

Middlesbrough - England



2010 Air Quality
Progress Report for
MIDDLESBROUGH

In fulfillment of Part IV of the Environment Act 1995
Local Air Quality Management

May 2010

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Executive Summary

This report is the ninth in the series of Air Quality Review and Assessments carried out in the Middlesbrough Council area under the Environment Act 1995.

The first Review and Assessment of Air Quality 2000, was submitted to Government in December 2000, and was based on a comprehensive review of pollutant emission and monitoring data between 1996 and 1999. The report concluded that air quality in Middlesbrough judged against Government objectives, was good, and there was no need to declare any Air Quality Management Areas; a fact supported by national government.

The second Review and Assessment of Air Quality, an Updating and Screening report, was submitted to Government in May 2003. The report concluded that air quality in Middlesbrough would meet Government objectives by the due date, and there was no need to declare any Air Quality Management Areas.

For 2004 and 2005, Progress reports were submitted to Government, updating monitoring data and trends, and recording significant developments and changes to pollutant emissions.

The fifth Review and Assessment of Air Quality, an Updating and Screening report, was submitted to Government in May 2006. The report concluded that air quality in Middlesbrough would meet Government objectives by the due date, and there was no need to declare any Air Quality Management Areas.

For 2007 and 2008, Progress reports were submitted to Government, updating monitoring data and trends, and recording significant developments and changes to pollutant emissions.

The eighth Review and Assessment of Air Quality, an Updating and Screening report, was submitted to Government in May 2009. The report concluded that air quality in Middlesbrough would meet Government objectives by the due date, and there was no need to declare any Air Quality Management Areas. This report was the first submitted under the new web-based reporting system.

All reports submitted have been accepted in full by the national government.

This report for 2010 is a Progress report updating monitoring data for 2009, historical trends, and recording significant developments and changes to pollutant emissions.

Government objectives for air quality currently cover seven pollutants:

- Nitrogen dioxide
- Particulate PM10
- Sulphur dioxide
- Carbon monoxide
- Benzene
- 1,3-butadiene
- Lead

The main sources of these pollutants are domestic / commercial heating emissions, road traffic fuel and exhaust emissions, and industrial combustion and process emissions, with some pollution imported, dependant on weather conditions

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Within Middlesbrough, domestic / commercial heating is largely fuelled by natural gas, which gives low levels of emissions compared with other carbon based fuels. There is 1 part A industrial process within the Council area, with low emissions, but there are many more large industrial processes in the neighbouring Tees Valley Council areas. This is no significant change from the earlier reviews, and they can from time to time impact on ground level pollutant concentrations. Overall, however, it is road traffic fuel and exhaust emissions that remain the largest source of air pollution at ground level.

While, in general, improved fuels, engines and exhaust systems are reducing road traffic emissions, traffic volume increases and the low point of discharge is still giving rise to high kerbside concentrations of nitrogen dioxide and particulate PM10. This is particularly so where there are very heavily congested roads with tall buildings creating a 'canyon' effect and limiting dispersal, such as can be found in older city centres. Middlesbrough does not have roads of this type, even in the central area of Middlesbrough. The main shopping area is extensively pedestrianised, and while the busy main A66 east – west route acts as the main through-route and feeder to the town centre, there are no potential areas of relevant public exposure in its immediate vicinity. The north – south A19 trunk road passes to the west of Middlesbrough, but is well away from public exposure areas.

Continuous monitoring carried out within Middlesbrough has shown that there is no exceedance of government objectives from traffic or from industry. Further support is provided by the results from continuous monitoring carried out elsewhere in the Tees Valley area (reference 1).

Further evidence of the generally good quality of air in the Tees Valley is found in reference 3, a five year analysis 2004 – 2008 of all continuous monitoring results against the UK Air Quality Banding system, published in January 2010. This system looks at potential health risks associated with short-term exposure to nitrogen dioxide, particulate PM10, sulphur dioxide, carbon monoxide and ozone, and concludes that on this measure of air quality, Middlesbrough air quality is better than the national average.

In 2005, a comprehensive traffic pollution study (reference 4) was carried out across the Tees Valley using the Highways Agency model. Within Middlesbrough the study looked at a continuous monitoring site, and building façades close to busy roads. The study showed that the model provided a good representation of traffic pollution, and confirmed that there were no exceedances of Government objectives.

It is concluded that all Government objectives will be met by the due date within the Middlesbrough Council area, and there is no need to declare any Air Quality Management areas.

The next Progress report is due in 2011, followed by an Updating and Screening report in 2012.

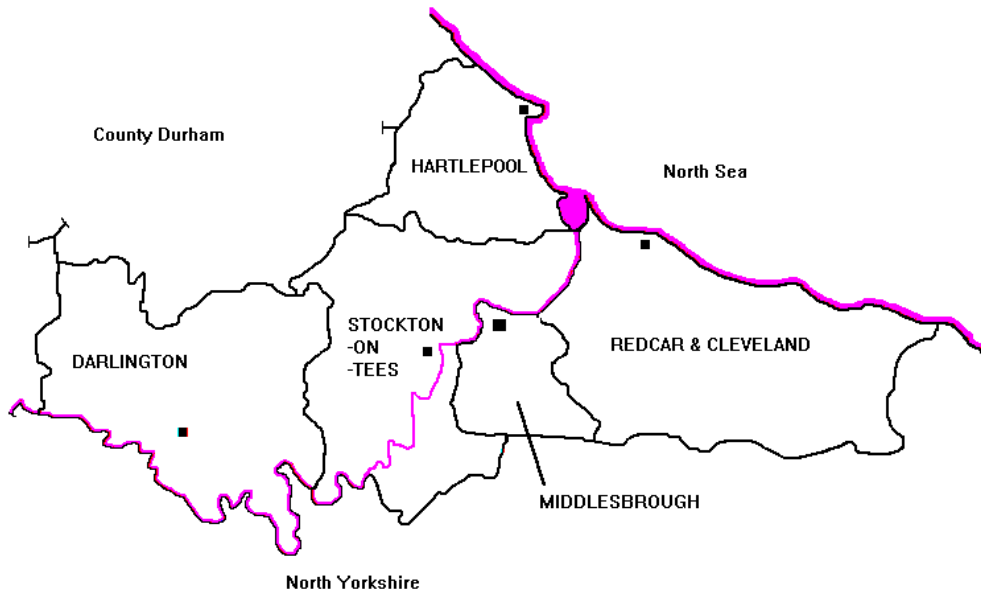
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1 Introduction

1.1 Description of Local Authority Area

Middlesbrough Council is one of five unitary Councils forming the general area known as the Tees Valley. As shown below, it is central, but has the smallest area, at 53.9 sq km.



