



## **FIRST STAGE AIR QUALITY STRATEGY REVIEW AND ASSESSMENT**

### **SUMMARY DOCUMENT – RELEASED MAY 1999**

#### **1. INTRODUCTION**

Today, air quality issues head both the political and environmental agenda for more and more people, not least because of the increasing concern linking our health to the air that we breathe.

Over the years, the air in the U.K. has significantly improved since the 1950's when legislation was first introduced to curb this trend. However, the pace of modern life and improved living standards, especially increased mobility, have placed further pressures on air quality.

In recognition of this current issue and in keeping with the U.K.'s adoption of the Agenda 21 initiative, Part IV of the Environment Act 1995 came into force in December 1997. This Act places a duty upon each local authority in the U.K. to periodically review and assess air quality in its area.

In response to the implementation of this Act, the Government published a National Air Quality Strategy (NAQS) for the U.K. in March 1997. The strategy basically aims to meet a series of air quality objectives by the year 2005 (see Table 1). This Strategy states that many of these objectives will already be met because of improving environmental national standards.

However, the Strategy accepts that some of these nationally adopted policies will not improve the air quality objectives overall, and some areas, such as heavily trafficked urban locations, will fall short of the standards set unless further action is implemented at a local level. Therefore, the primary objective of this new legislation and its guidance is to require local authorities to review and assess its area for air quality so that the areas where national policies are not expected to deliver the objectives will be identified and ultimately addressed. In achieving this, the Strategy encourages consultation with the community and promotes the integration of local authority functions such as environmental health, land use planning and traffic management.

Guidance suggests that local authorities undertake a three-stage review and assessment. Firstly, every local authority is expected to undertake a stage 1 review and assessment which should consist of an initial screening of industrial, transport and other sources of pollution, which have a significant impact within the authority's borders. If this stage 1 report concludes that the air quality objectives may not be met, despite the national policies to be adopted, then the local authority should proceed to a second-stage review and assessment.

This second stage should concentrate on the pollutants primarily at the locations where the first stage indicated that the objectives would not be met. This second stage normally would include basic monitoring and modelling techniques, which should provide a quantitative assessment as to whether the air quality objectives will actually be met.

Should stage two show that further work is required, the local authority should proceed to stage three which will entail detailed monitoring and extensive modelling.

If the results of this stage three review and assessment then indicate that the air quality objectives for 2005 will not be achieved, then under Section 82 (3) of the Environment Act 1995, the local authority would have to designate Air Quality Management Areas, requiring further detailed public consultation exercises in preparation of an Air Quality Action Plan.

Whatever the outcome, Herefordshire Council and all local authorities in the UK are required to submit a report to the DETR (Department of Environment, Transport and the Regions) by the end of 1999, which summarises its findings in accordance with the above.

## 2. THE BACKGROUND

The Environment Act 1995, required the U.K. National Air Quality Strategy to include statements on "standards relating to the quality of air" and "objectives for the restriction of the levels at which particular substances are present in the air". These standards are therefore based on the effects of each pollutant on public health, having regard to the recommendations of such bodies as the World Health Organisation (WHO) and more particularly the Expert Panel on Air Quality Standards in the U.K. (EPAQS).

In view of the time-scale required for local authorities to achieve the aims of this Strategy, and having regard to current unfinished negotiations being discussed within the European Community, the end date and hence deadline for the Strategy has been set at the year 2005.

The objectives set by the 1997 strategy are reproduced in Table 1 below:-

**Table 1 : Objectives of the National Air Quality Strategy**

Pollutant	Standard		Objective - to be achieved by 2005
	Concentration	Measured as	
Benzene	5ppb	Running annual mean	5ppb
1,3-Butadiene	1ppb	Running annual mean	1ppb
Carbon Monoxide	10ppm	Running 8-hour mean	10ppm
Lead	0.5 $\mu$ g/m <sup>3</sup>	Annual mean	0.5 $\mu$ g/m <sup>3</sup>
Nitrogen dioxide	150ppb 21ppb	1 hour mean annual mean	150 ppb, hourly mean 21ppb annual mean
PM10	50 $\mu$ g/m <sup>3</sup>	running 24 hour mean	50 $\mu$ g/m <sup>3</sup> measured as the 99 <sup>th</sup> percentile
Sulphur dioxide	100ppb	15 minute mean	100 ppb measured as the 99 <sup>th</sup> percentile.

