Sunderland City Council

Local Air Quality Management

Updating and Screening Assessment 2009

In fulfillment of Part IV of the Environment Act 1995

Date April 2009

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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 is the third Updating and Screening Assessment that has been undertaken. A major change to the approach to Updating and Screening Assessment is that the assessment is now carried out on a source-by-source basis, rather than considering each pollutant in turn.

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 and $PM_{2.5}$ for the AUN along with SO_2, CO and PM_{10} for the purposes of LAQM.

This Updating and Screening Assessment 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 2010 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 Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 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 exceedences are considered likely, the local authority must then 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.

1 Local Transport Plan Tyne & Wear – Congestion Reduction Plan December 2008

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgram's per cubic metre $\mu g/m^3$ (milligram's per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
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

1.4 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.

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 progress 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

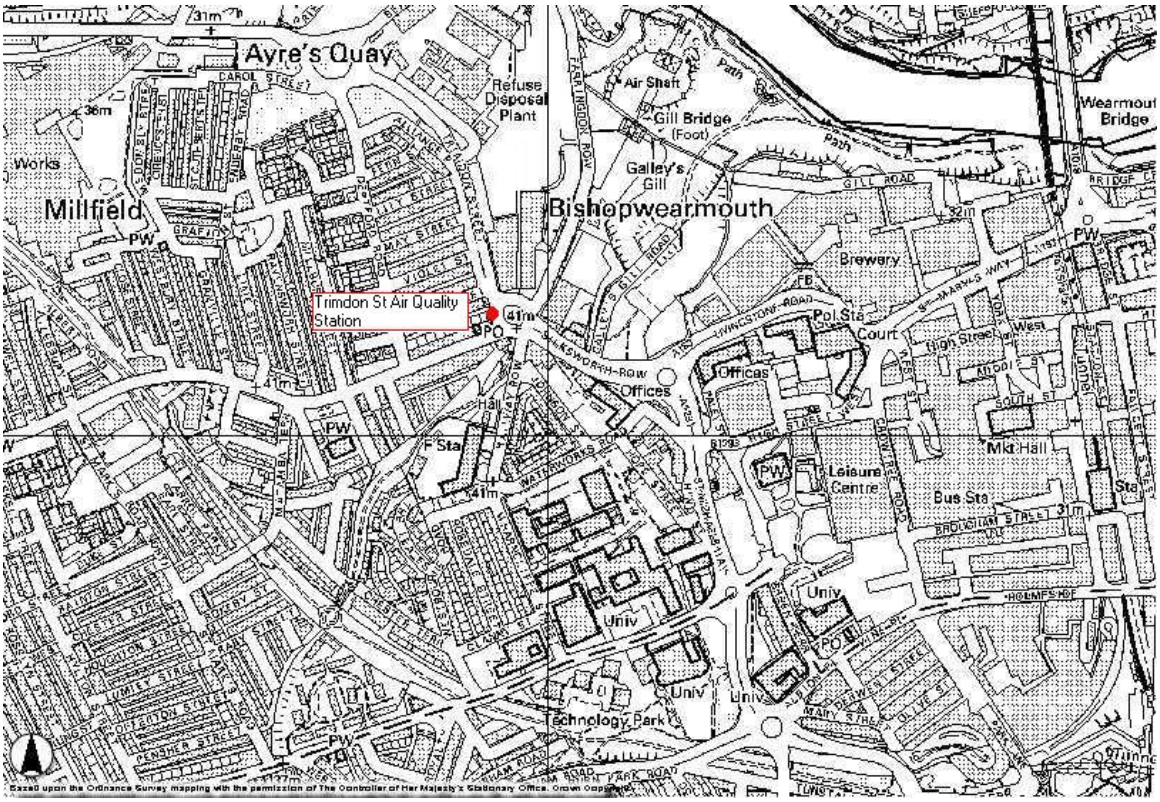

Figure 2.2 Location of Puma Centre Automatic Monitoring Station.