Middlesbrough is the most densely populated of the five Councils, with little in the way of rural area. It has well-developed retail areas in the town centre, with new commercial expansion planned for the Middlehaven development in the old port area of the Tees. Rail traffic is relatively light, with diesel-operated local services to Darlington, Newcastle, and York, and some through freight traffic from industrial areas to the East. There is no significant port traffic.

One IPPC industrial process lies in a small chemical complex within the Council area, but many larger processes are located in neighbouring Tees Valley Councils to the East and North. These impact from time to time on Middlesbrough air quality, but are not on prevailing wind directions.

The main A19 trunk road runs north – south to the West of the Borough, but this, and its feeder A174 east – west trunk route from the East, run through wide landscaped transport corridors, with no target groups in the vicinity. The main A66 east – west trunk route runs to the North of the town centre, but again is within its own transport corridor. Middlesbrough has the first two Tees crossings from the estuary, and has substantial through traffic from the east and west. It is also a significant commercial centre within the region, with substantial commuter traffic into the centre.

The majority of the Middlesbrough area is subject to Smoke Control Orders, and natural gas is the main source of heating. This means that air pollution from domestic and commercial sources is low. Industrial emissions within Middlesbrough are also low, leaving road transport as the most significant air pollution source.

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The Tees Valley Environmental Protection Group (TVEPG) is a joint committee of the five Tees Valley Councils, which looks at a range of environmental issues of mutual concern. Air pollution matters are an important part of the work of the Group, drawing together a better understanding of the sources of pollutants, and their impact across the Tees Valley.

There is a wide range of air pollution monitoring carried out between the five Councils. This data is collated and published annually (reference 1), and forms a key part of review and assessment for each of the Councils. The annual report is published on the Middlesbrough Council web site.

Middlesbrough is a large urban area. In addition to commuter traffic, it has the first road crossings of the Tees, with substantial through traffic. There are significant areas of light industry and commerce, but little or no heavy industry within its area.

Air quality in Middlesbrough is therefore a measure of emissions from domestic, light industry and road traffic sources, and provides an indication of emissions from the large industrial complexes in neighbouring Council areas to the north and east.

1.2 Purpose of Report

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

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

1.3 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 overleaf. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.2 overleaf sets out, for information, the unregulated air quality pollutants that are part of the UK National Air Quality Strategy. Information regarding these pollutants is included in this report.

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 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

Table 1.2 Air Quality Objectives not 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	
Particles (PM_{2.5}) (gravimetric)	25 $\mu\text{g}/\text{m}^3$ (target 15% reduction 2010 – 2020)	Annual mean	31.12.2020
Polycyclic Aromatic Hydrocarbons (PAHs)	0.25 ng/m^3	Annual mean	31.12.2010
Ozone	100 $\mu\text{g}/\text{m}^3$	Running 8-hour mean	31.12.2005

1.4 Summary of Previous Review and Assessments

REVIEW and ASSESSMENT SUBMISSIONS

These are held in the main reference library in Middlesbrough, and are published on the Middlesbrough Council web site. All submissions have been approved by Defra. No Air Quality Management Areas have been declared.

2000 Review and Assessment	<p>Stage 1 of the first Review and Assessment was a joint report published by the TVEPG in December 1998. A more detailed 2nd / 3rd stage Review and Assessment, which included work from consultants commissioned to undertake advanced air quality modelling (AAQuIRE 2000), was published by Middlesbrough Council in December 2000. This confirmed that road traffic was the main source of air pollution at ground level in the form of nitrogen dioxide and particulate PM10, but that there was no need to declare any Air Quality Management Areas.</p> <p>The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).</p>
2003 Updating and Screening Report	<p>Middlesbrough Council published this report in May 2003. There was no significant change to domestic, commercial or industrial sources within, or close to Middlesbrough area. Road traffic flows were updated and compared with the 2000 Review and Assessment, with no areas identified of particular concern.</p> <p>The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).</p>
2004 Progress Report	<p>This report was a joint report published by the TVEPG in April 2004. The report updated monitoring results across the Tees Valley, showed pollution trends, and recorded any significant developments that may affect air quality.</p> <p>The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).</p>
2005 Progress Report	<p>This report was a joint report published by the TVEPG in April 2005. The report updated monitoring results across the Tees Valley, showed pollution trends, and recorded any significant developments that may affect air quality.</p> <p>The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).</p>

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- 2006 Updating and Screening Report** Middlesbrough Council published this report in May 2006. There was no significant change to domestic, commercial or industrial sources within, or close to Middlesbrough. Road traffic flows were updated and compared with the 2003 Updating and Screening Report, with no areas identified of particular concern.
- An attachment to the above report was a traffic pollution study carried out in 2005, and published as a joint Council report in July 2005. The report tested the DMRB roadside air quality model against roadside continuous monitors for NO₂ and PM₁₀; and used the model to check building façade locations nearest to busy roads.
- The study concluded that the model showed good agreement against the continuous monitors, and provided a useful method for looking at traffic related issues.
- The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).
- 2007 Progress Report** This report was a joint report published by the TVEPG in April 2007. The report updated monitoring results across the Tees Valley, showed pollution trends, and recorded any significant developments that may affect air quality.
- The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).
- 2008 Progress Report** This report was a joint report published by the TVEPG in April 2008. The report updated monitoring results across the Tees Valley, showed pollution trends, and recorded any significant developments that may affect air quality.
- The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).
- 2009 Updating and Screening Report** Middlesbrough published this report in May 2009 using the new reporting template. There was no significant change to domestic, commercial or industrial sources within, or close to Middlesbrough. Road traffic flows showed no significant change compared with the 2006 Updating and Screening Report, with no areas identified of particular concern.
- The report was accepted in full by the Department for Environment, Food and Rural Affairs (DEFRA).

