

## CHAPTER 1: Introduction

### 1.0 The role of review and assessment

1.1 The Air Quality Strategy establishes the framework for air quality improvements. Measures agreed at national and international level are the foundations on which the strategy is based. It is recognised, however, that despite these measures, areas of poor air quality will remain, and that these will best be dealt with using local measures implemented through the Local Air Quality Management (LAQM) regime.

1.2 The role of the local authority in the review and assessment process is to identify these areas, where it is considered likely that the Air Quality Objectives, included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002, will be exceeded.

The objectives for each pollutant are described in the ensuing chapters.

### 1.3 The Phased approach to review and assessment

1.3.1 The relevant technical guidance for local authorities to follow is LAQM.TG (03) and this document builds upon the phased approach to review and assessment established in the previous technical guidance, LAQM.TG4 (00).

1.3.2 The intention is that local authorities should only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded.

1.3.3 During the first round of review and assessments, local authorities were required to carry out a three stage investigation of air quality within their District, with a fourth stage report required if exceedences were predicted. North Wiltshire District Council submitted a joint

second and third stage report in December 2000, which concluded that no exceedences were likely and that no Air Quality Management Areas (AQMA's) would need to be declared.

1.3.4 The first step of this current round of review and assessment process is an Updating and Screening Assessment, which is to be undertaken by all authorities. This is based on a checklist approach to identify those matters that have changed since the first round was completed, and which may now require further assessment.

1.3.5 The Updating and Screening Assessment takes account of new monitoring data; new objectives; new sources or significant changes to existing sources, either locally or in neighbouring authorities; and other changes that might affect air quality.

A simple screening assessment is then carried out if any significant changes are identified.

1.3.6 If the Updating and Screening Assessment identifies a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority will be required to undertake a Detailed Assessment.

1.3.7 The Detailed Assessment is aimed at concluding with reasonable certainty whether or not a likely exceedence will occur. Where an exceedence is identified, then the assessment should be sufficiently detailed to determine both its magnitude and geographical extent. An Air Quality Management Area should not be declared unless a Detailed Assessment has been completed.

1.3.8 The timetable for the process requires that the initial Updating and Screening Assessment be completed by the end of May 2003. The next stage in the process will be a Detailed Assessment, if required, or for those authorities who do not identify risk of exceedences, a

Progress Report, due by the end of April 2004.

1.3.9 Further submissions of Updating and Screening Assessment must then be submitted during the first four months of 2006 and 2008, with Detailed Assessment (if required) or Progress Reports by the end of 2007 and 2010. Progress reports must also be submitted by the end of April 2005 and 2008.

#### 1.4 The District of North Wiltshire

1.4.1 The District of North Wiltshire covers 300 square miles and extends south from the upper reaches of the Thames Valley. It is bisected by the Avon Valleys which run through the District from North to South. Swindon lies adjacent to the north-east boundary and Bath to the south-west.

1.4.2 Sections of the southern part of the Cotswold Area of Outstanding Natural Beauty (AONB) fall within the west of the District, with parts of the North Wessex Downs AONB to the east.

1.4.3 Over half the total population of 125,000 live in the six main towns of the District. The largest, Chippenham, has a population of over 33,030 and is expanding fast. The other towns are Calne (13,030); Corsham (10,970); Wootton Bassett (11,120); Cricklade (4,240) and Malmesbury (5,420) residents.

1.4.4 The District is crossed by both the M4 motorway and the railway from London to Bristol and South Wales. The M4 motorway, which crosses the centre of the District, has junctions to the north of Chippenham and just west of Swindon. The London and Swindon to Bath and Bristol railway line parallels the motorway and has a station at Chippenham well served by high-speed trains.

1.4.5 The District retains its economic prosperity and continues to draw new industries, largely to the industrial sites being developed at Chippenham, Calne and Wootton Bassett.

## The District of North Wiltshire



2.1     Introduction

2.1.1.   A maximum daily running 8 hour mean concentration of 10 mg/m<sup>3</sup> has been set as the air quality standard for carbon monoxide, to be achieved by the end of 2003.

2.1.2.   The main source of carbon monoxide in the United Kingdom is road transport, which accounted for 67% of emissions in 2000. Annual emissions have been falling steadily since the 1970's with current projections indicating that road transport emissions will decline by a further 42% between 2000 and 2005.

2.1.3.   Carbon monoxide concentrations adjacent to major roads have been modelled at national level suggesting that existing policies will be sufficient to reduce concentrations to below the objective.

2.2     Updating and Screening Assessment (USA) for Carbon Monoxide

2.2.1   Local Authorities should draw upon the information compiled as part of the First Stage report, completed in the first part of review and assessment.

2.2.2   The USA for Carbon Monoxide should be based on a checklist approach for each source or location as set out below:

- Monitoring data
- Very busy roads

### 2.3 Monitoring data

2.3.1 In terms of monitoring data, at the first stage of review and assessment, the Local Authority had monitored for one month roadside in the centre of the six main towns in the District.

2.3.2 Data was collected continuously in a self contained air conditioned mobile unit commissioned from Enviro Technology Services and forwarded to Dr Duncan Laxen of Air Quality Consultants Ltd to report on the results in the context of national air quality strategy objectives.

