

PETERBOROUGH CITY COUNCIL

AIR QUALITY

**REVIEW AND ASSESSEMENT
FINAL REPORT**

JULY 2000

PREFACE

This document represents the completion of the first comprehensive review and assessment of external ambient air quality in Peterborough. Part IV of the Environment Act 1995 requires each local authority to review air quality periodically. The Air Quality Regulations 2000 prescribe air quality objectives and the dates for meeting them. For each objective, local authorities have to consider present and likely future air quality, and assess whether the objectives are likely to be achieved in time.

The main aim of the Strategy and the Regulations is to ensure that ambient air quality in public places poses no significant risk to health and quality of life, but without imposing unacceptable social or economical costs. The Regulations provide that “the achievement or likely achievement of an air quality objective....shall be determined by reference to the quality of air at locations which are situated outside of buildings or man-made structures above or below ground and where members of the public are regularly present”. Peterborough City Council has therefore focused their review and assessment on locations where members of the public are regularly present and are likely to be exposed over the averaging time of the objectives.

Peterborough City Council has used simple screening techniques to determine if there is a need to carry out more detailed examination of air pollutants. The results of this screening has been previously reported in the Stage 1 Air Quality Review and Assessment for Peterborough issued in January 1999.

The results of the investigation into those pollutants brought forward for a further detailed review and assessment are detailed in this document. This report forms the basis for public consultation as required by the Environment Act 1995.

CONTENTS

Preface

Contents

List of Tables

Executive Summary

Acknowledgements

Chapter 1	Introduction
Chapter 2	Results of Consultation for Stage 1 of Review and Assessment
Chapter 3	Policy and Processes
Chapter 4	Data Sources
Chapter 5	Review of Benzene, 1,3-Butadiene and Lead
Chapter 6	Assessment of Carbon Monoxide
Chapter 7	Assessment of Sulphur Dioxide
Chapter 8	Assessment of Particles (PM ₁₀)
Chapter 9	Assessment of Nitrogen Dioxide
Chapter 10	Conclusions and Recommendations

Bibliography

LIST OF TABLES

1. Responses to Stage 1 Review and Assessment Consultation
2. Pollutants Requiring Further Review and Assessment
3. Objective for the Purpose of Local Air Quality Management
4. Traffic Flows, Speeds and Growth Forecasts for Existing Roads in Peterborough
5. Environmental Protection Act 1990 – Part A Processes
6. Environmental Protection Act 1990 – Part B Processes
7. Quarrying, Stockpiles and Landfill Sites
8. Carbon Monoxide Levels from the Automated Urban Network
9. Inputs to Design Manual for Roads and Bridges
10. Predicted Concentrates for Carbon Monoxide

EXECUTIVE SUMMARY

Over the past two years Peterborough City Council has carried out a major review of seven pollutants set out in the National Air Quality Strategy. The purpose of this work was to compare local air quality with national health based objectives set for the years 2003 to 2005, to identify actions required to reduce air pollution and provide data which will enable informed decisions to be made in relation to land use planning and transport planning.

A report of the Stage 1 Review and Assessment of air quality in Peterborough was published in January 1999 and subjected to wide consultation. That report together with this final report represent the findings of the first completed review and assessment of local air quality for Peterborough.

Progressively sophisticated information gathering modelling and monitoring techniques have been used to predict pollution levels in the local environment. The first stage of the review and assessment process identified four pollutants – carbon monoxide, nitrogen dioxide, particulate matter (PM₁₀) and sulphur dioxide – as potentially impacting upon local air quality.

These pollutants have received further evaluation in accordance with technical guidance issued by the Department of the Environment, Transport and the Regions (DETR).

As a result, of this assessment, it is concluded that all areas within Peterborough City Council will comply with the objectives set in the National Air Quality Strategy detailed in the DETR document 'Working Together for Clean Air'.

The following table summarises the judgements made for the review and assessment process for air quality in Peterborough.

Pollutant	Assessment	
	Stage 1: Potential Exceedence	Final Report: Exceedence Identified
Benzene	No	No
1,3- Butadiene	No	No
Carbon Monoxide	Yes	No
Lead	No	No
Nitrogen Dioxide	Yes	No
Fine Particles (PM ₁₀)	Yes	No
Sulphur Dioxide	Yes	No

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ACKNOWLEDGEMENTS

The following organisations have made valuable contributions to the technical content of this report and their assistance is acknowledged.

- The working group of officers from the District Councils in Cambridgeshire and the County Council for their assistance in the review and assessment process.
- Cambridgeshire Environmental Research Consultants Ltd who provided assistance with mathematical modelling.
- AEA Technology Ltd (NETCEN) who provided assistance with the technical aspects of assessment.
- The Environment Agency who provided information relative to industrial processes identified as Part A processes under the Environmental Protection Act 1990.

CHAPTER 1 INTRODUCTION

- 1.1 This document represents a detailed review and assessment in Peterborough for those pollutants brought forward from the first stage of the process. The aim of this stage of the process is to subject these pollutants to more detailed screening by way of modelling and monitoring techniques relevant to the Peterborough area, to determine whether or not there is a significant risk of the air quality objectives being exceeded both now and at the end of the year 2005.
- 1.2 It is not intended to provide an accurate prediction of current or future air quality across the entire district. However, for the purposes of the review and assessment a number of locations in Peterborough have been selected for consideration. These locations are representative of places where the highest concentrations of pollutants are likely to occur as highlighted by the first stage review and assessment. Where screening has indicated that there is a risk that an air quality objective may not be met detailed and accurate appraisal of the potential impacts has been undertaken.
- 1.3 For the purpose of the review and assessment, investigation has focused upon locations where members of the public are likely to be exposed to air pollutants over the averaging period of the objective.
- 1.4 The following pollutants have been brought forward from the Stage 1 review.
- Carbon Monoxide (CO)
 - Nitrogen Dioxide (NO₂)
 - Fine Particles (PM₁₀)
 - Sulphur Dioxide (SO₂)

CHAPTER 2 RESULTS OF CONSULTATION FOR STAGE 1 OF REVIEW AND ASSESSMENT

2.1 The consultation on the results of Stage 1 was undertaken at the beginning of 1999. This was largely an exercise in disseminating information. A report was published and despatched to an agreed list of consultees. This was wide ranging and included the statutory consultees, local councillors, parish councils and libraries within the Peterborough City Council area. Leaflets were published separately for wider circulation, which included all businesses with over 100 employees.

Summary of Responses

2.2 The consultation resulted in the return of 9 responses. Table 1 below indicates the main categories of responders and the main points of their reply.

Table 1: RESPONSES TO CONSULTATION ON STAGE 1 REVIEW AND ASSESSMENT

Consultee	Consultation Reply to Stage 1	Response
DETR	The approach taken to stage 1 and the conclusions reached are acceptable for all pollutants.	Noted
Statutory Consultees	Continued involvement in the County Air Quality Review and Assessment Group and Partnership approach praised as an example of good practice.	Noted – this approach has been continued.
	Main concerns focus around traffic pollution.	Stage 3 work has included further assessment of traffic related pollutants.
	A criticism was made that review and assessment process dealt solely with effects of air pollution on human health and not implications for wildlife.	Objectives in 1997 Regulations relate solely to effects on human health. The latest government strategy includes objectives for certain pollutants with regards to their ecological impacts. However, assessment against these does not form part of local authority statutory duties.
Parish Councils	Neither comment nor view was forthcoming.	
Businesses and others including pressure groups, schools & individuals	Summary leaflet would be useful to advise of health effects of pollutants.	Noted.

CHAPTER 3 POLICY AND PROCESSES

Background

- 3.1 The National Air Quality Strategy (NAQS) was published in 1997 by the DETR in response to the requirements of the Environment Act 1995. The Air Quality Regulations 1997 came into force at the end of that year. These required district and unitary authorities to review periodically air quality in their areas and set health based objectives for seven pollutants to be achieved by 2005 through a combination of national policy and local action. Where results of the review and assessment process show objectives are unlikely to be met by 2005 Air Quality Management Areas have to be designated. For these areas Action Plans have to be drawn up setting out the measures which will be undertaken in pursuit of the objectives.
- 3.2 A first report covering Stage 1 of the review and assessment was produced by Peterborough City Council in January 1999.

The results of the Stage 1 Review and Assessment, in respect of the seven pollutants being considered as part of the Air Quality Strategy in Peterborough, are identified in Table 2 below.

Benzene	No
1,3-Butadiene	No
Carbon Monoxide	Yes
Lead	No
Nitrogen Dioxide	Yes
Particulate Matter (PM ₁₀)	Yes
Sulphur Dioxide	Yes

- 3.3 The results of Stage 1 in Table 2 shows that carbon monoxide, nitrogen dioxide, fine particles (PM₁₀) and sulphur dioxide will be taken forward for further evaluation by Peterborough City Council. The main source of carbon monoxide, nitrogen dioxide and PM₁₀ was considered to be transport although in the latter case high background levels, for example from windblown dusts and secondary particles formed by chemical reactions are known to be significant in the county. High sulphur dioxide levels are associated with combustion plant at local industrial premises.
- 3.4 As a result of the Stage 1 Review and Assessment process more detailed investigations have now taken place with regard to the four pollutants which are identified as potentially impacting upon air quality.