The Government considers that these objectives should be applied to “non-occupational near ground level outdoor locations“ where a person might reasonably be expected to be exposed over the relevant averaging period“, e.g. in the vicinity of housing, hospitals and schools. In the light of future research, it may of course be necessary for these standards to be amended prior to the 2005 deadline, and even the 1999 deadline set for local authority to report back to the DETR. Because ozone is considered to be a secondary pollutant, being formed distant to an area and drifting into it, this pollutant was removed from the original list of objectives published. It is understood that ozone will be dealt with by national policy.

### 3. COUNTY OF HEREFORDSHIRE - THE STUDY AREA

The County of Herefordshire lies on the Welsh borders, being neighboured by the Counties of Gloucestershire, Worcestershire, Shropshire, Powys and Gwent. It has a relatively sparse population of just over 166,000, with the largest settlement by far being the Cathedral City of Hereford, having a population of some 48,100. Hereford is also the principal County town, being located in its approximate centre and possessing the main retail, industrial and administrative functions.

Other significant settlements in the County include: -

	<u>Population</u>
Bromyard	3,800
Kington	2,300
Ledbury	8,200
Leominster	10,800
Ross-on-Wye	10,000

The County itself spans some 50km east to west and 60km north to south. Its landscape is very varied, ranging from the steep sided valleys and hills towards the Black Mountains, the Radnorshire Hills and the Malvern Hills to the low-lying meadows and flood plains of the rivers Wye and Lugg. Scenery is typically rural with greater concentrations of livestock to the west, becoming more arable to the east. The detailed weather records for the County are available and illustrate that the predominant wind direction is south westerly, although this varies depending on the time of year and season. As with most geographical regions, periods of temperature inversions are not uncommon, usually observed as still foggy or hazy days. Because some of the settlements, particularly Hereford, lie in valleys, this is of significant interest, as it can lead to high pollution episodes in the towns, where polluted air can become trapped at near ground level.

### 4. POLLUTANT SPECIFIC REVIEWS AND ASSESSMENT FOR HEREFORDSHIRE

This section deals with each pollutant within the County and considers whether or not progression to more detailed stage 2 or 3 studies is necessary.

#### 4.1 Benzene

There are no authorised processes in existence within or adjacent to the County that emits benzene, nor are there any processes proposed to be developed. The only exceptions to this are the 27 major petrol stations, which have been authorised for vapour recovery. Government guidance is presently uncertain whether benzene emissions from these premises are significant to this review, but as all have been fitted with vapour recovery equipment already, this aspect will not be of relevance to the 2005 objective.

It is considered that road traffic will represent the only significant source of benzene emission within Herefordshire. As there is currently no benzene data available for the County, regard has to be paid to Government guidance which states that only roads with an Annual Average Daily Traffic (AADT) flow greater than 50,000 need to be considered for progression to a stage 2 or 3 approach.

The highest AADT flows within the County are on the A49 in Hereford and the M50/A40 near Ross-on-Wye, both projected to be in the region of 25,000 - 30,000 for the year 2005. Clearly this implies that benzene levels even on this heavily trafficked motorway will not pose a problem to the 2005 objective. In this respect, it is noteworthy to mention that in 1996 neighbouring Wychavon District Council carried out a 4 month diffusion tube survey for benzene adjacent to the M5 in Worcestershire. Here, despite AADT flows being in the region of 70,000 - 90,000, benzene was only found in the range 0.1 to 1.1 ppb. This implies that levels within County traffic hotspots will not pose a problem for this pollutant.

In any case, benzene emissions are expected to halve by the year 2005 because of tighter vehicle emission standards and because of increasing numbers of vehicles with catalytic converters.

### **Recommendation for Benzene**

**It is not considered necessary to proceed to the second stage review and assessment procedure for benzene. However, as elevated levels of PM10 have been observed at the Edgar Street roundabout continuous monitoring station, it is recommended that consideration is given to some monitoring of benzene by diffusion tube adjacent to this site in support of this.**

### **4.2 1, 3-Butadiene**

There are no authorised processes within or adjacent to Herefordshire that emit 1,3-Butadiene, nor are there any proposed by the year 2005.

Although 1,3-Butadiene is sometimes associated with rubber processes, confirmation has been obtained from the main rubber manufacturers in the county that their rubber process does not utilise nor emit this pollutant.

