

North Lincolnshire Council

# Air Quality, Progress Report 2008



## Executive Summary

Ambient air quality monitoring data collected in North Lincolnshire by the Council and Defra since the previous Progress Report in 2005 is reported; the data is also shown in the context of longer-term trends where appropriate.

The annual and daily PM<sub>10</sub> objectives are being breached in Low Santon. The results from East Common Lane are very close to the daily objective, while Scunthorpe Town has met the objective in two of the last three years.

The objectives for the other LAQM pollutants are being met in North Lincolnshire. Nitrogen dioxide concentrations have decreased at the Scunthorpe Town and Killingholme sites, although the concentrations are increasing at Kingsway House. At the main Scunthorpe sites of Cottage Beck Road and Rowland Road, the concentration of sulphur dioxide and the number of exceedances of the 15-minute limit value has shown a significant decrease since 1998. ConocoPhillips are increasing the height of the calciner stack to reduce SO<sub>2</sub> concentrations in the Killingholme area, thus eliminating a potential breach of the 15-minute limit value at one particular location.

Results from several pollutants that fall outside the remit of LAQM are presented. The PAH strategic target value has been breached at Scunthorpe Town in every year since 1999, the EU limit value was met in 2006. Monitoring of heavy metals and PM<sub>2.5</sub> will commence in the Scunthorpe area in May 2008.

There have been no significant changes to road traffic; existing monitoring covers any minor changes. A DMRB run for newly identified receptors near the M180 showed the air quality objectives are met in this area. New and changes to existing PPC processes are noted, planning applications that may impact on future air quality have been identified. Other air quality work is also discussed including the number of air quality related complaints and enquiries, the development of a dedicated website and three local liaison meetings.

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## Abbreviations

AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area
AURN	Automatic and Urban Rural Network
DA	Detailed Assessment
Defra	Department for the Environment, Food and Rural Affairs
DMRB	Design Manual for Road and Bridges
EA	Environment Agency
EPAQS	Expert Panel on Air Quality Standards
EPR	Environmental Permitting Regulations
FDMS	Filter Dynamics Measurement System
HDVs	Heavy Duty Vehicles (Lorries and buses)
LAQM	Local Air Quality Management
LSO	Local Site Operator
mg m <sup>-3</sup>	Milligrams per cubic metre
µg m <sup>-3</sup>	Micrograms per cubic metre
ng m <sup>-3</sup>	Nanograms per cubic metre
NAQS	National Air Quality Strategy
NSCA	National Society for Clean Air and Environmental Protection, now Environmental Protection UK.
NO <sub>2</sub>	Nitrogen dioxide
NPL	National Physical Laboratory
PAHs	Poly-aromatic hydrocarbons
Pb	Chemical symbol for lead
PM <sub>10</sub>	Particulate matter less than 10 µm in diameter
PPC	Pollution Prevention and Control Regulations
QA/QC	Quality Assurance / Quality Control
SO <sub>2</sub>	Sulphur dioxide
TEOM	Tapered Element Oscillating Microbalance
USA	Updating and Screening Assessment

Numbers in superscript indicate references, which are detailed in the Appendix. Any Tables or Figures with an 'A' preceding the number are located in the Appendix.

## Glossary

AQMA	Air Quality Management Area. A legally defined area identified as one in which a LAQM statutory air quality objective will not be met. An action plan must be drawn up to improve air quality.
Air Quality Objective	An air quality standard that includes a date by which it must be achieved bearing in mind issues such as the currently available technology.
Air Quality Standard	The maximum acceptable level of a pollutant in the air that will not present a risk to the health of the most susceptible groups in the population.
Average Time	The period of time that a pollutant level is measured and the mean concentration calculated. This can be a different period for each pollutant and directly affects which locations can be considered relevant. Generally the longer the averaging time the lower the concentration threshold.
Defra	Department for Environment Food and Rural Affairs, the Government department responsible for Environmental Protection, including air quality.
Diffusion Tube	A simple monitoring device. Can be subject to inaccuracies and can only be used to measure air quality objectives over longer time periods such as a month or year. Very cheap compared to continuous analysers so a greater number can be used.
Dispersion Model	A computer program which uses emissions inventory data and meteorological data to predict the concentration and distribution of pollutants in the atmosphere.
DMRB	Design Manual for Roads and Bridges, a screening method for estimating concentrations due to road traffic, version 1.03c (July 2007) used in this report.
Emissions Inventory	A catalogue of the sources of a pollutant in an area, with information about their positions and the quantities emitted. Used in dispersion models.
EPAQS	The Expert Panel on Air Quality Standards. The UK group appointed by the government to set standards for maximum acceptable levels of pollutants.
Exceedance	Any period of time where the concentration of a pollutant is greater than the appropriate Air Quality Standard.
Fugitive emission	Emissions of pollutants from a vent point or diffuse area other than a stack.
Limit value	A pollutant concentration set out in either UK or EU law that the Government must meet, usually with a specified averaging period and date.
Part A Processes	An industrial process that is required to obtain authorisation from the Environment Agency (Part A1) or by the Council (Part A2). Regulation of the emissions to air is included in the authorised document, along with other environmental impacts.

Part B Processes	An industrial process that is required to obtain authorisation from the local authority in order to operate. Regulation of the emissions to air only are included in the authorised document.
Percentile	The percentage of items in a set of data lying above or below a particular value, e.g. concentration of a pollutant. It is used if the data capture achieved is less than 90%. For example for nitrogen dioxide the hourly mean of $200\mu\text{g}/\text{m}^3$ can be exceeded up to 18 times a year. This is the equivalent of the 99.8 <sup>th</sup> percentile being less than $200\mu\text{g}/\text{m}^3$ because in one year there are 8760 hours of which 18 hours equals 0.2%, so the concentration at 99.8% must be lower than the objective.

	Time period	Permitted Exceedances	Equivalent Percentiles
Nitrogen dioxide	1 hour	18 per year	99.8th
PM <sub>10</sub>	24 hour	35 per year	90th
Sulphur dioxide	15 minute	35 per year	99.9th
	1 hour	24 per year	99.7th
	24 hour	3 per year	99th

QA/QC	Quality Assurance/Quality Control. Procedures to ensure that data from pollutant monitoring equipment has good accuracy, precision and data capture.
Relevant Locations	These can differ for each pollutant according to the averaging period considered. Relevant locations are those areas where the public might reasonably be exposed to a pollutant over its averaging time. Long averaging times such as a year mean relevant locations could include schools, houses, hospitals etc. Short averaging times widen the scope, as less exposure time is needed.
Running Mean	As an example the air quality standard for carbon monoxide is $10\text{mg}/\text{m}^3$ as a running 8-hour mean. To assess measured levels against this standard it is necessary to calculate the average of eight consecutive hourly values, e.g. from midnight to 8:00am then from 1:00am to 9:00am and so on throughout the period of interest. As each calculation of the "running 8-hour mean" gives a result there will be 24 opportunities for the standard to be assessed each day. This will hold true for whether an 8-hour, 24-hour or annual running mean is the time period under consideration.
Target value	A pollutant concentration that the Government should work towards, usually with a specified averaging period and date. Unlike limit values there is <b>no legal obligation</b> to meet these values. e.g. The $0.25\text{ ng}/\text{m}^3$ PAH concentration is a target value.
VOC	Volatile organic compound, a compound that evaporates easily and is composed of carbon and hydrogen or containing carbon and hydrogen in combination with other elements. VOCs contribute towards the formation of photochemical smog.

## Assumptions

All concentrations are expressed in mass units whether  $\text{mg m}^{-3}$ ,  $\mu\text{g m}^{-3}$  or  $\text{ng m}^{-3}$ .

The data capture values quoted include all losses whether due to calibrations, service visits or machine breakdowns. The data capture for  $\text{NO}_2$  and  $\text{SO}_2$  have been calculated based on hourly values, whilst  $\text{PM}_{10}$  has been calculated based on daily values.

The annual  $\text{NO}_2$  mean concentration has been calculated from the available hourly mean concentrations, whilst the annual  $\text{PM}_{10}$  mean concentration has been calculated from the daily mean concentrations.

TEOM results presented in this report have been corrected using a factor of 1.3. The main Part where this does not apply is Part 2.6.4, where Partisol and TEOM results are discussed in further detail, with various correction factors.

The 'Scunthorpe' monitoring station that was located on Cottage Beck Road in Scunthorpe ceased operation in March 2004 and was re-located to Rowland Road, Scunthorpe. This site, known as 'Scunthorpe Town' commenced operation in June 2004. The 2004 data presented in this report has been amalgamated from these two sites. Data from the two sites is treated as being comparable when considering long-term trends.

Table A1 details the ratification status of the data used in this report. Most of the automatic monitoring data has been ratified through to the end of June 2007. The exception is  $\text{PM}_{10}$  and  $\text{SO}_2$  data at Scunthorpe Town, as these monitors are affiliated to the AURN the data has been ratified through to the end of September 2007.

## Chapter 1: Introduction

The layer of the atmosphere from the Earth's surface to a height of about 15 km is known as the troposphere. In the UK, tropospheric pollutants that are thought to cause the most serious risk to human health are assigned an Air Quality Standard.

### Part 1.1: Local Air Quality Management

The concept of Local Air Quality Management (LAQM) was introduced under Part IV of the Environment Act 1995. Chapter 82 of the Act placed a duty on all Local Authorities to review and assess air quality in their area.

Air Quality objectives can be defined as the Government's medium term objectives. They are based on Air Quality Standards set by the Expert Panel on Air Quality Standards (EPAQS) and are the maximum acceptable level of an air pollutant that will not present a risk to the health of the most susceptible groups of the population. The air quality objectives include a date by which the Standards must be achieved. The length of time to achieve the Standard for each pollutant takes into account the costs to industry, the expected rate of improvements in available technology and the health effects on the country's population.

The Air Quality (England) Regulations 2000 initially set Air Quality objectives for seven pollutants that Local Authorities were responsible for reviewing. The most recent update of the objectives was presented in the Air Quality Strategy 2007. These objectives need to be achieved by varying dates, the latest being 31<sup>st</sup> January 2010. The air quality objectives for the seven pollutants are listed in Table 1.1.

If an objective is unlikely to be achieved in North Lincolnshire where relevant receptors are present, then the Council must declare the area as an air quality Management Area (AQMA). To date 225 Local Authorities have declared AQMAs. <sup>1</sup> North Lincolnshire Council currently has one AQMA for a breach of the PM<sub>10</sub> daily objective in part of Scunthorpe.

Pollutant	Objective		To be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m <sup>3</sup>	Running annual mean	31/12/2003
	5 µg/m <sup>3</sup>	Annual mean	31/12/2010
1,3 Butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	31/12/2003
Carbon Monoxide	10 mg/m <sup>3</sup>	Maximum daily running 8-hour mean	31/12/2003
Lead	0.5 µg/m <sup>3</sup>	Annual mean	31/12/2004
	0.25 µg/m <sup>3</sup>	Annual mean	31/12/2008
Nitrogen dioxide	200 µg/m <sup>3</sup>	1-hour mean not be exceeded more than 18 times a year	31/12/2005
	40 µg/m <sup>3</sup>	Annual mean	31/12/2005
Particles (PM <sub>10</sub> gravimetric)	50 µg/m <sup>3</sup>	24 hour mean (midnight to midnight) not be exceeded more than 35 times a year	31/12/2004
	40 µg/m <sup>3</sup>	Annual mean	31/12/2004
Sulphur Dioxide	350 µg/m <sup>3</sup>	1-hour mean not be exceeded more than 24 times a year.	31/12/2004
	125 µg/m <sup>3</sup>	24-hour mean not to be exceeded more than 3 times a year	31/12/2004
	266µg/m <sup>3</sup>	15-minute mean not to be exceeded more than 35 time a year	31/12/2005

Table 1.1: Air quality objectives that are relevant to Local Air Quality Management.

References 1 and 2.

The LAQM Review and Assessment process commenced in 1997. The LAQM process follows a three yearly cycle as shown in Figure 1.2; an Updating and Screening Assessment (USA) starts the process, for example the most recent was in 2006, this is followed by either a Detailed Assessment (if necessary) in 2007 or if not necessary then a Progress Report is produced instead. North Lincolnshire Council proceeded to a Detailed Assessment (DA) for 1,3 butadiene, lead and nitrogen dioxide in 2007. All authorities then need to produce a Progress Report in 2008.

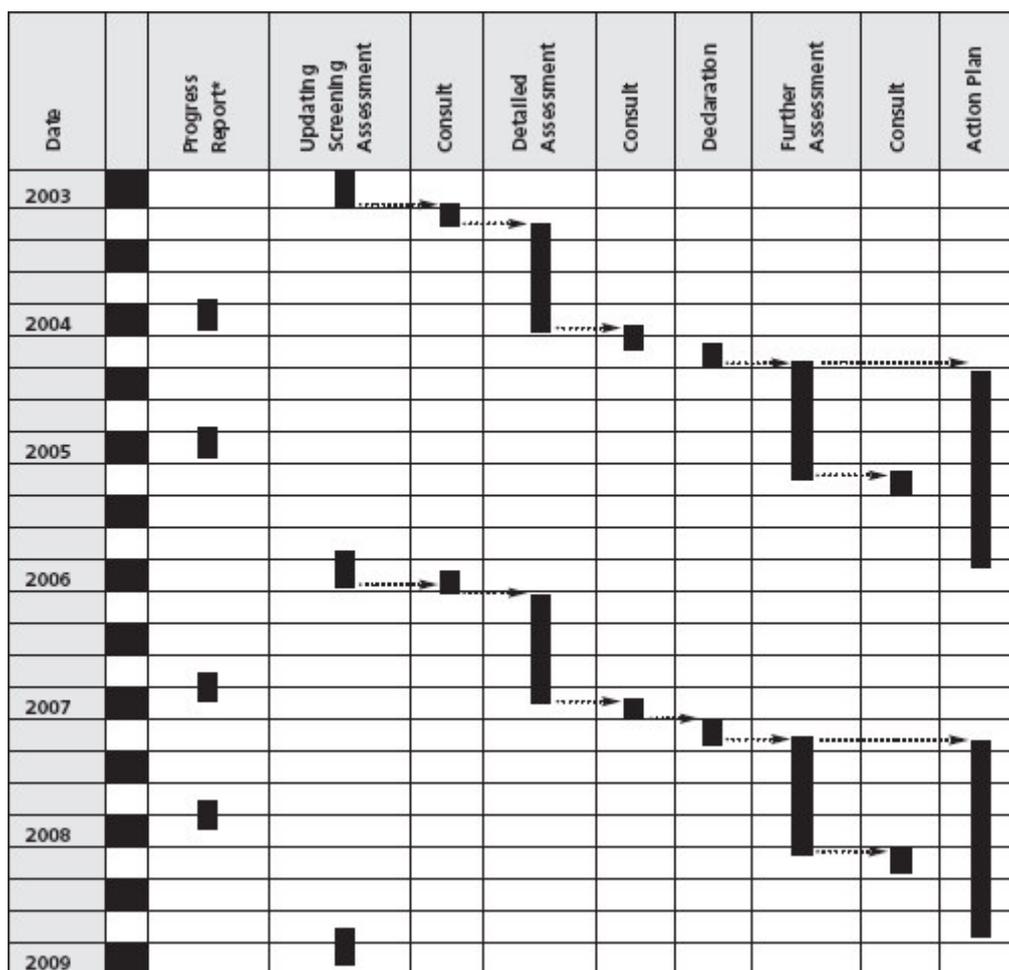


Figure 1.2: The timeline for LAQM and the reports required.

The Council has produced the following reports since the previous Progress Report in 2005:

- Updating and Screening Assessment (2006),
- Further Assessment into PM<sub>10</sub> in the Scunthorpe Area (April 2007),
- Action Plan (draft September 2007, final April 2008),
- Detailed Assessment for 1,3 butadiene, nitrogen dioxide and lead, 2007,
- Detailed Assessment of PM<sub>10</sub>, February 2008.

All are available for download at [www.nlincsair.info](http://www.nlincsair.info).

