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ENVIRONMENTAL MANAGEMENT
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Local Air Quality Management

Updating and Screening Assessment

for

North Lanarkshire Council

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EXECUTIVE SUMMARY

The Environment Act 1995 and subsequent Regulations requires that local authorities conduct a Review and Assessment of air quality in their area to assess compliance with the standards and objectives set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000, the Air Quality Regulations 2000 and Air Quality (Scotland) Amendment Regulations 2002.

This report forms the Updating and Screening assessment of the second round of the Review and Assessment process. The report considers the conclusions of the first round of Review and Assessment and any changes that have occurred since then.

The report follows technical guidance LAQM.TG(03) (Ref. 4), issued by the Scottish Executive to assist Local Authorities in their Review and Assessment of air quality and considers monitoring data and emission sources of each of the seven pollutants included within the National Air Quality Strategy (NAQS). Where any exceedence of NAQS objectives for any of the seven pollutants is predicted the Council is required to proceed to a Detailed Assessment of those pollutants.

The assessment concluded that there is potential for an exceedence of NAQS objectives for nitrogen dioxide as a result of road traffic emissions in Coatbridge, Chapelhall and Motherwell and from industrial emissions in Motherwell. The road traffic and industrial emissions will therefore be required to be considered at Detailed Assessment.

The assessment concluded that monitoring results indicate that the NAQS daily mean objective for sulphur dioxide may be exceeded in Coatbridge. The assessment also identified potential for an exceedence of NAQS objectives for sulphur dioxide in Salsburgh. These locations will therefore be required to be assessed at Detailed Assessment.

The assessment concluded that an exceedence of NAQS objectives for particles due to dust emitting processes is likely in 2004. The NAQS 2010 objective is expected to be exceeded at a number of locations as a result of emissions from road traffic, domestic sources and dust generating sources. A Detailed Assessment will therefore be required for particles.

For the remaining pollutants, namely carbon monoxide, benzene, 1,3-butadiene and lead the assessment concluded that it was unlikely that there would be an exceedence of any of the respective NAQS objectives.

It will therefore be necessary for North Lanarkshire Council to progress to a Detailed Assessment for nitrogen dioxide, sulphur dioxide and particles to be submitted by April 2004 and to complete a progress report for the remaining pollutants by this date.

1 INTRODUCTION

1.1 Review and Assessment Framework

The Environment Act 1995 and subsequent Regulations require local authorities to conduct a Review and Assessment of air quality in their area to assess compliance with the standards and objectives set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000, the Air Quality Regulations 2000 and Air Quality (Scotland) Amendment Regulations 2002 (Ref. 1).

The framework of local air quality management (LAQM) requires a Review and Assessment of air quality by local authorities on a regular basis. The first round of the Review and Assessment was completed by North Lanarkshire Council during 2001 following a Stage 2 Review and Assessment. The first round of Review and Assessment by North Lanarkshire Council concluded that it was unlikely that there would be any breach of air quality objectives but that further consideration of road traffic emissions would be required at later Review and Assessment.

The second round of the Review and Assessment has two phases. The first stage of the second round of Review and Assessment is to conduct an Updating and Screening Assessment (U&SA). The U&SA considers any changes that have occurred since the first stage Review and Assessment that may affect air quality. This U&SA has been undertaken following the guidance laid out in technical guidance document LAQM.TG(03) (Ref. 2).

Where the U&SA has identified that there may be a risk of an exceedence of an air quality objective at a location with relevant public exposure then a Detailed Assessment is undertaken. A Detailed Assessment will consider any risk of exceedence of an objective in greater depth in order to determine whether it is necessary to declare an air quality management area.

This report represents the U&SA of air quality within North Lanarkshire and follows the guidance laid out in the technical guidance document LAQM.TG(03) (Ref. 2).

1.2 Description of North Lanarkshire

North Lanarkshire Council is the fourth largest unitary authority in Scotland with a population of 327,600, approximately 6.4% of the national population. North Lanarkshire is situated to the east of Glasgow with the main road networks, comprising the M73, M74, A8/M8 and A80/M80 crossing the area.

North Lanarkshire occupies a land area of 47,358 hectares to the north of the River Clyde with the river forming part of its southern boundary. The Campsie hills are situated to the north of the area.

A map of the North Lanarkshire area is shown in Figure 1 of Appendix 2.

North Lanarkshire is neighboured by Glasgow City Council and East Dumbartonshire to the West, Falkirk and West Lothian Council to the north and east and South Lanarkshire to the south.

North Lanarkshire comprises a mixture of rural and urbanised and includes the towns of Cumbernauld, Airdrie, Coatbridge, Motherwell, Bellshill and Wishaw.

North Lanarkshire has traditionally associated with heavy industry. The amount of heavy industry has however been in decline over the last two decades. The economy of North Lanarkshire is now mixture of commerce and light industry with many residents of North Lanarkshire commute outwith the area to work, particularly into Glasgow.

2 REVIEW AND ASSESSMENT OF CARBON MONOXIDE

Carbon monoxide (CO) is produced by the incomplete combustion of organic substances. The main source of CO is from vehicle emissions.

The first round Review and Assessment of air quality within the North Lanarkshire Council area (Ref. 4) concluded that it was unlikely that there would be an exceedence of air quality objectives for carbon monoxide. The Scottish Executive accepted this conclusion.

The air quality objective for CO as set out in the Air Quality Regulations 2000 is presented in Table 1.

Table 1 Air Quality Objectives for CO

Concentration	Measured As	Date to be Achieved by
10.0 mg/m^3	Running 8 hour mean	31.12.03

The maximum running 8-hour mean therefore should not exceed 10 mg/m^3.

An assessment of the potential impact of emission sources of CO and available monitoring data is made in Sections 2.1 to 2.4.

2.1 Background Concentration

AEA Technology National Environment Technology Centre (NETCEN) (Ref. 3) have mapped the estimated annual mean background CO concentration for the UK including the North Lanarkshire area. The maps are included in Appendix 3. The maps indicate that in 2001 the annual mean background CO concentration was between 0.2-0.3 mg/m^3. Technical guidance LAQM.TG(03) (Ref. 2) provides a correction factor to be applied to 2001 background concentrations to obtain an estimated background concentration for 2003. A factor of 0.826 has therefore been applied to the estimated 2001 concentration giving and estimated background concentration for 2003 of between 0.165-0.248 mg/m^3.

2.2 Monitoring data

North Lanarkshire Council undertook monitoring of CO using an automatic infra-red analyser contained within one of their mobile units. The mobile unit has been in three locations. The maximum daily 8-hour mean concentrations measured at the sites are presented in Table 2 with the monitoring locations marked on Figure 2 in Appendix 2.

The site has been situated in both roadside locations at Bellshill and Moodiesburn and at Harthill adjacent to the M8 motorway.

Table 2 Maximum 8-hour Running Mean Concentrations of CO measured within North Lanarkshire

Year	Dates	Location	Maximum 8-hour Running Mean Concentration (mg/m^3)
2000	30th January to 12th July	Motherwell Civic Centre	-
	17th July to 14th November	Motherwell Civic Centre	-
2001	1st January to 31st December	Motherwell Civic Centre	-
2002	26th July to 31st December	Harthill	0.824
2000		Glasgow Centre	4.2
2001		Glasgow Centre	8.6

The maximum 8-hour running mean concentrations of CO measured at the various sites are higher than the predicted background CO annual mean concentration from the NETCEN maps but lower than the NAQS objective levels. For comparative purposes the concentrations monitored were compared with the closest national network monitoring site, Glasgow Centre. The concentrations measured within North Lanarkshire are lower than those measured at the Glasgow Centre site. The maximum 8-hour mean running mean concentrations measured at Glasgow Centre are also within NAQS objective levels.

Based on the monitoring data it is considered unlikely that there will be an exceedence of the NAQS objective for CO in urban background areas.

Any potential exceedence of the NAQS objective for CO is therefore expected to be due to a pollution hotspot. The two emissions sources with the potential to cause pollution hot-spots of CO are road traffic and industrial sources. These are considered in Sections 2.3 and 2.4.

2.3 Road Traffic

Two-thirds of the total emissions of CO in the UK are due to road transport. Technical guidance LAQM.TG(03) (Ref. 2) states that any exceedence of CO objectives is only likely to occur close to very busy roads or junctions.

The technical guidance (Ref. 2) states that very busy roads should only be considered where the 2003 annual mean background concentration is expected to be above 1 mg/m^3. Since the predicted background CO concentration for 2003 was between 0.17-0.25 mg/m^3 it is considered unlikely that emissions from any 'very busy roads' will cause exceedence of the NAQS objective for CO. No roads were therefore assessed for CO emissions.

2.4 Industrial Sources

During the first round of Review and Assessment no industrial processes were identified as having emissions with potential to cause an exceedence of the NAQS objective for CO. The Scottish Environment Protection Agency (SEPA), in their response to the Stage 1 Review and Assessment of air quality in North Lanarkshire, agreed with this conclusion.

Consultation with SEPA (Ref. 4) and reference to the public register at the SEPA offices in East Kilbride did not identify any new industrial processes or existing processes with significantly changed emissions of CO that had potential to cause an exceedence of the NAQS objective.

It is therefore concluded that it is unlikely that there will be any exceedence of the NAQS objective for CO in North Lanarkshire as a result of emissions from industrial processors.

2.5 Conclusion

The CO concentrations monitored within North Lanarkshire between 2000 and 2002 indicate that the NAQS objective for CO is unlikely to be exceeded in an urban environment. In addition it is considered unlikely that there will be any localised exceedence of the NAQS objective for CO as a result of emissions from road traffic or industrial sources.

National studies indicate that the ambient CO concentration is likely to fall in the coming years with a decrease in emissions, particularly from motor vehicles as a result of improved vehicle technology.

It is therefore considered that the maximum running 8-hour mean CO concentration in North Lanarkshire will remain below 10 mg/m^3 during 2003.

A Detailed Assessment for CO is not required for North Lanarkshire.

3 BENZENE

Benzene is an additive to vehicle fuel. The majority of emissions of benzene come from petrol vehicle exhausts.

The first round Review and Assessment of air quality within the North Lanarkshire Council area (Ref. 4) concluded that it was unlikely that there would be an exceedence of air quality objectives for benzene. The Scottish Executive accepted this conclusion.

The air quality objective for benzene as set out in the Air Quality Regulations 2000 is presented in Table 3. A stricter objective has been introduced in Scotland for 2010.

Table 3 Air Quality Objectives for Benzene

Concentration	Measured As	Date to be Achieved by
16.25 μg/m^3	Running annual mean	31.12.03
3.25 μg/m^3	Running annual mean	31.12.10

The running annual mean therefore should not be predicted to exceed 16.25 μg/m^3 by the end of 2003. In addition the running annual mean should not be predicted to exceed 3.25μg/m^3 by the end of 2010.

