Sunderland City Council

Local Air Quality Management

Progress Report 2010

In fulfillment of Part IV of the Environment Act 1995

Date April 2010

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Report Reference number	PR 2010
Date	April 2010

Executive Summary

The Air Quality Strategy establishes the framework for air quality improvements. Measures agreed at the national and international level are the foundations on which the strategy is based. It is recognised, however, that despite these measures, areas of poor air quality will remain, and these will best be dealt with using local measures implemented by the LAQM regime. The role of the local authority review and assessment process is to identify those areas where the air quality objectives are being or are likely to be exceeded. Experience has shown that such areas may range from single residential properties to whole town centres.

Sunderland City Council have been assessing the air quality in their area for over 10 years through the Review and Assessment framework and this Progress report follows on from last year's Updating and Screening Assessment which concluded that there was no need to proceed to a Detailed Assessment for any of the prescribed pollutants for LAQM. The new format of the USA which carries out an assessment on a source-by-source basis, rather than considering each pollutant in turn has been followed for this Progress Report.
Progress Reports are intended to maintain continuity in the LAQM process, and fill in the gap between the three-yearly cycle of Review and Assessment. Progress Reports are required in all years when the authority is not completing an Updating and Screening Assessment.

Sunderland City Council takes a pro-active stance on LAQM and although we have not had to declare an Air Quality Management Area within our boundaries, considerable effort and funding has been put into monitoring the air quality in Sunderland. We were also very pleased to have one of our automatic monitoring stations adopted into the National Automatic Urban Network in 2004. The station which is situated at the Tennis centre on the Silksworth Sports Complex now monitors NO_x, Ozone, SO_2 and $PM_{2.5}$ for the AUN along with CO and PM_{10} for the purposes of LAQM.

This Progress Report has not identified the need to proceed to a Detailed Assessment for any of the prescribed pollutants for LAQM.

Sunderland City Council's next course of action will therefore be to submit the 2011 Progress Report.

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1 Introduction

1.1 Description of Local Authority Area

Sunderland is one of five Local Authorities making up the conurbation of Tyne & Wear that covers an area of 54,006 hectares, with a population of 1.134 million. The conurbation centres around two major rivers with a mixture of large urban and rural areas.
A substantial rail and road network covers the region, which includes a number of motorways and trunk roads, primary roads, principal roads and other classified and non-classified routes. A comprehensive network of bus services operates in Tyne & Wear, as well as a Metro light rail network. Both regional and national rail systems and freight also operate. Passenger ferries and freight shipping services operate from the Port of Tyne and cargo traffic enters and leaves the Port of Sunderland.

Cars form the bulk of traffic on the roads - car ownership in Tyne & Wear increased by about 44% between 1980 and 1996, broadly in line with national trends. If existing trends continue, further substantial increases in car ownership can be anticipated. This, together with the expected increase in commercial traffic will lead to greater pressure on the road system. As car ownership grows congestion becomes worse. Businesses are especially concerned about rising expenses caused by traffic jams. Regions remote from London, like the North-East, are particularly affected. As a result, large urban areas – including Tyne and Wear – have been instructed by the Department of Transport to set congestion targets. The target for Tyne and Wear is to limit congestion so that, by 2010/11, travellers experience a maximum 7% increase in average journey time per person mile on 16 key corridors throughout Tyne and Wear. This compares with an expected 12% growth in traffic on these roads during this period.[1]

Air quality in Tyne & Wear may also be influenced by sources external to the region, notably power generation and metal refining activities. The region is bounded to the east by the North Sea, which is considered to be a source of natural particulates - sea salt- that contribute to the overall particulate level in the region.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.2 Air Quality Objectives

The air quality objectives applicable to Local Air Quality Management (LAQM) **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu g/m^3$ (for carbon monoxide the units used are milligrammes per cubic metre, mg/m^3). Table 1.1. includes the number of permitted exceedences in any given year (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.3 Summary of Previous Review and Assessments

Name of Report	Date Produced	Brief Outcome
First Stage Air Quality Review & Assessment for Tyne & Wear *(jointly with the Tyne & Wear authorities)*	1998	Identified that 6 of the 7pollutants with Air Quality Objectives needed further investigation. 1, 3 Butadiene was eliminated.
Final Stage Review and Assessment (*stages 2 & 3 jointly with South Tyneside Council*)	2000	Undertook an Urban Emissions Inventory and a computer model using ADMS- Urban. Concluded all objectives will be met by the specified dates.
Updating & Screening Assessment 2003 (*Sunderland only*)	2003	Proceeded to a detailed assessment for NO2 based on NO2 diffusion tubes and DMRB screening model.
Detailed Assessment of Air Quality (All Tyne & Wear Authorities)	Jan 2005	Concluded that AQMA's should be declared at two sites in Sunderland.
Supplementary Detailed Assessment of Air Quality (Sunderland only)	June 2005	Reversed findings of DA and concluded the AQMA's were not required due to new continuous analyser data and removal of a receptor due to redevelopment.
Updating & Screening Assessment 2006 (*Sunderland only*)	2006	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Progress Report (*Sunderland only*)	2007	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Progress Report (*Sunderland only*)	2008	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.
Updating & Screening Assessment 2009 (Sunderland only)	2009	Concluded not necessary to proceed to a DA for any pollutants but monitoring will continue.

The Updating and Screening Assessments (USA) carried out as part of the second round of Review and Assessment of air quality in the Sunderland region identified a number of locations where the UK Air Quality Objectives were at risk of being exceeded. In 2005, a Detailed Assessment (DA) was carried out to determine whether it was likely that the objectives will be exceeded at these locations, in order to determine the need for any Air Quality Management Areas (AQMA's).

The DA concluded that there was a risk of the annual mean objective for nitrogen dioxide to be exceeded at two locations, Trimdon Street Roundabout and Chester Road/Ormonde Street, and that Air Quality Management Areas (AQMA's) should be declared. Since publication of the Detailed Assessment report, additional information on measured nitrogen dioxide concentrations at the Chester Road/Ormonde Street junction was made available. The results from three months continuous monitoring at this location, along with the full 12 months data from a diffusion tube monitoring site indicated that the annual mean nitrogen dioxide objective would be achieved by a reasonable margin in 2005.