2.3.3 This produced the following results:-

| <u>Monitoring Location</u> | <u>Date</u>   | <u>mg/m<sup>3</sup></u> |                 |
|----------------------------|---------------|-------------------------|-----------------|
|                            |               | <u>Mean</u>             | <u>8hr. Max</u> |
| Cross Hayes, Malmesbury    | 1-16 Aug 1997 | 1.165                   | 3.78            |
|                            | 1-14 Nov 1997 | 1.28                    | 3.8             |
| Curzon Street, Calne       | Sept 1997     | 1.28                    | 2.8             |
| Pheasant R/About, Chipp    | Oct 1997      | 1.40                    | 5.36            |
| High St, Cricklade         | July 1998     | 0.2                     | 0.81            |
| High St, Wootton Bassett   | Aug 1998      | 1.05                    | 3.14            |
| Newlands Road, Corsham     | Sept 1998     | 0.93                    | 2.45            |

2.3.4 Monitoring data was also collected for one month over November/December 1999 during second stage review and assessment at a property called Byways, Ballards Ash (see Figure 1) immediately adjacent to the M4 motorway. This produced an 8 hour maximum concentration of 1.165 mg/m<sup>3</sup> and a mean of 0.47 mg/m<sup>3</sup>.

2.3.5 An evaluation of monitoring data from national network sites has indicated a poor relationship between the annual mean concentration and the maximum daily running 8 hour mean. It is therefore not practicable to adjust the measured 8 hour concentration towards 2003 and authorities should assume that whenever the 8 hour concentration is measured, that it is applicable to 2003.

2.3.6 A summary of maximum daily running 8 hour mean concentrations measured at nearby national network monitoring sites is provided in Table 2.1 of the Technical Guidance [LAQM.TG(03)].

This reports the following nearby sites:-

| <u>Site</u>        | <u>Classification</u> | <u>Max Daily Running</u>                     |             |             |
|--------------------|-----------------------|--|-------------|-------------|
|                    |                       | <u>8-hr Concentration (mg/m<sup>3</sup>)</u> |             |             |
|                    |                       | <u>1999</u>                                  | <u>2000</u> | <u>2001</u> |
| Bath roadside      | Roadside              | 5.2  | 4.9         | 3.8         |
| Bristol Old Market | Roadside              | 5.7  | 5.7         | 6.7         |
| Bristol Centre     | Urban Centre          | 3.0  | 5.2         | 3.2         |

## 2.4 Very busy roads

2.4.1 The criteria for 'very busy' roads is specified in Box 2.2 of the Technical Guidance as:

- Single carriageway roads with annual average daily traffic flows (AADT's) of greater than 80,000 vehicles.
- Dual carriageway (2 or 3 lane) roads exceeding an AADT of 120,000 vehicles.

- Motorways with AADT's in excess of 140,000 vehicles.

2.4.2 Table 1 of this report shows traffic flows provided by Wiltshire County Council Transport Planners. It can be seen, there are no roads exceeding the criteria above in North Wiltshire.

## 2.5 USA Conclusions for Carbon Monoxide

2.5.1 None of the monitoring data collected in North Wiltshire or at nearest national network sites exceed the air quality standard.

2.5.2 There are no roads in North Wiltshire that exceed the 'very busy' road criteria for further investigation.

2.5.3 This chapter demonstrates that there is no requirement for a detailed assessment for carbon monoxide.

3.1     Introduction

3.1.1    A running annual mean concentration of 16.25 ug/m<sup>3</sup> has been set as the air quality standard for benzene, with an objective for the standard to be achieved by the end of 2003. However, in the light of health advice from various bodies, to reduce concentrations of benzene in air to as low a level as possible, an additional tighter objective of 5 ug/m<sup>3</sup> by 2010 has been set for England and Wales.

3.1.2    The main sources of benzene emissions in the UK are petrol-engined vehicles, petrol refining, and the distribution and uncontrolled emissions from petrol station forecourts without vapour recovery systems.

3.1.3    First round reviews and assessments have proven that there is no requirement for authorities to consider road traffic emission for the 2003 objective. Only those authorities with relevant locations in the vicinity of major industrial processes that store, handle or emit benzene, will need to progress beyond the Updating and Screening Assessment for the 2003 objective.

3.1.4    Data collected during the first round of reviews and assessments has indicated that the 2010 objective may be at risk at locations in close vicinity to petrochemical processes and large petrol stations adjacent to busy roads.

3.2     The Updating and Screening Assessment (USA) for Benzene

3.2.1    Local authorities should draw upon the information compiled as part of the first stage report, completed in the first round of review and assessment.

3.2.2 The USA for benzene should be based on a checklist approach for each source or location as set out below:

- Monitoring data.
- Very busy roads or junctions in built-up areas.
- Industrial Sources.
- Petrol Stations.
- Major fuel storage depots (petroleum only).

### 3.3 Monitoring Data

3.3.1 Monitoring data was collected during the first stage of review and assessment using diffusion tubes positioned kerbside at a busy road and a petrol station boundary in both Chippenham and Calne.

3.3.2 This produced the following results:-

| <u>Site</u>                       | <u>Running Annual Mean (ug/m<sup>3</sup>)</u> |             |
|-----------------------------------|---|-------------|
|                                   | <u>1996</u>                                   | <u>1997</u> |
| Folly Crossroads, Chippenham      | 10.0  | 7.5         |
| BP Garage, Hungerdown Lane, Chipp | 8.4   | 4.6         |
| Curzon Street, Calne              | 9.1   | 7.1         |
| Coopers Garage, Calne             | 10.4  | 8.1         |

3.3.3 It can be seen that these concentrations are well below the 2003 objective of 16.25 ug/m<sup>3</sup>. In terms of the 2010 objective, however it is important to correct the concentrations obtained.

