Environmental Health
Local Air Quality Management

Progress Report 2008

Raising Standards- Protecting You

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1 INTRODUCTION

The Environment Act 1995 (Reference 1) and subsequent Regulations (References 2-3) require local authorities to undertake a review and assessment of air quality in their area from time to time. The National Air Quality Strategy (NAQS) objectives as defined in the Act and subsequent objectives are provided for reference in Table 1.

The third round of review and assessment commenced in 2006 for which South Ayrshire Council submitted an Updating and Screening Assessment (U&SA) to the Scottish Executive in May 2006. The report evaluated emission sources and monitoring data for the area against NAQS objectives. This report is published on the web and can be accessed under: http://www.south-ayrshire.gov.uk/environmentalhealth/Downloads/LAQMUSA2006.pdf

Since the annual average PM_{10} level at Sandgate Ayr was close to the 2010 objective level it was necessary for the Council to undertake a Detailed Assessment for that pollutant. This detailed assessment was submitted in September 2007 it is also published on the web and can be accessed under**:** http://www.south-ayrshire.gov.uk/environmentalhealth/Downloads/2007%20Detailed%20Assessment.pdf

The findings of that assessment was that the levels were below the 2010 objective level but it was concluded that monitoring would continue at that location. Additional monitoring data is therefore included in this report for that site. This report forms South Ayrshire Council's Annual Progress Report to the Scottish Executive as required by LAQM Technical Guidance LAQM.TG(03) and Progress Report Guidance LAQM.PRG(03) (Reference 5)

Table 1: Objectives included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the Purpose of Local Air Quality Management

Pollutant	Objective		Date to be Achieved By
	Concentration	Measured As	
Benzene	3.25 µg/m^3 (1 ppb)	Annual mean	31.12.10
1,3-butadiene	2.25 µg/m^3 (1 ppb)	Running annual mean	31.12.03
Carbon monoxide	10 mg/m^3 (8.6 ppm)	Max daily running 8-hour mean	31.12.03
Lead	0.5 µg/m^3	Annual mean	31.12.04
	0.25 µg/m^3	Annual mean	31.12.08
Nitrogen Dioxide (NO_2)	200µg/m^3 (105ppb) not to be exceeded more than 18 times per year[1]	1 hour mean	31.12.05
	40µg/m^3 (21ppb)	Annual mean	31.12.05
Particulates (PM_{10})	50µg/m^3 not to be exceeded more than 35 times per year[2]	24 hour mean	31.12.04
	40µg/m^3	Annual mean	31.12.04
	50µg/m^3 not to be exceeded more than 7 times per year[3]	24 hour mean	31.12.10
	18µg/m^3	Annual mean	31.12.10
Sulphur dioxide (SO_2)	350µg/m^3 (132ppb) not to be exceeded more than 24 times a year[4]	1 hour mean	31.12.04
	125µg/m^3 (47ppb) not to be exceeded more than 3 times a year[5]	24 hour mean	31.12.04
	266µg/m^3 (100ppb) not to be exceeded more than 35 times a year[6]	15 minute mean	31.12.05

[1] corresponds to the 99.79th percentile concentration of hourly means
[2] corresponds to the 90th percentile concentration of 24-hour means
[3] corresponds to the 98th percentile concentration of 24-hour means
[4] corresponds to the 99.7th percentile concentration of 1-hour means
[5] corresponds to the 99th percentile concentration of 24-hour means
[6] corresponds to the 99.9th percentile concentration of 15-minute means

2 MONITORING DATA

South Ayrshire Council maintains a monitoring network throughout the Council area, the sites are located as follows:

- Twenty- two NO_2 diffusion tube sites throughout the district.

- Two real time Chemiluminescent NOX analysers together with two real time TEOM PM_{10} units with FDMS upgrades fitted together with web-logger functionality.
  One of which is based at New Bridge St Ayr and the other at Tarbolton Primary School. Due to teething problems associated with the installation of this equipment meaningful data was not available until January 2008.

- Four benzene diffusion tube sites are currently in use. Up till April 2007 three were located within Maybole and one rural location within Rozelle Park in Ayr. However the use of the Cameron's Garage site in Maybole ceased in April 2007 and was substituted by the Ewanfield Place site in Ayr in August 2007.

- Two SO2 passive sampling (bubbler) sites- one in Dundonald and one in Girvan. Unfortunately a defect in the equipment at Dundonald in 2007 meant that there was insufficient data gathered to report meaningful results.

2.1 Benzene

Passive monitoring of benzene is undertaken using Chromosorb 106 adsorbent tubes. The diffusion tubes are left in position for a period of one month. The monitored concentration is then averaged over the exposure period. Analysis is carried out by Glasgow Scientific Services using thermal desorption, gas chromatography-mass spectrometry and is quantified against an 'internal standard' (benzene d6).The benzene mass is then corrected against a travel blank. Annual mean concentrations for 2006 and 2007 across the five sites are displayed in table 2.