An assessment of the potential impact of emission sources of benzene and available monitoring data is made in Sections 3.1 to 3.7.

3.1 Background Concentration

Netcen (Ref. 3) have mapped estimated annual mean background benzene concentrations for 2001, 2003 and 2010. The maps are appended in Appendix 3. The estimated annual mean concentration for all three years is between 0.3-0.5 μg/m^3 in the most densely populated areas and for the remaining areas less than 0.3 μg/m^3.

3.2 Monitoring Data

North Lanarkshire Council do not undertake monitoring of benzene. The closest national network monitoring site is at Edinburgh Medical School, an Urban Background site in Edinburgh. The maximum running annual mean concentrations measured at the site are presented in Table 4. No benzene monitoring data for 2002 was available from the national air quality archive.

Table 4 Maximum running annual mean concentrations of benzene measured at Edinburgh Medical School

	1999	2000	2001
Maximum running annual mean Benzene concentration ($\mu g/m^3$)	1.98	1.72	1.38

The maximum running annual mean concentrations measured at Edinburgh Medical School are therefore well below both the 2003 and 2010 NAQS objectives for benzene. Ambient benzene concentrations in North Lanarkshire are unlikely be higher than those experienced at Edinburgh Medical School.

3.3 Road Traffic

Technical guidance document LAQM.TG(03) (Ref. 2) states that local authorities need only consider emissions from 'very busy roads' where the 2010 background is expected to be above $2\mu g/m^3$. The estimated 2010 background concentration taken from the NETCEN maps was less than 0.3 $\mu g/m^3$. Emissions from road traffic are therefore not considered likely to result in an exceedence of LAQM objectives for benzene.

3.4 Industrial Sources

During the first round of Review and Assessment no industrial processes were identified as having emissions with potential to cause an exceedence of NAQS objectives for benzene. SEPA, in their response to the Stage 1 Review and Assessment of air quality in North Lanarkshire, agreed with this conclusion.

Consultation with SEPA (Ref. 4) and reference to the public register at the SEPA offices in East Kilbride did not identify any new industrial processes or existing processes with significantly changed emissions of benzene that have the potential to cause an exceedence of NAQS objectives.

It is therefore concluded that it is unlikely that there will be any exceedence of NAQS objectives for benzene in North Lanarkshire as a result of emissions from industrial processes.

3.5 Petrol Stations

The technical guidance document LAQM.TG(03) (Ref. 2) states that there is a potential for an exceedence of the 2010 objective for benzene where emissions from large petrol stations are combined with emissions from nearby busy roads. A large petrol station is defined as one having an annual petrol throughput in excess of two million litres per annum.

A busy road is defined as a road with an annual average daily traffic flow greater than 30,000 vehicles per day. Excluding motorways and dual carriageways, for the reason that there are no nearby sensitive receptors, there are three roads within North Lanarkshire in built up areas with traffic flows in excess of these levels. These are:

- A8011, Cumbernauld Central Way;
- A721, Motherwell to Wishaw at Flemington; and
- A725, Coatbridge to Bellshill at Shawhead.

All petrol stations with a throughput in excess of one million litres of petrol per annum are licensed by SEPA. There are no licensed petrol stations on the A721 at the locations of traffic flows exceeding 30,000 AADT (between Motherwell Civic Centre and Flemington roundabout) or on the A725 at Shawhead. Similarly there are no licensed petrol stations on the A8011 in Cumbernauld.

There are therefore no 'large' petrol stations within North Lanarkshire that are situated adjacent to busy roads. It is considered unlikely that there will be any exceedence of the 2010 benzene objective as a result of emissions from petrol stations.

3.6 Major Fuel Storage Depots

There are no major fuel depots situated within the North Lanarkshire Council area therefore no consideration of emissions from major fuel depots has been made.

3.7 Conclusion

Monitoring of benzene undertaken at Edinburgh Medical School indicates that the NAQS objectives for benzene are unlikely to be exceeded in urban background locations. Ambient benzene concentrations in North Lanarkshire are unlikely to be higher than those measured at the Edinburgh Medical School. It is therefore concluded that ambient benzene concentrations are unlikely to exceed NAQS objectives for benzene.

No emissions sources of benzene were identified that are considered likely to cause localised exceedences of NAQS objectives for benzene.

The technical guidance document LAQM.TG(03) (Ref. 2) states that national policy measures are expected to further reduce emissions of benzene, in particular by reducing the content of benzene in petrol.

It is therefore considered unlikely that there will be any exceedence of NAQS objectives for benzene.

A detailed assessment for benzene is not required for North Lanarkshire Council.

4 REVIEW AND ASSESSMENT OF 1,3-BUTADIENE

The primary sources of 1,3-butadiene are from vehicle emissions and industrial processes. Catalytic converters remove a high percentage of emissions of 1,3-butadiene from motor vehicles.

The first round Review and Assessment of air quality within the North Lanarkshire Council area (Ref. 4) concluded that it was unlikely that there would be an exceedence of air quality objectives for 1,3-butadiene. The Scottish Executive accepted this conclusion.

The air quality objective for 1,3-butadiene as set out in the Air Quality Regulations 2000 is presented in Table 5.

Table 5 Air Quality Objectives for 1,3-butadiene

Concentration	Measured As	Date to be Achieved by
2.25 μg/m^3	Running annual mean	31.12.03

The running annual mean therefore should not exceed 2.25 μg/m^3 by the end of 2003.

An assessment of the potential impact of emission sources of 1,3-butadiene and available monitoring data is made in Sections 4.1 to 4.3.

4.1 Background Concentrations

NETCEN (Ref. 3) have mapped estimated annual mean background benzene concentrations for 2001 and 2003. The maps are included in Appendix 3. The estimated annual mean concentration for 2001 is below 0.3μg/m^3 and for 2003 it is below 0.2 μg/m^3.

4.2 Monitoring Data

North Lanarkshire Council do not undertake monitoring of 1,3-butadiene. The closest national network monitoring site is at Edinburgh Medical School, an Urban Background site in Edinburgh. The maximum running annual mean concentrations measured at the site are presented in Table 6. No 1,3-butadiene monitoring data for 2002 was available from the national air quality archive.

Table 6 Maximum running annual mean concentrations of 1,3-butadiene measured at Edinburgh Medical School

	1999	2000	2001
Maximum running annual mean 1,3-butadiene concentration ($\mu g/m^3$)	0.21	0.19	0.20

The maximum running annual mean concentrations measured at Edinburgh Medical School are therefore well below the NAQS objectives for 1,3-butadiene. Ambient 1,3-butadiene concentrations in North Lanarkshire are unlikely to be higher those experienced at Edinburgh Medical School.

4.3 Industrial Sources

During the first round of Review and Assessment, no industrial processes were identified as having emissions with potential to cause an exceedence of NAQS objectives for 1,3-butadiene. SEPA agreed with this conclusion in their response to the Stage 1 Review and Assessment of air quality in North Lanarkshire.

Consultation with SEPA (Ref. 4) and reference to the public register at the SEPA offices in East Kilbride did not identify any new industrial processors or existing processors with significantly changed emissions of 1,3-butadiene with the potential to cause an exceedence of the NAQS objective.

It is therefore concluded that it is unlikely that there will be any exceedence of the NAQS objective for 1,3-butadiene in North Lanarkshire as a result of emissions from industrial processors.

4.4 Conclusion

Monitoring of benzene undertaken at Edinburgh Medical School indicates that the NAQS objective for 1,3-butadiene is unlikely to be exceeded in urban background locations. Ambient 1,3-butadiene concentrations in North Lanarkshire are unlikely to be higher than those measured at the Edinburgh Medical School. It is therefore concluded that ambient 1,3-butadiene concentrations are unlikely to exceed NAQS objective levels.

No emissions sources were identified that are considered likely to cause a localised exceedence of the NAQS objective for 1,3-butadiene.

As with benzene the technical guidance document LAQM.TG(03) (Ref. 2) states that a number of national policy measures are expected to further reduce emissions of 1,3-butadiene from road vehicles.

It is therefore considered unlikely that there will be any exceedence of the NAQS objective for 1,3-butadiene.

A Detailed Assessment for 1,3-butadiene is not required for North Lanarkshire.

5 REVIEW AND ASSESSMENT OF LEAD

Since the addition of lead to petrol was banned in 2000, the principal source of lead is from industrial emissions.

The first round Review and Assessment of air quality within the North Lanarkshire Council area (Ref. 4) concluded that it was unlikely that there would be an exceedence of air quality objectives for lead. The Scottish Executive accepted this conclusion.

The air quality objective for lead as set out in the Air Quality Regulations 2000 is presented in Table 7.

Table 7 Air Quality Objectives for Lead

Concentration	Measured As	Date to be Achieved by
0.5 μg/m^3	Annual mean	31.12.2004
0.25 μg/m^3	Annual mean	31.12.2008

The running annual mean therefore must not exceed 0.5 μg/m^3 by the end of 2004 and 0.25 μg/m^3 by the end of 2008.

An assessment of the potential impact of emissions sources of lead and available monitoring data is made Sections 5.1 to 5.3.

5.1 Monitoring data

North Lanarkshire Council undertake monitoring for lead at Motherwell, a national network batch monitoring site. The Motherwell monitoring site is situated on the roof of the Civic Centre building and is approximately 500m from a large steel mill and is adjacent to the A721, main Motherwell to Wishaw road.

In addition there is also a national network batch lead monitoring site in the neighbouring Glasgow City Council area. The monitoring site in Glasgow is situated in the East End of the City in an area that formerly contained a number of small foundries. No foundries are still in operation in the area, the area now being mainly residential. The monitoring data for both sites are presented in Table 8. No lead monitoring data for 2002 was available from the national air quality archive.

Table 8 Annual mean concentrations of Lead-in-Air at Glasgow and Motherwell National Network Monitoring sites

		1999	2000	2001
Annual mean lead-in-air concentration ($\mu g/m^3$)	Glasgow	0.02	0.017	0.025
	Motherwell	0.016	0.009	0.016

The annual mean lead-in-air concentration measured at Motherwell is therefore well below NAQS objective levels. Concentrations have steadily decreased over the last thirty years with the biggest decreases at the Motherwell site experienced when the Ravenscraig Steel works were closed in 1990 and the phasing out of leaded petrol during the nineties culminating in the abolition of lead in petrol in 2000.

Lead in air concentrations measured at the Glasgow network monitoring site concur with the low concentrations measured at Motherwell.

5.2 Industrial Sources

During the first round of Review and Assessment no industrial processes were identified as having emissions with potential to cause an exceedence of NAQS objectives for lead. SEPA agreed with this conclusion in their response to the Stage 1 Review and Assessment of air quality in North Lanarkshire.