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

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 ?
Breckon Hill (AURN)	Urban industrial	505 194	NO ₂ , PM ₁₀ , PM _{2.5} , SO ₂ , CO, O ₃	N	Y (1m)	20 metres	Y
MacMillan College (Local)	Urban background	478 193	NO ₂ , PM ₁₀ ,	N	Y (1m)	230 metres to A19 trunk route	Y
Elm Street (Local)	Urban	497 203	NO ₂ , PM ₁₀ ,	N	Y (for 1hr NO ₂) (1m)	15 metres	Y

Breckon Hill has been part of the AURN network since 1993 as an affiliated site. Local authority staff carry out regular calibrations, with details passed to the network operator (AEAT), who carry out QA / QC. A maintenance contract with the instrument supplier covers six-monthly inspections. Late in Q4 2008, the unmodified PM₁₀ TEOM was replaced with a PM₁₀ FDMS TEOM, and a PM_{2.5} FDMS TEOM added. The results shown below for particulate PM₁₀ and PM_{2.5} are FDMS TEOM for 2009. The unmodified PM₁₀ TEOM results for 2008 (part year) and for 2007 have been adjusted to gravimetric equivalence using Government guidance factor of 1.3. The vcm method was not available for 2007, and not relevant for 2008.

The AURN monitoring station is in school grounds within a residential area surrounded by busy commuter routes. It is a key public exposure location for all pollutants, and lies on a north-easterly wind direction (frequency around 15% pa) from the main chemical and steel industrial areas along the River Tees estuary.

MacMillan College is a local station owned and operated by Middlesbrough Council since year 2000. Local authority staff carry out regular calibrations. A maintenance contract with the instrument supplier covers six-monthly inspections. The unmodified TEOM is not being upgraded, but PM₁₀ results shown below for 2008 and 2009 have been adjusted to gravimetric equivalence using the vcm method. Vcm could not be used for 2007 results so these have been adjusted to gravimetric equivalence using Government guidance factor of 1.3.

The monitoring station is in school grounds surrounded at distance by very busy trunk road routes, and is an important public exposure location for the transport corridor, and for all objectives.

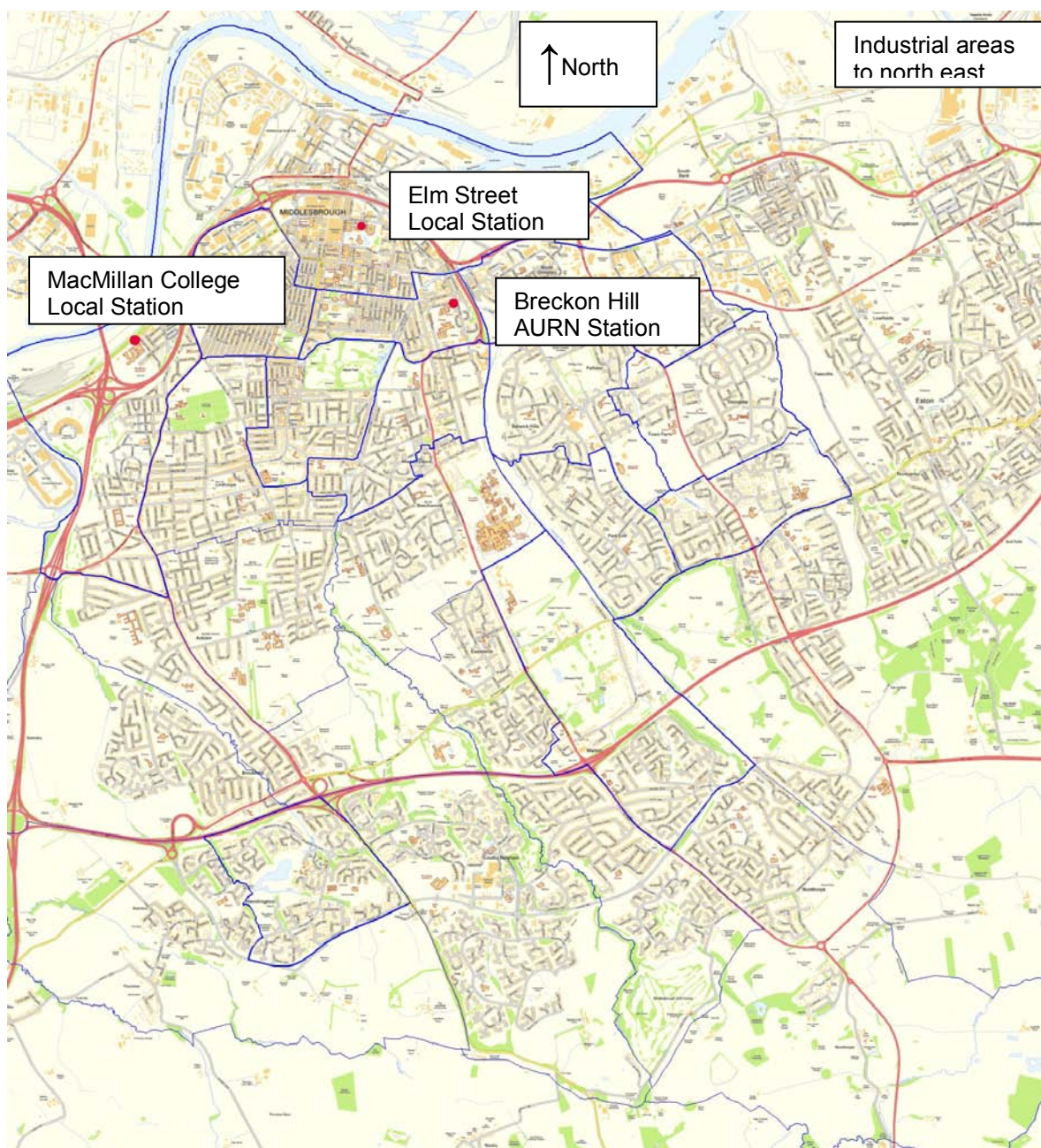
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Elm Street is a local station owned and operated by Middlesbrough Council since 2003. Local authority staff carry out regular calibrations. A maintenance contract with the instrument supplier covers six-monthly inspections. The unmodified TEOM is not being upgraded, but PM₁₀ results shown below for 2008 and 2009 have been adjusted to gravimetric equivalence using the vcm method. Vcm could not be used for 2007 results so these have been adjusted to gravimetric equivalence using Government guidance factor of 1.3.

The monitoring station lies just off a busy town centre access road, and provides a measure of pollution trends from vehicles, which is used in the transport plan. The unit is a public exposure location for the 1 hour nitrogen dioxide objective.