Therefore, the only significant source of this pollutant within the County will be from road traffic emissions. However, (as the previous section has mentioned for benzene) there are no roads in the County projected to have an AADT flow in excess of 50,000 and as such Government guidance implies that it is unlikely that the County's roads will contribute any significant quantities of this pollutant.

Similarly, data obtained from heavily trafficked kerbside monitoring stations operated by DETR confirm that exceedences of the 1ppb running annual mean standard do not occur even on the UK's busiest roads. By the year 2005, guidance suggests that the levels currently observed will reduce even further as exhaust emission standards improve and there are more catalytic converters. As 1,3-Butadiene is rapidly broken down in the air, this pollutant is not expected to drift into the County in any significant quantity.

### **Recommendation for 1,3-Butadiene**

**It is not considered necessary to proceed to the second or third stage review and assessment procedure for 1,3-Butadiene.**

### 4.3 Carbon Monoxide

#### 4.3.1 Industrial Emissions of Carbon Monoxide

There is only one authorised process within the County that emits any significant quantity of carbon monoxide to air and this is the Midlands Power (UK) Ltd. Combined Heat and Power (CHP) Station located very close to the centre of Hereford in Plough Lane. This CHP station comprises of four 17.5 MW(th) dual fuel shell type boilers and two 17.8 MW(th) marine type diesel engines. The boilers are fired continuously on natural gas although heavy fuel oil (HFO) is used as a back-up approx. 350 hrs/yr (Nov - Mar). The emission data available is as follows:-

Carbon monoxide from boilers (gas fired)	- 5-10 vpm <sup>3</sup>
Carbon monoxide from diesel engines (oil fired)	- unknown

The efflux velocity for this process is 15.4m/s and the gas temperature is 220°C, discharging from 2 x 38m high stacks. The Environment Agency's database does not provide any data for carbon monoxide but from the high levels of NO<sub>2</sub> emitted it is possible that the emissions of carbon monoxide may be significant, particularly during climatic temperature inversions when the stack emissions will ground close to the source of emission and hence in the City itself.

#### 4.3.2 Road Traffic Emission of Carbon Monoxide

Road traffic within the County is considered to be a main emitter of carbon monoxide. This pollutant is emitted at its highest concentrations in slow moving traffic on very busy roads. In this respect, Government guidance again suggests that only slow-moving vehicles on roads with an AADT flow in excess of 50,000 will be significant for further review. No roads fall in this category, nor are any predicted to by 2005. It must also be considered that tighter vehicle exhaust standards and increasing numbers of catalytic converters will reduce CO further.

Therefore in itself CO emissions from road traffic are unlikely to be significant for the purposes of the NAQS objective set for 2005. This is confirmed by the data obtained from the kerbside National Monitoring sites operated by the DETR for the major UK cities where CO levels are falling and are predicted to be well below the 10 ppm level set for 2005.

#### Recommendations for CO

**It is considered that the review and assessment procedure should proceed to stage 2 in the vicinity of the CHP station in Hereford for carbon monoxide as emissions from this process, combined with background pollutant levels from slow moving traffic in the general City centre area are likely to warrant further research and investigation. It is suggested that an appropriate dispersion modelling study and/or specific monitoring is undertaken although this will be considered in more detail as part of the stage 2 process.**

#### **4.4 Lead**

##### **4.4.1. Industrial Emissions of Lead**

There are no authorised processes that emit any significant levels of lead into air within the County, nor are there any known sources from other industrial processes either within or adjacent to Herefordshire or proposed by the year 2005.

##### **4.4.2. Road Traffic Emissions of Lead**

The major source of lead in air within the County will undoubtedly originate from the combustion of leaded petrol in motor vehicles. However, the full report illustrates that even kerbside levels at 3 of the UK's most trafficked urban monitoring sites do not exceed the 0.5µg/m<sup>3</sup> objective. Likewise the results show that levels are dramatically falling as a consequence of planned reductions in the lead content of petrol. Indeed, as it is probably that leaded fuel will no longer be commercially available after January 2000, then this source of emission will not be relevant for the 2005 objective in any case.

