



2009 Air Quality Updating and Screening Assessment

Spelthorne Borough Council

Document Control

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Executive Summary

This report presents the findings of Spelthorne Borough Council's third Updating and Screening Assessment (USA) of air quality within the Borough. The USA evaluates new and changed sources to identify those that may give rise to a risk of an exceedance of an air quality objective. Results from monitoring within the Borough are also presented and evaluated in relation to the objectives. Where a risk of an exceedance is identified at a relevant location the Council will proceed to a Detailed Assessment.

Previous air quality assessments have concluded that concentrations of carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide (SO₂) and PM₁₀ are compliant with UK objectives. However concentrations of nitrogen dioxide (NO₂) have been found to exceed the annual mean objective at various locations within the Borough. A Detailed Assessment was carried out in 2004, and an Air Quality Management Area (AQMA) for the annual mean nitrogen dioxide objective was declared across the whole Borough.

The Council operates an automatic monitoring site for nitrogen dioxide and PM₁₀. It also has access to data from two other automatic monitoring sites operated by BAA and the Highways Agency. These automatic sites are supplemented by a much larger network of diffusion tubes measuring nitrogen dioxide at a wide range of roadside and background locations. Results for 2008 show that PM₁₀ and SO₂ concentrations in the Borough meet the relevant objectives. Nitrogen dioxide concentrations, on the other hand, exceeded the annual mean objective in some, but not all, locations. As the areas in which the objective is being exceeded are not very extensive, it is proposed that the boundaries of the current whole-Borough AQMA are reassessed to identify more clearly those areas of the Borough where concentrations of nitrogen dioxide exceed the objective. This reassessment will be carried out as a Detailed Assessment, which will utilise the nitrogen dioxide monitoring together with modelling to define a more directly relevant boundary for the AQMA.

The USA has not identified any new or significantly altered road traffic, industrial, commercial or domestic sources that need to be subjected to a Detailed Assessment. Potential changes have, however, been noted at Heathrow Airport following the opening of Terminal 5, which will, in particular, affect traffic flows. These changes will be kept under review and to the extent possible, the changed traffic flows will be taken into account when the Detailed Assessment is carried out over the next twelve months.

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1 Introduction

1.1 Description of Local Authority Area

Spelthorne Borough is an urban area located in northwest Surrey, approximately 15 miles west of central London. It shares a boundary with the London Boroughs of Hillingdon, Hounslow and Richmond to the east, the district of Elmbridge to the south, Runnymede to the west and Slough, Windsor and Maidenhead and to the northwest. The river Thames forms a large portion of the western boundary of the borough, and much of it is occupied by either flood plain or reservoir, including Queen Mary Reservoir, Staines reservoir and King George VI reservoir.

The principle centres in the Borough are Ashford, Shepperton, Staines, Stanwell and Sunbury-on-Thames. The Borough is served by a number of major transport links, including the M25, A30 and M3, and is bordered to the northeast by Heathrow Airport.

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 Local Air Quality Management (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), and 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 $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 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 $\mu\text{g}/\text{m}^3$	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

1.4 Summary of Previous Review and Assessments

The following reports on air quality have been published by Spelthorne Borough Council:

- Progress Report, April 2008
- Progress Report, April 2007
- Updating and Screening Assessment, 2006
- Action Plan, 2005
- Progress Report 2005
- Detailed Assessment 2004

Monitoring data in the 2003 Updating and Screening Assessment suggested that that nitrogen dioxide and PM₁₀ concentrations in the Borough may not meet the objectives. The subsequent Detailed Assessment carried out in 2004 identified exceedences of the annual mean nitrogen dioxide objective and an AQMA was declared across the whole borough. PM₁₀ 24-hour objectives were exceeded between Junction 13 and 14 of the M25, however as there was no relevant exposure in these areas, an AQMA was not declared for PM₁₀. The 2005 Progress Report did not highlight any significant changes that required further investigation.

The 2005 Action Plan outlined proposals to reduce emissions on local roads by implementing improved traffic management, promoting public transport and providing an integrated transport system. It was estimated that despite reductions in traffic flows by introducing the above measures, nitrogen dioxide concentrations were unlikely to be brought below the objectives due to the volume of traffic on the roads.

The 2006 Updating and Screening Assessment concluded that no Detailed Assessment was required for any pollutant. Nitrogen dioxide concentrations were still above the objective and the AQMA, still justified. No new emission sources, including roads or industrial processes, had been introduced since the previous Updating and Screening Assessment.

The 2007 Progress Report indicated a general downward trend in nitrogen dioxide emissions across the Borough, from 2002 to 2006. A new automatic monitoring site was introduced at Sunbury Cross.

The 2008 Progress Report indicated a continuation in the downward trend of nitrogen dioxide at some locations, however an increase at others. Three diffusion tubes operated by the Highways Agency were introduced, close to the M25 and M3 motorways, the results for which are presented in this report.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Three automatic monitoring sites are currently operated in the Borough of Spelthorne; Sunbury Cross is operated by TRL on behalf of Spelthorne Borough Council; Oaks Road is operated by AEA on behalf of BAA and a station at M25 Junction 13, is operated by TRL on behalf of the Highways Agency. The pollutants monitored at the sites are summarised in Table 2.1 below.

PM₁₀ was monitored using a TEOM analyser at the M25 Junction 13 site, and at the Oaks Road site. At the Sunbury Cross site, PM₁₀ was monitored using an OSRIS from October 2007 until February 2008, and a TEOM from 20 November 2008.

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA ?	Relevant Exposure?	Distance to Kerb of Nearest Road	Worst-case Location?
Sunbury Cross	Urban Background	510064 170199	NO ₂ , PM ₁₀ , PM _{2.5} , PM ₁	Y	N	30m	N
Heathrow Oaks Road	Urban Background	505729, 174496	NO ₂ , O ₃ , PM ₁₀ , PM _{2.5}	Y	N	1m	Y
M25 J13	Roadside	502807, 173572	CO, NO ₂ , SO ₂ , PM ₁₀ , PM _{2.5} , O ₃	Y	N	6m	Y

2.1.2 Non-Automatic Monitoring

Spelthorne Borough Council carries out diffusion tube monitoring at 46 locations across the Borough. An additional three diffusion tubes (HA1 - HA3), which are part of the Highway Agency's network are located on the facades of residential properties close to the M3 and M25. Locations are shown in Figures 2.1 to 2.3.

