# Annual Progress Report (APR)

West Lothian Council

2017 Air Quality Annual Progress Report (APR) for West Lothian Council

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

30 June 2017

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## Executive Summary: Air Quality in Our Area

### Air Quality in West Lothian

West Lothian Council regularly reviews and assesses air quality throughout the district to determine whether or not air quality objectives are likely to be achieved. Air pollutants such as Nitrogen Dioxide ($NO_2$), fine particulates ($PM_{10}$ & $PM_{2.5}$), and Sulphur Dioxide ($SO_2$) which are mainly associated with vehicle emissions and domestic fuel burning, are measured using a network of 3 continuous air quality monitoring stations located in Linlithgow, Broxburn, and Newton. There are also 20 $NO_2$ passive diffusion tubes located throughout West Lothian as well as a new solar powered AQmesh located in Newton.

### Air Quality in Newton

An Air Quality Management Area (AQMA) was declared in Newton in July 2016 due to exceedances of fine particulates ($PM_{10}$). An Air Quality Action Plan (AQAP) is currently being developed through a steering group made up of relevant council departments. The development of the Newton AQAP will be a priority in 2017/18.

Newton Air Quality Monitoring data from 2016 showed a reduction in $NO_2$ and $PM_{10}$ annual mean levels compared to 2015 data. Both $NO_2$ and $PM_{10}$ are below the respective annual mean air quality objectives for a second consecutive year at the roadside monitoring location. There are no major new sources of air quality in the Newton area.

### Air Quality in Linlithgow

An Air Quality Management Area (AQMA) was declared in Linlithgow in April 2016 due to exceedances of fine particulates ($PM_{10}$) and $NO_2$. An AQAP is currently being developed through a steering group made up of relevant council departments. The development of the Linlithgow AQAP will be a priority for 2017/18.

Linlithgow Air Quality Monitoring data from 2016 showed a reduction in annual mean $PM_{10}$ levels and an increase in annual mean $NO_2$ levels compared to 2015 monitoring data. Both $NO_2$ and $PM_{10}$ annual mean levels have been below the respective annual mean air quality objectives for a second consecutive year at the

roadside monitoring location. There are no major new sources of air pollution in Linlithgow, however, the uptake of wood burning stoves in a number of properties is of concern.

A new FIDAS 200 Particulate Matter (PM) has been installed in Linlithgow and will measure $PM_{2.5}$ as well as $PM_{10}$.

**Air Quality in Broxburn**

An Air Quality Management Area (AQMA) was declared in [Broxburn](#) in March 2011 due to exceedances of fine particulates ($PM_{10}$) and Nitrogen Dioxide ($NO_2$). A final AQAP version has been developed and will be subject to public consultation.

2016 Broxburn Air Quality Monitoring data showed unchanged annual mean $PM_{10}$ levels and an increase in annual mean $NO_2$ levels compared to 2015 annual mean monitoring data. Both $NO_2$ and $PM_{10}$ have now been below the respective annual mean air quality objectives for four consecutive years at the roadside monitoring location. Further monitoring will take place to measure Particulate Matter (PM2.5) this financial year.

There are major new sources of emissions in Broxburn including, large scale residential and commercial developments which have received planning consent.

An Electric Vehicle (EV) charging point is being installed in Strathbrock Partnership Centre, Broxburn.  The completion of this development will be a priority for 2017.

**How to Get Involved**

If you would like to find out more about air quality in West Lothian please visit our Air Quality website http://www.westlothian.gov.uk/article/2216/Air-Pollution

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# 1. Local Air Quality Management

This report provides an overview of air quality in West Lothian during 2016. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by West Lothian to improve air quality and any progress that has been made.

**Table 1.1 – Summary of Air Quality Objectives in Scotland**

| Pollutant | Air Quality Objective | | Date to be achieved by |
|---|---|---|---|
| | **Concentration** | **Measured as** | |
| **Nitrogen dioxide ($NO_2$)** | 200 µg/m$^3$ not to be exceeded more than 18 times a year | 1-hour mean | 31.12.2005 |
| | 40 µg/m$^3$ | Annual mean | 31.12.2005 |
| **Particulate Matter ($PM_{10}$)** | 50 µg/m$^3$, not to be exceeded more than 7 times a year | 24-hour mean | 31.12.2010 |
| | 18 µg/m$^3$ | Annual mean | 31.12.2010 |
| **Particulate Matter ($PM_{2.5}$)** | 10 µg/m$^3$ | Annual mean | 31.12.2020 |
| **Sulphur dioxide ($SO_2$)** | 350 µg/m$^3$, not to be exceeded more than 24 times a year | 1-hour mean | 31.12.2004 |
| | 125 µg/m$^3$, not to be exceeded more than 3 times a year | 24-hour mean | 31.12.2004 |
| | 266 µg/m$^3$, not to be exceeded more than 35 times a year | 15-minute mean | 31.12.2005 |
| **Benzene** | 3.25 µg/m$^3$ | Running annual mean | 31.12.2010 |
| **1,3 Butadiene** | 2.25 µg/m$^3$ | Running annual mean | 31.12.2003 |
| **Carbon Monoxide** | 10.0 mg/m$^3$ | Running 8-Hour mean | 31.12.2003 |

| Pollutant | Air Quality Objective | | Date to be achieved by |
| --- | --- | --- | --- |
| | **Concentration** | **Measured as** | |
| **Lead** | 0.25 µg/m$^3$ | Annual Mean | 31.12.2008 |

## 2.    Actions to Improve Air Quality

### 2.1    Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months, setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by West Lothian Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at http://www.westlothian.gov.uk/article/2216/Air-Pollution. See full list at http://uk-air.defra.gov.uk/aqma/list.

**Table 2.1 – Declared Air Quality Management Areas**

| AQMA Name | Pollutants and Air Quality Objectives | City / Town | Description | Action Plan |
|---|---|---|---|---|
| AQMA Linlithgow | $NO_2$ & $PM_{10}$ annual mean | Linlithgow | Includes Linlithgow, Linlithgow Bridge and land allocated for development | In development |
| AQMA Broxburn | $NO_2$ & $PM_{10}$ annual mean | Broxburn | West Main Street eastwards to western boundary of service station, Broxburn | In development |
| AQMA Newton | $PM_{10}$ annual mean | Newton | Whole of Newton | In development |

### 2.2    Progress and Impact of Measures to address Air Quality in West Lothian

West Lothian has taken forward two measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

**Table 2.2 – Progress on Measures to Improve Air Quality**

| Measure No. | Measure | Category | Focus | Lead Authority | Planning Phase | Implementation Phase | Key Performance Indicator | Target Pollution Reduction in the AQMA | Progress to Date | Estimated Completion Date | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Electric Vehicle charging points☐ | Promoting low emission transport | Building a network for low emission vehicles☐ | Environmental Health☐ | June 2016 | March 2017 – on-going | EV point installed | Reduction in Air Pollution☐ | EV point installed but not operational yet | 2017 | Fulfills action measure 15 of draft Broxburn AQAP |
| 2 | Improving links with Local Planning and Development framework☐ | Policy guidance and development control | Air Quality Planning Guidance☐ | Environmental Health☐ | November 2016 | September 2017 | Air Quality Planning Guidance approved by council executive | Reduction in Air Pollution☐ | Air Quality Planning guidance out to public consultation | 2017 | Fulfills action plan measure 2 of draft Broxburn AQAP |

**2.3    Cleaner Air for Scotland**

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible. A series of actions across a range of policy areas are outlined, a summary of which is available at http://www.gov.scot/Publications/2015/11/5671/17. Progress by West Lothian Council against relevant actions within this strategy is demonstrated below.

**2.3.1    Transport – Avoiding travel – T1**

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. West Lothian Council has a Carbon Management Plan which can be found here: https://www.westlothian.gov.uk/media/10480/West-Lothian-Council-Carbon-Management-Plan-2015-20/pdf/Carbon_Management_Plan_2015-2020.pdf

West Lothian Council also has an Active Travel Plan which can be found here: https://www.westlothian.gov.uk/media/12492/West-Lothian-Active-Travel-Plan-2016-21-Making-Active-Connections/pdf/West_Lothian_Active_Travel_Plan_2016-212.pdf

West Lothian is developing Local Active Travel Network Plans for Broxburn and Linlithgow which is a commitment in the Active Travel Plan.

**2.3.2    Climate Change – Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2**

Scottish Government expects every Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered. West Lothian Council has a Climate Change Strategy which can be found here: https://www.westlothian.gov.uk/media/10479/West-Lothian-Council-Climate-Change-Strategy-2015-2020/pdf/West_Lothian_Council_Climate_Change_Strategy_2015-2020.pdf

## 3. Air Quality Monitoring Data and Comparison with Air Quality Objectives

### 3.1 Summary of Monitoring Undertaken

### 3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

West Lothian Council undertook automatic (continuous) monitoring at 3 sites during 2016. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at http://www.scottishairquality.co.uk/

Maps showing the location of the monitoring sites are provided in Appendix C. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

### 3.1.2 Non-Automatic Monitoring Sites

West Lothian Council undertook non- automatic (passive) monitoring of $NO_2$ at 20 sites during 2016. Table A.2 in Appendix A shows the details of the sites. Missing data indicates a loss of a diffusion tube.

Maps showing the location of the monitoring sites are provided in Appendix C. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

### 3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in Appendix C.

### 3.2.1 Nitrogen Dioxide ($NO_2$)

Table A.3 in Appendix A compares the ratified and adjusted monitored $NO_2$ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m$^3$.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored $NO_2$ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m$^3$, not to be exceeded more than 18 times per year.

There were no exceedances of the $NO_2$ annual mean or hourly mean in West Lothian in 2016.

### 3.2.2    Particulate Matter ($PM_{10}$)

Table A.5 in Appendix A compares the ratified and adjusted monitored $PM_{10}$ annual mean concentrations for the past 5 years with the air quality objective of $18\mu g/m^3$.

Table A.6 in Appendix A compares the ratified continuous monitored $PM_{10}$ daily mean concentrations for the past 5 years with the air quality objective of $50\mu g/m^3$, not to be exceeded more than 7 times per year.

There were no exceedances of the $PM_{10}$ annual mean or 24 hour mean in West Lothian in 2016.

### 3.2.3    Particulate Matter ($PM_{2.5}$)

Table A.7 in Appendix A compares the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past 5 years with the air quality objective of $10\mu g/m^3$. There was no monitoring of $PM_{2.5}$ in West Lothian in 2016.

### 3.2.4    Sulphur Dioxide ($SO_2$)

Table A.8 in Appendix A compares the ratified continuous monitored $SO_2$ concentrations for year 2016 with the air quality objectives for $SO_2$.

### 3.2.5    Carbon Monoxide, Lead and 1,3-Butadiene

There was no monitoring of Carbon Monoxide or 1,3-Butadiene in 2016.

## 4. New Local Developments

### 4.1 Road Traffic Sources

There were no new road traffic sources in 2016.

### 4.2 Other Transport Sources

There were no new other traffic sources in 2016.

### 4.3 Industrial Sources

- Planning permission has been granted for Erection of thermal treatment plant at Levenseat Waste Management Site (0795/FUL/16).
- Planning Permission has been granted for a change of use to Pet Crematorium in Bathgate (0013/FUL/17).

