2009 Air Quality Updating and Screening Assessment for EDEN DISTRICT COUNCIL

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

October 2009

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Executive Summary

Monitoring of NO_2 concentrations within the District indicates the Air Quality Objective for NO_2 will not be exceeded.

There are no Air Quality Management Areas within the District.

Generally there are considered to be no likely impacts within the District and Air Quality Objectives for all pollutants listed in Table 1.1 are likely not to be exceeded. There is uncertainty concerning a large mixed development for which an air quality impact assessment predicted neutral effects. The development is now being revised and it is unclear what likely air quality impacts on NO_2 concentrations will result.

Following a review of air quality monitoring in the District, the Brunswick Road monitoring location appears not to represent relevant exposure for NO_2 concentrations. An additional monitoring location at Brunswick Road will be selected and installed for 2010. A Detailed Assessment is not considered necessary at present because of uncertainties about the effects on traffic flows of a large mixed development currently undergoing revision. Other changes to monitoring locations are also under consideration and the use of some locations may discontinue with monitoring being transferred to urban roadside locations

Subsequent proposed actions as a result of this report are:

- Install new monitoring location at Brunswick Road before 2010
- Identify other new monitoring locations and install by 2010
- Submit 2010 Progress Report
- If necessary, proceed to Detailed Assessment for possible exceedence of NO_2 AQ Objective at new monitoring locations should measured NO_2 concentrations be close to Objective

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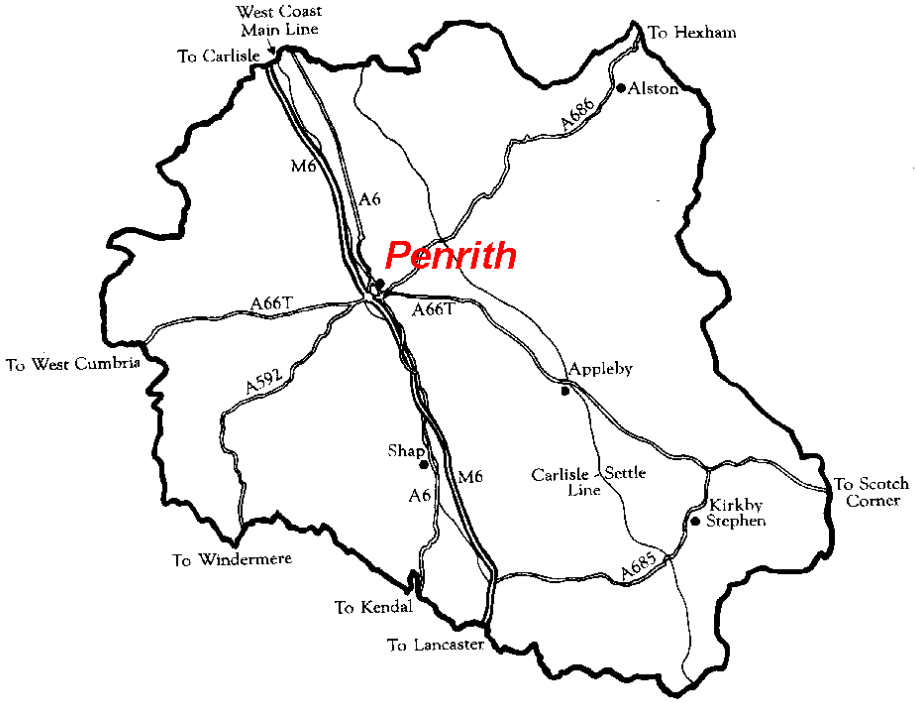
Appendix 1 QA/QC document from Laboratory supplying and analysing diffusion tubes

1 Introduction

1.1 Description of Local Authority Area

Eden is situated in North Cumbria and has a population of just over 50,000. A majority of residences are located within rural villages which cover over 830 square miles of land. There are four main centres of population (shown on the map below), the largest is Penrith, which is situated in the centre of the district, having a population of over 14,750. The Eden District is split into thirty wards and locally into seventy-one parishes.



Map of area showing major highways and settlements

The economy is characterised by agricultural support, public administration, wholesale and retailing, also several quarries. The Eden Area has a number of rail service links and Penrith has a direct link to the national road transport network and a train station for connections to major cities both north and south.

