

# Appendix 9.1 Diffusion Tube Monitoring

## Sampling

Sampling of NO<sub>2</sub> has been undertaken since April 2015 using passive diffusion tube samplers supplied by Gradko Scientific, which had been prepared using 50% TEA in acetone.

NO<sub>2</sub> diffusion tubes were deployed in duplicate at twelve locations around the Main SFRI Site at in triplicate at the Northampton Kingsthorpe monitor. All diffusion tubes were fixed to suitable street furniture at heights of approximately 2 metre above the ground.

## Analysis

Each diffusion tube was supplied with a unique reference number. For each period of exposure, the dates and times of the beginning and end of the exposure periods were recorded. The diffusion tube unique reference numbers and exposure details were forwarded with the diffusion tubes to the laboratory (Gradko) for analysis by ion chromatography in accordance with UKAS method.

## Quality Control

The diffusion tubes were deployed in duplicate at each location to quantify the uncertainty in the results. Travel blanks also accompanied the samples, to identify the potential contamination during transit or storage.

Defra's Local Air Quality Management 2016, LAQM.TG16 recommends that laboratories used for diffusion tube analysis are United Kingdom Accreditation Service (UKAS) accredited and can demonstrate consistency in their analyses. Gradko is a UKAS accredited laboratory.

## Calculations

### ***Annualisation***

The mean of the results monitored in 2015 has been annualised in accordance with the method set out in LAQM.TG16, to provide an estimate of the annual mean concentration at each monitoring location. At each site, the ratio between the annual mean and the period mean NO<sub>2</sub> concentration was determined for each calendar year.

No annualisation factor was required for 2016 or 2017 as monitoring was undertaken for a full calendar year.

### ***Bias Adjustment Factor***

Diffusion tubes may systematically under or over-read NO<sub>2</sub> concentrations when compared to the reference chemiluminescence analyser. This is described as "bias", and can be corrected to improve the accuracy of the diffusion tube results, using a suitable bias-adjustment factor. The bias-adjustment factor may be determined from a local study that has co-located diffusion tubes with a chemiluminescence analyser, or the factor may be derived from the national database of co-location studies. In this case, the annualised diffusion tube measurements have been adjusted for bias using co-located diffusion tubes with the Northampton Kingsthorpe or Northampton Spring Lane monitor. A Bias adjustment factor was calculated using Defra's Local bias adjustment factors calculator.

## Results

The table below shows the annualisation and bias adjustment factors for each year.

**Table 9.1.1 Bias Adjustment and Annualisation Factors Used**

Year	Bias Adjustment Factor	Annualisation Factor
2015	0.91	1.1
2016	1.18	No annualisation factor as monitoring was undertaken for a full year.
2017	0.94	No annualisation factor as monitoring was undertaken for a full year.

**Table 9.1.2 Adjusted Average Annual-Mean NO<sub>2</sub> Concentration**

Location ID	Location	Average NO <sub>2</sub> Concentration (April 2015 – December 2017)
1	Crematorium	35.2
2	Depot	16.6
3	Collingtree Road	17.5
4	Collingtree Court	33.3
5	Marina*	20.1
6	Fairfield Road/Station Road*	17.9
7	Canal	12.7
8	Footpath	12.2
9	Barn Lane	12.6
10	St Johns Road	16.9
11	Blisworth Village	26.0
12	Milton Malsor Village	20.6