### 4.4 Commercial and Domestic Sources

Domestic fuel burning through the use of wood burning stoves continues to grow in West Lothian. There have been many planning applications received within and out-with AQMA's. They are generally given consent subject to flue height.

### 4.5 New Developments with Fugitive or Uncontrolled Sources

Part of a planning application (0476/FUL/16) for the development of residential properties in Armadale included the extraction of peat and infilling of the resulting void to agreed development platform levels. A dust monitoring strategy has been developed with on-site real time $PM_{10}$ monitoring. The development is yet to start.

## 5.    Planning Applications

West Lothian has been subject to a number of planning applications which may affect air quality. These are listed below;

- Planning permission in principle for residential dev of 46 homes - Land to North of A71/Lindean Terrace, Wilkieston - 0731/P/16

- Planning permission in principle for the erection of a residential development with associated infrastructure, landscaping, access road and engineering works at Pumpherston Farm, Livingston - 0496/P/16

- Planning permission in principle for a 6.5 ha residential development at land at Clarendon Farm, Linlithgow - 0187/P/16

- Planning permission in principle for the erection of retail units and public house/restaurant with ancillary services and car parking at Land at East Main Street, Broxburn - 0080/P/16

- Planning permission for a residential development of 221 houses and land set aside for affordable at Land at Limefields, Brucefield, Livingston - 0725/MSC/16

## 6. Conclusions and Proposed Actions

### 6.1 Conclusions from New Monitoring Data

- There were no exceedances of any air quality objectives at any monitoring sites (automatic or passive) within and outside West Lothian AQMA's in 2016.

- 2016 annual mean monitoring has shown a reduction in $PM_{10}$ concentrations in Linlithgow and Newton. $PM_{10}$ annual mean concentrations in Broxburn are unchanged.

- 2016 $PM_{10}$ 24 hour mean monitoring has shown no exceedances at any site

- 2016 $NO_2$ annual mean monitoring has shown an increase in Linlithgow and Broxburn. $NO_2$ annual mean concentrations in Newton have fallen after the data was "annualised".

- 2016 $NO_2$ 1 hour mean monitoring has shown no exceedances at any site.

### 6.2 Conclusions relating to New Local Developments

The development of a public house and restaurant (Ref: 0080/P/16) has been subject to two Air Quality Impact Assessments and is on-going. This may have implications for air quality in the Broxburn AQMA in future.

### 6.3 Proposed Actions

- Monitoring data has identified no new additional monitoring or changes to existing monitoring programme.

- Monitoring has identified that no changes are required to any of the existing AQMA's.

- A draft will be completed of the Linlithgow AQAP which will be subject to public consultation.

- A draft will be completed of the Newton AQAP which will be subject to public consultation.

- A public consultation on the finalised version of Broxburn AQAP will take place.

## Appendix A: Monitoring Results

**Table A.1 – Details of Automatic Monitoring Sites**

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Monitoring Technique | Distance to Relevant Exposure (m) [1] | Distance to kerb of nearest road (m) [2] | Inlet Height (m) |
|---------|-----------|-----------|---------------|---------------|----------------------|----------|----------------------|---------------------------------------|-------------------------------------------|------------------|
| CM1 | Linlithgow High St | Roadside | 300426 | 677172 | $NO_2$; $PM_{10}$; $PM_{2.5}$ | Y | FIDAS; Nox analyser | 4 | 1.36 | 1.5 |
| CM2 | Broxburn CNC | Roadside | 308314 | 672231 | $NO_2$; $PM_{10}$ | Y | FDMS; Nox analyser | 3.5 | 2 | 1.5 |
| CM3 | Newton CNC | Roadside | 309258 | 677728 | $NO_2$; $PM_{10}$ | Y | FDMS; Nox analyser | 2.0 | 2.4 | 1.5 |

(1)  0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2)  N/A if not applicable.

**Table A.2 – Details of Non-Automatic Monitoring Sites**

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) [1] | Distance to kerb of nearest road (m) [2] | Tube collocated with a Continuous Analyser? |
|---------|-----------|-----------|---------------|---------------|----------------------|----------|----------------------------------------|-------------------------------------------|---------------------------------------------|
| DT1 | Newton | Roadside | 309223 | 677711 | $NO_2$ | Y | 3 | 2 | N |
| DT2 | Broxburn WMS | Roadside | 308165 | 672222 | $NO_2$ | Y | Facade | 3 | N |

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA ? | Distance to Relevant Exposure (m) [1] | Distance to kerb of nearest road (m) [2] | Tube collocated with a Continuous Analyser? |
|---------|-----------|-----------|---------------|---------------|---------------------|-----------|---------------------------------------|------------------------------------------|---------------------------------------------|
| DT3 | Broxburn EMS | Roadside | 308426 | 672233 | $NO_2$ | Y | 1.5 | 4 | N |
| DT4 | Broxburn CNC | Roadside | 308314 | 672231 | $NO_2$ | Y | 3 | 2 | Y |
| DT5 | Broxburn E Mains | Roadside | 309368 | 672213 | $NO_2$ | Y | 4 | 2 | N |
| DT6 | Dedridge Cedric Rise | Urban Background | 306403 | 666341 | $NO_2$ | N | 4 | 3 | N |
| DT7 | West Calder | Roadside | 301758 | 663158 | $NO_2$ | N | 2 | 2 | N |
| DT8 | Whitburn Cross | Roadside | 294687 | 665030 | $NO_2$ | N | 2 | 3 | N |

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA? | Distance to Relevant Exposure (m) [1] | Distance to kerb of nearest road (m) [2] | Tube collocated with a Continuous Analyser? |
|---------|-----------|-----------|---------------|---------------|---------------------|----------|--------------------------------------|------------------------------------------|---------------------------------------------|
| DT9 | Armadale Cross | Roadside | 293842 | 668588 | NO$_2$ | N | 2 | 2 | N |
| DT10 | Bathgate S Bridge | Roadside | 297401 | 668772 | NO$_2$ | N | 2 | 3 | N |
| DT11 | Bathgate Steelyard | Roadside | 297467 | 668734 | NO$_2$ | N | 12 | 4 | N |
| DT12 | Bathgate King St | Roadside | 297570 | 668586 | NO$_2$ | N | 5 | 4 | N |
| DT13 | Bathgate High St | Urban Background | 297656 | 669298 | NO$_2$ | N | 3 | 10 | N |
| DT14 | Linlithgow Romon | Roadside | 299989 | 677090 | NO$_2$ | N | -5.5 | 7 | Y |
| DT15 | Linlithgow H ST NW | Roadside | 299930 | 677070 | NO$_2$ | N | 2 | 1.4 | N |

| Site ID | Site Name | Site Type | X OS Grid Ref | Y OS Grid Ref | Pollutants Monitored | In AQMA ? | Distance to Relevant Exposure (m) [1] | Distance to kerb of nearest road (m) [2] | Tube collocated with a Continuous Analyser? |
|---------|-----------|-----------|---------------|---------------|---------------------|-----------|--------------------------------------|------------------------------------------|---------------------------------------------|
| DT16 | Linlithgow H ST SW | Roadside | 299911 | 677052 | $NO_2$ | N | 2 | 2.9 | N |
| DT17 | Linlithgow H ST NE | Roadside | 300479 | 677148 | $NO_2$ | N | 3.4 | 2 | N |
| DT18 | Linlithgow H ST SE | Roadside | 300485 | 677125 | $NO_2$ | N | 7.5 | 2.2 | N |
| DT19 | Linlithgow H ST N | Roadside | 300398 | 677132 | $NO_2$ | N | Facade | 2.4 | N |
| DT20 | Linlithgow H ST S | Roadside | 300405 | 677118 | $NO_2$ | N | Facade | 3 | N |

(1)  0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2)  N/A if not applicable.

**Table A.3 – Annual Mean NO$_2$ Monitoring Results**

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2016 (%) [2] | NO$_2$ Annual Mean Concentration (µg/m$^3$) [3] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| CM1 | Roadside | Automatic | n/a | 97% | n/a | 44.5(36) (3) | 32.4 | 33 | 38 |
| CM2 | Roadside | Automatic | n/a | 100% | 45 | 39 | 28 | 27 | 32 |
| CM3 | Roadside | Automatic | n/a | 72% | 32 | 24 | 21 | 21 | 23(17.6) (3) |
| | | | | | | | | | |

Notes: Exceedences of the NO$_2$ annual mean objective of 40µg/m3 are shown in **bold**.

NO$_2$ annual means exceeding 60µg/m$^3$, indicating a potential exceedence of the NO$_2$ 1-hour mean objective are shown in **bold and underlined.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

**Table A.4 – 1-Hour Mean NO$_2$ Monitoring Results**

| Site ID | Site Type | Monitoring Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2016 (%) [2] | NO$_2$ 1-Hour Means > 200µg/m$^3$ [3] | | | | |
|---------|-----------|-----------------|--------------------------------------------------|---------------------------------|--------|--------|--------|--------|--------|
| | | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| CM1 | Roadside | Automatic | N/A | 97% | 0 | 0 | 0 | 0 | 0 |
| CM2 | Roadside | Automatic | N/A | 100% | 0 | 0 | 0 | 0 | 0 |
| CM3 | Roadside | Automatic | N/A | 72% | 0 | 0 | 0 | 0 | 0 |

Notes: Exceedences of the NO$_2$ 1-hour mean objective (200µg/m$^3$ not to be exceeded more than 18 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 99.8[th] percentile of 1-hour means is provided in brackets.

**Table A.5 – Annual Mean PM$_{10}$ Monitoring Results**

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2016 (%) [2] | PM$_{10}$ Annual Mean Concentration (µg/m$^3$) [3] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| CM1 | Roadside | n/a | 75 | 12 | 13.9 | 18 | 15 | 14 |
| CM2 | Roadside | n/a | 88 | 16 | 16 | 17 | 15 | 15 |
| CM3 | Roadside | n/a | 82 | 14.7 | 19 | 22 | 16 | 15 |

Notes: Exceedences of the PM$_{10}$ annual mean objective of 18µg/m$^3$ are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

**Table A.6 – 24-Hour Mean PM$_{10}$ Monitoring Results**

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) (1) | Valid Data Capture 2016 (%) (2) | PM$_{10}$ 24-Hour Means > 50µg/m$^{3}$ (3) | | | | |
|---------|-----------|-----|-----|------|------|------|------|------|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| CM1 | Roadside | n/a | 75 | n/a | 0 | 1 | 2 | 0 |
| CM2 | Roadside | n/a | 88 | 2 | 0 | 2 | 2 | 0 |
| CM3 | Roadside | n/a | 82 | 0 | 4 | 1 | 0 | 0 |

Notes: Exceedences of the PM$_{10}$ 24-hour mean objective (50µg/m$^{3}$ not to be exceeded more than 7 times/year) are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 90.4$^{th}$ percentile of 24-hour means is provided in brackets.

