Month	Target Date (Acceptable Date)
2021	January	04-Jan (05-Jan) *
	February	01-Feb (02-Feb)
	March	01-Mar (02-Mar)
	April	01-Apr (31-Mar) #
	May	04-May (05-May)
	June	01-Jun (02-Jun)
	July	01-Jul (02-Jul)
	August	02-Aug (03-Aug) *
	September	01-Sep (02-Sep)
	October	30-Sep (01-Oct)
	November	01-Nov (02-Nov)
	December	01-Dec (02-Dec)
2022	January	04-Jan (05-Jan)*

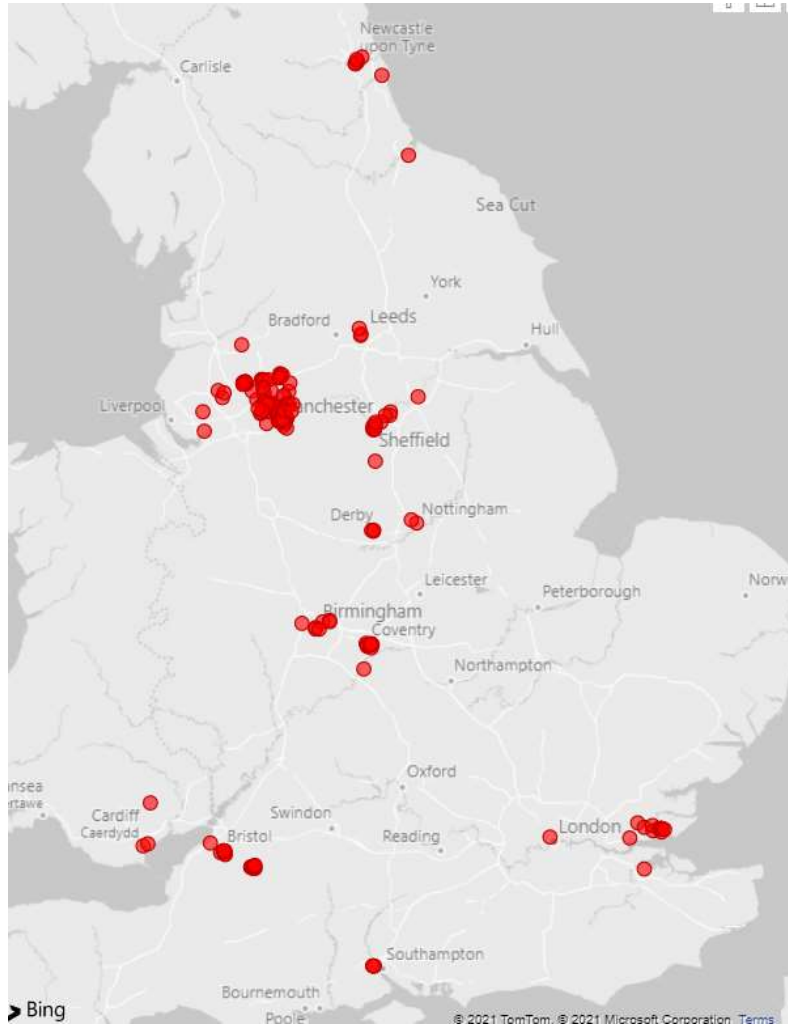
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How many sites?

- Network established in December 2019
- Monitoring at 177 locations in 2020
 - Including 25 at AURN validation sites
- Expanded in December 2020
- Monitoring undertaken at ~300 locations in 2021
 - Including 38 at AURN validation sites
- 3 sites in Wales