Following recommendations in the 2007 Progress Report, diffusion tubes were added and relocated following Defra guidance. A total of five new tubes were introduced in 2007 and early 2008. SP43, SP44 and SP45 are co-located at The Haven Sunbury and operational since September 2007. SP46 the Elmsleigh Centre, Staines and SP47 at Hadrian Way, Stanwell were both introduced in February 2008. SP40 was discontinued in February 2008 as a duplicate tube was no longer required.

All Spelthorne Borough Council diffusion tubes are analysed by Lambeth Scientific Services Ltd and prepared using 50% TEA in Acetone. The Highways Agency tubes are analysed by Gradko, and prepared using 20% TEA in water.

Bias adjustment factors have been calculated using data from the co-location study operated at the Oaks Road site. A second co-location study is operated at Sunbury Cross, however, due to better precision at the Oaks Road site, the Council has taken the decision to use this factor. Calculations and choice of bias adjustment factor are discussed in Appendix A.

Figure 2.1: Monitoring Site Location Plan

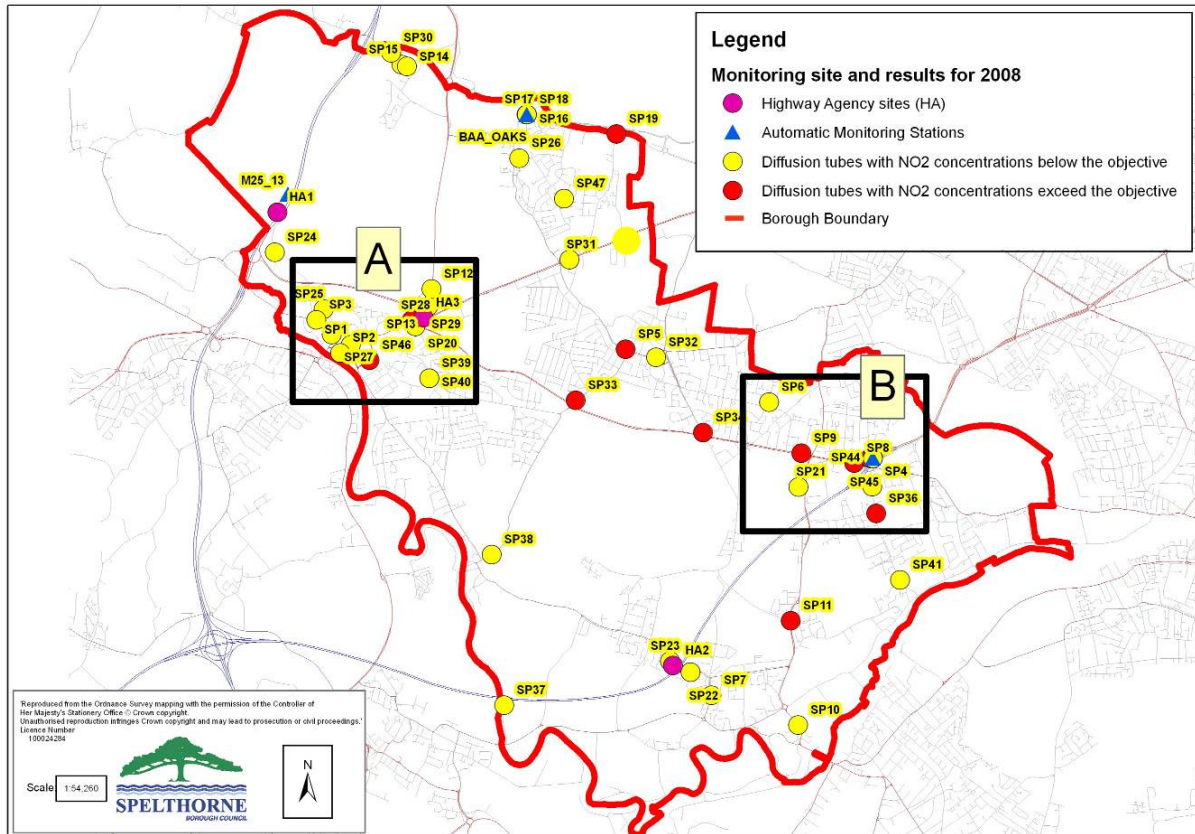


Figure 2.3: Monitoring Site Location Plan B

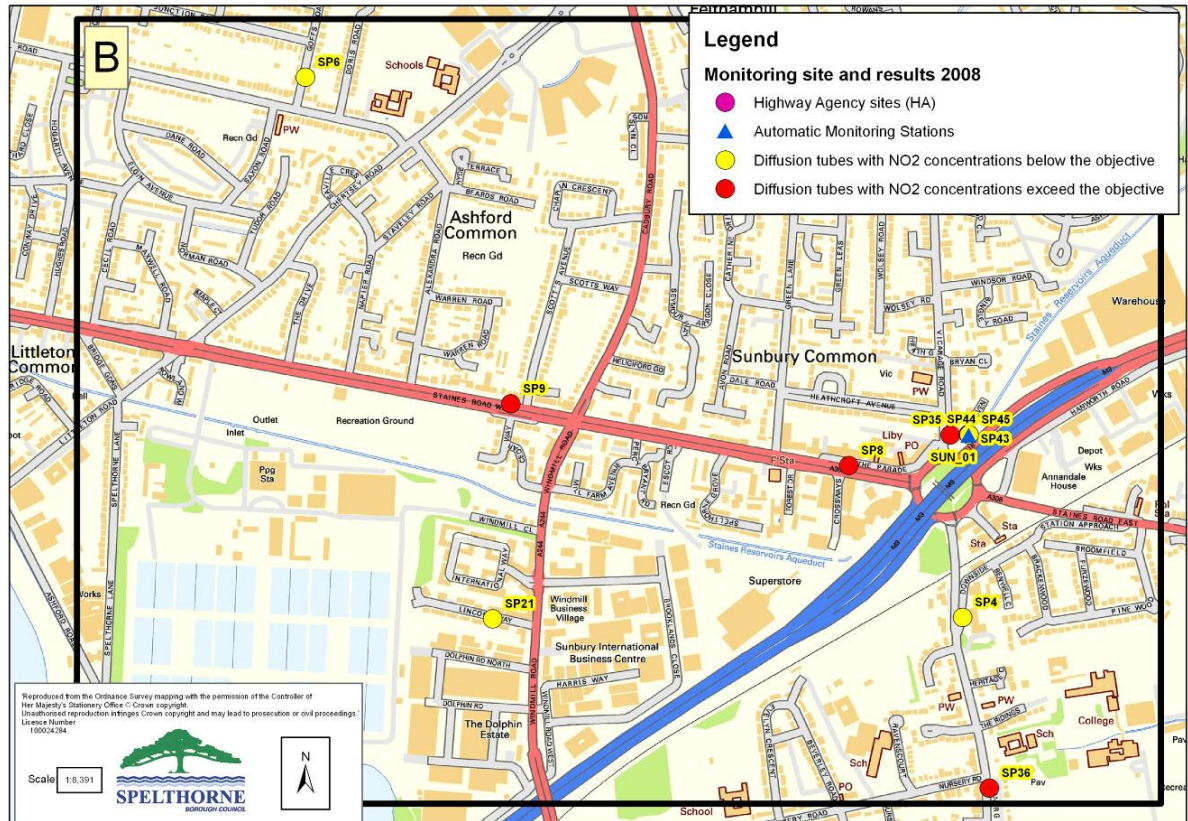


Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (with distance (m) to relevant exposure)	Distance to Kerb of Nearest Road (N/A if not applicable)	Worst-case Location ?
SP1	Staines High Street	Background Moved Oct 06	503529 171619	NO ₂	Y	Y - for 1 hour mean objective	N/A	N/A
SP2	Market Square, Staines	Background	503393 171516	NO ₂	Y	Y - for 1 hour mean objective	N/A	N/A
SP3	Wraysbury Road	Roadside	503097 171931	NO ₂	Y	N	2m	N
SP4	Benwell Centre, Sunbury	Roadside	510052 169843	NO ₂	Y	N	2m	N
SP5	Church Street, Ashford	Roadside	506967 171562	NO ₂	Y	Y – (10m)	1.5m	Y
SP6	Goffs Road, Ashford Common	Background	508763 170900	NO ₂	Y	Y – (8m)	N/A	N/A
SP7	High Street, Shepperton	Roadside	508043 167237	NO ₂	Y	Y - for 1 hour mean objective	1m	Y
SP8	The Parade, Sunbury Cross	Roadside, Moved Feb 07	509829 170140	NO ₂	Y	Y - for 1 hour mean objective	2m	N
SP9	Staines Road West, Sunbury	Roadside	509166 170260	NO ₂	Y	N – (13m)	0.5m	Y
SP10	Walton Bridge Road	Roadside	509125 166862	NO ₂	Y	N – (21m)	1.5m	Y
SP11	Halliford Bypass	Roadside	509033 168169	NO ₂	Y	N – (24m)	1m	Y
SP12	Stanwell New Road, Stanwell North	Background	504538 172318	NO ₂	Y	Y – (16m)	N/A	N/A
SP13	Shortwood County Infant School, Stanwell North	Background	504494 172098	NO ₂	Y	Y – (1.5m)	N/A	N/A
SP14	Flintlock Close, Stanwell	Background	504228 175098	NO ₂	Y	Y – (12m)	N/A	N/A
SP15	Horton Road, Stanwell Moor	Roadside	504161 175123	NO ₂	Y	N – (25m)	1.5m	Y
SP16	Oaks Road/Russell Drive, Stanwell South	Background	505729 174496	NO ₂	Y	Y	N/A	N/A
SP17	Oaks Road/Russell Drive, Stanwell South	Background	505729 174496	NO ₂	Y	Y	N/A	N/A