In addition, further information was obtained relating to the second potential area of exceedence of the annual mean nitrogen dioxide objective at Trimdon Street Roundabout. The area of potential exceedence covered one receptor known as Embassy House. The property was purchased by the City of Sunderland as part of a large development plan and was demolished soon after. Since there were no receptors in the area of potential exceedence there was no requirement for the declaration of an Air Quality Management Area.

Currently Sunderland City Council has no AQMA's within its boundary.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Pollutants are automatically monitored at 4 sites within Sunderland. Details are shown below in table 2.1. Maps of the 4 locations have also been provided as Fig 2.1-2.4. All four stations were running at the time of the previous Updating and Screening report and no new stations have been commissioned since. QA/QC procedures for these sites are detailed in Appendix 1 of this report. PM_{10} is measured at two locations using Tapered Element Oscillating Microbalances (TEOM's). Following the guidance supplied in LAQM.TG (09), the Volatile Correction Model was used to adjust the data collected from these two sites in order that they be compared to the air quality objectives.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	**Site Type**	**OS Grid Ref**	**Pollutants Monitored**	**In AQMA?**	**Relevant Exposure?** *(Y/N with distance (m) to relevant exposure)*	**Distance to kerb of nearest road** *(N/A if not applicable)*	**Worst-case Location?**
Trimdon Street	Kerbside	X438928 Y557151	NO_x,PM_{10}	N	Yes 3m	0.5m	Y
Puma Centre	Urban Back-ground	X438116 Y554462	NO_x, PM_{10}, SO_2, CO,O_3	N	No	0.5m but approx 10m to nearest 'busy' road	N
Chester Rd/ Ormond St Jnctn	Kerbside	X439423 Y556342	NOx	N	Yes 10m	1m	Y
Mary Street	Kerbside	X439423 Y556738	NOx	N	Yes 5m	0.5m	Y

Figure 2.1 Location of Trimdon St Automatic Monitoring Station

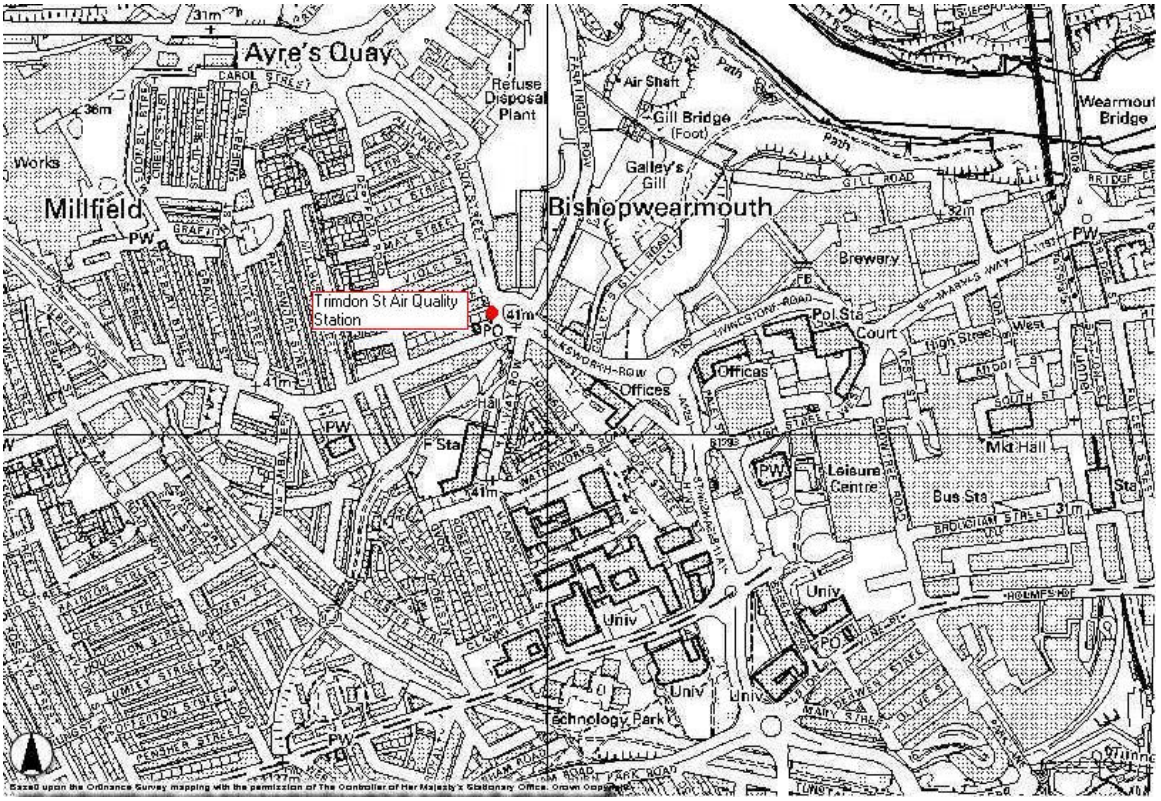

Figure 2.2 Location of Puma Centre Automatic Monitoring Station.