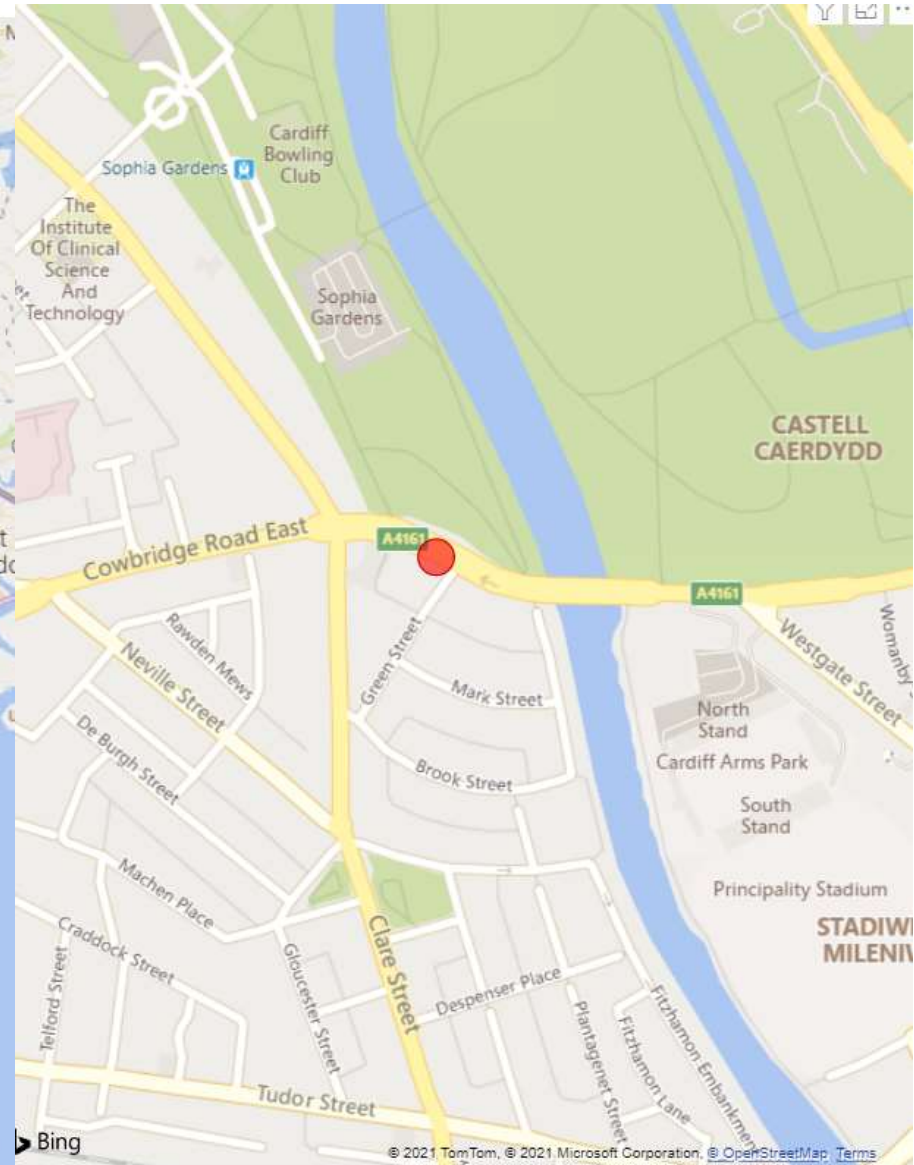
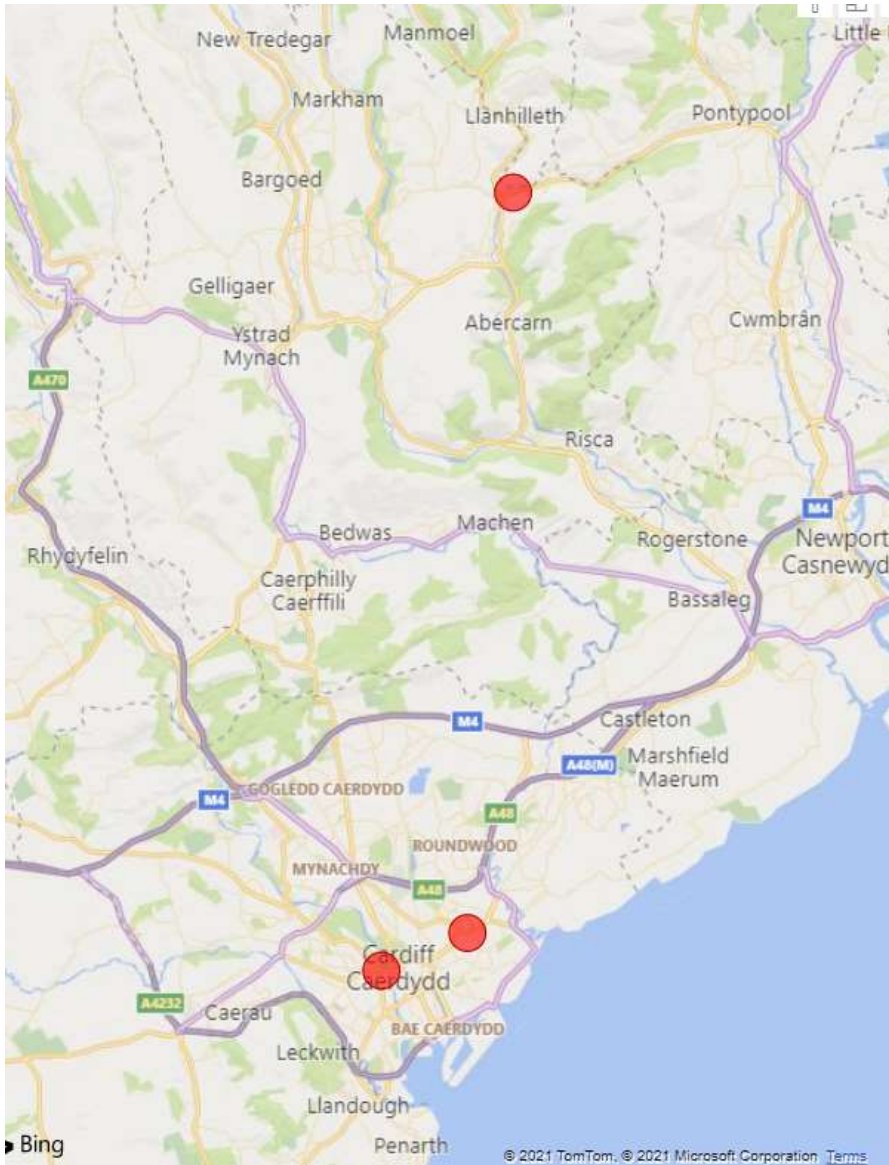
How many sites?



