CARLISLE CITY COUNCIL

LOCAL AIR QUALITY MANAGEMENT

THIRD STAGE REVIEW AND ASSESSMENT

14 MARCH 2000

CONTENTS PAGE

THIRD STAGE AIR QUALITY REVIEW AND ASSESSMENT

1. INTRODUCTION

1.1 AIM AND OBJECTIVES

This document is the third stage review and assessment of local air quality in the Carlisle City Council area. As such, its aim is to conclude this cycle of the air pollution examination process, focussing primarily on fine particulates and nitrogen dioxide.

The review and assessment will address the following objectives:

- Review conclusions from stage two study
- Review recent air quality monitoring data
- Assess the likelihood of achieving air quality objectives
- Decide whether any Air Quality Management Areas are necessary

1.2 LEGISLATION

The legislative background to the UK's Air Quality Strategy (AQS) is explained in Carlisle City Council's "Local air quality management - First stage review and assessment", published in September 1998. The strategy is targeted at the quality of ambient air; i.e. the outdoor air that the public breathes. It does not consider occupational or indoor air.

There has been substantial change in the supporting documentation from the government since the review and assessment process started in December 1997, as detailed below:

Table 1: Revised local air quality documentation

Original document	Replacement document	Published date
National Air Quality Strategy (1997)	Air Quality Strategy for England, Scotland, Wales and Northern Ireland	19 January 2000
Air Quality Regulations 1997	Air Quality Regulations 2000?	Forthcoming
General guidance, volumes LAQM.G1(98)-G4(98)	Draft general guidance, volumes LAQM.G1(00)-G4(00)	5 November 1999
Technical guidance, volumes LAQM.TG1(98)-TG4(98)	Draft technical guidance, volumes LAQM.TG1(00)-TG4(00)	5 November 1999

The main substance of these revisions have been the changes to pollution objective levels and the target dates when these must be attained (see section 1.4).

1.3 MAIN FINDINGS OF SECOND STAGE REVIEW AND ASSESSMENT

The second stage review and assessment was an intermediate-level report that examined in detail the two pollutants considered to be at significant risk of exceeding their objectives; nitrogen dioxide (NO_2) and fine particulates (PM_{10}). The findings were as follows:

Nitrogen dioxide

The annual objective limit for nitrogen dioxide was exceeded at most inner-city sites and in some urban residential zones; with projections to 2005 showing a continuing risk of the limit being breached at some sites. Hourly levels were not expected to exceed the 150 ppb hourly objective by 2005.

Fine particulates

Particulate levels had not been accurately measured in the city, but the UK perspective remained of elevated PM_{10} levels nationwide. There was uncertainty about which objective level authorities would ultimately be obliged to meet.

1.4 REVISED AIR QUALITY OBJECTIVES

The revised air quality strategy has made changes to all seven pollutants. Five have had their target dates brought forward or limits tightened, one (sulphur dioxide) had additional limits and one (particulates) had a lower limit. A summary of the new strategy's targets as applicable to local authorities, which will be included in new Regulations, is as follows:

Table 2: Changes to air quality objectives

Pollutant	Objective concentration	Measured as	Target date	Change in objective
Benzene	16.25 µg/m^3 (5 ppb)	Running annual mean	2003	Brought forward two years
1,3 – butadiene	2.25 µg/m^3 (1ppb)	Running annual mean	2003	Brought forward two years
Carbon monoxide	11.6 µg/m^3 (10 ppm)	Running 8-hour mean	2003	Brought forward two years
Lead	0.5 µg/m^3	Annual mean	2004	Brought forward one year
Nitrogen dioxide	200 µg/m^3 (105 ppb) not to be exceeded more than 18 times per year 40 µg/m^3 (21 ppb)	1-hour mean Annual mean	2005	Reduction in objective by 30% 18 exceedences allowed annually No change
Particulates (PM_{10})	50 µg/m^3 not to be exceeded more than 35 times per year	24- hour mean	2004	Brought forward one year Increase in number of exceedences from 4 to 35 annually Mean not running

	40 µg/m^3	Annual mean	2004	New objective
Sulphur dioxide	350 µg/m^3 (132 ppb) not to be exceeded more than 24 times per year	1- hour mean	2004	New objective
	266 µg/m^3 (100 ppb) not to be exceeded more than 35 times per year	15- minute mean	2005	No change
	125 µg/m^3 (47 ppb) not to be exceeded more than 3 times per year	24- hour mean	2004	New objective

NB: Each date is for the end of year e.g. 2005 is 31.12.2005

(Note that all objectives are now expressed in units of micrograms per cubic metre (µg/m^3), rather than parts per billion (ppb)). Review work for five of the seven pollutants was concluded at the end of stage one; the implications of the revised objectives for that 1998 report are as follows:

Benzene

The estimated annual mean by 2005 is 6.5 µg/m^3. The revised objective, two years earlier, in 2003 is expected to be met.

1,3-butadiene

The estimated annual mean by 2005 is 1.6 µg/m^3. The revised objective, two years earlier, in 2003 is expected to be met.

Carbon monoxide

The estimated maximum 8-hour mean by 2005 is 4.6 mg/m^3. The revised objective, two years earlier, in 2003 is expected to be met.

Lead

The estimated annual mean level by 2005 is 0.05 µg/m^3. The revised objective, one year earlier, in 2004 is expected to be met.

Sulphur dioxide

The estimated annual mean level by 2005 is below 6 µg/m^3. The new 1- and 24-hour EU objectives, one year earlier, in 2004 are expected to be met.

(Implications for nitrogen dioxide and fine particulates are discussed in the main body of the report).

1.5 THIRD STAGE REPORT STRUCTURE

The DETR publication "Framework for review and assessment of air quality" states that the third stage should be an accurate and detailed review and assessment of current and future air quality. The key step for authorities is the prediction of whether a failure to achieve an air quality objective by the relevant deadline is likely, as this is the crucial factor in triggering the designation of an Air Quality Management Area. This report will therefore be based on pollution data gathered as the measurement of current levels; these then be extrapolated to the deadline dates to assess compliance or otherwise with targets.

1.5.1 Monitoring

Monitoring is the measurement of ambient air quality and quantifies current pollution levels. Measurements must be over the relevant averaging times; for NO_2 these are periods of 1-hour and one year, for PM_{10} they are 24-hours and one year. These periods define the monitoring locations; for 1-hour averaging times the assessment should consider near-ground level outdoor locations where the public may be found. This would include parks, bus stops and pavements. Pollutants with longer averaging periods, especially those of one year, must be assessed where people spend a reasonable portion of a year, for example schools and residential areas. Two types of monitoring equipment are used by Carlisle City Council for the monitoring of NO_2 and PM_{10}; passive samplers and an automatic point analyser.

Passive samplers

Diffusion tubes are used to passively sample nitrogen dioxide. (They cannot sample particulates). These low cost tubes are mounted on street furniture and adsorb NO_2 onto a substrate. They are changed monthly and analysed by laboratory to determine the average level of the target pollutant over the exposure period. This provides the area data for the NO_2 annual average. There are 22 NO_2 diffusion tubes distributed around the authority area.