As can be seen, on no occasion did the annual mean exceed the NAQS level of 3.25 $\mu g/m^3$ which is to be achieved by 31.12.2010.

Table 2: Annual Mean Benzene Concentrations in South Ayrshire

Site	Annual Mean 2006		Annual Mean 2007	
	% Capture	$\mu g/m^3$	% Capture	$\mu g/m^3$
Camerons Garage, Maybole	83	1.66	33	1.33
Safeway, Maybole	92	0.94	75	0.94
Town Hall, Maybole	100	1.1	75	0.91
Rozelle Park, Ayr	100	0.36	33	0.36
Ewanfield Place, Ayr	0	N/A	17	0.39

2.2 Nitrogen Dioxide

There are a total of twenty- two working sites using diffusion tubes. In addition two real time analysers were installed at High Street Ayr and Tarbolton Primary School and the results for the four months January – April 2008 are shown. The QA and QC procedures in place in the monitoring data are discussed in section 2.1.1 whilst monitoring data obtained is discussed in section 2.1.2

2.2.1 NO_2 QA /QC Procedures

Laboratory analysis of the passive diffusion tubes is undertaken by Glasgow Scientific Services (GSS). GSS prepares the diffusion tubes using the technique of 20% TEA in water.
The laboratory undertakes the analysis of diffusion tubes from Glasgow City Council, which undertakes an annual co-location study of diffusion tubes from automatic monitoring stations in the city for the purposes of validation.

GSS participate in the AEA Technology laboratory inter -comparison scheme.
The scheme whilst assessing the analytical performance of laboratories, also allows for the performance of the laboratory against chemiluminescence techniques to be determined.
A laboratory bias for GSS was therefore determined using the methodology contained in the LAQM technical guidance document LAQM TG(03) (reference 3)
The bias factor determined for 2006 was 0.93 and was applied to all sites; likewise the bias adjustment factor for 2007 was 0.93 and again was applied to all sites.

2.2.2 NO_2 Monitoring Data

A brief description of each of the monitoring sites is provided in table 3. As can be seen from table 3 the majority of sites have benefited from one hundred percent capture rate.

The annual mean NO_2 concentration recorded at each of the monitoring sites is also presented in table 2. Monitoring results for 2006 and 2007 have been adjusted for the calculated laboratory bias factor for the respective years.

The measured annual mean concentration at each of the monitoring sites is below the NAQS objective standard of 40 µg/m^3. From 2003 to 2004 the majority of the sites have shown a slight reduction in the nitrogen dioxide levels.

The automatic monitoring data is displayed in Table 4.There were no exceedences of the 1 hour objective of 200 µg/m^3 nor was there any exceedence of the annual mean objective of 40 µg/m^3

Table 3: Annual Mean NO_2 Concentrations in South Ayrshire for 2006 and 2007

Location	Site Category	2006		2007	
		Data Capture %	Results (µg/m^3)	Data Capture %	Results (µg/m^3)
Craigie Park Ayr	Urban Background	100	6	92	4
Rozelle Park Ayr	Urban Background	100	5	100	4
Town buildings Ayr	Kerbside	92	39	100	34
Ayr College	Kerbside	100	14	92	12
Heathfield PS Ayr	Kerbside	100	18	92	15
Prestwick Rd Ayr	Kerbside	100	38	92	29
Beresford Terr Ayr	Kerbside	92	38	100	30
Tesco Ayr	Kerbside	100	20	100	18
Kingcase Garage P'wick	Kerbside	100	26	100	23
Shaw Rd P'Wick	Kerbside	92	21	100	19
Shaw Farm Gdns P'wick	Kerbside	92	16	100	14
Dundonald	Kerbside	100	10	100	9
Kilmarnock Rd Troon	Kerbside	92	16	100	14
Templehill Troon	Kerbside	100	10	100	8
Ardneils Troon	Kerbside	75	12	92	10
Loans	Kerbside	92	14	100	11
Coylton	Kerbside	83	10	92	9
Mossblown	Kerbside	92	12	100	12
Monkton	Kerbside	100	18	100	15
Dalrymple St Girvan	Kerbside	75	18	100	14
Henrietta St Girvan	Kerbside	100	10	100	7
Camerons Maybole	Kerbside	83	26	100	21

Table 4: Automatic NO_2monitoring stations January – March 2008.