Consultation with SEPA (Ref. 4) and reference to the public register at the SEPA offices in East Kilbride did not identify any new industrial processors or existing processors with significantly changed emissions of lead with the potential to cause an exceedence of the NAQS objectives.

It is therefore concluded that it is unlikely that there will be any exceedence of the NAQS objectives for lead in North Lanarkshire as a result of emissions from industrial processors.

5.3 Conclusion

Monitoring of lead undertaken in Glasgow and Motherwell indicates that the NAQS objective is unlikely to be exceeded in urban background locations. No emissions sources were identified that are considered likely to cause a localised exceedence of the NAQS objective for lead.

Concentrations of lead in air are expected to remain constant in forthcoming years. It is therefore considered unlikely that there will be any exceedence of the NAQS objective for lead.

A Detailed Assessment for Lead is not required for North Lanarkshire Council.

6 REVIEW AND ASSESSMENT OF NITROGEN DIOXIDE

Primary sources of Nitrogen Dioxide (NO_2) are from vehicle engines and combustion processes. NO_2 is also generated by the reaction of oxides of nitrogen (NO_x) and atmospheric ozone (O_3).

The first round Review and Assessment of air quality within the North Lanarkshire Council area concluded that it was unlikely that there would be an exceedence of air quality objectives for NO_2 although further consideration of emissions of NO_2 from road traffic would be required at future Review and Assessment. The Scottish Executive accepted this conclusion.

There are two air quality objectives for NO_2, an annual mean objective and an hourly objective, set out in the Air Quality Regulations 2000. The objectives are presented in Table 9.

Table 9 Air Quality Objectives for Nitrogen Dioxide

Concentration	Measured As	Date to be Achieved by
40 $\mu g/m^3$	Annual mean	31.12.2005
200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005

The annual mean concentration therefore should not exceed 40 $\mu g/m^3$ by the end of 2005. In addition it should be predicted that there will be fewer than 18 hourly exceedences of 200 $\mu g/m^3$ in a year by the end of 2005.

An assessment the potential impact of emission sources of NO_2 and available monitoring data is made in Sections 6.1 to 6.6.

6.1 Background Concentration

NETCEN (Ref. 3) have mapped estimated annual mean background concentrations for both NO_x and NO_2 for the years 2001, 2005 and 2010. The maps are appended in Appendix 3.

The estimated annual mean NO_x concentration across the Council area varies however for 2001 the maximum NO_x background concentration is between 60-80$\mu g/m^3$. In 2005 the maximum predicted background NO_x concentration is predicted to be between 40-60$\mu g/m^3$ whilst for 2010 the maximum background concentration is predicted to be between 30-40$\mu g/m^3$.

The NO_2 component of total NO_x is predicted to be between 30-40 $\mu g/m^3$ for the highest background concentration areas of North Lanarkshire during 2001 but is predicted to fall to between 20-30 $\mu g/m^3$ for the whole of the Council area in both 2005 and 2010.

6.2 Monitoring Data

North Lanarkshire Council monitor NO_2 at a number of sites within the area. Monitoring is undertaken using both automatic chemiluminescent analysers and passive diffusion tubes.

Monitoring by passive diffusion tubes is discussed in Sections 6.2.1 and 6.2.2 whilst monitoring by the chemiluminescent analysers is discussed in Section 6.2.3.

6.2.1 QA/QC of Diffusion Tube Monitoring Data

The laboratory analysis of the passive diffusion tubes used by North Lanarkshire Council is undertaken by Glasgow Scientific Services. Glasgow Scientific Services are UKAS accredited for the analysis of NO_2 diffusion tubes. Glasgow Scientific Services prepare diffusion tubes using 50% TEA in acetone. Up until mid-2001 the preparation method was 20% TEA in water.

Diffusion tube monitoring is less accurate than continuous monitoring techniques. The technical guidance LAQM.TG(03) (Ref. 2) recommends that diffusion tubes should be co-located with chemiluminesence analysers to compare the results in order to validate the performance of the diffusion tubes and analysis technique. This performance is described as laboratory bias and all diffusion tubes analysed at the same laboratory must have their results corrected to allow for the bias.

No co-location of diffusion tubes has been done in North Lanarkshire however diffusion tubes analysed by Glasgow Scientific Services have been co-located by Glasgow City Council with the chemiluminesence analysers at the national network sites at Glasgow Centre, Glasgow City Chambers and Glasgow Kerbside. In addition Glasgow City Council co-locates diffusion tubes with two non-national network automatic monitoring sites within the city.

Glasgow City Council have used Glasgow Scientific Services for analysis since mid-2001. Prior to this data Glasgow City Council conducted analysis in-house. The co-location study and the calculated bias correction factors are therefore only applicable to North Lanarkshire Council for 2002. Assumptions made for monitoring data before this date would be invalid due to the change in analysis techniques and preparation methods.

In summary of the Glasgow City Council bias correction report only two monitoring sites had sufficient data capture (i.e. >90%) to allow bias correction factors to be calculated. These were Glasgow Centre, an urban centre site and Glasgow Kerbside, a kerbside monitoring site. The bias correction factors were calculated using the methodology laid out in Box 6.4 of Technical Guidance LAQM.TG(03) (Ref. 2). Results of the cross-comparison study are shown in Table 10.

Table 10 Cross Comparison of NO_2 Concentrations from Co-located Diffusion Tube and Automatic NO_2 monitoring sites 2002

Site Name	Annual Mean Diffusion Tube Concentration ($\mu g/m^3$) (Dm)	Annual Mean Chemiluminesence Concentration ($\mu g/m^3$) (Cm)	Bias Adjustment Factor (Cm/Dm)	Diffusion Tube Bias (Dm-Cm)/Cm
Glasgow Centre	40.0	32.8	0.821	21.9 %
Glasgow Kerbside	88.1	74.5	0.845	18.3 %

The diffusion tubes at both sites therefore over predict the ambient NO_2 concentration in comparison with the chemiluminesence analysers. A factor of 0.821 can therefore be applied to urban centre or urban background sites and a factor of 0.845 to roadside or kerbside sites.

6.2.2 Diffusion Tube Monitoring Results

North Lanarkshire Council monitor NO_2 using diffusion tubes at thirty-five sites throughout the Council area. The site descriptions and annual mean concentrations measured at the sites are presented in Table 11. The locations are plotted on Figures 3a -3m in Appendix 2.

The monitoring locations were selected to provide monitoring data from several key areas within North Lanarkshire:

- At receptors adjacent to the motorway network throughout North Lanarkshire i.e. M8/A8, at location numbers 16 to 31, M73 and M74 at location numbers 32 to 35 and the A80 at location 6;

- Background concentration levels within Motherwell and Airdrie as an approximation of the background NO_2 concentration throughout urban areas within North Lanarkshire and

- Roadside monitoring at the busiest roads within North Lanarkshire at Coatbridge, Cumbernauld, Airdrie, Motherwell and Chapehall.

Table 11 NO_2 Monitoring Results

	Site Type	Grid Ref.
Coatbridge 1, Bank St.	Kerbside	
Coatbridge 2, Whifflet Court	Roadside	
Airdrie 1, Hallcraig St.	Background	
Airdrie 3, Springwells Cresc.	Background	
Auchenkilns, Cumbernauld	Kerbside	
Southfield Road, Cumbernauld	Kerbside	
Lauchope Street, Chapelhall	Kerbside	
Civic Centre, Motherwell	Kerbside	
Health Centre, Motherwell	Roadside	
Emily Drive, Motherwell	Background	
Kethers lane, Motherwell	Background	
Coursington Road, Motherwell	Roadside	
Craigneuk Road, Carfin	Kerbside	
Coatbridge 3, Hozier Street	Kerbside	
Camp Street, Motherwell	Background	
Braehead Farm, Bargeddie, R4	other	270,185 663,661
Shawhead, R9	other	273,832 662,668
Orchard Farm A8 East, R11	other	274,804 662,453
Woodhall Kennels, Calderbank, R12	other	276,843 664,107
Sandyford Farm, Newhouse R13	other	279,696 661,865
Salsburgh R14	other	282,942 662,923
Salsburgh R15	other	283,463 663,018
Salsburgh R16	other	283,830 663,045
Dewshill Cottages, R17	other	285,565 663,794
Blair House, R18	other	287,574 663,786
R19	other	287,753 663,867
Blairmuchole Road, R20	other	298,128 664,026
129 Edinburgh Road, R21	other	289,078 664,202

	Site Type	Grid Ref.
46 Howburn Road, R22	other	289,783 664,605
Orchard Fam A8 West, R10	other	274,648 662,332
Braehead Farm, Bargeddie W, R5	other	270,237 663,511
Johnston Farm, Gartcosh, R23	other	270,432 668,637
New Edinburgh Road, Uddingston, R27	other	269,162 661,432
Alpine Grove, Udingston, R28	other	269,671 661,257
Fallside Road, Uddingston, R29	other	270,880 660,082

*** The NO_2 annual mean concentrations were projected to 2005 for each year. The highest of the three projected concentrations is reported. Annual mean concentrations exceeding the NAQS objective are highlighted in red.**

The concentrations for 2002 have been adjusted for laboratory bias. No adjustment has been made to 2000 and 2001 figures. Projections of annual mean concentration forward to the objective reference year of 2005 has been made using factors provided in technical guidance LAQM.TG(03).

The diffusion tube monitoring results indicate that the annual mean concentration may exceed the NAQS objective at four sites, namely Bank Street in Coatbridge, Motherwell Civic Centre, Lauchope Street in Chapelhall and at Auchenkilns in Cumbernauld.

Of the four sites Auchenkilns is situated in an area where there are no sensitive receptors therefore there is no likely public exposure. Motherwell Civic Centre is in an area of with no sensitive receptors with regard to the annual mean objective; however pedestrians will be exposed over averaging periods comparable to the 1-hour objective period. The monitoring sites at Bank Street, Coatbridge and Lauchope Street, Chapelhall are at locations of heavy road traffic flow but have sensitive receptors close-by.

The monitoring results therefore indicate that the NO_2 annual mean concentration may be exceeded at kerbside locations adjacent to heavily congested roads.

The monitoring results situated at locations of sensitive receptors along the A8 motorway indicate that the annual mean objective for NO_2 is unlikely to be exceeded in these areas. One site, at Braehead Farm, Bargeddie measured an annual mean NO_2 concentration in excess of the NAQS objective level in 2001; however the annual mean concentration is expected to drop below the NAQS objective level by 2005.

The technical guidance LAQM.TG(03) suggests that meeting the 2005 annual mean objective is expected to be more demanding than meeting the hourly mean objective. Where the annual mean objective has been met it is considered unlikely that the hourly mean objective will be exceeded.