**Table A.7 – Annual Mean PM$_{2.5}$ Monitoring Results**

| Site ID | Site Type | Valid Data Capture for Monitoring Period (%) [1] | Valid Data Capture 2016 (%) [2] | PM$_{2.5}$ Annual Mean Concentration (µg/m$^3$) [3] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| CM1 | Roadside | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | | | | | | | | |
| | | | | | | | | |

Notes: Exceedences of the PM$_{10}$ annual mean objective of 10µg/m$^3$ are shown in **bold.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) All means have been "annualised" as per LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

**Table A.8 – SO$_2$ Monitoring Results**

| Site ID | Site Type | Valid Data Capture for monitoring Period (%) [1] | Valid Data Capture 2016 (%) [2] | Number of Exceedences (percentile in bracket) [3] | | |
|---------|-----------|--------------------------------------------------|----------------------------------|---------------------------------------------------|---|---|
| | | | | 15-minute Objective (266 µg/m$^3$) | 1-hour Objective (350 µg/m$^3$) | 24-hour Objective (125 µg/m$^3$) |
| CM1 | Roadside | 98 | 94 | 4 | 1 | 0 |
| | Urban Background | | | | | |

Notes: Exceedences of the SO$_2$ objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

(3) If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

## Appendix B: Full Monthly Diffusion Tube Results for 2016

**Table B.1 – NO$_2$ Monthly Diffusion Tube Results for 2016**

| Site ID | NO$_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | Annual Mean | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Raw Data | Bias Adjusted [1] |
| DT1 | 27.5 | 33.7 | 33.4 | 33.7 | 20.8 | 23.6 | 22.1 | 23.1 | 23.0 | 29.7 | 33.9 | 15 | **26.6** | 24.2 |
| DT2 | - | 36.1 | 33.3 | 41.2 | 30.9 | 33 | 20.4 | 25 | 28.5 | 40.8 | 20.8 | 24.5 | **30.4** | 27.7 |
| DT3 | 32.1 | 32.4 | 31.8 | 31.6 | 20.7 | 22.9 | 18.2 | 24.6 | 22.8 | 32.2 | 39.2 | 30.3 | **28.2** | 25.7 |
| DT4 | 34.8 | 37 | 36.3 | 44.8 | 26.6 | 41.2 | 23.2 | 34.5 | 32.2 | 39.8 | 43.9 | 33.4 | **35.6** | 32.4 |
| DT5 | 29.1 | 28.9 | 29 | 35.7 | 25 | 33 | 15.4 | 27.4 | 23.5 | 41.9 | 35.9 | 30.2 | **29.6** | 26.9 |
| DT6 | - | 18.4 | 16.3 | 23.3 | 9.6 | 11.6 | 7.8 | 12.2 | 14.3 | 19.5 | 22.8 | 18.4 | **16.0** | 14.6 |
| DT7 | 30.5 | 31.6 | 29.4 | 41.7 | 27.1 | 34.6 | 20.8 | 27.9 | 21.7 | 36.2 | 28.5 | 22.3 | **29.4** | 26.8 |
| DT8 | 28.4 | 32.2 | 31 | 36.1 | 23.7 | 25.8 | 16.7 | 24.2 | 26.1 | 31.5 | 39.4 | - | **28.7** | 26.1 |
| DT9 | 31 | 32 | 33.2 | 28.5 | 24.3 | 19 | 25.8 | 22.7 | 26.4 | 28.3 | 40.8 | 27.7 | **28.3** | 25.8 |
| DT10 | 23.6 | 23.1 | 19.3 | 24.2 | 13.7 | 14.6 | 12 | 16.4 | 16.3 | 23.2 | - | 25.3 | **18.7** | 17.0 |
| DT11 | 33.5 | 34.7 | 38.3 | 31.1 | 22.3 | 25.4 | 22.9 | 28.3 | 24.2 | 35.5 | 47.3 | 34.7 | **31.5** | 28.7 |
| DT12 | 35.3 | 34 | 35 | 41.8 | 23.1 | 25.3 | 22 | 21.7 | 31.1 | 37 | 51.1 | 19.2 | **31.4** | 28.6 |
| DT13 | 15.4 | 15.1 | 10.8 | 15.8 | 6.5 | 9.8 | 7 | 7.7 | 11 | 12.4 | 20.8 | 14.9 | **12.1** | 11.0 |
| DT14 | 40.6 | 39.8 | 38.8 | 41.4 | 30.7 | 31.8 | 28.5 | 31.9 | 27.8 | 41.9 | 49.3 | 33.1 | **36.3** | 33.0 |

| Site ID | NO$_2$ Mean Concentrations (µg/m$^3$) | | | | | | | | | | | | Annual Mean | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Raw Data | Bias Adjusted (1) |
| DT15 | 32.6 | 34.2 | 31.3 | 37.2 | 28.1 | 32.8 | - | 28.6 | 28 | 41.2 | 41.5 | 26.6 | **33** | 30.0 |
| DT16 | 40.3 | 40.4 | 39 | 40.3 | 33.5 | 32.7 | 31 | 33.5 | 33.6 | 43.9 | 37.4 | 42.1 | **37.8** | 34.4 |
| DT17 | 31.4 | 34.1 | 28.9 | 34.6 | 22.2 | 20.8 | 22.7 | 23.5 | 23.4 | 26 | 45.6 | 25.4 | **28.2** | 25.7 |
| DT18 | 38.1 | 38.1 | 32.5 | 41.1 | 25.8 | 28.9 | 23.9 | 28.5 | 25.4 | 38.4 | 41.2 | 35.1 | **33.1** | 30.1 |
| DT19 | 31.5 | 35.1 | 34.8 | 33.9 | 25 | 33 | 20.6 | 26.7 | 25.8 | 37.8 | 44.4 | 31 | **31.6** | 28.8 |
| DT20 | 40 | 39.3 | 41 | 37.2 | 27.2 | 30.9 | 28.2 | 29 | 32.7 | 31 | 44 | 38.2 | **34.8** | 31.7 |

(1) See Appendix C for details on bias adjustment

**As described in the Technical Guidance LAQM-TG-16 if there is more than one collocation study then the A factors should not be averaged but an approximation should be derived by averaging the B values. For example if there are two studies of 22% and 28% the average would be 25%. This is expressed as a factor, e.g 0.25, then 1 is added to this, 0.25+1.00 = 1.25. Finally take the inverse to give the bias adjustment factor 1/1.25=0.80.**
**We had 2 B values of 13% and 7%. Average = 10% = 0.10+1=1.10. Inverse of this is 1/1.10 = 0.91.**
**Therefore we have a Bias adjustment factor of 0.91.**

## Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

### Bias Adjustment Factors

**Adjustment of DUPLICATE or TRIPLICATE Tubes** — AEA Energy & Environment (From the AEA group)

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 39.8 | 40.7 | 41.4 | 40.6 | 0.80 | 1.97 | 1.99 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 39.5 | 36.3 | 41.5 | 39.8 | 1.62 | 4.07 | 4.02 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 45.9 | 36.3 | 34.1 | 38.8 | 6.27 | 16.19 | 15.59 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 41.9 | 38.8 | 43.6 | 41.4 | 2.43 | 5.87 | 6.05 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 33.4 | 27.9 | 30.8 | 30.7 | 2.75 | 8.96 | 6.83 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 35.3 | 29.4 | 30.8 | 31.8 | 3.08 | 9.68 | 7.66 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 28.1 | 29.3 | 28.1 | 28.5 | 0.69 | 2.43 | 1.72 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 29.6 | 34.1 | 32.1 | 31.9 | 2.25 | 7.06 | 5.60 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 15.8 | 34.4 | 33.2 | 27.8 | 10.41 | 37.44 | 25.86 | Poor Precision |
| 10 | 27/09/2016 | 24/10/2016 | 47.4 | 32.4 | 45.8 | 41.9 | 8.24 | 19.66 | 20.46 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 45.0 | 50.4 | 52.7 | 49.4 | 3.95 | 8.01 | 9.82 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 25.2 | 31.9 | 42.3 | 33.1 | 8.62 | 26.01 | 21.40 | Poor Precision |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA — Version 04 - February 2011

**Site Name/ ID:** DT14 Linlithgow AQ Station

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 7 periods of data
Tube Precision: 8    Automatic DC: 95%
Bias factor A: 0.87 (0.72 - 1.08)
Bias B: 15% (8% - 39%)
*Information about tubes to be adjusted*
Diffusion Tube average: 37 $\mu gm^{-3}$
Average Precision (CV): 8
Adjusted Tube average: 33 +/- 6 $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 10 periods of data
Tube Precision: 14    Automatic DC: 96%
Bias factor A: 0.94 (0.79 - 1.14)
Bias B: 7% (-13% - 26%)
*Information about tubes to be adjusted*
Diffusion Tube average: 36 $\mu gm^{-3}$
Average Precision (CV): 12
Adjusted Tube average: 34 +/- 8 $\mu gm^{-3}$

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**Adjustment of DUPLICATE or TRIPLICATE Tubes** — AEA Energy & Environment (From the AEA group)

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 36.7 | 32.9 | 34.9 | 34.8 | 1.90 | 5.46 | 4.72 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 36.1 | 35.8 | 39.1 | 37.0 | 1.82 | 4.93 | 4.53 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 31.8 | 37.7 | 39.5 | 36.3 | 4.03 | 11.09 | 10.01 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 43.8 | 44.8 | 45.8 | 44.8 | 1.00 | 2.23 | 2.48 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 27.8 | 26.6 | 25.5 | 26.6 | 1.15 | 4.32 | 2.86 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 44.2 | 39.7 | 39.6 | 41.2 | 2.63 | 6.38 | 6.53 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 23.7 | 20.3 | 25.7 | 23.2 | 2.73 | 11.75 | 6.78 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 32.4 | 40.4 | 30.8 | 34.5 | 5.14 | 14.89 | 12.78 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 35.5 | 32.4 | 28.8 | 32.2 | 3.35 | 10.40 | 8.33 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 44.1 | 36.4 | 38.8 | 39.8 | 3.94 | 9.91 | 9.79 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 40.4 | 44.3 | 47.1 | 43.9 | 3.37 | 7.66 | 8.36 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 32.9 | 32.9 | 34.4 | 33.4 | 0.87 | 2.59 | 2.15 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA — Version 04 - February 2011

**Site Name/ ID:** DT4 Broxburn AQ Station

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8    Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 36 $\mu gm^{-3}$
Average Precision (CV): 8
Adjusted Tube average: 32 +/- 3 $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8    Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 36 $\mu gm^{-3}$
Average Precision (CV): 8
Adjusted Tube average: 32 +/- 3 $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 26.0 | 28.9 | | 27.5 | 2.05 | 7.47 | 18.42 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 29.3 | 38.1 | | 33.7 | 6.22 | 18.46 | 55.91 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 40.7 | 26.1 | | 33.4 | 10.32 | 30.91 | 92.76 | Poor Precision |
| 4 | 29/03/2016 | 26/04/2016 | 32.5 | 34.8 | | 33.7 | 1.63 | 4.83 | 14.61 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 20.4 | 21.1 | | 20.8 | 0.49 | 2.39 | 4.45 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 22.4 | 24.7 | | 23.6 | 1.63 | 6.91 | 14.61 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 22.2 | 22.0 | | 22.1 | 0.14 | 0.64 | 1.27 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 25.0 | 21.2 | | 23.1 | 2.69 | 11.63 | 24.14 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 21.1 | 24.9 | | 23.0 | 2.69 | 11.68 | 24.14 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 29.4 | 29.9 | | 29.7 | 0.35 | 1.19 | 3.18 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 34.8 | 32.9 | | 33.9 | 1.34 | 3.97 | 12.07 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 6.8 | 23.2 | | 15.0 | 11.60 | 77.31 | 104.19 | Poor Precision |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT1 Newton