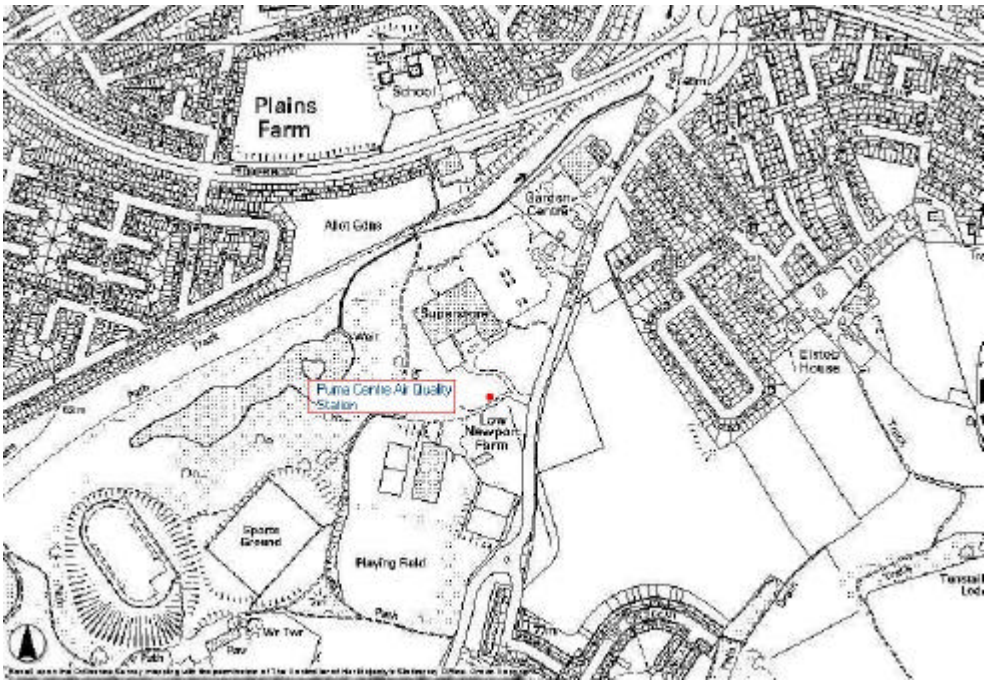

Figure 2.3 Location of Chester Road/Ormond St Junction Automatic Station.

Figure 2.4 Location of Mary Street Automatic Station

2.1.2 Non-Automatic Monitoring

Nitrogen Dioxide has been measured using passive diffusion tubes for several years throughout Sunderland and the number of sites has gradually increased to 50. The vast majority of the tubes are located on busy roads and there are two co-located sites where diffusion tubes in triplicate are sited at automatic stations. These are at Trimdon Street and the Puma Centre. Wherever possible the tubes are located on the façade of buildings that are relevant receptors such as residential properties.

Benzene concentrations have also been measured at several locations predominantly where there is relevant exposure near busy roads and where there is also a petrol station present.

Details of the QA/QC procedures and the laboratory used to analyse the tubes are contained in Appendix 1.

Table 2.2 Non-Automatic Monitoring Sites

Site Number	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
B1	Puma Centre	Urban Background	X438116 Y554462	Benzene	No	0.5	No
B2	Queen Alexandra Road	Roadside	X438453 Y555507	Benzene	Yes 0m	5m	Yes
B3	43 The Broadway	Roadside	X436746 Y555726	Benzene	Yes 0m	5m	Yes
B5	Fieldview Nursing Home	Roadside	x438869 Y559078	Benzene	Yes 0m	5m	Yes

Sunderland City Council has calculated the precision and bias of the NO_2 diffusion tubes to evaluate their performance. Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e., how similar the results of duplicate or triplicate are to each other. Bias represents the overall tendency of the diffusion tubes to depart from the true value, i.e., to under or over-read relative to the reference method (the chemiluminescence analyser).
The precision and bias have been calculated for the Trimdon Street station using the excel spreadsheet provided on the UK air quality archive website. The results of the precision analysis were good with 12 out of 12 periods having a confidence interval smaller than 20%. The bias was calculated to be 0.79 at this site. Data capture for the co located analyser was very good (98.7%) at the site. The Puma Centre Station also has tubes in triplicate co located but unfortunately due to power problems at the site the data capture was poor (66%) for 2009. It was therefore decided not to use this site to calculate a bias adjustment factor.

The combined bias adjustment factor was also obtained from the national database of co-location studies and the result from this spreadsheet was a bias factor of 0.92 for comparison.
The two bias factors were considered and it was decided that the factor from the Trimdon Street site would be used. The rationale for this decision was based on advice from Box 3.3 in LAQM.TG (09) and for the following reasons. The data capture from Trimdon Street was greater than 90% for the period. It is classed as a kerbside site and therefore it is a good representation of the majority of the sites in our survey being mostly roadside locations.

Site Number	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
29	Arndale House, St Mary's Way	Roadside	X439508 Y557151	NO_2	No	0.5m	Y
34	209 Newcastle Road, Fulwell	Roadside	X439266 Y559212	NO_2	Yes 0m	2m	Y
38	17 Parkside Sth, E. Herrington	Roadside	X435714 Y552473	NO_2	Yes 0m	10m	Y
39	15 John Street	Urban Centre	X439835 Y556978	NO_2	No	3m	N
41	The Golden Lion, Sth Hylton	Urban Background	X434997 Y556811	NO_2	Yes 0m	5m	N
53	166 Chester Road	Roadside	X438568 Y556566	NO_2	Yes 0m	4m	Y
55	25 Eden Vale	Roadside	X438690 Y556135	NO_2	Yes 0m	2m	Y
56	101 Southwick Road	Roadside	X439101 Y553282	NO_2	Yes 0m	2m	Y
57	5/6 Nbridge St, Monkwearmouth	Kerbside	X439664 Y557829	NO_2	Yes 0m	1m	Y
58	6 Beatrice Tce, Shiney Row	Kerbside	X432634 Y552616	NO_2	Yes 0m	1m	Y
67	39 Ferryboat Ln, Hylton Castle	Roadside	X434684 Y558878	NO_2	Yes 0m	4m	Y
78	Highfield Hotel, East Rainton	Roadside	X433338 Y547848	NO_2	Yes 0m	10m	Y
80	Dame Dor Sch, Monkwearmouth	Roadside	X440178 Y557937	NO_2	Yes 0m	10m	N
81	47 Howick Park, Monkwearmouth	Roadside	X439690 Y557638	NO_2	Yes 0m	5m	Y
82	20 Marlborough Rd	Roadside	X35097 Y555166	NO_2	Yes 0m	10m	Y
85	N Moor Hsg Off, North Moor	Roadside	X437043 Y554207	NO_2	Yes 5m	5m	Y
86	2 Alice Street	Roadside	X439466 Y556484	NO_2	Yes 0m	2m	Y
87	Dickens Street, Southwick	Roadside	X438095 Y558354	NO_2	Yes 0m	1m	Y
88	Hinds Street	Roadside	X439160 Y556995	NO_2	No	1m	Y
93	34A Durham Rd, Middle Herrington	Roadside	X436290 Y553566	NO_2	Yes 0m	10m	Y
94	Chaplin's PH, Mary St.	Kerbside	X439423 Y556738	NO_2	Yes 0m	0.5m	Y
100	Trimdon St AQ Station	Kerbside	X438927 Y557151	NO_2	Yes 3m	0.5m	Y
103	Trimdon St AQ Station	Kerbside	X438927 Y557151	NO_2	Yes 3m	0.5m	Y
104	Trimdon St AQ Station	Kerbside	X438927 Y557151	NO_2	Yes 3m	0.5m	Y
101	Puma Centre, Silksworth Ln	Urban Background	X438116 Y554462	NO_2	No	0.5m	N
105	Puma Centre, Silksworth Ln	Urban Background	X438116 Y554462	NO_2	No	0.5m	N
106	Puma Centre, Silksworth Ln	Urban Background	X438116 Y554462	NO_2	No	0.5m	N