This 2008 Progress Report has been produced in line with the LAQM.PRG(03) Guidance and the Technical Guidance LAQM.TG(03) with any subsequent updates. The Report aims to:

- Provide an update on the ambient air quality monitoring conducted (whether within LAQM or not) in North Lincolnshire since the 2006 USA.
- Discuss long-term trends where the monitoring stations have been running for a sufficient period of time.
- Provide a summary and update on the reports submitted since the 2006 USA.
- Identify new industrial processes in North Lincolnshire and review emissions of those processes in the vicinity of the 2007 Detailed Assessments.
- Identify any significant changes in relation to road traffic in North Lincolnshire.
- Identify any new commercial, retail or residential developments in North Lincolnshire that may impact on air quality in the future.
- Detail the number of air quality related complaints and enquiries received by the Council.
- Provide a summary of other air quality work.

There are other pollutants that fall outside of the remit of LAQM, the monitoring results and objectives for these pollutants are discussed in greater detail in Chapter 3.

## Part 1.2: North Lincolnshire

North Lincolnshire covers an area of around 85,000 hectares with a population of approximately 157,000 people, it is located on the southern side of the Humber estuary and occupies tracts of land on either side of the river Trent. A Parliamentary Order created the administrative area of North Lincolnshire in March 1995 and on 1<sup>st</sup> April 1996 the new unitary authority area of North Lincolnshire came into being.

North Lincolnshire covers a large, mainly agricultural area. The pattern of settlements in the area reflects this with market towns such as Brigg and Epworth surrounded by many villages.

The exception to this is the urban area of Scunthorpe and the adjoining town of Bottesford. Almost half of North Lincolnshire's population, approximately 65,000 people, live in Scunthorpe and the adjacent town of Bottesford. Overall, 71 percent of the population live in this main urban area and other small towns.

The local economy of North Lincolnshire was built upon and crucially still relies on traditional industries such as steel manufacturing, its associated industries and agriculture. More recently there has been the establishment of two oil refineries and the introduction of several gas fired power stations.

The M180 motorway and other primary and strategic routes, including the A18 and A15, are located within North Lincolnshire. By rail there are regular freight movements to and from the Scunthorpe steelworks and Humber port related industries. With several wharf facilities along the banks of the Humber and the Trent, North Lincolnshire is well positioned to take advantage of water transport.

The ambient air quality monitoring conducted in North Lincolnshire consists of:

- A benzene diffusion tube survey was performed between November 2003 and November 2004.
- 39 diffusion tubes to record nitrogen dioxide (NO<sub>2</sub>).
- Five sites, including two Airpointers, to record oxides of Nitrogen (NO<sub>x</sub>).
- Three poly-aromatic hydrocarbon (PAH) monitors, Local Site Operator duties are conducted by the Environmental Protection Team on behalf of Defra.
- Two Partisol 2025s for gravimetric, 'equivalent' measurement of PM<sub>10</sub>.
- Eight TEOMs for the detection of particulate matter less than 10 micrometres in diameter (PM<sub>10</sub>).
- Three sites capable of recording sulphur dioxide (SO<sub>2</sub>).

## Chapter 2: Progress on LAQM Pollutants

For each of the seven LAQM pollutants (benzene, 1,3 butadiene, carbon monoxide, lead, nitrogen dioxide, PM<sub>10</sub> and sulphur dioxide) this Chapter will detail the following:

- The latest monitoring results and where appropriate long-term trends,
- A summary of the reports submitted to Defra since the 2006 USA,
- Any significant changes to industrial emissions for those companies considered in the 2007 Detailed Assessment,
- Other air quality work and information in relation to each pollutant.

Note though that large industrial processes are required to submit to the Environment Agency figures for their emissions to air by the end of February of each year. The data then appears on the Environment Agency's pollution inventory around the middle of the year. A request for provisional data has been made to those processes that were close to locations relevant to the 2007 Detailed Assessment and this data has been included in the report. Other processes will be reviewed as part of the 2009 USA.

## **Part 2.1: Benzene**

In 2004 a benzene diffusion tube survey was conducted by the Council in Killingholme and in parts of Scunthorpe, it concluded that the air quality objective for benzene was not being breached.

The two most significant sources in the Killingholme area are the ConocoPhillips refinery and the Total Lindsey Oil refinery. As discussed in previous reports a new method of calculating benzene and 1,3 butadiene (and other VOCs) emissions from the refineries was introduced in 2004. This new method of measurement co-incides with the diffusion tube-monitoring scheme conducted in Killingholme.

Table 2.1a shows the emissions for each refinery since the introduction of the new method. Benzene emissions from the two refineries have decreased from a total of 446 tonnes in 2004 (during which the diffusion monitoring was done) to 419 tonnes in 2007. As a result it can be assumed that the conclusion of the 2004 monitoring is still valid, i.e. that the objective is not being breached at any relevant receptors.

The new PPC permit issued for ConocoPhillips in December 2007 contained a scheme for a VOC identification and reduction programme. Updates of this work will be provided in time for future Review and Assessment reports.

Benzene emissions, tonnes	2004	2005	2006	2007
ConocoPhillips Humber Refinery	319	312	306	297
Total Lindsey Oil Refinery	127	117	117	122
Sum	446	429	423	419

Table 2.1a: The emissions of benzene from the two refineries in Killingholme between 2004 and 2007.

The majority of the tubes in the monitoring scheme ceased monitoring in November 2004. However, three tubes continued in the Santon area until January 2006 as the results indicated some monthly concentrations were

above  $5 \mu\text{g m}^{-3}$ . These results were shown in the 2006 USA with the highest annual mean concentration being  $3.07 \mu\text{g m}^{-3}$ . This is less than the 2010 objective of  $5 \mu\text{g m}^{-3}$ .

Table 2.1b shows the benzene emissions between 2004 and 2007 for Corus and Koppers. Benzene emissions have increased slightly at Corus between 2005 and 2007. In-line with the updated LAQM.TG(03) technical guidance, as the increase is less than 30%, it is not deemed substantial and so an additional Detailed Assessment will not be conducted. Future emissions will continue to be considered as part of the Review and Assessment process.

The Council has conducted no further monitoring of benzene since the 2006 USA and has no further monitoring planned.

Benzene emissions, tonnes	2004	2005	2006	2007
Corus	30.8	29	33.3	34.4
Koppers	<1	<1	<1	n/a

Table 2.1b: The emissions of benzene from Koppers and Corus between 2004 and 2007.

Note: Koppers data not requested for 2007 as not significant emitter in previous years.

**Part 2.2: 1,3 Butadiene**

As a result of the 2006 USA, the Council was required to proceed to a Detailed Assessment for 1,3 butadiene in the Killingholme area. This part of the Detailed Assessment was submitted in April 2007 and a summary of this report is reproduced in Figure 2.3. A summary of the consultation responses for all sections of the Detailed Assessment is shown in the Appendix, Part 10. Defra stated in their appraisal that they accepted the conclusions of the 1,3 butadiene Detailed Assessment.

Table 2.2 shows the emissions for each refinery since the new method of calculating emissions was introduced in 2004. There has been no substantial changes to the emissions from either refinery, therefore it can be expected that the 1,3 butadiene objective will continue to be met in the Killingholme area.

1,3 butadiene emissions, tonnes	2004	2005	2006	2007
ConocoPhillips Humber Refinery	12	12	12	12
Total Lindsey Oil Refinery	12	11	11	11
Sum	24	23	23	23

Table 2.2: The emissions of 1,3 butadiene from the two refineries in Killingholme between 2004 and 2007.

Note: 2007 data not available on the EA Pollution Inventory at time of writing, requested from the operators direct.

The new PPC permit issued for ConocoPhillips in December 2007 contained a scheme for a VOC identification and reduction programme. Updates of the work will be provided in time for future Review and Assessment reports.

The Council has conducted no monitoring of 1,3 butadiene since the 2006 USA and has no further monitoring planned.

"The two refineries in Killingholme reported a significant increase in their 1,3 butadiene emissions in 2004 and 2005 compared to previous years as a result of a change in the reporting methodology. Consequently the Updating and Screening Assessment report (2006) concluded that North Lincolnshire Council should proceed to a detailed assessment for 1,3 butadiene. However, it was decided that a further scaling exercise would be carried out to determine whether any detailed modelling or monitoring are necessary, to achieve this results from a benzene diffusion tube survey that North Lincolnshire Council carried out in 2004 and the benzene emissions from the two refineries were used in a scaling exercise.

With this data three scenarios were considered, 1. A worst-case scenario based on the highest monthly benzene concentration measured at an installation boundary, 2. A worst-case scenario based on the highest monthly benzene concentration measured at a sensitive receptor. The first and second scenarios also assumed all the benzene originated from the refineries. 3. A realistic receptor scenario using the highest annual mean concentration at a sensitive receptor but taking account of the background concentration.

The calculations showed that even in the worst-case scenario the concentration of 1,3 butadiene would be equivalent to 51.7% of the Air Quality Objective. Scenario 3, a more realistic scenario, resulted in a concentration that was equivalent to 19.9% of the Air Quality Objective. The calculations show that road traffic is likely to be a more significant contributor to 1,3 butadiene concentrations for those receptors that are close to Humber Road. Thus it is extremely unlikely that the Air Quality Objective is being breached in the Killingholme area and so no further work will be necessary at this time."

Figure 2.3: The summary of the 1,3 butadiene section of the Detailed Assessment submitted in April 2007.

### **Part 2.3: Carbon Monoxide**

In the Updating and Screening Assessment 2006 it was stated that no carbon monoxide monitoring had been carried out in North Lincolnshire. Unfortunately this statement was incorrect and monitoring has in fact been carried out at the Scunthorpe Town site between the 2<sup>nd</sup> February and 7<sup>th</sup> November 2005. Table 2.4 details the results and data capture from this monitoring.

Site	Highest 8 hour running mean, mg/m <sup>3</sup>	Mean hourly concentration, mg/m <sup>3</sup>	Data Capture, %
Scunthorpe Town	1.5	0.163	90.3

Table 2.4: The hourly mean and 8-hourly maximum carbon monoxide concentrations and data capture from the Scunthorpe Town monitoring station in 2005.

The data capture during this period of monitoring was greater than the recommended 90%; the maximum 8-hourly carbon monoxide concentration recorded during this monitoring was 1.5 mg m<sup>-3</sup>. This is within the air quality objective of a maximum 8-hourly concentration of 10 mg m<sup>-3</sup>. The Council has conducted no further monitoring of carbon monoxide since November 2005 and has no plans for any more monitoring.

Any significant changes to road traffic are detailed in Chapter 4.

### **Part 2.4: Lead**

As a result of the 2006 USA the Council was required to proceed to a Detailed Assessment for lead (Pb) in the Scunthorpe area, the monitoring showed that the 2004 and 2008 objectives were met. A summary of the lead section, submitted in July 2007, is shown in Figure 2.5.

“Approximately six months of Partisol filters from the Scunthorpe Town monitoring site and three months of Partisol filters from the High Santon monitoring site were analysed for lead. The mean concentration recorded at Scunthorpe Town was  $0.022 \mu\text{g m}^{-3}$  and at High Santon it was  $0.076 \mu\text{g m}^{-3}$ . These values are below the current (2004) objective of  $0.5 \mu\text{g m}^{-3}$  and the 2008 objective of  $0.25 \mu\text{g m}^{-3}$ .

Although a full year’s worth of monitoring was not undertaken, North Lincolnshire Council is satisfied that the objectives are being met and that no further monitoring of lead in the Scunthorpe area need take place. An Air Quality Management Area does not need to be declared. However, emissions from industrial processes in Scunthorpe will continue to be examined as part of the Review and Assessment process.

A small amount of source apportionment work has been carried out. In line with expectations, the wind frequency roses drawn suggest that the highest lead concentrations occur when the wind originates from the east/southeast for Scunthorpe Town and the southwest for High Santon. Thus suggesting that emissions from the industrial site contribute to the lead concentrations recorded at both sites. In addition, the weekly  $\text{PM}_{10}$  and lead concentrations at Scunthorpe Town seemed to fluctuate in a very similar manner. This relationship was less distinct at High Santon.”

Figure 2.5: The summary of the lead section of the Detailed Assessment, 2007.

The Detailed Assessment analysed Partisol filters from Scunthorpe Town for the period August 2006 to March 2007, with filters from High Santon analysed for the period January to March 2007. The Council has conducted no further analysis of filters since the 2007 Detailed Assessment, although Partisol filters from Scunthorpe Town and High Santon are stored in case any additional analysis is required.

The EA were included in the consultation for the 2007 Detailed Assessment. As part of the follow-up, the method of data collection used by Corus was to be confirmed, Figure 2.6 highlights this part of the EA response.

**In relation to the Sinter Plant itself, I can confirm that the mass release data reported in our Pollution Inventory records is based on two extractive emission tests per year. The sampling method used for lead emissions is BS EN 14385. This is the mandatory method for extractive sampling of metals under the Environment Agency's MCERTS scheme. The sampling method should only change in-line with international standards.**

**Under PPC, Corus report lead emissions from three plant areas, namely the Sinter Plant, BOS Plant and Coke Ovens. Extractive methods are used for the Sinter stack and BOS Plant. An emission value is calculated for coke oven emissions based on the analysis of coal processed at the plant. The results for each plant area is then used together with production data to calculate the mass release data as reported in the Pollution Inventory.**

Figure 2.6: Part of the EA response to the Detailed Assessment discussing Corus' method of lead measurement.

The draft report has been amended to take account of the EA and Corus consultation responses. The report now suggests that the industrial site is the source of lead rather than specifically concentrating on the sinter plant. The responses to the Detailed Assessment consultation are included in the Appendix Part 10.

Figure 2.7 shows that Corus' emissions have declined slightly since 2005, this was the first year that the new measurement technique was used. In 2007 Corus registered emissions of 12.08 tonnes of lead, this value is lower than the emissions of 2005 and 2006. Corus are also due to submit further modelling to the Environment Agency in June 2008.

Year	Corus lead emissions, tonnes
2005	12.90
2006	12.19
2007	12.08

Table 2.7: The emissions of lead submitted by Corus to the EA's pollution inventory.

Note: 2007 data not available on the Pollution Inventory at time of writing, requested from the operators direct.

As discussed in Chapter 3 two Partisol 2000s are to be installed in North Lincolnshire by NPL on behalf of Defra. The Partisols will measure lead concentrations (along with other metals) on a weekly basis, therefore lead concentrations will be assessed at the Scunthorpe Town and Low Santon sites in future Review and Assessment reports. The Council's monitoring was conducted in High Santon, whilst the Low Santon is slightly closer to the eastern boundary of the steelworks, see Figure A20 in the Appendix.

## **Part 2.5: Nitrogen Dioxide**

### **Part 2.5.1: Detailed Assessment**

As a result of the 2006 USA the Council was required to proceed to a Detailed Assessment for nitrogen dioxide (NO<sub>2</sub>) in certain locations. A summary of the report is shown in Figure 2.8, with results of the consultation on all three parts of the Detailed Assessment discussed in the Appendix, Part 10.

“The results from North Lincolnshire Council’s automatic monitoring stations are reported and indicate that neither the annual or hourly NO<sub>2</sub> Air Quality Objectives were breached in 2006 at any of the sites. Diffusion tube results were corrected for their bias using results from a triplicate study at the Scunthorpe Town monitoring site. Once this was done the results show that in the vicinity of the junction of Brigg road and the A18, the annual mean Objective was breached in 2006. The annual mean Objective was not breached in any other location.

Nitrogen dioxide concentrations at Humber Road were considered with several DMRB runs, as the current tube may not be in a worst-case scenario location. The nitrogen dioxide tubes route will be changed to reflect this and the locations of other diffusion tubes were re-considered.

Industrial Emissions Screening Tool (IEST) calculations were re-done for Singleton Birch, Caparo Merchant Bar, Fibrogen and Edinburgh Oil and Gas, as the original background concentrations used seemed unusually high. These re-calculations showed that no further work is necessary in the respect of emissions from these companies.”

Figure 2.8: Summary of the 2007 NO<sub>2</sub> Detailed Assessment.

In October 2007 an update was sent to Defra regarding the diffusion tube at the junction of the A18 and Brigg Road, shown in Table 2.9.

"In the detailed assessment it was stated that further monitoring would be carried out at the junction of Brigg road and the A18. At that point the Council had applied for funding for an automatic NO<sub>x</sub> analyser from the Defra's air quality grant scheme.

The Council was successful in attaining some money under this grant. The value awarded to the Council was equal to the sum that was applied for lead (Pb) monitoring which was required for a detailed assessment and one year's worth of Partisol PM<sub>10</sub> monitoring.

On the 31<sup>st</sup> August 2007 an NO<sub>2</sub> diffusion tube was attached to the façade of the Ashby Lodge Pub at the junction of Brigg Road and the A18. This tube has joined the remainder of the NO<sub>2</sub> diffusion tube network and so will be replaced in line with the calendar published by AEA Energy and Environment. It has also been confirmed that someone does live in the flat above the pub.