There are deemed to be no major industrial sources of pollution. The M6 motorway runs North/South through the District but other roads, including the A66, which traverses the District East/West, are relatively lightly trafficked.

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

1.3 Air Quality Objectives

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene			
	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Eden Summary of R & A Conclusions

YEAR	MONITORING OR CALCULATED EXCEEDENCE	DETAILED ASSESSMENT/ AQMA REQUIRED	CONCERNS	ACTIONS	COMMENTS
2000 Stage 1	N	N	N	N	N
2003 USA	N	N	N	N	N
2004 Progress Report	Y NO_2 Monitoring Brunswick Rd & The Narrows – Annual Means >40µg/m^3	N	NO_2 results: Brunswick Rd & The Narrows: no relevant exposure.	Relocate NO_2 diffusion tube @ Brunswick Road for relevant exposure.	No relevant exposure at Narrows; Diffusion tube @ Brunswick Rd too close to kerb for relevant exposure.
2005 Progress Report	Y NO_2 Monitoring Brunswick Rd	DA required for NO_2	Brunswick Road	Planning condition requires submission of AQ impact assessment for proposed town centre mixed development	The proposed town centre mixed development would have potential impacts on traffic flows and air quality
2006 USA	N	Possible DA required for NO_2	Brunswick Road	Decision about Detailed Assessment delayed until modelling data received	
2007 Progress Report	N	N	N	N	p.9 mistaken reference to *50% TEA in Water* instead of 50% TEA in acetone lab preparation for diffusion tubes.
2008 Progress Report	N	N	Air quality impacts of proposed mixed development assessed as not likely to cause AQ objectives to be exceeded.	Increased NO_2 concentrations likely at some locations due to mixed dev. Examine in 2009 USA.	Since this AQ report was published the development is being redesigned due to collapse of funding.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

There is no automatic monitoring of NO_2 concentrations carried out within the District.

2.1.2 Non-Automatic Monitoring

Monitoring of NO_2 concentrations is carried out at 8 locations within the District using single passive diffusion tubes at each location.

Table 2.2 Details of Non- 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 ?
Tebay	Kerbside	X 361742 Y 504785	NO_2	N	N	1m	
Kirkby Stephen	Urban Background	X 377246 Y 508131	NO_2	N	N	3m	
Appleby	Urban background	X 368348 Y 520358	NO_2	N	N	3m	
Env Agency	Urban Background	X 351075 Y 529082	NO_2	N	N	20m	
Brunswick Road	Kerbside	X 351399 Y 530356	NO_2	N	Y	5m	
Middlegate	Kerbside	X 351531 Y 530206	NO_2	N	N	1m	
Guard House	Rural Background	X 334634 Y 526258	NO_2	N	N	NA	
Alston	Kerbside	X 371726 Y 546499	NO_2	N	N	2m	

- The laboratory supplying and analysing the nitrogen dioxide diffusion tubes is Gradko International Ltd.
- The preparation method used by the laboratory is 50% TEA v/v in acetone and analyses are carried out using UV spectrophotometry.
- The laboratory follows the procedures set out in the Harmonisation Practical Guidance
- The diffusion tube results have not been compared with the reference method in a co-location study
- The current bias factor of 0.93 has been applied to the annual mean values of diffusion tube analyses for each monitoring location. The factor was obtained from the Review and Assessment web-site: http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube050509.xls
- Gradko International Ltd have been rated as good in the last two WASP reports relating to Rounds 97-101 and 98-102

See also Appendix 1 for the laboratory QA/QC Document

2.2 Comparison of Monitoring Results with AQ Objectives

The annual mean NO_2 concentrations measured within the District using diffusion tubes are summarised in Tables 2.3a and 2.3b. None of the annual means exceeds 40µg/m^3. New monitoring locations are subject to a review of the suitability of current locations. Monitoring in new locations will be implemented as soon as possible. At least one new monitoring location will be installed in Brunswick Road because of historical concerns about relevant exposure to NO_2 concentrations and because the current location may not represent relevant exposure.

2.2.1 Nitrogen Dioxide

Annual mean NO_2 concentrations, measured by passive diffusion tubes, were less than 40µg/m^3 in 2008 at all locations.