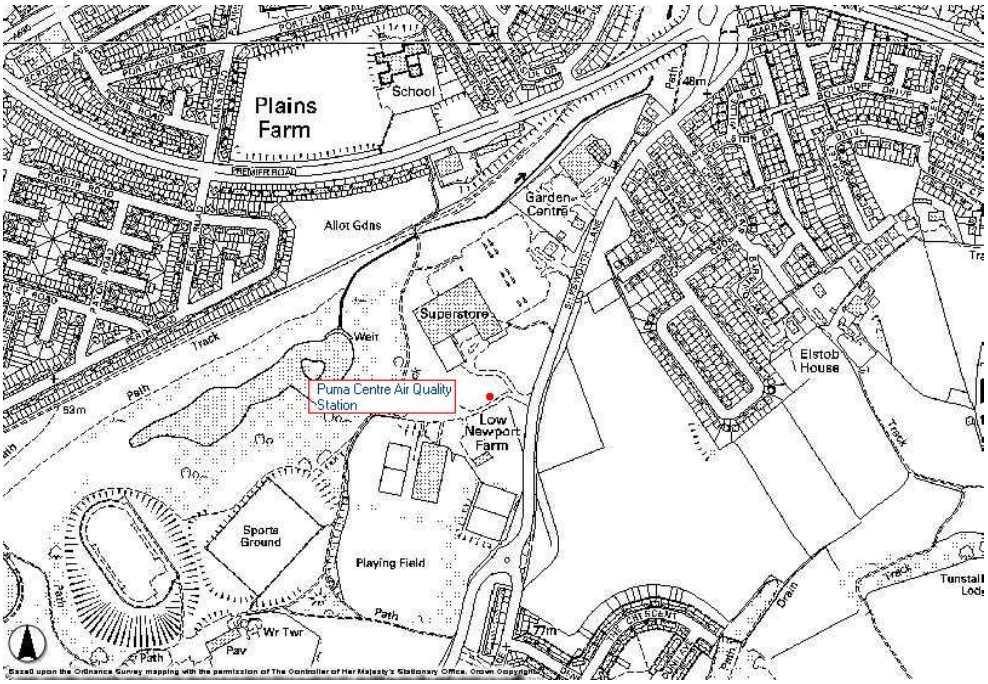

Figure 2.3 Location of Chester Road/Ormond St Junction Automatic Station.

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 Details of 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 0.98 at this site. However, data capture was less than 90% (85.5%) at the site. The same was carried out for the Puma Centre Station where data capture was better at 95% for the year. The results of the precision analysis were good with 11 out of 11 periods having a confidence interval smaller than 20%. The bias was calculated to be 0.89 at this site.
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 0.93 for comparison.

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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

These three bias factors were considered and it was decided that the factor from the national data base 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 less than 90% for the period and the Puma Centre is not a good representation of the vast majority of the sites in our survey being an urban background whereas most of our sites are roadside locations.

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

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 generally good but at Trimdon Street and Chester Road the data capture dipped below the 90% capture rate at 85.5 and 88.7% respectively. The 99.8th percentile of hourly averages was therefore calculated for these two sites and the results were 60.1 and 69.7 respectively. This is well within the objective of 200µg/m^3.

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

Location	Within AQMA?	Proportion of yea with valid data 2008 %	Annual mean concentration (µg/m^3) 2008
Trimdon Street	N	85.5	38.02
Puma Centre	N	95	14.03
Chester Rd/ Ormond St Jnctn	N	88.7	30.87
Mary Street	N	90.4	37.84

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

Location	Within AQMA?	Data Capture 2008 %	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.* 2008
Trimdon Street	N	85.5	0 (60.1)
Puma Centre	N	95	0
Chester Rd/ Ormond St Jnctn	N	88.7	12 (69.7)
Mary Street	N	90.4	0

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 except for one. This location which is number 117, (3 Holmeside) does not have a relevant receptor at the location of the tube. It was put into position to monitor levels due to expected development of the area known as the Holmeside Triangle. As yet there have been no planning applications granted for this area but this department will ensure that suitable Air Quality Assessments are carried out in connection with any development introducing new receptors to the area.
A method has been developed to allow NO_2 measurements made at one distance from a road to be used to predict concentrations at a different distance from the same road. This is described in LAQM.TG (09). It is appropriate for distances between 0.1 and 140m from the kerb. The closest receptor with relevant exposure is located in Derwent Street where a diffusion tube is located in any case which measured an annual mean 25.38. Measured data is always more certain than predicted results so it would not be relevant to use the method in this situation.