#### **Recommendations for Lead**

**It is not considered necessary to proceed to the second stage review and assessment procedure for lead.**

#### **4.5 Nitrogen Dioxide**

##### **4.5.1. Industrial Emissions of NO<sub>2</sub>**

There is only one authorised process within the County, which releases significant quantities of NO<sub>2</sub> into air. This is the Midlands (Power) UK Ltd. CHP station already discussed above. The Environment Agency regulate this process and have predicted that in 1997 it emitted approximately 65 tonnes of NO<sub>2</sub> and recent data from the company itself estimated 63 tonnes for 1998. The Environment Agency have been consulted and confirm that this level is above the CRI (Chemical Release Inventory) reporting level of 10,000 tonnes and they therefore recommend further investigation of this. Government guidance also recommends further assessment in the vicinity of this type of Part A processes.

##### **4.5.2. Road Traffic Emissions of NO<sub>2</sub>**

###### **4.5.2.1. NO<sub>2</sub> Diffusion Tube Survey Assessment**

The full report illustrates that there is a considerable amount of data from over 50 NO<sub>2</sub> diffusion tubes sites in the County, some dating back to 1993, allowing an underlying trend to be observed.

As these diffusion tubes give monthly averages (see the data in Appendices) it can only be realistically used to assess against the 21 ppb annual mean objective set for 2005. It is also useful to confirm 'hotspots' and seasonal trends.

In this respect Government guidance states that progression to a stage 2 review is likely where:-

- i. the annual mean urban background NO<sub>2</sub> concentration in 1996 was greater than 30 ppb,  
or
- ii. there is an indication that the current annual mean NO<sub>2</sub> exceeds 30 ppb

This is explained in the DETR guidance note TG4(98) "Review of Assessment - Pollution Specific Guidance" where it suggests that the annual mean background concentration of NO<sub>2</sub> in 2005 will be 0.7 times the 1996 values (i.e. >30 ppb) or 0.75 times the 1998 values (i.e. >28 ppb). It would follow that levels greater than 29 ppb in 1997 would also be relevant.

Having strict regard to this guidance, only the following sites would fall into this category:-

- i. Whitchurch (adjacent to (A40) : 36 ppb in 1998
- ii. Greytrees, Ross (adjacent to A449 cutting) : 38 ppb in 1998
- iii. Bargates, Leominster (adjacent to the town centre and A44 traffic lights junction) : 32 ppb in 1996

It should be noted that the Greytrees annual mean for 1998 of 38 ppb is based on only two readings in that year and as such, more weight should be placed on the 1997 annual mean of 17 ppb which was based on 9 averaged readings between March and December.

The other 2 locations would be expected to have elevated NO<sub>2</sub> levels because of the heavy traffic adjacent to the monitoring sites. It is possible that the Bargates levels in 1995 and 1996 are so high because of heavily congested traffic in Leominster town centre during this period due to roadworks and the laying of a new town sewer.

Although not strictly in the Government criteria listed above, it is also likely that the monitoring site at Garrick House, Hereford, should be included as the 1997 level of 33 ppb would clearly accord with NO<sub>2</sub> levels greater than 21 ppb in 2005. This assumption probably relates to the entire City centre as traffic flows in this area are all high and of similar levels.

On this note it is interesting to observe that the annual means for Broad Street in Hereford in the period 1995 - 1997 show elevated levels almost as high as the other busiest Hereford sites, being in the range of 27 - 28 ppb. Since the reversal of traffic flow in Broad Street in September 1997, the traffic flow along the Bridge Street/King Street/Broad Street/High Street/Widemarsh Street one-way system has noticeably reduced by a factor of a third in 1998, now placing these roads with much lower 'suburban levels'. For the purposes of air quality this is obviously welcomed. Although it would be expected that the NO<sub>2</sub> levels in the main City centre would be higher as a result of the September 1997 reversal, this does not appear to be the case, possibly as road users now avoid the centre, particularly at peak times.

Of the remaining sites, it can be seen in the appendices that the 1997 annual mean for Bacton (rural background level in the County) can be assumed to be about 3 ppb. This site is located distant to any significant industrial or domestic source on a very minor C class road in the rural Golden Valley area.

Therefore, we can assume that most of the sites are affected by NO<sub>2</sub>, albeit to an extent well below the 2005 objective. For example, villages with either a class A or B road passing through them tend to fall in the annual mean range of 3 to 10, based on 1997 readings. This is the case even for villages such as Harewood End and Wellington where monitoring sites were located adjacent to the A49(T), and for Withington on the A4103 Worcester road, Ewyas Harold on the A465 (T) Abergavenny road and even at Linton adjacent to a bridge over the M50.