Since the Detailed Assessment was written a FAQ on the Review and Assessment website was brought to the attention of the Council as being relevant to the potential breach at this junction. The FAQ states:

**"7. Measurements of nitrogen dioxide have been made over the last few years at the kerbside using diffusion tubes. Is there any way the results can be used to assess concentrations at the facade of nearby residential properties, to allow comparison with the annual mean objective?"**

Yes. Concentrations will be slightly lower at the building facade. The limited information that is available would suggest that the following adjustments can be applied to the kerbside results to estimate roadside values:

Distance from kerb Multiply Kerbside Result by  
2-5 m 0.95  
5-10 m 0.90  
10-20 m 0.75

These adjustments are still conservative in nature, but are appropriate for an Updating and Screening Assessment and may be useful in a Detailed Assessment. Reference: <http://www.uwe.ac.uk/aqm/review/mfaqroad.html#ROAD8>

The distance between the original diffusion tube and the closest façade of the pub is approximately 11 metres. Therefore if a factor of 0.90 is applied to the annual concentration of 41.63 µg m<sup>-3</sup> (rounded to 42 µg m<sup>-3</sup> in the original report), the concentration falls to 37.46 µg m<sup>-3</sup>. This is less than the annual air quality objective.

North Lincolnshire Council therefore concludes that at this stage the second diffusion tube on the façade of the pub is enough to determine whether the objective is being breached, with the installation of an automatic analyser not necessary at this stage. "

Table 2.9: Letter to Defra regarding results around Brigg Road and the A18.

### Part 2.5.2: Network changes since the 2006 USA

On the 10<sup>th</sup> January 2008 the NO<sub>x</sub> analyser at the Scunthorpe Town site joined its cousin PM<sub>10</sub> and SO<sub>2</sub> analysers and became affiliated to the national monitoring network, the AURN. Thus in addition to the results being available on the Council's air quality website, they will also be available on the national Air Quality Archive. However, there will be no increase in the quality of the data as the analyser has been a member of AEA's Calibration Club since it commenced operation in June 2004. It has therefore been subject to QA/QC procedures that are equivalent to national standards, as is the case with all of the Council's automatic monitoring stations.

Table A1 in the Appendix details the start and finish date, the OS grid reference and the type of monitor used at each of the monitoring stations. Changes were made to diffusion tube route in the beginning of 2008 as shown in Figure 2.10. Maps of these locations are shown in the Appendix, Figures A13 to A17.

- Tube 7 moved to represent a receptor that is closer to, and downwind, of Berkeley roundabout.
- Tube 13 removed from Lloyds Avenue as next to Airpointer, moved to junction of Ashby Road / Burringham Road.
- Tube 37 located at Chancel Road / Bottesford Road.
- Tube 38 located at Ashby High Street / Grange Lane South.
- Tube 39 located on Sluice Road, South Ferriby.

Figure 2.10: Changes to the NO<sub>2</sub> diffusion tube locations for 2008.

### Part 2.5.3: Automatic Monitoring

The Council currently operates five automatic NO<sub>x</sub> monitors; these are located at Gallagher Retail Park, Kingsway House (maps provided in previous reports), Killingholme, Low Santon and Scunthorpe Town (see Figure 2.28).

Table 2.11 shows the annual mean NO<sub>2</sub> concentrations, the number of exceedances of the hourly limit value and other relevant statistics for 2007.

2007 Site Results	Annual Mean, ug m-3	Highest Hourly Concentration, ug m-3	Exceedances of Hourly Limit Value	Data Capture %	99.8th Percentile, ug m-3
Gallagher Retail Park	24.6	105.1	0	97	87.9
Killingholme	21.6	120.3	0	98.8	86
Kingsway House	31.6	191	0	99.4	143.3
Low Santon	21.8	212	1	51.7	72.6
Scunthorpe Town	17.8	112.7	0	95.7	80.2

Table 2.11: The annual mean, highest hourly and 99.8<sup>th</sup> percentile NO<sub>2</sub> concentrations recorded with data capture and exceedances of the hourly limit value for 2007.

Note: The 2007 dataset contains provisional data.

Table 2.11 demonstrates that the annual and hourly NO<sub>2</sub> objectives were met in 2007 at the North Lincolnshire automatic monitoring stations. The highest annual mean concentration recorded was 31.6 µg m<sup>-3</sup> at the Kingsway House monitoring station. This is less than the annual objective of 40 µg m<sup>-3</sup>.

One exceedance of the hourly limit value (200 µg m<sup>-3</sup>) was recorded at the Low Santon site on the 19<sup>th</sup> August at 0700 hrs, a concentration of 212.0 µg m<sup>-3</sup> was recorded. However, 18 exceedances of the hourly limit value are allowed within the objective.

Unfortunately six months of data was lost at the Low Santon site between mid-December 2006 and May 2007, as it was discovered during a six-monthly service that the sample manifold had pulled away from the manifold, therefore reducing the flow. The data capture was less than the 90% target, but as shown in Table 2.11 the 99.8<sup>th</sup> percentile was 72.6 µg m<sup>-3</sup>. This is less than the hourly limit value and so it is likely that the objective would have been met.

There are no plans to move the Groundhog given the PM<sub>10</sub> concentrations being recorded at the site and so NO<sub>x</sub> concentrations will continue to be monitored in the area. All other sites achieved 90% data capture.

#### Part 2.5.4: Automatic Long-term Trends

This part will consider the long-term trends of NO<sub>2</sub> concentrations at the Council's automatic monitoring stations. The annual mean concentrations for the two sites that have been in operation for the longest period of time (Killingholme and Scunthorpe Town) are shown in Figures 2.12 and 2.13. Statistics for the other sites are shown in Tables 2.14 to 2.16.

Figure 2.12 shows that NO<sub>2</sub> concentrations have decreased at the Killingholme monitoring station from 25.7 µg m<sup>-3</sup> in 2003 to 20.7 µg m<sup>-3</sup> in 2006. With a period data capture of 90% achieved in each year, the results can be compared against each other. Although a slight increase has occurred in 2007 to 21.6 µg m<sup>-3</sup>, the annual objective has been met at the Killingholme monitoring station in every year of monitoring.

The NO<sub>2</sub> concentration recorded at Scunthorpe Town has been below the annual objective in all years, the trend of decreasing NO<sub>2</sub> concentrations is also shown at the Scunthorpe Town site, Figure 2.13. The NO<sub>2</sub> concentration has decreased from 23.3 µg m<sup>-3</sup> in 2004 to 17.8 µg m<sup>-3</sup> in 2007. The Scunthorpe Town NO<sub>x</sub> monitor commenced operation in June 2004 hence the annual data capture was only 53.1%, although the period data capture was a satisfactory 92.8%. In 2005 the annual data capture was 81.7%. As 90% data capture was not achieved in all years some caution should be associated with these results, but the trend does correlate with the Killingholme results.

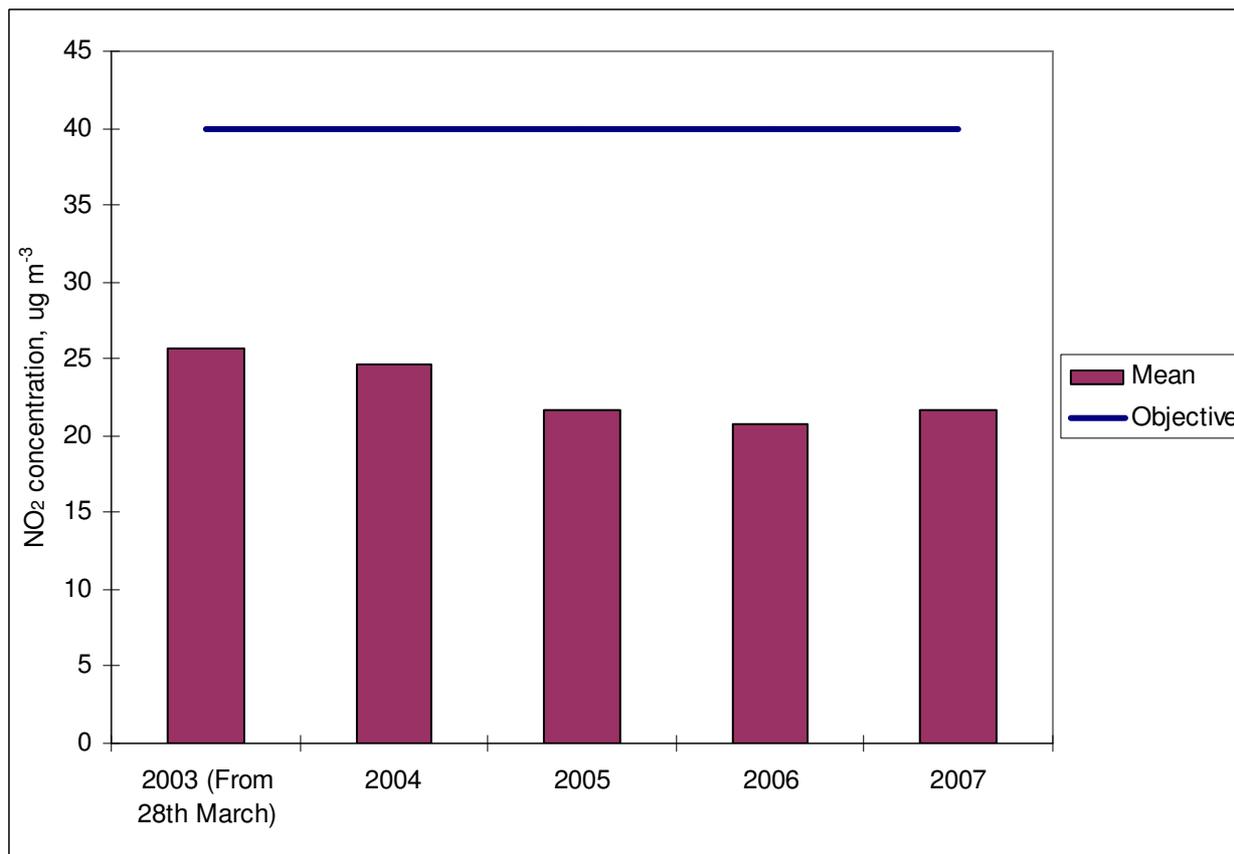


Figure 2.12: The annual mean NO<sub>2</sub> concentration at Killingholme from 2003 to 2007.

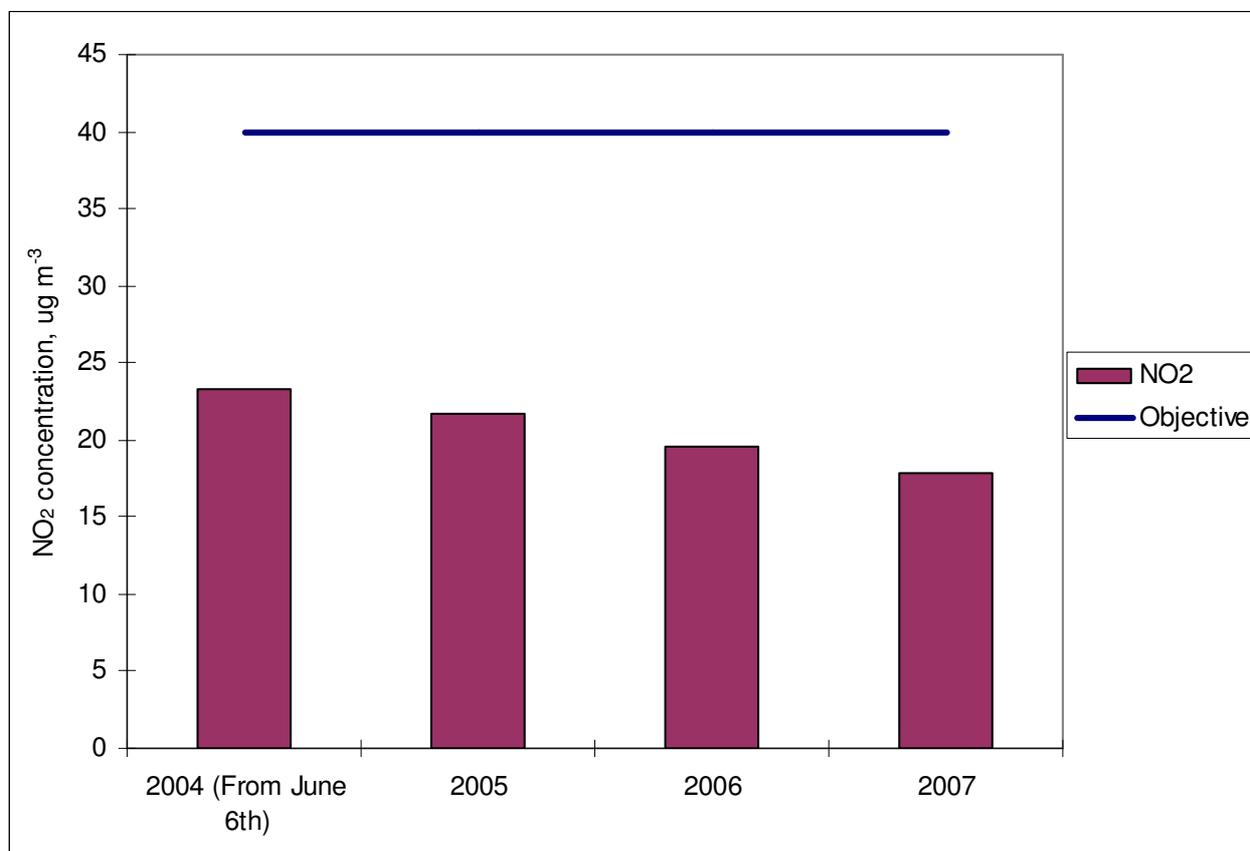


Figure 2.13: The annual mean NO<sub>2</sub> concentration at Scunthorpe Town from 2004 to 2007.

The results from Gallagher (Table 2.14) show a slight increase in both the annual mean concentration and the highest hourly concentration between 2006 and 2007. The results from Kingsway (Table 2.15) show that one exceedance of the hourly limit value was recorded in 2005, this has not been repeated in 2006 or 2007. However, the mean concentration has increased from 19.0  $\mu\text{g m}^{-3}$  in 2005 to 31.6  $\mu\text{g m}^{-3}$  in 2007.

The results from Low Santon (Table 2.16) indicate a decrease in the annual mean concentration on the one hand, but also a significant increase in the highest hourly concentration. However, the data capture for this analyser was below 90% in 2006 and 2007, thus these results should be treated with some caution. The Low Santon site is likely to remain in place for the foreseeable future given the  $\text{PM}_{10}$  concentrations being recorded in the area.

Gallagher	Mean, $\mu\text{g m}^{-3}$	Highest hourly concentration, $\mu\text{g m}^{-3}$	Data capture, %	99.8th percentile, $\mu\text{g m}^{-3}$
2006 (from January 24th)	23.9	101.2	79.4 *	78.3
2007	24.6	105.1	97	87.9

Table 2.14: Statistics from the Gallagher Retail Park monitoring station for 2006 and 2007.

\*Period data capture quoted, annual data capture is equal to 74.4%.

Kingsway	Mean, $\mu\text{g m}^{-3}$	Highest hourly concentration, $\mu\text{g m}^{-3}$	Exceedances of hourly limit value	Data capture, %	99.8th percentile, $\mu\text{g m}^{-3}$
2005 (from 22nd August)	19.0	223.5	1	98.3 *	142.2
2006	22.3	137.5	0	97.4	103.1
2007	31.6	191.0	0	99.4	143.3

Table 2.15: Statistics from the Kingsway House monitoring station between 2005 and 2007.

\* Period data capture quoted, annual data capture is equal to 34.5%.

Santon	Mean, $\mu\text{g m}^{-3}$	Highest hourly concentration, $\mu\text{g m}^{-3}$	Exceedances of hourly limit value	Data capture, %	99.8th percentile, $\mu\text{g m}^{-3}$
Oct to Dec 2005	26.5	86.0	0	98.1 *	74.5
2006	24.7	108.9	0	77.8	78.3
2007	21.8	212.0	1	51.7	72.6

Table 2.16: Statistics for NO<sub>2</sub> monitoring at the Low Santon site between 2005 and 2007.

Notes: \* Period data capture quoted, annual data capture is equal to 24.7%.

