Sunderland City Council

Local Air Quality Management

Updating and Screening Assessment 2006

1.0 Introduction

1.1 Review and Assessment of Air Quality

Under Part IV of the Environment Act 1995 local authorities are required to review and assess air quality in their areas to identify areas where air quality is unlikely to meet the objectives prescribed by the Air Quality Regulations 2000 within the relevant periods. The Government has recommended a phased approach to the review and assessment process, the intention being that local authorities only undertake as much work as necessary dependent upon the extent of the air quality problems in their area.

The Act requires that local authorities review the air quality in their areas with regard to seven specified pollutants; nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon dioxide (CO), lead, fine particles (PM_{10}), benzene, and 1,3-butadiene. The Governments Expert Panel on Air Quality Standards (EPAQS) has recommended air quality standards for these pollutants based upon their health effects. These have been translated into a set of statutory objectives, which must be met between 2003 and 2008 dependent upon the pollutant.

Where a local authority finds that a prescribed objective is likely to be exceeded it must declare an Air Quality Management Area and draw up an action plan identifying changes that will be necessary to improve air quality.

The review was carried using the guidance provided in 'Local Air Quality Management' Technical Guidance TG(03) together with the updated checklists for 2006. This review will follow a two-step approach. The first step is an Updating and Screening Assessment, which assesses the risk of an air quality objective being exceeded. If required, this is followed by a detailed assessment to provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposures.

The Air Quality Strategy contains standards and objectives for eight air pollutants; carbon monoxide, benzene, lead, nitrogen dioxide, sulphur dioxide, fine particulates (PM10) and ozone. All except ozone are the direct responsibility of local authorities. The standards are health-based targets based upon health effects and set at a level below which no health effects should occur. The objectives are policy targets, which state the maximum concentration for a pollutant and take into account cost and benefit of meeting the standard. The objectives were revised by the Air Quality Regulations 2000 and the Air Quality (Amendment) Regulations 2002 which set new deadlines for achievement and range from 2003 and 2010. In addition the E U have set limit values in respect of nitrogen dioxide and benzene to be achieved by 1 January 2010 as well as indicative limit values for PM10 to be achieved by 2010. The EU limits are currently not required to be reviewed although will be required to be considered in the future. The objectives are summarised in table 1.

Table 1 Standards and Objectives for Specific Pollutants

Objectives laid down in Regulations for the purposes of LAQM			
Pollutant	**Objective Concentration**	**To be achieved by Measured as**	
Benzene	16.25ug/m^3 (5ppb)	running annual mean	31 Dec 2003
1,3-Butadiene	2.25ug/m^3 (1ppb)	running annual mean	31 Dec 2003
Carbon Monoxide	11.6mg/m^3 (10ppm)	running 8 hour mean	31 Dec 2003
Lead	0.5ug/m^3 0.25ug/m^3	annual mean annual mean	31 Dec 2004 31 Dec 2008
Nitrogen Dioxide	200ug/m^3 (105ppb) not to be exceeded more than 18 times a year	1 hour mean	31 Dec 2005
	40ug/m^3 (21ppb)	annual mean	31 Dec 2005
Particles (PM_{10})	50ug/m^3 not to be exceeded more than 35 times a year	24 hour mean	31 Dec 2004
	40ug/m^3	annual mean	31 Dec 2004
Sulphur dioxide	350ug/m^3 (132ppb) not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125ug/m^3 (47ppb) not to be exceeded more than 3 times a year	24 hour mean	31 Dec 2004
	266ug/m^3 (100ppb) not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005

1.2 The Character of Tyne & Wear

The Tyne & Wear region 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. Traffic flows vary throughout the region and build up in the inner urban areas.

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.

1.3 Summary of previous Review & Assessment Work in Sunderland.

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. A Detailed Assessment (DA) was carried out to determine whether it is likely that the objectives will be exceeded at these locations, in order to determine the need for any Air Quality Management Areas (AQMAs).

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 (AQMAs) should be declared. Since publication of the Detailed Assessment report, additional information on measured nitrogen dioxide concentrations at the Chester Road/Ormonde Street junction has become available. The results from three months continuous monitoring at this location, along with the full 12 months data from a diffusion tube monitoring site indicate that the annual mean nitrogen dioxide objective will be achieved by a reasonable margin in 2005.

In addition, further information has been 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 covers one receptor known as Embassy House, information has been obtained which confirms the property is to be purchased by the City of Sunderland as part of a large development plan. Completion of the sale is confirmed to be September 2005 and the property will be assured vacant possession with demolition soon after. Since there are no receptors in the area of potential exceedence there will be no requirement for the declaration of an Air Quality Management Area.

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

1.4 Introduction to the Third round of R & A

The purpose of the Updating and Screening Assessment is to identify those matters that have changed since the second round of Review and Assessment was completed.
We will build upon and utilise the information provided in the Progress report in 2005. We will consider any new monitoring data, new sources or significant changes to existing sources (either locally or within neighbouring authorities), or any other local changes that may be significant. We shall also consider any relevant changes to public exposure e.g. new residential developments alongside busy roads etc, if these locations were not fully evaluated in previous Review and Assessment reports.
As the attainment year for some of the objectives has now been reached, increasing reliance will be placed upon monitoring data, as opposed to modelling predictions. All monitoring data will be examined and where exceedences of the objectives are recorded then we will progress to a detailed assessment for that pollutant.

Updating and Screening Assessment for Carbon Monoxide

OBJECTIVE: Maximum daily running 8-hour mean of 11.6 mg/m^3

2.0 Introduction

The main source of carbon monoxide is road transport which accounted for 67% of total releases in 2000[1]. Studies at a national level, based on both measured and modelling data, suggest that there is little likelihood of the new objective for carbon monoxide being exceeded by 2003[1].
The second round of R & A concluded that there was no need to proceed to a DA for Carbon Monoxide.

2.1 Checklist

(A) Monitoring Data

- Continuous monitoring has been carried out at:

Site	Classification
Puma Centre, Silksworth	Urban Background
Otto Terrace, City Centre	Roadside

- Maps of the monitoring locations are provided in Appendix 1. Table 2.1 provides a summary of continuous monitoring results. Figures 2.2 – 2.3 shows that data in graphical format.

Site	Monitoring Period	No. of exceedences of objective	Maximum 8-hour average recorded mg/m^3	Annual Average mg/m^3	Data Capture %
Puma Centre	2005	0	1.9	0.09	77.7
Otto Tce.	2005 Mar-Dec	0	2.9	0.14	60.4

- The maximum 8-hour means for each site were 1.9mg/m3 and 2.9mg/m3 respectively. Therefore the objective was not exceeded at either site.

[1] LAQM.TG(03), 2003

(B) Very bust roads or junctions in built-up areas

- There are no 'very busy roads' within the Sunderland City Council.

  A 'very busy road' can be defined as:

  - Single carriageways with > 80,000 veh. Per day
  - Dual carriageways with > 120,000 veh. Per day
  - Motorways with > 140,000 veh. Per day

  - In addition, background concentrations downloaded from the National Air Quality Information Archive show that no 1kmx1km grid square has a value of greater than 1 mg/m^3.