**Adjusted measurement (95% confidence level) Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:     27   $\mu gm^{-3}$
Average Precision (CV):     7
Adjusted Tube average: 24 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level) with all data**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:     27   $\mu gm^{-3}$
Average Precision (CV):     15
Adjusted Tube average: 24 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | Invalid | Invalid | | | | | | |
| 2 | 02/02/2016 | 01/03/2016 | 35.6 | 36.6 | | 36.1 | 0.71 | 1.96 | 6.35 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 40.8 | 25.7 | | 33.3 | 10.68 | 32.11 | 95.93 | Poor Precision |
| 4 | 29/03/2016 | 26/04/2016 | 38.5 | 43.8 | | 41.2 | 3.75 | 9.11 | 33.67 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 31.9 | 29.8 | | 30.9 | 1.48 | 4.81 | 13.34 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 30.2 | 35.8 | | 33.0 | 3.96 | 12.00 | 35.58 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 20.6 | 20.1 | | 20.4 | 0.35 | 1.74 | 3.18 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 27.7 | 22.3 | | 25.0 | 3.82 | 15.27 | 34.31 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 29.8 | 27.1 | | 28.5 | 1.91 | 6.71 | 17.15 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 43.3 | 38.3 | | 40.8 | 3.54 | 8.67 | 31.77 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 2.0 | 39.6 | | 20.8 | 26.59 | #### | 238.88 | Poor Precision |
| 12 | 28/11/2016 | 04/01/2017 | 23.1 | 25.9 | | 24.5 | 1.98 | 8.08 | 17.79 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT2 Broxburn WMS

**Adjusted measurement (95% confidence level) Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:     31   $\mu gm^{-3}$
Average Precision (CV):     8
Adjusted Tube average: 28 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level) with all data**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:     30   $\mu gm^{-3}$
Average Precision (CV):     21
Adjusted Tube average: 27 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 32.7 | 31.5 | | 32.1 | 0.85 | 2.64 | 7.62 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 34.8 | 30.0 | | 32.4 | 3.39 | 10.48 | 30.49 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 30.2 | 33.3 | | 31.8 | 2.19 | 6.90 | 19.69 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 34.7 | 27.8 | | 31.3 | 4.88 | 15.61 | 43.84 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 20.1 | 21.3 | | 20.7 | 0.85 | 4.10 | 7.62 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 24.0 | 21.7 | | 22.9 | 1.63 | 7.12 | 14.61 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 18.2 | 18.1 | | 18.2 | 0.07 | 0.39 | 0.64 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 22.8 | 26.4 | | 24.6 | 2.55 | 10.35 | 22.87 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 22.1 | 23.5 | | 22.8 | 0.99 | 4.34 | 8.89 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 34.4 | 29.9 | | 32.2 | 3.18 | 9.90 | 28.59 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 34.5 | 43.8 | | 39.2 | 6.58 | 16.80 | 59.08 | Good |
| 12 | 28/11/2016 | 04/01/2017 | 31.7 | 28.8 | | 30.3 | 2.05 | 6.78 | 18.42 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT3 Broxburn EMS

**Adjusted measurement (95% confidence level) Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8        Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:    28    $\mu gm^{-3}$
Average Precision (CV):    8
Adjusted Tube average: 25 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level) with all data**
Bias calculated using 12 periods of data
Tube Precision: 8        Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:    28    $\mu gm^{-3}$
Average Precision (CV):    8
Adjusted Tube average: 25 +/- 2  $\mu gm^{-3}$

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## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 27.1 | 31.0 | | 29.1 | 2.76 | 9.49 | 24.78 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 27.2 | 30.7 | | 29.0 | 2.47 | 8.55 | 22.24 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 30.2 | 27.8 | | 29.0 | 1.70 | 5.85 | 15.25 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 37.5 | 33.8 | | 35.7 | 2.62 | 7.34 | 23.51 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 27.6 | 22.3 | | 25.0 | 3.75 | 15.02 | 33.67 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 34.0 | 32.1 | | 33.1 | 1.34 | 4.07 | 12.07 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 13.7 | 17.0 | | 15.4 | 2.33 | 15.20 | 20.97 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 29.5 | 25.2 | | 27.4 | 3.04 | 11.12 | 27.32 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 24.9 | 22.0 | | 23.5 | 2.05 | 8.74 | 18.42 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 40.2 | 43.6 | | 41.9 | 2.40 | 5.74 | 21.60 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 33.0 | 38.8 | | 35.9 | 4.10 | 11.42 | 36.85 | Good |
| 12 | 28/11/2016 | 04/01/2017 | 31.8 | 28.6 | | 30.2 | 2.26 | 7.49 | 20.33 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT5 Broxburn E Mains

**Adjusted measurement (95% confidence level) Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8        Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:    30    $\mu gm^{-3}$
Average Precision (CV):    9
Adjusted Tube average: 26 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level) with all data**
Bias calculated using 12 periods of data
Tube Precision: 8        Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:    30    $\mu gm^{-3}$
Average Precision (CV):    9
Adjusted Tube average: 26 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | Invalid | 20.0 | | | | | | |
| 2 | 02/02/2016 | 01/03/2016 | 19.0 | 17.7 | | 18.4 | 0.92 | 5.01 | 8.26 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 18.3 | 14.2 | | 16.3 | 2.90 | 17.84 | 26.05 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 29.8 | 16.8 | | 23.3 | 9.19 | 39.45 | 82.59 | Poor Precision |
| 5 | 26/04/2016 | 23/05/2016 | 10.5 | 8.7 | | 9.6 | 1.27 | 13.26 | 11.44 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 11.0 | 12.2 | | 11.6 | 0.85 | 7.31 | 7.62 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 7.3 | 8.2 | | 7.8 | 0.64 | 8.21 | 5.72 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 10.4 | 13.9 | | 12.2 | 2.47 | 20.37 | 22.24 | Poor Precision |
| 9 | 23/08/2016 | 27/09/2016 | 15.6 | 13.0 | | 14.3 | 1.84 | 12.86 | 16.52 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 19.6 | 19.3 | | 19.5 | 0.21 | 1.09 | 1.91 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 24.0 | 21.5 | | 22.8 | 1.77 | 7.77 | 15.88 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 18.4 | 18.4 | | 18.4 | 0.00 | 0.00 | 0.00 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT6 Cedric Rise Dedridge

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:   15   $\mu gm^{-3}$
Average Precision (CV):   8
Adjusted Tube average: 14 +/- 1  $\mu gm^{-3}$

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:   16   $\mu gm^{-3}$
Average Precision (CV):   12
Adjusted Tube average: 14 +/- 1  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 30.4 | 30.6 | | 30.5 | 0.14 | 0.46 | 1.27 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 28.2 | 35.0 | | 31.6 | 4.81 | 15.22 | 43.20 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 32.3 | 26.4 | | 29.4 | 4.17 | 14.21 | 37.48 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 43.2 | 40.1 | | 41.7 | 2.19 | 5.26 | 19.69 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 26.5 | 27.6 | | 27.1 | 0.78 | 2.88 | 6.99 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 38.6 | 30.5 | | 34.6 | 5.73 | 16.58 | 51.46 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 19.8 | 21.7 | | 20.8 | 1.34 | 6.47 | 12.07 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 26.8 | 28.9 | | 27.9 | 1.48 | 5.33 | 13.34 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 20.9 | 22.5 | | 21.7 | 1.13 | 5.21 | 10.16 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 41.4 | 30.9 | | 36.2 | 7.42 | 20.54 | 66.71 | Poor Precision |
| 11 | 24/10/2016 | 28/11/2016 | 25.0 | 32.0 | | 28.5 | 4.95 | 17.37 | 44.47 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 20.8 | 23.8 | | 22.3 | 2.12 | 9.51 | 19.06 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT 7 West Calder

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:   29   $\mu gm^{-3}$
Average Precision (CV):   9
Adjusted Tube average: 26 +/- 2  $\mu gm^{-3}$

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:   29   $\mu gm^{-3}$
Average Precision (CV):   10
Adjusted Tube average: 26 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

### Diffusion Tubes Measurements — DT8 Whitburn Cross

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | Invalid | 28.4 | | | | | | |
| 2 | 02/02/2016 | 01/03/2016 | 32.9 | 31.4 | | 32.2 | 1.06 | 3.30 | 9.53 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 27.1 | 34.9 | | 31.0 | 5.52 | 17.79 | 49.55 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 35.9 | 36.3 | | 36.1 | 0.28 | 0.78 | 2.54 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 24.4 | 23.0 | | 23.7 | 0.99 | 4.18 | 8.89 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 25.6 | 25.9 | | 25.8 | 0.21 | 0.82 | 1.91 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 16.2 | 17.1 | | 16.7 | 0.64 | 3.82 | 5.72 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 22.6 | 25.8 | | 24.2 | 2.26 | 9.35 | 20.33 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 29.6 | 22.6 | | 26.1 | 4.95 | 18.96 | 44.47 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 34.3 | 28.6 | | 31.5 | 4.03 | 12.82 | 36.21 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 40.2 | 38.5 | | 39.4 | 1.20 | 3.05 | 10.80 | Good |
| 12 | 28/11/2016 | 04/01/2017 | missing | missing | | | | | | |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT8 Whitburn Cross

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:   29   $\mu gm^{-3}$
Average Precision (CV):   7
Adjusted Tube average: 25 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:   29   $\mu gm^{-3}$
Average Precision (CV):   7
Adjusted Tube average: 25 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

### Diffusion Tubes Measurements — DT9 Armadale Cross

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 31.4 | 30.5 | | 31.0 | 0.64 | 2.06 | 5.72 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 32.7 | 31.4 | | 32.1 | 0.92 | 2.87 | 8.26 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 35.7 | 30.6 | | 33.2 | 3.61 | 10.88 | 32.40 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 29.0 | 27.9 | | 28.5 | 0.78 | 2.73 | 6.99 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 23.7 | 24.8 | | 24.3 | 0.78 | 3.21 | 6.99 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 18.3 | 19.7 | | 19.0 | 0.99 | 5.21 | 8.89 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 24.0 | 27.6 | | 25.8 | 2.55 | 9.87 | 22.87 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 19.8 | 25.5 | | 22.7 | 4.03 | 17.79 | 36.21 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 24.7 | 28.0 | | 26.4 | 2.33 | 8.86 | 20.97 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 28.8 | 27.8 | | 28.3 | 0.71 | 2.50 | 6.35 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 39.6 | 41.9 | | 40.8 | 1.63 | 3.99 | 14.61 | Good |
| 12 | 28/11/2016 | 04/01/2017 | 30.4 | 24.9 | | 27.7 | 3.89 | 14.07 | 34.94 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT9 Armadale Cross

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:   28   $\mu gm^{-3}$
Average Precision (CV):   7
Adjusted Tube average: 25 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
Information about tubes to be adjusted
Diffusion Tube average:   28   $\mu gm^{-3}$
Average Precision (CV):   7
Adjusted Tube average: 25 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
*From the AEA group*