3.5 The DETR undertook the first review of the 1997 NAQS during 1998. Results of the review were published for consultation in February 1999. Subsequently a revised document "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland" (AQS) was published for consultation in August 1999 and adopted in January 2000. The changes to the air quality objectives were incorporated into prescribed regulations. These objectives are given in Table 3 below.

Table 3: Objectives for the Purpose of Local Air Quality Management

Pollutant	Objective		Date to be achieved by
	Concentration*	Measured as°	
Benzene	16.25µg/m ³ (5ppb)	running annual mean	31 December 2003
1,3-Butadiene	2.25µg/m ³ (1ppb)	running annual mean	31 December 2003
Carbon Monoxide	11.6mg/m ³ (10ppm)	running 8 hour mean	31 December 2003
Lead	0.5µg/m ³ 0.25µg/m ³	annual mean annual mean	31 December 2004 31 December 2008
Nitrogen Dioxide [‡]	200µg/m ³ (105ppb) not to be exceeded more than 18 times a year	1 hour mean	31 December 2005
	40µg/m ³ (21ppb)	annual mean	31 December 2005
Particles (PM ₁₀)	50µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31 December 2004
	40µg/m ³	annual mean	31 December 2004
Sulphur Dioxide	350µg/m ³ (132ppb) not to be exceeded more than 24 times a year	1 hour mean	31 December 2004
	125µg/m ³ (47ppb) not to be exceeded more than 3 times a year	24 hour mean	31 December 2004
	266µg/m ³ (100ppb) not to be exceeded more than 35 times per year	15 minute mean	31 December 2005
<p>* Conversions of ppb and ppm to µg/m³ at 20°C and 1013mb. [‡] The objectives for nitrogen dioxide are provisional. [°] How the objectives are to be measured is set out in Regulations.</p>			

The Review and Assessment Process

- 3.6 This report undertakes to make a more accurate and detailed analysis of the current and future concentrations of those pollutants identified at Stage 1 as being at risk of exceeding the air quality objectives in 2005. This involves investigation of the likelihood of failure to achieve the objectives, which is a crucial factor in determining the designation of Air Quality Management Areas (AQMAs). Modelling techniques, suitable for each particular scenario, have been used to estimate both the magnitude and the geographical extent of each potential exceedence.

CHAPTER 4 DATA SOURCES

- 4.1 The first stage of the review and assessment for the pollutants specified in the Air Quality Regulations 1997 was produced by Peterborough City Council in January 1999. This was essentially an information gathering exercise but judgements have to be made to determine if specific activities or processes exist that could have the potential to emit significant quantities of pollutants that could lead to exceedances of the relevant air quality objectives within the local authority area. Pollutants likely to exceed air quality objectives were then carried forward for further review and assessment.

Data Review

- 4.2 This document represents the review and assessment in Peterborough for those pollutants brought forward from the first stage of the process. The aim of this stage of the process is to subject these pollutants to more detailed screening.
- 4.3 Various organisations have provided information used in the compilation of this report and data provided for the Stage 1 review and assessment has been reviewed and updated as necessary.

Monitoring Data

- 4.4 Monitoring data held by Peterborough City Council has been considered together with data from other organisations. Data collected from outside the authority boundaries is used where monitoring data for a particular pollutant is not available.
- 4.5 Information on traffic has been supplied by the Transport and Engineering Division of the City Council's Environmental Services Department.
- 4.6 Background pollutant concentrations have been gathered from map data available in the National Air Quality Information Archive³ where information is not already available within the City Council.

Traffic Information

- 4.7 Traffic information has been provided by Peterborough City Council's Transport & Engineering Division for each of the major roadlinks and segments. Data on annual average daily flow, mean average daily traffic speed and heavy goods vehicles is given. The information shown in Table 4 replaces the forecasts for existing roads previously provided in Table 11 of the stage 1 Air Quality Review and Assessment.

Table 4: Traffic Flows, Speeds and Growth Forecasts for Existing Roads in Peterborough

Road	Link Description	Link No	Road Type	Urban Rural	1999 Flow			Year	24 Hr AADT 2005		AADT Hourly		Mean Peak Hour Traffic Speed (kph)
					ALL	%HGV	HGV		All	HGV	All	HGV	
A1	North of A1 Slips		D2AP	R	45.2	16	7.23	1999	49,578	7,661	1,033	160	96
A1073	North of Eye		S2AP	R	9.8	12	1.18	1997	10,749	1,246	224	26	75
A1073	North of B1443		S2AP	R	10.6	13	1.38	1993	11,627	1,460	242	30	75
A1129	High Street		S2AP	U	7.6	5	0.38	1998	7,887	381	164	8	43
A1139	Fletton Parkway	A1-01	D2AP	R	33.0	14	4.62	1999	36,196	4,894	754	102	97
A1139	Fletton Parkway	0103	D2AP	R	41.1	14	5.75	1997	45,081	6,095	939	127	97
A1139	Fletton Parkway		D2AP	R	38.3	14	5.36	1998	42,010	5,680	875	118	97
A1139	Frank Perkins Parkway	0708	D2AP	R	28.9	12	3.47	1999	31,699	3,674	660	77	97
A1139	Frank Perkins Parkway	0507	D2AP	R	36.6	11	4.03	1999	40,145	4,265	836	89	97
A1139	Frank Perkins Parkway	0568	D2AP	R	41.5	11	4.57	1998	45,519	4,836	948	101	97
A1139	Orton Parkway	0126	D2AP	R	10.2	3	0.31	1997	11,188	324	233	7	98
A1179	Thorpe Road	3436	S2AP	U	20.5	5	1.03	1999	21,274	1,027	443	21	35
A1260	Nene Parkway	0332	D2AP	R	32.2	8	2.58	1999	35,319	2,729	736	57	97
A1260	Nene Parkway	3233	D2AP	R	47.1	5	2.36	1998	51,662	2,495	1,076	52	96
A1260	Nene Parkway	1533	D2AP	R	31.9	7	2.23	1997	34,990	2,366	729	49	97
A15	A15	B1443-47	S2AP	R	14.8	7	1.04	1999	16,233	1,097	338	23	74
A15	Bourges Boulevard	1842	D2AP	R	31.9	5	1.60	1999	34,990	1,690	729	35	97
A15	Bourges Boulevard	4041	D2AP	R	27.0	3	0.81	1999	29,615	858	617	18	97
A15	Bourges Boulevard	3637	D2AP	R	33.8	5	1.69	1999	37,074	1,790	772	37	97
A15	Lincoln Road	1844	D2AP	R	40.7	4	1.63	1999	44,642	1,725	930	36	97
A15	London Road		S2AP	R	14.0	8	1.12	1998	15,356	1,186	320	25	74
A15	London Road	New Rd – Fl.	S2AP	U	7.4	7	0.52	1998	7,679	519	160	11	43
A15	Paston Parkway	2122	D2AP	R	15.7	9	1.41	1999	17,221	1,497	359	31	98
A15	Paston Parkway	2021	D2AP	R	20.2	7	1.41	1999	22,156	1,498	462	31	98
A47	Ailsworth Bypass		D2AP	R	19.1	14	2.67	1999	20,950	2,833	436	59	98
A47	East of A1		S2AP	R	18.5	13	2.41	1999	20,292	2,548	423	53	74
A47	East of Thorney		S2AP	R	13.7	16	2.19	1998	15,027	2,322	313	48	74
A47	Eye Bypass	A1139-20	S2AP	R	14.9	11	1.64	1998	16,343	1,736	340	36	74

Road	Link Description	Link No	Road Type	Urban/Rural	1999 Flow			Year	24 Hr ADT 2005		AADT Hourly		Mean Peak Hour Traffic Speed (kph)
					ALL	%HG V	HGV		All	HGV	All	HGV	
A15	Paston Parkway	0820	D2AP	R	23.8	8	1.90	1999	26,105	2,017	544	42	98
A47	Soke Parkway	1516	D2AP	R	32.7	9	2.94	1999	35,867	3,118	747	65	97
A47	Soke Parkway	1718	D2AP	R	45.4	8	3.63	1998	49,797	3,848	1,037	80	96
A47	Soke Parkway	1819	D2AP	R	29.2	8	2.34	1999	32,028	2,475	667	52	97
A47	Soke Parkway	1920	D2AP	R	26.1	9	2.35	1999	28,628	2,488	596	52	98
A47	Soke Parkway	1617	D2AP	R	34.7	9	3.12	1999	38,061	3,308	793	69	97
A47	West of Eye		S2AP	R	20.9	14	2.93	1998	22,924	3,100	478	65	74
A47	West of Thorney		S2AP	R	15.7	19	2.98	1998	17,221	3,160	359	66	74
A47	West of Thornhaugh		S2AP	R	9.0	17	1.53	1995	9,872	1,62	206	34	75
A605	Oundle Road	A1-26	S2AP	R	11.6	4	0.46	1997	12,724	492	265	10	75
A605	Oundle Road	New Rd –32	S2AP	U	12.6	4	0.50	1999	13,075	505	272	11	40
A605	Oundle Road	A1-26	S2AP	R	6.8	3	0.20	1999	7,459	216	155	5	75
A605	Oundle Road	New Rd – T..	S2AP	U	14.7	5	0.74	1998	15,255	737	318	15	39
A605	Town Bridge			U	35.8	5	1.79	1998	37,151	1,794	774	37	26
B1433	East of Stamford		S2AP	R	3.4	7	0.24	1999	37,729	252	78	5	76
B1443	East of Newborough		S2AP	R	2.5	5	0.13	1999	2,742	132	57	3	76
B1443	Lincoln Road		S2AP	R	3.4	8	0.27	1999	3,729	288	78	6	76
B1443	West of Glinton		S2AP	R	3.4	8	0.27	1998	3,729	288	78	6	76
B1443	West of Thorney		S2AP	R	1.7	5	0.09	1995	1,865	90	39	2	76
	Boongate	0539	S2AP	U	22.1	4	0.88	1999	22,934	478	478	18	34
	Peterborough Road	A1139-08	S2AP	R	15.3	11	1.68	1999	16,782	350	350	37	74