Sites in Wales



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Welsh Site Pictures



- UUNN established in December 2019
.....3 months later a pandemic arrives!
- Provided a whole range of logistical, and health & safety challenges
 - Re-routing of tube parcels
 - Strict guidance for attendance at AURN sites
 - Practical aspects of being an LSO

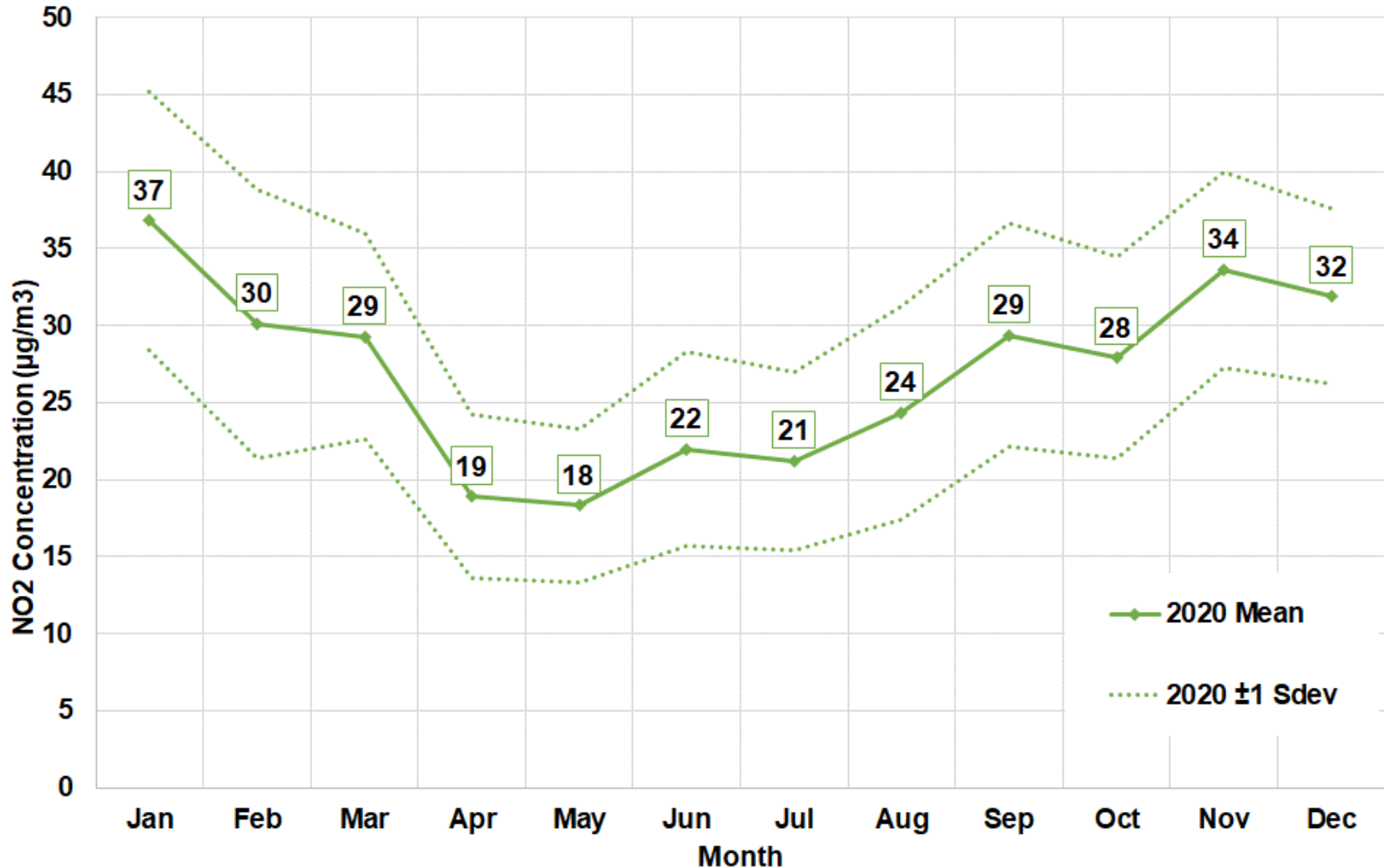
2020 Monitored Data - Headlines



- 2020 average data capture 96.7%
- 14 sites removed from compliance assessment due to data capture (stricter criteria than LAQM)