The locations of the three monitoring sites are shown on the map below

MIDDLESBROUGH COUNCIL AREA showing locations of the three automatic monitoring stations



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2.1.2 Non-Automatic Monitoring

Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQ MA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?
Breckon Hill (AURN)	Urban industrial	505 194	Benzene	N	Y (1m)	20 metres	Y
Breckon Hill (AURN)	Urban industrial	505 194	1,3-Butadiene (to Sept 2007)	N	Y (1m)	20 metres	Y
Breckon Hill (AURN)	Urban industrial	505 194	PAH	N	Y (1m)	20 metres	Y

Middlesbrough does not use nitrogen dioxide diffusion tubes, preferring automatic monitoring at key locations.

The Benzene monitor is a pumped diffusion tube, and part of the national network since 2002. Tubes are replaced by Middlesbrough Council staff at agreed times. QA / QC is carried out by the national network operators (NPL).

It is a key public exposure location for Benzene, and lies on a north-easterly wind direction (frequency around 15% pa) from the main chemical and steel industrial areas along the river Tees estuary.

The 1,3-Butadiene monitor was a diffusion tube, and part of the national network from 2003. The site was closed in September 2007 as a result of national network rationalisation. Tubes were replaced by Middlesbrough council staff at agreed times. QA / QC was carried out by the national network operators (NPL).

It was a key public exposure location for 1,3-butadiene, and lay on a north-easterly wind direction (frequency around 15% pa) from the main chemical and steel industrial areas along the river Tees estuary.

The PAH monitor is a digital unit, part of the national network, and started operation in Q4 2007, when it replaced the TOMPS network monitor installed close by at an elevated non-public exposure location. QA / QC is carried out by the national network operators (AEAT).

It is a key public exposure location for PAH, and lies on a north-easterly wind direction (frequency around 15% pa) from the main chemical and steel industrial areas along the River Tees estuary.

PAH is not yet a regulated pollutant, but results for the digital sampler for 2008 and 2009 are included in this report.

2.2 Comparison of Monitoring Results with AQ Objectives

The following sections record Middlesbrough monitoring data over the last three years, and compare them with the relevant AQ objectives. With regard to regulated pollutants, monitored levels are well within the objective level, with no borderline cases. Trend graphs covering the operating periods of the monitoring stations are shown in appendix B of this report, but show no discernable trend, with small variations each year mainly reflecting weather conditions. As most ground level pollution within Middlesbrough is from road transport, any improvements in emission levels seem to have been largely offset by traffic flow increases.

Reference 1 of this report records results from other monitoring stations in the neighbouring Council areas of the Tees Valley. In every case, a similar picture to that in Middlesbrough is shown, with monitored levels relatively stable, within the objective levels, and no discernable trend.

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective of 40 $\mu\text{g}/\text{m}^3$, with no exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
				2007	2008	2009
BH	Breckon Hill	N	97	21.3	21.1	18.6
Mac	MacMillan College	N	99	24.2	25.1	23.9
Elm	Elm Street	N	97	23.6	27.2	25.9

All three stations show annual means well within the objective level. Breckon Hill and MacMillan monitoring stations are representative of relevant public exposure. Variations from year to year tend to reflect weather conditions. Annual mean trends are shown in appendix B of this report.

Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective of 200 $\mu\text{g}/\text{m}^3$, with a maximum of 18 exceedances per year.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedances of hourly mean (200 $\mu\text{g}/\text{m}^3$)		
				2007	2008	2009
<i>The 99.8th %ile of hourly means is in brackets.</i>						
BH	Breckon Hill	N	97	0 (95)	0 (90)	0 (83)
Mac	MacMillan College	N	99	0 (93)	0 (87)	0 (90)
Elm	Elm Street	N	97	0 (84)	0 (89)	0 (86)

There have been no exceedances recorded at any of the three monitoring stations, which are all representative of relevant public exposure. The 99.8th percentile of hourly means is recorded for

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information, and show levels less than half of the objective level. The 99.8th percentiles of 1-hour mean trends are shown in appendix B of this report.

2.2.2 Diffusion Tube Monitoring Data

There are no nitrogen dioxide diffusion tubes in Middlesbrough.

2.2.3 PM₁₀

Table 2.4a Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective of 40 µg/m³ (gravimetric), with no exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations (µg/m ³)		
				2007	2008	2009
BH	Breckon Hill	N	75	21	21	18
Mac	MacMillan College	N	99	21	21	19
Elm	Elm Street	N	93	21	22	20

Note : annual mean concentrations shown are adjusted to gravimetric equivalence using vcm for 2008 / 9, and the Government guidance factor of 1.3 for 2007.

All three stations show annual means well within the objective level. Breckon Hill and MacMillan monitoring stations are representative of relevant public exposure. The small variations from year to year reflect weather conditions. Annual mean trends are shown in appendix B of this report.

Table 2.4b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective of 50 µg/m³ gravimetric, with a maximum of 35 exceedances per year.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedances of daily mean objective (50 µg/m ³)		
				<i>The 90th %ile of daily means in brackets.</i>		
				2007	2008	2009
BH	Breckon Hill	N	75	11 (31)	13 (36)	3 (33)
Mac	MacMillan College	N	99	9 (33)	12 (34)	3 (28)
Elm	Elm Street	N	93	9 (31)	15 (35)	2 (30)

There are rare exceedances of the objective at all three monitoring stations, but the number of exceedances is well below the objective maximum. The 90th percentile of 24 hour means is recorded for information, with levels comfortably within the objective level. Breckon Hill and MacMillan monitoring stations are representative of relevant public exposure. Variations from year to year reflect

weather conditions, in particular particle build-up during high-pressure weather episodes. Annual exceedance trends are shown in appendix B of this report.

2.2.4 PM_{2.5} (an unregulated pollutant)

Table 2.5a Results of PM_{2.5} Automatic Monitoring: Comparison with Annual Mean Objective of 20 µg/m³ (gravimetric).

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations (µg/m ³)		
				2007	2008	2009
BH	Breckon Hill (FDMS)	N	70	-	-	10.3

Note : During Q4 2008, the Breckon Hill AURN station was upgraded to include a FDMS TEOM particulate PM_{2.5} monitor alongside the new FDMS TEOM PM₁₀ monitor.