3.3.4 In the current guidance we only have correction factors for 1999 onwards. If we take the highest concentration of 10 ug/m<sup>3</sup> in 1996 and correct using the 1999 factors in Box 3.4 of the technical guidance then this produces the following projected concentration:-

$$10 \text{ ug/m}^3 \times (0.647/2.767) = 2.34 \text{ ug/m}^3$$

Again, this is well below the 2010 objective of 5 ug/m<sup>3</sup>.

3.3.5 Monitoring data for benzene measured at national network monitoring sites is also provided in Table 3.1 of the technical guidance.

This shows that the Bristol East, Urban background site produced no greater than 3.11 ug/m<sup>3</sup> as a maximum running annual mean when measured over 1999 and 2000.

### 3.4 Road Traffic Sources

3.4.1 Box 3.2 of the Technical Guidance says that for road traffic assessments will be required when the 2010 background is expected to be greater than 2 ug/m<sup>3</sup> due to 'very busy' roads.

This is defined as:-

- Single carriageway roads with annual average daily traffic flows (AADT) exceeding 80,000 vehicles per day.
- Dual carriageway (2 or 3 lane) roads exceeding an AADT of 120,000 vehicles.
- Motorways exceeding an AADT of 140,000.

3.4.2 There are no roads in North Wiltshire exceeding the above criteria.

### 3.5 Industrial Sources

3.5.1 Annex 2 of the Technical Guidance lists industrial processes with the potential to emit significant quantities of benzene.

3.5.2 There are no such processes in North Wiltshire and consultation with neighbouring authorities has not identified any such processes.

### 3.6 Other sources

3.6.1 There is some evidence that petrol stations will emit sufficient benzene to put the 2010 objective at risk, especially if combined with higher levels from busy roads.

3.6.2 The approach is to identify all petrol stations with an annual throughput of more than 2000m<sup>3</sup> of petrol, with a road with an AADT of more than 30,000 vehicles nearby.

3.6.3 Leigh Delamere service station meets the above criteria, being adjacent to the M4 with AADT's in excess of 75,000.

3.6.4 The guidance also states to determine if there is relevant exposure within 10 metres of the pump, however as can be seen in Figure 2, the nearest dwelling is in excess of 400 metres away and so there is no public exposure.

### 3.7 USA Conclusions for Benzene

3.7.1 This chapter demonstrates that neither the 2003 or 2010 objectives for Benzene are at risk and as such a detailed assessment is not required.

4.1    Introduction

4.1.1    A maximum running annual mean concentration of 2.25 ug/m<sup>3</sup> has been adopted as an air quality standard for 1,3-butadiene, with the objective to be achieved by the end of 2003.

4.1.2    The main source of 1,3-butadiene in the United Kingdom is emissions from motor vehicle exhausts, although it is also an important industrial chemical and is handled in bulk at a small number of industrial premises.

4.1.3    The increasing number of vehicles equipped with three way catalysts, agreed reductions in vehicle emissions and improvements in fuel quality are expected to have reduced emissions from vehicle exhausts whereby the objective will be delivered.

4.1.4    Only those authorities with relevant locations in the vicinity of major industrial processes which handle, store or emit 1,3-butadiene, are expected to proceed beyond the updating and screening assessment.

4.2    The Updating and Screening Assessment (USA) for 1,3-butadiene

4.2.1    Local authorities should draw upon the information compiled as part of the first stage report, completed in the first round of review and assessment.

4.2.2    The USA for 1,3-butadiene should be based on a checklist approach for each source or location as set out below:-

- Monitoring Data

- New industrial sources
- Existing industrial sources with significantly increased emissions

#### 4.3 Monitoring Data

4.3.1 Whilst North Wiltshire have never carried out any monitoring for 1,3-butadiene, Table 4.1 of the Technical Guidance shows that the nearest national network monitoring site produced the following annual mean concentrations ( $\mu\text{g}/\text{m}^3$ ):-

| <u>Site</u>  | <u>Classification</u> | <u>1999</u> | <u>2000</u> |
|--------------|-----------------------|-------------|-------------|
| Bristol East | Urban background      | 0.36        | 0.29        |

4.3.2 There is no monitoring data available to suggest that there will be any running annual means greater than  $2.25 \mu\text{g}/\text{m}^3$  in North Wiltshire.

#### 4.4 Industrial Sources

4.4.1 There is no information to suggest that there are new industrial sources or sources with increased emissions either within or adjacent to North Wiltshire that would give rise to exceedences of the 1, 3-butadiene objective.

#### 4.5 USA Conclusions for 1, 3-butadiene

4.5.1 This chapter demonstrates that 2003 objective for 1, 3-butadiene is not at risk and as such a detailed assessment is not required.

5.1    Introduction

5.1.1    An annual mean concentration of  $0.5 \text{ ug/m}^3$  has been adopted as the air quality standard for lead, with an objective for the standard to be achieved by the end of 2004. A lower objective of  $0.25 \text{ ug/m}^3$ , to be achieved by the end of 2008 has also been set.

5.1.2    Since the ban on sales of leaded petrol was imposed in 2000 in the United Kingdom, the main source of lead in the environment is restricted to industries involving battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping.

5.2    Updating and Screening Assessment (USA) for Lead

5.2.1    Local Authorities are encouraged to maximise and build upon the information collated during the first round of review and assessment, by identifying any significant changes since that time.

5.2.2    The USA for lead should be based on a checklist approach for each source or location as set out below:

- Monitoring data outside an Air Quality Management Area (AQMA).
- New industrial sources
- Industrial sources with substantially increased emissions

### 5.3 Monitoring data

5.3.1 North Wiltshire have no monitoring data for Lead.

5.3.2 Table 5.1 of the Technical Guidance summarises annual mean lead in air concentrations at national network monitoring sites for 1999-2001. The nearest site to North Wiltshire is a kerbside site in Cardiff. The concentrations are well below the objectives for 2004 and 2008, as are most of the concentrations elsewhere in the UK for the industrial sites.