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | Invalid | 23.6 | | | | | | |
| 2 | 02/02/2016 | 01/03/2016 | 23.0 | 23.2 | | 23.1 | 0.14 | 0.61 | 1.27 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 19.8 | 18.7 | | 19.3 | 0.78 | 4.04 | 6.99 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 24.6 | 23.8 | | 24.2 | 0.57 | 2.34 | 5.08 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 12.5 | 14.8 | | 13.7 | 1.63 | 11.91 | 14.61 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 15.5 | 13.7 | | 14.6 | 1.27 | 8.72 | 11.44 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 12.8 | 11.1 | | 12.0 | 1.20 | 10.06 | 10.80 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 15.5 | 17.2 | | 16.4 | 1.20 | 7.35 | 10.80 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 16.8 | 15.7 | | 16.3 | 0.78 | 4.79 | 6.99 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 22.4 | 23.9 | | 23.2 | 1.06 | 4.58 | 9.53 | Good |
| 11 | 24/10/2016 | 28/11/2016 | missing | missing | | | | | | |
| 12 | 28/11/2016 | 04/01/2017 | untestable | 25.3 | | | | | | |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

**Site Name/ ID:** DT10 Bathgate S Bridge

*Jaume Targa, for AEA*
*Version 04 - February 2011*

**Adjusted measurement (95% confidence level)**
**Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    18    $\mu gm^{-3}$
Average Precision (CV):    6
Adjusted Tube average: 16 +/- 1  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
**with all data**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    18    $\mu gm^{-3}$
Average Precision (CV):    6
Adjusted Tube average: 16 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
*From the AEA group*

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 33.9 | 33.0 | | 33.5 | 0.64 | 1.90 | 5.72 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 34.6 | 34.7 | | 34.7 | 0.07 | 0.20 | 0.64 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 37.5 | 39.1 | | 38.3 | 1.13 | 2.95 | 10.16 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 30.7 | 31.4 | | 31.1 | 0.49 | 1.59 | 4.45 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 22.0 | 22.5 | | 22.3 | 0.35 | 1.59 | 3.18 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 26.2 | 24.5 | | 25.4 | 1.20 | 4.74 | 10.80 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 23.4 | 22.3 | | 22.9 | 0.78 | 3.40 | 6.99 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 28.0 | 28.5 | | 28.3 | 0.35 | 1.25 | 3.18 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 22.9 | 25.5 | | 24.2 | 1.84 | 7.60 | 16.52 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 36.5 | 34.4 | | 35.5 | 1.48 | 4.19 | 13.34 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 46.9 | 47.6 | | 47.3 | 0.49 | 1.05 | 4.45 | Good |
| 12 | 28/11/2016 | 04/01/2017 | 35.1 | 34.3 | | 34.7 | 0.57 | 1.63 | 5.08 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

**Site Name/ ID:** DT11 Bathgate Steelyard

*Jaume Targa, for AEA*
*Version 04 - February 2011*

**Adjusted measurement (95% confidence level)**
**Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    31    $\mu gm^{-3}$
Average Precision (CV):    3
Adjusted Tube average: 28 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
**with all data**
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    31    $\mu gm^{-3}$
Average Precision (CV):    3
Adjusted Tube average: 28 +/- 2  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
From the AEA group

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 34.5 | 36.1 | | 35.3 | 1.13 | 3.21 | 10.16 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 34.7 | 33.3 | | 34.0 | 0.99 | 2.91 | 8.89 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 41.3 | 28.6 | | 35.0 | 8.98 | 25.69 | 80.68 | Poor Precision |
| 4 | 29/03/2016 | 26/04/2016 | 44.5 | 39.1 | | 41.8 | 3.82 | 9.13 | 34.31 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 23.8 | 22.4 | | 23.1 | 0.99 | 4.29 | 8.89 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 24.7 | 25.8 | | 25.3 | 0.78 | 3.08 | 6.99 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 20.8 | 23.1 | | 22.0 | 1.63 | 7.41 | 14.61 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 22.2 | 21.2 | | 21.7 | 0.71 | 3.26 | 6.35 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 32.5 | 29.6 | | 31.1 | 2.05 | 6.60 | 18.42 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 34.3 | 39.6 | | 37.0 | 3.75 | 10.14 | 33.67 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 53.1 | 49.1 | | 51.1 | 2.83 | 5.54 | 25.41 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 22.2 | 16.2 | | 19.2 | 4.24 | 22.10 | 38.12 | Poor Precision |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT12 Bathgate King Street

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8          Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    32    $\mu gm^{-3}$
Average Precision (CV):     6
Adjusted Tube average: 29 +/- 2  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8          Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    31    $\mu gm^{-3}$
Average Precision (CV):     9
Adjusted Tube average: 28 +/- 2  $\mu gm^{-3}$

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## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
From the AEA group

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | Invalid | 15.4 | | | | | | |
| 2 | 02/02/2016 | 01/03/2016 | 14.9 | 15.3 | | 15.1 | 0.28 | 1.87 | 2.54 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 9.9 | 11.7 | | 10.8 | 1.27 | 11.79 | 11.44 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 13.2 | 18.3 | | 15.8 | 3.61 | 22.90 | 32.40 | Poor Precision |
| 5 | 26/04/2016 | 23/05/2016 | 6.3 | 6.7 | | 6.5 | 0.28 | 4.35 | 2.54 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 7.9 | 11.7 | | 9.8 | 2.69 | 27.42 | 24.14 | Poor Precision |
| 7 | 28/06/2016 | 26/07/2016 | 7.1 | 6.8 | | 7.0 | 0.21 | 3.05 | 1.91 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 7.7 | 7.7 | | 7.7 | 0.00 | 0.00 | 0.00 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 9.1 | 12.9 | | 11.0 | 2.69 | 24.43 | 24.14 | Poor Precision |
| 10 | 27/09/2016 | 24/10/2016 | 12.9 | 11.8 | | 12.4 | 0.78 | 6.30 | 6.99 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 23.0 | 18.5 | | 20.8 | 3.18 | 15.33 | 28.59 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 12.4 | 17.4 | | 14.9 | 3.54 | 23.73 | 31.77 | Poor Precision |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT13 Bathgate High Street

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8          Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    11    $\mu gm^{-3}$
Average Precision (CV):     6
Adjusted Tube average: 10 +/- 1  $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8          Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    12    $\mu gm^{-3}$
Average Precision (CV):     13
Adjusted Tube average: 11 +/- 1  $\mu gm^{-3}$

## Adjustment of DUPLICATE or TRIPLICATE Tubes
AEA Energy & Environment
From the AEA group

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 μgm⁻³ | Tube 2 μgm⁻³ | Tube 3 μgm⁻³ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | ube missin | 32.6 | | | | | | |
| 2 | 02/02/2016 | 01/03/2016 | 36.4 | 31.9 | | 34.2 | 3.18 | 9.32 | 28.59 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 32.5 | 30.1 | | 31.3 | 1.70 | 5.42 | 15.25 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 41.7 | 32.6 | | 37.2 | 6.43 | 17.32 | 57.81 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 29.1 | 27.1 | | 28.1 | 1.41 | 5.03 | 12.71 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 32.0 | 33.5 | | 32.8 | 1.06 | 3.24 | 9.53 | Good |
| 7 | 28/06/2016 | 26/07/2016 | ube missin | ube missing | | | | | | |
| 8 | 26/07/2016 | 23/08/2016 | 31.6 | 25.5 | | 28.6 | 4.31 | 15.11 | 38.75 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 28.4 | 27.6 | | 28.0 | 0.57 | 2.02 | 5.08 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 41.1 | 41.3 | | 41.2 | 0.14 | 0.34 | 1.27 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 41.8 | 41.1 | | 41.5 | 0.49 | 1.19 | 4.45 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 27.8 | 25.4 | | 26.6 | 1.70 | 6.38 | 15.25 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT15 Linlithgow H ST NW

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8    Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 33 μgm⁻³
Average Precision (CV): 7
Adjusted Tube average: 29 +/- 3 μgm⁻³

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8    Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 33 μgm⁻³
Average Precision (CV): 7
Adjusted Tube average: 29 +/- 3 μgm⁻³

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## Adjustment of DUPLICATE or TRIPLICATE Tubes
AEA Energy & Environment
From the AEA group

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 μgm⁻³ | Tube 2 μgm⁻³ | Tube 3 μgm⁻³ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 39.8 | 40.7 | | 40.3 | 0.64 | 1.58 | 5.72 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 41.9 | 38.9 | | 40.4 | 2.12 | 5.25 | 19.06 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 35.6 | 42.4 | | 39.0 | 4.81 | 12.33 | 43.20 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 40.3 | 40.3 | | 40.3 | 0.00 | 0.00 | 0.00 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 34.9 | 32.0 | | 33.5 | 2.05 | 6.13 | 18.42 | Good |
| 6 | 23/05/2016 | 28/06/2016 | ube missin | 32.7 | | | | | | |
| 7 | 28/06/2016 | 26/07/2016 | 31.7 | 30.3 | | 31.0 | 0.99 | 3.19 | 8.89 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 38.0 | 29.0 | | 33.5 | 6.36 | 19.00 | 57.18 | Good |
| 9 | 23/08/2016 | 27/09/2016 | ube missin | 33.6 | | | | | | |
| 10 | 27/09/2016 | 24/10/2016 | 42.2 | 45.7 | | 44.0 | 2.47 | 5.63 | 22.24 | Good |
| 11 | 24/10/2016 | 28/11/2016 | ube missin | 37.4 | | | | | | |
| 12 | 28/11/2016 | 04/01/2016 | 41.7 | 42.4 | | 42.1 | 0.49 | 1.18 | 4.45 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT16 Linlithgow H ST SW

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8    Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 38 μgm⁻³
Average Precision (CV): 6
Adjusted Tube average: 34 +/- 3 μgm⁻³

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8    Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 38 μgm⁻³
Average Precision (CV): 6
Adjusted Tube average: 34 +/- 3 μgm⁻³

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 µgm⁻³ | Tube 2 µgm⁻³ | Tube 3 µgm⁻³ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 30.9 | 31.8 | | 31.4 | 0.64 | 2.03 | 5.72 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 36.4 | 31.8 | | 34.1 | 3.25 | 9.54 | 29.22 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 25.3 | 32.4 | | 28.9 | 5.02 | 17.40 | 45.11 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 39.2 | 29.9 | | 34.6 | 6.58 | 19.03 | 59.08 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 22.4 | 22.0 | | 22.2 | 0.28 | 1.27 | 2.54 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 19.6 | 21.9 | | 20.8 | 1.63 | 7.84 | 14.61 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 25.9 | 19.5 | | 22.7 | 4.53 | 19.94 | 40.66 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 22.5 | 24.4 | | 23.5 | 1.34 | 5.73 | 12.07 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 24.9 | 21.8 | | 23.4 | 2.19 | 9.39 | 19.69 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 26.1 | 25.8 | | 26.0 | 0.21 | 0.82 | 1.91 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 45.2 | 45.9 | | 45.6 | 0.49 | 1.09 | 4.45 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 21.9 | 28.9 | | 25.4 | 4.95 | 19.49 | 44.47 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT17 Linlithgow H ST NE