Tables 2.14 to 2.16: The 99.8<sup>th</sup> percentile concentration should be compared against the hourly objective of 200  $\mu\text{g m}^{-3}$ .

The 2007 dataset contains provisional data.

All the results recorded by the Council's automatic NO<sub>2</sub> monitors have been within the air quality objectives.

Part 2.5.5: Automatic NO<sub>x</sub> results and NO<sub>2</sub>/NO<sub>x</sub> ratios

Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity generation industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO<sub>2</sub>) via a reaction with ozone (O<sub>3</sub>). NO<sub>2</sub> is considered harmful to health hence an objective is set for this pollutant.

NO<sub>2</sub> and NO are both oxides of nitrogen and together they are referred to as oxides of nitrogen (NO<sub>x</sub>). There is no objective for NO<sub>x</sub> but it is useful to consider the ratio between NO<sub>2</sub> and NO<sub>x</sub>. The AQEG report <sup>3</sup> into primary NO<sub>2</sub> published in December 2007 noted that whilst urban NO<sub>x</sub> and NO<sub>2</sub> concentrations have decreased in recent years, NO<sub>2</sub> concentrations have not decreased as rapidly as NO<sub>x</sub> concentrations, this results in the NO<sub>2</sub>/NO<sub>x</sub> ratio increasing. This means more of the NO<sub>x</sub> in the atmosphere is composed of NO<sub>2</sub>, for which an objective has been set.

The annual mean NO<sub>x</sub> concentration and the NO<sub>2</sub>/NO<sub>x</sub> ratio have been calculated for the three sites with the longest running datasets (Killingholme, Kingsway House and Scunthorpe Town) and are shown in Tables 2.17 to 2.19.

Killingholme	NO <sub>x</sub> mean, ug m <sup>-3</sup>	NO <sub>2</sub> mean, ug m <sup>-3</sup>	NO <sub>2</sub> /NO <sub>x</sub> ratio
2003 (from 28th March)	45.0	25.7	0.57
2004	39.2	24.7	0.63
2005	37.1	21.7	0.58
2006	40.2	20.7	0.51
2007	39.6	21.6	0.55

Table 2.17: The annual mean NO<sub>x</sub> and NO<sub>2</sub> concentrations at Killingholme.

Note: NO<sub>x</sub> data capture will be the same as NO<sub>2</sub> data capture.

Kingsway House	NO <sub>x</sub> mean, ug m <sup>-3</sup>	NO <sub>2</sub> mean, ug m <sup>-3</sup>	NO <sub>2</sub> /NO <sub>x</sub> ratio
2005 (from 22nd August)	40.9	19.0	0.465
2006	42.1	22.3	0.530
2007	52.2	31.6	0.605

Table 2.18: The annual mean NO<sub>x</sub> and NO<sub>2</sub> concentrations at Kingsway House.

Scunthorpe Town	NO <sub>x</sub> mean, ug m <sup>-3</sup>	NO <sub>2</sub> mean, ug m <sup>-3</sup>	NO <sub>2</sub> /NO <sub>x</sub> ratio
2004 (from June 6th)	36.4	23.3	0.640
2005	34.7	21.7	0.625
2006	33.4	19.6	0.587
2007	30.2	17.8	0.589

Table 2.19: The annual mean NO<sub>x</sub> and NO<sub>2</sub> concentrations at Scunthorpe Town.

Table 2.19 shows that between 2004 and 2007 the NO<sub>x</sub> and NO<sub>2</sub> concentrations have decreased at Scunthorpe Town, with the NO<sub>2</sub>/NO<sub>x</sub> ratio also decreasing. This site is some distance from a busy road (126 m to Brigg Road) and is also more likely to be influenced by background concentrations and potentially emissions from the steelworks site.

Results at Killingholme also show a decrease in NO<sub>2</sub> concentrations, although there is no overall trend in the NO<sub>2</sub>/NO<sub>x</sub> concentrations, again this could potentially be due to the influence of local industrial emissions and its distance from Humber Road.

On the other hand Kingsway House, which is closer to a road, shows not only a significant increase in NO<sub>2</sub> concentrations but also an increase in the NO<sub>2</sub>/NO<sub>x</sub> ratio as well, from 0.465 in 2005 to 0.605 in 2007. The annual objective is currently being met at Kingsway House, but if the trend of increasing NO<sub>2</sub> concentrations and an increase in the NO<sub>2</sub>/NO<sub>x</sub> ratio continues it will become increasingly difficult to carry on meeting the objective.

Results from Gallagher Retail Park and Low Santon have not been considered due to the smaller amount of data available and lower data capture at these sites.

#### Part 2.5.6: Diffusion Tube Results

In 2007 the Council operated 36 NO<sub>2</sub> diffusion tubes throughout North Lincolnshire, these were mostly located at kerbside and roadside sites. A total of nine tubes were used in triplicate studies at three automatic monitoring stations.

Table 2.20 presents the annual mean NO<sub>2</sub> concentrations and data capture recorded by the diffusion tubes in 2007. The tubes co-located at the automatic monitoring stations have been excluded from this Table. The results from the tubes should be 'bias corrected' to enable a comparison to the objective. This means the tube results are corrected based on the results from an automatic monitoring station, as they are regarded as being more accurate and precise.

A local bias correction factor for 2007 has been calculated for the co-location studies at the Kingsway House, Gallagher Retail Park and Scunthorpe Town automatic monitoring sites, see Appendix, Figures A5 to A7. The Gallagher and Kingsway House correction factors seem to be higher than that of Scunthorpe Town. However, only the Scunthorpe Town factor is used in this report. This is because the Kingsway tubes achieved poor precision and although Gallagher achieved good overall data capture and precision, there are only seven months where 'good' data for both the automatic analyser and the tubes was achieved.

The results in Table 2.20 are shown in three formats, as raw results (which should not be compared to the objective), as bias corrected results using the local factor and as bias corrected results using the national factor. Table 2.20 shows that when using the locally derived bias factor there are no sites that breach the annual NO<sub>2</sub> objective. However, the co-location study at Scunthorpe Town gives quite a low correction factor so the national correction factor (0.84, based on data available in March 2008) has been applied to the

results as well. This has also been done because the Scunthorpe Town bias correction factor may not be applicable to all of North Lincolnshire.

The national factor has been attained from the Review and Assessment Helpdesk database (March 2008). Details of the laboratory and method used, as well the sheets for the calculation of the bias correction factors are shown in the Appendix, Part 4.

Site Location	Annual mean, ug m <sup>-3</sup>			Annual data capture, %
	Raw	Local bias factor (0.66)	National bias factor (0.84)	
Frodingham Road	31	21	26	100
Normanby Road	32	21	27	75
A1077 Orbital Road	26	17	22	100
Epworth, Belton Road Junction	31	20	26	75
Keadby Bridge	27	18	22	50
Doncaster Road / Hilton Avenue	32	21	27	92
Scotter Road	40	26	33	92
Doncaster Road / Royal Hotel	31	20	26	92
Britannia Corner	40	26	34	75
Oswald Road	34	23	29	100
Ashby Road	30	20	25	92
Lloyds Avenue/Glover Road	31	21	26	83
Lloyds Avenue / Ashby Road	31	21	26	92
Ashby Road/A18	35	23	29	100
Ashby Road / Brumby Street	39	26	33	100
Old Brumby / East Common Lane / Queensway	37	25	31	75
Dudley Road / Queensway	30	20	25	92
Lakeside Parkway	29	19	25	58
Jct Brigg Rd/A18	56	37	47	92
Barnard Avenue, Brigg	31	20	26	92
Humber Road, LP695	42	28	35	50
Jct Brigg Rd/A18 (2)	35	23	29	33
Wrawby Road	33	22	28	92
Humber Road	34	22	28	100
St Crispins Close	20	13	17	75
Holydyke, Barton	35	23	29	75
Station Road/Brigg Road	28	19	24	83

Table 2.20: Annual mean NO<sub>2</sub> concentrations from the Council's diffusion tubes (excluding co-location tubes), presented as raw results, corrected using the Scunthorpe Town bias factor and corrected using a national bias factor.

Following the 2007 Detailed Assessment two new locations were added to the diffusion tube route. One is on lamp-post 695 on Humber Road, and represents a receptor that is closer to the main road than the current tube, Figure A12. The second tube is located on the drainpipe of the building of the relevant receptor at the junction of the Brigg Road and the A18. See Figure A11 and is shown as Jct Brigg Road / A18 (2) in Table 2.20.

In the letter sent to Defra as a follow up to the 2007 Detailed Assessment, a factor of 0.75 was applied to the annual NO<sub>2</sub> concentration of the original tube located at the junction of Brigg Road/A18. This was done to take account of the distance between the receptor and location of the original tube. Given that a full year's worth of data is not available for the second tube, the same has been done to the 2007 result. This gives a concentration of 27.75 µg m<sup>-3</sup>, which is slightly higher than the 23 µg m<sup>-3</sup> recorded by the second diffusion tube, both results are within the objective.

The first tube breaches the annual objective if the national bias correction factor is used (47 µg m<sup>-3</sup>). If the 0.75 factor is applied to this value to give an estimate of the concentration at the receptor, a result of 35.25 µg m<sup>-3</sup> is given. Again this is within the objective and slightly higher than the value currently recorded at the second tube (29 µg m<sup>-3</sup>).

It is likely that the some of the 800 houses at the Lakeside development will begin to be occupied in 2008. This has the potential to increase traffic levels at the Brigg Road/A18 junction. In the response to the Detailed Assessment the Transport Planning Manager stated three potential developments that may impact on air quality, one of them was in relation to the roundabout next to the Brigg Road/A18:

“Highways & Planning are currently looking at a scheme to improve traffic flows at the Lakeside roundabout and remove significant numbers of HGVs from the junction, although we are only in the initial feasibility stage. There is therefore, potential to counteract some of the air quality impact at this junction caused by the full opening of the residential development.”

The correction factor for Scunthorpe Town during 2006 has been re-calculated with a fully ratified dataset from the automatic analyser. The ratified factor was slightly lower (0.72) than the provisional factor (0.75), therefore any concentrations reported would have been a slight over-estimate.

In Defra's appraisal of the 2006 USA it was stated that the source of the bias correction factor being used should be stated. This is being done in this report and was done for the 2007 Detailed Assessment. However, the correction factor used in the 2006 USA for the 2005 results was 1.01, given that this is significantly higher than the factor recorded in subsequent years the 2005 results have been looked at again. A bias correction sheet for Scunthorpe Town data is shown in the Appendix, Figure A3. The local correction factor should have been 0.71, although the automatic analyser did not achieve data capture of 90%. The national correction factor for 2005 was 0.91. This has the effect of reducing the NO<sub>2</sub> concentrations, thus any discussion about 2005 results in previous reports would have been extremely conservative (i.e. the concentrations were being over-estimated).

#### Part 2.5.7: Diffusion Tubes, Long-term Trends

There are two tubes with reasonably long running datasets, these are the tubes at Britannia Corner in Scunthorpe and Barnard Avenue in Brigg. Figures 2.21 and 2.22 shows the uncorrected annual NO<sub>2</sub> concentrations since 1998 for these two locations. Note these results should not be compared directly to the objective, as they are raw results and have not been bias adjusted. This is because a local correction factor is only available from 2005 and a national bias adjustment factor is only available from 2000. At both sites there seems to be a downward trend in the NO<sub>2</sub> concentrations recorded.

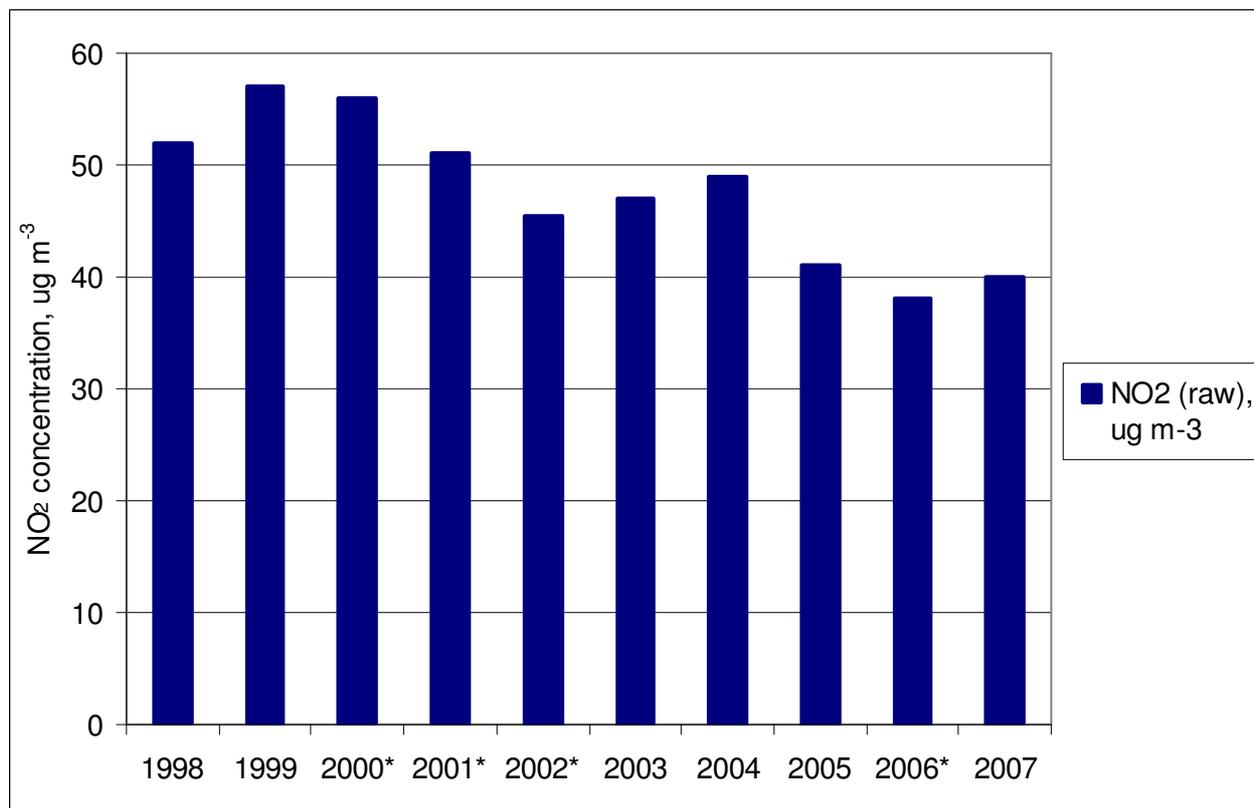


Figure 2.21: **Uncorrected** tube results for Britannia Corner in Scunthorpe between 1998 and 2007.

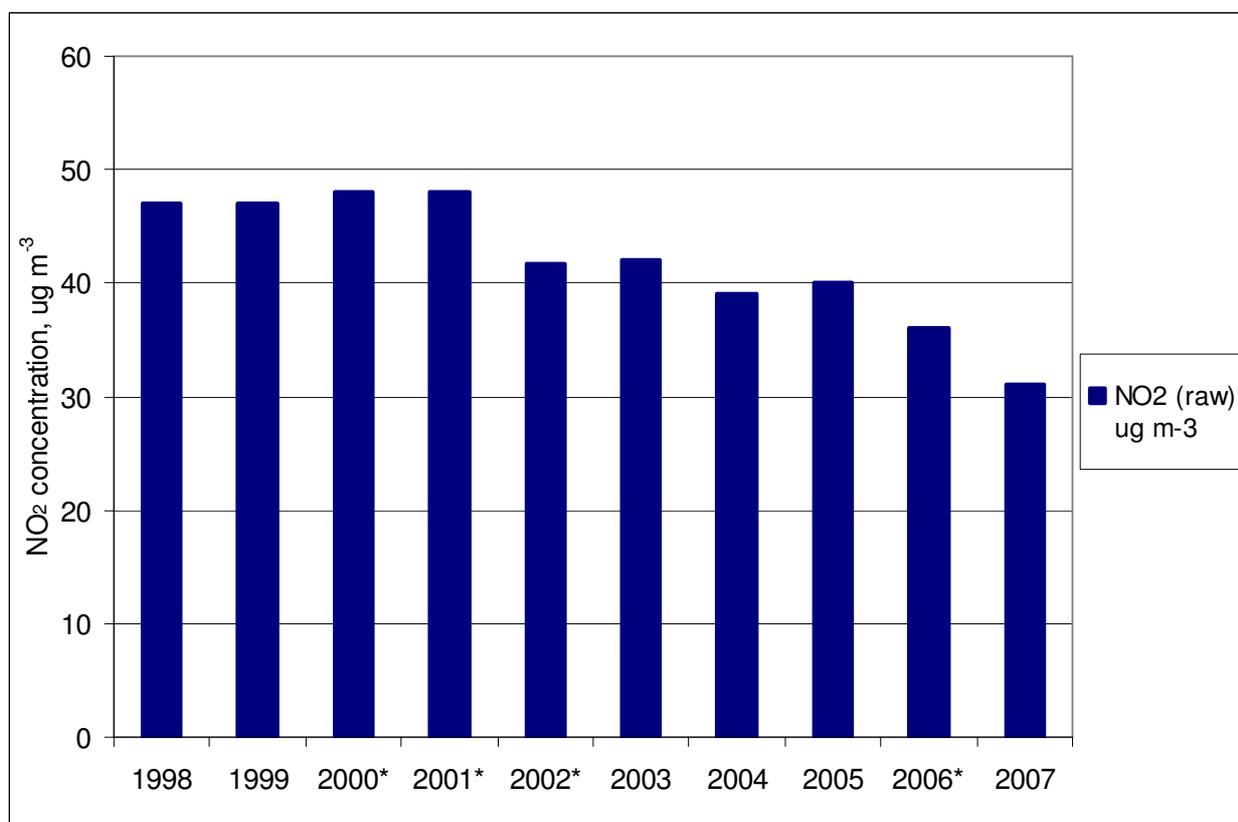


Figure 2.22: **Uncorrected** tube results for Barnard Avenue in Brigg from 1998 to 2007. Note for Figures 2.21 and 2.22: \* indicates less than 75% data capture.