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Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentration 2008 (μg/m^3) Adjusted for bias (0.93)
29	Arndale House, St Mary's Way	N	100	25.77
34	209 Newcastle Road, Fulwell	N	100	16.56
38	17 Parkside Sth, E. Herrington	N	100	26.85
39	15 John Street	N	100	27.05
41	The Golden Lion, Sth Hylton	N	83.40	17.39
53	166 Chester Road	N	91.7	29.97
55	25 Eden Vale	N	100	34.23
56	101 Southwick Road	N	83.4	26.01
57	5/6 Nbridge St, Monkwearmouth	N	91.7	35.45
58	6 Beatrice Tce, Shiney Row	N	100	31.98
67	39 Ferryboat Ln, Hylton Castle	N	91.7	20.60
78	Highfield Hotel, East Rainton	N	91.7	16.95
80	Dame Dor Sch, Monkwearmouth	N	0	0
81	47 Howick Park, Monkwearmouth	N	100	20.27
82	20 Marlborough Rd	N	91.7	22.12
85	N Moor Hsg Off, North Moor	N	75	15.83
86	2 Alice Street	N	58.4	23.37
87	Dickens Street, Southwick	N	91.7	20.79
88	Hinds Street	N	58.4	28.97
93	34A Durham Rd, Middle Herrington	N	100	19.06
94	Chaplin's PH, Mary St.	N	66.6	31.77
100	Trimdon St AQ Station	N	91.7	37.05
103	Trimdon St AQ Station	N	100	36.44
104	Trimdon St AQ Station	N	100	36.94
101	Puma Centre, Silksworth Ln	N	83.4	14.48
105	Puma Centre, Silksworth Ln	N	100	14.74
106	Puma Centre, Silksworth Ln	N	91.7	14.46

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentration 2008 (µg/m3) Adjusted for bias (0.93)
107	1,Morningside, Rickleton	N	100	27.84
108	Peareth Hall Rd, Donwell	N	91.7	16.67
109	23 Newcastle Rd	N	100	31.29
110	94 Fulwell Road	N	100	23.08
111	237 Queen Alexandra Rd,	N	83.4	22.69
112	43 The Broadway	N	100	24.24
113	181 Durham Road	N	66.6	29.12
114	Univer Crèche, Chester Rd	N	100	24.33
115	4 Mowbray Alms Houses	N	100	20.79
116	9 Derwent St	N	83.4	25.38
117	3, Holmeside	N	83.4	**41.76**
118	27 Bridge St	N	100	28.12
119	4 Athenaeum St	N	91.7	33.44
120	Gillespie's PH	N	66.6	28.16
121	16 Windsor Tce, Grngetwn	N	41.7	21.74
122	Uni Flats, High St	N	100	23.09
123	263 Chester Rd	N	100	37.95
124	35 Rydal Mount	N	91.7	21.08
125	45 Station Rd	N	91.7	27.01
126	24 Crake Way	N	91.7	22.67
127	Chester Rd AQ Station	N	83.4	29.76
128	Echo Building	N	50	27.77
129	West Sunniside	N	100	21.52
130	St Mary's Car Park	N	75	23.26
131	Chaplin's PH 2nd Tube	N	41.7	36.13
132	Dunn House, N Bridge St.	N	0	0

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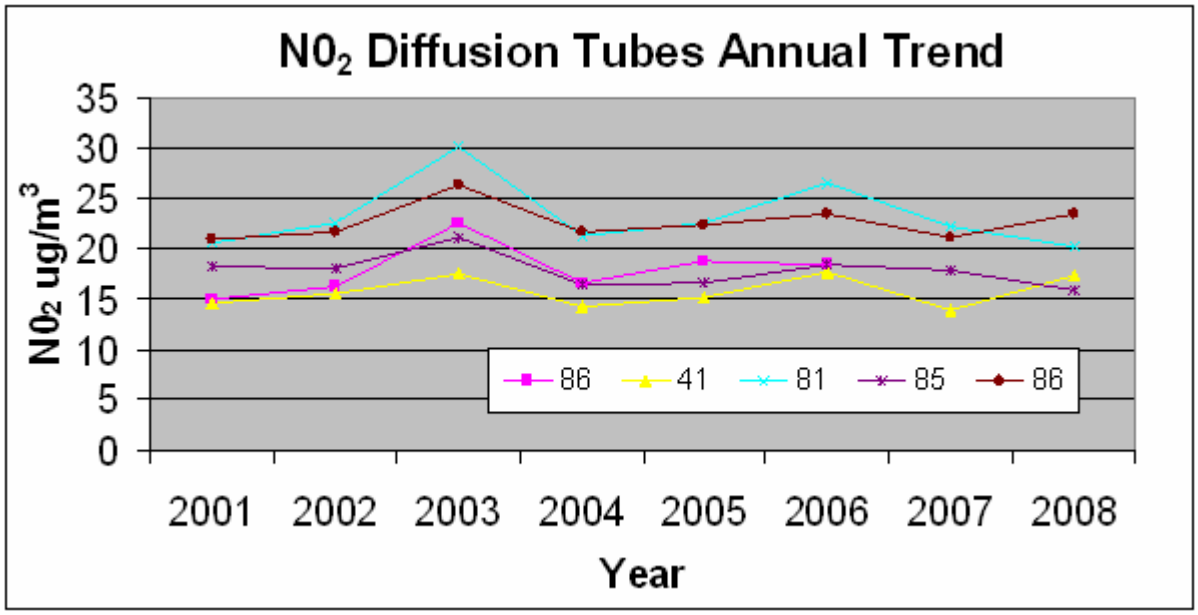
Chart 2.1 below shows the annual averages for tubes from various locations across the city. These have been plotted for the last 8 years to investigate trends in NO_2 within Sunderland.
The 5 sites show a strong visible correlation even though some are road side and some are classed as background sites. 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.