Site No	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location
107	1,Morningside, Rickleton	Roadside	X428269 Y553809	NO_2	Yes 5 m	0.5m	Y
108	Peareth Hall Rd, Donwell	Roadside	X429555 Y558545	NO_2	Yes 0m	10m	Y
109	23 Newcastle Rd	Roadside	X439648 Y558120	NO_2	Yes 0m	2m	Y
110	94 Fulwell Road	Roadside	X439901 Y558514	NO_2	Yes 0m	1m	Y
111	237 Queen Alexandra Rd,	Roadside	X438453 Y555507	NO_2	Yes 0m	5m	Y
112	43 The Broadway	Roadside	X436746 Y555726	NO_2	Yes 0m	5m	Y
113	181 Durham Road	Roadside	X437446 Y554989	NO_2	Yes 0m	5m	Y
114	Univer Crèche, Chester Rd	Roadside	X439190 Y556823	NO_2	Yes 0m	5m	Y
115	4 Mowbray Alms Houses	Urban Centre	X439333 Y556936	NO_2	Yes 0m	10m	Y
116	9 Derwent St	Urban Centre	X439451 Y556718	NO_2	Yes 0m	1m	Y
117	3, Holmeside	Roadside	X439495 Y556795	NO_2	No	1m	N
118	27 Bridge St	Roadside	X439696 Y557205	NO_2	Yes 0m	2m	Y
119	4 Athenaeum St	Roadside	X439792 Y556921	NO_2	Yes 0m	2m	Y
120	Gillespie's PH	Roadside	X439806 Y557063	NO_2	No	2m	N
121	16 Windsor Tce, Grngetwn	Roadside	X440702 Y554722	NO_2	Yes 0m	3m	Y
122	Uni Flats, High St	Roadside	X440121 Y557255	NO_2	Yes 0m	3m	Y
123	263 Chester Rd	Roadside	X437943 Y556341	NO_2	Yes 0m	4m	N
124	35 Rydal Mount	Roadside	X435494 Y557711	NO_2	Yes 0m	5m	Y
125	45 Station Rd	Roadside	X435417 Y547025	NO_2	Yes 0m	1m	Y
126	24 Crake Way	Roadside	X428820 Y554819	NO_2	Yes 0m	5m	Y
127	Chester Rd AQ Station	Roadside	X437976 Y556342	NO_2	Yes 10m	0.5m	Y
128	Echo Building	Roadside	X439707 Y557312	NO_2	Yes 10m	10m	Y
129	West Sunniside	Roadside	X439938 Y557089	NO_2	Yes 5m	1m	Y
130	St Mary's Car Park	Roadside	X439538 Y557292	NO_2	No	1m	Y
131	Chaplin's PH 2nd Tube	Kerbside	X439397 Y556666	NO_2	Yes 3m	0.5m	Y
132	Dunn House, N Bridge St.	Kerbside	X439661 Y557901	NO_2	Yes 3m	1m	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Automatic Monitoring Data

Nitrogen dioxide was monitored in four locations across the city. The annual mean objective was met at all four sites (table 2.3a). Data capture was very good at Trimdon Street but data capture dipped below the 90% capture rate at 86.3% at Mary Street and 66% at Puma Centre which had a power cable severed by workmen. Chester Road site has very low data capture as it was unfortunately out of use for much of the year during work to remodel the junction. The 99.8th percentile of hourly averages was therefore calculated for these three sites and the results are shown in Table 2.3c below. All three were well within the objective of 200µg/m^3.

The Chester Road data has also been adjusted to take into account the short monitoring period from 9th January to 4th June 2009. The method described in box 3.2 of LAQM.TG(09) was used to give the best estimate for the annual mean. Two long term continuous monitoring sites were identified within the national network and the annual and period means relevant to the Chester Road period mean were obtained. These details are shown below in table 2.3b The ratio of these two values was calculated and then an average value taken which was 0.95. Chester Road site period mean of 30.2 was then multiplied by this value to obtain the estimated annual mean shown in Table 2.3a.

The Puma Centre also had in total less than 9 months data but the missing data was not all in one block making it difficult to calculate a period mean for the site therefore the process used for Chester Road to estimate the annual mean has not been carried out.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Location	Within AQMA?	Proportion of yea with valid data 2009 %	Annual mean concentrations (µg/m^3) 2008
Trimdon Street	N	98.7	33
Puma Centre	N	66	16.1
Chester Rd/ Ormond St Jnctn	N	33.8	28.7 (annualised mean)
Mary Street	N	86.3	36

Table 2.3b Details of stations used to adjust Cheater Road Mean

Site	Site Type	Annual Mean	Period Mean	Ratio
Newcastle Centre	Urban Centre	33.73	35.09	0.96
Middlesborough	Urban Industrial	18.68	20.13	0.93
			Average	0.95

Table 2.3c Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Location	Within AQMA?	Data Capture 2009 %	Number of Exceedences of hourly mean (200 µg/m^3) *If the period of valid data is less than 90% of a full year, include the 99.8th %ile of hourly mean in brackets.* 2009
Trimdon Street	N	98.7	0
Puma Centre	N	90.1	0 (40.5)
Chester Rd/ Ormond St Jnctn	N	33.8	1 (66.6)
Mary Street	N	86.3	11 (88.0)

2.2.2 Diffusion Tube Monitoring Data

The results of the diffusion tube data for NO_2 were that the annual objective of 40µg/m^3 was met at all locations.