### 5.4 New or increased industrial sources

5.4.1 No industrial sources were identified locally or nationally during the first round of Review and Assessment as likely to give rise to exceedences of the annual mean objective for lead.

5.4.2 Box 5.1(B) of the Technical Guidance acknowledges this, however recommends that authorities determine whether new processes have moved into their district or neighbouring authorities with the potential to emit significant quantities of lead.

5.4.3 No such sources have been identified, nor existing sources who have increased lead emissions by > 30%, as Box 5.1 (C) advises.

### 5.5 USA Conclusions for Lead

5.5.1 This chapter demonstrates that there is no requirement to carry out a detailed assessment for lead.

6.1 Introduction

- 6.1.1 Two air quality objectives have been adopted for nitrogen dioxide, an annual mean concentration of  $40 \text{ ug/m}^3$  and a 1 hour mean concentration of  $200 \text{ ug/m}^3$  not to be exceeded more than 18 times per year. The objectives are to be achieved by the end of 2005.
- 6.1.2 The first Air Quality Daughter Directive also sets the same limits to be achieved by 1<sup>st</sup> January 2010.
- 6.1.3 Nitrogen dioxide ( $\text{NO}_2$ ) and nitric oxide ( $\text{NO}$ ) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides ( $\text{NO}_x$ ). All combustion processes produce  $\text{NO}_x$  emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health.
- 6.1.4 The principal source of nitrogen oxides emissions is road transport which accounted for about 49% of total UK emissions in 2000. Major roads carrying large volumes of high-speed traffic (such as motorways and other primary routes) are a predominant source, as are conurbations and city centres with congested traffic.
- 6.1.5 The contribution of road transport to nitrogen oxides emissions has declined significantly in recent years as a result of various policy measures and urban traffic  $\text{NO}_x$  emissions are estimated to fall by about 20% between 2000 and 2005, and by 46% between 2000 and 2010.
- 6.1.6 Other significant sources of  $\text{NO}_x$  emissions include the electricity supply industry and other industrial and commercial sectors, which accounted for about 24% and 23% respectively in

1999. As with the transport sector, emissions from these sources are declining as technology improves.

6.1.7 Nationally, the first round of review and assessments predicted exceedences in the vicinity of major airports, where both road traffic and aircraft NO<sub>x</sub> emissions combine. Whilst industrial sources may make a contribution to local pollutant levels, no exceedences of the objectives have been identified as a direct result of these emissions above.

6.1.8 An analysis of monitoring data in the vicinity of roads throughout the UK has been undertaken by Air Quality Consultants and the University of the West of England on behalf of DEFRA, and provided useful guidance to authorities on where exceedences might occur. The report concludes that, outside of major conurbations, exceedences of the annual mean objective are only likely to occur within about 10 metres of the kerbside of single carriageway roads. This includes roads with fairly low traffic flows (10,000 – 20,000 vehicles/day) if they are within congested town centres. This conclusion is particularly significant, as many market towns have narrow streets, with residential properties within 5 metres of the kerb.

6.1.9 This chapter will therefore focus on areas where traffic is most congested in the towns of the district and where the traffic flows are the highest, but most of all where pollution levels and public exposure are most critical.

## 6.2 Updating and Screening Assessment (USA) for Nitrogen dioxide

6.2.1 This updating review is intended to identify any significant changes that may have occurred since the first round of review and assessment was completed.

6.2.2 Local Authorities are encouraged to maximise and build upon the data and assessments work carried out during the first round of review and assessment.

6.2.3 The USA for NO<sub>2</sub> should be based on a checklist approach for each source or location as set out below:

- Monitoring data within or outside an AQMA.
- Narrow congested streets with residential properties close to the kerb.
- Junctions.
- Busy streets where people may spend 1 hour or more close to traffic.
- Roads with high flows of buses and/or HGV's.
- New roads constructed or proposed since the first round.
- Roads close to the objective during the first round.
- Roads with significantly changed traffic flows.
- Bus Stations.
- New industrial sources.
- Industrial sources with substantially increased emissions.
- Aircraft.

### 6.3 Monitoring data

6.3.1 Whilst no AQMA's have been declared, historically, North Wiltshire District Council have gathered a lot of data in respect of NO<sub>2</sub> levels across the district. This has been in the form of passive diffusion tubes, self-contained mobile monitoring unit for one month and automatic monitoring.

- 6.3.2 All monitoring has been focussed on locations identified as being exposed to the highest traffic levels, most congestion, and potential highest pollution levels i.e. relevant locations.
- 6.3.3 The monitoring strategy started with siting the mobile unit for a month roadside/kerbside in the 6 main towns in the district to provide a snapshot of pollution concentrations. Air Quality Consultants were commissioned to report on the data having regard to the National Air Quality Strategy objectives.
- 6.3.4 This monitoring highlighted the need for further (third stage) investigations at two locations
- (i) Curzon Street, Calne
  - (ii) High Street, Wootton Bassett

These locations are probably the most congested locations in the district, due to slow moving traffic as a result of a narrow street in the case of Curzon Street and traffic lights, in the case of Wootton Bassett.

- 6.3.5 Automatic monitoring was therefore carried out for a year at each location (1999 for Calne and 2000/2001 for Wootton Bassett). Measured data and 2005 projections were well below the air quality objectives in both situations.
- 6.3.6 The mobile monitoring unit was also stationed for a month in 1999 at Byways, Ballards Ash which is a property 20m from the M4 and deemed to be the closest receptor to the highest traffic flows in the district. Again, measured concentrations over the month were well below the objective, and Air Quality consultants concluded that this location was not a risk of a breach in 2005.