Figure 2.2

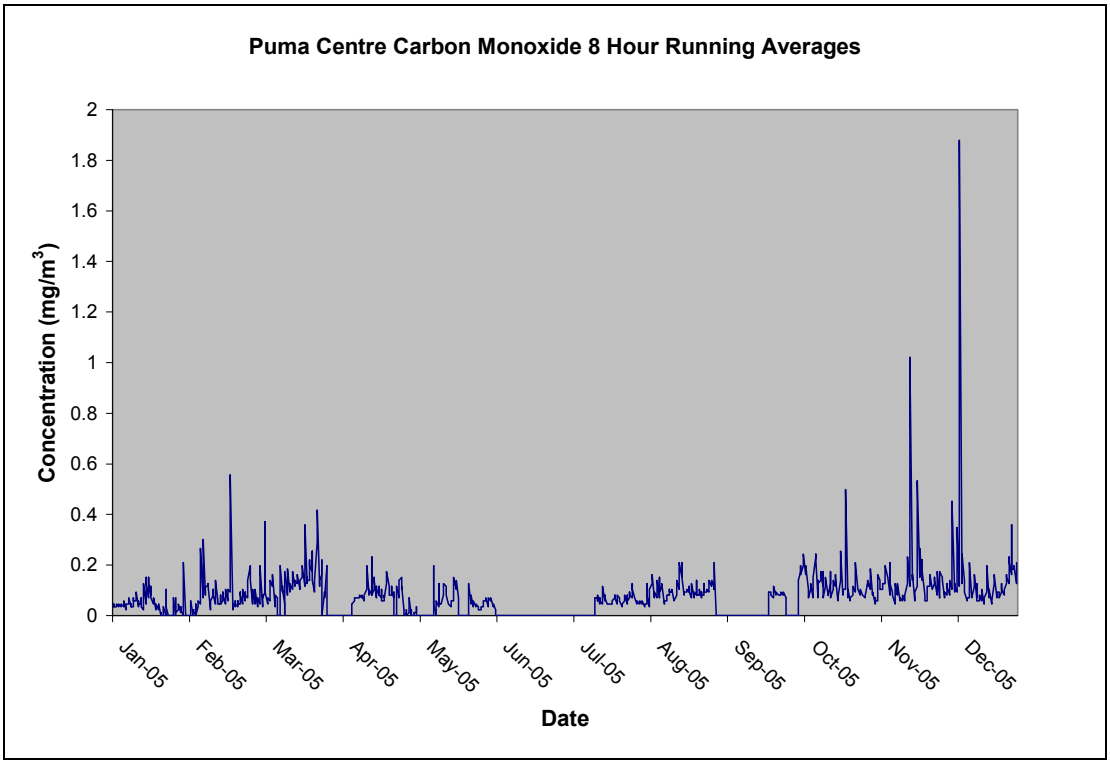
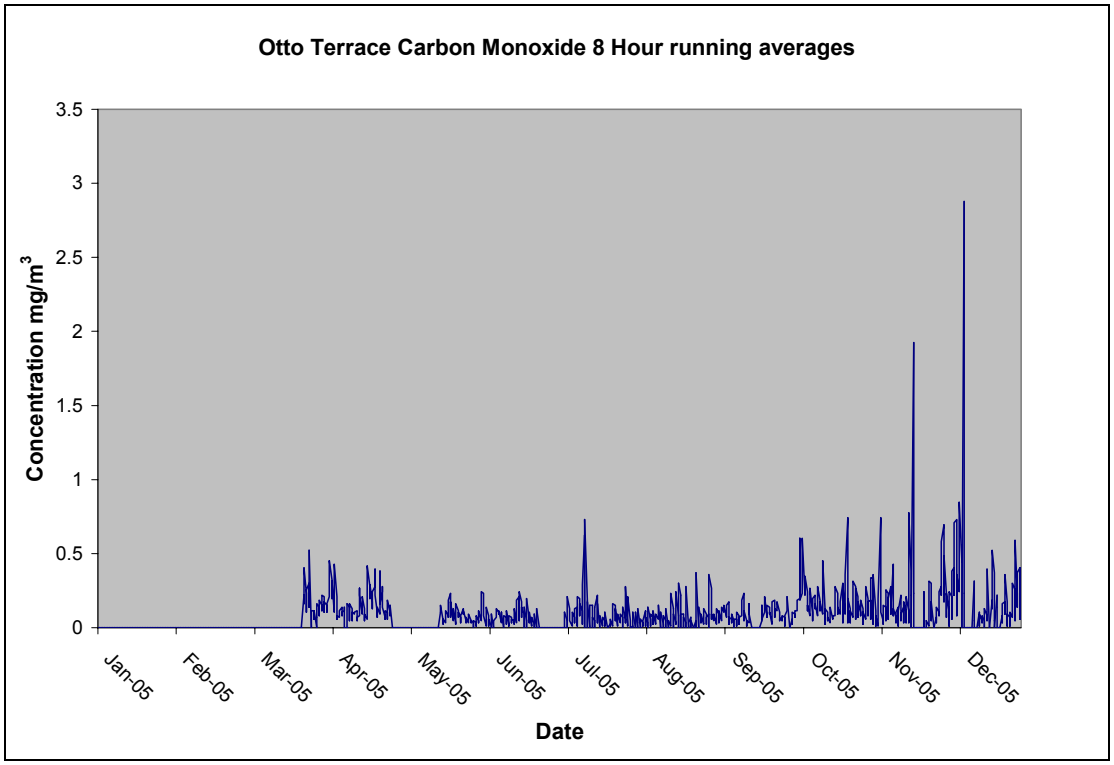


Figure 2.3



2.2 Conclusion

- Monitoring data has demonstrated that all statutory objectives for carbon dioxide are currently being met and there are no 'very busy roads' where exceedences might be expected. Sunderland City Council has therefore decided not to proceed to a detailed review and assessment for carbon monoxide.

Updating and Screening Assessment for Benzene

OBJECTIVE: Running annual mean of 16.25 μg/m^3
Annual mean of 5μg/m^3 by 2010.

3.0 Introduction

The main sources of benzene within the City of Sunderland are petrol-engined vehicles, petrol station forecourts and one industrial source - a major fuel storage depot.
The second round of R & A concluded that there was no need to proceed to a DA for Benzene.

3.1 Checklist

(A) Monitoring data outside an AQMA

- Diffusion tube monitoring has taken place at four locations across Sunderland situated at 3 receptors that are both close to a petrol station and a reasonably busy road and at the Puma Centre as a background site (see Appendix 1). The result from this monitoring is shown in Figures 3.1. Figure 3.2 shows the annual means with the correction factor for 2010 applied and the results show that the annual means are well below the current objective and the 2010 objective.

Figure 3.1

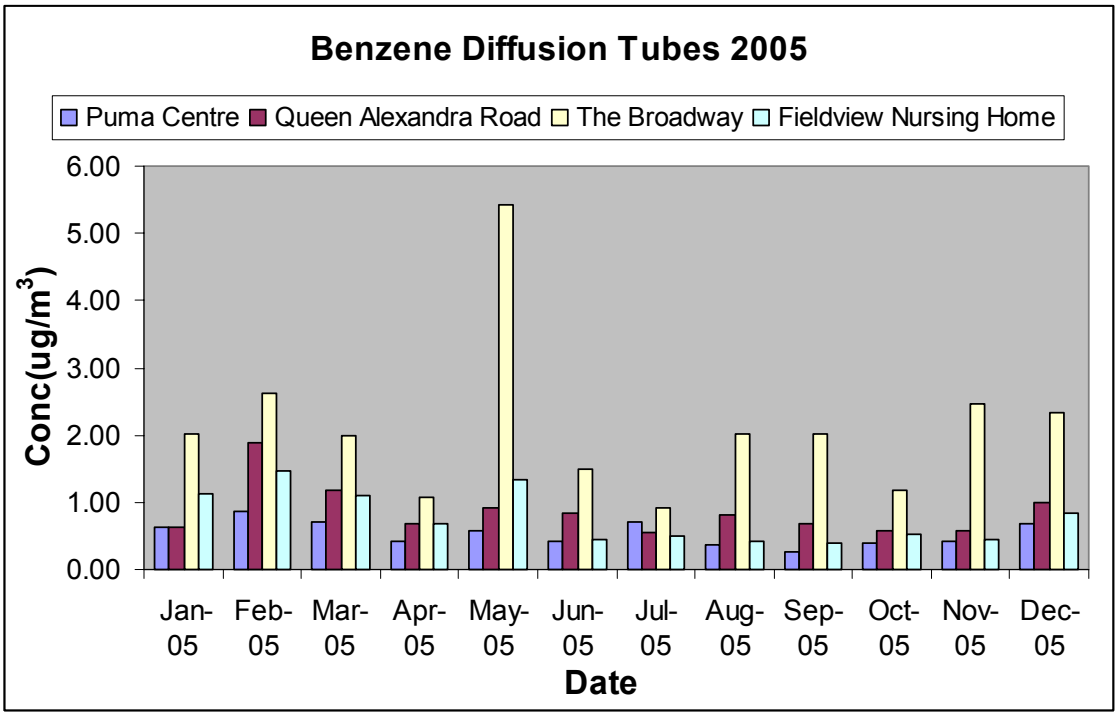
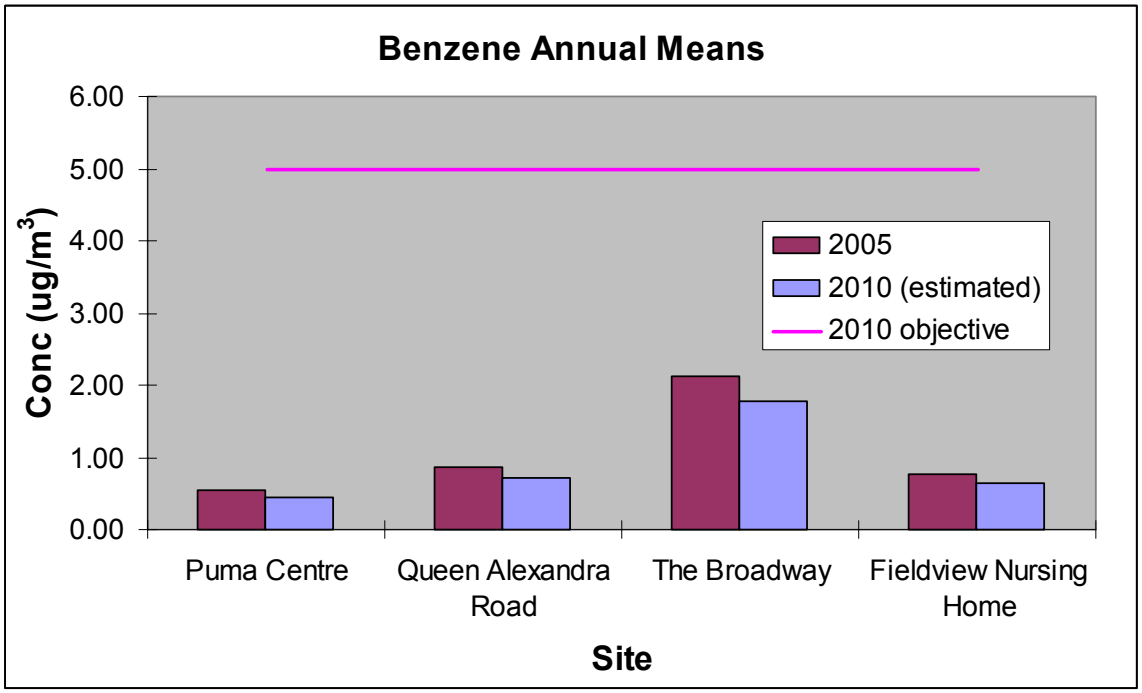


Figure 3.2



(B) Monitoring data within an AQMA

- Not applicable to Sunderland City Council.