Site ID	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (with distance (m) to relevant exposure)	Distance to Kerb of Nearest Road (N/A if not applicable)	Worst-case Location ?
SP18	Oaks Road/Russell Drive, Stanwell South	Background	505729 174496	NO ₂	Y	Y	N/A	N/A
SP19	Bedfont Road/Long lane, Stanwell South	Roadside	506850 174253	NO ₂	Y	N – (21m)	1.5m	Y
SP20	Greenlands Road, Staines	Background	504334 171845	NO ₂	Y	Y – (9m)	N/A	N/A
SP21	Lincoln Way, Ashford	Background	509131 169840	NO ₂	Y	Y – (7m)	N/A	N/A
SP22	Manor Mead School Shepperton	Background	507782 167524	NO ₂	Y	Y – (18m)	N/A	N/A
SP23	Greeno Crescent, Shepperton	Background	507525 167662	NO ₂	Y	Y – (22m)	N/A	N/A
SP24	Yeoveney Close, Staines	Background	502577 172777	NO ₂	Y	Y – (6.5m)	N/A	N/A
SP25	Moor Lane, Staines	Background	503188 172063	NO ₂	Y	Y – (11.5m)	N/A	N/A
SP26	St Mary's Crescent, Staines	Background	505635 173949	NO ₂	Y	Y – (10m)	N/A	N/A
SP27	Church Street, Staines	Roadside	503287 171744	NO ₂	Y	N – (0.5m)	2m	Y
SP28	London Road, Staines	Roadside	504291 171926	NO ₂	Y	N – 910m)	1.5m	Y
SP29	London Road, Staines	Roadside	504381 171975	NO ₂	Y	N	1m	Y
SP30	Horton Road, Stanwell Moor	Roadside Moved Dec 2007	504030 175272	NO ₂	Y	N – (8m)	1m	Y
SP31	Ashford Hospital, Stanwell	Roadside	506265 172681	NO ₂	Y	N? – (4m)	2m	N
SP32	Feltham Road, Ashford	Roadside Moved Feb 07	507349 171461	NO ₂	Y	N – (15m)	1m	Y
SP33	Ford Close, Ashford	Roadside	506340 170926	NO ₂	Y	N – (17m)	0.5m	Y
SP34	School Road, Ashford	Roadside	507936 170518	NO ₂	Y	N – (11m)	1m	Y
SP35	Vicarage Road, Sunbury	Roadside	510028 170200	NO ₂	Y	N – (8m)	2m	Y
SP36	St Ignatius School,	Roadside Moved Feb	510104 169508	NO ₂	Y	N – (27m)	2.5m	N

Site ID	Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (with distance (m) to relevant exposure)	Distance to Kerb of Nearest Road (N/A if not applicable)	Worst-case Location ?
	Sunbury	07						
SP37	Nr Abbeyfields, Thames Side, Laleham	Roadside	505444 167111	NO ₂	Y	N	3m	N
SP38	Laleham CofE primary, Laleham	Roadside	505289 168995	NO ₂	Y	N	2m	Y
SP39	Knowle Green, Staines	Background	504508 171200	NO ₂	Y	Y	N/A	N/A
SP40	Knowle Green, Staines	Background (discontinued Feb 08)	504508 171200	NO ₂	Y	Y	N/A	N/A
SP41	Green Street, Sunbury	Roadside	510404 168675	NO ₂	Y	Y - for 1 hour mean objective – main shopping area	0.5m	Y
SP43, SP44, SP45	The Haven, Sunbury (3 tubes)	Background	510063 170201	NO ₂	Y	Y – (18m)	N/A	N/A
SP46	Elmsleigh Centre	Roadside	503759 171423	NO ₂	Y	N	1m	N
SP47	Hadrian Way, Stanwell	Background	506194 173445	NO ₂	Y	Y – (8m)	N/A	N/A
-	HA1	Background	502605 173274	NO ₂	Y	Y – on residential facade	7.5m	N/A
-	HA2	Background	507560 167607	NO ₂	Y	Y – on residential facade	45m	N/A
-	HA3	Roadside	504438 171958	NO ₂	Y	Y? – 3m from residential facade	8m	Y

2.2 Comparison of Monitoring Results with AQ Objectives

Monitoring results for the years 2006 - 2008 have been compared with the relevant air quality objectives and are presented below.