Further consideration will therefore be required of the three monitoring locations with relevant receptors at which the exceedence of NAQS annual mean objective for NO_2 is predicted. This will require a Detailed Assessment for NO_2.

6.2.3 Automatic Analyser Monitoring Results

North Lanarkshire Council own and operate one stationary and two mobile automatic monitoring stations. These monitoring stations contain real-time chemiluminescent analysers. The analysers are fitted with dual reaction chambers; therefore they are suitable for measuring real-time NO_2 concentrations at road and kerbside locations.

The monitoring stations were provided and are maintained and calibrated by Horiba.

The stationary monitoring site is situated within residential accommodation at Calder Court in Whiflett, Coatbridge, as an urban background monitoring site. The mobile monitoring stations have been rotated around a number of roadside and urban background sites. The locations of monitoring since 2000 are presented in Table 12 and plotted on Figures 2a – 2c of Appendix 2.

Table 12 Locations of Automatic Monitoring stations since 2000

Dates of Monitoring	Location	Site Type
January 2000 – July 2002	Calder Court, Coatbridge	Urban Background
January 2000 – May 2000	Motherwell Civic Centre	Roadside
May – July 2000	Stepps	Roadside
July – November 2000	Auchekilns	Roadside
November 2000 - December 2001	Greengairs	Industrial
January 2002 – December 2002	Kirk o' Shotts	Roadside
July 2002 – December 2002	Harthill	Industrial

The monitoring stations were rotated around several sites to provide monitoring data with respect to the following:

- Urban background concentrations measured at Calder Court, Coatbridge;
- Roadside monitoring at Bellshill;
- Monitoring at sites close to motorways and trunk roads at Stepps, Auchenkilns and Kirk o' Shotts;

- Monitoring in areas of industrial activity at Greengairs and Harthill.

Technical guidance document LAQM.TG(03) (Ref. 2) provides guidance on estimating the annual mean concentration for a site based on short term monitoring data. It is assumed that patterns in pollution concentrations will affect a wide area. In order to adjust the short term concentration to an annual mean concentration a local site with complete monitoring data is used for comparison. Adjustments for the Stepps, Auchenkilns and Greengairs monitoring sites during 2000 and Calder Court and Harthill during 2002 have been made using concentrations measured at Calder Court automatic monitoring site and Glasgow Centre network monitoring site.

The adjustment factors are presented in Table 13.

Table 13 Estimation of Ratio of Short-term Monitoring to Annual Mean Concentration

Dates	Monitoring Site	Annual Mean (Am)	Period Mean (PM)	Ratio (Am/Pm)
May-June 2000	Calder Court	26.11	16.85	1.55
	Glasgow Centre	37.20	-	-
			Average	**1.55**
June – November 2000	Calder Court	26.11	23.91	1.09
	Glasgow Centre	37.20	31.59	1.18
			Average	**1.13**
November-December 2000	Calder Court	26.11	34.34	0.76
	Glasgow Centre	37.20	40.77	0.91
			Average	**0.84**
January-July 2002	Calder Court	-	-	-
	Glasgow Centre	32.48	27.19	1.19
			Average	**1.19**
July-December 2002	Calder Court	-	-	-
	Glasgow Centre	32.48	38.61	0.84
			Average	**0.84**

The annual mean concentration measured at each of the monitoring sites including the periods of short term monitoring factored to annual mean are presented in Table 14. The number of 1-hour exceedences is as monitored as no projection of the number of exceedences can be made.

Table 14 Automatic Monitoring Station NO_2 Monitoring Results

Year	Monitoring Site	Annual Mean Concentration ($\mu g/m^3$)	No. of 1-hr Mean Exceedences

2000	Calder Court, Coatbridge	26.11	0
	Motherwell Civic Centre	25.75	0
	Stepps	33.60	0
	Auchenkilns	29.85	0
	Greengairs	20.38	0
2001	Calder Court, Coatbridge	22.77	0
	Motherwell Civic Centre	25.21	0
	Greengairs	25.04	0
2002	Calder Court, Coatbridge	26.83	0
	Kirk o' Shotts	21.48	0
	Harthill	23.80	0

The monitoring results therefore indicate that there is unlikely to be an exceedence of NAQS objectives for NO_2 in urban locations throughout North Lanarkshire. Any exceedences of the objective will therefore be the result of localised emissions sources or 'hot-spots'. The pollution sources with potential to cause such a hot-spot are assessed in Sections 6.3 to 6.5.

6.3 Road Traffic

During the first round of the Review and Assessment consideration was made to road traffic emissions within North Lanarkshire. The stage 2 Review and Assessment undertaken on behalf of North Lanarkshire Council concluded that following an assessment of road traffic emissions using the model laid out in the Design Manual for Roads and Bridges (DMRB) (Ref. 5) that it was unlikely that there would be an exceedence of NO_2 objectives within the main centres of population but that the annual mean NO_2 objective may be exceeded at locations along the main transport route corridor.

A revised version of DMRB (Ref. 6) has been issued which provides a more conservative assessment of road traffic emissions. In addition the DMRB model has been found to significantly underestimate pollutant concentrations in street canyons. Technical guidance LAQM.TG(03) (Ref. 2) suggests therefore that traffic flows of as low as 10,000 vehicles per day can cause an exceedence of air quality objectives within congested conditions.

As North Lanarkshire Council have a number of motorways and trunk roads and heavily trafficked urban roads, each category of roads have been assessed separately. The motorways and trunk roads within North Lanarkshire are considered in Section 6.3.1 whilst the urbanised A-roads are considered in Section 6.3.2.

6.3.1 Motorways and Trunk Roads

Traffic flows and the percentage of heavy goods vehicles on motorways and trunk roads within North Lanarkshire were taken from the UK National Atmospheric Emissions Inventory

sponsored by the Department for Environment, Food and Rural Affairs and the Scottish Executive.

North Lanarkshire Council's road traffic department was consulted on the traffic flows from the study and they confirmed that the traffic flows were accurate. The traffic flows were projected forward to 2005 and 2010 using National Traffic Growth Factors (Ref. 7). No average traffic speeds were available, therefore the average traffic speed is assumed to be the same as the speed limit.

No new roads have been proposed or constructed since the first round of the Review and Assessment. The A8 between Bargeddie (Junction 2) and Newhouse (Junction 6) is being upgraded to motorway with the addition of a hard shoulder in each direction to be completed before the end of 2005. This is not expected to significantly affect the volume of traffic but may alter the distance to sensitive receptors. These changes will be assessed in future Review and Assessment.

Whilst no new roads have been built residential development to the north of the A8 at Kirkwood, Coatbridge has introduced new receptors close to the road.

Since no new roads have been constructed, it is only necessary to check the conclusion reached during the first round of Review and Assessment using the new conservative version of DMRB (Ref. 6). The roads with the highest traffic flows, highest percentage of heavy goods vehicles (HGVs) and closest proximity to sensitive receptors were chosen for consideration.

A list of traffic flows and percentage HGVs for motorways and trunk roads within North Lanarkshire including traffic flows projected to 2005 and 2010 are included in Appendix 4. A summary of the DMRB assessment of selected roads is presented in Table 15.

The DMRB assessment was undertaken for receptors at distances of 10, 20 and 50m from the centre of the roads. A background concentration of 25 $\mu g/m^3$ for 2005 was assumed from the Netcen background maps.

Table 15 DMRB Assessment of Motorways and Trunk Roads

Road	AADT 2005	% HGVs	Predicted annual mean concentration at distance from road ($\mu g/m^3$)		
			50m	20m	10m
M73 @ Birkenshaw	91,500	13	34	41	45
A8 @ Kirkwood	69,800	9	31	37	40
M8 @ Salsburgh	63,000	9	31	37	40
A80 @ Cumbernauld	77,300	12	33	39	43
A725 @ Bellshill	50,000	7	30	35	37

The DMRB assessment therefore predicts that it is unlikely that there will be any exceedence of NAQS objectives for NO_2 as a result of emissions from the main motorways and trunk roads within North Lanarkshire at distances greater than 20m from the centre of the roads. The closest receptors on each of these roads are unlikely to be closer than 20m from the centre of the roads.

The concentrations predicted by the DMRB assessment are higher than the concentrations that were measured in 2001 and 2002 at the diffusion tube sites close to the A8/M8 and the M73/M74 motorways.

No exceedence of NAQS objectives for NO_2 is therefore predicted for motorways and main trunk roads. Exceedence of the objective is more likely to occur in urbanised environments where receptors are closer to the roads and traffic flows are slower at road junction etc.

6.3.2 Busy and Congested Roads within Urbanised Areas

A review of congested streets within North Lanarkshire was undertaken utilising local knowledge. A review of potential street canyons was also undertaken. The locations identified tended to be on the main thoroughfare of the towns where shops and public amenities are often situated. Pedestrians will be subjected to road traffic emissions over timescales comparable with the 1-hour mean objective.

The locations identified are detailed in Table 16. The locations included congested junctions in Motherwell and Wishaw, heavily trafficked roads in Airdrie, Coatbridge, Chapelhall and Cumbernauld and the A73 at Stand a road with a high number of HGVs. None of the roads would be described as street canyons.

The road junctions and Sections of roads identified are plotted on Figure 4 of Appendix 2.

Table 16 Busy and Congested Roads in Urbanised areas

Road / Junction	Combined Traffic Flow (AADT) 2005	%HGV	Distance to receptors from Road Centre (m)
Wishaw Cross Junction of A722 and A721	26,118	7%	5
Motherwell Cross Junction of A723 and A721	38,949	8%	5
Chapelhall on A73	20,215	9%	5
Whifflet Roundabout, Coatbridge, A725	29,585	6%	10
Airdrie on A89	16,329	5%	10
Coatbridge on A89	21,317	5%	10
Cumbernauld on A8011	46,760	4%	10
Stand on A73	16,581	11%	5

Assessment of emissions from road traffic on these roads was made using the DMRB model assuming the road traffic at speeds of 10 and 20 miles per hour (mph) for road junctions and at average speeds of the speed limits for the other roads. A summary of the results from the DMRB assessment are presented in Table 17.

Table 17 DMRB Assessment of Busy and Congested roads

Road / Junction	Speed Limit of Assessment (mph)	Predicted 2005 Annual Average NO_2 Concentration ($\mu g/m^3$)
Wishaw Cross Junction of A722 and A721	10	36
	20	34
Motherwell Cross Junction of A723 and A721	10	43
	20	40
Chapelhall on A73	30	36
Whifflet, Coatbridge, A725	20	39
	30	37
Airdrie on A89	30	32
Coatbridge on A89	30	31
Cumbernauld on A8011	50	34
Stand on A73	60	34

The results of the DMRB assessments therefore indicate that an exceedence of the NAQS objectives for NO_2 may occur at Motherwell Cross and at Whifflet, Coatbridge. In addition the annual mean concentration predicted at Chapelhall on the A73 did not allow for the additional traffic flow from the B799, Bo'ness Road at the road junction. As discussed in Section 6.2.2 the NO_2 annual mean concentration is predicted to exceed NAQS objective levels in 2005.