2.2.2 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 Trimdon Street Site was less than 90% and therefore the 90th percentile of 24-hour concentrations has been calculated. Data Capture at the Puma Centre was good at 91%. 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 2008 %	Annual mean concentrations 2008(µg/m^3)TEOM$_{VCM}$ PM_{10}
Trimdon Street	N	77.6	18.2
Puma Centre	N	91	12.4

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

Site ID/ Location	Within AQMA?	Data Capture 2008 %	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	77.6	4 (33.77)
Puma Centre	N	91	0

2.2.3 Sulphur Dioxide

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

Location	Within AQMA?	Data Capture 2008 %	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	91.3	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 91.3%. The annual mean using 15-minute means was 8.48µg/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.

2.2.4 Benzene

Table 2.7 Results of Benzene Diffusion Tubes

Site ID	Location	Data Capture	Annual Mean Conc. 2008 µg/m^3
B1	Puma Centre	100	0.67
B2	Queen Alexandra Road	100	0.84
B3	43 The Broadway	100	1.45
B5	Fieldview Nursing Home	100	0.68

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.

2.2.5 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 2008 %	Number of Exceedences of running 8-hour mean (10 mg/m^3) 2008
Puma Centre	N	90.9	0

The annual mean of 8-hourly means for Carbon Monoxide was 0.197mg/m^3 in 2008. There were no exceedences of the objective in the monitoring period and data capture was good at 90.9%.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Whilst undertaking the 2003 USA, Sunderland City Council identified Narrow Congested Streets with residential properties close to the kerb as was defined in the current guidance at that time LAQM.TG (03). DMRB was used to assess these locations and if necessary proceed to a detailed review. LAQM.TG (09) describes these locations slightly differently so they have been examined again. A review of any possible new locations falling into this category was also made using local knowledge. It was concluded that there were no roads meeting these criteria that have not been previously assessed.

Sunderland City Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

Whilst undertaking the USA in 2003, Sunderland City Council identified busy streets where people may spend 1-hour or more close to traffic. DMRB was then used to assess these locations and if necessary proceed to a detailed assessment. Since this assessment was carried out there have been no new or newly identified streets meeting this criteria.

Sunderland City Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGV's.

Whilst undertaking the USA in 2003, Sunderland City Council identified any roads with a high flow of buses and/or HGV's. DMRB was then used to assess these locations and if necessary proceed to a detailed assessment. Since this assessment was carried out there have been no new or newly identified roads meeting this criteria.

Sunderland City Council confirms that there are no new/newly identified roads with high flows of buses/HGV's.

3.4 Junctions

Whilst undertaking the USA in 2003, Sunderland City Council identified any busy roads or busy junctions. DMRB was then used to assess these locations and if necessary proceed to a detailed assessment. Since this assessment was carried out there have been no new or newly identified roads or junctions meeting these criteria.

Sunderland City Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

During the 2003 USA a proposed new road was identified known as the Southern Radial Route which has now been built and is being used. The Southern Radial Route had an air quality assessment completed for it and this concluded that none of the objectives would be exceeded at relevant locations. The air quality assessment was deemed to be adequate for review and assessment purposes.
There are no other new or proposed roads.