2.2.1 Nitrogen Dioxide

Nitrogen dioxide concentrations in the Borough are measured at three automatic monitoring stations and 46 diffusion tube sites.

Automatic Monitoring Data

Results from the three automatic monitoring sites are summarised in Table 2.3a and 2.3b.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual Mean Concentrations ($\mu\text{g}/\text{m}^3$)		
			2006	2007	2008
Sunbury Cross	Y	92	n/a	38.6	35.1
Heathrow Oaks Road	Y	98	33.0	37.2	35.4
M25 J13	Y	96	59.4	57.3	52.4
Objective			40	40	40

Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of Hourly Mean ($200 \mu\text{g}/\text{m}^3$)		
			2006	2007	2008
Sunbury Cross	Y	92	n/a	1	0
Heathrow Oaks Road	Y	98	0	1	0
M25 J13	Y	96	9	31	12
Objective			18	18	18

Diffusion Tube Monitoring Data

Results from diffusion tube monitoring in 2008 are presented in Table 2.4a. Concentrations which exceed the objective are highlighted in bold.

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual Mean Concentrations
				2008 ($\mu\text{g}/\text{m}^3$) Adjusted for bias ^a
SP1	Staines High Street	Y	100	33.3
SP2	Market Square, Staines	Y	100	33.7
SP3	Wraysbury Road	Y	100	37.9
SP4	Benwell Centre, Sunbury	Y	100	33.3
SP5	Church Street, Ashford	Y	100	45.3
SP6	Goffs Road, Ashford Common	Y	100	31.8
SP7	High Street, Shepperton	Y	100	37.2
SP8	The Parade, Sunbury Cross	Y	100	54.6
SP9	Staines Road West, Sunbury	Y	100	47.5
SP10	Walton Bridge Road	Y	100	35.8
SP11	Halliford Bypass	Y	100	42.8
SP12	Stanwell New Road, Stanwell North	Y	100	38.3
SP13	Shortwood County Infant School, Stanwell North	Y	100	37.9
SP14	Flintlock Close, Stanwell	Y	100	35.6
SP15	Horton Road, Stanwell Moor	Y	100	33.6
SP16, SP17, SP18	Oaks Road/Russell Drive, Stanwell South	Y	100	36.1
SP19	Bedfont Road/Long lane, Stanwell South	Y	100	48.6
SP20	Greenlands Road, Staines	Y	100	34.6
SP21	Lincoln Way, Ashford	Y	100	30.0
SP22	Manor Mead School Shepperton	Y	83	28.3
SP23	Greeno Crescent, Shepperton	Y	100	32.4
SP24	Yeoveney Close, Staines	Y	100	37.3
SP25	Moor Lane, Staines	Y	100	30.9
SP26	St Mary's Crescent, Staines	Y	100	36.6
SP27	Church Street, Staines	Y	100	39.8
SP28	London Road, Staines	Y	75	52.9
SP29	London Road, Staines	Y	92	57.7
SP30	Horton Road, Stanwell Moor	Y	100	33.9
SP31	Ashford Hospital, Stanwell	Y	92	39.5
SP32	Feltham Road, Ashford	Y	100	39.3
SP33	Ford Close, Ashford	Y	100	40.4
SP34	School Road, Ashford	Y	92	46.1
SP35	Vicarage Road, Sunbury	Y	92	46.2

SP36	St Ignatius School, Sunbury	Y	100	44.8
SP37	Nr Abbeyfields, Thames Side, Laleham	Y	100	32.2
SP38	Laleham Cof E primary, Laleham	Y	100	29.7
SP39	Knowle Green, Staines	Y	92	31.5
SP40	Knowle Green, Staines	Y	N/A ^b	27.0
SP41	Green Street, Sunbury	Y	92	37.1
SP43, SP44, SP45	The Haven, Sunbury	Y	100	37.6
SP46	Elmsleigh Centre	Y	50	52.8
SP47	Hadrian Way, Stanwell	Y	92	33.1
-	HA1 ^c	Y	83	40.1
-	HA2 ^c	Y	92	35.6
-	HA3 ^c	Y	92	44.1
Objective				40

^a All Spelthorne Diffusion tubes bias adjusted using a factor of 1.00 (See Appendix A). All highways agency diffusion tubes bias adjusted using the national factor of 0.9 in version 05/09 of the spreadsheet available at www.uwe.ac.uk/agm/review

^b Discontinued in February 2008 as duplicate to SP39 no longer required. Data for January only

^c Monitoring period for 11 months from May 2008- Mar 2009.

For comparison, results from the diffusion tube monitoring are also shown with those for 2006 and 2007 in Table 2.4b. Concentrations which exceed the objective are highlighted in bold