Table 4 (Continued): Traffic Flows; Speeds and Growth Forecasts for Existing Roads in Peterborough

KEY: HGV – Heavy Goods Vehicle
AADT – Annual Average Daily Traffic

Prescribed Industrial Processes

- 4.8 The Environmental Protection Act 1990 introduced new legislative controls to deal with specific industrial processes. These are contained in Part 1 of the Act and its introduction follows the issue of a European Community Directive in 1985.
- 4.9 This new legislation identified two forms of control to deal with the vast range of industrial processes. It is recognised that industrial processes have the potential to pollute land, air and water. Where specific processes have the potential for pollution to more than one of these, the process was known as a Part A process and was categorised under Integrated Pollution Control (IPC). Such processes are subject to an authorisation scheme administered by the Environment Agency. Prior to April 1996 this was undertaken by Her Majesty's Inspectorate of Pollution.
- 4.10 Where the specific industrial processes have a potential for only pollution to air they are known as Part B processes and categorised as Local Authority Pollution Control. These are authorised by local authorities such as Peterborough City Council.
- 4.11 Guidance issued by the DETR¹ provides information on those prescribed processes which are of significance with respect to air quality. Details of processes authorised by the Environment Agency, i.e. Part A are submitted to Peterborough City Council in respect of premises in this area and kept on Public Register. In addition, all processes authorised by Peterborough City Council, i.e. Part B, have Public Register copy.
- 4.12 In considering prescribed industrial processes for the purpose of this report, account has been taken of Part A processes within Peterborough and also processes in neighbouring authorities where their proximity to the City Council boundary is considered to be significant to air quality. These are identified in Table 5 and their location is shown in Figure 1 on the following page.

Table 5: Environmental Protection Act 1990		Part A Processes
Name & Address of Operator	O.S. Grid Ref	Type of Process
Peterborough Power Ltd Storeys Bar Road, Peterborough	5218 2992	Combustion Process - Gas Turbine/Boiler
Transco 1650 Lincoln Road, Peterborough	5150 3045	Combustion Process - Gas Turbine
Hanson Brick Ltd Saxon Works, 222 Peterborough Rd, Whittlesey	5256 2971	Ceramics Kiln Firing
Hanson Brick Ltd Kings Dyke, 222 Peterborough Rd, Whittlesey	5244 2977	Ceramics Kiln Firing
Castle Cement Ltd Ketton Works	4985 3055	Cement Manufacture

- 4.13 Data from processes authorised by Peterborough City Council as Part B processes have been considered to assess the impact of emissions on air quality. Although 65 processes are currently authorised under the 1990 Act as Part B processes in Peterborough, only three are considered to have implications for local air quality. These are identified in Table 6 and their location is shown in Figure 1 on the previous page.

Table 6: Environmental Protection Act 1990		Part B Processes
Name & Address of Operator	O S Grid Ref	Type of Process
Bardon Aggregates Thornhaugh Quarry, Wansford	5055 2993	Limestone Quarry
Bardon Roadstone Oxney Rd Industrial Estate Peterborough	5225 3008	Roadstone Coating
Bardon Aggregates Cross Leys Quarry Wittering	5032 3006	Limestone Quarry

Quarrying, Stockpiles and Landfill Sites

- 4.14 Data for minerals and waste activities in the Peterborough area have been considered to assess the impact of emissions on air quality. These processes are identified in Table 7 and their location is shown in Figure 4.3.

Table 7: Quarrying, Stockpiles and Landfill Sites		
Name & Address of Operator	O S Grid Ref	Type of Process
Bardon Aggregates Cross Leys Quarry Wittering	5032 3006	Limestone Quarry
Bardon Aggregates Thornhaugh Quarry, Wansford	5055 2993	Limestone Quarry
Tarmac Quarry Products Maxey Quarry, Maxey	5135 3075	Sand & Gravel Quarry
Bardon Aggregates Pode Hole Quarry Thorney	5255 3035	Sand & Gravel Quarry
Mick George Haulage Southorpe Quarry Sutton Road, Southorpe	5087 3018	Sand & Gravel Quarry Inert Landfill & Recycling
RMC Eyebury Quarry Eyebury Road, Eye	5234 3017	Sand & Gravel Quarry Putrescible Landfill & Inert Recycling
Shanks Welland Road Dogsthorpe	5208 3021	Clay extraction & Putrescible Landfill

Major Planned Developments

- 4.15 A major planned development with implications for local air quality is the creation of the Hampton Township to the south of the city. The implications of this development for local air quality are considered in this report. Details of other planned developments can be found in the Peterborough Local Plan⁴.

CHAPTER 5 REVIEW OF BENZENE, 1,3-BUTADIENE AND LEAD

BENZENE AND 1,3-BUTADIENE

5.1 Summary of Stage 1 Review and Assessment Findings

1997 NAQS Objectives

**Benzene – 5ppb or less as the annual mean to be met by 2005.
1,3-Butadiene 1ppb or less as the annual mean to be met by 2005**

Stage 1 results indicated that the above NAQS objectives would be met throughout Peterborough by 2005.

The Position in Peterborough in 2000

- 5.2 Review of the National Air Quality Strategy by the DETR stated that the 1997 objectives were likely to be met throughout the United Kingdom by 2005. Since the publication of the strategy, further reductions in emissions from cars, light vans and heavy-duty vehicles have been agreed in Europe as part of the ongoing Auto Oil Programme. These further reductions, to take effect in 2001 (Euro 3) and 2006 (Euro 4) will make compliance with the objectives more certain and sooner. The following revised objectives have been adopted in the 2000 National Air Quality Strategy⁵.

Revised Objectives

**Benzene – 15.25µg/m³ (5ppb) or less as annual mean to be met by 2003
1,3-Butadiene – 2.25µg/m³ (1ppb) or less as the annual mean to be met by 2003**

- 5.3 Peterborough City Council does not have relevant locations in the vicinity of major industrial processes which handle, store or emit 1,3-butadiene or benzene.
- 5.4 The Stage 1 review and assessment in Peterborough showed that there were no industrial sources that could lead to a situation where either of the revised objectives were likely to be breached. Therefore, there is no reason to suppose that any of the population of Peterborough is likely to be exposed to levels of these pollutants above the relevant air quality objectives.

Assessment: Benzene and 1,3-Butadiene

No further review and assessment proposed for this pollutant.

LEAD

5.5 Summary of Stage 1 Review and Assessment Findings

1997 NAQS Objective

0.5µg/m³ or less as the annual mean to be met by 2005

Stage 1 results indicated that the above NAQS objective would be met throughout Peterborough by 2005.

The Position in Peterborough in 2000

- 5.6 Review of the NAQS stated that the 1997 objective for lead was likely to be met throughout the United Kingdom by 2005, with the possible exception of areas in the vicinity of individual industrial plant, and also that this objective would be met by the earlier date of 2004. Also further reductions in emissions will arise from the agreement reached in Europe (part of the Auto Oil Programme) to ban the sale of leaded petrol from the beginning of the year 2000.
- 5.7 On the basis of the conclusions of health advice from the Expert Panel on Air Quality Standards, the government have decided that the objective of national policy should be to reduce concentrations of lead in air in all areas to as low a level as is practicably possible. The following revised objective for lead has been adopted in the 2000 National Air Quality Strategy.

Revised Objectives

0.5µg/m³ or less as the annual mean to be met by 2004

0.25µg/m³ or less as the annual mean to be met by 2008

- 5.8 Historically, lead pollution has been associated with motor vehicles running on leaded four star petrol. Over the last decade, there have been significant reductions in lead pollution from this source. Data from the national monitoring network shows that even at the kerbside of a major highway in London carrying in excess of 60,000 vehicles per day, the 1998 annual mean lead content was less than 0.1µg/m³.
- 5.9 The stage 1 review and assessment in Peterborough showed that there were no industrial sources that could lead to a situation where either of the new air quality objectives were likely to be breached. Therefore, there is no reason to suppose that any of the population of Peterborough is likely to be exposed to levels of lead that are above either of the two new air quality objectives for lead.