Sunderland City Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Sunderland City Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

The number of bus movements was calculated during the 2003 USA and it was found to be above the threshold of 2500 movements per day. However there were no relevant receptors within 10 metres of any part of the bus station so there was no need to proceed further with this assessment. This situation has not changed.

Sunderland City Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Sunderland City Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

This was examined during the 2003 USA and the situation has not changed.

Sunderland City confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Table 5.1 of LAQM.TG (09) provides a list of lines with a substantial number of diesel passenger trains per day. None of these locations fall within Sunderland so this assessment need go no further.

Sunderland City Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

The number of ship movements at the port of Sunderland falls below the criteria of more than 5,000 movements per year.

Sunderland confirms that there are no ports or shipping that meets the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

Since the last round of Review and Assessment in 2006 several new industrial installations have begun to operate within the Sunderland City Council district. Some of these have been noted in previous Progress Reports and will now be assessed in this report. A summary of the installations is shown in Table 5.1.

Table 5.1

Name of Installation	Address	Type of Industry	Potential pollutant releases	Part B Y/N
Johnson Controls Automotive (UK) Ltd	Cherry Blossom Way, Sunderland, SR5 3TW	Di-isocyanate.	Di-isocyanate & VOC's	Y
Eppleton Quarry Products	Downs Pit Lane, Hetton-Le-Hole, DH5 9AR	Limestone Quarrying	PM_{10}	Y
Eppleton Quarry Products	Downs Pit Lane, Hetton-Le-Hole, DH5 9AR	Bulk Cement	PM_{10}	Y
North East Concrete Ltd	Woodbine Tce, Sunderland, SR4 6LL.	Bulk Cement	PM_{10}	Y
Northumbrian Roads Ltd	Port of Sunderland, Hudson Dock, Sunderland, SR1 2BU	Road Stone Coating	PM_{10}	Y
Nissan Motor Manufacturing UK Ltd	Washington Road, Sunderland, SR5 3NS	Petroleum	Benzene	Y
Tesco Stores Ltd	Silksworth Rd, Sunderland, SR3 3PN	Petroleum	Benzene	Y
JC Atkinson & Son Ltd	Sedling Rd, Washington, NE38 9BZ	Combustion	PM10 & NOx	Y

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been carried Out

There have been two new installations within Sunderland City Council since the last round of Review and Assessment that have had an air quality assessment carried

out. These are two installations based on the same site, Eppleton Quarry in Hetton-Le-Hole. This site is a reclamation site where spoil heaps from former mining works have been processed to remove any remaining coal deposits and also shale. In addition, part of the site is being quarried for limestone and aggregates and there is a small bulk cement silo on the site. The coal processing activity is also permitted but has been looked at during previous rounds of Review and Assessment.
An Air Quality Assessment was submitted with the Part B Application form for both the quarrying and cement Installations and was deemed to be suitable and sufficient for both the purposes of the Part B Permitting process and the Review and Assessment Process. The Assessment concluded that the site could be worked without creating an unacceptable dust impact on properties surrounding the site. Dust monitoring formed part of the assessment and this is ongoing. Sunderland City Council has not received any complaints about the site regarding dust emissions. Therefore Sunderland City Council will not proceed to a Detailed Assessment for these two installations.

Sunderland City Council confirms that there are new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority that have had an air quality assessment carried out. Sunderland City Council concludes that it will not be necessary to proceed to a Detailed Assessment for these sources.

5.1.2 Existing Installations where Emissions have increased Substantially or New Relevant Exposure has been introduced

An assessment of existing installations has been carried out using information from process operators and Sunderland City Council Officers that visit industrial processes as part of the LA-PPC and LA-IPPC regime.

Sunderland City Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

Johnson Controls Automotive (UK) Ltd was previously a Part A1 installation and so came under the control of the Environment Agency. However, it removed the use of Toluene Di-isocyanates from the site and so became a Part B installation in May 2008 as the site still uses Di-isocyanates in the process. This site holds a permit issued by Sunderland City Council and a condition of the permit is to undertake annual extractive stack testing. This has been carried out in accordance with accredited methods and concentrations were within the limits set in the permit. Information regarding emissions from the process was included in the application document. Results from stack emission test carried out in 2007 were <0.41g/hr of isocyanate. Fugitive VOC emissions from the process are listed as Dichloromethane

and MethylEthylKetone which had emissions of 0.0396g/s and 0.0050g/s respectively. The emitted pollutants are not regulated by the LAQM regime and therefore cannot be further assessed using pollutant nomograms. It is not thought that the installation will give rise to significant pollutant emissions.