### Part 2.5.8: Projections

Concentrations for future years have been calculated using the 2007 annual NO<sub>2</sub> concentrations from the automatic monitoring stations and selected diffusion tubes, Figures 2.23 and 2.24. The projections have been calculated using the latest year adjustment calculator (January 2006) available on the Air Quality Archive. The 'NO<sub>2</sub> roadside' option was used for Gallagher Retail Park, Kingsway House and the diffusion tubes. The 'NO<sub>2</sub> background' option was used for the other automatic sites, as they are likely to be influenced by background concentrations, road emissions as well as industrial emissions.

Projection	Gallagher Retail Park, annual mean, ug m <sup>-3</sup>	Killingholme, annual mean, ug m <sup>-3</sup>	Kingsway House, annual mean, ug m <sup>-3</sup>
2007 (actual)	24.6	21.6	31.6
2008	23.76	21.02	30.52
2009	22.83	20.41	29.33
2010	22.01	19.87	28.27

Figure 2.23: Projected NO<sub>2</sub> concentrations for Gallagher Retail Park, Killingholme and Kingsway House through to 2010.

Projection	Low Santon, annual mean, ug m <sup>-3</sup>	Scunthorpe Town, annual mean, ug m <sup>-3</sup>
2007 (actual)	21.8	17.8
2008	21.22	17.33
2009	20.60	16.82
2010	20.05	16.37

Figure 2.24: Projected NO<sub>2</sub> concentrations for Low Santon and Scunthorpe Town through to 2010.

Interestingly, if the NO<sub>2</sub> concentration recorded at Scunthorpe Town from 2004 is used to predict a concentration for 2007 (Table 2.25), then it suggests that the NO<sub>2</sub> concentration has fallen faster than the calculator predicts. Based on the 2004 concentration the calculator predicted a concentration of 21.74 µg m<sup>-3</sup> for 2007, in fact a concentration of 17.8 µg m<sup>-3</sup> was recorded.

Scunthorpe Town	Annual Mean, ug m <sup>-3</sup>
2004 (actual)	23.3
2007 (projection)	21.74

Table 2.25: Projection of the 2007 NO<sub>2</sub> concentration at Scunthorpe Town based on the 2004 concentration.

Projection, ug m <sup>-3</sup>	Jct Brigg Rd/A18	Humber Road, LP695	Britannia Corner
2007 (actual)	37	28	26
2008	35.74	27.05	25.11
2009	34.35	25.99	24.13
2010	33.1	25.05	23.26

Table 2.26: Projected concentrations for three diffusion tubes through to 2010.

The NO<sub>2</sub> objectives are currently being met at Kingsway House, although the projections show decreasing concentrations the data recorded suggests increasing concentrations, results will therefore remain under review.

#### Part 2.5.9: Other

A discussion about air quality was held with consultants who are developing a freight strategy for North Lincolnshire, in return the company shared their data with regard to a traffic count near the Brigg Road / A18 junction in Scunthorpe. The count noted the number of lorries and their age, this was then translated into which Euro emission category the vehicle belonged to.

The results are shown in Table 2.27, they have then been compared to the inputs into the DMRB model. It can be seen that the percentage of Euro I and II vehicles are similar, but at the junction the number of Euro III vehicles is higher than the DMRB model and the number of Euro IV vehicles is lower. Euro III vehicles have higher NO<sub>x</sub> and PM<sub>10</sub> emissions than Euro IV.

HGVs	% of lorries from DMRB input	% measured at Brigg Road/A18.
Pre-1988	0	
1988 - 1993	0.4	
Euro I	4.4	4%
Euro II	25.1	25%
Euro III	54.7	65%
Euro IV	15.4	6%

Table 2.27: The percentage of lorries according to age according to the DMRB model and as measured at the Brigg Road / A18 junction in Scunthorpe.

## **Part 2.6: Particulate Matter (PM<sub>10</sub>)**

The Council currently has one AQMA for a breach of the PM<sub>10</sub> **daily** objective. This area covers the steelworks, a mostly agricultural area to the east of the steelworks and to the west, part of Scunthorpe. The AQMA is shown by the black line in Figure 2.28.

### **Part 2.6.1: Monitoring**

North Lincolnshire Council currently monitors PM<sub>10</sub> at nine locations using ten machines; Figure 2.28 shows the location of the monitoring stations in relation to the current AQMA.

Since the 2006 USA the following additions and changes have been made to the North Lincolnshire PM<sub>10</sub> monitoring network:

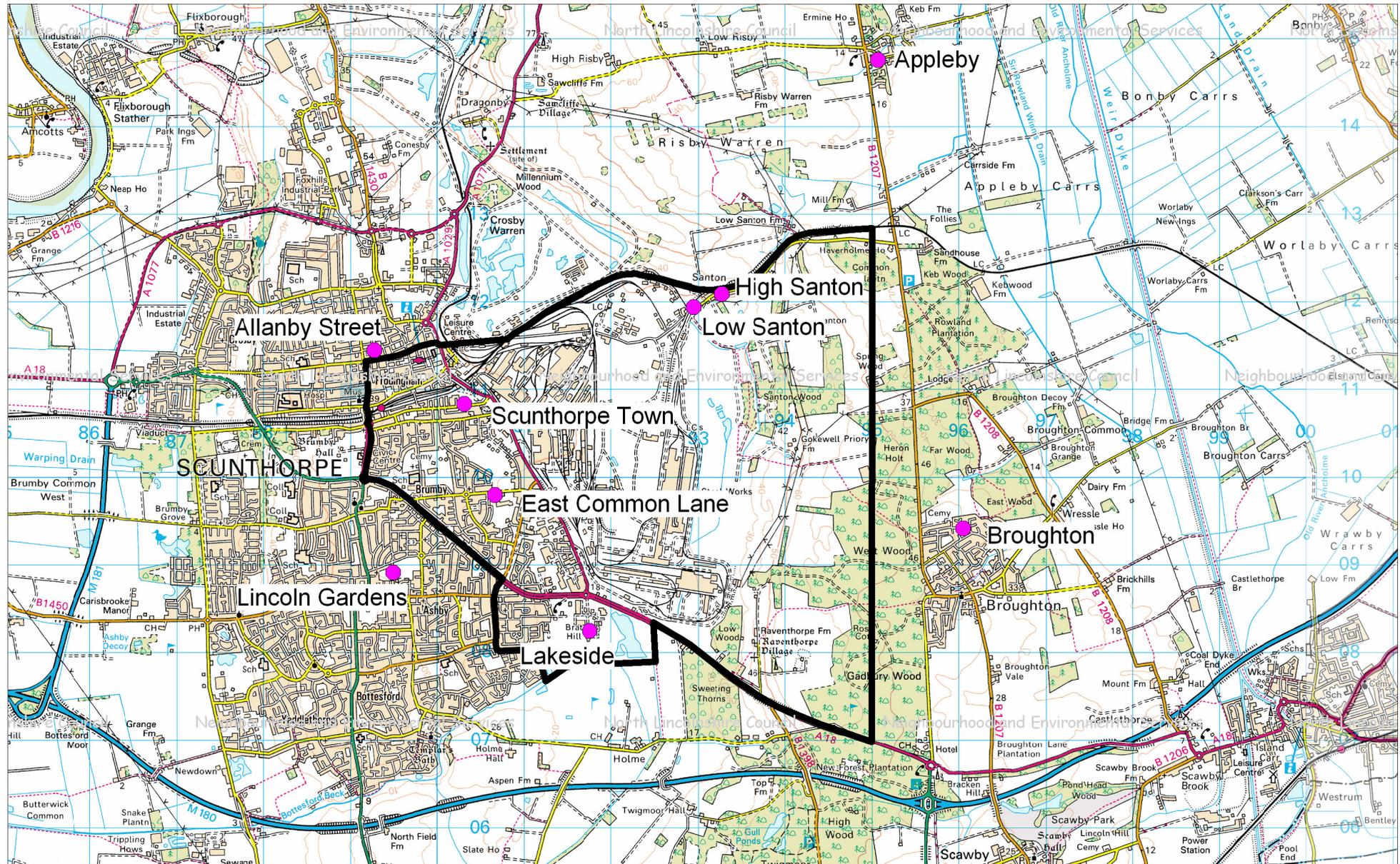
- On the 10<sup>th</sup> March 2006 a TEOM commenced operation in the village of Broughton. Results from this site are shown in Tables 2.29 and 2.31, with a map of its location shown in Figure A19. The site is located within an Anglian Water enclosure within a residential area in the village of Broughton. It is approximately three km east of the steelworks site. The B1207 is 500 m west of the site and the area between this road and the steelworks is comprised of woods and fields. This site is outside of the current AQMA for the daily objective.
- Due to the ongoing construction of 800 houses in the vicinity of the Partisol at Lakeside and with no relevant receptors at the time, the machine was not in operation in 2006. On the 5<sup>th</sup> January 2007, this Partisol was re-located and commenced operation in High Santon, see Figure A20. The Partisol is located in the front garden of a property in the collection of properties known as High Santon Villas, approximately 350 m to the east (i.e. away from the steelworks boundary) of the Low Santon site. Results from this Partisol are included in Table 2.30, these results were discussed in the Detailed Assessment 2008, which is summarised in Figure 2.51. This site is inside the current AQMA for the daily objective.
- On the 8<sup>th</sup> February 2007 a TEOM commenced operation in Appleby Village, results from the site are included in Table 2.29 with a detailed

map of its location shown in Figure A18. This site is located on a playing field in the village of Appleby, arable fields and open field surround the village. It is six km northeast of Scunthorpe and is outside of the current AQMA for the daily objective.

Maps showing the detailed location of the monitoring sites installed since the 2006 USA are shown in the Appendix, Figure A18 to A20. Detailed maps for the other monitoring stations have been shown in previous review and assessment reports.

The monitoring stations installed in Appleby and Broughton were both part of the expansion of the monitoring network to determine whether the scope of the AQMA was correct. However, a secondary use for the sites has been that they provide a local 'background' concentration when the wind originates from an easterly direction. This allows a comparison to be made between concentrations before and after the steelworks site.

Table A1 in the Appendix details the start and finish date of monitoring, the OS grid reference and the type of monitor used at each of the monitoring stations.



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	<p>Drawn by: JRF</p>	<p>Date: 12/03/2008</p>	
	<p>Scale:</p>	<p>OS Grid Ref: SE93051047</p>	

Figure 2.28: A map of the AQMA and PM<sub>10</sub> monitoring stations.

Part 2.6.2: 2006 and 2007 data

Table 2.29 shows monitoring data from the Council's TEOM PM<sub>10</sub> monitoring stations for 2007, whilst Table 2.30 shows the results from the two Partisol monitors.

Site (TEOMs)	Number of exceedances	Annual mean, ug m <sup>-3</sup>	Data capture, %	90.4th percentile, ug m <sup>-3</sup>
Allanby Street	11	24.1	100	36.0
Appleby Village	8	24.0	97.2 *	34.0
Broughton	5	23.0	99.2	34.0
East Common Lane	34	27.5	99.7	49.2
Killingholme	6	23.2	88.8	32
Lincoln Gardens	14	22.8	100	35.1
Low Santon	133	51.1	90.4	99.8
Scunthorpe Town	18	25.0	98.1	40.7

Table 2.29: The number of exceedances, annual mean concentration, data capture and 90.4<sup>th</sup> percentile concentrations recorded in **2007** for North Lincolnshire Council's TEOM PM<sub>10</sub> monitoring stations.

Note: The 2007 dataset contains provisional data.

\* Period data capture quoted, annual data capture was equal to 87.1%.

Site (Partisols)	Number of exceedances	Mean, ug m <sup>-3</sup>	Data capture, %	90.4th percentile, ug m <sup>-3</sup>
High Santon	34	30.5	84.8	53.0
Scunthorpe Town	15	22.0	98.4	39.4

Table 2.30: The number of exceedances, mean concentrations, data capture and 90.4<sup>th</sup> percentile concentrations recorded in **2007** for North Lincolnshire Council's Partisol PM<sub>10</sub> monitoring stations.

The technical guidance LAQM.TG(03) recommends that for data to be 'usable', a data capture of 90% target should be attained, for screening studies a data capture of 75% is suggested. The data capture calculated for all stations relates to the daily means and includes all lost data, whether due to calibrations, services or breakdowns. This value is therefore stricter than necessary as, for example, the 6-monthly services could be excluded from the data capture.

With a data capture of 88.8%, Killingholme was below the 90% target. In line with the LAQM.TG(03) technical guidance the 90.4<sup>th</sup> percentile should be

compared to the daily limit value. The 90.4<sup>th</sup> percentile concentration is 32  $\mu\text{g m}^{-3}$ , as this is less than the limit value of 50  $\mu\text{g m}^{-3}$  the daily objective is regarded as being met.

The monitoring site in Appleby Village commenced operation on the 8<sup>th</sup> February 2007 therefore the annual data capture was below 90%, however, the period data capture recorded was an adequate 97.2%. The 90.4<sup>th</sup> percentile is less than 50  $\mu\text{g m}^{-3}$  and with eight exceedances being recorded, the daily objective is regarded as being met. At the High Santon Partisol it was regarded that the daily objective had been breached as the 90.4<sup>th</sup> percentile was greater than 50  $\mu\text{g m}^{-3}$ , whilst the annual objective was met. These results were discussed in greater detail in the 2008 Detailed Assessment, a summary of which is shown in Figure 2.51.

As in 2006, the Low Santon TEOM breached both the annual and daily objective in 2007, although the number of exceedances and annual mean were lower than in 2006. The East Common Lane site was very close to the objective with 34 exceedances in 2007, 43 exceedances were recorded in 2006. These results will be discussed in more detail in Part 2.6.4.

At the Scunthorpe Town site  $\text{PM}_{10}$  is measured by a TEOM and Partisol machine, both analysers met the objectives in 2007. With a 1.3 correction factor applied to the results the TEOM recorded three more exceedances (18) than the Partisol (15). The TEOM recorded 37 exceedances of the daily limit value in 2006.

Table 2.31 shows the 2006  $\text{PM}_{10}$  data from the TEOM sites whilst Table 2.32 shows the  $\text{PM}_{10}$  data from the Scunthorpe Town Partisol. The 2006 dataset discussed in the 2007 Further Assessment was based on a combination of provisional and ratified data, the values in Table 2.31 are now based on a fully ratified dataset. The only change to the number of exceedances after ratification is a reduction from 18 exceedances to 17 exceedances at Lincoln Gardens, both values are below the objective.