No exceedence of the NAQS annual mean objective is predicted at the other roads / road junctions considered. The roads considered represent the most heavily congested roads within North Lanarkshire therefore no other roads are expected to cause exceedence of NAQS objectives for NO_2. The technical guidance LAQM.TG(03) states that if the DMRB assessment does not predict any exceedence of annual mean objectives then it is unlikely that there will be any exceedence of the short term (1-hour mean) objectives.

Further consideration will therefore be required of road traffic emissions at the three road junctions, Motherwell Cross, Whifflett and Chapelhall. A Detailed Assessment is therefore required for NO_2.

6.4 Industrial Sources

In the first round of Review and Assessment it was concluded that it was unlikely that emissions from any industrial processes would result in an exceedence of NAQS objectives for NO_2.

It was noted in the reports (Refs. 8 and 9) that consultation with SEPA had identified the Corus Dalzell Steel Works in Motherwell as being a significant emitter of NO_2.

North Lanarkshire Council have NO_2 diffusion tubes situated about 0.5km to the south-east and 2.5km to the north-east of the site. No exceedences of the NAQS NO_2 annual mean objective have been measured at these sites. The prevailing wind direction is south-westerly; therefore emissions from the Dalzell works will fall away from the monitoring site to the south-east. There are sensitive receptors situated approximately 400m to the north of the Dalzell works site. The Dalzell Works are highlighted on Figure 5 of Appendix 2.

A review of emissions data from the Dalzell Works held by SEPA identified NO_2 emissions from ten furnaces with a net thermal output of 150 megawatts. The estimated total annual emission of total NO_x (NO_2 equivalent) from the site was approximately 83 tonnes in 2001.

Assessment of the emissions from the plant is beyond the scope of the nomograms contained within the technical guidance LAQM.TG(03) (Ref. 2). It will therefore be necessary to undertake a Detailed Assessment of emissions of NO_2 from the Corus Dalzell Works.

Corus are required to submit an application for a new permit under the PPC Regulations during 2003 at which point they will be required to assess the impact of emissions to air from the site. This assessment will be available from the SEPA public register and will form the basis of the detailed assessment.

6.5 Air Traffic

Cumbernauld airport is situated within North Lanarkshire at Westerwood, Cumbernauld. The airport is highlighted in Figure 6 of Appendix 2.

The airport is mainly used for leisure purposes with flight schools, helicopter rides and microlights plane operating from the site. In addition Cumbernauld airport services private flights.

Technical guidance document LAQM.TG(03) (Ref. 2) states that where airports have a predicted throughput of greater than 5 million passengers equivalent (including freight) a detailed assessment of air quality surrounding the airport will be required.

The airport activity at Cumbernauld airport is unlikely to approach anything around those levels therefore no further assessment of emissions from airports is required.

6.6 Conclusion

Monitoring of NO_2 undertaken in North Lanarkshire indicates that the NAQS objectives are unlikely to be exceeded in urban locations. It is therefore concluded that ambient NO_2 concentrations are unlikely to exceed NAQS objective levels.

Monitoring results do however indicate that there will be an exceedence of the NAQS annual mean NO_2 objective at three roadside locations with relevant public exposure. A Detailed Assessment will therefore be required for the monitoring locations at Motherwell Civic Centre, Bank Street, Coatbridge and Lauchope Street, Chapelhall.

An assessment of road traffic emissions using the DMRB model (Ref. 6) identified potential exceedences of the NAQS objectives for NO_2 at Motherwell Cross, Whifflet and Chapelhall. A Detailed Assessment of road traffic emissions will therefore be required for these locations.

A review of industrial processors within North Lanarkshire identified that there is potential for an exceedence of NAQS objective levels as a result of emissions from the Corus Dalzell Works in Motherwell. A Detailed Assessment of emissions from the site will therefore be required.

No other emission sources with potential to cause an exceedence of NAQS objective levels for NO_2 were identified.

A Detailed Assessment for NO_2 is therefore required for North Lanarkshire Council.

7 REVIEW AND ASSESSMENT OF SULPHUR DIOXIDE

The principal source of emissions of sulphur dioxide (SO_2) is from coal-fired power stations and other industrial combustion sources. Emissions from motor vehicles are minimal in comparison.

The first round Review and Assessment of air quality within the North Lanarkshire Council area (Ref. 4) concluded that it was unlikely that there would be an exceedence of air quality objectives for SO_2. The Scottish Executive accepted this conclusion.

There are three air quality objectives for sulphur dioxide, an hourly mean objective, a 24-hour objective and a 15-minute mean objective, set out in the Air Quality Regulations 2000. The objectives are presented in Table 18.

Table 18 Air Quality Objectives for Sulphur Dioxide

Concentration	Measured As	Date to be Achieved by
350 μg/m^3 not to be exceeded more than 24 times per year	1-hour mean	31.12.2004
125 μg/m^3 not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
266 μg/m^3 not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

The ground level concentration therefore should not be predicted to exceed 350 μg/m^3 on more than 24 hourly periods by the end of 2005. In addition it should be predicted that the 24-hour mean will not exceed 125 μg/m^3 on more than three occasions by the end of 2004 and that there will be fewer than 35 15-minute mean exceedences of 266 μg/m^3 a year by the end of 2005.

An assessment the potential impact of emission sources of NO_2 and available monitoring data is made in Sections 7.1 to 7.7.

7.1 Background Concentration

NETCEN (Ref. 3) have mapped estimated annual mean background concentrations for SO_2 during 2001. The map is included in Appendix 3.

The estimated annual mean SO_2 concentration in North Lanarkshire in 2001 is between 4-6 μg/m^3. Technical guidance LAQM.TG(03) (Ref. 2) suggests that the annual mean SO_2 background concentration at the end of 2004 and 2005 will be 75% of the 2001

concentration. The background annual mean concentration during 2004 and 2005 is therefore predicted to be between 3 - 4.5 $\mu g/m^3$.

7.2 Monitoring Data

North Lanarkshire Council monitor SO_2 at a number of sites within the area. Monitoring is undertaken using both automatic ultra-violet fluorescent (UVF) analysers and bubbler samplers.

Monitoring by bubbler samplers is discussed in Section 7.2.1 and monitoring by UVF analysers is discussed in Section 7.2.2.

7.2.1 SO_2 Active Sampler Monitoring

North Lanarkshire Council monitor SO_2 using 8-port active samplers (bubblers) at three locations, Muirhead and Kirkwood and Main Street, both Coatbridge. Analysis of the bubbler is undertaken by Glasgow City Council's public laboratory, Glasgow Scientific Services, using the net acidity titration technique. There are no procedures in place to validate the results.

The SO_2 bubblers monitor over 24-hour periods. The annual mean concentration and the maximum 24-hour mean concentration monitored at the site are presented in Table 19. Technical guidance LAQM.TG(03) (Ref. 2) provides a correction factor to adjust 24-hour mean concentrations for comparison with hourly and 15-minute mean objectives. The correction factors are:

99.9^{th} %ile of 15-minute means = 1.8962 x maximum daily mean

99.7^{th} %ile of 1-hour means = 1.3691 x maximum daily mean

The correction factors have been utilised and the results presented in Table 19.

Table 19 SO_2 Concentrations measured within North Lanarkshire

	2000	2001	2002
Muirhead			
Maximum Daily Mean Concentration ($\mu g/m^3$)	46	128	126
99.7th %ile of 1-hour Means ($\mu g/m^3$)	63	175	172
99.9th %ile of 15-minute Means ($\mu g/m^3$)	87	243	239
Coatbridge Kirkwood			
Maximum Daily Mean Concentration ($\mu g/m^3$)	50	60	47
99.7th %ile of 1-hour Means ($\mu g/m^3$)	68	82	64
99.9th %ile of 15-minute Means ($\mu g/m^3$)	95	114	89
Coatbridge Main Street			
Maximum Daily Mean Concentration ($\mu g/m^3$)	105	61	57
99.7th %ile of 1-hour Means ($\mu g/m^3$)	144	84	78
99.9th %ile of 15-minute Means ($\mu g/m^3$)	199	116	108

The monitoring site at Muirhead has therefore recorded daily mean concentrations in excess of the NAQS objective level. No daily mean concentrations in excess of the NAQS objective level have been recorded at either of the other two sites. No exceedence of the hourly or 15-minute NAQS objective levels has been predicted when the maximum daily mean concentrations have been factored.

Further assessment of the SO_2 concentration at the Muirhead monitoring site is required. A Detailed Assessment for SO_2 is therefore required.

7.2.2 UVF Analyser Monitoring

North Lanarkshire Council have been operating two mobile automatic monitoring stations since 1999 with an additional stationary analyser added during 2002. These monitoring stations contain real-time UVF analysers. The monitoring stations were provided, maintained and are subject to annual calibrations by Horiba.

The stationary monitoring site is situated within residential accommodation at New Town Hall, Bron Way, Cumbernauld, an urban background monitoring site. The mobile monitoring stations have been rotated around a number of roadside and urban background sites. The locations of monitoring since 2000 are presented in Table 20 and plotted on figures 2a – 2c of Appendix 2.

Table 20 Locations of Automatic Monitoring stations since 2000

Dates of Monitoring	Location	Site Type
January 2000 – May 2002	Motherwell Civic Centre	Roadside
May – July 2000	Stepps	Roadside
July – November 2000	Auchekilns	Roadside
November 2000 - December 2001	Greengairs	Industrial
January 2002 – December 2002	Kirk o' Shotts / Salsburgh	Roadside
July 2002 – December 2002	Harthill	Industrial
April 2002 – December 2002	Bron Way, Cumbernauld	Urban Background

The monitoring stations were rotated around several sites to provide monitoring data with respect to the following:

- Urban background concentrations measured at Bron Way, Cumbernauld;
- Roadside monitoring at Bellshill;
- Monitoring at sites close to motorways and trunk roads at Stepps, Auchenkilns and Kirk o' Shotts;
- Monitoring in areas of industrial activity at Greengairs and Harthill.

No exceedences of NAQS SO_2 objectives were measured at any of the monitoring locations during 2000, 2001 or 2002. It is therefore concluded that it is unlikely that there will be any exceedence of SO_2 objective levels at roadside locations.