Assessment: Lead

No further review and assessment proposed for this pollutant.

CHAPTER 6 ASSESSMENT OF CARBON MONOXIDE

6.1 Summary of Stage 1 Review and Assessment Findings

1997 NAQS Objective

10ppm or less as the 8 hour running mean to be met by 2005

The stage 1 report of Carbon Monoxide indicated that a further review and assessment was required because of:-

- The presence of road links with annual average daily traffic flows in excess of 50,000 vehicles, and
- A planned major development at Hampton which is projected to increase traffic flow.

The Position in Peterborough 2000

- 6.2 Review of the National Air Quality Strategy⁵ stated that the 1997 objective was likely to be met throughout the United Kingdom by 2005. Since the publication of the strategy, further reductions in emissions from cars, light vans and heavy-duty vehicles have been agreed in Europe as part of the ongoing Auto Oil Programme. These reductions, to take effect in 2001 (Euro 3) and 2006 (Euro 4) will make compliance with the objective more certain and sooner. The following revised objective has been adopted in the 2000 national strategy.

Revised Objective

11.6µg/m³ (10ppm) or less as the 8 hour running mean to be met by 2003

Monitoring Data Source

- 6.3 Carbon monoxide has never been measured in the Peterborough area. The nearest data source is from Cambridge City Council's monitoring site in the centre of Cambridge. This is a kerbside site situated in a tight canyon street whose topography and street geometry are totally unrepresentative of receptor locations in Peterborough. Data from this source is therefore not considered in this report.
- 6.4 Receptor locations in Peterborough will tend to be located in corridors either side of the heavily trafficked trunk road in the district and for this reason monitoring data from suitably sited Automated Urban Network (AUN) stations is considered here, together with mapped urban background concentration data published by DETR.

Levels Monitored on the Automated Urban Network

- 6.5 Data collected from four sites on the DETR's AUN has been compared with the air quality objective for carbon monoxide (10 ppm expressed as the maximum 8 hour running mean). These AUN sites were elected because they are located at varying distances from major roads carrying high numbers of vehicles. Results shown in Table 8 indicate that the air quality objective for carbon monoxide is met at AUN monitoring sites.

Site	Description	Year	Maximum 8 hour running mean CO concentration (ppm)
Cromwell Road, London	At the kerbside of major road carrying 60000+ vehicles per day	1996	6.42
London A3	Roadside site on the Kingston bypass	1997	2.75
London Hillingdon	Suburban site 30 metres from the M4 motorway	1996	7.8
Stevenage	100 metres east of the A1(M)	1994	2.5

Predicted Concentrations for 2003 using the Design Manual for Roads and Bridges issued by the Highways Agency in 1998

- 6.6 The next step in the assessment is to model likely concentrations at receptor sites in Peterborough for the year 2003. It must be emphasised that this exercise is carried out on a precautionary basis using the highest traffic flows in the district and choosing relevant receptor locations near to major trunk road. For example, receptor locations are considered at distances of 30, 50 and 100 metres from the A1.

Input Parameter	Value in 2003
Average traffic flow per hour	2336
% H.G.V.'s	15.8
Average traffic speed in kph	96

- 6.7 Table 10 gives the results of this modelling exercise. The results indicate that the air quality objective will be met at these locations. For each calculation, 0.2 ppm has been added to account for the background concentration as derived from mapped background data³.

Year	Distance from centre of A1		
	30m	50m	100m
2005	2.6	2.2	2.1

- 6.8 The traffic flow associated with the planned development of Hampton has not been predicted to increase the projected annual average daily traffic flow for any road link above 80,000 vehicles. It is therefore unlikely that the air quality objective will be exceeded as a result of this development.

National Perspective

- 6.9 The UK Government has identified that 8-hour mean concentrations of carbon monoxide being recorded in urban background locations are already below 10 ppm. An assessment of likely 8-hour concentrations at roadside locations suggests that policy measures already in place should lead to concentrations at all roadsides falling below 10 ppm by 2003.
- 6.10 The Review and Assessment: Pollutant Specific Guidance¹ advises that it will only be necessary to proceed to second stage review and assessment where the daily average traffic flow exceeds 80000 vehicles per day. No road links in Peterborough are expected to exceed this figure before 2003 and therefore it is unlikely that the revised objective will be exceeded.

Assessment : Carbon Monoxide

On the basis of predicted concentrations of carbon monoxide both now and in 2003 it is concluded that the air quality objective for this pollutant is likely to be met throughout Peterborough and no further review and assessment is required.

CHAPTER 7 ASSESSMENT OF SULPHUR DIOXIDE

Summary of Stage 1 Review and Assessment Findings

1997 NAQS Objective

100ppb or less expressed as the 99.9th percentile of 15 minute average

- 7.1 The stage 1 report of Sulphur Dioxide indicated that further review and assessment was required because of
- The presence of relevant Part A authorised processes in the Peterborough District
 - The presence of relevant Part A authorised processes in areas adjacent to the district boundary
 - The presence of a relevant Part B prescribed process in Peterborough
 - The possibility of a 1km x 1 km grid square in the authority's areas for which maximum low-level (i.e. domestic combustion and other short stack) emissions are greater than 25kg per hour or 40 tonnes per year.

The Position in Peterborough in 2000

- 7.2 The review of the 1997 National Air Quality Strategy acknowledged that the UK will be under a legal obligation to achieve the Air Quality Daughter Directive limit values by 1 January 2005. The strategy therefore includes:-
- The one hour limit value of $350\mu\text{g}/\text{m}^3$ (132ppb), not to be exceeded more than 24 times per year; and
 - The 24 hour limit value of $125\mu\text{g}/\text{m}^3$ (47ppb), not to be exceeded more than 3 times per year;
 - Both to be achieved by the end of 2004.
- 7.3 The Directive's limit values are however less stringent than the 1997 strategy. The Government and devolved administrations consider that concentrations of sulphur dioxide should be reduced as much as reasonably practicable in order to reduce the exposure of the population to levels at which harmful effects are unlikely to occur and also to reduce its contribution to secondary particle formation and acidification. The 1997 objective for sulphur dioxide of $266\mu\text{g}/\text{m}^3$ (100ppb) as a 15 minute mean not to be exceeded more than 35 times a year as the objective to be achieved by 31 December 2005 is therefore retained.

The UK will be under a legal obligation to achieve the Directive's limit values. By working towards the more stringent objective for the end of 2005, this should ensure that any action needed to drive concentrations down towards this level is set in hand in good time to ensure that the Directive's limit value is achieved by the end of 2004. The three objectives are included in new regulations, which replace the Air Quality Regulations 1997, for the purposes of Local Air Quality Management.

REVISED OBJECTIVES

- 7.4 **266µg/m³ (100ppb) as the 15 minute average, with no more than 35 exceedences in a year to be met by 31 December 2005.**

350µg/m³ (132ppb) as a 1-hour mean with a maximum of 24 exceedences per year by the 31 December 2004.

125µg/m³ (47ppb) as a 24-hour mean with a maximum of 3 exceedences per year by the 31 December 2004.

- 7.5 Sulphur Dioxide has been brought through to a second stage of review and assessment because of the presence of Part A authorised processes in the Peterborough district, and in areas adjacent to the district boundary, and also because of the presence of a relevant Part B prescribed process in Peterborough.
- 7.6 The processes in question are gas compression by Transco at Werrington, power generation in Fengate by Peterborough Power Ltd, cement manufacture in Ketton, Brick Manufacture in Whittlesey and a roadstone coating plant in Fengate operated by Bardon Roadstone Ltd.
- 7.7 The review of the 1997 NAQS also identified a potential exceedence where the density of coal or solid smokeless fuel burning houses exceeds 300 properties per 1km².

Peterborough Power Ltd: Power Generation

- 7.8 Peterborough Power Ltd operates a Combined Cycle Turbine combustion process for power generation. The process is prescribed as a Part A process requiring authorisation for the control of emissions under the Environment Act 1990.
- 7.9 A dispersion modelling study has been conducted and is referenced in the Peterborough Power Ltd Application for Authorisation. The study concluded that the Power Station is unlikely to induce an increase of more than 1.9µg/m³ SO₂ as an Annual average as a worst case scenario.
- 7.10 The Environment Agency authorisation reflects the insignificant potential for releases of sulphur dioxide, and has not required any monitoring of this determinand, although a restriction is made on the sulphur content of the hazardous fuel.

7.11 A national dispersion modelling exercise of the existing major Part A processes in the UK has been undertaken by NETCEN on behalf of DETR. The results of this assessment indicated there are no areas in Peterborough which will exceed the 99.9th percentile of 15-minute means by the end of 2005.

7.12 It is therefore concluded that the risk of the objective not being met, in areas that are affected by the emissions from this process, is negligible.

Transco: Peterborough Compressor Station

7.13 Transco operate a combustion process for the compression of natural gas by a power turbine driving a gas compressor. The process is prescribed as a Part A process requiring authorisation for the control of emissions by the Environment Agency.