Table 2.4b Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Annual Mean Concentrations ($\mu\text{g}/\text{m}^3$) Adjusted for bias		
			2006 ^a	2007 ^b	2008 ^c
SP1	Staines High Street	Y	38.0	34.3	33.3
SP2	Market Square, Staines	Y	39.2	34.6	33.7
SP3	Wraysbury Road	Y	39.6	40.3	37.9
SP4	Benwell Centre, Sunbury	Y	26.8	31.8	33.3
SP5	Church Street, Ashford	Y	38.9	43.3	45.3
SP6	Goffs Road, Ashford Common	Y	37.2	36.1	31.8
SP7	High Street, Shepperton	Y	37.6	37.9	37.2
SP8	The Parade, Sunbury Cross	Y	61.8	49.6	54.6
SP9	Staines Road West, Sunbury	Y	51.9	39.8	47.5
SP10	Walton Bridge Road	Y	35.1	38.2	35.8
SP11	Halliford Bypass	Y	37.2	36.7	42.8
SP12	Stanwell New Road, Stanwell North	Y	32.3	38.4	38.3
SP13	Shortwood County Infant School, Stanwell North	Y	35.2	36.7	37.9
SP14	Flintlock Close, Stanwell	Y	27.3	32.9	35.6
SP15	Horton Road, Stanwell Moor	Y	32.8	33.9	33.6
SP16, SP17, SP18	Oaks Road/Russell Drive, Stanwell South	Y	33.0	37.0	36.1
SP19	Bedfont Road/Long lane, Stanwell South	Y	48.3	45.1	48.6
SP20	Greenlands Road, Staines	Y	35.0	31.4	34.6
SP21	Lincoln Way, Ashford	Y	28.2	31.4	30.0
SP22	Manor Mead School Shepperton	Y	24.5	29.2	28.3
SP23	Greeno Crescent, Shepperton	Y	30.6	31.1	32.4
SP24	Yeoveney Close, Staines	Y	36.3	34.3	37.3
SP25	Moor Lane, Staines	Y	29.9	32.2	30.9
SP26	St Mary's Crescent, Staines	Y	33.5	36.5	36.6
SP27	Church Street, Staines	Y	33.0	36.1	39.8
SP28	London Road, Staines	Y	47.5	40.8	52.9
SP29	London Road, Staines	Y	61.4	49.9	57.7
SP30	Horton Road, Stanwell Moor	Y	37.1	37.3	33.9
SP31	Ashford Hospital, Stanwell	Y	39.0	40.5	39.5
SP32	Feltham Road, Ashford	Y	50.5	41.2	39.3
SP33	Ford Close, Ashford	Y	40.0	40.4	40.4
SP34	School Road, Ashford	Y	52.6	46.0	46.1
SP35	Vicarage Road, Sunbury	Y	45.1	41.7	46.2
SP36	St Ignatius School,	Y	42.8	40.2	44.8

	Sunbury				
SP37	Nr Abbeyfields, Thames Side, Laleham	Y	33.9	31.3	32.2
SP38	Laleham CofE primary, Laleham	Y	30.8	32.3	29.7
SP39	Knowle Green, Staines	Y	29.0	30.4	31.5
SP40	Knowle Green, Staines	Y	34.4	30.5	27.0
SP41	Green Street, Sunbury	Y	36.8	32.4	37.1
SP43, SP44, SP45	The Haven, Sunbury	Y	n/a	n/a	37.6
SP46	Elmsleigh Centre	Y	n/a	n/a	52.8
SP47	Hadrian Way, Stanwell	Y	n/a	n/a	33.1
Objective			40	40	40

^a Bias adjusted using a factor of 1.37

^b Bias adjusted using a factor of 1.06

^c Bias adjusted using a factor of 1.00

2.2.2 PM₁₀

All three automatic monitoring stations measure PM₁₀, however less than two months of TEOM monitoring is available for the Sunbury Cross site in 2008. Given such a short period of monitoring, a period-to-year adjustment has not been attempted.

Table 2.5a Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Annual Mean Concentrations (µg/m ³)		
			2006	2007	2008
Sunbury Cross	Y	11	n/a	36.8 ¹	22.7 ²
Heathrow Oaks Road	Y	99	26.6	24.5	22.0
M25 J13	Y	97	29.4	28.3	26.3 ³
Objective			40	40	40

¹ Data from 22/11/07 to 26/2/08 using an OSIRIS, as reported in the Progress Report 2008

² Data from 20/11/08 to 28/01/09 with TEOM. Gravimetric equivalent - VCM Corrected

³ Data provided by TRL

Table 2.5b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of 24-hour mean (50 µg/m ³)		
			2006	2007	2008
Sunbury Cross	Y	100	n/a	12 ¹	1 ²
Heathrow Oaks Road	Y	99	11	18	8
M25 J13	Y	97	29	21	18 ³
Objective			35	35	35

¹ Data from 22/11/07 to 26/2/08 using an OSIRIS, as reported in the Progress Report 2008

² Data from 20/11/08 to 28/01/09 with TEOM. Gravimetric equivalent - VCM Corrected

³ Data provided by TRL

2.2.3 Sulphur Dioxide

One monitoring site where sulphur dioxide is measured exists within the Borough, located at the M25 J13 monitoring site which is operated on behalf of the Highways Agency.

Table 2.6a Results of SO₂ Automatic Monitoring: Annual Mean

Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m ³)		
			2006	2007	2008
M25 J13	N	97	7.45	5.32	4.50

Table 2.6b Results of SO₂ Automatic Monitoring: Comparison with 15-Minute Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of 15min mean (266 µg/m ³)		
			2006	2007	2008
M25 J13	N	97	0	0	0
Objective			35		

Table 2.6c Results of SO₂ Automatic Monitoring: Comparison with Hourly Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean (350 µg/m ³)		
			2006	2007	2008
M25 J13	N	97	0	0	0
Objective			24		

Table 2.6d Results of SO₂ Automatic Monitoring: Comparison with 24-Hour Mean Objective

Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of 24-hour mean (125 µg/m ³)		
			2006	2007	2008
M25 J13	N	97	0	0	0
Objective			3		

Results show that all the SO₂ objectives have been met in 2008.

2.2.4 Carbon Monoxide

One monitoring site where carbon monoxide is measured exists within the Borough, located at the M25 J13 monitoring site which is operated by TRL on behalf of the Highways Agency.

Table 2.6a Results of CO Automatic Monitoring: Annual Mean

Location	Within AQMA?	Data Capture 2008 %	Maximum daily running 8-hr mean ($\mu\text{g}/\text{m}^3$)		
			2006	2007	2008
M25 J13	N	-	1.0	2.0	-
Objective			8.6		

Monitoring data for 2008 has not yet been provided to the council by TRL, however based on 2006 and 2007 results, which were well below the objective, it is unlikely that the objective was exceeded in 2008. Results for 2008 will be presented in the next review and assessment report.

2.2.5 Other pollutants monitored

Benzene concentrations were monitored at two petrol station locations (the A308 London Road in Staines and in Walton Bridge) in the Borough from 2003 to 2007. Measured concentrations were consistently well below the national annual mean objective for 2010 of $5 \mu\text{g}/\text{m}^3$, and it was therefore concluded that benzene concentrations were highly unlikely to exceed the objective in future years and monitoring ceased.

The results from monitoring in the Borough have shown that concentrations of PM_{10} and sulphur dioxide are below the objective values. Nitrogen dioxide concentrations exceed the objective at a number of locations. However this is not the case at all locations. It is therefore recommended that the boundaries of the AQMA be reassessed to more clearly identify these areas where nitrogen dioxide concentrations do not meet the objective. In particular, higher concentrations are noted close to the motorways, main roads and junctions in the Borough. It is proposed that the area be remodelled as part of a Detailed Assessment, with the model verified using the expanded monitoring network, in order to more accurately define the AQMA boundary.