(C) Very busy roads or junctions in built up areas

- There are no 'very busy roads' or junctions within Sunderland.
- A 'very busy road' can be defined as:
    - Single carriageways with > 80,000 veh. Per day
    - Dual carriageways with > 120,000 veh. Per day
    - Motorways with > 140,000 veh. Per day

(D) New Industrial Sources

- There have been no new industrial sources since the 2003 USA in Sunderland.

(E) Industrial sources with substantially increased emissions, or new relevant exposure.

- There are no new industrial sources, which are listed in annex 2 of LAQM TG (03) therefore there is no requirement to consider these sources any further.

(F) Petrol Stations

- There are no petrol stations within the City of 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. The situation has remained the same since the last USA.

(G) Major fuel storage depots (petrol only)

- There is one major fuel storage depot in the Sunderland area. This was examined in the 2003 USA and it was concluded that further assessment was not needed. The amount of fuel handled by the depot has slightly decreased in 2005 compared with 2002 and so the situation remains the same.

3.2 Conclusion

Monitoring data has demonstrated that all statutory objectives are currently being met for the 2003 objective and are expected to be met for the 2010 objective. Road and industrial sources have been screened and do not need further assessment. Sunderland city council has therefore decided not to proceed to a detailed review and assessment of benzene but will continue to monitor Benzene in their area.

Updating and Screening Assessment for 1,3-butadiene

OBJECTIVE: Running annual mean of 2.25 $\mu g/m^3$

4.0 Introduction

The main source of 1,3-butadiene in the UK is emissions from motor vehicle exhausts. It is also an important industrial chemical. LAQM. TG (03) states that only authorities with relevant locations in the vicinity of major industrial processes that handle, store or emit 1,3-butadiene are expected to proceed beyond the updating and screening assessment.
In the 2nd round of R&A the Tyne & Wear Authorities decided not to proceed any further as there were no significant sources of 1,3-butadiene within Tyne & Wear.

4.1 Checklist

(A) Monitoring Data

- There has been no monitoring carried out in Sunderland for 1,3-butadiene as there has been no risk of exceeding the objectives at any location.

(B) New Industrial Sources

- There are no new industrial sources, which are listed in annex 2 of LAQM TG (03) therefore there is no requirement to consider these sources any further.

(C) Industrial sources with substantially increased emissions, or new relevant exposure

- Not applicable as there are no new potentially significant industrial sources identified since the last round of R & A.

4.2 Conclusion

- Sunderland City Council has decided not to proceed to a detailed review and assessment of 1,3-butadiene.

Updating and Screening Assessment for Lead

OBJECTIVE: annual mean of 0.5μg/m^3
annual mean of 0.25μg/m^3 by 2008

5.0 Introduction

With the ban on sales of leaded petrol since 1 January 2000, emissions of lead in the UK are now restricted to industrial activities. Only those authorities with relevant locations in the vicinity of major industrial processes that emit significant quantities of lead will need to proceed beyond the updating and screening assessment. In the second round of Review and Assessment Sunderland City Council considered one potential industrial source of lead however following monitoring the process was deemed not to be a significant source.

5.1 Updating and Screening Assessment

A Monitoring Data

- No further monitoring of lead levels has been undertaken since the last round of R & A within Sunderland as previous exercises had shown levels to be well below the objective.

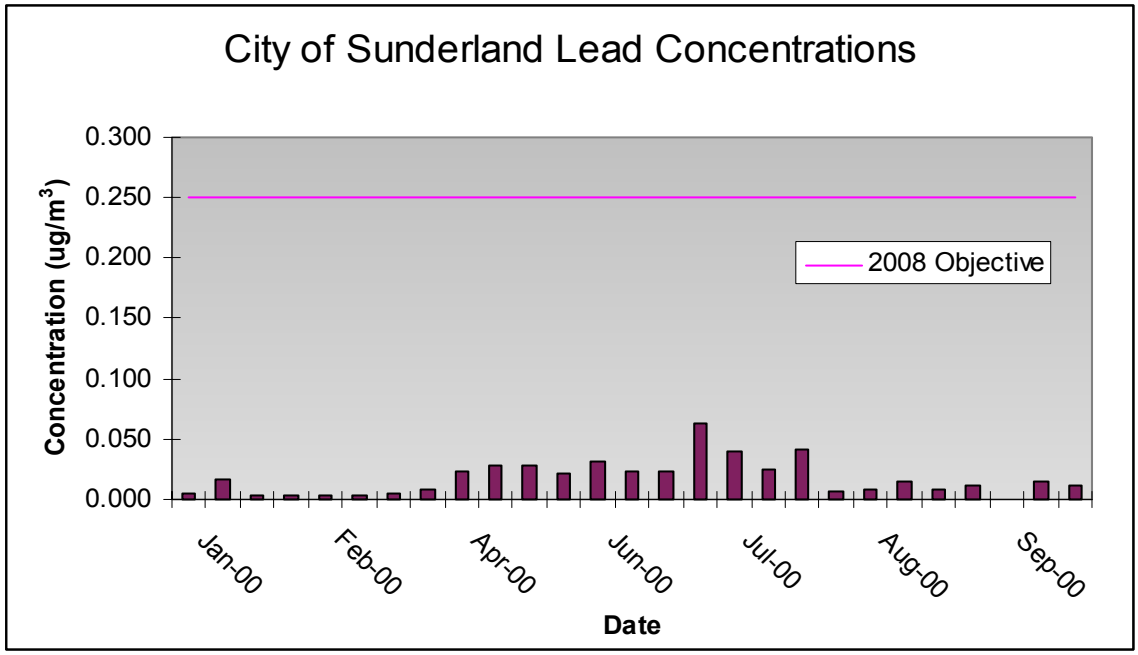
- The first round of R&A identified only one potential significant source of airborne lead - Jennings Winch & Foundry Company Ltd. This Part B process is located close to residential areas and a primary school so was the subject of a monitoring programme in 2000.

- The results are shown in Figure 5.1 and the average concentration over the 9-month monitoring period was 0.017μg/m^3 and the highest measured concentration was 0.062μg/m^3. These results are well below the 2008 objective of 0.25μg/m^3. Therefore there is no need to proceed to a detailed assessment on the basis of monitoring data.

B New Industrial Sources

- There are no new industrial sources, which are listed in annex 2 of LAQM TG (03) therefore there is no requirement to consider these sources any further.

Fig 4.1



C Industrial sources with substantially increased emissions

- The potential significant source identified during the last round does not have substantially increased emissions.

5.2 Conclusion

- Monitoring data has demonstrated that all statutory objectives are expected to be met in 2004 and 2008. Industrial sources have been screened and do not need further assessment. Sunderland City Council has therefore decided not to proceed to a detailed review and assessment of lead.

Updating and Screening Assessment for Nitrogen Dioxide

OBJECTIVE: annual mean of 40μg/m^3 1-hour mean of 200μg/m^3 not to be exceeded more than 18 times per year.

6.0 Introduction

The major source of nitrogen dioxide within the City of Sunderland is from road traffic. The Tyne & Wear Urban Emission Inventory states that 73% of nitrous oxides within the region are emitted form this source. Other sources include Industrial processes, industrial & commercial combustion and domestic combustion.
After completing their Updating and Screening of air quality in 2003, Sunderland City Council concluded that the air quality objectives would be met for all pollutants except Nitrogen Dioxide. City of Sunderland felt there may be a risk of exceeding the annual average objective for Nitrogen Dioxide at relevant locations and therefore proceeded to a Detailed Assessment of this pollutant.

Together with the other Tyne & Wear Local Authorities, Sunderland City Council has employed Air Quality Consultants to undertake the detailed assessment work on their behalf.

The initial Detailed Assessment highlighted two potential areas of nitrogen dioxide exceedences however on further investigation both areas have been excluded due firstly to new continuous monitoring data which has been used to calibrate the model results and secondly the removal of relevant receptors through the acquisition and imminent demolition of the property.
Sunderland City Council has continued to monitor NO_2 and this information is presented in this USA.

6.1 Checklist

(A) Monitoring data outside an AQMA

- Continuous monitoring of nitrogen dioxide has been carried out at:

Site Name	Classification
Trimdon Street, City Centre	Kerbside
Puma Centre, Silksworth	Urban Background
Otto Terrace, City Centre	Roadside
Chester Road	Roadside
Mary Street	Roadside

- Maps of the monitoring locations are provided in Appendix 1. Table 6.1 provides a summary of continuous monitoring results. Figures 6.2 – 6.6 shows that data in graphical format.

Table 6.1

Site	Monitoring period	No. of exceedences of hourly objective	Annual Mean	Data Capture %
Trimdon St	2005 Jan -Jun	0	37.8(estimated)	49
Puma Centre	2005	0	15.3	85
Otto Tce	2005 Mar -Dec	0	27.4 (estimated)	63.2
Chester Rd	2005	11	31.2	90.1
Mary Street	2005	0	33.8	95.2

- Trimdon Street station has suffered from technical difficulties and as a result has only provided 6 months of usable data. Otto Terrace station has also only 9 months of data. The period mean has therefore been adjusted using the method in Box A1.3 of LAQM. TG(03) to give an estimated annual mean for both data sets.