Emissions from North East Concrete Ltd are considered to be fugitive PM_{10} only. This source has therefore been assessed under section 7 on Fugitive and Uncontrolled Sources.

Northumbrian Roads have held a Part B permit since December 2006. They do not use heavy fuel oil or coal at the process so emissions to be assessed are solely Particulates. Conditions of the permit specify that extractive monitoring of total particulate matter be undertaken at least once every 6 months. Data from the test reports together with information supplied by the operator in the application document have been used to determine if the source requires further assessment. The nomogram in Figure 5.5 of LAQM.TG(09) was used to derive a maximum emission rate in tonnes per annum and this was compared with the actual emission rate of the installation. The permitted emission rate was then background adjusted to take into account the background PM_{10} levels. The result of this assessment was that the emission rate of the installation fell below the corrected permitted rate so this source will require no further assessment.

JC Atkinson & Son Ltd combustion process involves the use of Biomass Combustion and therefore has been assessed under the Commercial and Domestic source chapter 6.

Sunderland City Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.2 Major Fuel (Petrol) Storage Depots

The major fuel (petrol) storage depot in Sunderland was assessed during previous rounds of Review and Assessment and it was concluded that it was not necessary to proceed to a detailed assessment.

There are major fuel (petrol) storage depots within the Local Authority area, but these have been considered in previous reports.

5.3 Petrol Stations

There were two new petrol stations opening in the Sunderland area since the last round of review and assessment, details of which have been included in table 5.1. These two stations have been considered along with all other stations throughout Sunderland and it has been concluded that there are no petrol stations within Sunderland that have an annual throughput of more than 2000m^3 of petrol and are

near a road with more than 30,000 vehicles per day and have relevant exposure within 10m of the pumps.

Sunderland City Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Sunderland City Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Sunderland City Council has identified two Individual Biomass plants that have not been previously assessed and are in receipt of a granted planning application for one plant at Hudson Dock East. These are detailed in Table 6.1.

Name & Address	Heat Output	Stack Height (m)	Stack Diam. (m)	Dimensions of buildings within 5x stack height (m)	Maximum Emission Rates (g/s)
JC Atkinson & Son Ltd Sedling Rd, Washington, NE38 9BZ	200kW	8	0.5	40x20x8	NO_x=0.03 PM_{10} = 0.048
John Porter Doors, North Hylton Rd, Sunderland	150kW	8	0.5	No buildings	NO_x=0.0225 PM_{10} = 0.036*
Sunrise Renewables, Hudson Dock E., Barrack St, Sunderland.	9MW	20	0.9	5x3x3 8x5x6	NO_x=0.8132 PM_{10}=0.0407

*** Emission factors estimated from Appendix 1 of Technical Guidance: Screening assessment for biomass boilers.**

An assessment has been carried out for each of the three installations above using the method contained in Technical Guidance: Screening assessment for biomass boilers. The method allows the local authority to assess emissions against the 24 hour objective for PM_{10} and the annual and 1-hourly objective for NO_2.
The results of the assessments for all three installations were that the objectives would not be breached and there was no need to proceed to a detailed assessment.

Sunderland City Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

Apart from the Biomass appliances identified above there are thought to be very few small biomass combustion appliances throughout Sunderland and those that do exist are not located in one high density area but spread throughout the Local Authority area. It is therefore not necessary to proceed to a detailed assessment for this source.

Sunderland City Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

Since April 1995, Smoke Control Orders have been in place throughout the City of Sunderland meaning smokeless fuel has replaced coal burning. The number of properties using smokeless fuel has declined rapidly as residents have switched to natural gas as a fuel source.
There are no areas within Sunderland City Council where significant smokeless fuel burning takes place.

Sunderland City Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

Several of the new industrial installations described in box 5.1 are potential sources of fugitive PM_{10}. Table 7.1 details the results of the assessments carried out for each of these installations.

Site Name	Has an AQ Assessment been carried out?	Local Background PM_{10} conc. $\mu g/m^3$	Is there "near" relevant exposure?	Are there any dust concerns?	Proceed to a DA?
Eppleton Quarry Products (Quarry)	Y	13.1	Yes	No	No
Eppleton Quarry Products (Cement)	Y	13.1	Yes	No	No
North East Concrete Ltd	N	16.6	No	No	No

Sunderland City Council has identified potential sources of fugitive particulate matter emissions in the Local Authority area. An assessment has been carried out and it was concluded that there is no need to proceed to a detailed assessment for any of the sources.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Sunderland City Council has no existing AQMA's within its boundary. Monitoring has continued across the city focusing on potential known hotspots and areas where new development could introduce new receptors.