Automatic analysers

Automatic analysers contain monitoring equipment that runs continuously to generate real-time data on pollution levels at a single location point. This equipment is the only way to gather the short-duration data required for the 1- and 24- hour averages that comprise three of the four objectives. A limitation of the stage two review was the paucity of short-term data on local pollution concentrations. The DETR guidance document "Monitoring air quality" states that, for stage three work, "automatic monitoring equipment is likely to be required for the measurement of gaseous pollutants [e.g. NO_2]. For PM_{10} both automatic and gravimetric samplers are suitable". Approval was therefore given for the purchase of a real-time air quality monitoring unit by the authority from ETI Group Ltd of Cheltenham. This equipment has been operational at a kerbside site opposite 21 Scotland Road since 22 April 1999.

1.5.2 Modelling

DETR's basic screening model "Design Manual for Roads and Bridges" was used during the stage 2 review for line sources, such as roads, but with variable results. The guidance document "Selection and use of dispersion models" indicates that (if modelling is to be used), it is only advanced models that are appropriate for stage three work. These have not been used during this review because overall pollution levels are not unequivocally over objective levels and it is considered that the financial costs of advanced models (£10,000s) exceed their benefits of generating only theoretical data with a significant inclusive error.

1.5.3 Methodology

Monitoring data will provide the core of this report. For each pollutant there are two objectives and the report is structured to consider, for each in turn, the available data (the review) and a projection of whether the objective is likely to be met (the assessment).

2. CONSULTATION

Schedule II of the Environment Act 1995 requires local authorities to consult externally as part of their review and assessment exercises and the following bodies have been contacted:

- Eden District Council
- Copeland Borough Council
- Tynedale District Council (Northumberland)
- Scottish Environmental Protection Agency (Borders and Dumfries & Galloway area offices)
- Cumbria County Council
- North Cumbria Health Authority
- Environment Agency
- Carlisle Business Forum
- Friends of the Earth
- Carlisle Association of Parish Councils

Responses have been received from Cumbria County Council, the Environment Agency, Friends of the Earth, Carlisle Association of Parish Councils and the Department of the Environment, Transport and the Regions. Alongside general observations, they all intended to see the details of the report before commenting further.

3. REVIEW & ASSESSMENT OF NITROGEN DIOXIDE

Objectives: ***40 µg/m^3 or less when expressed as an annual mean by 2005***
200 µg/m^3 or less when expressed as an hourly mean, not to be exceeded more than 18 times per year, by 2005

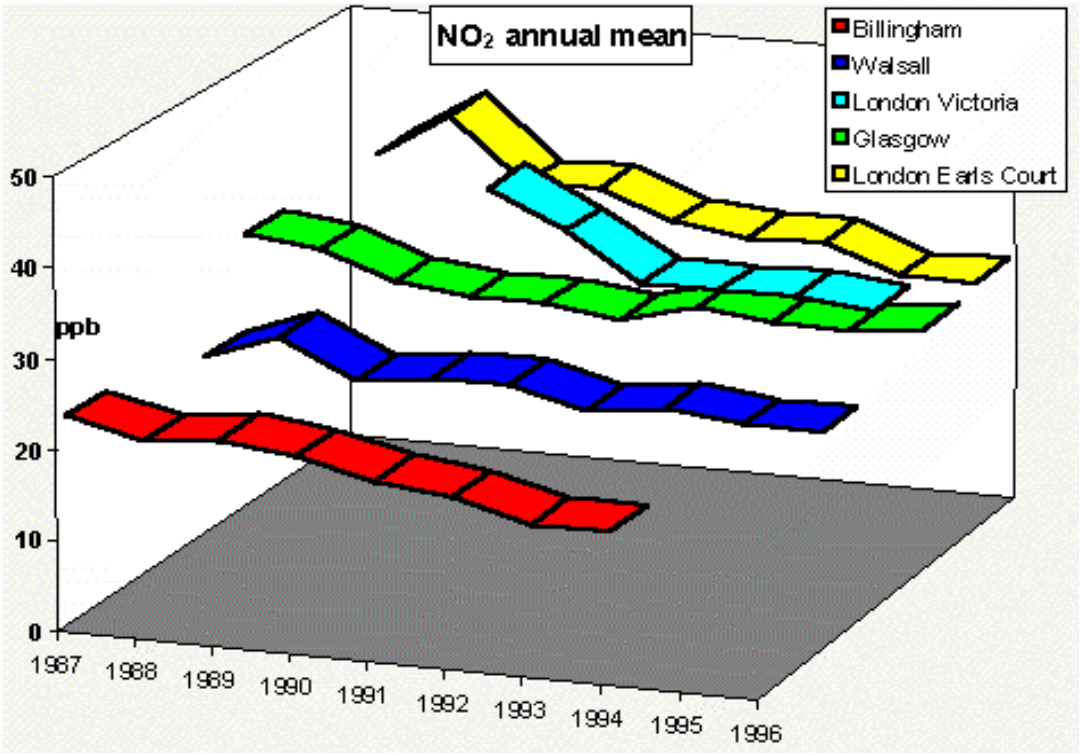
(For information on the health effects of nitrogen dioxide, see the stage one report. For information on national and local sources of nitrogen dioxide, see the stage two report.)

3.1 NATIONAL SCENARIO

Nitrogen dioxide is produced by the reaction between nitrogen and oxygen during high temperature combustion. Most oxides of nitrogen (NO_x) are generated as nitric oxide (NO), which is oxidised in the atmosphere by local ozone to produce nitrogen dioxide (NO_2). Kerbside measurements at the Stanwix air quality monitoring unit revealed a NO:NO_2 ratio of about 2½:1, rising at background levels to about 1:1. It is one of the most widespread pollutants in the UK. National emissions of NO_x in 1997 were 1.83 million tonnes, 48% produced by vehicles and 18% by power stations.

Current UK trends show a slow reduction in NO_2 levels outside metropolitan areas, with national levels forecast to continue declining until 2010 as a result of government policies. Some national operating sites have data records of sufficient length for valid calculation of long term trends; five are show below. The magnitude reduction ranges between 0.2 to 2.3 ppb per year.