Figure 6.2

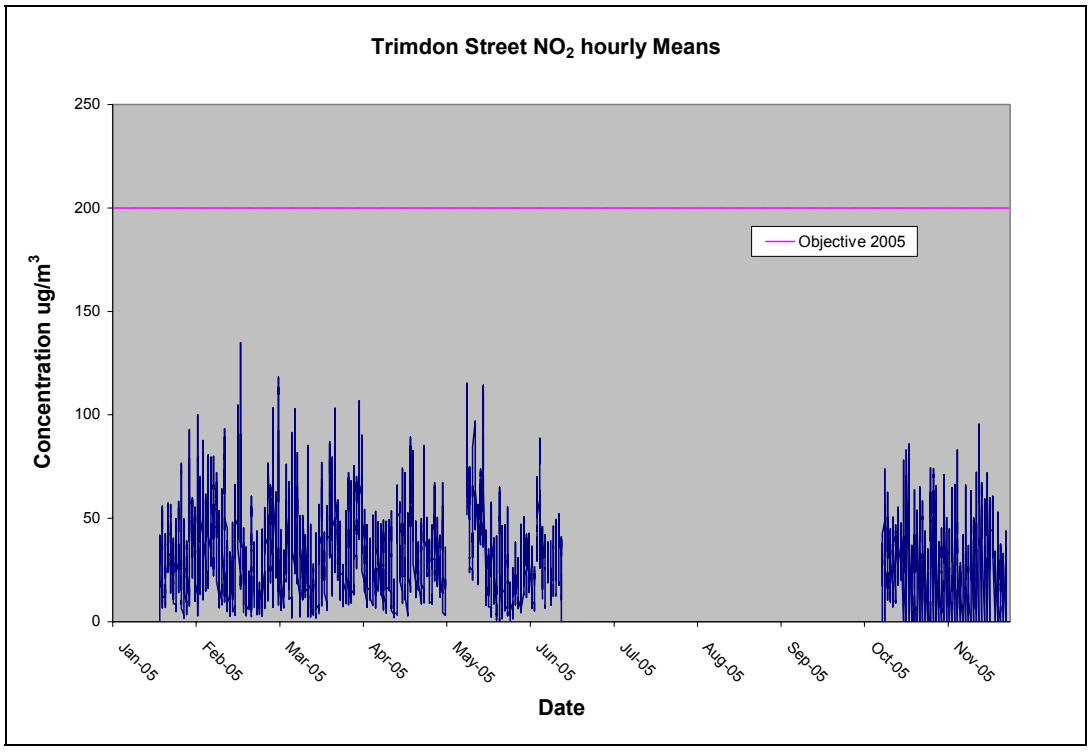


Figure 6.3

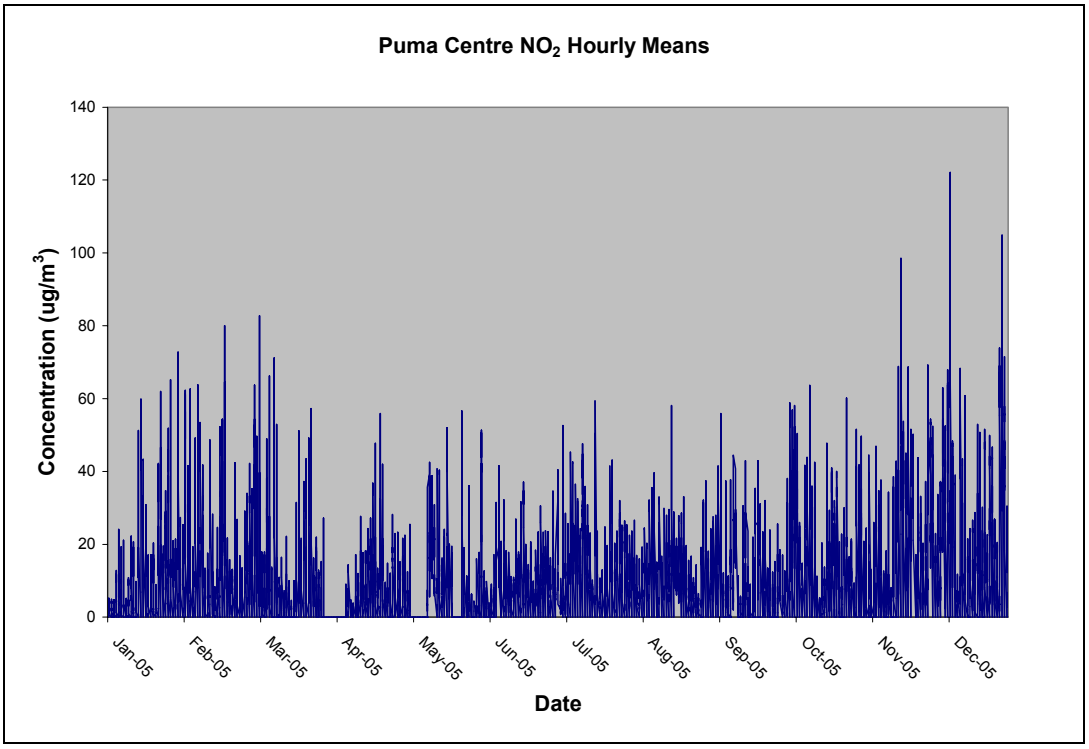


Figure 6.4

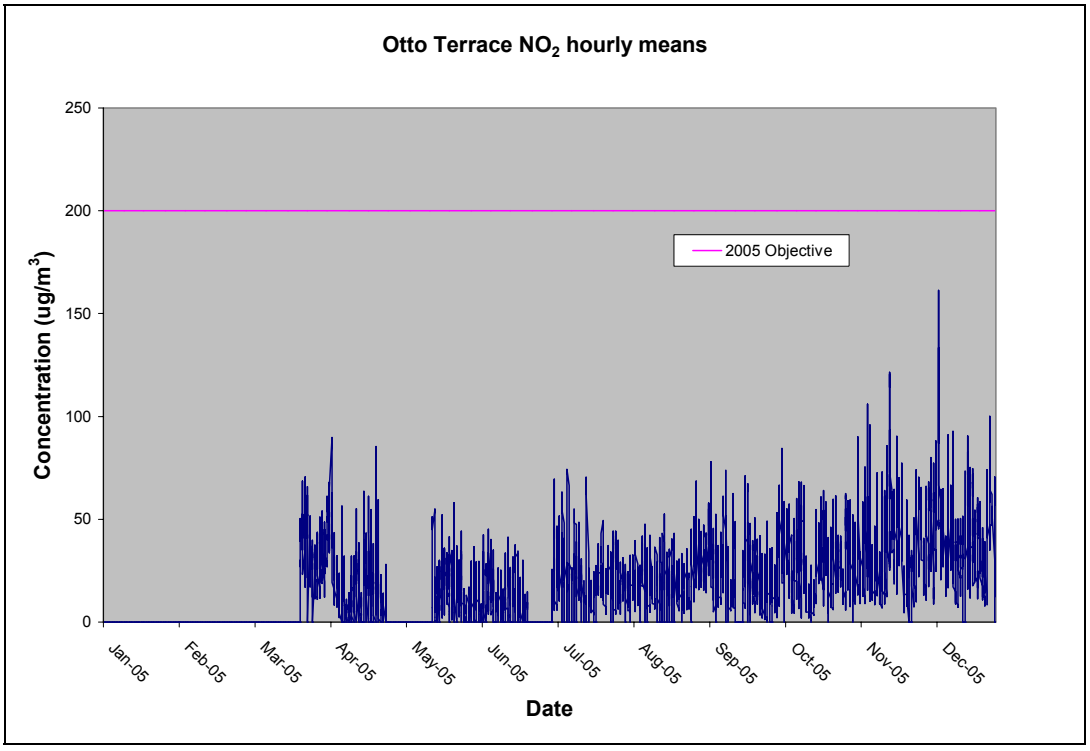


Figure 6.5

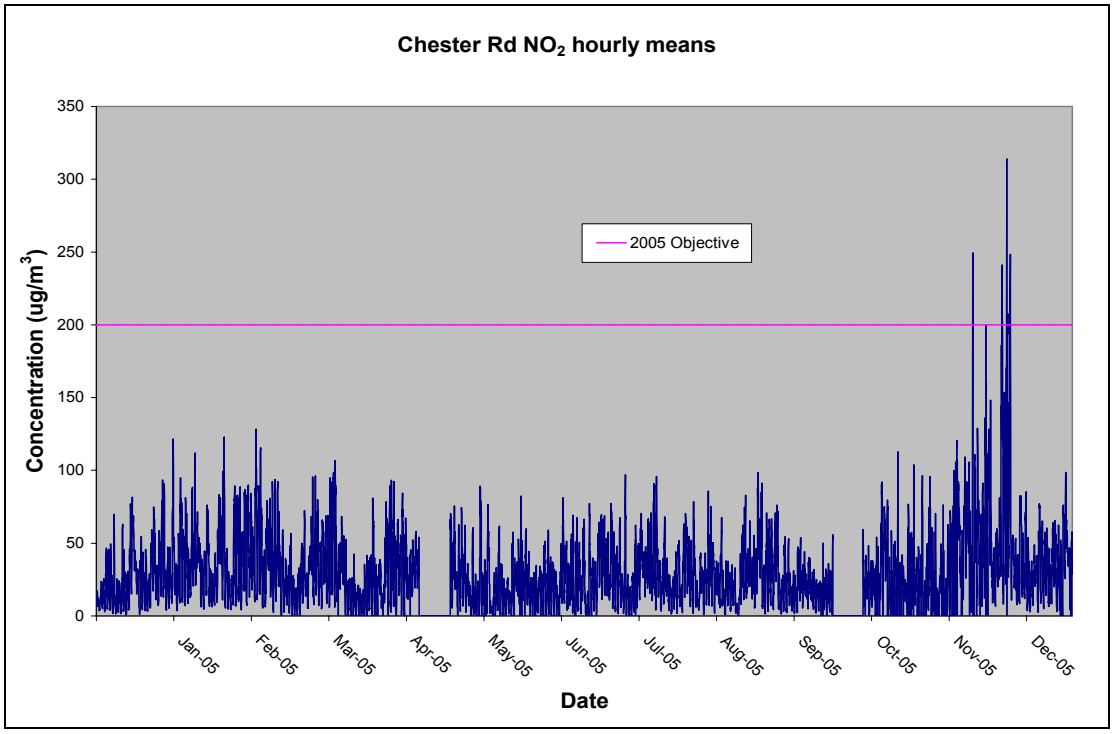
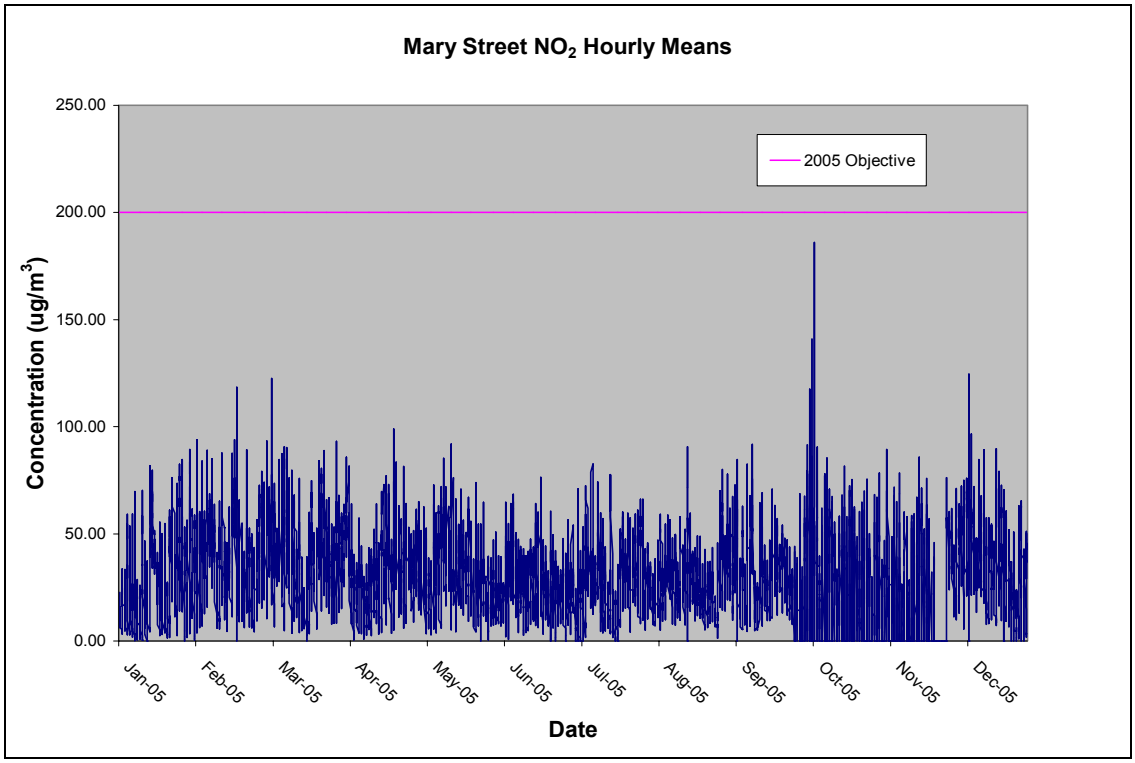


Figure 6.6



- All continuous monitoring sites meet both the hourly and annual 2005 objectives.

- Nitrogen dioxide is also measured using passive diffusion tubes across Sunderland at many sites and for several years. The number of sites had gradually increased predominantly focusing on roadside sites where there is relevant exposure and we now monitor at 48 locations.

- Co-location studies using tubes in triplicate are undertaken at two continuous monitoring sites, Trimdon Street and the Puma Centre, to