Automatic Monitoring Data

No automatic monitoring of airborne pollutants is carried out by Eden District Council.

Diffusion Tube Monitoring Data

Table 2.3a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations 2008 (μg/m^3) Adjusted for bias
ED 1	Tebay	N	100	21.0
ED 2	Kirkby Stephen	N	100	19.2
ED 3	Appleby	N	100	17.8
ED 4	Env Agency	N	100	27.6
ED 5	Brunswick Road	N	100	33.3
ED 6	Narrows	N	100	32.9
ED 7	Guard House	N	100	4.2
ED 8	Alston	N	91.5	13.6

The current bias factor of 0.93 has been applied to the annual mean values of diffusion tube analyses for each monitoring location. The factor was obtained from the Review and Assessment web-site:
http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube050509.xls

Table 2.3b Results of Nitrogen Dioxide Diffusion Tubes

~~2.2.2~~

Site ID	Location	Within AQMA?	Annual mean concentrations ($\mu g/m^3$) Adjusted for bias				
			2004[1]	2005[2]	2006[3]	2007[4]	2008[5]
ED 1	Tebay	N	20.2	24.6	23.8	23.0	21.0
ED 2	Kirkby Steph	N	20.9	24.5	22.0	20.6	19.2
ED 3	Appleby	N	20.8	21.8	22.0	18.4	17.8
ED 4	Env Agency	N	28.3	30.0	29.3	25.8	27.6
ED 5	Brunswick R	N	45.9	42.4	33.1	34.2	33.3
ED 6	Narrows	N	32.7	36.0	34.7	29.9	32.9
ED 7	Guard House	N	4.9	5.7	5.2	4.0	4.2
ED 8	Alston	N	13.9	11.7	12.8	13.7	13.6

[1] Bias Factor: 1.10
[2] Bias Factor: 1.10
[3] Bias Factor: 1.01
[4] Bias Factor: 1.04
[5] Bias Factor: 0.93

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2.2.2 PM10

There is no automatic monitoring of PM_{10} concentrations carried out by Eden District Council.

~~2.2.3~~2.2.3 Sulphur Dioxide

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There is no automatic or non-automatic monitoring of SO_2 concentrations carried out by Eden District Council. Previous SO_2 monitoring, using a 'bubbler', has indicated it is unlikely the AQ Objective will be exceeded in a densely populated area of housing adjacent an industrial estate.

~~2.2.4~~2.2.4 Benzene

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There is no automatic or non-automatic monitoring of benzene concentrations carried out by Eden District Council.

Eden District Council has examined the results from monitoring in the district. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

The 2008 Progress Report discussed the air quality impact assessment for a large commercial/residential development in the Penrith. Work began in 2008 but ceased due to funding problems. At present design details for the modified development are being prepared therefore the impact assessment may not reflect the effects of the revised design on air quality and further discussion of likely impacts is not possible in this report.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

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

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

3.3 Roads with a High Flow of Buses and/or HGVs.

In the absence of recent traffic flow data, limited traffic counts have been carried out on the main routes into Penrith where relevant exposure is possible. The counts have indicated that flows of buses and HGVs are low, < 5%.

Eden District Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

3.4 Junctions

Eden District Council confirms that there are no new/newly identified busy junctions/busy roads.

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

The 2008 Progress Report mentioned proposals for improving a section of the A66 and a new access road for the Gillwilly Industrial Estate in Penrith which may have implications for local air quality. There is no information about the proposals at present. The issues will be dealt with as necessary in subsequent R & As.

Eden District Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

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

3.7 Bus and Coach Stations

The Updating and Screening Assessment 2003 stated the flow of buses is less than 1000 buses per day and concluded there was no relevant exposure to NO_2 or PM_{10}.

Eden District Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Eden District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

The main West Coast railway line, the main passenger train route between the South and Glasgow, passes through Penrith and minerals are transported from and to locations within Eden.

4.2.1 Stationary Trains

Previous assessments have concluded there is no potential for outdoor exposure from loading of quarry products at Shap Blue Quarry or unloading of material at British Gypsum.

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

4.2.2 Moving Trains

The section of track passing through Eden DC area is not listed in Table 5.1 as having substantial numbers of passenger trains per day; it therefore appears unlikely there is long-term exposure within 30m of the edge of the tracks.