Other than the Bargates site at Leominster, the five market towns all have levels below those relevant for the 2005 objective. Bromyard, for example has an annual mean of 19 ppb in the town centre, although this is based on 6 readings only. Given the relatively low traffic flow in Bromyard compared to Hereford, this is likely to be reasonably accurate.

Ledbury's readings imply a 1998 annual mean of 18 ppb in the town centre and 12 on the bypass. Clearly, the traffic in the town centre accounts for the higher levels, even though these levels fall well below those required for a stage 2 review.

As one would expect, Kington enjoyed only 9 ppb for 1998, obviously because of a low traffic flow despite the diffusion tube site being in the town centre.

Other than for Bargates, Leominster reveals annual means of about 12 ppb for Pierpoint and only 8 ppb for the Ebnal Close site. These compare favourably within the County and give no cause for concern.

Ross-on-Wye's levels show the annual mean for the town centre to average at about 21 ppb. at Gloucester Road, for 1998. The other sites tend to fall in the range of 6 - 16 only, although there is a reasonably high level of 19 ppb at the Wilton roundabout, obviously influenced by the A40 traffic and a sporadic peak of 25 ppb in Camp Road for 1998, although this mean is based on one reading only in 1998.

As there has been a change in traffic flows in Ross-on-Wye over the past year, it will be interesting to see if air quality levels will alter and it would, therefore, be useful to undertake further monitoring at chosen locations in the town, even though all sites fall well below the criteria set for the 2005 objective.

#### **4.5.2.2. NO2 Continuous Monitoring Station at Edgar Street, Hereford Assessment**

There is data relating to this site since 1995, recorded as hourly averages of NO<sub>x</sub>, NO and NO<sub>2</sub> (NO + NO<sub>2</sub> = NO<sub>x</sub>). The site is unarguably located on the kerbside of Hereford City's busiest traffic junction, which constitutes the convergence of 3 A-class roads on a traffic light controlled roundabout, adjacent to a bus station.

Examination of the NO<sub>2</sub> data shows that in 1998 NO<sub>2</sub> hourly means usually tend to fall in the range 15 - 120 ppb, often peaking above 100 ppb between 8am - 10am in weekdays with peaks often in the region of 70 - 100 during the evening rush hours 5pm - 6pm with a minor peak also at school pick up time of 3pm - 4pm.

Generally speaking, the 150 ppb target is rarely exceeded at present, with only 4 days in 1998 with hourly averages above this level (present guidance allows an exceedence of 18 days above 150 ppb). This emphasises the importance of the diffusion tube site data, as the annual mean objective of 21 ppb is more likely to be exceeded.

#### **From these hourly means, annual means can be calculated which are as follows:-**

1995 - 19 ppb  
1996 - 24 ppb  
1997 - 42 ppb  
1998 - 41 ppb

Although exceedences are relatively unusual, clearly the data shows that this site has the ability to exceed the 150 ppb hourly mean and that these levels are predominantly traffic related because of the obvious rush

hour correlation. The annual means for the last 2 years clearly show exceedences of the 21 ppb target (i.e. they exceeded 29 ppb in 1997 & 28 ppb in 1998).

#### 4.5.2.3. Traffic Flow Assessment

In addition to the above assessments, Government guidance also suggests that stage 2 reviews may be required where one or more existing or planned roads have a projected AADT flow greater than 20,000 in 2005.

The following roads fall in this category:-

A40 (T)  
M50  
A49 (in Hereford)

Many of these roads correlate with elevated NO<sub>2</sub> levels resulting from the Countywide NO<sub>2</sub> survey.