Technical guidance LAQM.TG(03) details various emissions sources that could result in localised emissions sources or 'hot-spots'. The emission sources with potential to cause such a hot-spot are assessed in Sections 7.3 to 7.5.

7.3 Industrial Sources

During the first round of Review and Assessment no industrial processes were identified as having emissions with potential to cause an exceedence of NAQS objectives for SO_2. SEPA agreed with this conclusion in their response to the Stage 1 Review and Assessment of air quality in North Lanarkshire.

Consultation with SEPA (Ref. 4) and reference to the public register at the SEPA offices in East Kilbride did not identify any new industrial processes or existing processes with significantly changed emissions of SO_2 that have the potential to cause an exceedence of the NAQS objective.

It is therefore concluded that it is unlikely that there will be any exceedence of the NAQS objectives for SO_2 in North Lanarkshire as a result of emissions from industrial processors.

7.4 Domestic Coal Burning

Technical guidance LAQM.TG(03) (Ref. 2) indicates that local exceedences of SO_2 objectives may occur in areas of concentrated coal burning. Concentrated areas are defined as those with more than 100 properties coal burning in an area of 500m by 500m (0.25 km^2).

A survey undertaken by North Lanarkshire Council Environmental Health staff identified three areas of concentrated coal burning. The survey only included current Council housing stock at that time and did not include former council housing. It is assumed that former housing stock have been converted to gas or electric heating by the owners.

The highest densities of coal burning properties found within North Lanarkshire are presented in Table 21.

Table 21 Density of Coal-burning properties within North Lanarkshire

Town / Village	Number of Solid Fuel Burning Properties	Approximate area of Town / Village (km^2)
Salsburgh	188	0.4
Greengairs	95	0.5
Kirkshaws, Coatbridge	153	0.8

The highest density of coal burning properties was therefore identified to be within Salsburgh. The council housing within Salsburgh is on the Council's plan for gas heating conversion but conversion is likely to be after 2005. From the information available, the number of coal burning properties in Salsburgh will therefore exceed 100 houses per 0.25 km^2. There is therefore a possibility that there will be an exceedence of NAQS objectives for SO_2 as a result of emissions from domestic coal burning.

Monitoring of SO_2 was undertaken at Kirk o' Shotts Primary School to the east of Salsburgh village. The monitoring site was selected to primarily measure the effect of emissions from the A8 motorway on the Primary School. Although the monitoring site did not record any exceedence of SO_2 objectives, the distance of the site from the main areas of coal burning may mean that SO_2 emissions from the village are not fully accounted for.

Further consideration of SO_2 concentrations within Salsburgh will therefore be required. This will require a Detailed Assessment for SO_2.

7.5 Small Boilers

An inventory of small boilers within North Lanarkshire with a thermal throughput greater than 5 MW was undertaken by BMT Cordah during 2002.

No boilers were identified that have a thermal output greater than 5 MW that are coal or oil-fired. It is therefore unlikely that there will be any exceedence of NAQS objectives for SO_2 as a result of emissions from small boiler plant.

7.6 Shipping

As North Lanarkshire Council is landlocked it can be assumed that there are no significant shipping movements or ports within North Lanarkshire therefore no assessment of emissions from shipping has been made.

7.7 Railways

North Lanarkshire Council, being situated in the centre of Scotland is a main through route for a variety of rail routes. Network Rail (Scotland) was consulted as to train movements within the North Lanarkshire area however no information has been forthcoming to date.

Details of passenger train routes were obtained from Scotrail, GNER and Virgin train timetables. These routes identified are:

- Glasgow-Stirling & the North services pass through North Lanarkshire at Croy on this line;
- Glasgow-Edinburgh services also pass through North Lanarkshire at Croy;
- Glasgow-Edinburgh via Shotts pass through the heart of North Lanarkshire roughly following the route of the A8/M8;
- Glasgow-South East coast and West coast mainline services stop at Motherwell and pass through Wishaw;
- Local Scotrail services from Glasgow Central low-level and Glasgow Queen Street low-level services pass through Coatbridge, Airdrie, Cumbernauld, Bellshill, Motherwell and Wishaw.

Motherwell station is an interchange station for a variety of routes including mainline services south. Adjacent to Motherwell station is the depot for Scotrail services servicing these lines. The majority of the trains at Motherwell station are electrified.

With the exception of the Glasgow-Edinburgh via Shotts and services north from Glasgow Queen Street passing via Croy, which are diesel train routes, the train services are electrified.

In addition to the passenger rail services a number of freight services pass through North Lanarkshire. There are freight depots situated at Motherwell, Mossend and Coatbridge. The Eurocentral Freight Terminal at Mossend is the main freight terminal for freight services from Scotland to the south and the Channel Tunnel. These depots are highlighted on figures 7a – 7c of Appendix 2.

Technical guidance LAQM.TG(03) (Ref. 2) states that potential for exceedence of the NAQS 15-minute objective for SO_2 exists where diesel locomotives are regularly stationary for periods of 15 minutes or more.

The passenger diesel services from Glasgow Queen Street to Edinburgh and the north only stop at either Croy or Greenfaulds and Cumbernauld stations within the North Lanarkshire boundary, stops are scheduled to last one minute. The Glasgow-Edinburgh via Shotts route stops at a number of stations within North Lanarkshire but like the other Glasgow-Edinburgh route each stop is scheduled to last only one minute.

It is expected that there will be significant movements of freight trains within small areas within the freight depots including regularly stationary vehicles with idling engines during various activities such as refuelling. There are no receptors close to the Eurocentral freight terminal but there are residential properties close to both the Motherwell and Coatbridge depots.

It is therefore concluded that exceedence of the NAQS 15-minute objective for SO_2 as a result of emissions from railway locomotives cannot be dismissed. Further assessment of emissions will therefore be required. This will be considered in a Detailed Assessment.

7.8 Conclusion

Monitoring of SO_2 is undertaken at a number of locations within North Lanarkshire. Monitoring using UVF automatic analysers at a number of locations measured no concentrations in exceedence of NAQS objective levels for SO_2.

The SO_2 active sampler monitoring site at Muirhead has recorded 24-hour mean concentrations in excess of the NAQS 24-hour mean objective level. No exceedences of the 15-minute or 1-hour mean objective levels have been measured. Further consideration of the SO_2 concentration within this area is therefore required.

Consideration made to emission sources with potential to cause exceedence of NAQS objectives highlighted areas where possible exceedence of the objectives may occur.

The density of coal burning properties in Salsburgh exceeds the threshold set out in technical guidance LAQM.TG(03) (Ref. 2). There is therefore potential for an exceedence of the NAQS objective for SO_2 in Salsburgh. Further consideration of SO_2 concentrations in Salsburgh will therefore be required.

Emissions from freight trains at depots in Motherwell and Coatbridge were identified as having potential to cause exceedence of NAQS objectives for SO_2. Further consideration of SO_2 concentrations around these freight depots will therefore be required.

A Detailed Assessment for SO_2 is therefore required for North Lanarkshire Council.

8 REVIEW AND ASSESSMENT OF PARTICLES (PM_{10})

PM_{10} comprises a variety of substances of less than 10 microns (μm) in diameter.

PM_{10} is produced from a variety of sources. The principal sources are road transport, combustion processes and quarrying and mining. PM_{10} can also arise from a variety of natural sources including sea salt, pollen grains and biological particles.

PM_{10} can be classified as being either primary or secondary. Primary sources are released directly into the atmosphere, from combustion processes whilst secondary sources are formed by chemical reaction in the atmosphere. The formation of secondary particles can occur a distance away from their origin. The smaller particles (<2 $\mu g/m^3$) are defined as fine whilst larger diameter particles (2-10 $\mu g/m^3$) are defined as being coarse.

The first round Review and Assessment of air quality within the North Lanarkshire Council area (Ref. 4) concluded that it was unlikely that there would be an exceedence of air quality objectives for PM_{10}. The Scottish Executive accepted this conclusion.

There are two air quality objectives for PM_{10}, an annual mean objective and a daily mean objective, set out in the Air Quality Regulations 2000. In addition the Scottish Executive have set in place stricter objectives to be achieved by 2010. The objectives are presented in Table 22.

Table 22 Air Quality Objectives for PM_{10}

Concentration	Measured As	Date to be Achieved by
40 $\mu g/m^3$	Annual mean	31.12.2004
18 $\mu g/m^3$	Annual mean	31.12.2010
50 $\mu g/m^3$ not to be exceeded more than 35 times per year	24-hour mean	31.12.2004
50 $\mu g/m^3$ not to be exceeded more than 7 times a year	24-hour mean	31.12.2010

The annual mean concentration therefore should not be predicted to exceed 40 $\mu g/m^3$ by the end of 2004 and 18 $\mu g/m^3$ by the end of 2010. In addition it should be predicted that there will be fewer than 35 24-hourly exceedences of 50 $\mu g/m^3$ in a year by the end of 2004 and less than 7 by the end of 2010.

An assessment the potential impact of emission sources of PM_{10} and available monitoring data is made in Sections 8.1 to 8.7.

8.1 Background Concentration

NETCEN (Ref. 3) have mapped estimated annual mean background concentrations for primary PM_{10} concentrations during 2001, 2004 and 2010 and secondary PM_{10} concentrations for 2001. The maps are included in Appendix 3.

The estimated primary annual mean PM_{10} concentration in 2001 is between 15-18 $\mu g/m^3$. The background concentration is again predicted to be between 15-18 $\mu g/m^3$ in 2004 but expected to fall below 15 $\mu g/m^3$ by 2010. The estimated secondary annual mean concentration in 2001 was estimated to be below 3 $\mu g/m^3$. It is assumed that secondary PM_{10} concentration will remain constant until 2010.

The total background concentration during 2004 is therefore predicted to be between 18-21 $\mu g/m^3$ whilst it will be 18 $\mu g/m^3$ in 2010.

8.2 Monitoring Data

North Lanarkshire Council own and operate two stationary and two mobile automatic monitoring stations. The stations monitor PM_{10} continuously using Tapered Element Oscillating Microbalance (TEOM) units providing real-time continuous readings.

The monitoring stations were provided and are maintained and are subject to annual calibrations by Horiba.

The stationary monitoring sites are situated within residential accommodation at Calder Court in Whiflett, Coatbridge, an urban background monitoring site and at Holy Cross Primary School in Croy, an industrial monitoring site. The mobile monitoring stations have been rotated around a number of roadside and urban background sites. The locations of monitoring since 2000 are presented in Table 23 and plotted on Figures 2a – 2c of Appendix 2.