**Adjusted measurement (95% confidence level) Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    28    µgm⁻³
Average Precision (CV):    9
Adjusted Tube average: 25 +/- 2  µgm⁻³

**Adjusted measurement (95% confidence level) with all data**
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    28    µgm⁻³
Average Precision (CV):    9
Adjusted Tube average: 25 +/- 2  µgm⁻³

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment (From the AEA group)

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 µgm⁻³ | Tube 2 µgm⁻³ | Tube 3 µgm⁻³ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 35.2 | 40.9 | | 38.1 | 4.03 | 10.59 | 36.21 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 39.6 | 36.6 | | 38.1 | 2.12 | 5.57 | 19.06 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 33.7 | 31.3 | | 32.5 | 1.70 | 5.22 | 15.25 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 39.2 | 42.9 | | 41.1 | 2.62 | 6.37 | 23.51 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 27.1 | 24.5 | | 25.8 | 1.84 | 7.13 | 16.52 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 26.1 | 31.8 | | 29.0 | 4.03 | 13.92 | 36.21 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 23.5 | 24.2 | | 23.9 | 0.49 | 2.08 | 4.45 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 30.7 | 26.2 | | 28.5 | 3.18 | 11.18 | 28.59 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 24.8 | 25.9 | | 25.4 | 0.78 | 3.07 | 6.99 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 37.5 | 39.3 | | 38.4 | 1.27 | 3.31 | 11.44 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 48.5 | 33.9 | | 41.2 | 10.32 | 25.06 | 92.76 | Poor Precision |
| 12 | 28/11/2016 | 04/01/2016 | 32.6 | 37.5 | | 35.1 | 3.46 | 9.89 | 31.13 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT18 Linlithgow H ST SE

**Adjusted measurement (95% confidence level) Without periods with CV larger than 20%**
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    32    µgm⁻³
Average Precision (CV):    7
Adjusted Tube average: 29 +/- 2  µgm⁻³

**Adjusted measurement (95% confidence level) with all data**
Bias calculated using 12 periods of data
Tube Precision: 8       Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13%   (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average:    33    µgm⁻³
Average Precision (CV):    9
Adjusted Tube average: 29 +/- 2  µgm⁻³

## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
From the AEA group

### Diffusion Tubes Measurements

| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 32.3 | 30.7 | | 31.5 | 1.13 | 3.59 | 10.16 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 35.4 | 34.7 | | 35.1 | 0.49 | 1.41 | 4.45 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 32.6 | 36.9 | | 34.8 | 3.04 | 8.75 | 27.32 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 29.4 | 38.3 | | 33.9 | 6.29 | 18.59 | 56.54 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 23.5 | 26.5 | | 25.0 | 2.12 | 8.49 | 19.06 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 32.3 | 33.7 | | 33.0 | 0.99 | 3.00 | 8.89 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 20.5 | 20.7 | | 20.6 | 0.14 | 0.69 | 1.27 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 24.9 | 28.5 | | 26.7 | 2.55 | 9.53 | 22.87 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 29.1 | 22.5 | | 25.8 | 4.67 | 18.09 | 41.93 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 33.9 | 41.6 | | 37.8 | 5.44 | 14.42 | 48.92 | Good |
| 11 | 24/10/2016 | 28/11/2016 | 47.2 | 41.6 | | 44.4 | 3.96 | 8.92 | 35.58 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 29.8 | 32.1 | | 31.0 | 1.63 | 5.25 | 14.61 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT19 Linlithgow High St N

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 32 $\mu gm^{-3}$
Average Precision (CV): 8
Adjusted Tube average: 28 +/- 2 $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 32 $\mu gm^{-3}$
Average Precision (CV): 8
Adjusted Tube average: 28 +/- 2 $\mu gm^{-3}$

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## Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
From the AEA group

### Diffusion Tubes Measurements

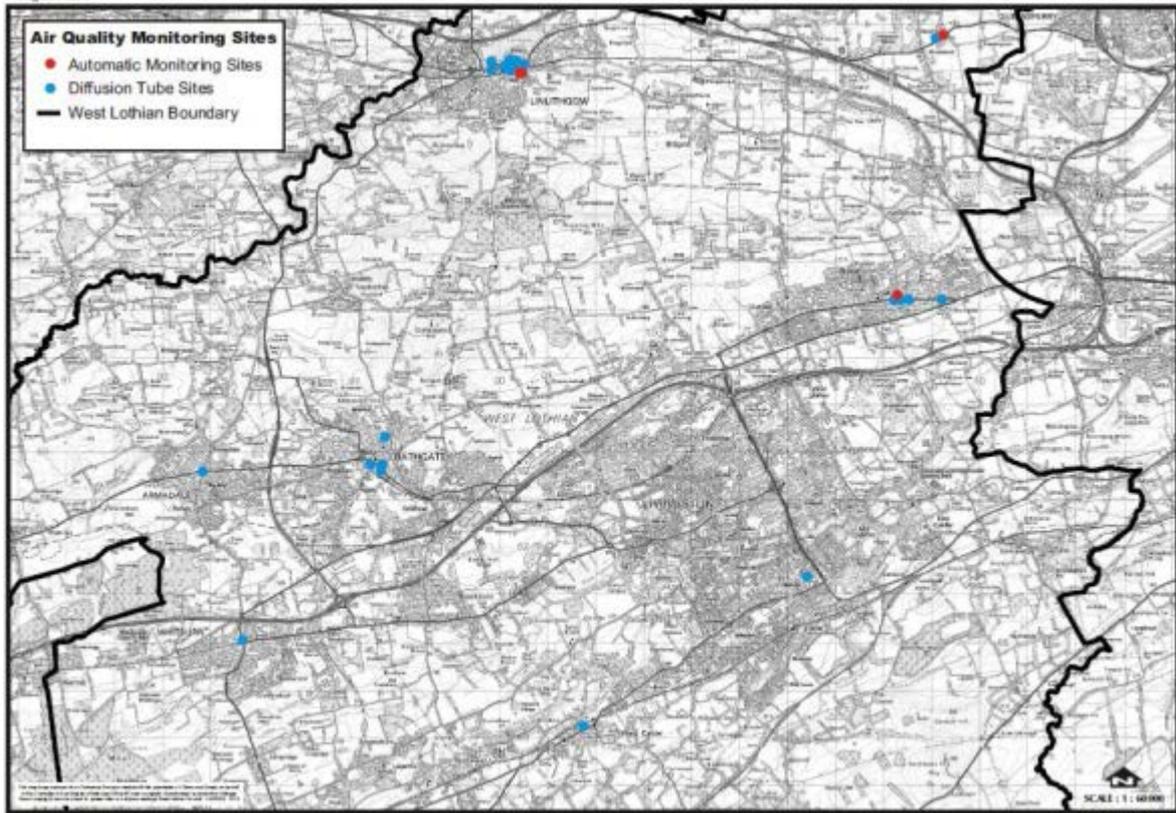| Period | Start Date dd/mm/yyyy | End Date dd/mm/yyyy | Tube 1 $\mu gm^{-3}$ | Tube 2 $\mu gm^{-3}$ | Tube 3 $\mu gm^{-3}$ | Triplicate Average | Standard Deviation | CV | 95% CI mean | Data Quality Check — Diffusion Tubes Precision Check |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 05/01/2016 | 02/02/2016 | 41.8 | 38.1 | | 40.0 | 2.62 | 6.55 | 23.51 | Good |
| 2 | 02/02/2016 | 01/03/2016 | 40.4 | 38.1 | | 39.3 | 1.63 | 4.14 | 14.61 | Good |
| 3 | 01/03/2016 | 29/03/2016 | 36.9 | 44.8 | | 40.9 | 5.59 | 13.67 | 50.19 | Good |
| 4 | 29/03/2016 | 26/04/2016 | 34.7 | 39.6 | | 37.2 | 3.46 | 9.33 | 31.13 | Good |
| 5 | 26/04/2016 | 23/05/2016 | 28.5 | 25.8 | | 27.2 | 1.91 | 7.03 | 17.15 | Good |
| 6 | 23/05/2016 | 28/06/2016 | 30.2 | 31.6 | | 30.9 | 0.99 | 3.20 | 8.89 | Good |
| 7 | 28/06/2016 | 26/07/2016 | 29.5 | 26.8 | | 28.2 | 1.91 | 6.78 | 17.15 | Good |
| 8 | 26/07/2016 | 23/08/2016 | 29.2 | 28.8 | | 29.0 | 0.28 | 0.98 | 2.54 | Good |
| 9 | 23/08/2016 | 27/09/2016 | 34.9 | 30.4 | | 32.7 | 3.18 | 9.75 | 28.59 | Good |
| 10 | 27/09/2016 | 24/10/2016 | 19.9 | 41.1 | | 30.5 | 14.99 | 49.15 | 134.69 | Poor Precision |
| 11 | 24/10/2016 | 28/11/2016 | 41.4 | 46.6 | | 44.0 | 3.68 | 8.36 | 33.04 | Good |
| 12 | 28/11/2016 | 04/01/2016 | 37.3 | 39.0 | | 38.2 | 1.20 | 3.15 | 10.80 | Good |
| 13 | | | | | | | | | | |

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

**Site Name/ ID:** DT20 Linlithgow High St S

**Adjusted measurement (95% confidence level)**
Without periods with CV larger than 20%
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 35 $\mu gm^{-3}$
Average Precision (CV): 7
Adjusted Tube average: 31 +/- 3 $\mu gm^{-3}$

**Adjusted measurement (95% confidence level)**
with all data
Bias calculated using 12 periods of data
Tube Precision: 8     Automatic DC: 100%
Bias factor A: 0.89 (0.82 - 0.97)
Bias B: 13% (4% - 22%)
*Information about tubes to be adjusted*
Diffusion Tube average: 35 $\mu gm^{-3}$
Average Precision (CV): 10
Adjusted Tube average: 31 +/- 3 $\mu gm^{-3}$

Figure 2.1

Air Quality Monitoring Sites
- Automatic Monitoring Sites
- Diffusion Tube Sites
- West Lothian Boundary