- 6.3.7 Monitoring for NO<sub>2</sub> during 2001 and 2002 has been based on 17 diffusion tubes scattered across the district at relevant locations (See Tables 2 & 3). The first four locations in Chippenham are part of the UK NO<sub>2</sub> Network survey, whilst the remainder of the sites were chosen due to their proximity to road traffic.
- 6.3.8 Several tubes were located in and around the High Street, Wootton Bassett in the year 2000, to determine NO<sub>2</sub> concentration dispersion, with a view to defining an Air Quality Management Area should there be an exceedence. The automatic monitoring kerbside during that year, however subsequently demonstrated that the objective would be comfortably met.
- 6.3.9 The annual mean concentrations in 2001 have been projected to 2005 (Figure 3) and produce no exceedences of the air quality objective.
- 6.3.10 The annual mean concentrations for 2002 have been bias corrected in Table 3, following the advice contained in Box 6.4 of the Technical Guidance, with the factor of 1.019 being provided by Cheltenham Borough Council who collocated diffusion tubes provided by Bristol City Council Scientific Services, with a chemiluminescence monitor, prior to 2005 projection.
- 6.3.11 This is the same laboratory used by North Wiltshire and thus the analytical quality control will be identical. This protocol is attached in Appendix 1 for information.
- 6.3.12 It can be seen that all 2002 diffusion tube concentrations and 2005 predictions are well below the objective (See Figure 4).

#### 6.4 Narrow congested streets with residential properties close to the kerb

6.4.1. All previous monitoring exercises have encompassed areas where traffic is slow moving with stop/start driving and where buildings either side reduce dispersion.

6.4.2. These types of location will therefore require no further consideration.

#### 6.5 Junctions

6.5.1 As stated in paragraph 6.4.1 above, all previous monitoring has been focussed on relevant locations. Indeed, the previous report submitted by this local authority included 1999 diffusion tube data for the following roads:-

A4 Avenue La Fleche, Chippenham

A4 Sainsbury's, Chippenham

Bridge Centre, Bath Road, Chippenham

A350 North of Chippenham

Coped Hall Roundabout, Wootton Bassett

The highest concentration measured roadside was  $34 \text{ ug/m}^3$  at the Bridge Centre which when projected to 2005 produced  $29 \text{ ug/m}^3$ .

6.5.2 The Technical Guidance also says to determine if there is relevant exposure within 10m of the Junction, however navigation of the digital mapping system (GIS) has not identified any such locations.

6.5.3 The Local Authority feel they have monitored at representative locations and that the Bridge Centre site will be the worst case scenario in terms of traffic flows meeting at one point. i.e. a

Junction (See Figure 5).

6.6 Busy Streets where people may spend 1 hour or more close to traffic

6.6.1 These types of location were specifically included during the first round of review and assessment. e.g. High Street, Wootton Bassett and Curzon Street, Calne, whilst Chippenham, our largest town is pedestrianised.

6.7 Roads with high flows of buses and/or HGV's

6.7.1 Section F of Box 6.2 in the Technical Guidance defines an 'unusually high' proportion of heavy duty vehicles as > 25% of traffic flow.

6.7.2 Information provided by Wiltshire County Council transport planners identifies only one road as high as 17% and as such no further investigation is required.

6.8 New roads constructed or proposed since the first round of review and assessment

6.8.1 No such roads have been identified for consideration.

6.9 Roads close to the objective during the first round of review and assessment

6.9.1 Section H of Box 6.2 requires that roads where annual mean concentrations in 2005 were predicted to be above 36 ug/m<sub>3</sub>, but below 40 ug/m<sub>3</sub> at relevant locations, may need to be reassessed.

6.9.2 No roads in North Wiltshire meet this criteria, however, the diffusion tube data in section 6.4 has reassessed each location in spite of this.

6.10 Roads with significantly changed traffic flows

6.10.1 Section I of Box 6.2 requires that the local authority identifies any roads with more than 10,000 vehicles per day that have experienced more than a 25% increase in traffic flow.

6.10.2 No roads in North Wiltshire are considered to fall into this category and as such no further investigation is required.

6.11 Bus Stations

6.11.1 Section J of Box 6.2 advises the Local Authority to collate information on bus movements and to determine if there is relevant exposure within 10 metres against the 1-hour objective.

6.11.2 Information provided by Wiltshire County Council Passenger Transport Unit shows that Chippenham Bus Station would not exceed the 1,000 movements a day necessary for further investigation and this is the only Bus Station in the district.

6.11.3 Furthermore, the Local Authority would not consider the bus station itself as a relevant location for one hour if the bus movements had exceeded 1,000 movements.

6.11.4 No further investigation of bus stations is considered necessary.

6.12 New industrial Sources

6.12.1 No significant new industrial sources have been located in North Wiltshire or neighbouring authorities since the first round of review and assessment.

6.13 Industrial sources with substantially increased emissions

6.13.1 As no industrial sources were identified during the first round of review and assessment, no further investigation is required.

6.14 Aircraft

6.14.1 RAF Lyneham has been previously assessed for NO<sub>2</sub> with the mobile monitoring unit demonstrating at a relevant location (Chippenham Road, Lyneham) that the objective in 1999 was not being breached.

6.15 USA conclusions for Nitrogen dioxide

6.15.1 A robust monitoring strategy at carefully chosen relevant locations where public exposure to the highest concentrations of traffic related NO<sub>2</sub> has demonstrated that the objectives will comfortably be met in North Wiltshire.