enable a bias adjustment factor to be calculated and applied to the diffusion tubes. Puma Centre was used to provide the adjustment factor as it is an urban background site and deemed to be more representative of Sunderland as a whole.

Bias Adjustment (A)

Annual Mean Diffusion tube concentration = 15.6μg/m^3. (Dm)
Annual Mean Chemiluminesence concentration = 15.3μg/m^3. (Cm)

A = Cm/Dm
A = 15.3/15.6 = **0.98**

Diffusion tube bias (B)

B = (Dm – Cm)/Cm
B = (15.6 -15.3)/15.3 = **0.02** = Tubes over read by 2%.

Figure 6.7

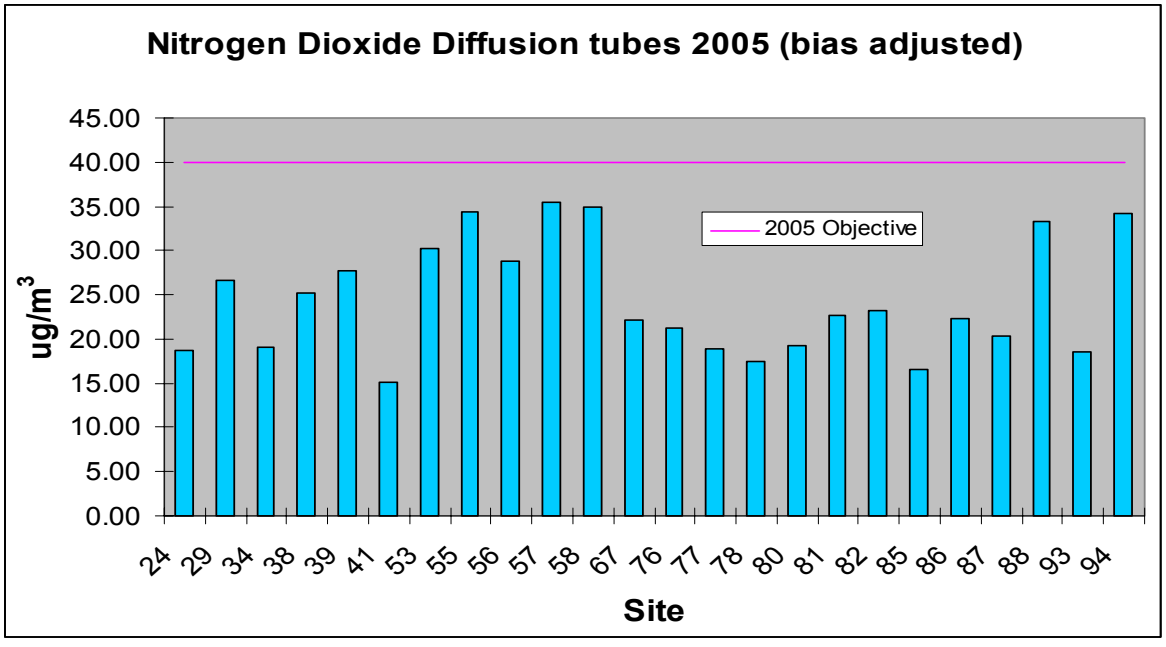
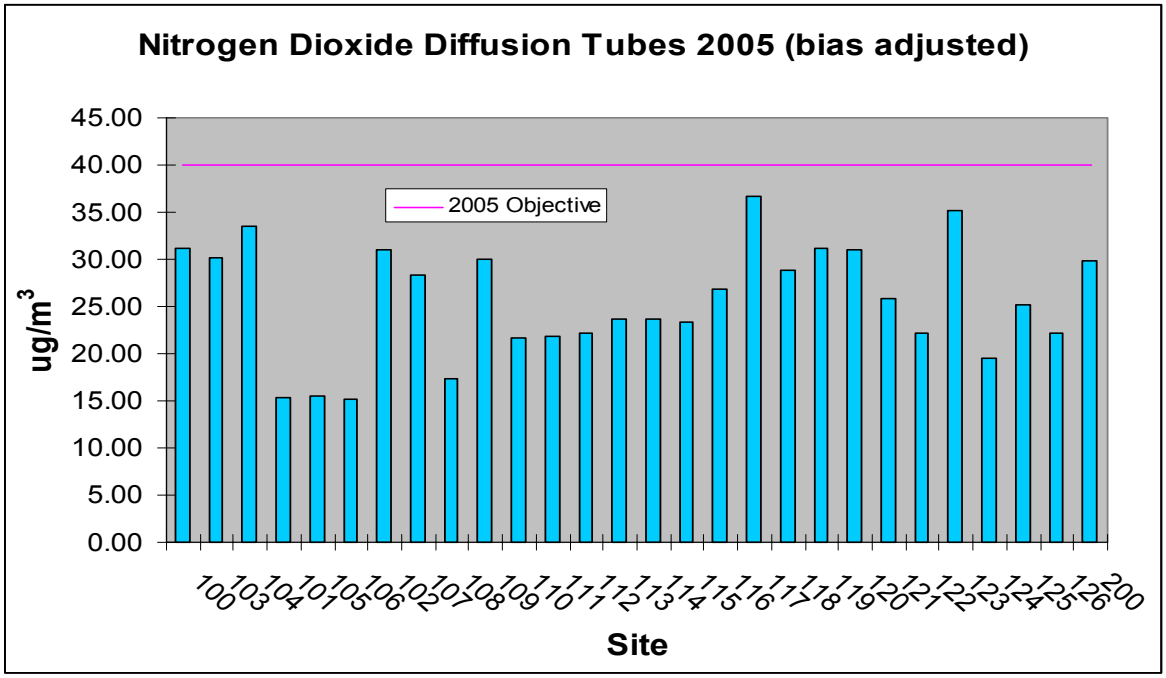


Figure 6.8



Figures 6.7 and 6.8 show the bias adjusted annual averages for 2005. The results show that none of the sites exceed the 40µg/m^3 objective.