The Breckon Hill site is representative of public exposure, and became fully operational in January 2009, using FDMS TEOM technology. Annual mean concentrations are well within the objective level. There is insufficient data for a trend graph in appendix B of this report.

For 2009, particulate PM_{2.5} was 56% of the particulate PM₁₀ fraction.

2.2.5 Sulphur Dioxide

Overview: Results below show that the three sulphur dioxide objectives are easily met.

Table 2.6a Results of SO₂ Automatic Monitoring: Comparison with 15-minute Mean Objective of 266 µg/m³, with a maximum of 35 exceedances per year.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedances of 15 minute mean objective (266 µg/m ³)		
				<i>The 99.9th %ile of daily means in brackets.</i>		
				2007	2008	2009
BH	Breckon Hill	N	96	0 (95)	1 (81)	0 (81)

The 15 minute objective is the more difficult of the 3 sulphur dioxide objectives, but is easily met within Middlesbrough, with only a very occasional exceedance. Most sulphur dioxide emissions come from outside of the area, either from the major chemical and steel industries along the river Tees estuary, or occasionally from the large power stations well to the South. Breckon Hill is representative of relevant public exposure, but has 99.9th percentiles less than one third of the objective level. There are indications of a continuing downward trend in concentrations (appendix B to this report). The Environment Agency reports a 30% decline in sulphur dioxide emissions from Tees Valley industry over the last 5 years (reference 2).

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Table 2.6b Results of SO₂ Automatic Monitoring: Comparison with 1-hour Mean Objective of 350 µg/m³, with a maximum of 24 exceedances per year.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedances of 1 hour mean objective (350 µg/m ³)		
				<i>The 99.7th %ile of daily means in brackets.</i>		
				2007	2008	2009
BH	Breckon Hill	N	97	0 (66)	0 (59)	0 (53)

Breckon Hill is representative of relevant public exposure and has never had an exceedance of this objective. There are indications of a continuing downward trend in concentrations.

Table 2.6c Results of SO₂ Automatic Monitoring: Comparison with 24-hour Mean Objective of 125 µg/m³, with a maximum of 3 exceedances per year.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Exceedances of 24 hour mean objective (125 µg/m ³)		
				<i>The 99th %ile of daily means in brackets.</i>		
				2007	2008	2009
BH	Breckon Hill	N	98	0 (25)	0 (23)	0 (17)

Breckon Hill is representative of relevant public exposure and has never had an exceedance of this objective.

2.2.6 Benzene and 1,3- butadiene

Table 2.7 Results of Benzene Pumped Diffusion Tube Monitoring: Comparison with Annual Mean Objectives of 16.25 and 5.00 µg/m³, with no exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations (µg/m ³)		
				2007	2008	2009
BH	Breckon Hill	N	90	1.16	1.15	0.98

Breckon Hill is representative of relevant public exposure for Benzene. Results show that the two objectives are readily met and show a downward trend that reflects reduced benzene emissions from industrial sources along the River Tees estuary, as reported by the Environment Agency (reference 2).

Table 2.8 Results of 1,3-butadiene Diffusion Tube Monitoring: Comparison with Annual Mean Objective of 2.25 µg/m³, with no exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations (µg/m ³)		
				2005	2006	2007
BH	Breckon Hill	N	-	0.04	0.09	0.14 *

* - Monitor closed September 2007, 8 months data only

Breckon Hill is representative of relevant public exposure for 1,3-butadiene. Results show that the objective is readily met.

The national network monitor was closed in September 2007 as a result of rationalisation of the national hydrocarbon network, so historical results are shown here.

2.2.7 Other pollutants monitored

Breckon Hill has carbon monoxide monitoring as a regulated pollutant, and also measures ozone and PAH as unregulated pollutants.

Table 2.9 Results of Carbon Monoxide Automatic Monitoring: Comparison with 8-hour Running Mean Objective of 10 mg/m³, with no exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Maximum of 8 hour running mean concentrations (mg/m ³)		
				2007	2008	2009
BH	Breckon Hill	N	84	1.2	1.3	1.3

Breckon Hill is representative of relevant public exposure for carbon monoxide. Concentrations are stable year on year at less than 20% of the objective level, so the objective is readily met.

Table 2.10 Results of Ozone Automatic Monitoring: Comparison with 8-hour Running Mean Target of 100 µg/m³, with a maximum of 10 day exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Number of Day Exceedances of 8 hour running mean target (100 µg/m ³)		
				2007	2008	2009
BH	Breckon Hill	N	86	4	11	1

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Ozone is not a regulated pollutant. The number of exceedances is normally a reflection of summer weather conditions, with the last three summers being generally poor weather. The higher number of 2008 day exceedances was due to a major ozone episode across the UK, which has been reported on by AEAT through the Air Quality Archive site. There were no such episodes in 2009.

Exceedance of this target objective is likely across much of Middlesbrough during good summer weather.

Table 2.11 Results of PAH digital sampler Monitoring: Comparison with Annual Mean Target of 0.25 ng/m³ (BAP), with no exceedances.

Site ID	Location	Within AQMA?	Data Capture 2009 %	Annual mean concentrations (ng/m ³)		
				2007	2008	2009
BH	Breckon Hill	N	99	0.24 (4 mths)	1.09	0.35

PAH is not a regulated pollutant, but results are shown here because an exceedance of the target objective is at risk. The most significant source of PAH is considered by the Environment Agency to be the coke ovens connected with the steel industry further along the Tees estuary. Breckon Hill is generally upwind of this source.

This pollutant requires further investigation.

Lead is a regulated pollutant, but there has not been any monitoring within Middlesbrough area. However, lead levels were monitored as part of a heavy metal programme at three locations within the neighbouring Stockton-on-Tees Council area until 2007, where for the last ten years, lead concentrations were below the limit of detection. In addition, lead monitoring started in June 2008 within the Redcar & Cleveland Council area as part of a national heavy metal programme connected with steel manufacturing along the Tees estuary. Results (see reference 1 of this report) confirm exceptionally low lead levels.

There are no significant source emissions within Middlesbrough, or within the Tees Valley, and there is no requirement for further monitoring.

Middlesbrough has examined the results from monitoring in the borough, and in neighbouring Council areas. Concentrations at areas of relevant public exposure are all below the regulated objectives; therefore there is no need to proceed to a Detailed Assessment.