Graph 1: National nitrogen dioxide trends



3.2 NITROGEN DIOXIDE ANNUAL OBJECTIVE

3.2.1 Review of local monitoring

The diffusion tube network provides the broad spread of data for calculation the nitrogen dioxide annual mean across the authority's urban areas. 22 monitoring sites are maintained at different categories of location; half were established October 1995 and the remainder September 1998. They are grouped as below:

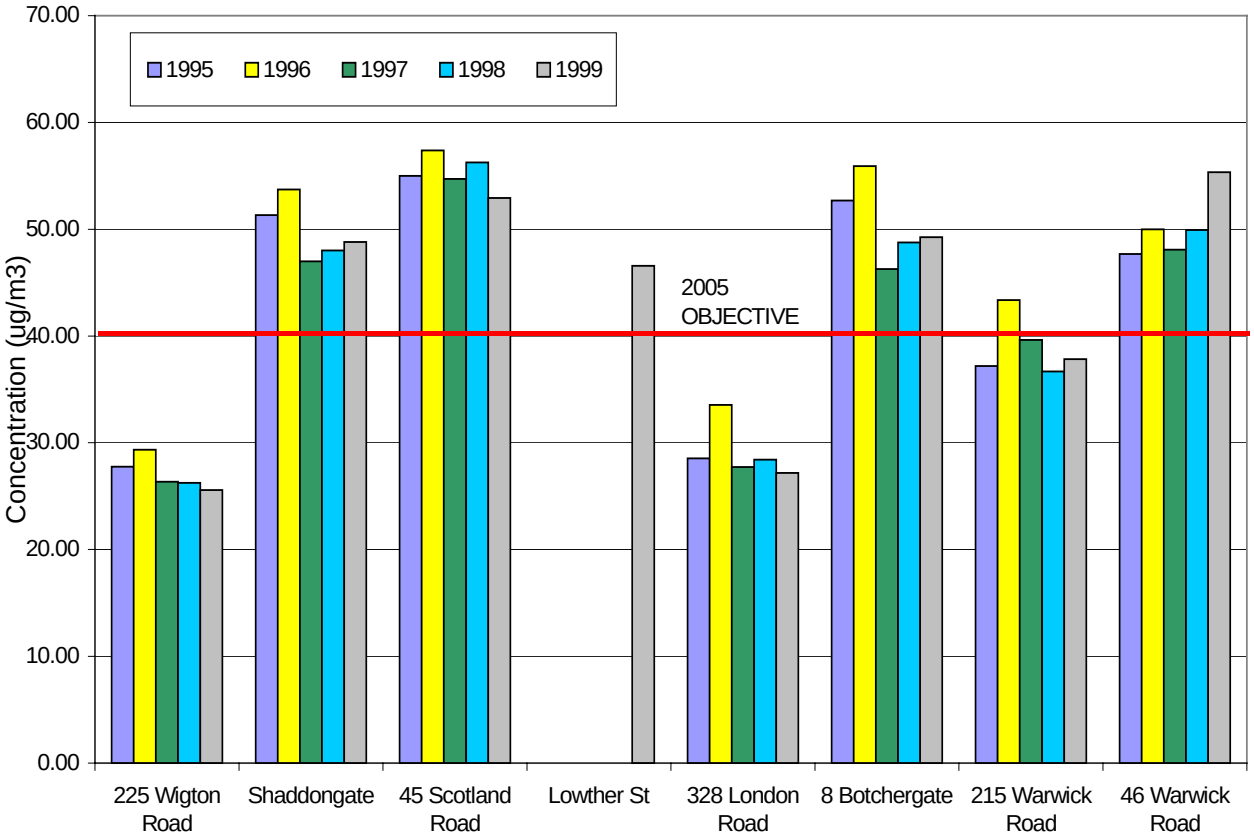
- Roadside
- City centre
- Urban
- Suburban
- Rural towns
- Air Quality Unit

Results from the 6 groupings of locations are below, with individual sites listed and marked on maps at Annexes 6.5 and 6.6.

<u>Roadside sites</u>

9 diffusion tube monitoring sites are maintained alongside main roads around the city; one kerbside (under 1m from road) and 8 roadside (1 to 5m from road). These measure the highest concentrations of nitrogen dioxide to which people may be exposed during a year; say at roadside terraced housing. Annual averages for these 8 roadside sites are thus:

Graph 2: NO_2 annual means - roadside sites

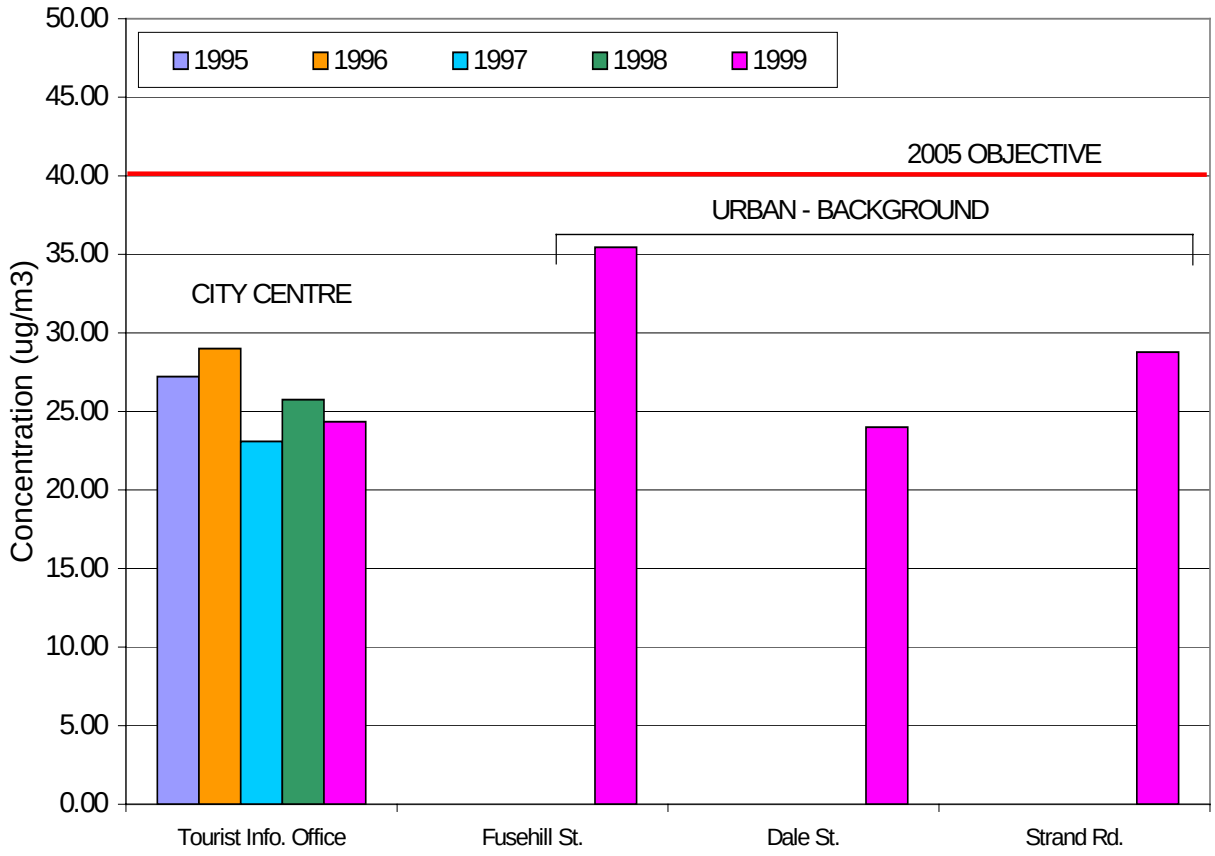


This shows the substantial presence of NO_2 at roadside sites over the last five years and most columns on the graph exceed the annual 2005 objective line, with some of these sites in locations where people are exposed for a proportion of the year-long period.