Site (TEOMs)	Number of exceedances	Annual mean, $\mu\text{g m}^{-3}$	Data capture, %	90.4th percentile, $\mu\text{g m}^{-3}$
Allanby Street	23	27.8	96.7	46
Broughton	2	22.6	89.2 *	35
East Common Lane	43	28.9	97.5	53
Killingholme	8	24.1	94.5	38
Lincoln Gardens	17	25.6	97.8	44
Low Santon	158	58.9	96.7	118
Scunthorpe Town	37	29.6	95.3	51

Table 2.31: The number of exceedances, annual mean, data capture and 90.4<sup>th</sup> percentile (where relevant) recorded in **2006** for North Lincolnshire Council's TEOM PM<sub>10</sub> monitoring stations.

\* Period data capture quoted, annual data capture was 72.6%.

Site (Partisols)	Number of exceedances	Mean, $\mu\text{g m}^{-3}$	Data capture, %	90.4th percentile, $\mu\text{g m}^{-3}$
Scunthorpe Town (from 23rd August)	10	22.8	94.7 *	43.2

Table 2.32: The number of exceedances, mean concentrations, data capture and 90.4<sup>th</sup> percentile (where relevant) recorded in **2006** for North Lincolnshire Council's Partisol PM<sub>10</sub> monitoring stations.

\* Period data capture quoted, annual data capture was 34.0%.

Most of the PM<sub>10</sub> monitoring sites in North Lincolnshire recorded fewer exceedances in 2007 than in 2006. It is clear that the daily objective is being broken in the Santon area, with the results at East Common Lane floating close to the objective.

### Part 2.6.3: Long-Term Trends

This Part concentrates on results from the four longest running monitoring sites, East Common Lane, Killingholme, Lincoln Gardens and Scunthorpe / Scunthorpe Town. The Scunthorpe site began operation in mid-December 1997 (thus results from 1998 are shown), with Killingholme commencing PM<sub>10</sub> measurement in March 2003.

### East Common Lane

Figures 2.33 to 2.35 show the number of exceedances of the daily limit value, the annual mean and 90.4<sup>th</sup> percentile concentrations for the East Common Lane monitoring station. Table A21 in the Appendix shows this data along with highest daily concentration and data capture. The monitoring site is inside the current AQMA.

Figures 2.33 and 2.34 show that the daily PM<sub>10</sub> objective was breached in 2005 and 2006, in 2007 the number of exceedances and 90.4<sup>th</sup> percentile concentration were just below the objective and limit value respectively. The annual mean objective has been met in all years of monitoring. Although it should be noted that on those days where the limit value is breached the concentration recorded can be significantly higher than the limit value, the highest daily concentration in 2007 was 129 µg m<sup>-3</sup>.

The number of exceedances being recorded at East Common Lane is close to the objective when a 1.3 correction factor is applied to the TEOM results. Therefore these results will be discussed in more detail in Part 2.6.4.

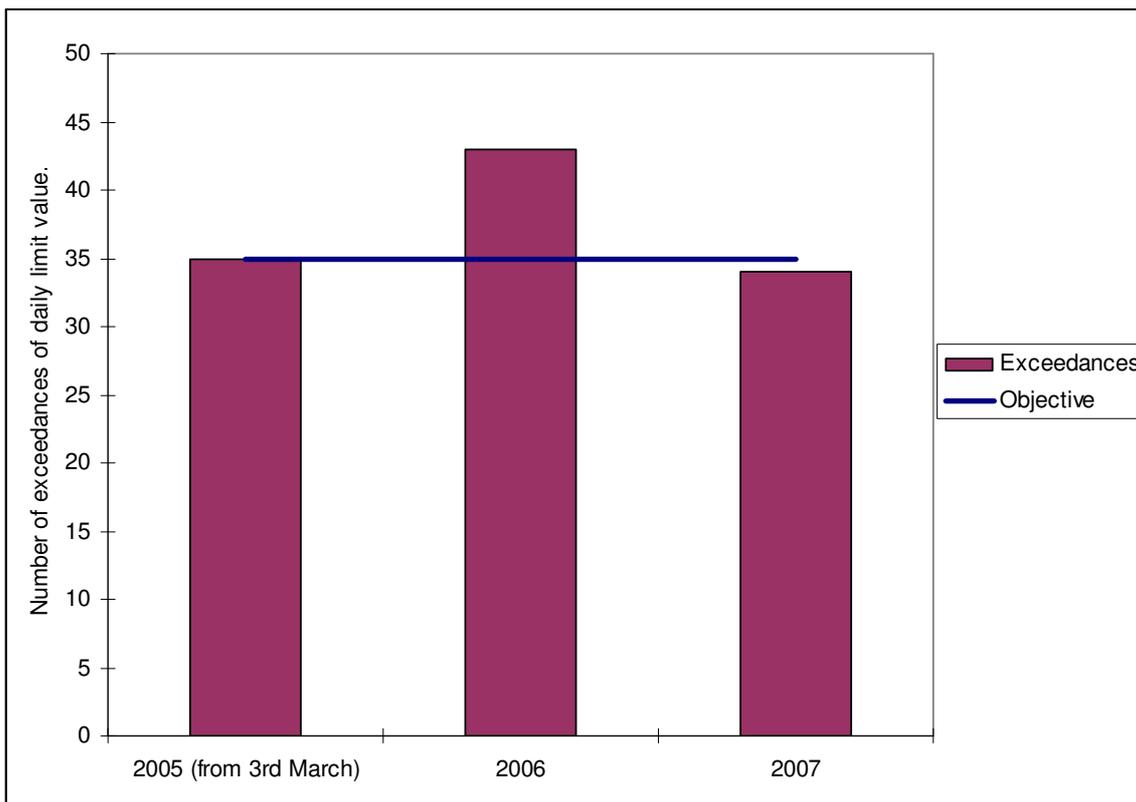


Figure 2.33: The number of exceedances of the daily PM<sub>10</sub> limit value recorded at East Common Lane between 2005 and 2007.

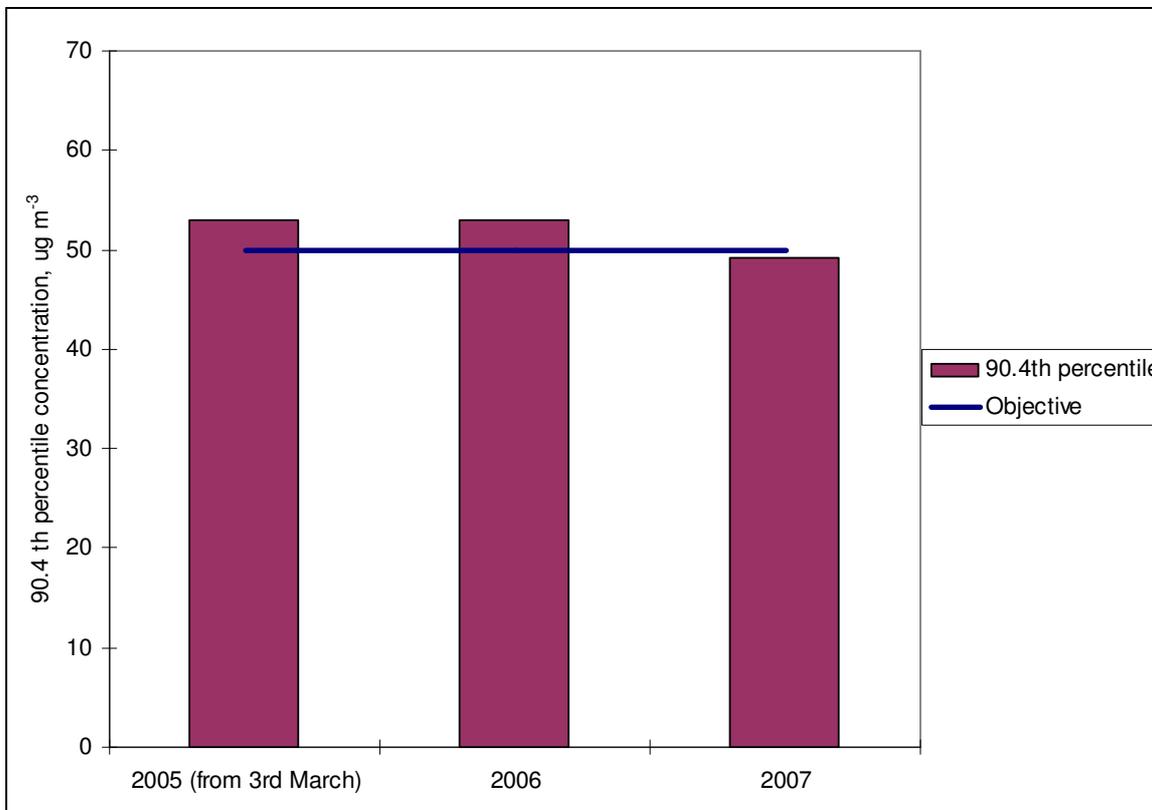


Figure 2.34: The 90.4<sup>th</sup> percentile concentration of PM<sub>10</sub> recorded at East Common Lane between 2005 and 2007.

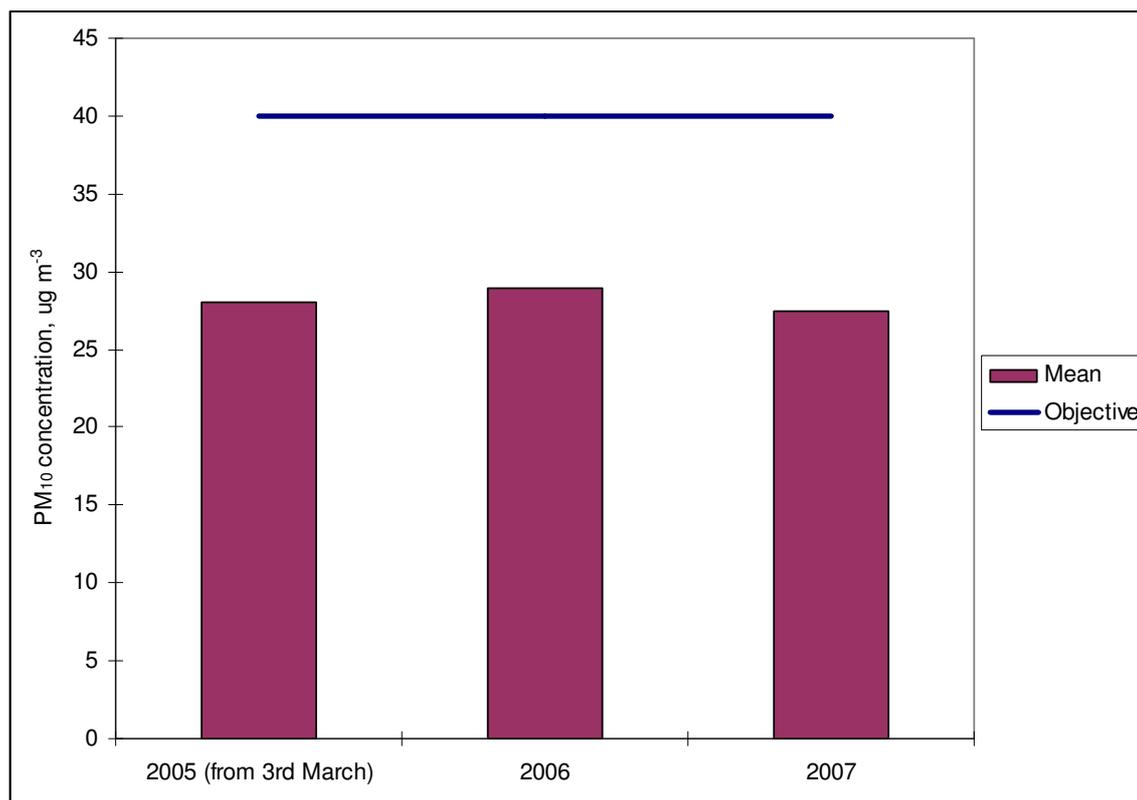


Figure 2.35: The annual mean PM<sub>10</sub> concentration recorded at East Common Lane between 2005 and 2007.

### Killingholme

Figures 2.36 to 2.38 show the number of exceedances of the daily limit value, the annual mean and 90.4<sup>th</sup> percentiles at the Killingholme monitoring site for every year of its operation. Table A22 in the Appendix displays the number of exceedances, annual mean, 90.4<sup>th</sup> percentile, highest daily concentration and data capture. The Killingholme site is 20 km east of the current AQMA.

As the period data capture was less than 90% in 2004 (86.1%) and 2007 (88.8%), Figure 2.38 shows the 90.4<sup>th</sup> percentile concentrations, which are all below the limit value of 50 µg m<sup>-3</sup>. The annual and daily PM<sub>10</sub> objectives have and are being met at the Killingholme monitoring station.

There is no distinct trend in the concentrations recorded. It is clear that the number of exceedances recorded in 2003 was higher than in the following years, with a significant decrease in 2004 followed by a rise through to 2006 and then a drop again in 2007. Although there has been debate about

whether PM<sub>10</sub> concentrations were exceptional in 2003, <sup>ref 4</sup> the North Lincolnshire data shows that PM<sub>10</sub> concentrations were significantly higher than in previous or subsequent years.

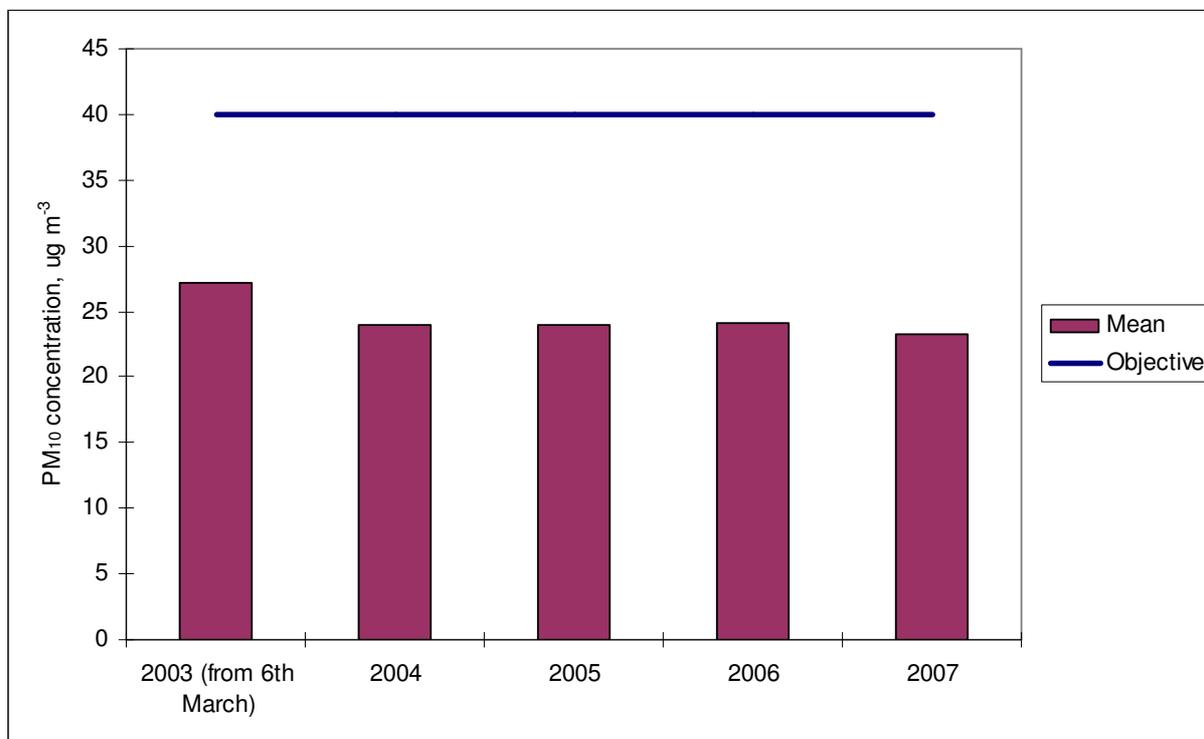


Figure 2.36: The annual mean PM<sub>10</sub> concentration recorded at Killingholme between 2003 and 2007.