#### Recommendations

It is considered necessary to proceed to the second stage review and assessment procedure for NO<sub>2</sub> at the following locations:-

<u>Location</u>	<u>Reason</u>
i. Hereford City Centre	<ul style="list-style-type: none"> <li>a) High traffic flow</li> <li>b) Elevated NO<sub>2</sub> levels recorded at Garrick House and the Edgar Street roundabout</li> <li>c) Proximity to CHP station emissions where there may be an accumulative effect with road traffic generated NO<sub>2</sub>.</li> <li>d) To investigate the impact of traffic reversal along Broad St/Widemarsh St, scheduled for mid 1999.</li> </ul>
ii. Bargates area of Leominster	<ul style="list-style-type: none"> <li>a) Elevated levels of NO<sub>2</sub> recorded at traffic light junction in 1996.</li> </ul>
iii. Whitchurch village/A40 corridor	<ul style="list-style-type: none"> <li>a) Elevated levels of NO<sub>2</sub> recorded adjacent to residential properties beside A40 (T) dual carriageway.</li> </ul>

In addition it is recommended that further investigations are also undertaken for NO<sub>2</sub> at:-

iv. Greytrees area of Ross-on-Wye	<ul style="list-style-type: none"> <li>a) to investigate the 1998 peak of 38 ppb and to determine if it was representative</li> </ul>
v. Ross-on-Wye	<ul style="list-style-type: none"> <li>a) to determine the impact on air quality following recent traffic direction/flow alterations</li> </ul>

It is recommended that all the above are investigated further as part of a stage 2 review and assessment, and that this is achieved through further monitoring and other appropriate methods.

## 4.6 Particles - PM10

### 4.6.1. Industrial Emissions of PM10

There are 6 authorised processes in the County, which can potentially give rise to significant levels of PM10 according to the Government guidance note TG4(98). These are:-

- |      |  |   |
|------|--|---|
| i.   | Midlands Power (UK) Ltd, Plough Lane, Hereford             | Combined heat and power station giving potential PM10 release through the combustion of fuel, particularly Heavy Fuel Oil |
| ii.  | Forsheda Ltd., Alton Road, Ross-on-Wye                     | A rubber process where fine carbon black powder is used and may become airborne.  |
| iii. | Huntsman Quarry, Perton, Stoke Edith                       | A limestone quarry process where fugitive emissions of PM10 dust may escape the site boundary.                            |
| iv.  | Johnstone Roadstone Ltd., Leinthall Earls, Wigmore         | Another limestone quarry where dust emissions may again escape the site boundary.   |
| v.   | Thorn Lighting Ltd., Rotherwas Industrial Estate, Hereford | A powder coating process where fine powder may escape the site boundary.  |
| vi.  | Edmo Powder Coating Ltd., Overross Industrial Estate, Ross | Another powder coating process where powder may again escape the site boundary  |

Of the above processes, the Environment Agency have been consulted with regard to their regulation of the Midlands Power CHP station and its projected PM10 emissions. They have estimated that in 1997, PM10 emissions only constituted just over 1 tonne and the company estimates that only 0.5 tonnes were emitted in 1998. This level does not normally require further investigation, especially bearing in mind the dispersion from 38 metre chimney stacks.

Similarly, the release of carbon black from Forsheda is regulated as a part B authorised process and as such emissions are very limited. In any case, the carbon black aspect of the process is to be relocated outside of the County in 1999 and therefore this process will not be relevant to the 2005 objective.

The two quarries at Perton and Leinthall Earls are relevant, although no data for PM10 is currently available to assess their impact. It should be noted that both quarries are fortunately reasonably remote, and it is uncertain at this stage whether the quarries will still be operating in 2005.

Finally the two powder coating processes at Thorn Lighting and Edmo are again regulated as part B processes by the Council and, as such, bag filter arrestment plant is installed to both, minimising any significant PM10 release. Neither plants have been known to breach these conditions and no complaints of dust have ever been received. They do not manufacture powder. It is, therefore, unlikely that PM10 from these processes will be relevant to the 2005 objective, and it is possible that the Thorn Lighting process may close down in December 1999.

#### 4.6.2. Road Traffic Emissions of PM<sub>10</sub>

##### 4.6.2.1. Assessment of PM<sub>10</sub> Data from the Edgar Street Continuous Monitoring Station

Since October 1997 a beta gauge PM<sub>10</sub> continuous analyser has been situated at the City centre Edgar Street Site. The data since its installation is not available in its entirety as problems were initially experienced in its commissioning.

Daily averages frequently exceed the 50 µg/m<sup>3</sup> target set for 2005. The levels show similar peaks and daily trends as for NO<sub>2</sub> from traffic. This clearly demonstrates the link between PM<sub>10</sub> and rush-hour traffic.