City centre & urban sites

A further 10 sites are distanced from busy roads, but are in urban locations where exposure to pollution is prolonged. These include a city centre site and three of urban sites. Graph 3 illustrates these:

Graph 3: NO_2 annual means – city centre & urban sites

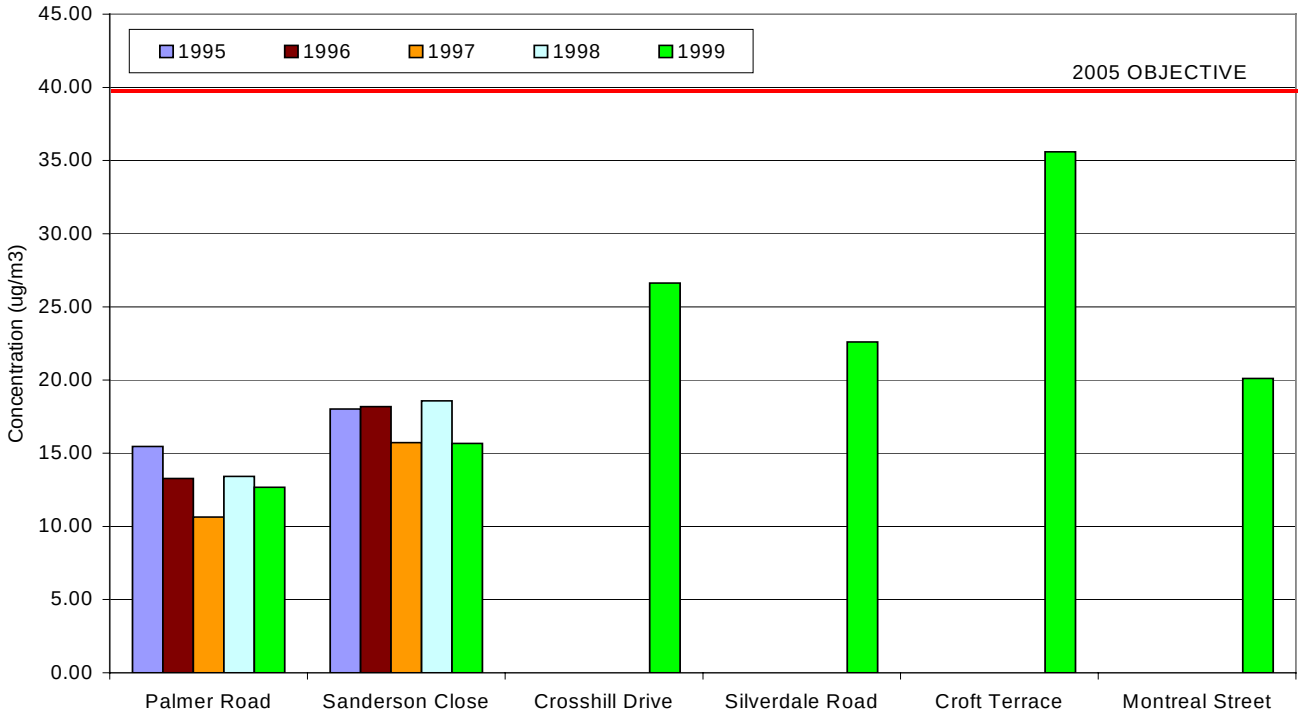


The Tourist Information Centre is a central site within the pedestrianised area of the city centre where large numbers of people will experience moderate exposure. Over the five year period, pedestrians breathed air polluted to an average of 65% of annual objective level. The three urban (background) sites, which represent typical inner-city residential areas, experienced air polluted from 47% to 58% of the limit. Neither categories of location are therefore at significant risk of breaching the NAQS objective.

Suburban sites

The third grouping is of suburban sites; these represent a variety of residential areas around the city.

Graph 4: NO_2 annual means – suburban sites

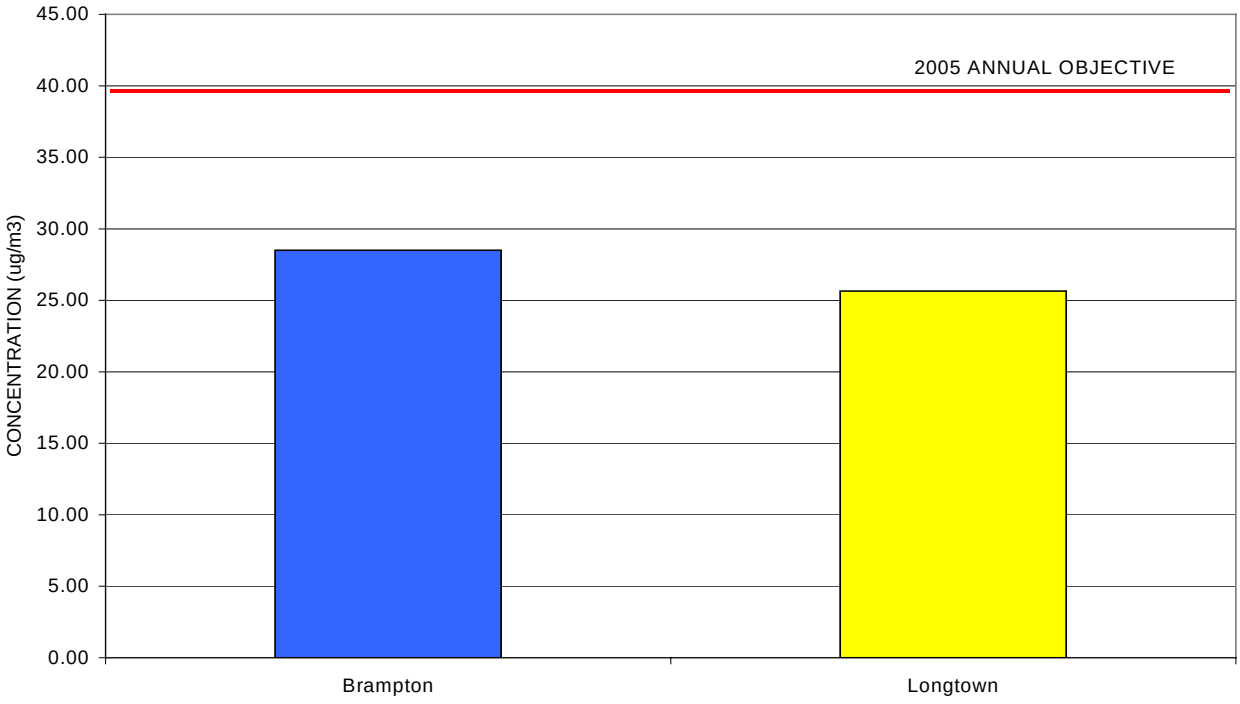


This shows that all locations are under the nitrogen dioxide annual objective.

Rural town sites

Two monitoring sites are maintained in two rural towns; Brampton (population: 4,000) and Longtown (population: 2,000).

Graph 5: NO_2 annual means – rural town sites



This shows that both locations are under the nitrogen dioxide annual objective.