Table 23 Locations of Automatic Monitoring stations since 2000

Dates of Monitoring	Location	Site Type
January 2000 – December 2002	Calder Court, Coatbridge	Urban Background
January 2000 – December 2002	Holy Cross P.S., Croy	Industrial
January 2000 – December 2001	Motherwell Civic Centre	Roadside
May – July 2000	Stepps	Roadside
July – November 2000	Auchekilns	Roadside
November 2000 – March 2001	Greengairs Primary School	Industrial
January 2002 – December 2002	Kirk o' Shotts	Roadside
July 2002 – December 2002	Harthill	Industrial

The monitoring stations were rotated around several sites to provide monitoring data with respect to the following:

- Urban background concentrations measured at Calder Court, Coatbridge;
- Roadside monitoring at Motherwell Civic Centre;
- Monitoring at sites close to motorways and trunk roads at Stepps, Auchenkilns and Kirk o' Shotts and
- Monitoring in areas of industrial activity at Greengairs, Harthill and Croy.

Technical guidance document LAQM.TG(03) (Ref. 2) provides guidance on estimating the annual mean concentration for a site based on short term monitoring data. It is assumed that patterns in pollution concentrations will affect a wide area. In order to adjust the short-term concentration to an annual mean concentration a local site with complete monitoring data is used for comparison. Adjustments for the Stepps, Auchenkilns and Greengairs monitoring sites during 2000 and Calder Court and Harthill during 2002 have been made using concentrations measured at Calder Court and Croy automatic monitoring sites.

The adjustment factors are presented in Table 24.

Table 24 Estimation of Ratio of Short-term Monitoring to Annual Mean Concentration

Dates	Monitoring Site	Annual Mean (Am)	Period Mean (PM)	Ratio (Am/Pm)
May-June 2000	Calder Court	13.69	11.92	1.15
	Croy	10.97	10.57	1.04
			Average	**1.09**
June – November 2000	Calder Court	13.69	11.00	1.24
	Croy	10.97	10.13	1.08
			Average	**1.16**
November-December 2000	Calder Court	13.69	12.13	1.13
	Croy	10.97	10.98	0.99
			Average	**1.06**
January-July 2002	Calder Court	12.30	11.67	1.05
	Croy	15.62	14.26	1.09
			Average	**1.07**
July-December 2002	Calder Court	12.30	12.89	0.95
	Croy	15.62	16.96	0.92
			Average	**0.93**

The annual mean concentration measured at each of the monitoring sites including the periods of short term monitoring factored to annual mean are presented in Table 25. In line with technical guidance LAQM.TG(03) (Ref. 2) the concentrations have been factored by 1.3 to account for the under-read of TEOM analysers.

Table 25 Automatic Monitoring Station PM_{10} Monitoring Results

Year	Monitoring Site	Annual Mean Concentration ($\mu g/m^3$)	No. of 24-hr Mean Exceedences
2000	Calder Court, Coatbridge	18	5
	Holy Cross P.S., Croy	14	0
	Motherwell Civic Centre	14	0
	Stepps	23	0
	Auchenkilns	15	0
	Greengairs	24	0
2001	Calder Court, Coatbridge	17	5
	Holy Cross P.S., Croy	27	25
	Motherwell Civic Centre	19	6
	Greengairs	24	1
2002	Calder Court, Coatbridge	16	2
	Holy Cross P.S., Croy	20	6
	Kirk o' Shotts	16	1
	Harthill	19	0

The monitoring results at Coatbridge and Croy therefore indicate that there is unlikely to be an exceedence of NAQS objectives for PM_{10} in urban locations throughout North Lanarkshire. Monitoring at roadside or industrial sites did not measure any exceedence of NAQS objectives.

Technical guidance LAQM.TG(03) (Ref. 2) details various emissions sources that could result in localised emissions sources or 'hot-spots'. The emission sources with potential to cause such a hot-spot are assessed in Sections 8.3 to 8.7.

8.3 Road Traffic

During the first round of the Review and Assessment consideration was made to road traffic emissions within North Lanarkshire. The stage 2 Review and Assessment undertaken on behalf of North Lanarkshire Council concluded that following an assessment of road traffic emissions using the model laid out in the Design Manual for Roads and Bridges (DMRB) that it was unlikely that there would be an exceedence of PM_{10} objectives within the main centres of population or along the main transport route corridor.

A revised version of DMRB (Ref. 6) has been issued which provides a more conservative assessment of road traffic emissions. In addition the DMRB model has been found to

significantly underestimate pollutant concentrations in street canyons. Technical guidance LAQM.TG(03) suggests therefore that traffic flows of as low as 10,000 vehicles per day can cause an exceedence of air quality objectives.

As North Lanarkshire Council have both a number of motorways and trunk roads and heavily trafficked urban roads each category of roads have been assessed separately. The motorways and trunk roads within North Lanarkshire are considered in Section 8.3.1 whilst the urbanised A-roads are considered in Section 8.3.2.

8.3.1 Motorways and Trunk Roads

Traffic flows and the percentage of heavy goods vehicles on motorways and trunk roads within North Lanarkshire were taken from the UK NAEI (Ref. 8) sponsored by the Department for Environment, Food and Rural Affairs and the Scottish Executive.

North Lanarkshire Council's road traffic department was consulted on the traffic flows from the study and they confirmed that the traffic flows were accurate. The traffic flows were projected forward to 2005 and 2010 using National Traffic Growth Factors (Ref. 7). No average traffic speeds were available, therefore the average traffic speed is assumed to be the same as the speed limit.

No new roads have been proposed or constructed since the first round of the Review and Assessment. The A8 between Bargeddie (Junction 2) and Newhouse (Junction 6) is being upgraded to motorway with the addition of a hard shoulder in each direction to be completed before the end of 2005. This is not expected to significantly affect the volume of traffic but may alter the distance to sensitive receptors. This will be considered at future Review and Assessment.

Whilst no new roads have been built residential development to the north of the A8 at Kirkwood, Coatbridge has introduced new receptors close to the road.

Since no new roads have been constructed, it is only necessary to check the conclusion reached during the first round of Review and Assessment using the new conservative version of DMRB. The roads with the highest traffic flows, highest percentage of heavy goods vehicles (HGVs) and closest proximity to sensitive receptors were chosen for consideration.

A list of traffic flows and percentage HGVs for motorways and trunk roads within North Lanarkshire including traffic flows projected to 2005 and 2010 are included in Appendix 4. A summary of the DMRB assessment of selected roads for 2005 is presented in Table 26 whilst the assessment for 2010 is summarised in Table 27.

The DMRB assessment was undertaken for receptors at distances of 10, 20 and 50m from the centre of the roads. A background concentration of 18 µg/m^3 for 2004 and 15 µg/m^3 for 2010 were assumed from the background maps.

Table 26 DMRB Assessment of Motorways and Trunk Roads 2005

Road	Predicted annual mean concentration (µg/m^3)			Predicted no. days >50µg/m^3		
	10m	20m	50m	10m	20m	50m
M73 @ Birkenshaw	29	26	22	23	15	6
A8 @ Kirkwood	27	24	21	16	11	4
M8 @ Salsburgh	26	24	21	15	10	4
A80 @ Cumbernauld	28	26	22	20	13	5
A725 @ Bellshill	25	23	20	12	8	4

Table 27 DMRB Assessment of Motorways and Trunk Roads 2010

Road	Predicted annual mean concentration (µg/m^3)			Predicted no. days >50µg/m^3		
	10m	20m	50m	10m	20m	50m
M73 @ Birkenshaw	22	20	17	6	3	1
A8 @ Kirkwood	20	19	17	4	2	0
M8 @ Salsburgh	20	19	17	3	2	0
A80 @ Cumbernauld	21	20	17	5	3	0
A725 @ Bellshill	19	18	16	2	1	0

The DMRB assessment therefore predicts that it is unlikely that there will be any exceedence of NAQS objectives for PM_{10} in 2004 as a result of emissions from the main motorways and trunk roads within North Lanarkshire even at receptors only 10m from the centre of the roads. The closest receptors on each of these roads are unlikely to be closer than 20m from the centre of the roads.

Exceedence of the 2010 annual average PM_{10} objective is predicted at locations within 50m of the major motorways and trunks roads. This will require to be considered in future Review and Assessment studies.

No exceedences of NAQS 2004 objectives for PM10 are therefore predicted for motorways and main trunk roads. Exceedence of the objectives is more likely to occur in urbanised environments where receptors are closer to the roads and traffic flows are slower at road junction etc.

8.3.2 Busy and Congested Roads within Urbanised Areas

A review of congested streets within North Lanarkshire was undertaken utilising local knowledge. Consideration was made to streets where the possibility of a street canyon exists. The locations identified tended to be on the main thoroughfare of the towns where shops and public amenities are often situated.

The locations identified are detailed in Table 28. The locations included congested junctions in Motherwell and Wishaw, heavily trafficked roads in Airdrie, Coatbridge, Chapelhall and Cumbernauld and the A73 at Stand a road with a high number of HGVs. None of the roads would be described as street canyons.

The road junctions and Sections of roads identified are plotted on Figure 4 of Appendix 2.

Table 28 Busy and Congested Roads in Urbanised Areas

Road / Junction	Combined Traffic Flow (AADT) 2005	%HGV	Distance to receptors from Road Centre (m)
Wishaw Cross Junction of A722 and A721	26,118	7%	5
Motherwell Cross Junction of A723 and A721	38,949	8%	5
Chapelhall on A73	20,215	9%	5
Whifflet Roundabout, Coatbridge, A725	29,585	6%	10
Airdrie on A89	16,329	5%	10
Coatbridge on A89	21,317	5%	10
Cumbernauld on A8011	46,760	4%	10
Stand on A73	16,581	11%	5

Assessment of emissions from road traffic on these roads was made using the DMRB model assuming the road traffic at speeds of 10 and 20 miles per hour (mph) for road junctions and at the speed limits for the other roads. A summary of the results from the DMRB assessment for 2004 are presented in Table 29 and a summary of the 2010 assessment in Table 30.

Table 29 2005 DMRB Assessment of Busy and Congested Roads

Road / Junction	Speed Limit of Assessment (mph)	Predicted Annual Average PM_{10} Concentration ($\mu g/m^3$)	No. of days > 50 $\mu g/m^3$
Wishaw Cross Junction of A722 and A721	10	25	12
	20	23	7
Motherwell Cross Junction of A723 and A721	10	31	30
	20	27	17
Chapelhall on A73	20	23	7
Whifflet Roundabout, Coatbridge, A725	20	28	19
	30	25	11
Airdrie on A89	30	22	5
Coatbridge on A89	30	22	7
Cumbernauld on A8011	50	24	9
Stand on A73	50	22	5

Table 30 2010 DMRB Assessment of Busy and Congested Roads

Road / Junction	Speed Limit of Assessment (mph)	Predicted Annual Average PM_{10} Concentration ($\mu g/m^3$)	No. of days > 50 $\mu g/m^3$
Wishaw Cross Junction of A722 and A721	10	21	6
	20	21	4
Motherwell Cross Junction of A723 and A721	10	25	13
	20	23	8
Chapelhall on A73	20	22	6
Whifflet Roundabout, Coatbridge, A725	20	22	6
	30	21	4
Airdrie on A89	30	20	3
Coatbridge on A89	30	20	3
Cumbernauld on A8011	50	20	3
Stand on A73	50	20	3

The results of the DMRB assessments therefore indicate that none of the urbanised roads considered are likely to cause an exceedence of the NAQS objectives for PM_{10} in 2004. As the roads considered represent worst case roads no other roads within North Lanarkshire are expected to cause exceedence of NAQS objectives for PM_{10} in 2004.