4.3 Ports (Shipping)

This aspect was considered in the Updating and Screening Assessment 2003 which stated that whilst Eden DC is land-locked, there are no boats on lakes within the Lake District National Park which use sulphur-containing fuels.

Eden District Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

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

Eden District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

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

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

Eden District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

Although there are Petrol Stations within the District with an annual throughput of >3500 m^3/yr there are no roads carrying 30,000 vehicles per day therefore no relevant exposure is likely.

Eden District Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Eden District Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

There are no known biomass combustion plants within the District. An enquiry was received about the possible installation of such a plant but the input was anticipated to be less than 50kW.

Eden District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

There are no known biomass combustion plant in the District therefore it is anticipated there are no local impacts on air quality from such plant.

Eden District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

Eden District covers an area of 2,142 Km^2 with a population of around 52,000. Penrith, the largest population centre, has around 15,000 residents. The population of Eden DC is therefore distributed throughout the area in relatively small population centres. There is only one possible area within the District where more than 100 properties may have solid fuel appliances: the Castletown area of Penrith. This was dealt with in the 2003 USA, previous monitoring of SO_2 concentrations indicated that objectives for both SO_2 and PM_{10} were not exceeded.

Eden District Council therefore confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

There are no known sources of fugitive or uncontrolled sources of PM_{10} which have not been previously considered in the R & A régime.

Eden District Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

According to monitoring of NO_2 concentrations at 8 locations within the District, using single passive diffusion tubes, data from 2008 indicates the Air Quality Objective for NO_2 will not be exceeded (see comments in 8.2).

There are no Air Quality Management Areas within the District.

8.2 Conclusions from Assessment of Sources

Generally there are considered to be no likely impacts within the District and Air Quality Objectives for all pollutants listed in Table 1.1 are likely not to be exceeded. There is uncertainty concerning a large mixed development for which an air quality impact assessment predicted neutral effects. The development is now being revised and it is unclear what likely air quality impacts on NO_2 concentrations will result.

Following a review of air quality monitoring, the Brunswick Road monitoring location does not appear to represent relevant exposure for NO_2 concentrations. An additional monitoring location at Brunswick Road will be selected and installed for 2010. A Detailed Assessment is not considered necessary at present because of uncertainties about the effects on traffic flows of a large mixed development currently undergoing revision. Other changes to monitoring locations are also under consideration and the use of some locations may discontinue with monitoring being transferred to urban roadside locations

8.3 Proposed Actions

Additional monitoring of NO_2 concentrations has been identified as necessary at Brunswick Road because the current monitoring location may not represent relevant exposure. Some existing monitoring locations might also be removed and be replaced by urban roadside locations.

Subsequent proposed actions as a result of this report are:

- Install new monitoring location at Brunswick Road before 2010
- Identify other new monitoring locations and install by 2010
- Submit 2010 Progress Report
- If necessary, proceed to Detailed Assessment for possible exceedence of NO_2 AQ Objective at new monitoring locations should measured NO_2 concentrations be close to Objective

9 References

[1]Technical Guidance LAQM.TG(09)

Eden District Council Air Quality Review and Assessment Reports:-

[2] Air Quality Review and Assessment Stage 1 Report
[3] Air Quality Review and Assessment 2003 Updating and Screening Assessment
[4] Air Quality Review and Assessment 2004 Progress Report
[5] Air Quality Review and Assessment 2005 Progress Report
[6] Air Quality Review and Assessment 2006 Updating and Screening Assessment
[7] Air Quality Review and Assessment 2007 Progress Report
[8] Air Quality Review and Assessment 2008 Progress Report

Appendices

Appendix A: QA/QC Data

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

9.1.1 Quality assurance and quality control

The EU Daughter Directive set data quality objectives for nitrogen dioxide along with other pollutants. Under the Directive, annual mean NO_2 concentration data derived from diffusion tube measurements must demonstrate an accuracy of ±25 % to enable comparison with the Directive air quality standards for NO_2. These standards remain unchanged with the Clean Air for Europe (CAFÉ) Directive (2009) which incorporated the first three Daughter Directives.