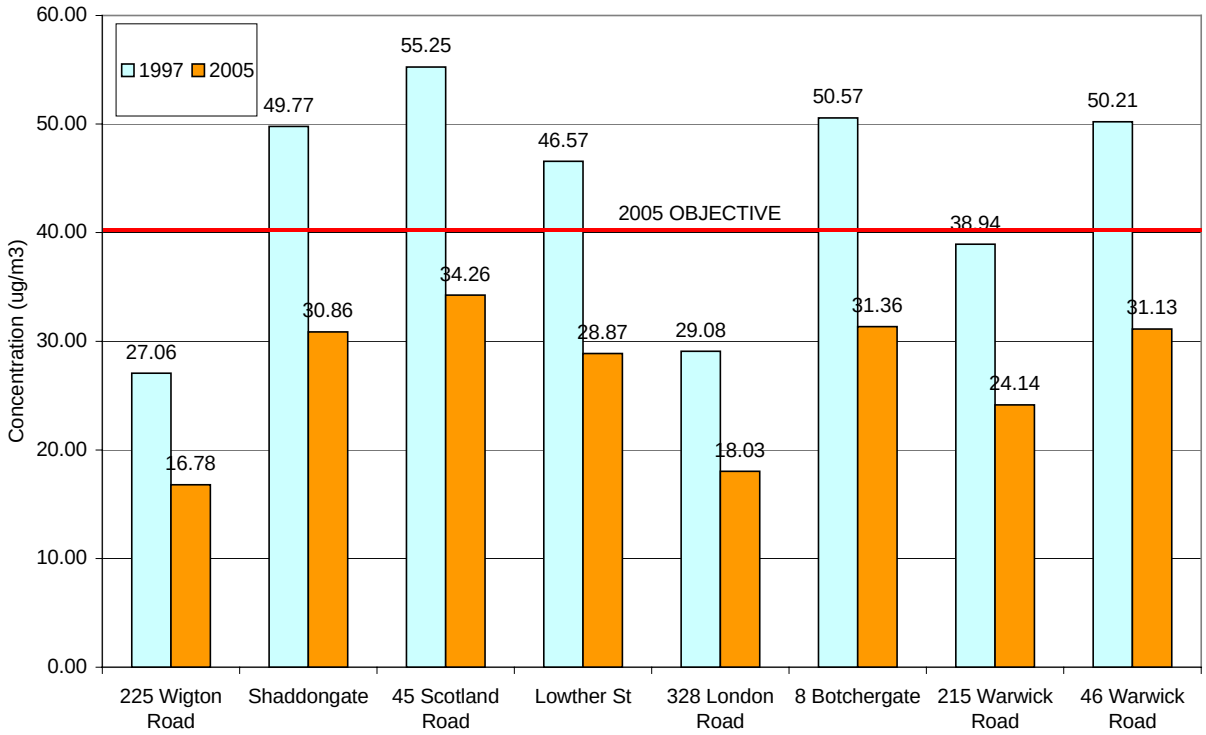
Air Quality Unit – Scotland Road

The air quality monitoring unit opposite 21 Scotland Road also provides hourly data which is used to project an annual mean. Data over ten months (23 Apr 99 – 22 Feb 00) gives a ten-monthly mean of 31.3 µg/m^3; suggesting an annual mean significantly under the 40 µg/m^3 limit.

3.2.2 Assessment of likelihood of achieving NO_2 annual objective

The diffusion tube monitoring programme results above show that the only parts of the city at risk of breaching the annual objective are by the most heavily trafficked roads. National trends shows declining levels in nitrogen dioxide and the revised UK air quality strategy (page 45) indicates that emissions are expected to decline from 1997 figures by 38% to 2005. This figures has therefore be applied to the existing diffusion tube data (graph 2); with data for two years either side of 1997 averaged to give a more robust 1997 data figure, and then a projected 2005 figures at 38% reduction.

Graph 6: NO_2 annual means - 1995-1999 average and projected 2005



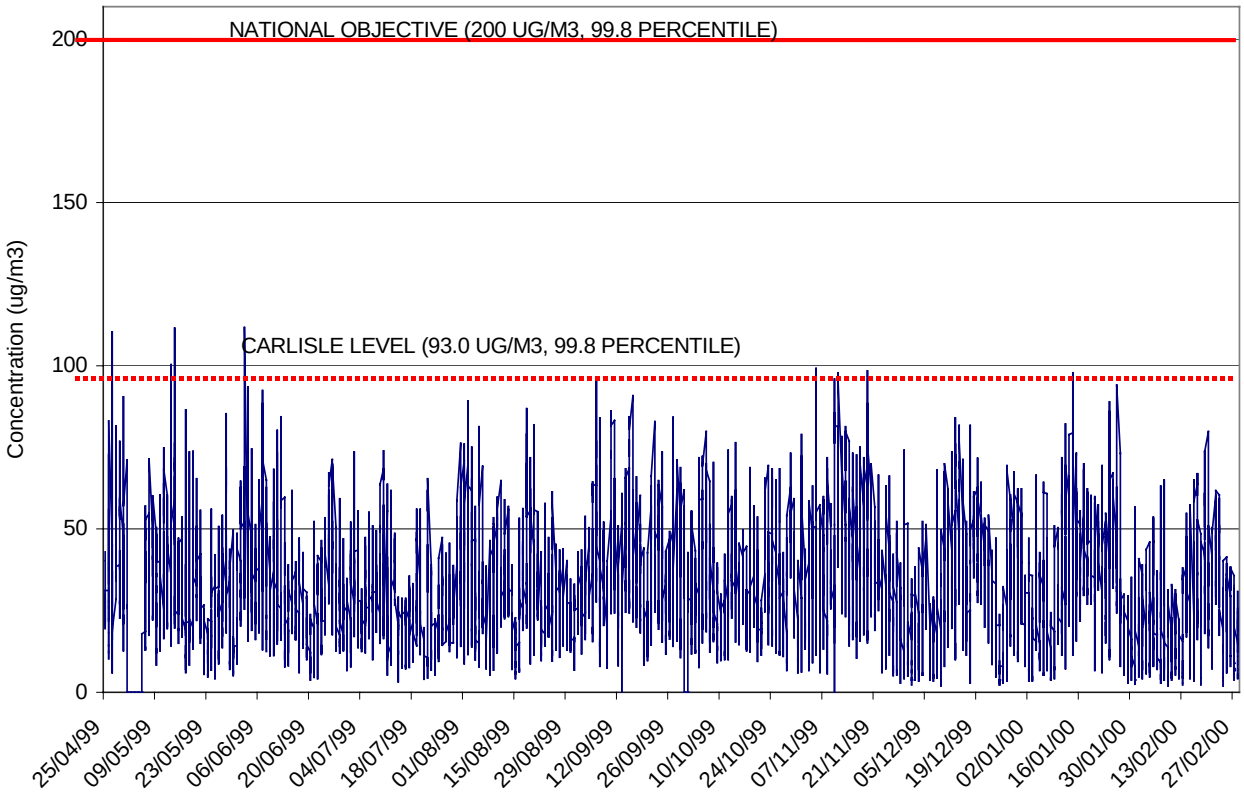
This shows that even the busiest roadside sites in the city can be expected to be under the annual objective by 2005. There is not therefore considered to be a significant risk in any parts of the authority area of exceeding this objective.