Site	No. Of Exceedences Of One Hour Mean (200 µg/m^3)	Annual Mean µg/m^3
Ayr High Street	0	14.80
Tarbolton Primary School	0	8.19

2.3 Particles (PM_{10})

South Ayrshire Council monitored PM10 at New Bridge Street Ayr using a tapered element oscillated microbalance (TEOM) analyser. The results from this were reported in the detailed assessment, which was submitted in September 2007. The conclusions of that report were that it was unlikely that there would be in exceedence of either annual mean or 24-hour mean PM10 objectives in 2010 however further monitoring should be carried out.

That site and the Tarbolton Primary School site were upgraded to FDMS in October 2007 however due to teething problems with the new analysers, the first set of meaningful results were not obtained until January 2008. Therefore only three months of new data is available for reporting at this time and is displayed in table 5. Using the methods and factors described in LAQM Technical Guidance the 2008 annual mean concentrations have been factored to predict the likely annual mean concentration at the site in 2010. The figure for New Bridge Street site is close to the objective level of 18 µg/m^3. However it should be borne in mind that this sampling period only covers three months and once the full 12 month monitoring data is available for 2008 that will be presented in the US&A report in 2009.

Table 5: PM10 concentrations 1st January – 30th March 2008

Site	Period annual mean concentrations (µg/m^3)	Projected 2010 annual mean concentrations (µg/m^3)
New bridge Street Ayr	19.51	18.09
Tarbolton Primary School	11.18	10.62

2.4 Sulphur Dioxide

South Ayrshire Council monitors SO2 using two eight port bubblers, one at Dundonald Activity Centre and the other at the Road Depot within Grangeston Industrial Estate Girvan. There are no QA or QC procedures in place to validate the results. Analysis of the solution takes place at Glasgow Scientific Services.

The SO2 bubblers monitor over 24 hour periods. The annual mean concentration and the maximum 24 hour mean concentration monitored at the site are presented in table 4. Technical guidance LAQM TG (C03) provides a correction factor to adjust mean concentrations for comparison with hourly and fifteen minute mean objectives, the correction factors are:

99.9^{th} percentile of fifteen minute means =1.8962 x the maximum daily mean
99.7th percentile of one hour mean = 1.63691 x maximum daily mean

The correction factors have been utilised and these results are also presented in table 4. Unfortunately, due to a defect with the bubbler at Dundonald in 2007 meant that there was insufficient data gathered to report meaningful results.

SO_2 Concentration measured at both these locations over a period of several years have revealed that they are significantly lower than the objective levels and it is therefore unlikely that any of the NAQS objectives for SO_2 will be exceeded within South Ayrshire.

As a result we have now ceased monitoring for SO_2 at both these locations and consideration will be given to whether any other sites within the district should be monitored.

Table 6: SO_2 Concentrations In South Ayrshire for 2006 and 2007

	Dundonald		Girvan		Equivalent Objective Standard (µg/m^3)
	2006	2007	2006	2007	
Annual Mean Concentration (µg/m^3)	12	-	14	18	-
Maximum Daily mean Concentration (µg/m^3)	33	-	34	43	125
99.7th percentile of I-hour Means (µg/m^3)	54	-	56	70	350
99.9th percentile of 15-minute Means (µg/m^3)	62	-	64	82	266

3 New Local Developments

Since the Upgrading and Screening Assessment Report was completed in June 2006, no planning applications have been submitted to the Council, which have the potential to significantly affect local air quality.

4 Conclusions

South Ayrshire Council's Upgrading and Screening Assessment in June 2006 concluded that it was unlikely that the NAQS objectives for benzene, 1,3-butadiene, carbon monoxide, lead, NO2, SO2 or PM10 in 2004 would be exceeded. Monitoring data obtained within South Ayrshire during 2006 and 2007 for NO2, SO2 and benzene indicate that the conclusions of U & SA remain valid.

The Detailed Assessment produced in 2007 for PM10 levels at New Bridge Street, Ayr concluded that it was unlikely that the 2010 objective level would be exceeded. The limited new data available in this report indicates that the 2010 level will be close to the objective; however it is considered that three months data is insufficient to predict the overall 2008 level. It is our intention therefore to continue monitoring at this site and present further data in the 2009 US&A report.

No monitoring data is available for the remaining pollutants, however no significant new emissions sources have been identified since the last Updating and Screening Assessment was produced in 2006.

The conclusions of the 2006 Updating and Screening Assessment, that it is unlikely that there will be any exceedences of any NAQS objectives, remain valid.

5 References

Reference 1: UK National Air Quality Strategy for England, Wales, Scotland and Northern Ireland, Department of Environment, Food and Rural Affairs, January 2003

Reference 2: Air Quality Regulations, 2000

Reference 3: Air Quality (Scotland) Regulations 2002

Reference 4: Local Air Quality Management, Updating and Screening Assessment for South Ayrshire Council, BMT Cordah Limited, May 2006

Reference 5: Local Air Quality Management, Technical Guidance LAQM.TG(03), Scottish Executive, February 2003