Chart 2.1 below shows the annual averages for tubes from various locations across the city. These have been plotted for the last 8 years to investigate trends in NO_2 within Sunderland. The 5 sites show a strong visible correlation even though some are road side and some are classed as background sites. The annual averages can also be seen to increase and decrease quite substantially over the monitored period which would indicate that NO_2 levels are being affected by additional factors apart from traffic for which there should have been only a steady increase in the averages. In 2008 the 4 sites plotted deviate from the good correlation previously seen with two sites increasing from the previous year and two sites decreasing. It is not clear what the reason for this change is. In 2009 there is a decrease of levels in 3 sites but an increase at one site.

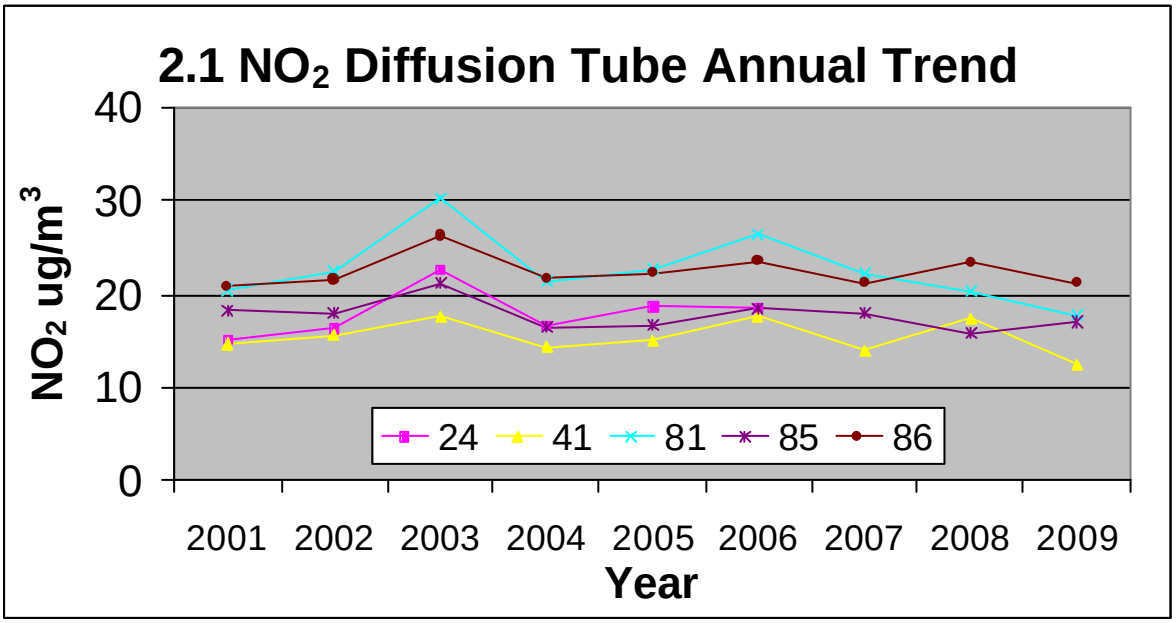

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentration 2009 (µg/m^3) Adjusted for bias (0.79)
29	Arndale House, St Mary's Way	N	100	21.83
34	209 Newcastle Road, Fulwell	N	100	14.81
38	17 Parkside Sth, E. Herrington	N	100	24.11
39	15 John Street	N	100	22.66
41	The Golden Lion, Sth Hylton	N	83.40	12.42
53	166 Chester Road	N	91.7	25.2
55	25 Eden Vale	N	100	32.92
56	101 Southwick Road	N	83.4	23.51
57	5/6 Nbridge St, Monkwearmouth	N	91.7	29.42
58	6 Beatrice Tce, Shiney Row	N	100	31.44
67	39 Ferryboat Ln, Hylton Castle	N	91.7	20.26
78	Highfield Hotel, East Rainton	N	91.7	14.74
80	Dame Dor Sch, Monkwearmouth	N	0	15.29
81	47 Howick Park, Monkwearmouth	N	100	17.78
82	20 Marlborough Rd	N	91.7	18.90
85	N Moor Hsg Off, North Moor	N	75	16.98
86	2 Alice Street	N	58.4	21.12
87	Dickens Street, Southwick	N	91.7	19.65
88	Hinds Street	N	58.4	28.09
93	34A Durham Rd, Middle Herrington	N	100	16.23
94	Chaplin's PH, Mary St.	N	66.6	26.92
100	Trimdon St AQ Station	N	91.7	32.25
103	Trimdon St AQ Station	N	100	33.50
104	Trimdon St AQ Station	N	100	33.82
101	Puma Centre, Silksworth Ln	N	83.4	13.30
105	Puma Centre, Silksworth Ln	N	100	13.77
106	Puma Centre, Silksworth Ln	N	91.7	13.22

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentration 2009(µg/m3) Adjusted for bias (0.79)
107	1,Morningside, Rickleton	N	100	22.90
108	Peareth Hall Rd, Donwell	N	91.7	13.64
109	23 Newcastle Rd	N	100	27.17
110	94 Fulwell Road	N	100	20.50
111	237 Queen Alexandra Rd,	N	83.4	18.51
112	43 The Broadway	N	100	20.60
113	181 Durham Road	N	66.6	26.86
114	Univer Crèche, Chester Rd	N	100	19.65
115	4 Mowbray Alms Houses	N	100	17.72
116	9 Derwent St	N	83.4	23.39
117	3, Holmeside	N	83.4	36.15
118	27 Bridge St	N	100	24.81
119	4 Athenaeum St	N	91.7	28.35
120	Gillespie's PH	N	66.6	26.22
121	16 Windsor Tce, Grngetwn	N	41.7	20.04
122	Uni Flats, High St	N	100	21.26
123	263 Chester Rd	N	100	33.01
124	35 Rydal Mount	N	91.7	17.74
125	45 Station Rd	N	91.7	24.69
126	24 Crake Way	N	91.7	17.24
127	Chester Rd AQ Station	N	83.4	28.33
128	Echo Building	N	50	27.92
129	West Sunniside	N	100	19.74
130	St Mary's Car Park	N	75	21.66
131	Chaplin's PH 2nd Tube	N	41.7	30.53
132	Dunn House, N Bridge St.	N	0	33.47

2.2.3 PM_{10}

PM_{10} is measured at two locations in Sunderland at present. Both sites use a TEOM to collect these measurements. The data has been corrected using the Volatile Correction Model. Data Capture at the Puma Centre Site was less than 90% and therefore the 90th percentile of 24-hour concentrations has been calculated. Data Capture at the Trimdon Street site was good at 98.9%. Both sites met the objectives for the Annual Mean objective of 40µg/m_3 and the 24-hour mean of less than 35 exceedences of 50µg/m^3 per year.