(B) Monitoring Data within an AQMA

- Not applicable to Sunderland City Council as we have not declared an AQMA.

(C) Narrow congested streets with residential properties close to the kerb

- This was examined during the last R & A and it was found that there were no narrow congested streets as defined by TG(03) and this is still the case.

(D) Junctions

- During the last round of R & A junctions were highlighted which had daily traffic flows greater than 10,000 vehicles and with relevant exposure. DMRB modelling was then carried out with the results showing that there may be possible exceedences of the annual objective. These locations were further assessed in a Detailed Assessment and in the supplementary Detailed Assessment and it was concluded that an AQMA did not need to be declared. The junctions that showed potential exceedences using the DMRB model now have continuous analysers situated at them (Chester Road and Mary Street). The data from 2005 shows that both the annual

and hourly objectives at these junctions have not been exceeded. It is Sunderland City Councils intention to continue to monitor these locations.

(E) Busy streets where people may spend 1-hour or more close to traffic

Certain areas were considered during the last USA and DMRB was used to assess the locations. Since the last round a café bar close to a busy roundabout in the city centre has been identified as a location where people may spend 1-hour or more close to traffic. DMRB was used to predict the annual mean, which was calculated as 39.15μg/m3. This is below the threshold of 60μg/m^3, which indicates there should be no more than 18 hours above 200μg/$m^3$and no further assessment for this location is required.

(F) Roads with high flow of buses and/or HGV's.

- This was examined in the 2003 USA and certain roads were assessed using DMRB. The Stockton Road/Mary Street junction area was reviewed in a detailed assessment the results of which concluded that an AQMA should not be declared. Continuous monitoring is ongoing at this site at Mary Street and results from 2005 have not exceeded the objectives.

(G) New Roads constructed or proposed since the previous round of R&A

- There is a proposal for a new River Wear crossing but at present the scheme does not have planning permission and the environmental impact assessment has not been completed. The projected completion date is 2008 and this scheme may have impacts on existing roads. It is therefore Sunderland City Council's intention to further report on this scheme in future Progress Reports as more information becomes available.

(H) Roads with significantly changed traffic flows, or new relevant exposure

- There are no roads within Sunderland that have experienced "large" increases in traffic or new exposure.

(I) Bus Stations

- This was examined in the 2003 USA. DMRB was used to predict the annual mean and this did not exceed 40μg/m3 objective so we did not need to proceed further and this is still the case in 2006.

(J) New industrial sources

- There have been no new industrial sources since the 2003 USA.

(K) Industrial Sources with substantially increased emissions, or new relevant exposure

- There have been no industrial sources with substantially increased emissions or new exposure since the 2003 USA.

(L) Aircraft

- Not applicable to Sunderland

6.2 Conclusion

Continuous and passive monitoring results have shown that the statutory objectives were all met for Nitrogen Dioxide in 2005. Sunderland City Council has therefore decided not to proceed to a detailed assessment of nitrogen dioxide.

Updating and Screening Assessment for Sulphur Dioxide

OBJECTIVE: 15-minute mean of 266μg/m^3 not to be more Than 35 times per year. 1-hour mean of 350μg/m^3 to be exceeded no more than 24 times per year. 24-hour objective of 125μg/m^3 to be exceeded no more than 3 times per year.

7.0 Introduction

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.

Sunderland City Council concluded from the last round of R & A that all objectives would be met and did not proceed to a detailed assessment of sulphur dioxide.
Sunderland City Council has continued to assess sulphur dioxide concentrations since the last round of R & A.

7.1 Checklist

(A) Monitoring data outside an AQMA

- Continuous monitoring has been carried out at:

Site	Classification
Puma Centre, Silksworth	Urban Background
Otto Terrace, City Centre	Roadside
John Street, City Centre	Urban Background

- Maps of the monitoring locations are provided in Appendix 1. Table 7.1 provides a summary of continuous monitoring results for data collected in 2005. Only hourly data was available for John Street from the AURN data archive. The data shows that none of the three objectives were exceeded at any of the sites during 2005. Therefore it is not necessary to proceed to a detailed R&A on the basis of monitoring data.

(B) Monitoring data within an AQMA

- Not applicable to Sunderland City Council

Table 7.1

Site	No. of exceedences of 15-min mean & 99.9th %ile		No. of exceedences of hourly mean & 99.7th %ile		No. of exceedences of 24 hour mean & 99th %ile		Data Capture %
Puma Centre	0	26.08	0	23.7	0	10.64	79.9
Otto Tce	0	35.91	0	25.23	0	11.91	55.8
John St			0	13.0			

C New industrial Sources

- There are no new industrial sources within or around Sunderland since the last USA, therefore there is no requirement to consider these sources any further**.**

D Industrial Sources with substantially increased emissions

- None of the sources identified during previous rounds as potentially significant have substantially increased emissions

E Areas of Domestic Coal Burning

- This was investigated during the last USA. No areas of domestic coal burning were identified and the situation has not changed.

F Small Boilers > 5MW (thermal)

- **Identify all boiler plant > 5MW that burn coal or fuel oil**
  There have been no new boiler plants identified since the last round of R & A.

G Shipping

- There are 700 ship movements per year into and out of the Wear this is below the stated threshold of 5000 and therefore there is no requirement to assess the potential Sulphur Dioxide from this source. The situation has not changed.

H Railway Locomotives

- Two train operators were identified in the Sunderland area. These were Arriva, who operate a passenger service, and EWS who run freight trains. After discussions with representatives of both Arriva and EWS it was concluded that at no time would diesel locomotives be stationary for more than 15 minutes. Both companies stated that it was company policy not to allow their train engines to idle for more than 15 minutes. This situation has not changed since the last USA.

7.2 Conclusion

- Monitoring data has demonstrated that all statutory objectives are predicted to be met for the 2004 and the 2005 objective. Industrial and transport sources have been screened and do not need further assessment. Sunderland City Council has therefore decided not to proceed to a detailed review and assessment of sulphur dioxide.

Updating and Screening Assessment for PM_{10}

Objective: 24 hour mean of 50μg/m^3 not to be exceeded more than 35 times a year by 2004
Annual mean of 40μg/m^3 by 2004

8.0 Introduction

The APEG[1] report has confirmed that PM_{10} sources can be divided into 3 main categories. Primary particle emissions are derived directly from combustion sources, including road traffic, power generation and industrial processes. Secondary particles are formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates. Coarse particles comprise of emissions from a wide range of sources, including resuspended dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles. The focus of LAQM is on control of emissions at a local level.

Sunderland City Council concluded from the last round of R & A that all objectives would be met and did not proceed to a detailed assessment of PM_{10}. Sunderland City Council has continued to assess sulphur dioxide concentrations since the last round of R & A.

8.1 Checklist

(A) Monitoring Data (outside an AQMA)

- Continuous monitoring has been carried out at:

Site	Classification
Puma Centre, Silksworth	Urban Background
Otto Terrace, City Centre	Roadside
Trimdon Street, City Centre	Kerbside