3.3 NITROGEN DIOXIDE HOURLY OBJECTIVE

3.3.1 Review of local monitoring

The only source of short-term hourly data is from the air quality monitoring unit on Scotland Road. Ratified hourly data from the unit for the period 24/4/99 to 27/2/00 is shown at graph 7:

Graph 7 : NO_2 hourly means – 24 Apr 99 to 27 Feb 00



This shows that the 99.8 percentile level (that level which allows 18 hourly exceedences per year) for Carlisle is at 93 µg/m^3; less than half the hourly objective level of 200µg/m^3.

3.3.2 Assessment of likelihood of achieving NO_2 hourly objective

Measurement to assess the likelihood of achieving the nitrogen dioxide hourly objective has only taken place at one location in Carlisle, using the air quality monitoring unit. However, this unit is alongside a very busy road and ten months measurements have produced a 99.8 percentile of less than half the objective level. This shows that even the busiest roadside sites in the city can be expected to be under the annual objective by 2005. There is not therefore considered to be a significant risk in any parts of the authority area of exceeding this objective.

3.4 CONCLUSION OF NITROGEN DIOXIDE REVIEW & ASSESSMENT PROCESS

Pollution measurements for around the authority has given the following evidence:

NO_2 (µg/m^3)	National objective by 2005	Current Carlisle levels	Projected Carlisle level by 2005
Annual mean	40	55.25 (averaged over 5 years 1995-1999, most polluted site)	34.26 (most polluted site)
Hourly mean (99.8th percentile)	200	93.0	No reduction factor available, but under 1999 level

It is therefore considered that there are no parts of the Carlisle City Council area that are at risk of exceeding the annual or 24-hourly objectives for nitrogen dioxide (NO_2).

4. REVIEW & ASSESSMENT OF PARTICULATES

Objectives: 50 μg/m^3 PM_{10} or less, when expressed as a 24-hourly mean, not to be exceeded more than 35 times per year, by 2004
40 μg/m^3 PM_{10} or less, when expressed as an annual mean by 2004

(For background information on the health effects of particulates, see stage one report. For information on national and local sources of particulates and their types, see stage two report.)

4.1 NATIONAL SCENARIO

Particulate Matter (PM) consists of solid matter and is categorised according to its size. PM_{10} are particles which are 10 microns or less in diameter [one micron = 1 μm = one millionth of a metre]. National emissions of PM_{10} in 1997 were 180 thousand tonnes. Most primary particulate matter in Carlisle is likely to come from traffic.

Data on the National Air Quality Information Archive web pages shows local particulate concentrations as follows:

- Estimated total particulate concentrations for 2004 (see Annex 6.3) projects local PM_{10} levels at 18 μg/m^3.

- Secondary particulate concentrations for 1996 (see Annex 6.4) shows levels at 9 μg/m^3; this was material mostly blown into the UK from mainland Europe.

These figures are only *estimates*, but provide a useful illustration of likely current and future levels.

4.2 PM_{10} 24-HOURLY OBJECTIVE

4.2.1 Review of local monitoring

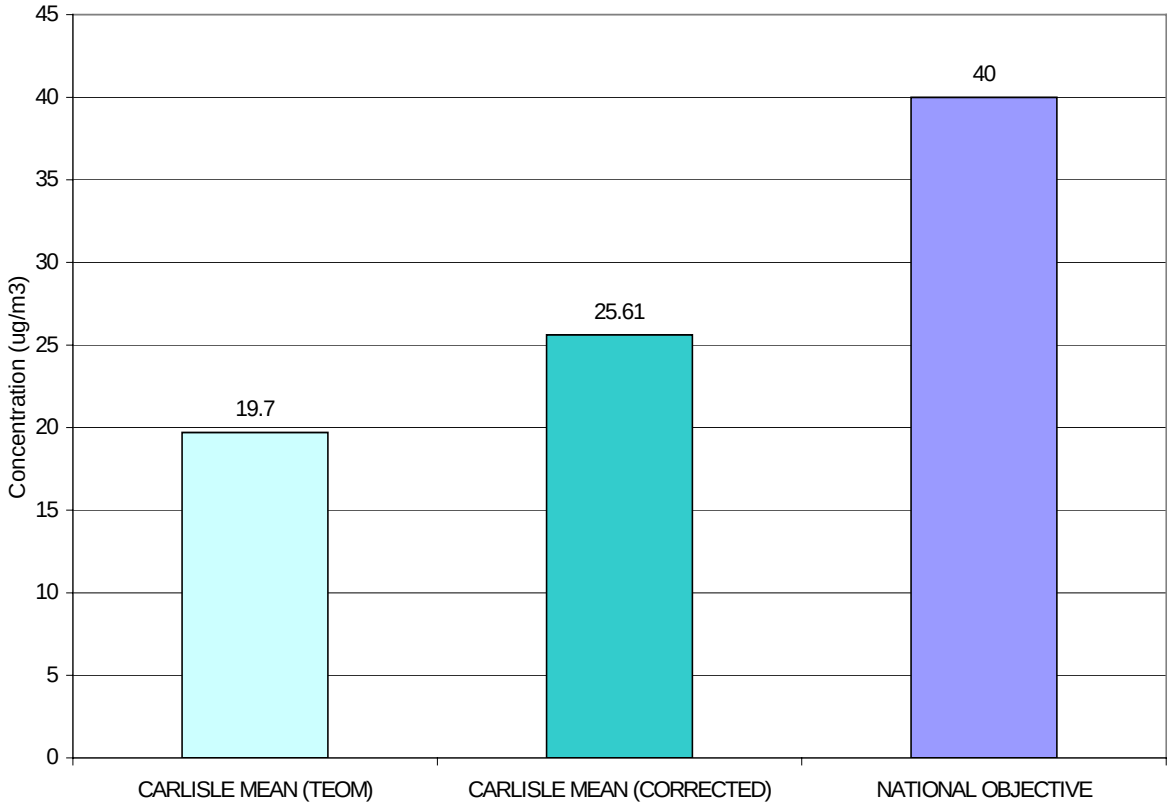
No monitoring equipment was available for the authority's use at the time of the stage two report. Since then, the purchase of an air quality monitoring unit has allowed the continuous collection of fine particulate measurements. That apparatus provides all the local data used in this report. (The annual mean is based on 10 month's worth of data, rather than a full year, but significantly incorporates data collected over the winter months).

PM_{10} monitoring in the UK has, to date, largely been based on TEOM (Tapered Element Oscillating Microbalance) equipment and the original National Air Quality Strategy objective for PM_{10} reflected that. A characteristic of TEOM equipment is that the collecting filter is heated to 50^{o}C, which drives off some volatile particulate fractions. Carlisle's air quality unit is fitted with a TEOM instrument; in common with most national PM_{10} monitoring stations. This gives a different (lower) result compared to more traditional (and labour-intensive) gravimetric devices. The February 2000 revision of the strategy changed the UK objective to comply with the EU directive, which is based on gravimetric measurement. It is therefore

necessary to apply a correction factor of x1.3 to convert (increase) from $PM_{10(TEOM)}$ to $PM_{10(gravimetric)}$ to allow direct comparisons between our data and the new national objective.