In order to ensure that NO_2 concentrations reported are of a high calibre, strict performance criteria need to be met through the execution of quality assurance and control procedures. As mentioned earlier, a number of factors have been identified as influencing the performance of diffusion tubes including the laboratory preparing and analysing the tubes and the tube preparation method. Quality assurance and control procedures are, therefore, integral features of any monitoring programme, ensuring that uncertainties in the data are minimised and allowing the best estimate of true concentration. The Harmonisation Working Paper published its findings in February 2008 as the Practical Guidance[1]. This guidance provides a set of preparation and analytical procedures and guidelines for the deployment of diffusion tubes with the aim to standardize both. Gradko International were members of the Working Party and were key partners in the standardization of diffusion tubes.

Gradko International Ltd conducts rigorous quality control and assurance procedures in order to maintain the highest degree of confidence in their laboratory measurements. These are discussed in more detail below.

Workplace Analysis Scheme for Proficiency (WASP)

Gradko International Ltd participates in the Health and Safety Laboratory WASP[2] NO_2 diffusion tube scheme on a monthly basis. This is a recognised performance-testing programme for laboratories undertaking NO_2 diffusion tube analysis as part of the UK NO_2 monitoring network. The scheme is designed to help laboratories meet the European Standard EN482[3]. The laboratory performance for each month of 2008 was rated 'good' which signifies a high level of accuracy for laboratory measurements.

Network Field Inter-Comparison Exercise

Gradko International Ltd also takes part in the NO_2 Network Field Inter-Comparison Exercise, operated by AEA (formerly NETCEN), which complements the WASP scheme in assessing sampling and analytical performance of diffusion tubes under normal operating conditions. This involves the regular exposure of a triplet of tubes at an Automatic Urban Network site (AUN) site. These sites employ continuous chemiluminescent analysers to measure NO_2 concentrations. Of particular interest is the bias of the diffusion tube measurement relative to the automatic analyser that gives an indication of accuracy. AEA have established performance criterion for participating laboratories in line with the EU 1st Daughter Directive requirement for indicative monitoring techniques, as the 95% confidence interval of the annual mean bias which should not exceed ± 25%.

In conjunction with this, a measure of precision is determined by comparing the triplet co-located tube measurements commonly referred to as the coefficient of variation (CoV). This value is useful for assessing the uncertainty of results due to sampling and analytical techniques. The AEA performance criterion for precision is that the mean coefficient of variation for the full year should not exceed 10%.

[1] AEA(2008) Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users.
[2] Health and Safety Executive, Workplace Analysis Scheme for Proficiency
[3] European Committee for Standardisation (CEN) Workplace Atmospheres, General requirements for the performance of procedures for the chemical measurement of chemical agents, EN482, Brussels, CEN 1994.

The Field Inter-Comparison Exercise has historically generated the bias and precision results for each laboratory on an annual basis. This changed in 2004 to results being reported on a monthly basis. This enables a full year's inter-comparison against the AEA performance criteria to be carried, as shown in Table 3. The results below indicate that Gradko International Ltd diffusion tubes are well within the performance targets set by AEA.

Table 1 Summary of NO_2 Network Field Inter-Comparison Results, 2008

Annual Mean Bias		Precision	
AEA Performance Target	Gradko Annual Mean Bias	AEA Performance Target	Gradko Precision
±25%	**-11 %**	**10%**	**3 %**

Gradko International Ltd performs blank exposures that serve as a quality control check on the tube preparation procedure**.** All results are not blank subtracted before they are issued to the relevant Borough.

Factor from Local Co-location Studies (if available)

There are no local co-location studies available

Discussion of Choice of Factor to Use

The bias factor obtained from the Review and Assessment web-site (see below) was used to correct annual mean concentrations: http://www.uwe.ac.uk/aqm/review/R&Asupport/diffusiontube050509.xls

PM Monitoring Adjustment

Eden District Council does not carry out any PM_{10} monitoring.

Short-term to Long-term Data adjustment

This has not been required for the diffusion tube monitoring carried out by Eden District Council

QA/QC of automatic monitoring

Eden District Council carries out no automatic monitoring

QA/QC of diffusion tube monitoring

See p.8 for details of laboratory, diffusion tube preparation method, tube analysis and WASP reports.