3 Road Traffic Sources

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

The criteria for assessing narrow congested streets are set out in Box 5.3, section A1 of TG(09). The traffic flow required to trigger a Detailed Assessment has reduced since the last Updating and Screening Assessment from 10,000 vpd to 5,000 vpd. A number of areas within the AQMA declared across the whole Borough comprise narrow congested streets. These locations will be specifically assessed as part of the Detailed Assessment re-assessing the AQMA.

Spelthorne Borough 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

The criteria for assessing busy streets relevant for the hourly nitrogen dioxide objective are set out in Box 5.3, section A2 of TG(09) and are unchanged from previous rounds of Review and Assessment. Busy streets have been assessed in previous rounds of review and assessment, and no relevant locations identified. Green Street, Sunbury has been identified as a relevant location for the hourly nitrogen dioxide objective. However, concentrations are below $40 \mu\text{g}/\text{m}^3$ and it is therefore highly unlikely that the hourly objective will be exceeded at this location.

Spelthorne Borough 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.

The criteria for assessing roads with high flows of buses and/ or HGVs are set out in Box 5.3, section A3 of TG(09) and are unchanged from previous rounds of Review and Assessment. Any roads with high flow of buses and/or HGV's within the Borough, will specifically be assessed as part of the Detailed Assessment re-assessing the AQMA.

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

3.4 Junctions

The criteria for assessing junctions are set out in Box 5.3, section A4 of TG(09) and are unchanged from previous rounds of Review and Assessment. Busy junctions with greater than 10,000 vehicles per day

and relevant exposure within 10m of the kerb were considered in previous Updating and Screening Assessments. Junctions will be explicitly covered by the Detailed Assessment re-assessing the AQMA.

Spelthorne Borough 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 criteria for assessing new roads are set out in Box 5.3, section A5 of TG(09) and are unchanged from previous rounds of Review and Assessment. There are no new roads constructed or proposed since the last round of review and assessment.

Spelthorne Borough Council confirms that there are no new/proposed roads within the Borough.

3.6 Roads with Significantly Changed Traffic Flows

The criteria for assessing roads with significantly changed traffic flows are set out in Box 5.3, section A6 of TG(09) and are unchanged from previous rounds of Review and Assessment.

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

3.7 Bus and Coach Stations

The criteria for assessing bus and coach stations are set out in Box 5.3, section A7 of TG(09) and are unchanged from previous rounds of Review and Assessment. Bus and Coach stations within the Borough have been assessed. The Staines Bus Station is not enclosed and is located near a shopping centre, where there is relevant 1 hour objective exposure, however it is a small bus station with fewer than 2,500 movements a day.

Spelthorne Borough Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

The criteria for assessing airports are set out in Box 5.4, section B1 of TG(09) and are less stringent than previous rounds of Review and Assessment. Heathrow Airport lies outside the boundaries of Spelthorne Borough Council, however there are receptors within the Borough boundary which are within 1000m of the airport. Since the previous assessment, Heathrow Airport has been expanded with the addition of Terminal 5 (T5). This has increased the passenger capacity by at least 30 million. Air quality is monitored at a worst case location in Spelthorne in relation to the airport at the Oaks Road site. This site is currently meeting relevant air quality objectives. Spelthorne Borough Council will continue to monitor any developments at Heathrow Airport and traffic generated by Heathrow will be included in the review of the AQMA due to be undertaken in the next 12 months.

Spelthorne Borough Council borders Heathrow Airport (which is located in the London Borough of Hillingdon) and hence there may be impacts of the airport expansion within the Borough. All sites of relevant exposure are currently included in a whole Borough AQMA. However, the AQMA is due to be reviewed in the next 12 months. The impact of traffic from Heathrow will be included in any modelling work undertaken. In addition monitoring at Oaks Road will continue. A Detailed Assessment, specifically in relation to the airport will not be undertaken, but will be included in the review of the whole Borough AQMA.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

The criteria for assessing stationary locomotives are set out in Box 5.4, section B2 of TG(09) (Approach 1) and are unchanged from previous rounds of Review and Assessment. Locations where diesel locomotives may regularly remain stationary for 15 minutes or more were considered in previous Review and Assessments and no such locations were identified. Furthermore, most railways within the Borough are electrified.

Spelthorne Borough Council 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 criteria for assessing moving locomotives are set out in Box 5.4, section B2 of TG(09) (Approach 2) and is a new section for the 2009 Updating and Screening Assessment. None of the rail lines listed in Table 5.1 of the Technical Guidance LAQM.TG(09) travel through the Borough of Spelthorne. Therefore there are no locations with a 'large number' of movements of diesel locomotives. Furthermore, most railways within the Borough are electrified.

Spelthorne Borough Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

The criteria for assessing ports are set out in Box 5.4, section B3 of TG(09) and are unchanged from previous rounds of Review and Assessment. Spelthorne Borough Council has no coastline and therefore no significant shipping to consider

Spelthorne Borough 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

The criteria for assessing industrial installations are set out in Box 5.5, section C1 of TG(09) and are unchanged from previous rounds of Review and Assessment. There are no new or proposed industrial installations in Spelthorne Borough Council.

Spelthorne Borough 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

None of the industrial installations identified in previous Updating and Screening Assessments have substantially increased emissions and no new exposure has been introduced nearby.

Spelthorne Borough 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.

5.2 Major Fuel (Petrol) Storage Depots

The criteria for assessing major fuel (petrol) storage depots are set out in Box 5.5, section C2 of TG(09) and are unchanged from previous rounds of Review and Assessment. Major petrol storage depots were considered in the previous Updating and Screening Assessments and no such locations identified.

There are no major fuel (petrol) storage depots within the Borough of Spelthorne.

5.3 Petrol Stations

The criteria for assessing petrol stations are set out in Box 5.5, section C3 of TG(09) and are unchanged from previous rounds of Review and Assessment. All petrol filling stations were considered in the previous Updating and Screening Assessments and were found not to be relevant.

Spelthorne Borough Council confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

The criteria for assessing poultry farms are set out in Box 5.5, section C4 of TG(09) and is a new section for the 2009 Updating and Screening Assessment. There are no poultry farms within the Borough of Spelthorne.

Spelthorne Borough Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

The criteria for assessing biomass combustion (individual installations) are set out in Box 5.8, section D1 of TG(09) and is a new section for the 2009 Updating and Screening Assessment. There are a small number of biomass boilers between 50kW and 20MW proposed within the Borough of Spelthorne, however none have yet been built. The planning system is used within Spelthorne to identify and assess any potential impacts of biomass combustion and this will continue.