2020 Monitored Data – Focus on Welsh Sites

Monthly Adjusted Average Concentrations



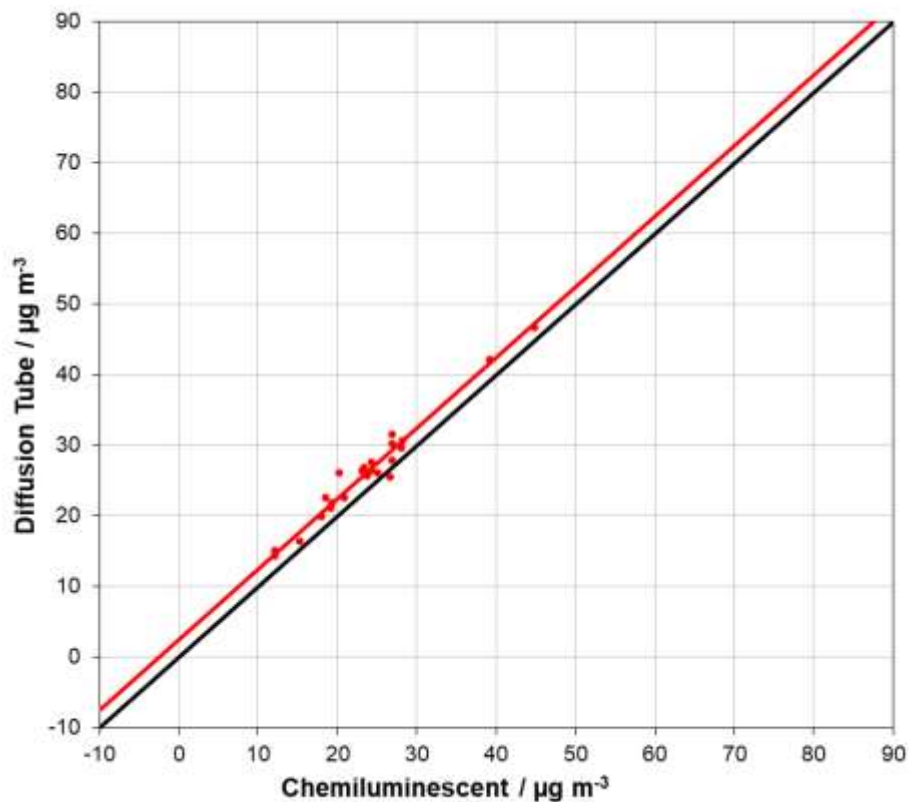
- Site on Cowbridge Road East (A4161) reported annual average of $23.5\mu\text{g}/\text{m}^3$
- Cardiff Newport Road AURN site reported annual average of $18.5\mu\text{g}/\text{m}^3$
- Hafod-yr-ynys Roadside AURN site reported annual average of $44.1\mu\text{g}/\text{m}^3$,
 - Removed from compliance assessment due to data capture (83%)