3 New Local Developments

3.1 Road Traffic Sources

A new short road from the A66 to the Riverside industrial area has been completed. The road improvement was assessed for air quality impact at the planning stage and it was determined that the road would have no adverse effect on air quality, and would reduce traffic congestion at busy times.

3.2 Other Transport Sources

There are no changes involving other transport sources

3.3 Industrial Sources

There is one new Part B, waste oil burner installation within the Middlesbrough area that has been introduced in 2009.

3.4 Commercial and Domestic Sources

There are no significant new developments.

3.5 New Developments with Fugitive or Uncontrolled Sources

There are no new developments with fugitive or uncontrolled sources.

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

4 Local / Regional Air Quality Strategy

In the absence of air quality management areas, there is no formal air quality strategy, although this is kept under review by the Council and through the TVEPG.

5 Planning Applications

Planning applications for biomass boiler installations both within the borough and in neighbouring authorities have required air quality assessments.

6 Air Quality Planning Policies

Air quality within the Council area is generally good, and there is a commitment to maintain, and where possible, improve air quality.

7 Local Transport Plans / Strategies

The Council regularly reviews the local transport plan, and has a commitment to support measures that improve air quality where economically viable.
The Council is a partner in the Tees Valley Joint Strategy Unit (renamed Tees Valley Unlimited from April 1st 2010).

8 Climate Change Strategies

The Council signed up to the Nottingham Declaration on Climate Change in 2002.
The Council is part of the Tees Valley Climate Change Partnership, which published a joint climate change strategy in 2007, and updated in 2010.
Middlesbrough Council has had a climate change community action plan since 2005 and was a Beacon Council for tackling climate change in 2008/09.
Middlesbrough Council is a signatory to the Environmental Union covenant of Mayors scheme to a minimum reduction of 21% in CO₂ by 2020 based on 2005 baseline.
Future carbon reduction measures will be proposed through a 'One Planet Living' Action Plan
Middlesbrough Council has signed the 10/10 Carbon Reduction Campaign

9 Implementation of Action Plans

In the absence of air quality management areas, there are no formal action plans, although this topic is kept under review by the TVEPG.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The main source of air pollution within Middlesbrough continues to be road traffic, with nitrogen dioxide and particulate PM₁₀ the important pollutants. Three continuous monitors are strategically placed at worst case locations to monitor these pollutants, with Breckon Hill AURN station also well placed to monitor potential air pollutants from the industrial areas in neighbouring Council areas to the East and North.

All monitoring results clearly show that concentrations of regulated air pollutants continue to meet air quality objectives at these locations, and that this will be the case across the entire Middlesbrough Council area.

It is noted that monitoring in the neighbouring Tees Valley Councils supports the Middlesbrough conclusions (reference 1).

10.2 Conclusions from Assessment of Sources

There have been no significant new developments that will have any adverse impact on Middlesbrough air quality, either within the Council area, or nearby within neighbouring Council areas. The Middlehaven area of Middlesbrough, around the old port facilities, has been remediated for new commercial and housing development, but these developments are unlikely to be in place for some years, and will meet environmental planning requirements, including air quality. The main A66 trunk route that runs through a transport corridor has been upgraded from two to three lanes, with new access to the Riverside area, but this will reduce air pollution by removing existing congestion points. There are no new industrial installations within Middlesbrough, or neighbouring Council areas, that will impact on air quality.

10.3 Other Conclusions

Other non-regulated pollutants that are included, or are likely to be included in the UK air quality strategy, have been given full consideration. The ozone objective is likely to be exceeded in many parts of the Council area during periods of hot sunny summer weather. PAHs need further assessment.

10.4 Proposed Actions

This Progress Report for Middlesbrough has not identified any areas of concern for regulated pollutants, and there is no need to proceed to any detailed assessment. No additional air quality monitoring is required, or changes to the existing monitoring, which are all at strategic locations.

Middlesbrough Council will continue to work closely with the other four Tees Valley Councils on air quality matters through the Tees Valley Environmental Protection Group.

One study to be carried out by this group is an update of the Traffic Pollution study, carried out in 2005, using the new DMRB model once it has been published.

A new report was published in January 2010 (reference 3) providing a breakdown of all continuous monitoring results within the Tees Valley into the relevant air quality banding categories. This report shows that most monitoring results are in the low category, with only particulate PM₁₀ (of the regulated

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pollutants) having some transition into the moderate category. Of the non-regulated pollutants, ozone is a potential problem area, and polycyclic aromatic hydrocarbons (PAHs) are expected to need further investigation.

The next submission to Defra will be a Progress report for 2011 in May 2011, based on 2010 monitoring data.

11 References

These reports can be found on the Middlesbrough Council web site under Middlesbrough air quality

1. Annual Air Quality Report for the Tees Valley

Published by the Tees Valley Environmental Protection Group, June 2010

2. Industrial Emission Inventory for the Tees Valley

Published by the Tees Valley Environmental Protection Group, February 2010

3. Air Quality Banding Analysis for the Tees Valley

Published by the Tees Valley Environmental Protection Group, March 2010

4. Tees Valley Traffic Pollution Study 2005

Published by the Tees Valley Environmental Protection Group, July 2005

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Middlesbrough Council does not use nitrogen dioxide diffusion tubes.

Factor from Local Co-location Studies (if available)

Not applicable

Discussion of Choice of Factor to Use

Not applicable

PM Monitoring Adjustment

All measurements for PM₁₀ at the Local stations are unmodified TEOM based. Results up to end 2007 have been multiplied by Government guidance factor 1.3 to give an approximate gravimetric equivalence.

For 2008 / 9, the local station results were adjusted using the Volatile Correction Model (vcm), giving small differences to the 1.3 factor. The vcm method was not suitable for earlier years.

Short-term to Long-term Data adjustment

All monitoring data has been full year, with no adjustment required.

QA/QC of automatic monitoring

The Breckon Hill AURN station is operated under a comprehensive service contract with Enviro Technology Services Ltd, with QA / QC carried out by AEAT. Operators of the site have received supplier training.

The two Middlesbrough fixed continuous local monitoring stations (both NO_x and PM₁₀), are modern installations, operated under a comprehensive service contract with the supplier, in both cases Casella Measurement Ltd. Operators of the site have received supplier training.