The predicted 2010 annual mean concentration will however exceed the NAQS 2010 annual mean objective. It is expected the 2010 NAQS annual mean objective will be widely exceeded throughout North Lanarkshire.

8.4 Industrial Sources

During the first round of Review and Assessment no industrial processes were identified as having emissions with potential to cause an exceedence of NAQS objectives for PM_{10}. SEPA agreed with their conclusion in their response to the Stage 1 Review and Assessment of air quality in North Lanarkshire.

Consultation with SEPA (Ref. 4) and reference to the public register at the SEPA offices in East Kilbride did not identify any new industrial processors or existing processors with significantly changed emissions of PM_{10} that had potential to cause an exceedence of the NAQS objectives.

It is therefore concluded that it is unlikely that there will be any exceedence of the NAQS objective for PM_{10} in North Lanarkshire as a result of emissions from industrial processors.

8.5 Solid Fuel Burning

Technical guidance indicates that local exceedences of PM_{10} 24-hour mean objective may occur in areas of concentrated coal burning.

Using Figure 8.8 in technical guidance LAQM.TG(03) (Ref. 2),North Lanarkshire, with a background PM_{10} concentration of 18 $\mu g/m^3$, would require a density of over 250 coal burning premises within a 500m by 500m (0.25 km^2) area to give rise to an exceedence of the 24-hour mean PM_{10} objective in 2004.

Figure 8.9 in technical guidance LAQM.TG(03) (Ref. 2), estimates that North Lanarkshire, with a background PM_{10} concentration of 18 $\mu g/m^3$ in 2010, would require a density of only 40 coal burning premises within a 500m by 500m area to give rise to an exceedence of the annual mean PM_{10} objective in 2010.

A survey undertaken by North Lanarkshire Council Environmental Health staff identified three areas of concentrated coal burning. The survey only included current Council housing stock at that time and did not include former council housing. It is assumed that former housing stock have been converted to gas or electric heating by the owners.

The highest densities of coal burning properties found within North Lanarkshire are presented in Table 31.

Table 31 Density of Coal-burning properties within North Lanarkshire

Town / Village	Number of Solid Fuel Burning Properties	Approximate area of Town / Village (km^2)	Average per $0.25km^2$
Salsburgh	188	0.4	117
Greengairs	95	0.5	48
Kirkshaws, Coatbridge	153	0.8	48

The highest density of coal burning properties was therefore identified to be within Salsburgh. The council housing within Salsburgh is on the Council's plan for gas heating conversion but conversion is likely to be after 2005.

From the information available, the number of coal burning properties may therefore exceed 40 houses per 0.25 km^2 at all three locations in 2010 depending on the Council's domestic heating conversion timetable. There is therefore a possibility that there will be an exceedence of NAQS objectives for PM_{10} in 2010 as a result of emissions from domestic coal burning.

Monitoring of PM_{10} has been undertaken at Kirk o' Shotts Primary School to the east of Salsburgh village. The monitoring site was selected primarily to measure the effect of emissions from the M8 motorway on the Primary School. Although the monitoring site did not record any exceedence of PM_{10} objectives, the distance of the site from the main areas of coal burning may mean that PM_{10} emissions from the village are not fully accounted for.

Monitoring of PM_{10} was undertaken in Greengairs at Greengair Primary School during 2000 and 2001. The monitoring was undertaken within the village. The monitoring site was placed in order to be exposed to emissions from road traffic emissions, fugitive emissions from the landfill sites and domestic coal burning. No exceedence of 2004 NAQS objectives for PM_{10} were measured within Greengairs. The concentrations measured at the Greengairs site will however exceed the 2010 NAQS annual mean concentration objective.

No exceedence of the PM_{10} objectives is therefore predicted for 2004. Further consideration of PM_{10} concentrations within Salsburgh and Greengairs will however be required in order compliance with the 2010 objectives.

8.6 Quarries and Dust Emitting Processes

A review of emissions of PM_{10} from quarries was undertaken during North Lanarkshire Council's Stage 2 Review and Assessment (Ref. 9). Only one quarry, Tams Loup Quarry near Harthill was identified as being likely to be operational in 2004. North Lanarkshire Council have monitored PM_{10} near this quarry since 2001. No exceedences of NAQS objectives for PM_{10} have been recorded.

Technical guidance document LAQM.TG(03) (Ref. 2) states that where in the case of North Lanarkshire the background concentration is less than 26 µg/m^3 exceedence of the 2004 PM_{10} objectives are only likely to occur at locations within 200m of dust emission sources. The guidance states that within that distance the presence of dust nuisance complaints is a good indication of potential dust problems.

North Lanarkshire Council have received unsubstantiated complaints about four dust emitting processes in recent years. The locations of the complaints are presented in Table 32.

Table 32 Quarries and dust generating processes within North Lanarkshire

Process	Location	Distance to Nearest Receptor
Croy Quarry	Croy	20 metres
Enviroscot	Bargeddie	150 metres
H G Banks opencast mine	Morningside	0 metres
Hillend Quarry	Caldercruix	40 metres

It is considered likely that emissions from these sites will cause exceedence of NAQS objective levels in 2004 due to their distance from receptors.

The predicted annual mean background concentration for North Lanarkshire in 2010 is 18 µg/m^3. For compliance with the 2010 objectives further investigation is required where the predicted background concentration is greater than 17 µg/m^3 and there are receptors within 1 kilometre from source. There is therefore potential for exceedence of NAQS objectives for PM_{10} in 2010.

It is therefore unlikely that there will be any exceedence of 2004 NAQS objectives for PM_{10} as a result of fugitive releases from quarries and other dusty processes. Further investigation will be required to assess compliance with 2010 NAQS objectives for PM_{10}.

8.7 Air Traffic

Cumbernauld airport is situated within North Lanarkshire at Westerwood, Cumbernauld. The airport is shown in Figure 6 of Appendix 2.

The airport is mainly used for leisure purposes, with flight schools, helicopter rides and microlight plane operating from the site. In addition Cumbernauld airport services private flights.

Technical guidance document LAQM.TG(03) (Ref. 2) states that where airports have a predicted throughput of greater than 5 million passengers equivalent (including freight) a detailed assessment of air quality surrounding the airport will be required.

The airport activity at Cumbernauld airport is unlikely to approach anything around those levels therefore no further assessment of emissions from airports is required.

8.8 Conclusion

Monitoring of PM_{10} undertaken at sites throughout North Lanarkshire indicates that the 2004 NAQS objectives for PM_{10} are unlikely to be exceeded in urban locations. It is therefore concluded that ambient PM_{10} concentrations are unlikely to exceed 2004 NAQS objective levels.

Emissions from the dust emitting processes were identified that are considered likely to cause a localised exceedence of the NAQS objective for PM_{10} in 2004.

Emissions from road traffic, domestic and dust emitting processes were identified as likely to cause exceedence of the NAQS annual mean objective set by the Scottish Executive for 2010.

It is therefore considered unlikely that there will be any exceedence of the NAQS objective for PM_{10} in 2004 except in localised areas around dust emitting processes and that further assessment will be required in forthcoming years with regard to the 2010 objective.

A Detailed Assessment for PM_{10} is therefore required for North Lanarkshire.

9 CONCLUSION

Assessment was made of the seven pollutants contained within the National Air Quality Strategy and the ambient ground level concentrations of each pollutant assessed against the NAQS objectives for each pollutant. The conclusions of the assessment were as follows:

- The ambient carbon monoxide concentration is unlikely to exceed the NAQS objective by the end of 2003. No pollutant hotspots from industrial or road traffic emissions sources were predicted. It is therefore concluded that there will be no exceedence of the NAQS objective for carbon Monoxide within North Lanarkshire and it is deemed unnecessary to progress to a Detailed Assessment.

- The ambient benzene concentration is unlikely to exceed the NAQS objective by the end of 2003 or 2010. No pollutant hotspots from industrial, road traffic or petrol station emissions sources were predicted. It is therefore concluded that there will be no exceedence of the NAQS objective for benzene within North Lanarkshire and it is deemed unnecessary to progress to a Detailed Assessment.

- The ambient 1,3-butadiene concentration is unlikely to exceed the NAQS objective by the end of 2003. No pollutant hotspots from industrial sources were predicted. It is therefore concluded that there will be no exceedence of the NAQS objective for 1,3-butadiene within North Lanarkshire and it is deemed unnecessary to progress to a Detailed Assessment.

- The ambient lead concentration is unlikely to exceed the NAQS objective by the end of 2004 or 2008. No pollutant hotspots from industrial emissions sources were predicted. It is therefore concluded that there will be no exceedence of the NAQS objective for lead within North Lanarkshire and it is deemed unnecessary to progress to a Detailed Assessment.

- It is predicted that there will be exceedence of NO_2 objectives in Coatbridge, Chapelhall and Motherwell as a result of road traffic emissions. Potential of exceedence of NAQS objectives for NO_2 as a result of industrial emissions from Corus Dalzell Works in Motherwell was also identified. A Detailed Assessment of NO_2 in North Lanarkshire is therefore required.

- The ambient sulphur dioxide concentration is unlikely to exceed the respective NAQS objectives by the end of 2004 or 2005. Sulphur dioxide concentrations in excess of the daily mean objective have been recorded at Muirhead, Coatbridge. Potential for exceedence of SO_2 15-minute objectives has been identified in Salsburgh. It is considered necessary to progress to a Detailed Assessment for sulphur dioxide.

- The ambient particulate concentration is unlikely to exceed NAQS objectives by the end of 2004. Pollutant hotspots from dust emitting sources have been predicted by the end of 2004. Exceedence of the 2010 NAQS particulate objectives is predicted as a result of road traffic and quarrying processes. A Detailed Assessment is therefore required for particles.

It will therefore be necessary for North Lanarkshire Council to progress to a Detailed Assessment for nitrogen dioxide, sulphur dioxide and particles to be submitted by April 2004 and to complete a progress report for the remaining pollutants by this date.

10 REFERENCES

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