7.14 No dispersion modelling has been conducted for the emission of sulphur dioxide from this source. The process is however of a similar nature in terms of emissions to that conducted by Peterborough Power Ltd, and therefore a similar impact from sulphur dioxide may be anticipated.

7.15 The Environment Agency authorisation for this process has not required any monitoring of sulphur dioxide, although a restriction has been placed on the sulphur content of the natural gas fuel.

7.16 A national dispersion modelling exercise of the existing major Part A processes in the UK has been undertaken by NETCEN on behalf of DETR⁶. The results of this assessment indicates there are no areas in Peterborough which may exceed the 99.9th percentile of 15-minute means by the end of 2005.

7.17 It is concluded that the risk of the objectives not being met in areas that are affected by the emissions from this process is negligible.

Castle Cement Ltd: Cement Manufacture

7.18 Castle Cement Ltd operates a cement manufacture process in Ketton. The process is prescribed as a Part A Process requiring Authorisation for the control of emissions by the Environment Agency.

7.19 Sulphur dioxide is generated from sulphur in the raw materials and from sulphur in the kiln fuels. A significant proportion of sulphur is absorbed during the process, the remainder is emitted in the flue gases as SO₂.

7.20 Dispersion modelling and fuel trials have been conducted for the process. These studies estimated an annual average ground level concentration contribution of 1.5µg/m³ SO₂ in close proximity to the process.

7.21 The Environment Agency has set a limit on SO₂ emissions from the process and do not anticipate any problems of compliance with National Air Quality Strategy limits.

7.22 It is therefore concluded that the risk of the objective not being met, in cases that are affected by the emissions from this process, is negligible.

Hanson Brick Ltd, Operations in the Whittlesey area

- 7.23 Hanson Brick Ltd manufactures bricks at its Kings Dyke and Saxon works which are located in the Whittlesey area. The Company operates four kilns at Kings Dyke and a further two kilns at Saxon which are authorised to produce a total of 7.5 million bricks/week. Lower Oxford clay is fired in those kilns. In common with other clays, the natural clay contains substances such as sulphur which are partly released during firing in the kiln. Fletton bricks comprising 100% Lower Oxford clay are currently produced at Saxon and Kings Dyke. However, one kiln at Saxon produces a PFA (pulverised fly ash) modified Fletton brick which results in the discharge of significantly lower emissions to atmosphere than occurs from the other kilns producing Fletton bricks. This reduction in emissions is achieved because the PFA is largely inert thus reducing the proportion of potential pollutants in the green brick. Furthermore, additions of acid neutralising substances are made to the PFA/Fletton green brick mix which further reduces acidic emissions. The impact of local air quality as a result of the existing operations is within existing and enacted future EC directive limit values. However, the Company has plans to further reduce the environmental impact of its operations. These plans are described below.
- 7.24 As part of its environmental improvement policy and product development programme, Hanson Brick Ltd is proposing to phase out the production of Fletton bricks at its Saxon/Kings Dyke kilns. All brick manufacture will be replaced by the production of PFA modified Flettons and Kempston modified Flettons. The Kempston modified Fletton is manufactured by an extrusion process from a green brick which contains just less than 80% Lower Oxford Clay with the balance comprising blast furnace slag and other largely non polluting materials such as acid neutralising limestone and woodchippings. The Company proposes to make the manufacturing change in two phases. The first and second phases are scheduled for February 2000 and February 2002 start-ups, respectively. The first phase change involves one Fletton Kiln (KD2) at Kings Dyke and a reduction in kiln capacity of 0.25 million bricks/week. The second phase change involves all the remaining Fletton kilns at both the Kings Dyke and Saxon works with a further reduction in capacity of 0.25 million bricks/week at Kings Dyke. The timing of this phase would be subject to changes in market conditions. These changes will result in significantly lower emissions to atmosphere compared to the current Fletton production.
- 7.25 Process data and dispersion modelling results formed an integral part of the application to the Environment Agency for a variation of the process. The modelling study predicted impacts for:
- The current "Base" case
 - The proposed first phase case which relates to changes at Kings Dyke (start-up Feb 2000)
 - The proposed second phase which relates to proposed future changes at both Kings Dyke and Saxon works (start-up Feb 2002 subject to market conditions).

- 7.26 The current base case modelling predicts a potential exceedance of the most stringent 99.9% of 15 minute averages limit within a small part of the Peterborough district, to the North of the brickwork's. The modelling demonstrates that this exceedance is likely to be removed on completion of the proposed first phase.
- 7.27 The predictions of pollutant levels subsequent to the completion of the second phase changes, demonstrate significantly lower emissions compared to the base case scenario. On completion, the impact on local air quality resulting from kiln operations is predicted to be within the UK Air Quality Strategy objectives.
- 7.28 It is therefore concluded that there is no risk of the objectives not being met in areas that are affected by the emissions from this process.

Bardon Roadstone Ltd, Roadstone Coating

- 7.29 Bardon Roadstone Ltd operate a roadstone coating process requiring authorisation as a Part B Process from the Local Authority for the control of emissions to atmosphere.
- 7.30 From data held on the authorisation, ground level concentrations may be predicted and compared with the National Strategy Objectives.
- 7.31 An equivalent 99.9th percentile of fifteen-minute averages of 38µg/m³ may be predicted. The addition of this predicted level with relevant estimated annual mean background concentrations does not indicate the potential for an exceedance of the National Strategy Objectives.
- 7.32 An assessment of SO₂ emissions from this process may also be made using a nomogram¹ which estimates the emission rate which would produce a 99.9th percentile of 15 minute mean ground level concentration of 53.2µg/m³ equivalent to 20% of the more stringent (15 minute mean) air quality objective. Using this procedure the actual emission rate is less than the emission threshold derived from the chart.
- 7.33 It is therefore concluded that the risk of the objective not being met in areas that are affected by the emissions from this process is negligible.

Survey of Point Sources

- 7.34 The first stage Review and Assessment for sulphur dioxide identified that low level emissions from point sources may possibly result in an exceedance of the air quality objectives.
- 7.35 Point sources can cause exceedance of the Air Quality Objectives by the use of fuel oils (such as heavy, medium or light fuel oil) or coals to power heating systems or production operations.
- 7.36 A survey was completed of local businesses, with greater than 100 employees. Details were requested of the type of fuel oil and the quantities used. From these quantities a threshold oil use level was used to eliminate fuel users who would not produce enough Sulphur Dioxide to lead to an exceedance of the Air Quality Objectives.

- 7.37 This threshold was determined to be 700,000 litres per annum of light or medium fuel oil or 400,000 litres per annum of heavy fuel oil. These threshold levels were based on the Pollutant Specific Guidance Notes¹, which states that emission of greater than 40 tonnes per annum in a one kilometre square area are likely to lead to exceedance in the Air Quality Objectives. Using this procedure no businesses were identified which would exceed the air quality objectives.
- 7.38 A review of data for Peterborough of estimated annual mean background and 99.9th percentile SO₂ concentrations for individual 1 x 1km grid squares does not identify concentrations, which exceed the air quality objectives.
- 7.39 It is therefore concluded that the risk of this objective not being met in areas that are affected by low level emissions from point sources is negligible

Domestic Sources

- 7.40 Solid fuel burning for domestic heating has largely been replaced by alternative fuels throughout most of the UK. However, there are a few areas remaining where solid fuel burning is still predominant, and which may have the potential to cause exceedances of the objectives. The risk of exceedance within an area can be considered significant where the density of coal burning (or Solid Smokeless Fuel burning) houses exceeds 300 properties per 1 km².
- 7.41 A review of monitoring data was completed after identification of areas where the density of coal burning houses may exceed 300 properties per 1km². Estimated annual mean and 99.9th percentile background SO₂ concentrations for 1996 mapped by NETCEN were used. Existing concentrations were not found to exceed the air quality objectives.
- 7.42 It is therefore concluded that the risk of the objective not being met in areas that are affected by domestic emissions from point sources is negligible.

Assessment – Sulphur Dioxide

On the basis of the above it is concluded that the air quality objective for this pollutant is likely to be met throughout Peterborough and no further review and assessment is required.

CHAPTER 8 ASSESSMENT OF PARTICLES (PM₁₀)

Summary of Stage 1 Review and Assessment Findings

1997 NAQS Objective

50µg/m³ less expressed as the 99th percentile of maximum daily running 24 hour mean

- 8.1 The Stage 1 report of particulate matter (PM₁₀) indicated that further review and assessment was required because of:-
- The presence of urban areas with an annual mean secondary particle concentration of greater than 8µg/m³ in the Peterborough district.
 - The presence of emissions from low level dispersed sources greater than 10 tonnes in any single 1km x 1km grid square or an average of 5 tonnes in several adjacent squares in the Peterborough district.
 - The presence of 'Part A' and 'Part B' industrial processes with the potential to emit significant quantities of PM₁₀ in the Peterborough district or in areas adjacent to the district boundary.
 - The presence of one or more existing or planned roads with an existing or projected annual average daily traffic flow of greater than 25000 in the Peterborough district.