Table 2.5a Results of PM_{10} Automatic Monitoring: Comparison with Annual Mean Objective

Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations 2009(µg/m^3) $TEOM_{VCM}$ PM_{10}
Trimdon Street	N	98.9	18.05 (corrected by a factor of 0.9)
Puma Centre	N	73.2	14.97 (corrected by a factor of 0.99)

Table 2.5b Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID/ Location	Within AQMA?	Data Capture 2009 %	Number of Exceedences of hourly mean (50 µg/m^3) *If data capture < 90%, include the 90th %ile of hourly means in brackets.* 2008
Trimdon Street	N	98.9	0
Puma Centre	N	73.2	0 (25.9)

2.2.4 Sulphur Dioxide

Table 2.6 Results of SO_2 Automatic Monitoring: Comparison with objectives.

Location	Within AQMA?	Data Capture 2009 %	No. of exceedences of 15 min mean (266µg/m^3)	No. of exceedences of one-hour mean (350 µg/m^3)	No. of exceedences of 24-hour mean (125µg/m^3)
Puma Centre	N	72.3	0	0	0

Sulphur dioxide has been monitored for many years within Sunderland and the results have shown ambient concentrations have declined. A major factor in this decline has been a reduction of the use of coal due to implementation of Smoke Control Orders within the City. An AURN site measuring SO_2 was located in John Street in the City Centre for 15 years but this site was decommissioned in 2007. Sulphur Dioxide is measured at the Puma Centre site and has been adopted for SO_2 as an AURN site since 2004.

Data capture for 2008 for the Puma Centre site was 72.3%. The annual mean using 15-minute means was 7.7 µg/m^3. There were no exceedences of the 15-minute, one-hour or 24-hour mean. Therefore all of the objectives were met at this location.

2.2.5 Benzene

Table 2.7 Results of Benzene Diffusion Tubes

Site ID	Location	Data Capture	Annual Mean Conc. 2009 µg/m^3
B1	Puma Centre	100	0.83
B2	Queen Alexandra Road	100	0.81
B3	43 The Broadway	100	0.97
B5	Fieldview Nursing Home	100	0.71

The results of the benzene diffusion tube monitoring are shown in Table 2.7. The annual mean concentrations indicate that both the 2003 and 2010 objectives will be met at all four sites. Benzene is not monitored automatically at any site within Sunderland.

2.2.6 Carbon Monoxide

Table 2.8 Results of PM_{10} Automatic Monitoring: Comparison with Running 8-hour Mean Objective.

Site ID/ Location	Within AQMA?	Data Capture 2009 %	Number of Exceedences of running 8-hour mean (10 mg/m^3) 2008
Puma Centre	N	74	0

The annual mean of 8-hourly means for Carbon Monoxide was 0.08mg/m^3 in 2009. There were no exceedences of the objective in the monitoring period.

Summary of Compliance with AQS Objectives

Sunderland has examined the results from monitoring in the City. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3. New Local Developments

This section of the Progress Report deals with changes that have taken place that may affect air quality. The types of developments that were considered are

- New industrial processes, i.e. Part A, A2 or B
- New developments with an impact on air quality, especially those that will significantly change traffic flows. Only developments that have been granted planning permission are included
- New landfill sites, quarries that have been granted planning permission, and which have nearby relevant exposure.

This Progress Report will log these changes so that they can be considered more thoroughly during the next full round of review and assessment.

3.1 Road Traffic Sources

Sunderland confirms that there are no new/newly identified road traffic sources which may have an impact on air quality within the Local Authority area.

3.2 Other Transport Sources

Sunderland confirms that there are no new/newly identified industrial sources which may have an impact on air quality within the Local Authority area.

3.3 Industrial Sources

There were three new Part B processes that were permitted between Jan and Dec 2009. The table below summarises these processes and they will be more fully considered at the 2012 USA.

Development	Description	Source of information
New Part B process Hi-Performance Auto Centre	Waste Oil Burner	Sunderland City Council
New Part B process Ian's Auto Repair	Waste Oil Burner	Sunderland City Council
New Part B process CF Motoring Services	Vehicle Resprayer.	Sunderland City Council

3.4 Commercial and Domestic Sources

Sunderland confirms that there are no new or newly identified commercial and domestic sources which may have an impact on air quality within the Local Authority area.

3.5 New Developments with Fugitive or Uncontrolled Sources

Sunderland confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4. Planning Applications

In December 2009 Sunderland City Council submitted a planning application for Phase 2 of the Strategic Transport Corridor which relates to the construction of a new road bridge across the River Wear together with associated access roads. The Environmental Health department were asked to comment on the Environmental Impact Assessment provided by a consultant on behalf of the Council.
An Air Quality Assessment was carried out as part of the EIA and it concluded that the Air Quality Objectives would not be exceeded at relevant receptors. However, at two of the receptors modelled the annual NO_2 concentrations were very close to the objective. Comments were therefore passed from this department highlighting these concerns and recommending that further monitoring and modelling work be carried out to further investigate these two locations.
At the time of writing this report, the planning application had not been granted and was still pending a decision. Further updates will be given in the 2011 Progress Report followed by a full assessment of the development in the 2012 USA.

5. Air Quality Planning Policies

The air quality steering group of the five Tyne & Wear Local Authorities are currently in discussion with the aim of producing a supplementary planning guidance document to address air quality issues. Further updates will be provided within the 2011 Progress Report.