The results from the automatic NO_2 monitoring data were that both the annual and hourly mean was met at all four sites. The results from the non-automatic monitoring were that the annual mean was met at all sites apart from one which does not have relevant exposure.

Both sites monitoring PM_{10} automatically met the objectives fro the annual and 24-hour mean.

The results from automatic monitoring of SO_2 concluded that the 15-minute, 1-hourly and 24-hourly mean would be met.

Benzene is monitored non-automatically and the most recent monitoring results indicate that both the 2003 and 2010 objectives will be met at all sites.

There were no exceedences of the CO objective.

Sunderland City Council concludes that it is not necessary to proceed to a detailed assessment on the basis of new monitoring data.

8.2 Conclusions from Assessment of Sources

Assessment of road sources has not identified any major changes within Sunderland and hence Air Quality Objectives are not being breached for any pollutant. There are several large developments within Sunderland in the pipeline for which applications for outline planning permission has been submitted. These schemes include a new supermarket and development of the former Vaux Brewery site in the City Centre. Full planning permission has not yet been granted and hence they have not been further assessed at this stage.
The developments may have impacts on road traffic and as a consequence on air quality and so the Pollution Control department will seek to ensure that suitable and sufficient air quality assessments are carried out by the developers. The results of these assessments will be reported in upcoming Progress Reports as appropriate. Other transport sources have been assessed and Sunderland City Council has concluded that these sources do not require further assessment.

There have been some changes within the Industrial sources sector with several new installations emerging. At the same time it may also be noted that several industrial installations have closed down within the Sunderland area removing there impact on air quality although it is not a requirement to report on this. Most notably the two large

glass manufacturers have now ceased operation and the site is likely to be redeveloped.
The new installations have been thoroughly assessed using the guidance provided in LAQMTG(09) and Sunderland City Council have concluded that these sources will require no further assessment.

Sunderland City Council concludes that it will not be necessary to proceed to a detailed assessment on the basis of the assessment of sources.

8.3 Proposed Actions

This Updating and Screening Assessment 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 2010 Progress Report.

The five Tyne & Wear Local Authorities together with Nexus and the Local Transport Plan Core Team have formed the Tyne and Wear AQ Steering Group. The LTP has funded a campaign run by "Smarter Choices". The campaigns' aims are to reduce congestion by reducing the number of single occupancy drivers and encouraging the use of public transport. It will be run on a regional basis.

Running alongside this campaign the Steering Group are also running an air quality awareness campaign called "Be Air Aware". The aims of the campaign are:

- To raise awareness air pollution and its causes across Tyne and Wear on a local level
- Raise awareness of the work that local authorities, businesses and communities are doing to improve air quality.
- Inform and encourage residents and businesses how they can do 'their bit' to improve air quality.
- To provide some funding and facilitation of air quality awareness and improvement activities at a local level.

The campaign will be targeted at the following groups:

- Private car users across Tyne and Wear
- Schools, pupils and parents across Tyne and Wear
- General public across Tyne and Wear
- Businesses with fleets, such as bus and delivery companies

The campaign was begun in April 2009 when a stakeholder event was held before the event went live. The campaign has funding for three years and will hopefully provide an umbrella for the air quality friendly work already being done by schools, fleets managers, businesses, cycling officers and councils. Information on the campaign can be accessed on the pages of the LTP website www.tyneandwearltp.co.uk.

9 References

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

Abbott, J., 2008, *Technical Guidance: Screening Assessment for biomass boilers*, AEA Energy & Environment.

Appendix

Appendix A: QA/QC Data

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 0.98 at this site. However data capture was less than 90% (85.5%) at the site. The same was carried out for the Puma Centre Station where data capture was better at 95% for the year. The results of the precision analysis were good with 11 out of 11 periods having a confidence interval smaller than 20%. The bias was calculated to be 0.89 at this site.
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 0.93 for comparison.
These three bias factors were considered and it was decided that the factor from the national data base 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 less than 90% for the period and the Puma Centre is not a good representation of the vast majority of the sites in our survey being an urban background whereas most of our sites are 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.

Council Name - England

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 $\pm$ 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.

Council Name - England