The Position in Peterborough in 2000

- 8.2 At the stage 1 Review and Assessment in Peterborough, guidance from DETR on further review and assessment of PM₁₀ was not available. Since publication of the Stage 1 document, the review of the National Air Quality Strategy has resulted in the adoption of new objectives for PM₁₀.
- 8.3 The following revised objectives for fine particles has been adopted in the January 2000 Air Quality Strategy.

Revised Objectives

- **50µg/m³ (gravimetric) as the daily mean, not to be exceeded more than 35 times in a calendar year.**
- **40µg/m³ (gravimetric) as the annual mean measured over a calendar year.**

To be met by 31 December 2004.

- 8.4 DETR issued revised pollutant specific guidance¹ in May 2000 for the review and assessment of PM₁₀. In summary this guidance provides a method for carrying out an assessment for PM₁₀ from road traffic, domestic solid fuel use, Part A and Part B industrial processes, and quarrying, stockpiles and landfill sites.
- 8.5 The proposed 24-hour objective is more stringent than the annual mean objective. It is recommended that the initial stages of review and assessment are carried out by calculation the annual mean PM₁₀ concentration and then estimating the 90th percentile concentration. The 90th percentile of daily means in a calendar year is approximately equivalent to 35 exceedance days.

Road Traffic

- 8.6 Revised pollutant specific guidance has been issued for the review and assessment of PM₁₀. In summary this guidance provides a method for carrying out a Stage 2 assessment by calculating the background concentration of PM₁₀ in 2004 and then assessing the total PM₁₀ by adding the 2004 traffic contributions.
- 8.7 The annual mean PM₁₀ concentration has been estimated for 2004 at relevant locations close to those sections of the road network identified as being of potential concern. The screening model provided in the Design Manual for Roads and Bridges (DMRB) has been used for these purposes.
- 8.8 The predicted annual mean PM₁₀ contribution for roads in 2004 has then been added to the estimated background concentration in 2004 derived from data mapped for the UK by the National Environmental Technology Centre³.
- 8.9 Where the total annual mean concentration is predicted by this method to be greater than 28µg/m³ there is a risk of the objective being exceeded. Concentrations of PM₁₀ from road traffic in Peterborough have not been identified as exceeding 28µg/m³. The greatest concentration at relevant locations has been predicted by this methodology as 27.8µg/m³.
- 8.10 The above procedure provides a conservative approach with regard to the relationship between the annual mean and the 90th percentile, and the 2004 background PM₁₀ concentrations which are based on anticipated meteorology. Therefore no further review and assessment of PM₁₀ from road traffic is required.

Domestic Solid Fuel Use

- 8.11 An assessment of the impact of domestic solid fuel use has been carried out using existing black smoke data, based upon an empirical relationship described in DETR revised pollutant specific guidance.
- 8.12 The procedure involves the determination of annual mean black smoke concentrations for Peterborough for the most recent year, and the determination of the 1996 annual mean background secondary PM₁₀ concentration for the area.
- 8.13 The annual mean black smoke concentration for Peterborough, determined for 1989, is 10µg/m³. The 1996 annual mean background secondary PM₁₀ concentration is derived from mapped data³.

- 8.14 The empirical relationship between the annual mean black smoke measurement and the annual mean secondary PM₁₀ concentration does not justify the need for further review and assessment of domestic solid fuel use.

Part A and Part B Industrial Processes

- 8.15 The pollutant specific guidance provides a method for the assessment of industrial PM₁₀ emissions. In brief, nomograms have been prepared which estimate the emission rate which would produce a 90th percentile of the 24-hour mean ground level concentration of 1µg/m³. If the actual emission rate exceeds the identified threshold, then further review and assessment is necessary.
- 8.16 Part A and Part B processes with the potential to emit significant quantities of PM₁₀ have been assessed by the procedure described in paragraph 8.15.

Peterborough Power Ltd: Power Generation

- 8.17 Peterborough Power Ltd operates a Combined Cycle Turbine combustion process for power generation. The process is prescribed as a Part A process requiring authorisation for the control of emissions by the Environment Agency.
- 8.18 The emission rate for the process that would produce a 90th percentile of the 24-hour mean ground level concentration of 1µg/m³ is 35 tonnes/annum. The actual emission rate for the process is below the reporting threshold of 10 tonnes/annum. Therefore no further review and assessment of PM₁₀ from this process is required.

Castle Cement Ltd: Cement Manufacture

- 8.19 Castle Cement Ltd operates a cement manufacture process in Ketton. The process is prescribed as a Part A process requiring Authorisation for the control of emissions by the Environment Agency.
- 8.20 The exhaust gases leaving the kilns pass through electrostatic precipitators to remove the majority of entrained particulates before being released through stacks 92 metres high.
- 8.21 The emission rate for the process that would produce a 90th percentile of the 24-hour mean ground level concentration of 1µg/m³ is 40 tonnes/annum. The estimated annual average total release of particulates to air from the process kiln is 4.32 tonnes. Therefore no further review and assessment of PM₁₀ from this process is required.

Hansen Brick, Whittlesey: Brick Manufacturers

- 8.22 Mathematical modelling of PM₁₀ dispersion from the 5 stationary sources at the brick works has been undertaken using the emission estimates for the 2004 works production scenario and 1998 meteorological data from Wattisham. Emissions of fine particles for the 2004 production scenario are taken as 10.93 grams per second in total for 5 sources. The results of the modelling show that over a 10 kilometre square grid surrounding the works, the contribution to ground level annual mean concentrations of PM_{10 (gravimetric)} is very small, with a maximum value of 0.3µg/m^{3 (gravimetric)}. This value occurs approximately 600 metres to the northeast of the works. Because of this very low stationary source contribution, these emissions are not considered further in this assessment.

Bardon Roadstone Ltd: Roadstone Coating

- 8.23 Bardon Roadstone Ltd operate a roadstone coating process requiring authorisation as a Part B process from the Local Authority for the control of emissions to atmosphere.
- 8.24 The emission rate from the process can be identified from the authorisation file as 0.056g/sec. The emission rate for the process that would produce a 90th percentile of the 24 hour mean ground level concentration of 1µg/m³ is 0.8 tonnes/annum. It is therefore unlikely that a ground level concentration for the 90th percentile of the 24-hour mean will be exceeded, and no further review and assessment of PM₁₀ from this process is required.

Quarrying, Stockpiles and Landfill Sites

- 8.25 An assessment of dust emissions from quarrying, landfill sites and materials handling has been conducted by the approach suggested in the DETR revised pollutant specific guidance.
- 8.26 The procedure involves the determination of the estimated 2004 background PM₁₀ concentration, and consideration of the proximity of relevant locations for public exposure.
- 8.27 If the projected background PM₁₀ for 2004 is below 25µg/m³ there should be no need for further assessment unless properties lie closer than 200 metres. In Peterborough the estimated 2004 background PM₁₀ concentration is 24µg/m³ and further assessment is therefore required only for those activities with properties closer than 200 metres to the source.
- 8.28 Where properties lie closer than 200 metres to the source, authorities are advised to investigate whether any dust nuisance complaints have been reported, as this may give a guide to the potential problems. However, the absence of complaints in an area cannot be used as a definitive method of determining that the objective will not be exceeded, and authorities are advised to take account of local background levels and their own professional judgement based on a visual inspection of the operations.
- 8.29 Sites with properties closer than 200 metres to the source with the Peterborough area have no recorded complaints of dust emissions. In consideration of the local background levels, the nature of the material quarried, the local topography and process controls employed, it is judged that there is negligible risk of the objectives being exceeded.

Assessment – Particles (PM₁₀)

On the basis of the above it is concluded that the air quality objective for this pollutant is likely to be met throughout Peterborough and no further review and assessment is required.

CHAPTER 9 ASSESSMENT OF NITROGEN DIOXIDE

Summary of Stage 1 & 2 Review and Assessment Findings 1997 NAQS Objective

150ppb or less when expressed as the hourly mean, and 21ppb when expressed as the annual mean to be achieved by 2005

- 9.1 The Stage 1 report of Nitrogen Dioxide indicated that further review and assessment was required because of:
- the presence of existing or planned roads with a projected annual average daily traffic flow of greater than 20,000 vehicles per day in 2005
 - The presence of relevant Part A or Part B industrial processes in the Peterborough district or in areas adjacent and the district boundary, with the potential to emit significant quantities of nitrogen oxides.