6. Local Transport Plans and Strategies

The **Tyne and Wear Air Quality Delivery Plan** has been completed by the Tyne and Wear Local Transport Plan Core Team as a response to air quality issues and problems. The overall aim is to outline air quality conditions across Tyne and Wear, to show where potential problems lie and finally to outline what can be done to improve air quality and thus the quality of life for the people of Tyne and Wear. In doing so, the plan sets out:

- The background to air quality issues and air quality objectives in Tyne and Wear
- Governance and monitoring arrangements to drive improvement forward
- Current air quality levels and measures in the region
- New air quality indictors and targets for Tyne and Wear
- Challenges to our proposed objectives and solutions, and how these can be overcome
- Examples of national and regional best practice which can be used to improve Tyne and Wear air quality levels
- Proposed actions to improve area specific and overall Tyne and Wear air quality levels which affects us all

The key issues raised by the plan are an emphasis on action and a clear commitment that we must, wherever possible, prevent further areas in Tyne and Wear from becoming AQMAs – areas where air quality had been recognised as being especially poor. Current air quality action plans produced subsequent to an area being declared an AQMA do not propose tangible actions, ownership of problems, budgets or timelines. This indicates that the problem does not lie in insufficient monitoring, but in what this information is subsequently utilised for; signifying a need for the proposed actions and for clear ownership of these, as presented in the plan.

The plan therefore presents realistic, efficient and reliable air quality solutions which need to incorporate the promotion of alternative modes, management of the existing highway network, planning, emissions management, information and education. This will be based around a combination of policy implementation and interventions. However, the task of implementing such actions to improve air quality in a specific area can be challenging due to a lack of standardised processes and the varying conditions and sources in each area. Two ‘sets’ of actions are hence needed; one aimed at area-specific interventions, and one dealing with measures which will improve Tyne and Wear air quality levels as a whole.

In order to achieve these ambitions, the plan recognises the need for a clear commitment from stakeholders, along with a better working relationship between planning departments and environmental health officers and more pooling of knowledge. It is also important to note that the Air Quality Delivery Plan is a living document and will hence be regularly updated to reflect changes in AQMA boundaries and to take into account results of on-going detailed assessments.

The LTP is now going into its third round (LTP3) and will be a 10 year strategy with 3 year delivery plans. An updated Air Quality Delivery plan is currently being drafted and the Tyne & Wear AQ Steering Group have been asked for their comments and input into this.

7. Climate Change Strategies

Sunderland's Climate Change Action Plan was adopted in November 2008, and is the framework through which Sunderland will work to reduce the city's carbon emissions.
Sunderland is now aiming to cut carbon emissions by at least 34% by 2020 (compared to 2005), to align itself with the new UK Low Carbon Transition Plan (July 2009). This is an increase from the 26% target agreed previously.

In 2007, Sunderland's carbon emissions were 1,864,300 tonnes CO2. This is 4.5% lower than the previous year (2006), and 5.6% below the baseline year of 2005. Of these emissions, 34% were produced by housing, 40% from employers (public and commercial) and 26% from road transport.
With initiatives known to have been implemented to from April 2008 to January 2010, an estimated 54,500 tonnes CO2 will be saved, taking total emissions in 2009 to 8% below 2005 levels. The following summarises key areas of progress, between April 2008 – January 2010:

Housing initiatives have saved 8,200 tonnes of carbon emissions
Carbon savings are expected from:
• Insulation measures were installed in 4014 homes, by the Council, Gentoo and Warmfront combined.
• 3231 new boilers were installed by Gentoo and Warmfront
Other progress includes:
• The Council has secured £3M of CERT funding, to fund energy efficiency improvements up to March 2012.

Employer actions have saved 27,300 tonnes of carbon emissions
Carbon savings are expected from:
• Nissan installed 2 more 660kW wind turbines, taking the total to 10 turbines.
• Employers continued to install carbon saving measures. For example, City Hospital Sunderland installed new CHP boilers, and the University of Sunderland installed Sunderland's first ground source heating system in their new Chester Rd campus building.
• The Council installed 1.7MW of wood burning boilers, in 6 new schools.
• Emissions saved from closure of Sunderland Glassworks in Sept 2007, will manifest in 2008 emissions data.

8. Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The conclusions from the new monitoring data were that all objectives were met and there was no need to proceed to a detailed assessment for any of the prescribed pollutants.

8.2 Conclusions relating to New Local Developments

There were three new industrial processes identified that could have a potential impact on Local air quality. These have been logged for further assessment during the next USA.

8.3 Other Conclusions

The development of a new River Wear crossing is likely to have large implications for air quality within Sunderland. As well as the potential for air quality to worsen in certain areas, the new crossing is likely to take pressure off existing river crossings and their associated access roads which may lead to an improvement of air quality in these areas. The modelling that was carried out carries with it a degree of uncertainty as all modelling inherently does so it may not be until the new bridge is in place that the full impact on air quality is known.

8.4 Proposed Actions

All of the new monitoring data collected within 2009 shows that there is no need to proceed to a detailed assessment for any of the prescribed pollutants.
Monitoring of Benzene has been carried out using diffusion tubes for several years. Levels have been consistently low and well beneath the 2010 objective. In addition the petrol stations that 3 of the sites are next to have now fitted Stage II recovery systems on their forecourts which can only lead to a further reduction of Benzene levels in the surrounding environment. As a result it has been decided to stop monitoring Benzene at the present time. If future new sites are identified that warrant monitoring this would be considered.
The number of Nitrogen Dioxide tubes have also been reduced as a review of all sites was made at the beginning of 2010. It was decided that sites that have an annual mean consistently below 25µg/m^3 should be removed unless they are there to monitor for a proposed development or are a long term comparison site. Several new sites have also been commissioned to monitor receptors identified by the AQ Assessment for the new Wear Bridge.

Therefore Sunderland City Council's next course of action will be to submit their Progress Report in 2011.

9. References

Department for Environment, Food and Rural Affairs, 2009, *Local Air Quality Management Technical Guidance* LAQM.TG (09).

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors,

Sunderland City Council diffusion tubes are supplied and analysed by Gradko International Ltd, Winchester, Hampshire. The preparation method used is 50% TEA and acetone.
Sunderland City Council has calculated the precision and bias of the NO_2 diffusion tubes to evaluate their performance. Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e., how similar the results of duplicate or triplicate are to each other. Bias represents the overall tendency of the diffusion tubes to depart from the true value, i.e., to under or over-read relative to the reference method (the chemiluminescence analyser).
The precision and bias have been calculated for the Trimdon Street station using the excel spreadsheet provided on the UK air quality archive website. The results of the precision analysis were good with 12 out of 12 periods having a confidence interval smaller than 20%. The bias was calculated to be 0.79 at this site. Data capture for the co located analyser was very good (98.7%) at the site. The Puma Centre Station also has tubes in triplicate co located but unfortunately due to power problems at the site the data capture was poor (66%) for 2009. It was therefore decided not to use this site to calculate a bias adjustment factor.
The combined bias adjustment factor was also obtained from the national database of co-location studies and the result from this spreadsheet was a bias factor of 0.92 for comparison.
The two bias factors were considered and it was decided that the factor from the Trimdon Street site would be used. The rationale for this decision was based on advice from Box 3.3 in LAQM.TG (09) and for the following reasons. The data capture from Trimdon Street was greater than 90% for the period. It is classed as a kerbside site and therefore it is a good representation of the majority of the sites in our survey being mostly roadside locations.