6.15.2 There have been no significant changes with regard to other potential sources of NO<sub>2</sub>.

6.15.3 This chapter demonstrates that there is no requirement to carry out a detailed assessment for NO<sub>2</sub>.

## 7.1 Introduction

7.1.1 A 15-minute mean of  $266 \text{ ug/m}^3$  has been adopted as an air quality standard for sulphur dioxide, with an objective for the standard not to be exceeded more than 35 times in a year by the end of 2005. Additional objectives have been set which are equivalent to the EU limit values specified in the First Air Quality Directive. These are for a 1 hour mean objective of  $350 \text{ ug/m}^3$ , to be exceeded no more than 24 times per year, and a 24 hour objective of  $125 \text{ ug/m}^3$ , to be exceeded no more than 3 times per year, to be achieved by the end of 2004.

7.1.2 The main source of sulphur dioxide in the United Kingdom is power stations, which accounted for more than 71% of emissions in 2000. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions.

7.1.3 Local exceedences of the objectives (mainly the 15-minute mean objective) may occur in the vicinity of small combustion plant (less than 20 MW) which burn coal or oil, in areas where solid fuels are the predominant form of domestic heating, and in the vicinity of major ports.

## 7.2 Updating and Screening Assessment (USA) for Sulphur Dioxide ( $\text{SO}_2$ )

7.2.1 Local authorities are encouraged to maximise and build upon the data and assessments work completed during the first round of review and assessment.

7.2.2 The USA for sulphur dioxide should be based on a checklist approach for each source or location as set out below:

- Monitoring data within or outside an AQMA.
- New industrial sources.
- Industrial sources with substantially increased emissions.
- Areas of domestic coal burning.
- Small boilers (>5MW<sub>(thermal)</sub>) burning coal or oil.
- Shipping.
- Railway locomotives.

### 7.3 Monitoring data

7.3.1 Whilst no AQMA's have been declared, monitoring data was collated during the first round of review and assessment at roadside locations in the six main towns of the District, using the self-contained mobile unit as previously outlined in earlier chapters.

7.3.2 The locations were originally selected with road transport as the focus, but it was concluded that any significant emissions from local industry should also be reflected in the monitoring.

7.3.3 The results obtained were as follows:-

| <u>Monitoring Location</u> | <u>Date</u>   | <u>Air Quality Std</u>         |                                |
|----------------------------|---------------|--------------------------------|--------------------------------|
|                            |               | <u>1hr Max Not</u>             | <u>15 min Mean Not</u>         |
|                            |               | <u>&gt;350ug/m<sup>3</sup></u> | <u>&gt;266ug/m<sup>3</sup></u> |
| Cross Hayes, Malmesbury    | 1-16 Aug 1997 | 77.1                           | 87.8                           |
|                            | 1-14 Nov 1997 | 47.9                           | 50.5                           |
| Curzon Street, Calne       | Sept 97       | 42.6                           | 47.9                           |
| Pheasant, R/About, Chip    | Oct 97        | 103.7                          | 114.4                          |
| High Street, Cricklade     | July 98       | 26.6                           | 34.6                           |
| High Street, W/Bassett     | Aug 98        | 34.6                           | 45.2                           |
| Newlands Road, Corsham     | Sept 98       | 39.9                           | 53.2                           |

7.3.4 Air Quality Consultants analysed the data at the time and concluded that the objective was in no way at risk.

7.3.5 A summary of measured sulphur dioxide concentrations at UK national network sites is shown in Table 7.1 of the Technical Guidance for the period 1999 –2001. Concentrations have fallen at all sites in recent years, and the objectives were only exceeded at one site in Belfast during this period. This exceedence is associated with domestic coal burning which is still widespread in Belfast.

#### 7.4 New industrial sources

7.4.1 No new industrial sources have been identified within North Wiltshire or neighbouring authorities, that are likely to produce significant quantities of SO<sub>2</sub>.

#### 7.5 Industrial sources with substantially increased emissions

7.5.1 No industrial sources with substantially increased (>30%) emissions of SO<sub>2</sub> have been identified either within North Wiltshire or in neighbouring authorities.

#### 7.6 Areas of domestic coal burning

7.6.1 Having analysed supply information provided by the coal companies during the first round using the digital mapping system (GIS), the local authority is satisfied that domestic coal burning does not exceed the criterion for further investigation i.e. 100 houses within an area 500 x 500 metres.

7.7 Small boilers >5MW<sub>(thermal)</sub>

7.7.1 No boiler plant >5MW<sub>(thermal)</sub> that burn coal or fuel oil have been identified within the district.

7.8 Shipping

7.8.1 There are no shipping sources in the district of North Wiltshire.

7.9 Railway Locomotives

7.9.1 No locations have been identified within the district whereby diesel locomotives are regularly stationary for periods of 15 minutes or more as detailed in section H of the Technical Guidance.

7.10 USA Conclusions for Sulphur Dioxide

7.10.1 Monitoring data within North Wiltshire and at national network sites demonstrate that the objectives for SO<sub>2</sub> will be comfortably met.

7.10.2 No sources have been identified since the first round of review and assessment that would produce breaches of the SO<sub>2</sub> objectives.

7.10.3 This chapter demonstrates that there is no requirement to carry out a detailed assessment for SO<sub>2</sub>.

8.1    Introduction

8.1.1    Two air quality objectives have been adopted for fine particles (PM<sub>10</sub>), which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are 40 ug/m<sup>3</sup> as the annual mean, and 50 ug/m<sup>3</sup> as the fixed 24 hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004. The objectives are based upon measurements carried out using the European gravimetric transfer reference sampler or equivalent.