##### 4.6.2.2. Traffic Flow Assessment

Government guidance states that stage 2 assessments may be required where one or more existing or planned roads have a projected AADT flow greater than 25,000. This criteria applies to the following roads:-

**Road**  
M50  
A40(T)  
A49 (in Hereford)

Many of these roads are already selected for further investigation for NO<sub>2</sub> and it can be presumed that there is a close correlation between the two pollutants.

#### Recommendations for PM<sub>10</sub>

In view of the above, it is considered necessary to proceed to the second stage review and assessment procedure for PM<sub>10</sub> at the following locations:-

<b><u>Location</u></b>	<b><u>Reason</u></b>
i. Hereford City Centre	a) high traffic flows b) elevated PM <sub>10</sub> levels recorded at Edgar Street roundabout c) CHP station's possible high PM <sub>10</sub> emissions adding to background levels in City centre generated by traffic d) to investigate the impact of traffic reversal along Broad St./ Widemarsh St, scheduled for mid 1999
ii. M50/A449/A40(T) corridor	a) high traffic flows > 25,000 for 2005
iii. Perton, Stoke Edith	a) proximity to a quarry
iv. Leinthall Earls, Wigmore	a) proximity to a quarry

#### 4.7 Sulphur Dioxide

##### 4.7.1 Industrial Emissions of Sulphur Dioxide

According to Government guidance note TG4(98) the Midlands Power (UK) Ltd. CHP station emits 'significant' quantities of SO<sub>2</sub>. This process is regulated by the Environment Agency who have been consulted and have estimated that in 1997 only approximately 1.3 tonnes of SO<sub>2</sub> were emitted. The lower levels of SO<sub>2</sub> presumably relate to the burning of predominantly natural gas, with heavy fuel oil (with a

measurable sulphur content) being burnt only 350 hours/year. As this falls below the Environment Agency's CRI reporting levels, in itself the levels are not considered relevant, despite the general guidance. This can be illustrated by comparing this CHP station with its nearest neighbouring power station at Telford where SO<sub>2</sub> emissions are 10 times higher for the small Ironbridge coal burning power station.

The other part A process, Inco Alloys International Ltd. (a metals process), is not a significant emitter of SO<sub>2</sub> either, according to Environment Agency records.

There are no part B processes or other industries within the County that are considered significant, nor are there any power stations or other high SO<sub>2</sub> emitters on Herefordshire's borders which could cause significant levels of pollutant to drift into the County.

#### **4.7.2 Road Traffic Emissions of SO<sub>2</sub>**

Although Government guidance suggests that SO<sub>2</sub> will be slightly elevated at kerbside locations, road traffic is not considered a significant source. Therefore, road traffic can largely be disregarded, as there is little apparent correlation to traffic flow with SO<sub>2</sub> emission.

#### **4.7.3 Domestic Emissions of SO<sub>2</sub>**

Guidance suggests that domestic coal and oil burning can lead to the 100 ppb objective being breached in excessive circumstances. It is said that this can be estimated by the assumed approximation of 300 houses burning coal in a 1 x 1 km grid square.

Having consulted the Housing Department of the Council, it is evident that such coal burning estates no longer exist as natural gas has been made available to the larger and more densely populated areas of the County.

#### **4.7.4 Assessment of SO<sub>2</sub> Results**

The Appendices show all the SO<sub>2</sub> data resulting from the diffusion tube surveys carried out since 1997 at 15 different sites. These results cannot be directly compared to the 100 ppb 15 minute mean standard set by the NAQS as only monthly averages and thus annual means are possible.

However, the surveys have proved useful as they can determine the 'hotspot' areas and locate trends.

All the annual means are relatively low compared to the 100 ppb standard, falling in the range 3 - 31 ppb. The villages surveyed tend to be at a fraction of the level of the towns, which in themselves yield only low annual mean levels, peaking at 31ppb in Hereford and Leominster. Even the monthly means are fairly low, peaking at 44ppb in Hereford and 46ppb in Kington, the latter presumably related to coal and wood fires.

Surprisingly, Bacton - (the chosen rural background site) - shows a high annual mean of 31 ppb, which can only be attributable to farm coal/wood space heating and agricultural burning.

For Bromyard, the full report gives data on the daily SO<sub>2</sub> averages between October 1997 - March 1998 (winter period). Here, results only ranged from 2 - 50 ppb, apparently increasing in the mid-winter months. This implies that the 100 ppb standard is again very unlikely to be exceeded in the Bromyard area especially bearing in mind the proposed consultative guidance.