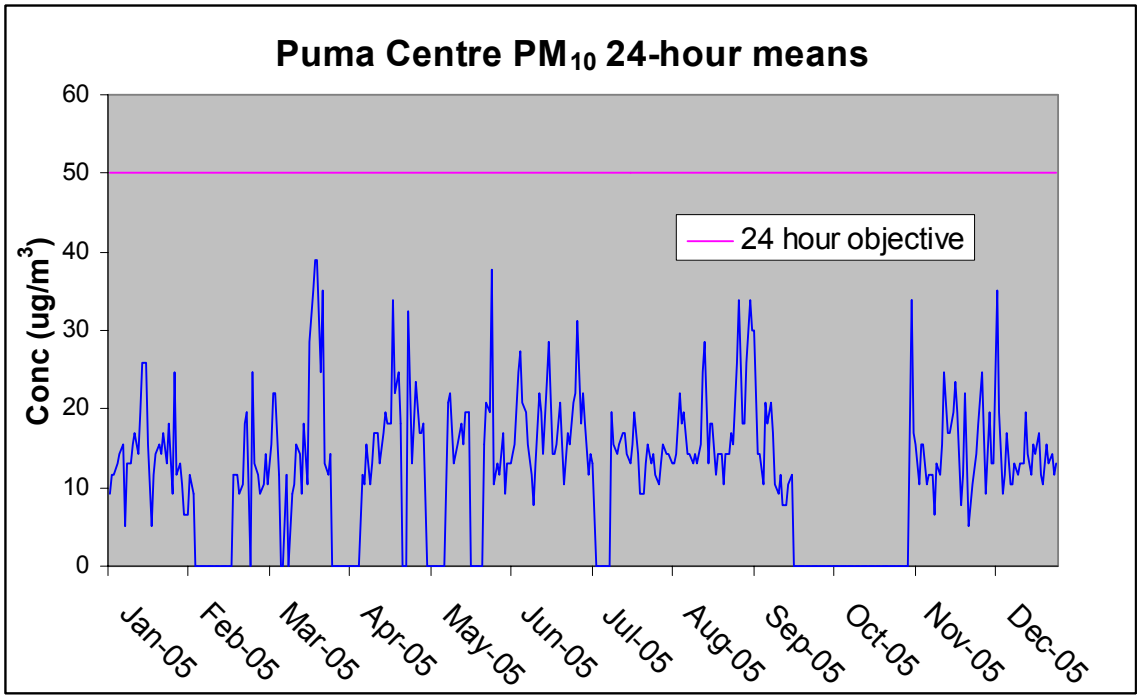
- Monitoring was carried out using a TEOM at all 3 sites and data has been multiplied by a factor of 1.3 in accordance with LAQM TG. (03). Maps of the monitoring locations are provided in Appendix 1. Table 8.1 provides a summary of continuous monitoring results for data collected in 2005 and figure 8.2 shows data for the Puma Centre. The data shows that both the objectives were met at all of the sites during 2005. 90th percentiles were calculated for the sites as 90% data capture had not been achieved and these too fell below the threshold of 50μg/m^3.

[1] APEG (1999) *Source apportionment of airborne particulate matter in the United Kingdom*. Report of the Airborne Particles Expert Group.

Table 8.1

Site	Year	No. of exceedences of 24-hour objective (50µg/m^3)	90th percentile	Maximum 24-hr average recorded	Annual Mean (Objective = 40µg/m^3)	Data Capture %
Trimdon Street	2005	8	40.3	152.1	27.3	55.6
Puma Centre	2005	0	24.7	39	15.6	73.7
Otto Tce	2005	0	35.1	68.9	23.4	66.3

Figure 8.2



- Therefore it is not necessary to proceed to a detailed R&A on the basis of monitoring data.

(B) Monitoring data within an AQMA

- Not applicable to Sunderland City Council

(C) Busy roads and junctions in Scotland

- Not applicable to Sunderland City Council

(D) Junctions

- Junctions identified as having flows of greater than 10,000 vehicles have been modelled using DMRB during the last round of R & A. There are no junctions which exceed the objectives for particulate matter for the year 2005.

(E) Roads with high flow of buses and/or HGVs

- This was covered in the previous round of R & A and the results of DMRB did not predict an exceedence. The situation has not changed.

(F) New Roads constructed or proposed since last round of R & A

- As mentioned in the Nitrogen dioxide chapter, there is a proposal for a new River Wear crossing but at present the scheme does not have planning permission and the environmental impact assessment has not been completed. The projected completion date is 2008 and this scheme may have impacts on existing roads. It is therefore Sunderland City Council's intention to further report on this scheme in future Progress Reports as more information becomes available.

(G) Roads with significantly changed traffic flows, or new relevant exposure

- There are no roads within Sunderland that have experienced "large" increases in traffic or new exposure.

(H) Roads close to the objective during the second round of R & A

- There were no roads identified during the last round where between 25 and 35 days exceedences of the 24-hour objective were predicted. The situation has not changed.

(I) New industrial Sources

- There is one new industrial source that has the capacity to emit significant quantities of particulate matter which within Sunderland. This is a mobile crusher situated on Hetton Lyons Industrial Estate, Hetton-le-Hole. The crusher has a Part B Permit held by the company Altrac.
- Assessment of the mobile crusher (although it is held permanently on a fixed site) indicates no relevant exposure as it is located in an industrial area industrial where long term exposure by residents is unlikely. Sunderland City Council makes regular visits to the site to ensure Permit conditions are being adhered to.

(J) Industrial Sources with substantially increased emissions

- There have been no industrial sources with substantially increased emissions or new exposure since the 2003 USA.

(K) Areas of Domestic Solid Fuel Burning

- This was investigated during the last USA. No areas of domestic coal burning were identified and the situation has not changed.

(L) Quarries/ landfill sites/ opencast coal/ handling of dusty cargoes at ports etc

- Fugitive emissions were assessed during the last round of R & a and the decision was made not to proceed to a detailed assessment for fugitive emissions. As mentioned in section (I) there is one new industrial source since the last round of R & A and emissions have been assessed.

- It must be established whether there is relevant exposure 'near' to the sources of dust emission. LAQM. TG (03) defines 'near' within 1000m if the estimated 2004 annual mean background is greater to or equal to 27$\mu g/m^3$, within 400m if the 2004 background if greater or equal to 26$\mu g/m^3$, and within 200m if 2004 background is <26 $\mu g/m^3$. Using these criteria it can be established that the mobile crusher at Altrac does not have relevant exposure and therefore there is no need to proceed further for fugitive emissions.

8.2 Conclusion

- Monitoring data has demonstrated that all statutory objectives are predicted to be met for the objectives. Industrial, transport and fugitive sources have been screened and do not need further assessment. Sunderland City Council has therefore decided not to proceed to a detailed review and assessment of PM_{10} at this stage. However, it is likely that further assessment will be needed when the 2010 objective comes into force.

Updating and Screening Assessment Conclusion

Following this updating and screening assessment Sunderland City Council will not proceed to a detailed assessment for any of the seven pollutants, as it is unlikely that any of the objectives will be exceeded.

Monitoring of pollutants will continue across Sunderland and the results will be reported in Annual Progress Reports along with assessments of any substantial changes to transport or industrial sources in the area.

Appendix 1

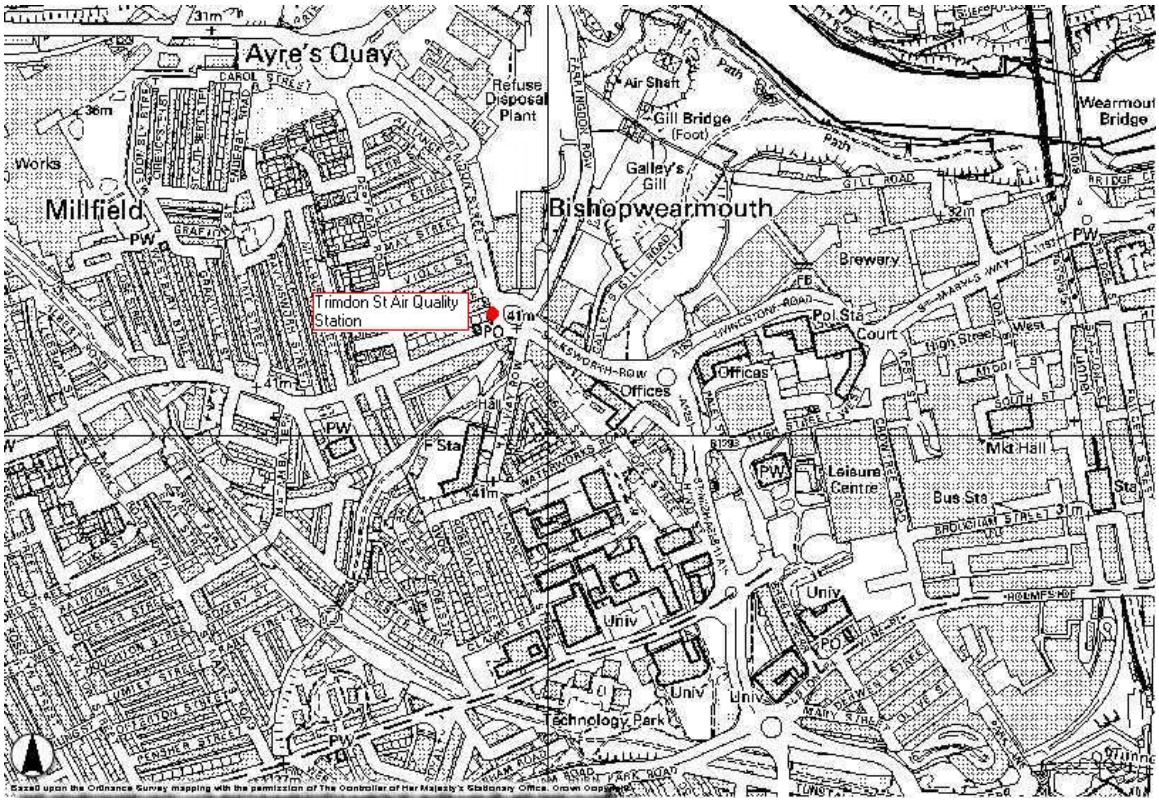
Monitoring Site Descriptions

Automatic Monitoring Stations Site Description

Trimdon Street Station

Trimdon Street Air Quality Station is a kerbside site on a busy 5-arm roundabout in the city centre. It can be classified as a Kerbside (U1) site according to LAQM (TG03) and is 0.5m from the edge of the road.