## West Lothian Broxburn

01/01/2016 – 31/12/2016
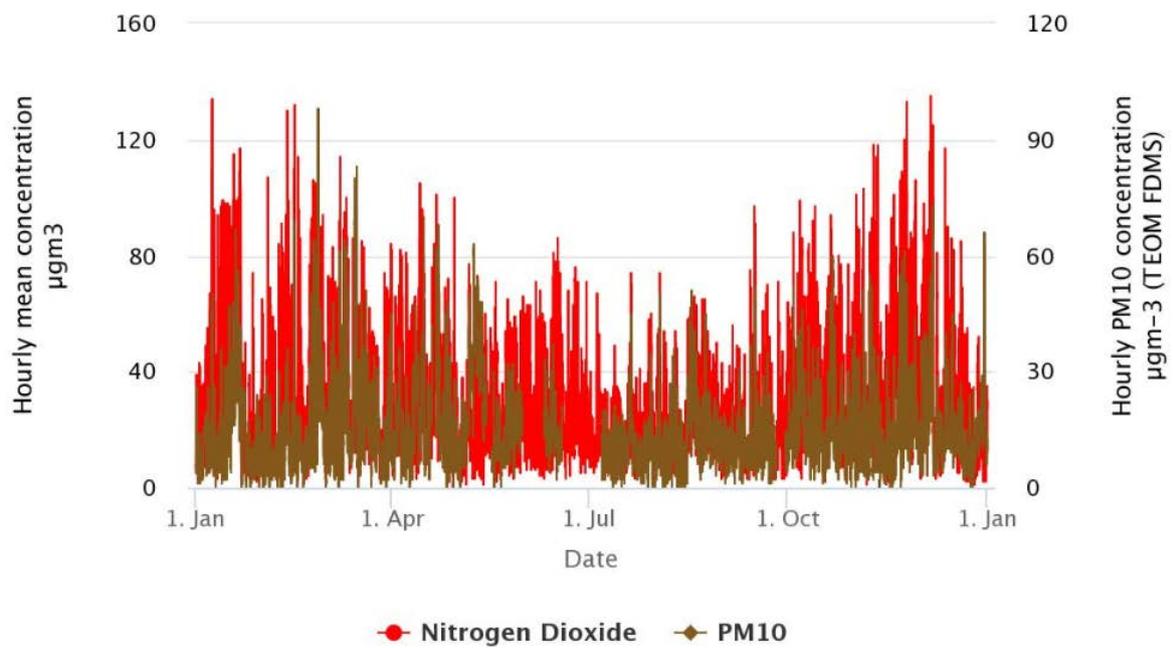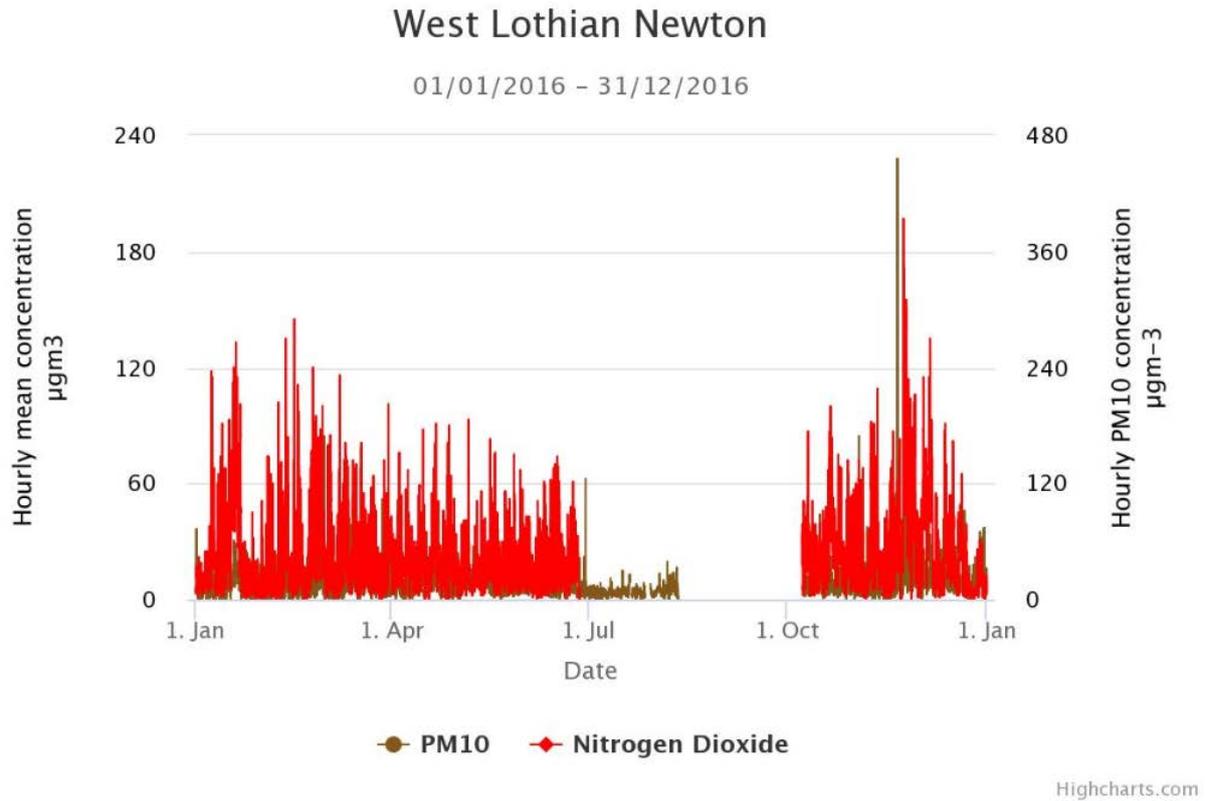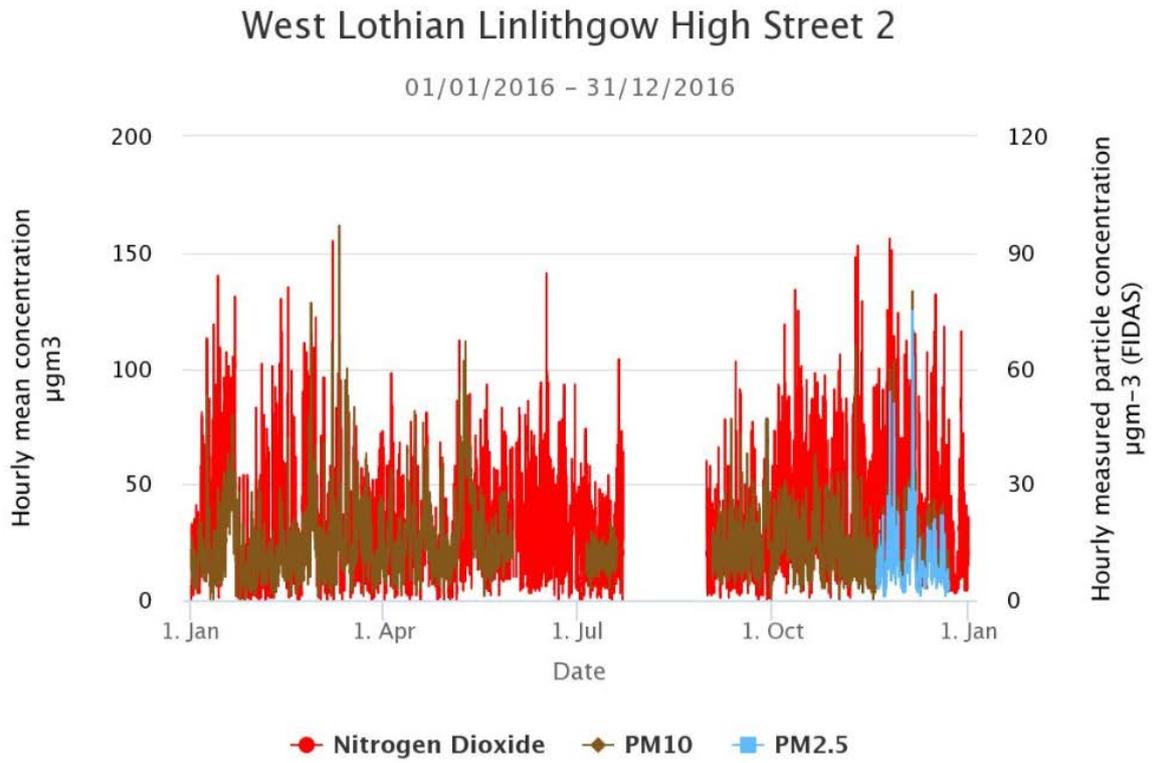
Nitrogen Dioxide    PM10

Highcharts.com

West Lothian Newton

01/01/2016 – 31/12/2016

PM10   Nitrogen Dioxide

Highcharts.com

## West Lothian Linlithgow High Street 2

01/01/2016 – 31/12/2016

# Air Pollution Report

**1st January to 31st December 2016**

Air Quality in Scotland

## West Lothian Broxburn (Site ID: BRX)

**These data have been fully ratified**

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

| Pollutant | NO µg/m³ | NO₂ µg/m³ | NOₓasNO₂ µg/m³ | PM₁₀ µg/m³ |
|---|---|---|---|---|
| Number Days Low | - | 366 | - | 323 |
| Number Days Moderate | - | 0 | - | 0 |
| Number Days High | - | 0 | - | 0 |
| Number Days Very High | - | 0 | - | 0 |
| Max Daily Mean | 235 | 82 | 443 | 43 |
| Annual Max | 509 | 135 | 916 | 98 |
| Annual Mean | 36 | 32 | 88 | 15 |
| 98th Percentile of daily mean | - | - | - | 35 |
| 90th Percentile of daily mean | - | - | - | 25 |
| 99.8th Percentile of hourly mean | - | 117 | - | - |
| 98th Percentile of hourly mean | 180 | 91 | 358 | 46 |
| 95th Percentile of hourly mean | 122 | 77 | 264 | 36 |
| 50th Percentile of hourly mean | 21 | 27 | 59 | 12 |
| % Annual data capture | 99.58% | 99.56% | 99.56% | 88.24% |

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. $NO_X$ mass units are $NO_X$ as $NO_2$ µg m-3

| Pollutant | Air Quality Standards (Scotland) Regulations 2010 | Exceedances | Days |
|---|---|---|---|
| PM10 particulate matter (Hourly measured) | daily mean > 50 microgrammes per metre cubed | 0 | 0 |
| PM10 particulate matter (Hourly measured) | Annual mean > 18 microgrammes per metre cubed | 0 | - |
| Nitrogen dioxide | Hourly Mean > 200 microgrammes per metre cubed | 0 | 0 |
| Nitrogen dioxide | Annual Mean > 40 microgrammes per metre cubed | 0 | - |

# Air Pollution Report

**1st January to 31st December 2016**

**Air Quality** in Scotland

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## West Lothian Linlithgow High Street 2 (Site ID: WLC1)

| Pollutant | NO µg/m³ | NO$_2$ µg/m³ | NO$_x$asNO$_2$ µg/m³ | PM$_{10}$ µg/m³ | PM$_{25}$ µg/m³ |
|---|---|---|---|---|---|
| Number Days Low | - | 326 | - | 274 | 33 |
| Number Days Moderate | - | 0 | - | 0 | 0 |
| Number Days High | - | 0 | - | 0 | 0 |
| Number Days Very High | - | 0 | - | 0 | 0 |
| Max Daily Mean | 211 | 72 | 395 | 42 | 28 |
| Annual Max | 562 | 156 | 1,017 | 97 | 75 |
| Annual Mean | 42 | 33 | 97 | 14 | 10 |
| 98th Percentile of daily mean | - | - | - | 33 | - |
| 90th Percentile of daily mean | - | - | - | 23 | - |
| 99.8th Percentile of hourly mean | - | 125 | - | - | - |
| 98th Percentile of hourly mean | 223 | 94 | 432 | 39 | 33 |
| 95th Percentile of hourly mean | 152 | 79 | 303 | 31 | 24 |
| 50th Percentile of hourly mean | 25 | 29 | 68 | 12 | 8 |
| % Annual data capture | 87.47% | 87.11% | 87.12% | 75.25% | 9.31% |