Spelthorne Borough Council confirms that there are currently no significant biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

The criteria for assessing biomass combustion (combined impacts) are set out in Box 5.8, section D2 of TG(09) and is a new section for the 2009 Updating and Screening Assessment. Spelthorne Borough Council has an estimated worst-case PM₁₀ background concentration of 22 µg/m³ in 2009. Using the nomograms and worst case emissions factors (wood burning) provided in TG(09) there would need to be a minimum of 210 households within a 500m by 500m grid square all using wood as their primary fuel. Using this fact, and local knowledge of the district, it is considered highly unlikely that there are any areas of biomass combustion exceeding these criteria.

Spelthorne Borough Council confirms that there are no areas of combined biomass combustion in the Local Authority area which are likely to be significant.

6.3 Domestic Solid-Fuel Burning

The criteria for assessing domestic solid-fuel burning are set out in Box 5.8, section D2 of TG(09) and are unchanged from previous Review and Assessments. There is an insufficient density of coal fired homes in the Borough of Spelthorne to be significant as defined in Technical Guidance LAQM.TG(09).

Spelthorne Borough Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

The criteria for assessing fugitive or uncontrolled sources is set out in Box 5.10, section E1 of TG(09) and is unchanged from previous Review and Assessments. Spelthorne Borough Council identified a proposed extension to Hengrove Farm Quarry (Gravel extraction), which is located within 100m of a Primary School. The proposed extension would move the boundary of the quarry to within 55m of residential housing. Should planning permission be granted, Spelthorne Borough Council are requesting further monitoring, with in OSRIS monitor to be located downwind of the site. Dust monitoring carried out by WSP, following a previous site extension identified dust soiling rates were at a maximum of 0.5% EAC/day. The impact of the scheme will be assessed in future rounds of review and assessment, should it go ahead.

Spelthorne Borough Council confirms that there are currently no potential sources of fugitive particulate matter emissions in the Local Authority area. A proposed extension to Hengrove Quarry may require further monitoring and assessment should it go ahead. This will be addressed in future review and assessment reports, should it be required.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The results from monitoring in the Borough have shown that concentrations of PM₁₀ and sulphur dioxide are below the objective values. Nitrogen dioxide concentrations exceeded the objective at a number of locations, however all are currently within the whole Borough AQMA. It is noted that measured concentrations of nitrogen dioxide at a number of diffusion tubes within the AQMA did not exceed the objective, and have not done so for a number of years. It is therefore recommended that the boundaries of the AQMA be reassessed to reflect the areas where nitrogen dioxide concentrations do not meet the objective. In particular, higher concentrations are noted close to the motorways, main roads and junctions in the Borough. It is suggested that the area is re-modelled and verified using the expanded monitoring network in order to more accurately define the AQMA boundary.

8.2 Conclusions from Assessment of Sources

New road traffic sources, other transport sources, industrial sources, commercial and domestic sources and fugitive or uncontrolled sources have been assessed in accordance with LAQM, TG(09) guidance. Potential changes have been noted at Heathrow Airport and traffic generated by increasing passenger numbers will be incorporated into modelling being undertaken within the Detailed Assessment to be carried out over the next twelve months.

8.3 Proposed Actions

Monitoring data from a number of automatic monitoring stations and diffusion tube sites within the AQMA are below the relevant objective. It is proposed to carry out a Detailed Assessment for nitrogen dioxide within the Borough to fully assess the distribution of nitrogen dioxide concentrations and determine if the extent of the AQMA can be reduced. This will be undertaken in the next twelve months.

In addition, Spelthorne Borough Council will undertake a Progress Report in 2010.

9 References

- Defra, 2009a** Air Quality Review and Assessment Website (Helpdesk), available at www.uwe.ac.uk/aqm/review/ (last accessed 11/08/2009).
- Defra 2009b** LAQM: Technical Guidance LAQM.TG(09) February 2009, available at www.defra.gov.uk/environment/airquality/local/guidance/pdf/tech-guidance-laqm-tg-09.pdf (last accessed 11/08/2009).
- Defra 2009c** Air Quality Archive at www.airquality.co.uk (last accessed 11/08/2009).
- Spelthorne Borough Council, 2004** Detailed Assessment of nitrogen dioxide in Spelthorne Borough Council, , available at www.spelthorne.gov.uk/env_aq_latestreports (last accessed 11/08/2009).
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- Spelthorne Borough Council, 2007** Air Quality Progress Report, available at www.spelthorne.gov.uk/env_aq_latestreports (last accessed 11/08/2009).
- Spelthorne Borough Council, 2008** Air Quality Progress Report, available at www.spelthorne.gov.uk/progress_report2008-2.pdf (last accessed 11/08/2009).

Appendix A: QA/QC Information

QA/QC of automatic monitoring

Sunbury Cross is operated by TRL on behalf of Spelthorne Borough Council. TRL carry out maintenance and quality control of the site. Data are checked, collected and stored on a daily basis. Equipment is serviced and audited every six months, to ensure it is operating effectively. Fortnightly checks and calibrations are carried out. Calibration records are checked and used for data ratification.

The Oaks Road monitoring site is operated by AEA. Routine Calibrations are carried out by AEA every 3 to 4 weeks in line with the R&A requirements. The QA/QC audits are carried out by AEA at 6 monthly intervals. All data from the site are managed by (AEA) to quality procedures developed under the UK National Network. The data management processes represent best practice and fully meet the requirements set out in LAQM TG(09). All data are screened and scaled (on the basis of site calibrations) and the final data sets have benefited from a full process of data ratification, including through additional data quality checks that include site UKAS quality control audits and a final data ratification process that corrects data for instrument sensitivity drift between routine calibrations.

The M25 Junction 13 sites are operated and maintained by TRL on behalf of the Highways Agency. Details of QA/QC have not been provided to Spelthorne Borough Council at the time of writing.

QA/QC of diffusion tube monitoring

All tubes used by Spelthorne Borough Council and prepared using 50% TEA in acetone, were supplied and analysed by Lambeth Scientific Services Ltd. Lambeth Scientific Services participate in an inter comparison scheme for diffusion tubes run by NETCEN. Results for the WASP¹ scheme show acceptable performance and the laboratory precision is reported as poor to good².

Tubes operated by the Highways Agency were prepared using 20% TEA in water by Gradko Environmental. Results for the WASP scheme show good performance and the laboratory precision is also good.