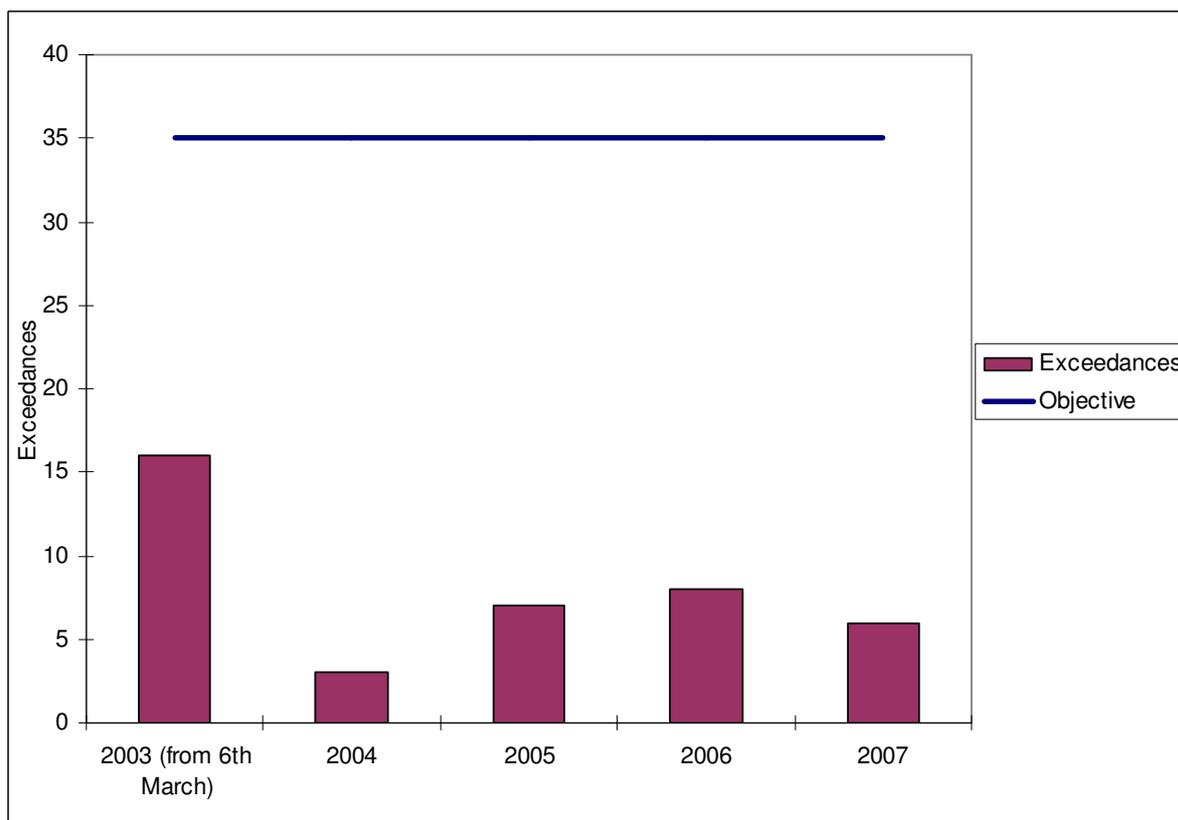


Figure 2.37: The number of daily PM<sub>10</sub> exceedances recorded at Killingholme.

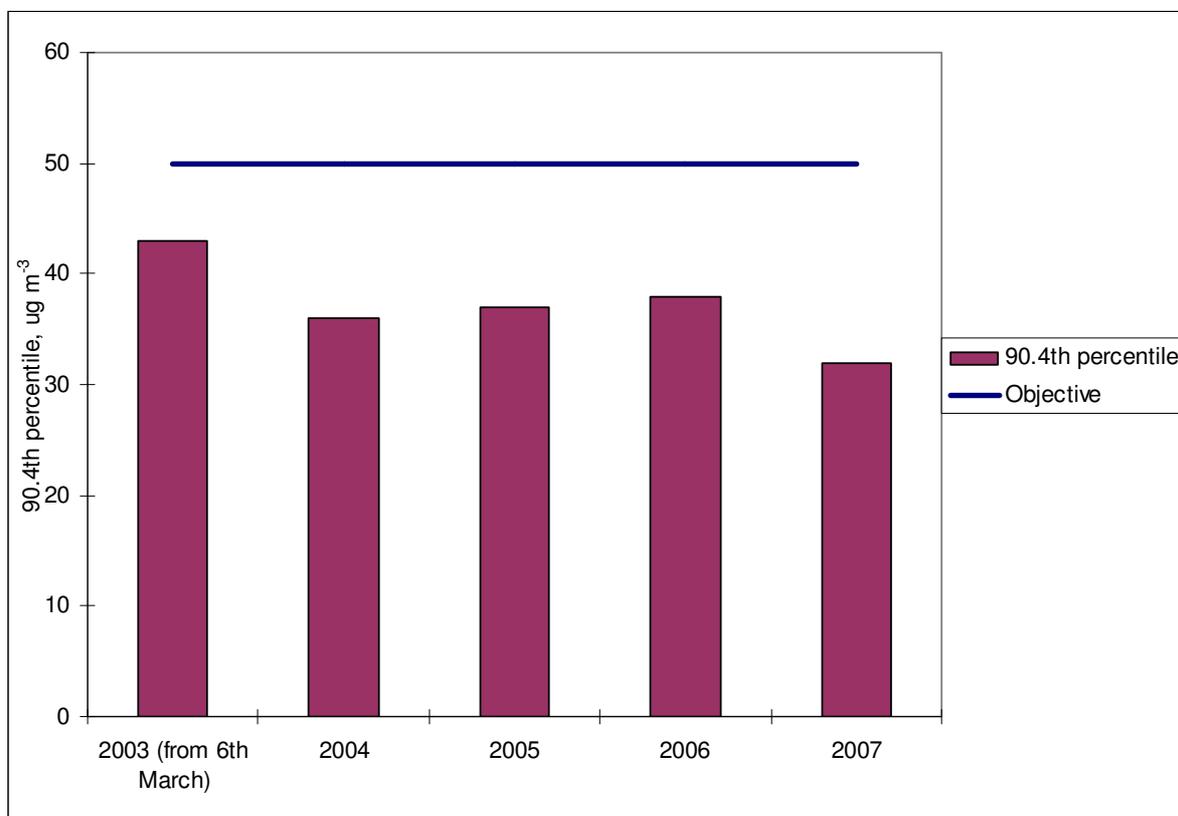


Figure 2.38: The 90.4<sup>th</sup> percentile concentration for PM<sub>10</sub> recorded at Killingholme.

### Lincoln Gardens

The Lincoln Gardens site began operation on the 1<sup>st</sup> December 2004, Figures 2.39 and 2.40 show the number of exceedances of the daily limit value and the annual mean for the Lincoln Gardens monitoring station. Data capture has been greater than 90% in every year of operation. Table A23 in the Appendix displays the number of exceedances, annual mean, 90.4<sup>th</sup> percentile, highest daily concentration and data capture.

Figures 2.39 and 2.40 show that both PM<sub>10</sub> objectives have been met at Lincoln Gardens. The site is outside the current AQMA. To date there appears to be no trend in the results, although the results from across the sites in Scunthorpe indicate that the number of exceedances were higher in 2006 than in 2005 or 2007.

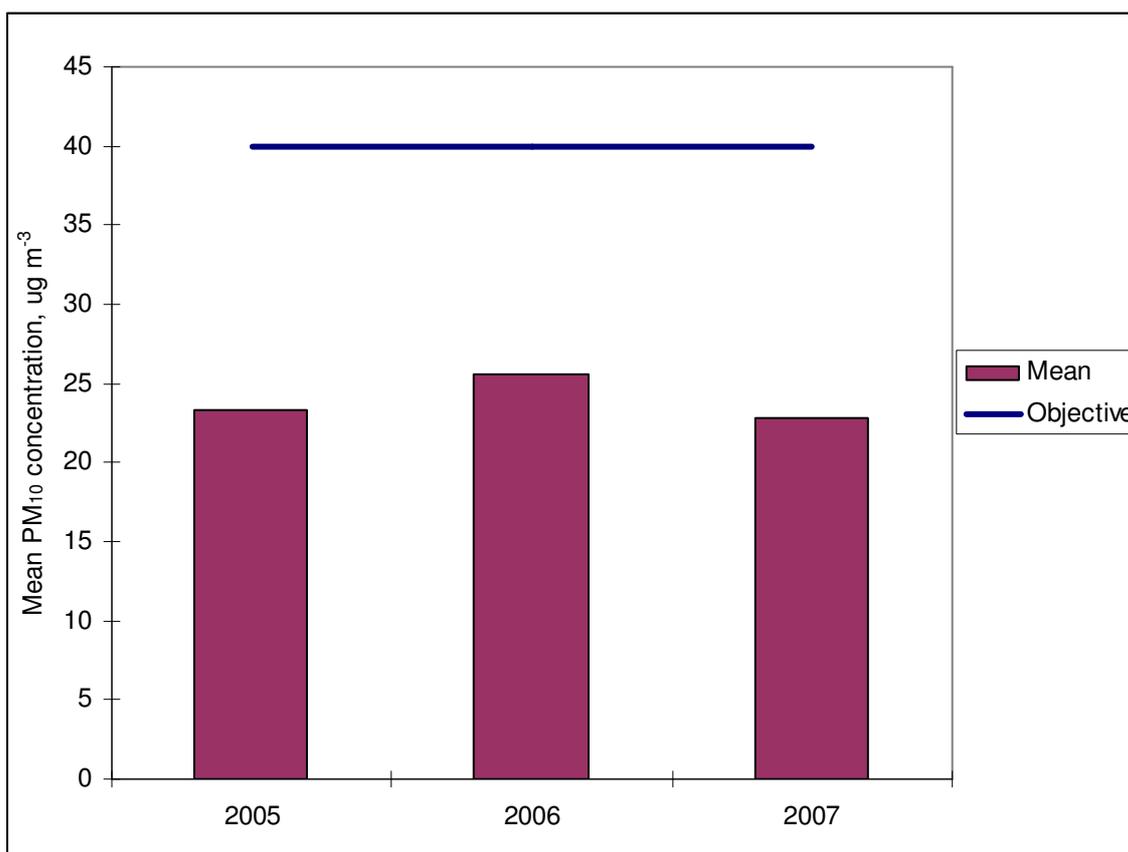


Figure 2.39: The annual mean PM<sub>10</sub> concentration at Lincoln Gardens between 2005 and 2007.

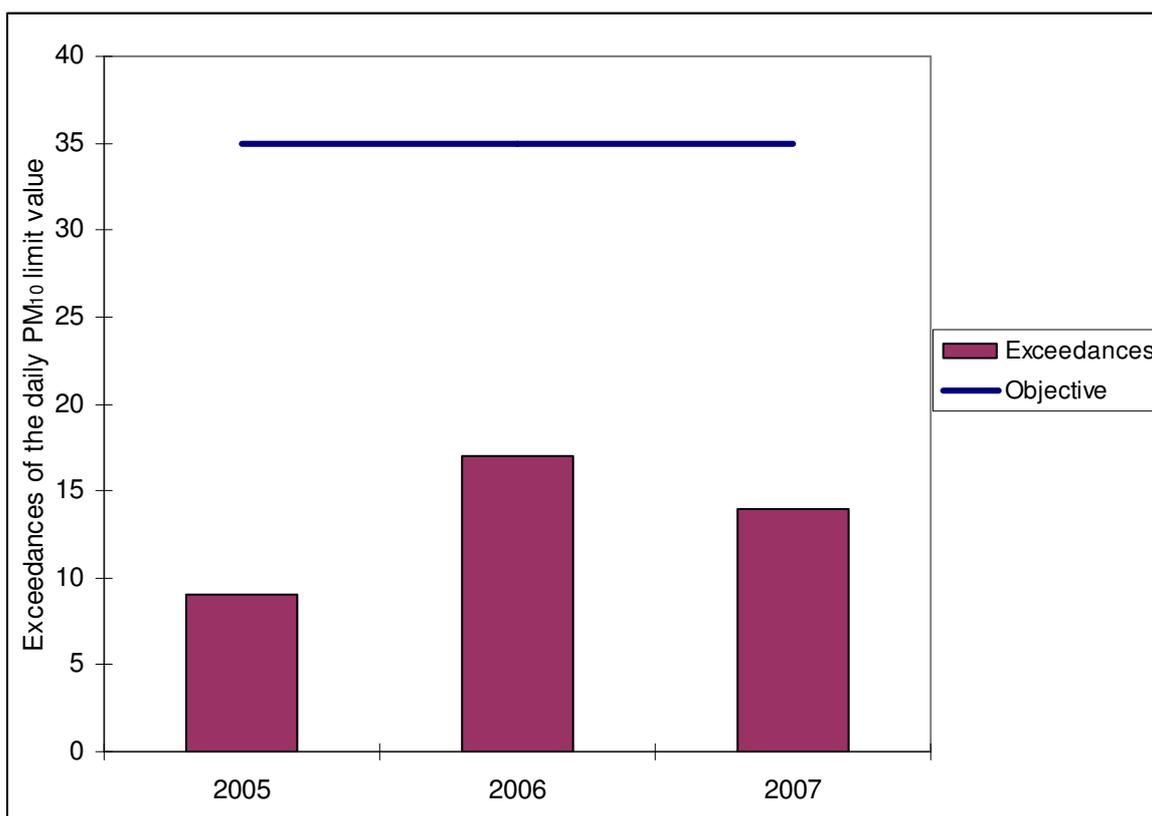


Figure 2.40: The number of PM<sub>10</sub> exceedances at Lincoln Gardens between 2005 and 2007.

### Scunthorpe Town

Figures 2.41 to 2.43 show the number of exceedances of the PM<sub>10</sub> daily limit value, the annual mean and 90.4<sup>th</sup> percentile concentrations for the Scunthorpe / Scunthorpe Town monitoring site. Scunthorpe began operation in mid-December 1997, thus data is shown from 1998. 90% data capture was not attained in 2000 (88.8%), 2002 (83.6%) and 2004 (75.1%). Data for 2004 has been amalgamated from the Scunthorpe and Scunthorpe Town sites.

Table A24 in the Appendix displays the number of exceedances, annual mean, 90.4<sup>th</sup> percentile, highest daily concentration and data capture for all years.

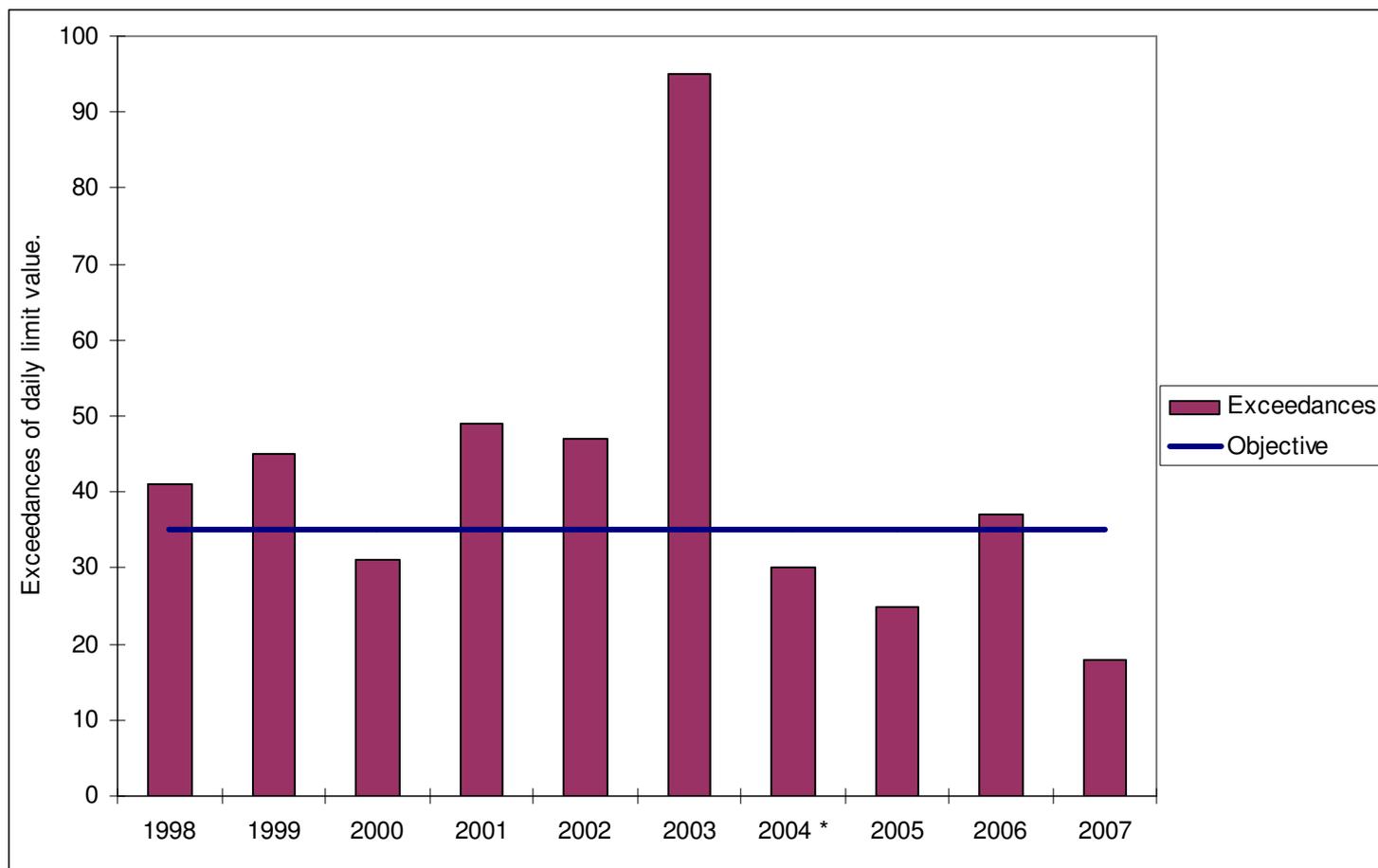


Figure 2.41: The number of exceedances of the PM<sub>10</sub> daily limit value at the Scunthorpe / Scunthorpe Town sites between 1998 and 2007.