PM Monitoring Adjustment

PM_{10} is monitored at two locations using TEOM instruments. The data has been adjusted using the volatile correction model (VCM) accessed at http://www.volatile-correction-model.info/ .

QA/QC of automatic monitoring

The QA/QC procedures of Sunderland are based on the AUN Site Operator's manual along with training received from our equipment suppliers, Casella Measurement.

The fundamental aims of a quality assurance/ control programme are:

- The data obtained from measurement systems should be representative of ambient concentrations existing in each area.
- Measurements must be accurate, precise and traceable.
- Data must be comparable and reproducible.
- Results must be consistent over time.

An appropriate level of data capture is required throughout the year.

Equipment Maintenance

- Automatic analysers are serviced every 6 months by a qualified engineer under a contract with Casella Measurement.
- Local Authority staff visits the air quality sites at least once every 2 weeks during which a check of the equipment is made to ensure it is all working within normal parameters. Filters are also changed during this visit.
- If a problem occurs then a call-out is instigated to the service centre and an engineer will normally visit site within 48-hours to correct the fault.

Calibration

- Each day a calibration response check is undertaken by the logger, this check does not re-calibrate the instrument. The calibration system uses certified gas cylinders of a known concentration, to produce an expected response from the analyser.
- Calibration reports stored in the logger will retain expected zero and span gas responses and the actual measured zero and span gas responses.
- Computer software collects and stores these calibration reports and also calculates a zero correction and span response scaling factor which can be applied to the data if required.
- At the 6-month service the instruments are re-calibrated to the site cylinder certificated value.
- Gas cylinder pressures are regularly checked at routine visits to ensure they are replaced before they run out completely.

When a cylinder is replaced the new certified values are entered into the logger.

Data Validation

Data from all of Sunderland City Council's automatic monitoring sites are collected via modem by Sunderland University. The University are under contract with Sunderland City Council to validate and ratify the data. Quarterly and annual reports regarding the data are produced by the University and disseminated to the five local authorities of Tyne & Wear. The data is also displayed on a website that members of the public can freely access. The website address is http://enviweb.sunderland.ac.uk/ The University review data daily to ensure that

- Telecommunications to the station are operational
- The air quality station is operational
- Individual analysers are operational
- Air quality exceedences are identified
- Operational information such as TEOM filter loading, does not invalidate data
- Obvious data errors are identified

Data Ratification

In addition to the initial data screening process (validation), data are further scrutinised in monthly blocks in order to provide a final ratified data set.

The software that collects the data is used to rescale the data using the factor calculated from the fortnightly calibration check. Data is then reviewed for erroneous data such as:

- Daily calibration spikes
- Routine or service visit errors
- Analyser faults
- Site faults, such as power outages

When data is satisfactory, it is compared to other local sites. This provides a check to ensure data is realistic.

QA/QC of diffusion tube monitoring

Gradko has full U.K.A.S. accreditation for compliance with ISO-IEC 17025 for laboratory management system. Its accuracy and consistency of analytical methods is regularly monitored using external proficiency schemes such as

- Workplace analysis scheme for proficiency (W.A.S.P.)
- Laboratory Environmental Analysis Proficiency (L.E.A.P.)

In addition regular cross-checks are carried out with other U.K.A.S. accredited labs using certified standard solutions.

According to the *WASP – Annual Performance Criteria for NO_2 Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 97-101*, Gradko International were deemed to have a good performance. Gradko International also follows the procedures set out in the Harmonisation Practical Guidance

Details of the tube precision are provided in the section on Diffusion Tube Bias Adjustment Factors at the beginning of this section.

Nitrogen Dioxide Diffusion Tube Procedure

This procedure used in Sunderland is identical to the UK NO_2 Diffusion Tube Network procedure produced by AEA Technology for DEFRA.

- The calendar year is divided into 12 'pollution months', which contain either 4 or 5 weeks for which the tubes will be exposed.
- Change over occurs on a Tuesday to avoid bank holidays. Every effort is made to change tubes on the specified date but if this is not possible then tubes are changed ± 2 days.
- Tubes are stored in airtight bags in a refrigerator until used.
- A 'blank' control tube is left in the refrigerator during the exposure period and not exposed.
- Tubes are labelled with a unique ID number.
- Tubes are transported to site in snap seal bags.
- At each site the date and time of start of the exposure period is recorded and with the absorbent end cap uppermost, the bottom cap is removed and the tube is clipped into the holder.
- The tube is mounted vertically with its open end downwards.
- At the end of the exposure period tubes are removed and end cap replaced. The date and time are recorded.
- The tubes are then transported back to the office and refrigerated in an airtight bag until they are sent to the lab for analysis which is as soon as possible.

Benzene Diffusion Tube Procedure

- Tubes are exposed for the same periods as nitrogen dioxide tubes.
- Tubes are stored in airtight bags at room temperature in a clean environment.
- A 'travel blank' is left at the office and not exposed.
- Tubes are not labelled directly but put into individually labelled snap seal bags and transported to site.
- Caps (marked with a red spot) are removed using a spanner and a diffuser cap is placed on the tube in its place.
- The tube is mounted vertically with diffuser cap facing downwards and the date and time recorded.
- At the end of the exposure period the diffuser cap is removed and the brass cap is put back onto the tube making sure the bottom of the PTFE seal is in-line with the groove on the tube.
- The cap is tightened with a spanner and tube placed in labelled snap seal bag. The date and time are recorded.
- Caps should be retightened with spanner in case of temperature change when returning to the office.

Tubes are sent to lab for analysis as soon as possible.