Data is logged (recorded) at the air quality unit every 15 minutes and the estimated annual mean in $PM_{10(TEOM)}$ has been projected from ten months worth of data. This result and the converted value in $PM_{10(gravimetric)}$ are shown at graph 8:

Graph 8: Projected PM_{10} annual mean



This shows that the $PM_{10(gravimetric)}$ projected annual mean is 26.8 $\mu g/m^3$; which is substantially under the annual objective of 40 $\mu g/m^3$.

4.2.2 Assessment of likelihood of achieving PM_{10} annual objective

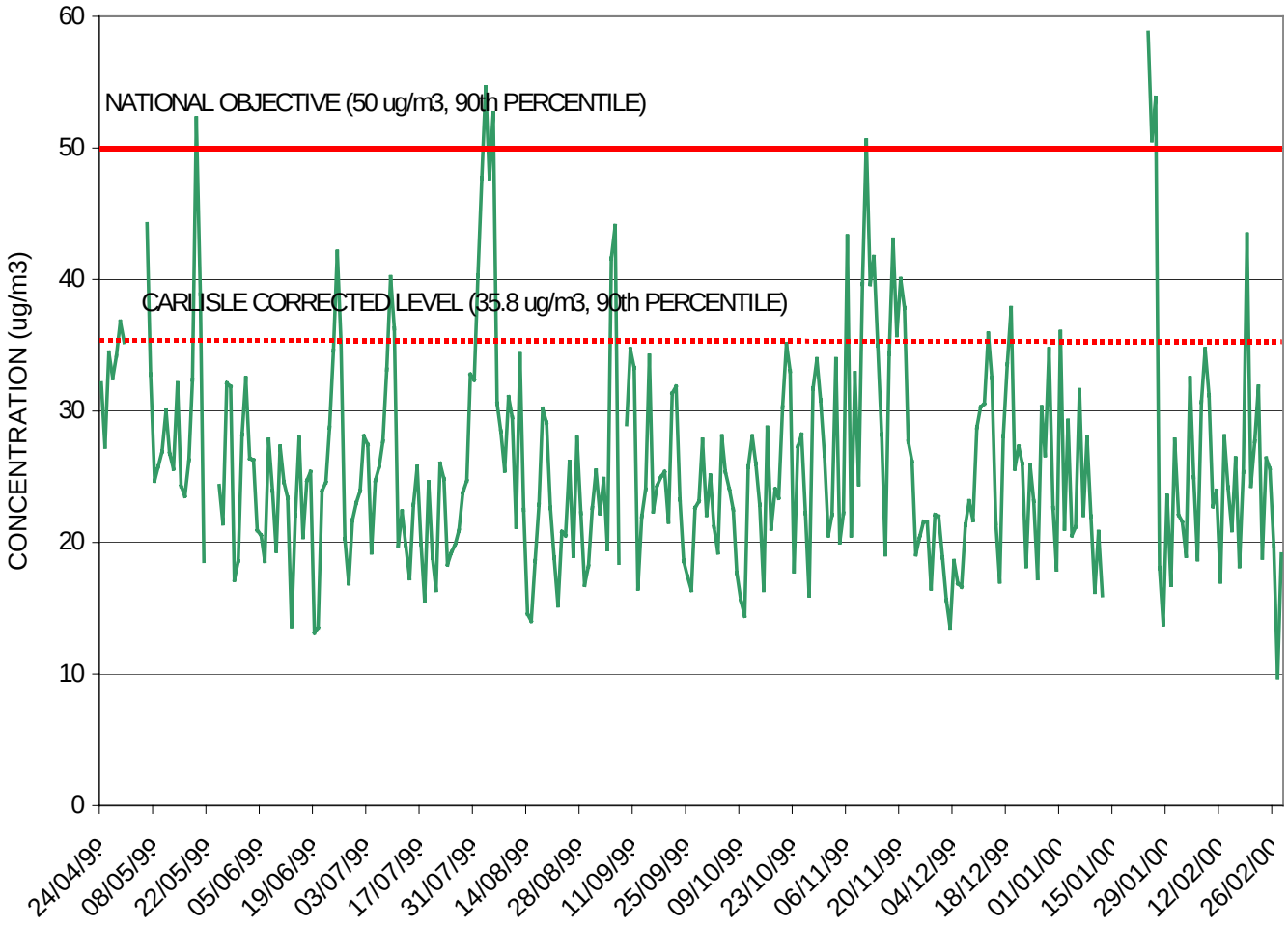
Measurements at a roadside location for PM_{10} show no risk of exceeding the PM_{10} annual objective at relevant outdoor locations.

4.3 PM_{10} 24-HOURLY OBJECTIVE

4.3.1 Review of local monitoring

Logged data from the unit has been used to calculated the PM_{10} hourly mean. Graph 9 shows converted data from the unit in $PM_{10(gravimetric)}$.

Graph 9: PM_{10} 24-hourly means



This shows that the 90th percentile of the PM $_{10(gravimetric)}$ hourly mean is 35.8µg/m^3, significantly under the hourly objective of 50 µg/m^3.

4.3.2 Assessment of likelihood of achieving PM_{10} hourly objective

Measurement at a roadside location for PM_{10} shows no risk of exceeding the PM_{10} hourly objective at relevant outdoor locations.

4.6 CONCLUSION OF PARTICULATE REVIEW & ASSESSMENT PROCESS

Pollution measurements for 10 months has given the following evidence:

PM_{10} (µg/m^3)	National objective by 2004	Carlisle level in 2000 (converted to gravimetric)
Annual mean	40	26.8 (estimate)
24-hourly mean (90th percentile)	50	35.8

It is therefore considered that there are no parts of the Carlisle City Council area that are at risk of exceeding the annual or hourly objectives for fine particulates (PM_{10}).

5. SUMMARY OF FINDINGS

5.1 Overall assessment of likelihood of achieving objectives

This stage three review and assessment of local air quality in the Carlisle City Council area has examined the two pollutants – nitrogen dioxide and fine particulates – which were assessed at stage two to be at risk of exceeding the objectives in the Air Quality Regulations 1997.

The annual objective limit for nitrogen dioxide is currently exceeded only at some inner-city roadside sites; projections for 2005 show that all of these sites are expected to fall under the objective limit. Other urban and suburban sites are already under this objective. Hourly levels are currently less than half the objective and are not predicted to exceed the 2005 objective. It is therefore considered that there is no significant likelihood of either the annual or hourly nitrogen dioxide objectives being breached by 31 December 2005.

The annual mean for particulates at the roadside monitoring location is substantially under the 2004 objective. The 24-hourly mean also falls significantly beneath its objective. It is therefore considered that there is no significant likelihood of either the annual or 24-hourly fine particulates objectives being breached by 31 December 2004.

5.2 Air quality management areas

As a result of this 2½ year review of local air quality, it is not considered necessary to declare an air quality management area within the Carlisle City Council area.

5.3 Further air quality review & assessment work

A further round of local air quality review and assessment work will be completed by this authority by December 2003.