8.1.2    There is a wide range of emission sources that contribute to PM<sub>10</sub> concentrations in the UK. These sources can be usefully divided into 3 main categories:

- Primary particles – emissions derived directly from combustion sources, including road traffic, power generation, industrial processes etc.
  
- Secondary particles – particles formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates.
  
- Coarse particles – these comprise of emissions from a wide range of sources, including resuspended dusts from road traffic, constructions works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles.

8.1.3    It is important to bear in mind the different emissions sources, and their respective contributions to PM<sub>10</sub>, concentrations, within the review and assessment process for the following reasons:

- The expected reduction in particle emissions in future years is different for each source type e.g. emissions from road transport will be governed by new legislation on vehicle emissions standards.
- Emissions of secondary particles will be largely governed by controls on power generation, industrial and transport SO<sub>2</sub> and NO<sub>x</sub> emissions, both in the UK and in Europe.
- Emissions of coarse particles are largely uncontrolled, and in general are not expected to decline in future years.

8.1.4 In forecasting future emissions it is therefore essential to treat each source category separately.

8.1.5 The principal focus of Local Air Quality Management should be towards the control of emissions at 'local' level. It is therefore important that the review and assessment process identifies the contribution of local emission sources, so that the effectiveness of control policies or action plans can be evaluated.

8.1.6 A significant proportion of current annual mean background PM<sub>10</sub> concentrations is derived from regional (including long distance transport from Europe) background sources. Typical regional annual mean background contributions are currently within the range 14-21 ug/m<sup>3</sup> gravimetric, and are outside of the control of local authorities. Where exceedences of the proposed objectives are predicted, local authorities are strongly advised to focus their efforts on the identification of the contribution of local sources to overall PM<sub>10</sub> concentrations.

8.1.7 There has been significant progress in recent years in reducing emissions of particles from both the transport and industrial sectors, and total national annual UK emissions declined by nearly 40% in the period between 1990 and 1999. Further reductions are expected in future

years as a result of agreed additional policies, or those that are currently under discussion.

8.1.8 Within the industrial sector, particle emissions will be further controlled through the EU Directive on Integrated Pollution Prevention and Control (IPPC) and the EU Waste Incineration Directive. In addition, a significant reduction in emission of pollutants that lead to the formation of secondary particles is expected as a result of the EU legislation on the Acidification Strategy. Emissions from road transport will also be reduced as a result of tightening emissions controls and by the reduction of the sulphur content of diesel fuel, which affects the emissions of particles from vehicles.

8.1.9 Concentrations of PM<sub>10</sub> are currently measured at more than 60 national network monitoring sites in the UK. They are shown in Table 8.1 of the Technical Guidance for the period 1999 to 2001. Concentrations are generally well below the 2004 annual mean objective (40 ug/m<sup>3</sup> gravimetric) with the exception of the London Marylebone Road kerbside site. The 24 hour objective for 2004 (50 ug/m<sup>3</sup>, maximum of 35 exceedences per year) has been exceeded at a small number of sites, mainly those in the vicinity of busy roads or close to industrial activities.

8.1.10 The data above still requires projecting to 2004 and when this is carried out, the analysis has indicated that exceedences of the 2004 objectives might be found in the following areas:

- Urban background sites in central London.
- Areas adjacent to busy roads, particularly within major urban areas.
- Areas which have significant emissions from the domestic burning of solid fuels.
- Areas in the vicinity of industrial plant, or which have significant uncontrolled or fugitive emissions (for example, quarrying, materials handling facilities etc).

## 8.2 Updating and Screening Assessment (USA) for PM<sub>10</sub>

- 8.2.1 This updating review is intended to identify any significant changes that may have occurred since the first round of review and assessment was completed.
- 8.2.2 Authorities are encouraged to maximise and build upon the data and assessments completed during the first round of review and assessment.
- 8.2.3 The USA for PM<sub>10</sub> should be based on a checklist approach for each source or location as set out below:

- Monitoring data within or outside an AQMA
- Junctions
- Roads with high flow of buses and/or HGV's
- New roads constructed or proposed since first round
- Roads close to the objective during first round
- Roads with significantly changed traffic flows
- New industrial sources
- Industrial sources with substantially increased emissions
- Areas with domestic solid fuel burning
- Quarries, landfill sites, open cast coal, handling of dusty cargoes at ports
- etc
- Aircraft

## 8.3 Monitoring data within or outside an AQMA

- 8.3.1 Whilst North Wiltshire District Council have never declared an AQMA, the local authority have carried out air quality monitoring as outlined in the previous chapters, with a view to

highlighting 'hotspots' for further investigation.

8.3.2 In the case of PM<sub>10</sub>, this involved using the mobile monitoring station to provide real time data for one month, at either roadside locations, or sites susceptible to fugitive emissions or dust from nearby activities.

8.3.3 This screening monitoring highlighted the need for further (third stage) assessments at the same two roadside locations as described in paragraph 6.3.4 of this report i.e. Curzon Street, Calne and High Street, Wootton Bassett.

8.3.4 Subsequent third stage monitoring at both locations has substantiated that both air quality objectives would not be breached in 2004, nor indeed were they breached in the year of measurement (1999 for Calne and 2000/2001 for Wootton Bassett).