2020 Monitored Data – Data Quality

- 23 of 25 sites used for network validation (including Hafod-yr-ynys & Cardiff Newport Road)
- Correction factors and uncertainty calculated in line with Guide to Demonstration of Equivalence
- Annual average UUNN tube concentration compared to annual average analyser concentration
 - Slope found to be very close to 1 (1.001)
 - Intercept 2.494
- Intercept correction undertaken
- 2020 UUNN uncertainty 8.82%

2020 Monitored Data – Data Quality

Chemiluminescent versus Diffusion Tubes



— Regression Line

— 1:1 Line

DT data not corrected

Slope (b) = 1.001 +/- 0.041 Not Significantly different from 1

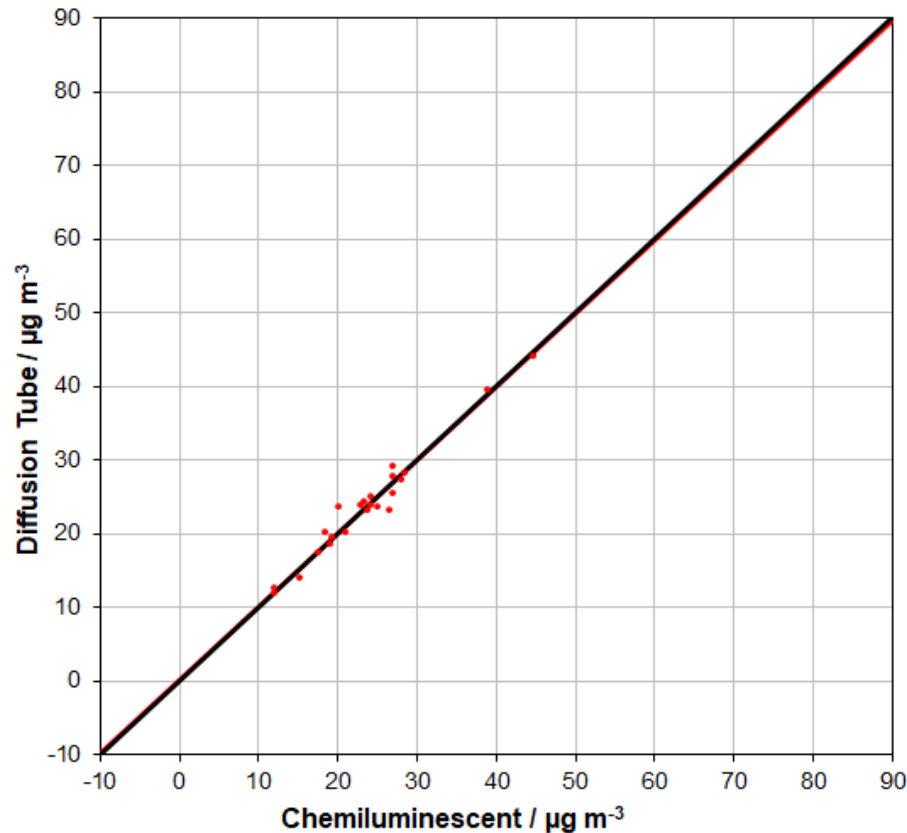
Intercept (a) = 2.494 +/- 1.022 µg m⁻³ Significantly different from 0

n = 23

R Squared = 0.965

2020 Monitored Data – Data Quality

Chemiluminescent versus Diffusion Tubes



— Regression Line

— 1:1 Line

DT data corrected by subtracting 2.494

Slope (b) = 0.994 +/- 0.041 Not Significantly different from 1

Intercept (a) = 0.096 +/- 1.009 $\mu\text{g m}^{-3}$ Not Significantly different from 0

n = 23

R Squared = 0.965

Expanded Uncertainty (Wcm) = 8.82 % Passes 25% criterion

Random Term = 1.758 $\mu\text{g m}^{-3}$

Bias at LV = -0.15 $\mu\text{g m}^{-3}$

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- UUNN affiliation
- Informing future method for diffusion tube monitoring

- A new national NO₂ diffusion tube monitoring network
- Currently monitoring at around 300 roadside locations across the UK
- Focus on national compliance rather than LAQM priorities
- Focus on improved data quality to allow compliance assessment
- Achieved uncertainty level in line with equivalent methods in 2020

- UUNN affiliation programme
- Ongoing data collection may inform future diffusion tube monitoring method for LAQM

Thank You for Listening – Any Questions

jamie.clayton@bureauveritas.com

uun.network@bureauveritas.com

Monitoring Queries - 07971 581 549