The position in Peterborough in 2000

- 9.2 The review of the 1997 National Air Quality Strategy acknowledged the potential problems associated with the achieving the nitrogen dioxide air quality objectives and for this reason the objectives remain provisional. The annual mean objective has been retained but the hourly objective has been tightened and is more challenging. The government is committed to a further review of the NAQS in 2 years time, when more information will be available on the cost/benefit analysis of measures necessary to achieve the objectives.
- 9.3 The following revised objectives for nitrogen dioxide have been adopted in the January 2000 Air Quality Strategy:-

Revised Objectives

200µg/m³ (105 ppb) as hourly mean not to be exceeded more than 18 times a year, to be met by December 31, 2005 (equivalent to the 99.8th percentile of hourly means)

40µg/m³ (21ppb) as annual mean to be met by December 31, 2005

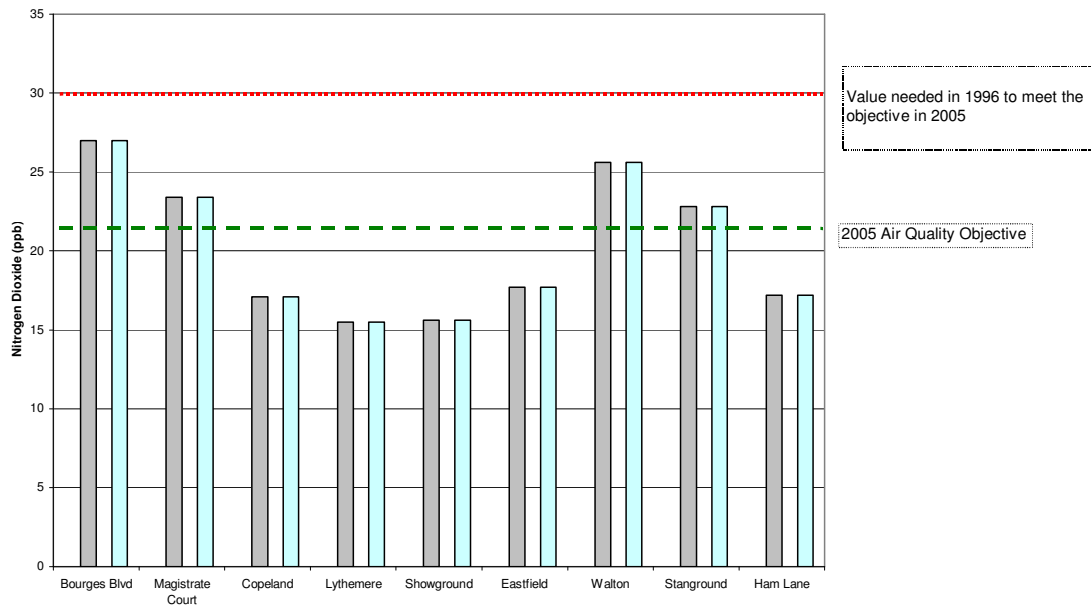
- 9.4 Nitrogen dioxide (NO₂) and nitric oxide (NO) are both oxides of nitrogen and are collectively referred to as NO_x. All combustion processes produce some NO_x emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. Only nitrogen dioxide is associated with adverse effects upon human health.

- 9.5 The main sources of NO_x emissions in the UK are road transport, which accounted for almost 50% of total UK emissions in 1997; the electricity supply industry which accounted for 20%; and the industrial and commercial sectors which accounted for about 17%. In most urban areas, the contribution of road transport to local emissions will be much greater.
- 9.6 Significant reductions in emissions are expected by 2005 from the road transport sector as a result of the implementation of various policy measures. As large power stations are generally located outside of major urban areas, and emit NO_x from high chimneys, these emissions are not thought to be a major source of non-transport related urban NO_x. Emissions associated with space heating from boilers are, however, considered to be an important source of NO_x emissions, and are not expected to reduce significantly in the future.
- 9.7 Recently agreed further reductions in industrial emissions, as part of the EC Large Combustion Plant Directive, the National Emissions Ceiling Directive (NECD), and more stringent control of vehicle emissions as part of the Auto-Oil programme, will all serve to further reduce NO_x emissions by 2005.
- 9.8 In practice, meeting the annual mean objective is expected to be more demanding than achieving the 1-hour objective. It is therefore generally considered that if the annual mean objective is achieved, it is unlikely that the 1-hour objective will be exceeded. Exceptions to this rule may occur where emissions are predominantly related to large stationary sources. National studies have indicated that the annual mean objective is expected to be met at all urban background locations outside of London, but that the objective may be exceeded more widely, at roadside sites and in close proximity to busy road links.

Monitoring Data

- 9.9 Nitrogen dioxide has been monitored with diffusion tubes at 10 locations in Peterborough since March 1994. Four of the monitoring sites are part of the National Nitrogen Dioxide Diffusion Tube Survey. The figure on page 30 shows the annual average concentration at each of the diffusion tube locations for the twelve months ending March 1997.

Annual Mean Nitrogen Dioxide Concentrations in Peterborough, Mar96 - Feb97



- 9.10 In order for the air quality objective of 21 ppb as the annual mean to be met in 2005, the annual mean in 1996 must be no greater than 30 ppb. The assessment level is not being exceeded at the kerbside location in Bourges Boulevard or any other of these monitoring locations, in Peterborough.
- 9.11 In 1997 an additional 5 locations were selected as additional diffusion tube monitoring sites. Four of these sites were identified as being potentially at risk of exceeding the National Air Quality Strategy objective.
- 9.12 By comparison with the procedure described in section 9.10 above it was noted that there was potential for the kerbside location in Thorney to be exceeding the assessment level. No exceedences were predicted for the Fletton Parkway or A1 locations by this monitoring procedure.

Predicted Concentrations Adjacent to Major Highways

- 9.13 The application of the Design Manual for Roads and Bridges (DMRB) screening model was used for the review and assessment procedure. The procedure for undertaking the modelling assessment using DMRB involves the estimation of the local 2005 background NO_x concentration, calculation of the road traffic contribution to NO_x and the addition of the road traffic NO_x contribution to the background.
- 9.14 Predictions have been made of NO_x concentrations at receptor locations. This exercise has been carried out on a precautionary basis using the highest traffic flows in the district and choosing receptor locations near to major trunk roads.
- 9.15 For this procedure, estimated local background NO_x concentrations for 2005 have been obtained from mapped data for the UK³. The road traffic contribution has been calculated using the DMRB screening model and the input of traffic information provided by Peterborough City Council Transport & Engineering Department.

- 9.16 The total predicted NO_x concentration in 2005 has been compared with the NO_x assessment criteria concentrations provided by the DETR which allows for the differing NO_x: NO₂ relationship with distance from the kerbside.
- 9.17 The above monitoring and modelling procedures have identified roads in the Peterborough District as being of potential concern. Further assessment of the potential impact of these sites has therefore been undertaken by Cambridge Environmental Research Consultants Ltd⁷ on behalf of Peterborough City Council.

Dispersion Modelling Study (ADMS – Urban)

- 9.18 Dispersion modelling has been carried out using ADMS-Urban (Version 1.53) for emissions of nitrogen oxides (NO_x) and small particulate material (PM₁₀) from three locations near Peterborough; the A1130 and B1091 at Fletton Parkway; the A47 and B1040 through Thorney; and the A1 through Wittering. The study involves an investigation into the impact of vehicle emissions, calculated for the current situation and 2005, to correspond with the relevant Air Quality Strategy (AQS) objective values.
- 9.19 Hourly sequential meteorological data for 1999 from Wittering were used to calculate ground level concentrations of NO₂ over the modelled areas.
- 9.20 The modelled results show that no exceedences are predicted of the appropriate Air Quality Strategy objectives at any of the three locations.
- 9.21 For the current (1999) situation, the highest predicted 90.14th percentiles of 24 hour average concentrations of PM₁₀ are between 19 to 21µg/m³, compared with the objective value of 50µg/m³. The highest predicted annual average concentrations of PM₁₀ are between 13 to 14µg/m³, compared with the objective value of 40µg/m³. In 2004, the maximum values are predicted to decrease slightly. The highest predicted 90.14th percentiles of 24 hour average concentrations of PM₁₀ are between 18 to 19µg/m³ and the highest predicted annual average concentrations of PM₁₀ are between 12 to 13µg/m³.
- 9.22 The comparison between the monitoring data and modelling results for the current situation for NO₂ shows that the monitored values are all between 30 to 75% higher than the modelled results. The exceedences for NO₂ that are indicated by the monitoring data at Fletton Parkway and Thorney are not supported by the modelled results, which predict no exceedences of the appropriate Air Quality Strategy objectives for NO₂.
- 9.23 While there are inherent uncertainties in modelling atmospheric pollutions, the consultants experience in using ADMS-Urban show that much better agreement with measured data can be attained than has been achieved in this study. Consequently, there must be significant doubts about the accuracy of the emissions data available for this study or the monitoring results, or both.
- 9.24 However, it should be remembered that traffic emission rates are set to decrease significantly in the future, and so, even if exceedences are currently occurring, it is unlikely that these will exist at any of the three locations in 2005.

- 9.25 ADMS-Urban has been used successfully in a number of major studies including those for Birmingham and Coventry, and for central London. Although the locations considered here are of a more rural nature than the major metropolitan areas mentioned, there is no reason, given the appropriate input data, why the model should not function to an equally high level of accuracy in this study. Consequently, it is considered unlikely that the difference seen here between the modelled and monitored results is due to a significant extent to inaccuracies in the modelling software.