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO$_x$ mass units are NO$_x$ as NO$_2$ µg m-3

| Pollutant | Air Quality Standards (Scotland) Regulations 2010 | Exceedances | Days |
|---|---|---|---|
| PM10 particulate matter (Hourly measured) | daily mean > 50 microgrammes per metre cubed | 0 | 0 |
| PM10 particulate matter (Hourly measured) | Annual mean > 18 microgrammes per metre cubed | 0 | - |
| PM2.5 particulate matter (Hourly measured) | Annual mean > 12 microgrammes per metre cubed | 0 | - |
| Nitrogen dioxide | Hourly Mean > 200 microgrammes per metre cubed | 0 | 0 |
| Nitrogen dioxide | Annual Mean > 40 microgrammes per metre cubed | 0 | - |

# Air Pollution Report

**1st January to 31st December 2016**

## West Lothian Newton (Site ID: WLN4)

These data have been **fully ratified**

Only relevant statistics for LAQM are presented in the table. Cells with - indicate no data available or calculated.

| Pollutant | NO<br>µg/m³ | NO$_2$<br>µg/m³ | NO$_x$asNO$_2$<br>µg/m³ | PM$_{10}$<br>µg/m³ |
|---|---|---|---|---|
| Number Days Low | - | 264 | - | 296 |
| Number Days Moderate | - | 0 | - | 0 |
| Number Days High | - | 0 | - | 0 |
| Number Days Very High | - | 0 | - | 0 |
| Max Daily Mean | 100 | 81 | 227 | 44 |
| Annual Max | 285 | 197 | 602 | 456 |
| Annual Mean | 16 | 23 | 47 | 15 |
| 98th Percentile of daily mean | - | - | - | 32 |
| 90th Percentile of daily mean | - | - | - | 25 |
| 99.8th Percentile of hourly mean | - | 120 | - | - |
| 98th Percentile of hourly mean | 86 | 82 | 213 | 57 |
| 95th Percentile of hourly mean | 56 | 67 | 151 | 40 |
| 50th Percentile of hourly mean | 9 | 17 | 31 | 11 |
| **% Annual data capture** | **71.64%** | **71.64%** | **71.64%** | **81.88%** |

All gaseous pollutant mass units are at 20°C and 1013mb. Particulate matter concentrations are reported at ambient temperature and pressure. NO$_x$ mass units are NO$_x$ as NO$_2$ µg m-3

| Pollutant | Air Quality Standards (Scotland) Regulations 2010 | Exceedances | Days |
|---|---|---|---|
| PM10 particulate matter (Hourly measured) | daily mean > 50 microgrammes per metre cubed | 0 | 0 |
| PM10 particulate matter (Hourly measured) | Annual mean > 18 microgrammes per metre cubed | 0 | - |
| Nitrogen dioxide | Hourly Mean > 200 microgrammes per metre cubed | 0 | 0 |
| Nitrogen dioxide | Annual Mean > 40 microgrammes per metre cubed | 0 | - |

## NO₂ Trend Data Graph
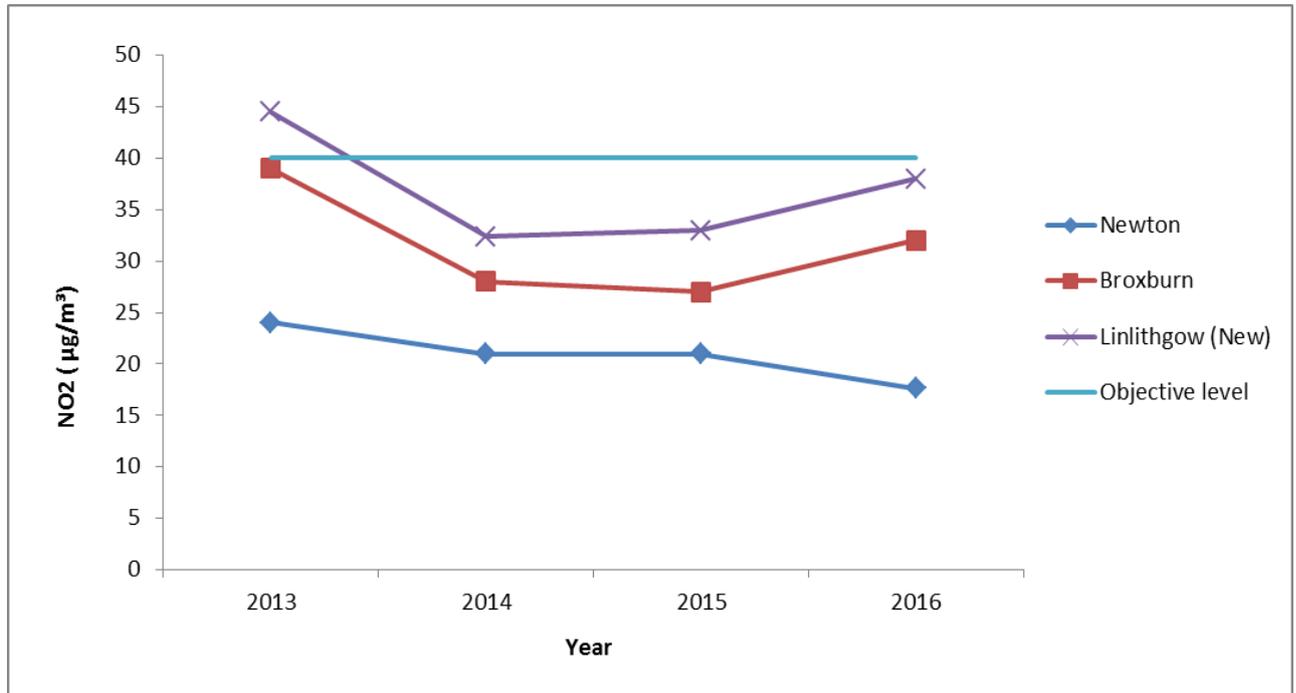


## PM₁₀ Trend Data Graph
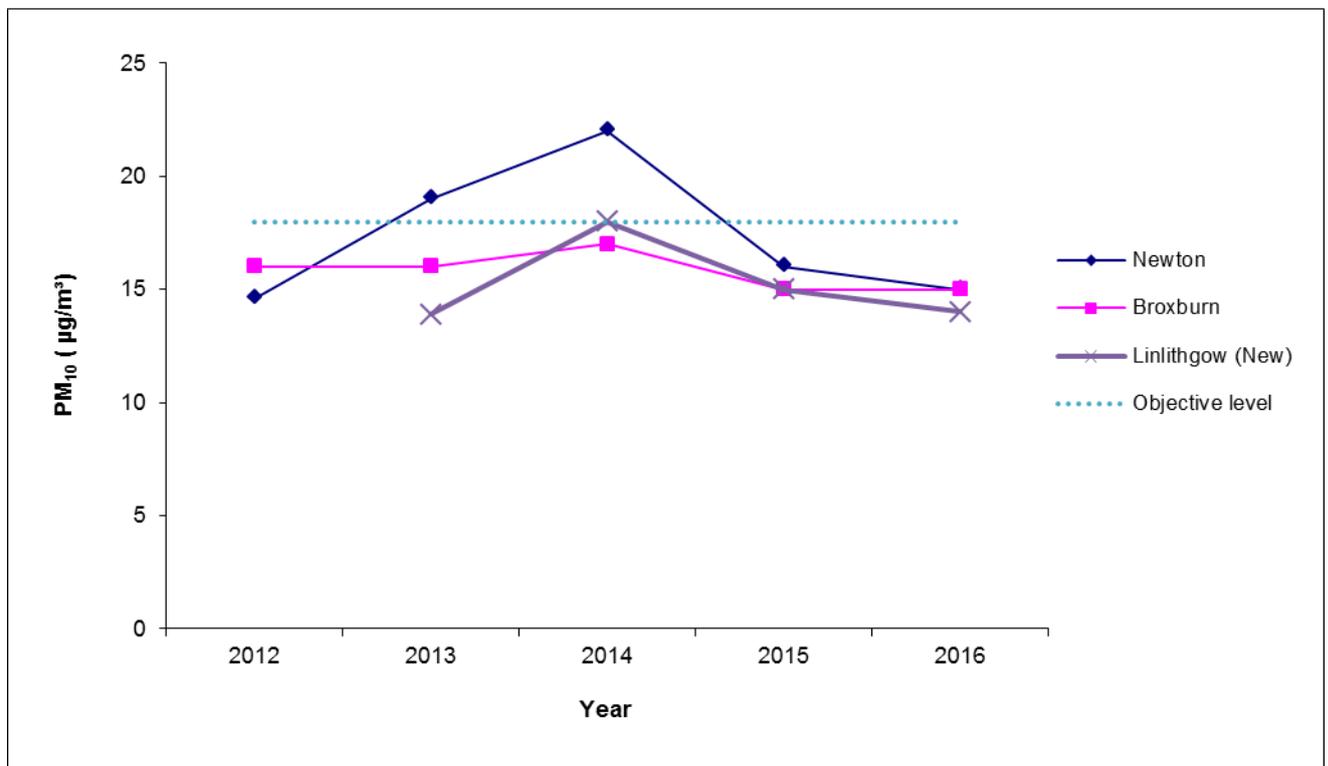
## Annualisation

As described in the Technical Guidance LAQM-TG-16 annualisation is carried out when data capture is less than 75% . To do this first identify two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. The data capture for each of these sites should ideally be at least 85%. These sites should be background (Urban Background, Suburban or Rural) sites to avoid any very local effects that may occur at Urban Centre, Roadside or Kerbside sites, and should, wherever possible lie within a radius of about 50 miles. If no background sites are available, and the site to be annualised is itself a Urban Centre, Roadside or Kerbside site, then it is permissible to annualise using roadside or kerbside sites rather than background sites, though this should be clearly stated in the annual report.

Obtain the annual means, **Am**, for the calendar year for these sites.

Work out the period means, **Pm**, for the period of interest, in this case July to December 2015.

Calculate the ratio, **R**, of the annual mean to the period mean (**Am/Pm**) for each of the sites.

Calculate the average of these ratios, **Ra**. This is then the annualisation factor.

Multiply the measured period mean concentration **M** by this annualisation factor **Ra** to give the estimate of the annual mean for 2015. For NO2 at Newton we only had data capture of 72%, annualisation was calculated as below:

## Annualisation for NO2 Newton

|  | Annual mean(Am) | Period mean(Pm) | Ratio(Am/Pm) |
| --- | --- | --- | --- |
| Lin Site A | 34 | 44 | 0.772 |
| Brox Site B | 32 | 43 | <u>0.744</u> |

## Ratio                                                                                    0.758

**Annualisation for Newton: 0.758 x 23.2(Newton Period mean)  = 17.6**

## Glossary of Terms

| Abbreviation | Description |
| --- | --- |
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values' |
| AQMA | Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives |
| APR | Air quality Annual Progress Report |
| AURN | Automatic Urban and Rural Network (UK air quality monitoring network) |
| Defra | Department for Environment, Food and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England |
| FDMS | Filter Dynamics Measurement System |
| LAQM | Local Air Quality Management |
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxides |
| $PM_{10}$ | Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less |
| $PM_{2.5}$ | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |
| QA/QC | Quality Assurance and Quality Control |
| $SO_2$ | Sulphur Dioxide |

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