The Council is committed to achieving accuracy, precision, data capture, traceability and long term consistency to ensure that data is representative of ambient air quality. In common with other Tees Valley Councils, Middlesbrough has a documented quality assurance and control programme, which includes an established schedule of regular site calibrations, validation of data, and documentation of all procedures. Details are summarised as follows:

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Calibration	daily 'automatic' calibration with frequent (usually fortnightly) manual checks. Calibration gas obtained from approved gas standard suppliers.
Equipment	comprehensive service agreement with the supplier.
Data capture	site operators are experienced and trained personnel, monitoring data capture on a daily basis where possible to ensure that faults are detected and corrected quickly.
Ratification	data is screened, where possible on a daily basis, to check for unusual measurements. Suspicious data is investigated fully, and if found to be faulty, is deleted from the records. Particular attention is paid to possible environmental changes in the vicinity of the analyser. Data is recorded monthly and compared with earlier results. Data is collated quarterly with that from other monitors within the Tees Valley, including AURN stations, as a further check on accuracy.

All data is published annually (reference 1) by the Tees Valley Environmental Protection Group.

QA/QC of diffusion tube monitoring

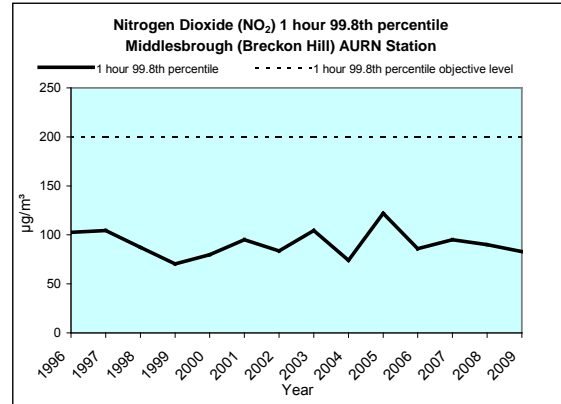
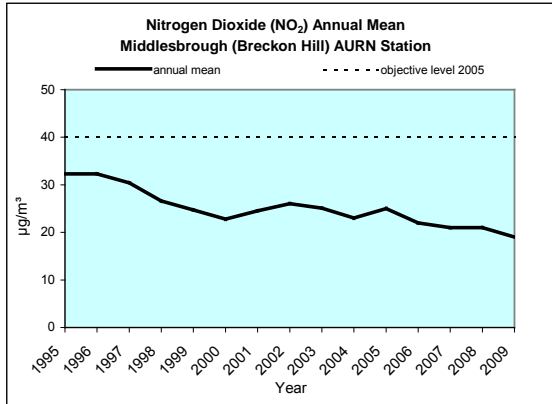
Middlesbrough Council does not use nitrogen dioxide diffusion tubes.

Appendix B: Monitoring Trend Graphs

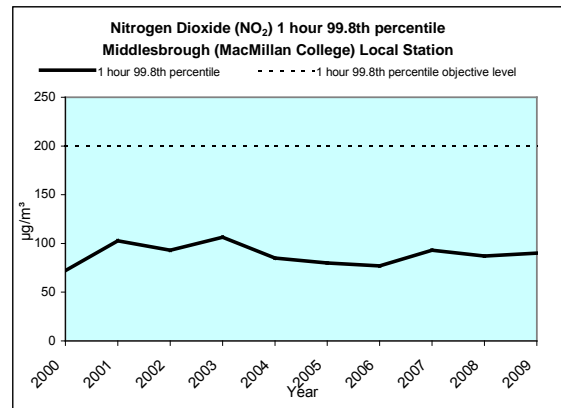
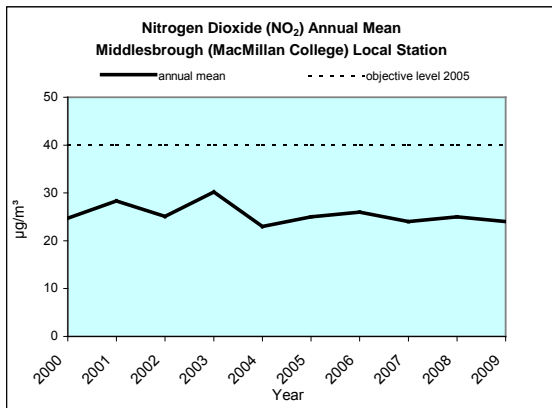
B1 Nitrogen Dioxide

NITROGEN DIOXIDE

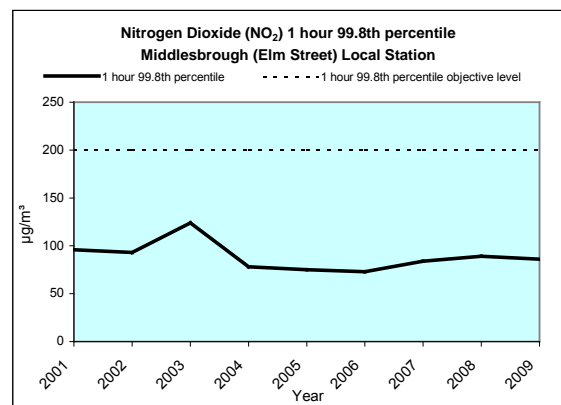
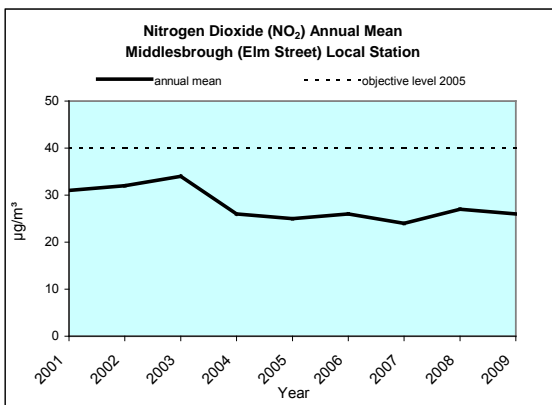
MIDDLESBROUGH (Breckon Hill) AURN Station
(urban-industrial site classification)



MIDDLESBROUGH (MacMillan College) Local Station
(urban background site)