Inaccuracies in the Input Data

- 9.26 In this study, the scope of the modelling was to include traffic emissions from individual, limited lengths of road, taking into account background levels of the modelled pollutants in the area.
- 9.27 Inaccuracies in the traffic data input to the model are difficult to quantify. However, since only one or two roads have been modelled at each location, the accuracy of the modelled results is very dependent on the accuracy of this data; and the relative insignificance of other local sources. Further more, there are inaccuracies associated with any assumptions made about the way in which the traffic behaviour is represented in the model. A good example of this is the representation of the traffic queuing at the junction in Thorney, where the build up of traffic at the junction of the A47 and the B1040 has been represented by 5km/hr traffic flow.
- 9.28 To take account of other emissions in the area, most notable the City of Peterborough; the only emissions data available were 1km square gridded emissions from national estimates. These are likely to be much less detailed and subject to a significant level of inaccuracy compared to the data provided in a detailed emissions inventory, such as that compiled for the whole of Greater London. The relatively low resolution of these emissions means that their contribution to impacts near the modelled roads and monitoring sites are unlikely to be very accurate.
- 9.29 Taking all of these concerns into consideration, it seems that a significant part of the difference seen here between the modelled and monitored results may be due to the emissions data available for this study.

Inaccuracies in the Monitoring Data

- 9.30 The measurement of NO₂ concentrations using diffusion tubes is not generally considered to be very accurate, and the use of diffusion tubes is therefore considered more appropriate for achieving an indication of relative concentrations rather than precise measurements. The technique is particularly well suited to baseline and initial screening studies of an area and is widely used for identification of 'hotspots' where NO₂ concentrations may warrant further more detailed investigation.
- 9.31 The document LAQM.TG1(00) quotes a data quality objective for NO₂ monitoring using diffusion tubes in terms of an accuracy of 25% as defined for the EC Directive 1999/30/EC. It states that the performance of diffusion tubes in the field and laboratory is both site and supplier specific. There is evidence of systematic over or under reading by up to 30%.

- 9.32 In major studies such as those mentioned in Section 9.25 above, the modelled results are compared with continuous, calibrated monitoring data from multiple sites. Where diffusion tube data is used, there are often ten or twenty diffusion tube sites within the modelled area, and the production of a scatter plot of monitored against modelled results usually reveals a wide spread of data values.
- 9.33 Given the small number of diffusion tube results available to the consultants, it is statistically possible for them to be giving over-estimates of NO₂ concentrations.

Summary of Comparison Exercise

- 9.34 In summary, while there are inherent uncertainties in modelling atmospheric pollution, experience in using ADMS-Urban shows that much better agreement with measured data can be attained than has been achieved in this study. Consequently, there must be some doubt about the accuracy of the emissions data available for this study, or the monitoring results, or both.
- 9.35 However, while the absolute values predicated in the modelling are uncertain, the results provide a useful picture of the spatial distribution of the impact of the modelled traffic.

Summary of Study Results

- 9.36 The comparison between the monitoring data and modelled results for the current situation for NO₂ shows that the monitored values are all between 30 to 75% higher than the modelled results. The exceedences for NO₂ that are indicated by the monitoring data at Thorney are not supported by the modelled results, which predict no exceedences for the appropriate air quality objectives for NO₂.
- 9.37 It is thought that the difference between the monitoring data and modelled results arise from uncertainties in the emissions data available for this study, or the monitoring results, or both.
- 9.38 At Thorney, it is unclear why the levels of NO₂ recorded by the diffusion tube are so high. However, there is only one diffusion tube in this modelled area, and so it is inadvisable to rely too much on this value. It is advised that the situation may be investigated further with additional monitoring.
- 9.39 It is also noted that in March 2000 the Secretary of State for the Environment gave the go ahead for the Thorney Bypass. The Highways Agency has appointed a project manager to oversee the development, including responsibility for drawing up and progressing a preferred alignment. No set implementation timetable for the bypass has yet been fixed.
- 9.40 Despite the uncertainties involved in modelling the current situation, the expected reduction in emissions between the current and future years is likely to be sufficient such that exceedences of the appropriate air quality objectives in the year 2005 are unlikely. It is therefore concluded that no further review and assessment of NO₂ from road traffic is required.

Part A & Part B Industrial Processes

- 9.41 Processes which have been identified as having the potential to exert an influence on air quality in Peterborough, with respect to nitrogen dioxide, are power generation by Peterborough Power Ltd in Fengate, the Transco gas compressor facility at Werrington, Cement Manufacture by Caste Cement Ltd in Ketton and the manufacture of bricks by Hanson Brick Ltd at Whittlesey

Peterborough Power Ltd: Power Generation

- 9.42 Peterborough Power Ltd operates a Combined Cycle Turbine combustion process for power generation. The process is prescribed as a Part A process requiring authorisation for the control of emissions by the Environment Act 1990.
- 9.43 Modelling has been conducted for the purposes of the application for authorisation of the plant under the Environmental Protection Act 1990. It has been identified that the maximum contribution made by the process to the annual average is likely to be $2.35\mu\text{g}/\text{m}^3$ NO_x expressed as NO_2 . The modelling assumed that emissions of NO are immediately oxidised to NO_2 and impact upon the environment in this form. The predicted contribution is very small relative to the air quality objectives.
- 9.44 The estimated local annual mean background NO_x concentration for 2005 derived from the Internet³ is $27.5\mu\text{g}/\text{m}^3$. It is concluded that the industrial emissions from this process in addition to the local background concentration are unlikely to exceed air quality strategy objectives and no further assessment of this source is required.

Transco: Peterborough Compressor Station

- 9.45 Transco operate a combustion process for the compression of natural gas by a power turbine driving a gas compressor. The process is prescribed as a Part A process requiring authorisation for the control of emissions by the Environment Agency.
- 9.46 Modelling has been conducted for the purposes of the application for authorisation of the plant under the Environmental Protection Act 1990. It has been identified that a maximum contribution made by the compressor station to the annual average NO_x levels is likely to be $1.1\mu\text{g}/\text{m}^3$. The predicted contribution of NO_2 is therefore likely to be very small relative to the air quality objectives.
- 9.47 The estimated local annual mean background NO_x concentration for 2005 derived from the Internet³ is $20.5\mu\text{g}/\text{m}^3$. It is concluded that the industrial emissions for this process in addition to the local background concentration are unlikely to exceed air quality strategy objectives and no further assessment of this source is required.

Castle Cement Ltd: Cement Manufacturing

- 9.48 Castle Cement Ltd operates a cement manufacture process in Ketton. The process is prescribed as a Part A Process requiring authorisation by the Environment Agency for the control of emissions.

- 9.49 Modelling and fuel trials have been conducted by Castle Cement Ltd for the purposes of authorisation of the plant under the Environmental Protection Act 1990. It has been identified that the maximum contribution made by the process to the annual average ground level NO_x concentration is likely to be 0.11µg/m³. The predicted contribution of NO₂ is therefore likely to be very small relative to the air quality objectives.
- 9.50 The estimated local annual mean background NO_x concentration for 2005 derived from the Internet³ is 24.8µg/m³. It is concluded that the industrial emissions from this process in addition to the local background concentration are unlikely to exceed air quality strategy objectives and no further assessment of this source is required.

Hanson Brick Ltd: Brick Manufacture

- 9.51 Hanson Brick Ltd operates a brick manufacture process in the Whittlesey area. The process is prescribed as a Part A process requiring authorisation by the Environment Agency for the control of emissions.
- 9.52 Emissions of NO_x from brick manufacture in Whittlesey are, from emission measurements, about one fiftieth of the sulphur dioxide emissions. Dispersion modelling predicts a maximum annual average SO₂ concentration from this process in the Peterborough area of 7µg/m³.
- 9.53 The estimated local annual mean background NO_x concentration for 2005 derived from the Internet³ is 18.5µg/m³⁵. On this basis, the contribution to ground level nitrogen dioxide concentrations is negligible and therefore this source will not impair the achievement of both the objectives for this pollutant in 2005 in the Peterborough area.

Assessment – Nitrogen Dioxide

On the basis of the above it is concluded that the air quality objective for this pollutant is likely to be met throughout Peterborough and no further review and assessment is required.

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

The Air Quality Regulations 2000 prescribe air quality objectives and the dates for meeting them. For each objective, Peterborough City Council has considered present and likely future air quality, and has assessed whether the objectives are likely to be met in time.

The interim report was published in January 1999 and subjected to wide consultation. That report together with the final report represent the findings of the first completed review and assessment of local air quality.

Benzene, 1,3-butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Fine Particles (PM10) and Sulphur Dioxide have been assessed. Four pollutants, Nitrogen Dioxide, Carbon Monoxide, Fine Particles (PM10) and Sulphur Dioxide were carried through from the interim report for further investigation.

The objectives set out in the Regulations in many cases, differ from those originally prescribed, in the Air Quality Regulations 1997. The changes to the objectives has meant that those pollutants not brought forward from the interim report, have had to be reconsidered as part of this final assessment.

The assessments in this report were undertaken in accordance with technical guidance issued by the Department of the Environment Transport and Regions. Monitoring and modelling techniques relevant to each pollutant were used to determine the potential for local exceedences of national air quality objectives.

This report concludes that, in the judgement of Peterborough City Council, the air quality objectives are likely to be achieved by the relevant deadline in all areas of the local authority. As a consequence, it is recommended that Air Quality Management Areas are not required in Peterborough.

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6. Abbott and Steadman – Dispersion Modelling Mapping Studies for Review and Assessment of PM₁₀ – 1999.
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