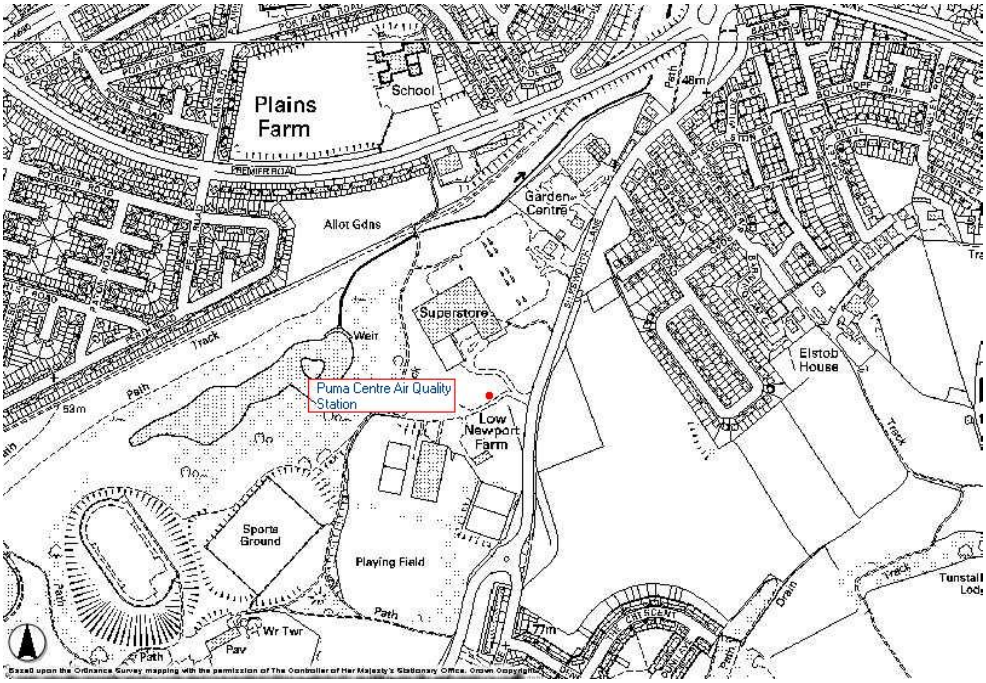
Traffic Flow past the station on the major link (Silksworth Row to Trimdon Street) is approximately 26,000 AADT. There are also two additional traffic links on the roundabout that have an AADT of 10,555 and 1,160. The station has been in place since Sept 2000 and measures NO_x, PM_{10}, and Wind Speed & Direction.



Puma Centre Station

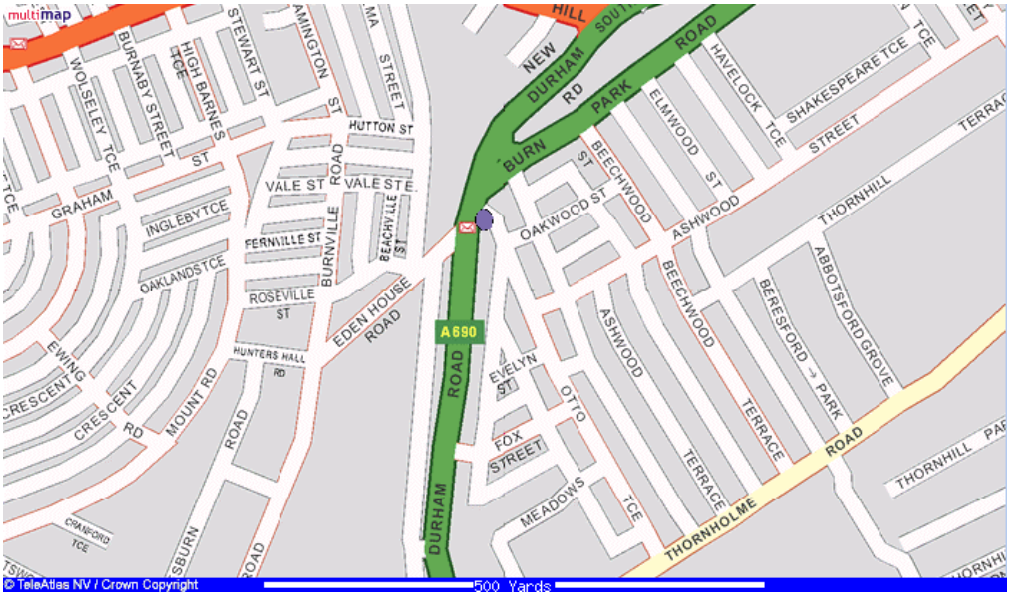
The Puma Centre Air Quality station is situated in the grounds of the Silksworth Sports Complex on the sports centre access road adjacent to Silksworth Lane. It can be classified as an Urban Background site (U4) according to LAQM TG (03). Traffic flows on Silksworth Lane, which is the closest 'busy' road, are approx. 12,000 AADT

The station has been in place since September 2001 and measures NO_x, PM_{10}, SO_2, CO,O^3 and Wind Speed & Direction. The station has also been adopted into the AURN network for O_3 and NO_x.



Otto Terrace

This site was monitored for 12 months between March 2005 and March 2006. The air quality station used is shared between the local authorities of the Tyne & Wear Air Quality Group and each authority receives the station for approximately 9 months each in turn. The site is on a main road the A690 leading to the city centre. It can be classified as a Roadside site according to LAQM TG (03). The station measures NO_x, PM_{10}, SO_2 and CO.



Sunderland Nitrogen Dioxide Diffusion Tube Sites 2004-2005

Tube	Site Address	Back ground	Grid Reference Easting	Northing
24	3 Rothley, Fatfield, Washington	R	431568	554800
29	Arndale House, St Mary's Way	R	439508	557151
34	209 Newcastle Road, Fulwell	R	439266	559212
38	17 Parkside South, East Herrington	B	435714	552473
39	15 John Street, Central	R	439835	556978
41	The Golden Lion, Lion Place, South Hylton	B	434997	556811
53	166 Chester Road, Millfield	R	438568	556566
55	25 Eden Vale, Thornholme	R	438690	556135
56	101 Southwick Road, Southwick	B	439101	558282
57	5/6 Northbridge Street, Monkwearmouth	R	439664	557829
58	6 Beatrice Terrace, Shiney Row	R	432634	552616
67	39 Ferryboat Lane, Hylton Castle	R	432634	552616
76	8 Burn Hope Road, Barmston, Washington	B	431705	556786
77	31 Mendip Drive, Lambton, Washington	R	430040	555002
78	Highfield Hotel, 101 Durham Rd East Rainton	R	433338	547848
80	Dame Dorothy Primary School, Monkwearmouth	B	440178	557937
81	47 Howick Park, Monkwearmouth	R	439690	557638
82	20 Marlborough Road, Hastings Hill	R	435097	555166
83	The Wavendon, Wavendon Cres, High Barnes	R	437009	555802
84	B.P.Filling Station, Wessington Way	R	435664	557816
85	North Moor Housing Office, Nth Moor Lane	R	437043	554207
86	2 Alice Street, Thornholme	R	439466	556484
87	Dicken's Street, Southwick	R	438095	558354
88	Hind's Street, Central	R	439160	556995
93	34A Durham Road, Middle Herrington	R	436290	553566
94	8 Vine Place Central	R	439423	556738
100	Air Quality Station, Trimdon Street	R	438928	557151
101	Puma Centre, Silksworth Lane	B	438116	554462
102	Lamppost, AQ Station, Station Road, Hetton	R	435278	547463
107	Lamp post, Morningside, Rickleton	R	428629	553809
108	The Touks, Peareth Hall Rd, Donwell	R	429555	558545
109	23 Newcastle Road	R	439648	558120
110	94 Fulwell Road	R	439901	558514
111	237 Queen Alexandra Rd	R	438453	555507
112	43 The Broadway	R	436746	555726

113	Lamp post junction of Durham Rd /Premier Rd	R	437446	554989
114	University Creche, Chester Road	R	439190	556823
115	4, Mowbray Alms Houses	R	439333	556936
116	9 Derwent Street	R	439451	556718
117	3, Holmside, City Centre	R	439495	556795
118	27 Bridge Street	R	439696	557205
119	4 Athenaeum Street	R	439792	556921
120	Gillespies, John Street	R	439806	557063
121	12 Windsor Terrace	R	440702	554722
122	University Flats, High Street East	R	440121	557255
123	263 Chester Road	R	437943	556341
124	35 Rydal Mount	R	435494	557711

Benzene Diffusion Tubes Sites 2004 - 5

Tube	Site Address	Back ground	Grid Reference	
			Easting	Northing
B1	Puma Centre, Silksworth Lane	B	438116	554462
B2	237 Queen Alexandra Road	R	438453	555507
B3	43 The Broadway	R	436746	555726
B4	Blank			
B5	Fieldview Nursing Home, Thompson Rd	R	438869	559078

Appendix 2

QA/QC

QA/QC of Diffusion Tubes

Laboratory Accreditation

Sunderland diffusion tubes are supplied and analysed by Gradko International Ltd, Winchester, Hampshire.
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.

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 using

- 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 are 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.

QA/QC of Continuous Analysers

The QA/QC procedures of Sunderland are based on the AUN Site Operator's manual along with training received from our equipment suppliers, EMC who are part of the Casella Group (formerly ETI).

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 EMC.
- 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 2-3 days 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.
- Enview 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 is reviewed 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 Enview software has been set up to automatically rescale the data using the factor calculated from the daily calibration check so there is no requirement to rescale the data set.
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.