Bias Adjustment factor

For Spelthorne Borough Council's own diffusion tubes, the bias adjustment factor was calculated from the co-location study carried out at the Oaks Road site. Although there are two co-location studies (Oaks Road and Sunbury Cross) carried out within the Borough, the Oaks Road study was used instead of either the Sunbury Cross Study or the national bias adjustment factor for a number of reasons.

Firstly, use of the results from the Oaks Road site is consistent with previous review and assessment reports. Secondly, it is more conservative than the national bias adjustment factor of 0.97. Finally the precision and accuracy of the Oaks Road study is better than that of the Sunbury Cross study. The precision and accuracy calculations for the Oaks Road and Sunbury Cross studies respectively are shown below.

Diffusion tube results from the Highways Agency monitoring sites have been bias adjusted by the factor published by the Review and Assessment Helpdesk (0.90).

¹ The Workplace Analysis Scheme for Proficiency (WASP) scheme is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL)


² [http://www.uwe.ac.uk/aqm/review/R&Asupport/Tube%20Precision_2008_\(Mar%202009\).pdf](http://www.uwe.ac.uk/aqm/review/R&Asupport/Tube%20Precision_2008_(Mar%202009).pdf)

Table A1 – Calculation of local bias adjustment factor for co-location study at Oaks Road automatic monitoring site

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements										
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	
1	04/01/2008	30/01/2008	29	23	25	26	3.1	12	7.6	
2	30/01/2008	24/02/2008	55	53	52	53	1.5	3	3.8	
3	24/02/2008	02/04/2008	35	32	37	35	2.5	7	6.3	
4	02/04/2008	30/04/2008	44	40	43	42	2.1	5	5.2	
5	30/04/2008	28/05/2008	62	63	69	65	3.8	6	9.4	
6	28/05/2008	02/07/2008	29	30	30	30	0.6	2	1.4	
7	02/07/2008	30/07/2008	22	22	15	20	4.0	21	10.0	
8	30/07/2008	03/09/2008	17	16	19	17	1.5	9	3.8	
9	03/09/2008	01/10/2008	37	43	40	40	3.0	8	7.5	
10	01/10/2008	30/10/2008	29	31	30	30	1.0	3	2.5	
11	30/10/2008	03/12/2008	43	41	37	40	3.1	8	7.6	
12	03/12/2008	07/01/2009	33	32	40	35	4.4	12	10.8	
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements



Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
23	100	Good	Good
54	100	Good	Good
30	100	Good	Good
42	93	Good	Good
60	100	Good	Good
27	100	Good	Good
22	100	Poor Precision	Good
16	94	Good	Good
41	100	Good	Good
31	93	Good	Good
38	100	Good	Good
47	100	Good	Good

Overall survey --> **Good precision** / **Good Overall DC**

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: **Spelthorne BC**

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%

Bias calculated using 11 periods of data

Bias factor A 0.99 (0.92 - 1.07)

Bias B 1% (-7% - 8%)

Diffusion Tubes Mean: **38 μgm^{-3}**

Mean CV (Precision): **7**

Automatic Mean: **37 μgm^{-3}**

Data Capture for periods used: **98%**

Adjusted Tubes Mean: **37 (35 - 40) μgm^{-3}**

Precision 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
WITH ALL DATA

Bias calculated using 12 periods of data

Bias factor A 1 (0.93 - 1.07)

Bias B 0% (-7% - 7%)

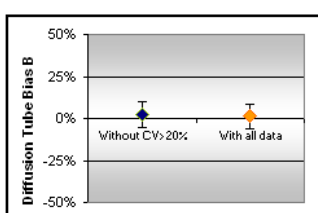
Diffusion Tubes Mean: **36 μgm^{-3}**

Mean CV (Precision): **8**

Automatic Mean: **36 μgm^{-3}**

Data Capture for periods used: **98%**

Adjusted Tubes Mean: **36 (34 - 39) μgm^{-3}**



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Version 03 - November 2006



Table A2 – Calculation of local bias adjustment factor for co-location study at Sunbury Cross automatic monitoring site

Checking Precision and Accuracy of Triplicate Tubes										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Diffusion Tubes Measurements			TriPLICATE Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
			Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}								
1	01/01/2009	31/01/2009	48	45	35	43	6.8	16	16.9	41.1	100	Good	Good
2	01/02/2009	29/02/2009	48	47	53	49	3.2	7	8.0	68.7	100	Good	Good
3	01/03/2009	31/03/2009	38	36	40	38	2.0	5	5.0	48.5	33	Good	or Data Capture
4	01/04/2009	30/04/2009	26	26	55	36	16.7	47	41.6	47.8	100	Poor Precision	Good
5	01/05/2009	31/05/2009	24	49	51	41	15.0	36	37.4	54.5	100	Poor Precision	Good
6	01/06/2009	30/06/2009	32	30	29	30	1.5	5	3.8	24.8	97	Good	Good
7	01/07/2009	31/07/2009	29	25	30	28	2.6	9	6.6	11.6	93	Good	Good
8	01/08/2009	31/08/2009	31	28	29	29	1.5	5	3.8	8.5	100	Good	Good
9	01/09/2009	30/09/2009	36	43	38	39	3.6	9	9.0	15.4	100	Good	Good
10	01/10/2009	31/10/2009	41	37	35	38	3.1	8	7.6	33.9	100	Good	Good
11	01/11/2009	31/11/2009	41	41	42	41	0.6	1	1.4	35.1	113	Good	Good
12	01/12/2009	31/12/2009	39	40	37	39	1.5	4	3.8	45.9	100	Good	Good
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID:	Spelthorne BC_Sunbury X
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Precision	10 out of 12 periods have a CV smaller than 20%
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Accuracy (with 95% confidence interval) without periods with CV larger than 20%	Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 9 periods of data	Bias calculated using 11 periods of data
Bias factor A 0.85 (0.52 - 2.21)	Bias factor A 0.94 (0.59 - 2.21)
Bias B 18% (-55% - 91%)	Bias B 7% (-55% - 68%)
Diffusion Tubes Mean: 37 μgm^{-3}	Diffusion Tubes Mean: 38 μgm^{-3}
Mean CV (Precision): 7	Mean CV (Precision): 13 caution
Automatic Mean: 32 μgm^{-3}	Automatic Mean: 35 μgm^{-3}
Data Capture for periods used: 100%	Data Capture for periods used: 100%
Adjusted Tubes Mean: 32 (19 - 83) μgm^{-3}	Adjusted Tubes Mean: 35 (22 - 83) μgm^{-3}

Overall survey -->	Good precision	Good Overall DC
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(Check average CV & DC from Accuracy calculations)

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