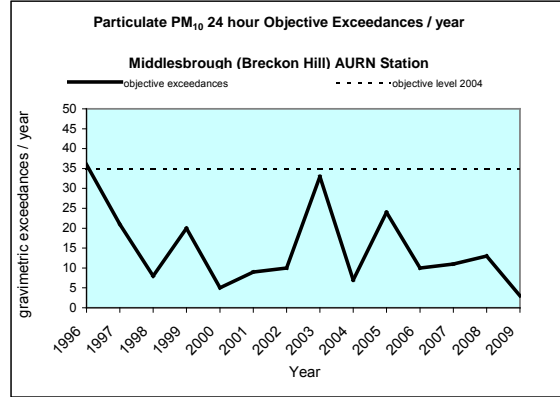
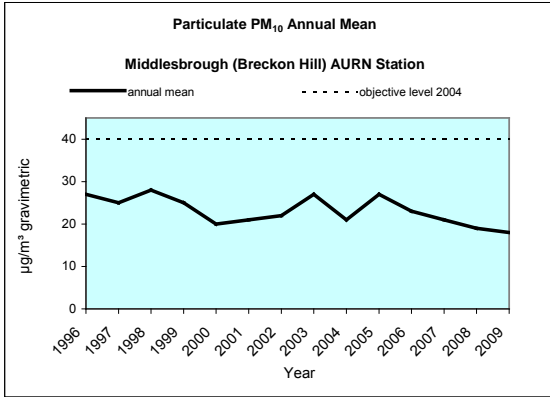
MIDDLESBROUGH (Elm Street) Local Station
(urban roadside site)



B2 Particulate PM₁₀

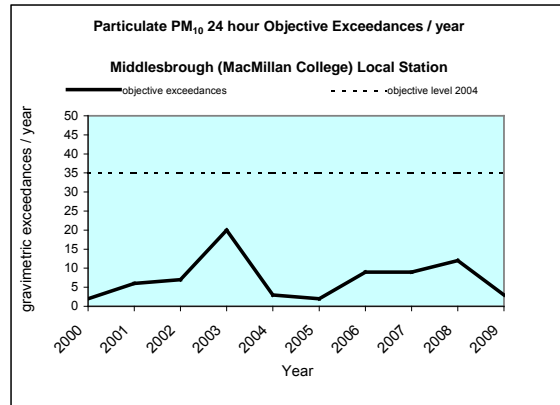
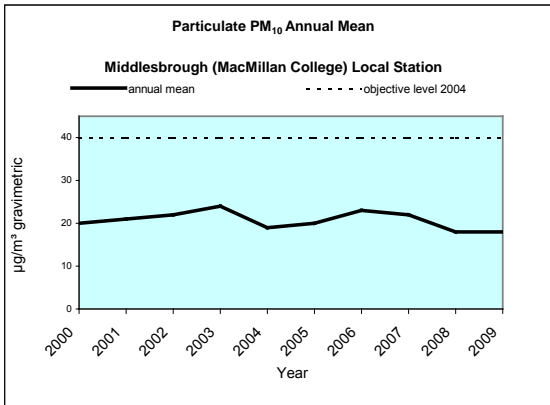
PARTICULATE PM₁₀

MIDDLESBROUGH (Breckon Hill) AURN Station
(urban-industrial site classification)

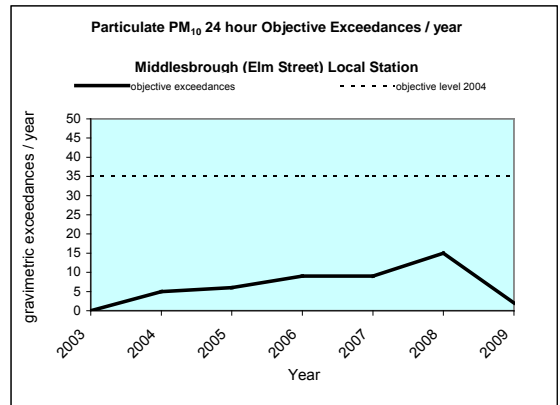
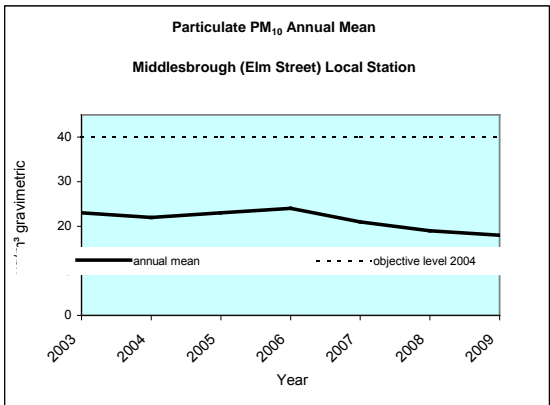


2009 data is from a new TEOM FDMS monitor

MIDDLESBROUGH (MacMillan College) Local Station
(urban background site)



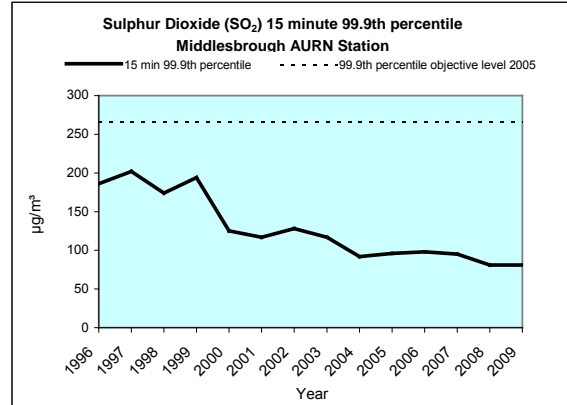
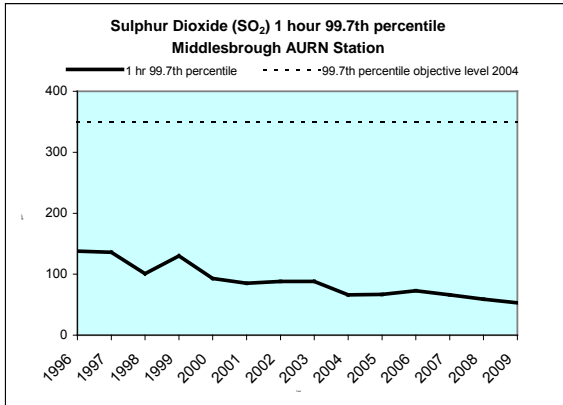
MIDDLESBROUGH (Elm Street) Local Station
(urban roadside site)



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B3 Sulphur Dioxide

MIDDLESBROUGH (Breckon Hill) AURN Station
(urban-industrial site classification)



B4 Carbon Monoxide

MIDDLESBROUGH (Breckon Hill) AURN Station
(urban-industrial site classification)