#### **4.7.5 Assessment of Smoke Results**

An 8-port smoke analyser has been operated off Ledbury Road in Hereford since March 1995. Although this does not give SO<sub>2</sub> results, it is accepted that smoke and SO<sub>2</sub> are closely linked and therefore an insight can be gained as to trends and seasonal variation

The data reveals a low smoke level in the City throughout, with peaks over 30 ppb only on bonfire night 1995 and during the winter of 1995 on three occasions. Since the 1995 peaks, levels have lowered, possibly as coal and wood become less popular.

#### **Recommendations for SO<sub>2</sub>**

**It is not considered necessary to proceed to the second or third stage review and assessment procedure for SO<sub>2</sub>**

**However, it is recommended that SO<sub>2</sub> diffusion tube monitoring is carried out in the market towns and Hereford City for the time being in order to establish a longer-term trend.**

#### **5. RECOMMENDATIONS**

**It is recommended that only the following pollutants are investigated further, by way of a 'Stage 2' assessment: -**

- 1. Carbon monoxide in Hereford City centre.**
- 2. Nitrogen dioxide in Hereford City centre, at Bargates (Leominster) and Whitchurch/A40 corridor.**
- 3. PM<sub>10</sub> in Hereford City centre, the M50/A449/A40 corridor and adjacent to the two quarries at Perton and Leinthall Earls.**

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**A copy of this document and the non-abbreviated 'First Stage Air Quality Review' report and Assessment can be viewed at either the Council's Bath Street Offices in Hereford, or in any of the public libraries within Hereford.**

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## SECOND STAGE AIR QUALITY STRATEGY REVIEW AND ASSESSMENT

### NON TECHNICAL SUMMARY – RELEASED MARCH 2000

#### EXECUTIVE SUMMARY

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in the Environment Act, 1995. The National Air Quality Strategy provides a framework for air quality control through air quality management and air quality standards. New national air quality standards have been proposed by the Expert Panel on Air Quality Standards (EPAQS) for the UK. These and other air quality standards<sup>1</sup> and their objectives<sup>2</sup> have been enacted through the Air Quality Regulations in December 1997. The Environment Act 1995 requires Local Authorities to undertake an air quality review. In areas where air quality objectives are not anticipated to be met by the year 2005, Local Authorities are required to establish Air Quality Management Areas to improve air quality.

The first step in this process is to undertake a review of current and potential future air quality. A minimum of two air quality reviews are recommended in order to assess compliance with air quality objectives, one to assess air quality at the outset of the National Air Quality Strategy and a second to be carried out towards the end of the policy time-scale (2005). The number of reviews necessary depends on the likelihood of achieving the objectives.

This report is equivalent to a stage one and two air quality review as outlined in the Government's published guidance. The air quality review investigates current and potential future air quality through an examination of the location and size of principal emission sources, emissions modelling exercises and by reference to monitored air quality data.

Results indicate that it is likely that the national air quality objective for the following pollutants will not be met in the Herefordshire Council area by the year 2005 based on national emission reduction policies alone. We suggest a third stage review and assessment should be undertaken for:

- nitrogen dioxide

The required air quality objectives are likely to be met and a third stage review is not required for the following pollutants:

- carbon monoxide
- benzene
- 1,3-butadiene
- lead

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<sup>1</sup> Refers to standards recommended by the Expert Panel on Air Quality Standards. Recommended standards are set purely with regard to scientific and medical evidence on the effects of the particular pollutants on health, at levels at which risks to public health, including vulnerable groups, are very small or regarded as negligible.

<sup>2</sup> Refers to objectives in the Strategy for each of the eight pollutants. The objectives provide policy targets by outlining what should be achieved in the light of the air quality standards and other relevant factors and are expressed as a given ambient concentration to be achieved within a given timescale.

A third stage review may be required for:

- sulphur dioxide (due to emissions from Midlands Power (UK) Ltd. CHP).
- particulate matter (PM<sub>10</sub>) if significant expansion occurs at Huntsman Quarry

When information about the >5MW (thermal) sources, in this case the Hereford hospital boilers becomes available, the likely effects on ambient air quality should be assessed.

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**A copy of the full 'Second Stage Air Quality Review' report and Assessment can be viewed at either the Council's Bath Street Offices in Hereford, or in any of the public libraries within Hereford.**

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