6.7 SUPPLEMENTARY INFORMATION FOR THE STAGE TWO REVIEW

The stage two review and assessment by Carlisle City Council was issued on 21 June 1999 and a copy forwarded to DETR. On 11 August 1999 an appraisal report was received from DETR, the report having been examined by their contractors Air Quality Consultants. Their report identified areas where additional information would be valuable to support the review's summaries and it is detailed below.

6.7.1. DMRB NO_x calculations

The DMRB modelling has been rerun using the methodology specified in the appraisal report. The pollution specific guidance states that traffic and background NO_x figures should be summed together and that total then compared - without conversion to NO_2 - against a 60 ppb NO_x annual kerbside mean. The remodelled results for 1998 and 2005 are as in table 3:

Table 3: Modelled NO_2 annual means 1998 and 2005

Site	1998 NO_x annual kerbside mean (ppb)	2005 NO_x annual kerbside mean (ppb)
225 Wigton Road	51.3	32.2
45 Scotland Road	108.5	62.9
328 London Road	61.3	35.0
215 Warwick Road	79.1	43.4
46 Warwick Road	46.8	29.2

This shows that current NO_x figures range between 46-108 ppb, i.e. mostly above 60 ppb. With the anticipated decline in future emissions, it is predicted that only Scotland Road will be at risk of exceeding that objective. This concurs with surrogate hourly figures generated from diffusion tube readings that showed Scotland Road as the sole possible exceedence site.

6.7.2. Background PM_{10} concentrations

The PM_{10} background level of 10µg/m^3 in section 4.4.1 was that used by the developers of the wood-burning power station, proposed for location at Kingmoor, during their pollution modelling. A rural background of 16 µg/m^3 (taken from the NAQIA) is more representative and would give results as table 4 shows:

Table 4: Predicted maximum PM_{10} ground level concentrations

Measurement	Background Concentration (µg/m^3)	Predicted process concentration (µg/m^3)	Background + process concentration (µg/m^3)	% of NAQS standard
99th percentile (hourly average)	16	18	34	68

This give the 99th percentile of hourly averages at 68% of the NAQS standard. Maps from the developers show these peaks (of plume grounding) occurring in

open countryside; with the highest total particulate level experience by a dwelling being 24 μg/m^3 (50% of the standard).

6.7.3. Annual mean PM_{10} values

The annual mean PM_{10} values in section 4.4.2 were erroneously compared against the NAQS objective's 24-hour averages. Adjustment factors of 1.79 and 3 have therefore been applied to the annual means to predict the 90th and 99th percentiles of 24-hourly means. The results are shown in Table 5:

Table 5: Modelled PM_{10} annual and 24-hourly means

Site	1999 means (μg/m^3)			2005 mean (μg/m^3)		
	Annual	24-hr 90th percentile	24-hr 99th percentile	Annual	24-hr 90th percentile	24-hr 99th percentile
(column)	(a)	(b)	(c)	(d)	(e)	(f)
225 Wigton Rd.	20.99	37.6	63.0	17.9	32.0	53.7
45 Scotland Rd.	25.16	45.0	75.5	19.79	35.4	59.4
328 London Rd.	21.78	39.0	65.3	18.28	32.7	54.8
215 Warwick Rd.	23.22	41.6	69.7	18.95	33.9	56.9
46 Warwick Rd.	20.89	37.4	62.7	17.86	32.0	54.6
53 Lowther St.	24.79	44.4	74.4	19.6	35.1	58.8
Average	**22.8**	**40.8**	**68.4**	**18.73**	**33.5**	**56.2**

This indicates that average current PM_{10} levels on the city's arterial roads (column c) exceed the 24-hourly mean's 50μg/m^3 99th percentile (NAQS objective), but fall under the 90th percentile (EU limit value)(column b). 2005 levels should be about 18% less across all sites, when the 90th percentile of 24-hourly means will be in the range 32-35μg/m^3 and comfortably under the EU limit (column e). (NAQS and EU levels are not equivalent because they relate to the different particle monitoring methods of using TEOM or gravimetric equipment. However the Stanger Science and Environment document "Assistance with the review and assessment of PM_{10} concentrations in relation to the proposed EU Stage 1 Limit Values" states that the 1.3 adjustment figure between TEOM and gravimetric data can be ignored with DMRB figures as it designed to give conservative results.)

6.7.3. Uncontrolled and fugitive PM10 emissions

The document "Assistance with the review and assessment of PM_{10} concentrations in relation to the proposed EU Stage 1 Limit Values" states that:

"Due to the considerable uncertainties in emissions estimates for uncontrolled or fugitive dust releases, there is no suitable screening approach which can be confidently applied to the second stage review and assessment."

Examining the profile of local industrial activities, uncontrolled or fugitive emissions are not assessed to be a problem in the authority area.

6.8 REFERENCES

1. The Environment Act Part IV, The Stationery Office, 19 July 1995

2. "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland", Department of the Environment Transport and the Regions, The Stationery Office, January 2000.

3. The Air Quality Regulations 1997 S.I. 3043, The Stationery Office, 16 December 1997.

4. "The United Kingdom National Air Quality Strategy and Local Air Quality Management: Guidance for Local Authorities (Circular 15/97)", Department of the Environment, Transport and the Regions, 17 December 1997.

5. "Local Air Quality Management - Second Stage Review and Assessment", Carlisle City Council, 21 June 1999.

6. Draft "Framework for Review and Assessment of Air Quality LAQM.G1(00)", Department of the Environment, Transport and the Regions, 5 November 1999.

7. Draft "Monitoring air quality LAQM.TG1(00)", Department of the Environment, Transport and the Regions, 5 November 1999.

8. Draft "Selection and use of dispersion models LAQM.TG3(00)", Department of the Environment, Transport and the Regions, 5 November 1999.

9. Draft "Review and Assessment: Pollutant-Specific Guidance LAQM.TG4(00)", Department of the Environment, Transport and the Regions, 5 November 1999.

10. Department of the Environment, Transport and the Regions, internet site http://www.environment.detr.gov.uk/airq/aqinfo.htm

11. "Source apportionment of airborne particulate matter in the United Kingdom", Airborne Particles Expert Group, January 1999.

12. "Assistance with the review and assessment of PM_{10} concentration in relation to the proposed EU Stage 1 Limit Values", Department of the Environment, Transport and the Regions, March 1999.

6.9 GLOSSARY

Accuracy	A statistical definition for defining how well measured data fits the true values
AEA	Atomic Energy Authority
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AUN	Automated Urban Network
BS	British Standard
DETR	Department of the Environment, Transport and the Regions (formerly Department of the Environment)
EA	Environment Agency
EPAQS	Expert Panel on Air Quality Standards
Mean	The average value of a data set
mg/m^3	Milligrams per metre cubed
NAQIA	UK National Air Quality Information Archive
NETCEN	National Environmental Technology Centre
NO_2	Nitrogen Dioxide
PM_{10}	Particulate Matter of 10 microns or less in diameter
ppb	Parts per billion
ppm	Parts per million
Precision	A statistical definition of how closely a set of repeated measurements taken independently are to one another
µg	microgram (one millionth of a metre)
$\mu g/m^3$	microgram per cubic metre