8.3.5 As well as siting the mobile unit in our six main towns, as previously explained, it was also utilised in three other specifically chosen locations for differing reasons:-

| <u>Site</u>              | <u>Reason</u>  |
|--------------------------|--|
| Gosditch, Ashton Keynes  | Proximity to gravel extraction/concrete batching activities. |
| Chippenham Road, Lyneham | Proximity to RAF Lyneham.                                    |
| Byways, Ballards Ash     | Proximity to M4.   |

8.3.6 This further screening of the district highlighted the need for further (third stage) monitoring in Lyneham only, due to a tendency for elevated concentrations at this location, but with no obvious local source.

- 8.3.7 This further monitoring took place between April and July 2000 with data obtained by Enviro Technology Services Plc and analysed by Air Quality Consultants Ltd, as has been the case in previous monitoring excersises.
- 8.3.8 This further monitoring demonstrated that aircraft (exhausts) which regularly fly over the monitoring location, is unlikely to be a major contributor to measured concentrations.
- 8.3.9 It was also concluded that whilst the 24 hour objective may currently (2000) be exceeded at Lyneham, it was highly unlikely to be exceeded in 2004. The local authority were advised to continue to pay particular attention to this location during future air quality reviews and assessments.
- 8.3.10 To this end, the local authority arranged for another three month monitoring at the same location during this round of review and assessment. This took place between October 2002 and January 2003 and the report written by Air Quality Consultants Ltd, can be seen in Appendix 2 of this report.
- 8.3.11 The recent three month monitoring again proved that it was unlikely that PM<sub>10</sub> concentrations would exceed the 2004 objectives and that it should not be necessary to carry out further monitoring at this location.

#### 8.4 Junctions

- 8.4.1 For the reasons given in section 6.5 of this report there is no need to consider junctions any further.

#### 8.5 Roads with high flow of buses and/or HGV's

8.5.1 There are no roads in North Wiltshire, according to information provided by Wiltshire County Council, that exceed 20% of the AADT, which is the figure deemed to be an 'unusually high' proportion in the Technical Guidance.

#### 8.6 New roads constructed or proposed since first round

8.6.1 No such roads have been identified for consideration

#### 8.7 Roads close to the objective during the first round

8.7.1 No roads have been identified where more than 30 exceedences of the 24 hour objective were predicted at relevant locations during the first round, and as such no further investigation is necessary.

#### 8.8 Roads with significantly changed traffic flows

8.8.1 The Technical Guidance defines a significant change as greater than 25% in AADT traffic flow. No such roads have been identified as having such an increase.

#### 8.9 New industrial sources

8.9.1 No significant new industrial sources have been located in North Wiltshire or neighbouring authorities, since the first round of review and assessment.

#### 8.10 Industrial sources with substantially increased emissions

8.10.1 No industrial sources were identified as potentially significant in the last round and therefore no further investigation is required.

#### 8.11 Areas of domestic solid fuel burning

8.11.1 Having analysed supply information provided by the coal companies during the first round, using the digital mapping system (GIS), the local authority is satisfied that solid fuel burning does not take place in >50 houses within 500x500m, as described in the Technical Guidance.

#### 8.12 Quarries/landfill sites/opencast coal/handling of dusty cargoes at ports etc

8.12.1 The local authority is satisfied that during second stage review and assessment, the monitoring in Gosditch, Ashton Keynes reflected a relevant location near (approx. 300m) to the most likely sources of fugitive sources of PM<sub>10</sub> in the district. i.e. gravel extraction, concrete batching.

#### 8.13 Aircraft

8.13.1 The local authority has monitored on several occasions in the flight-path of RAF Lyneham, proving that there will be no breach of the 2004 objectives.

#### 8.14 USA conclusions for PM<sub>10</sub>

8.14.1 All monitoring at carefully chosen relevant locations has not identified any likely breaches of the 2004 objectives.

8.14.2 There have been no significant changes with regards to other potential sources of  $PM_{10}$ .

8.14.3 This chapter demonstrates that there is no requirement to carry out a detailed assessment of  $PM_{10}$ .

## GLOSSARY OF TERMS AND ABBREVIATIONS

| <u>Term</u>       |   | <u>Description</u>   |
|-------------------|---|--|
| AADT              | - | Annual average daily traffic flow  |
| AQMA              | - | Air Quality Management Area  |
| AQS               | - | Air Quality Strategy   |
| Chemiluminescence | - | The emission of absorbed energy as light during a chemical reaction. The measurement of the light emitted can give a measure of the concentration of one of the reactants if the other one is known. |
| CO                | - | Carbon Monoxide – a gaseous pollutant formed during incomplete combustion of carbonaceous fuel.  |
| (grav.)           | - | Gravimetric method of weighing particulate matter on a filter  |
| m <sup>3</sup>    | - | Unit of volume cubic metre = 1000 litre  |
| mg/m <sup>3</sup> | - | Milligrams per cubic metre   |
| NO                | - | Nitric Oxide   |
| NO <sub>2</sub>   | - | Nitrogen Dioxide   |
| NO <sub>x</sub>   | - | Oxides of Nitrogen   |
| PM <sub>10</sub>  | - | Particulate matter less than 10µm aerodynamic diameter   |
| SO <sub>2</sub>   | - | Sulphur Dioxide  |
| µg                | - | Microgram millionth (10 <sup>-6</sup> ) of a gram  |
| µg/m <sup>3</sup> | - | Micrograms per cubic metre – a unit of concentrations (1 millionth of a gram of pollutant per cubic meter of air)  |
| Kerbside          | - | A site sampling within 1m of the edge of a busy road.  |
| Roadside          | - | A site sampling within 1 – 5m of a busy road.  |
| Urban background  | - | An urban location distanced from sources and therefore broadly representative of city-wide background conditions e.g. urban residential areas.   |