Note for Figures 2.41 to 2.43: \* Data amalgamated from Scunthorpe and Scunthorpe Town.

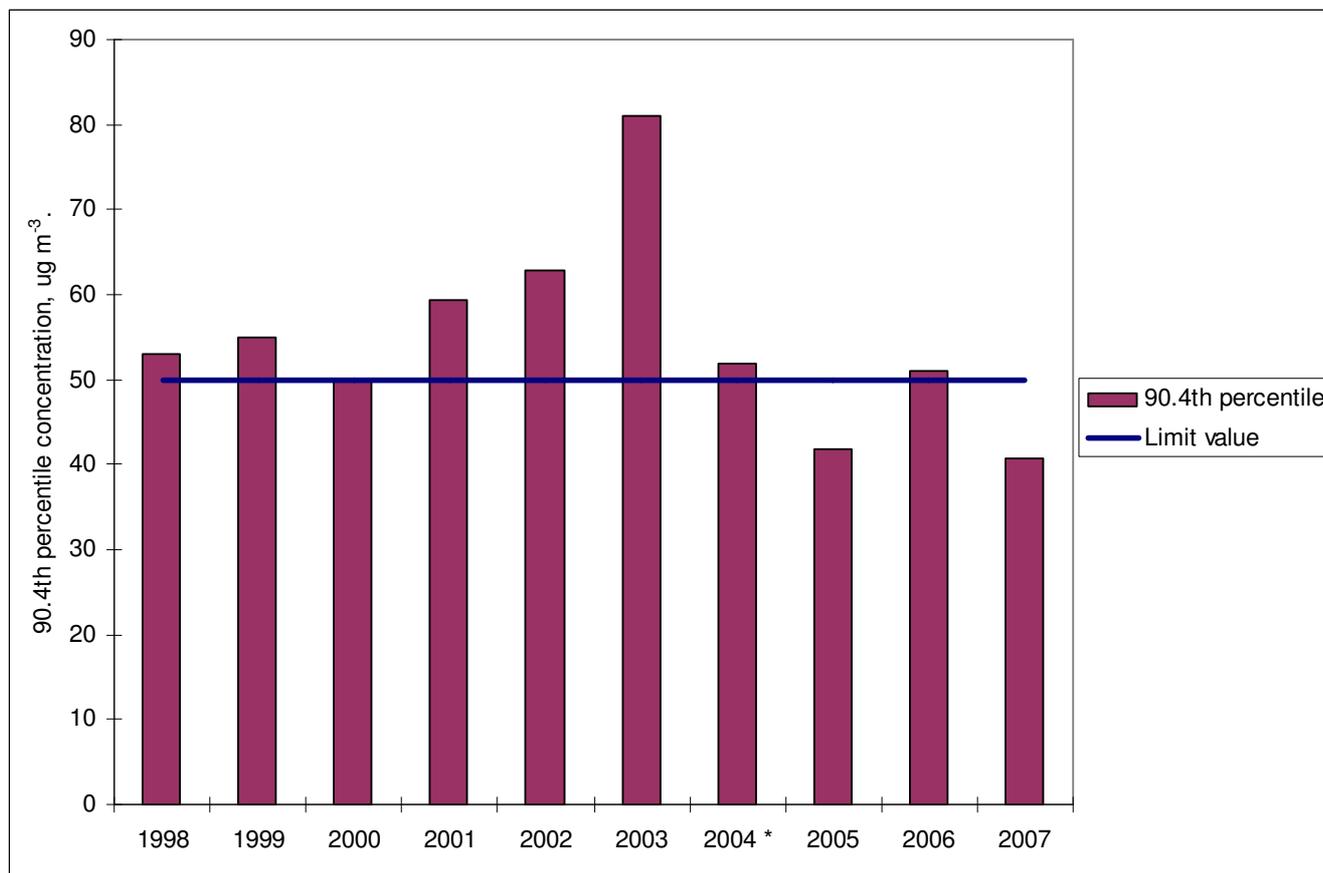


Figure 2.42: The 90.4<sup>th</sup> percentile concentrations at the Scunthorpe/Scunthorpe Town site between 1998 and 2007.

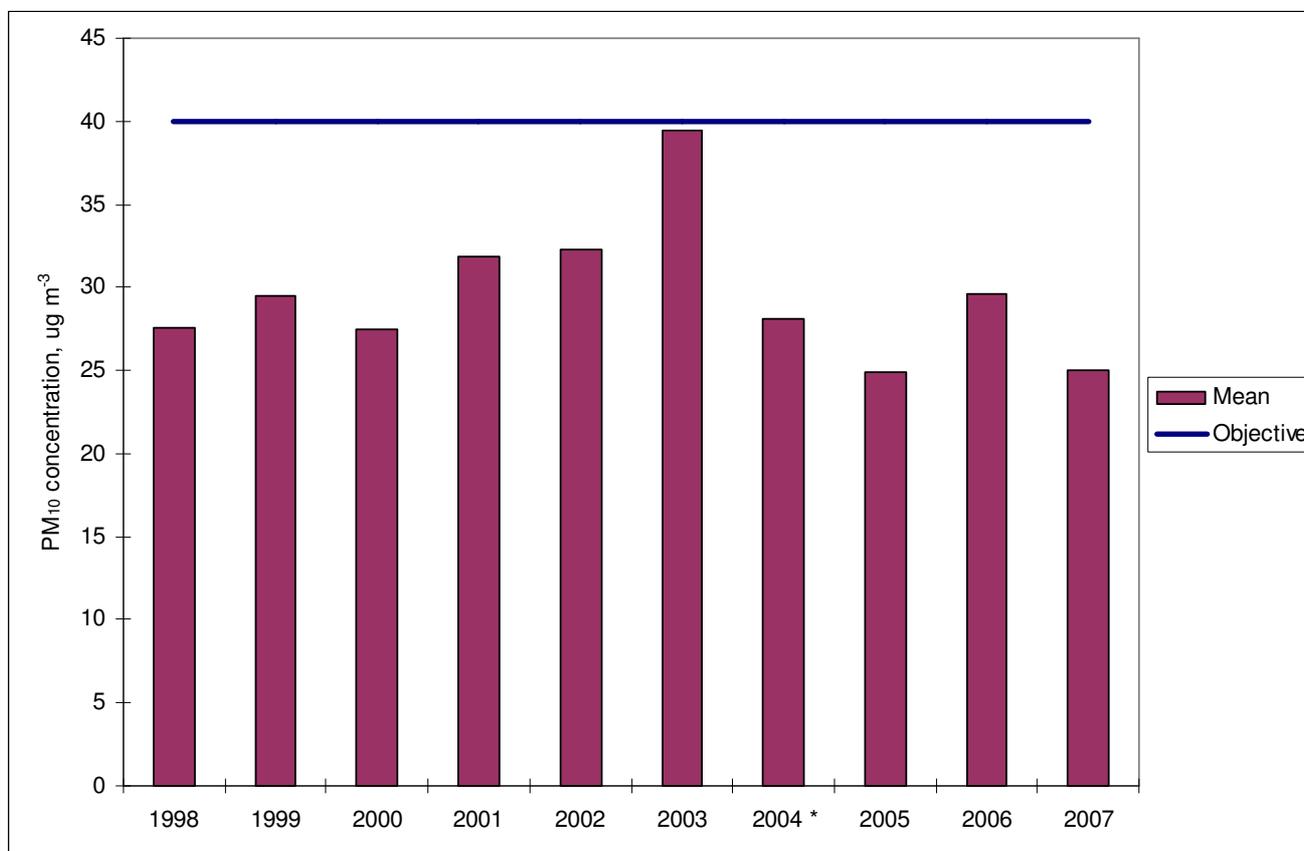


Figure 2.43: The annual mean  $\text{PM}_{10}$  concentration at the Scunthorpe/Scunthorpe Town sites between 1998 and 2007.

Figures 2.41 and 2.42 show that the daily objective was met at the Scunthorpe Town site in 2005 and 2007 with a (marginal) breach occurring in 2006. There is no clear long-term trend in either the concentrations or number of exceedances being recorded at Scunthorpe Town. The results indicate no significant long-term improvement, for example the 90.4<sup>th</sup> percentile was approximately the same in 2007 as in the year 2000.

The number of exceedances recorded in 2003 was significantly higher than other years, at 95 exceedances this is also significantly greater than the 16 recorded in the ten months of monitoring at Killingholme.

The annual mean was close to being breached in 2003 at the Scunthorpe site, but this has not been repeated in subsequent years. The annual objective is being met at the Scunthorpe Town site; again there is no clear downward trend in the concentrations being recorded. The number of daily exceedances recorded clearly influences the annual mean.

Instead of calculating projections for future years, it was considered more useful to compare the North Lincolnshire PM<sub>10</sub> results to the air quality sustainability indicator published by Defra. The indicator measures the number of moderate or higher (based on a nationally set scale) days of air pollution. This does not tie up with the number of exceedance days because an exceedance requires a daily concentration above 50 µg m<sup>-3</sup> whereas a moderate day requires a daily concentration above 64 µg m<sup>-3</sup>.

Figure 2.44 shows the number of moderate days recorded by the sustainability indicator for particulates only compared to the number of moderate (or higher) days at the Scunthorpe/Scunthorpe Town site.<sup>5</sup> The number of moderate days at the Scunthorpe / Scunthorpe Town site varies in a similar fashion to that nationally, in 2003 though the number of moderate days was significantly higher compared to the national figure. Promisingly though, the number of moderate days at the Scunthorpe/Scunthorpe Town site was lower than the national average for the first time in 2007.

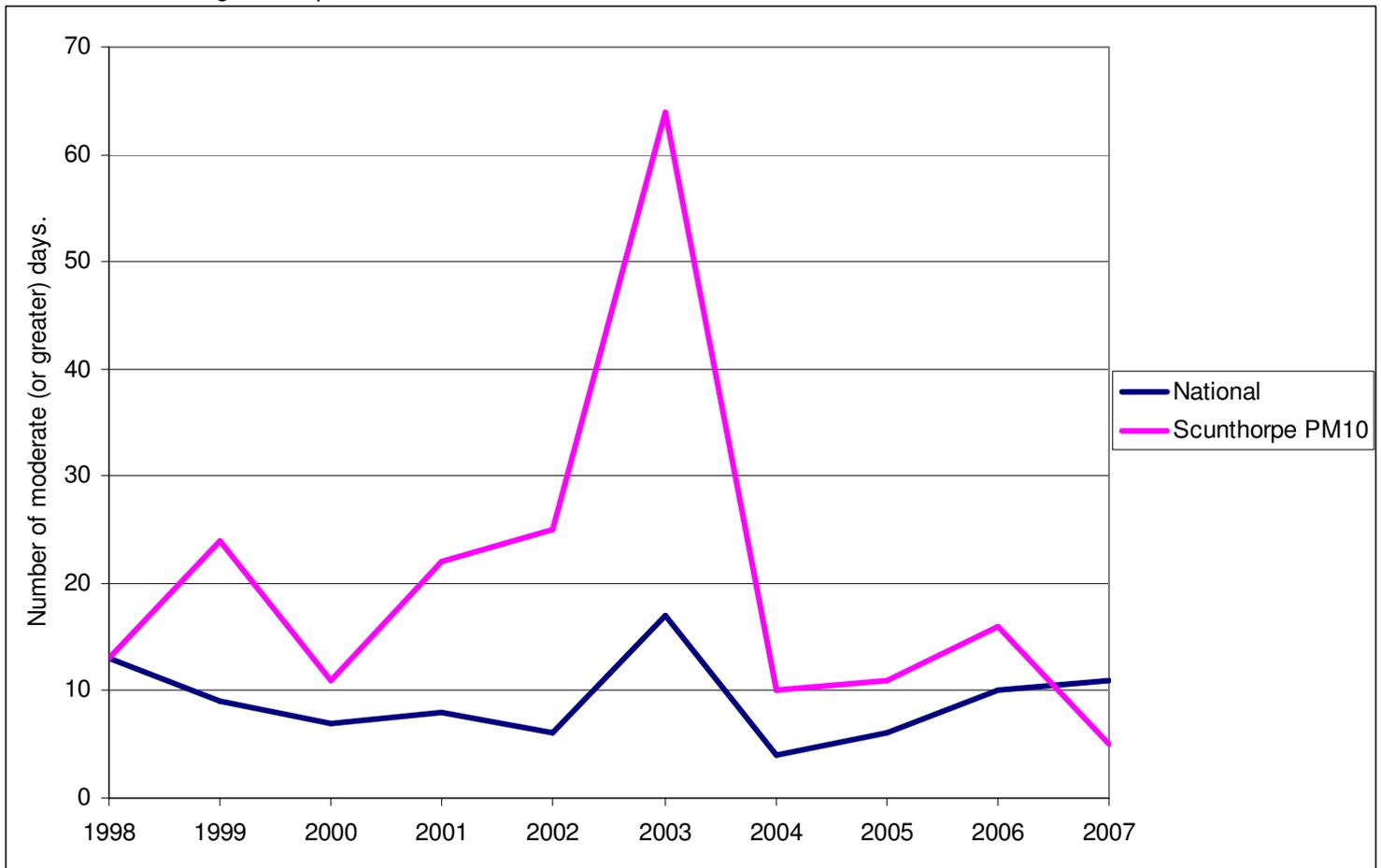


Figure 2.44: The number of moderate days for particulates nationally and for the Scunthorpe/Scunthorpe Town site.

#### Part 2.6.4: Equivalence

If PM<sub>10</sub> results are to be directly compared to the air quality objectives, then either the defined reference method or an ‘equivalent’ method of monitoring should be used. The Partisol 2025 was shown to be equivalent to the reference method in the equivalence trials.<sup>6</sup> Therefore the monitoring results at High Santon and Lakeside and the Partisol at Scunthorpe Town can be compared directly to the air quality objectives. The 2007 results from these ‘equivalent’ machines indicate the daily objective was breached at High Santon but not at Scunthorpe Town. The TEOM failed to meet the criteria and was deemed not to be equivalent to the reference method. However, bearing in mind that TEOMs are extensively used by Local Authorities throughout the UK, the Review and Assessment Helpdesk has issued a FAQ that deals with the continued use of TEOMs, as shown in Figure 2.45.

“For example, the issue is more critical where PM<sub>10</sub> concentrations are close to the objective. It is not possible to precisely define what “close to the objective” means, but as an approximate guide, it is likely to be in the range of 30 to 40 days exceedance as measured by the TEOM multiplied by 1.3. In this case, robust and reliable PM<sub>10</sub> data are necessary, so Local Authorities faced with this situation should consider upgrading their equipment as soon as is practicable, or consider restructuring their local networks so that analysers that meet the equivalence criteria are sited at the most critical locations.”

Figure 2.45: The Helpdesk FAQ relating to the use of TEOMs.<sup>7</sup>

The 1.3 correction factor can continue to be used provided that the number of exceedances recorded is regarded as not being ‘close to the objective’. The helpdesk suggests that close to the objective is likely to be considered in the range of 30 to 40 days. Table 2.46 shows the proposed correction factors for each of the PM<sub>10</sub> monitoring stations in North Lincolnshire.

Monitoring Station	Correction Factor	Reason
Allanby Street	TEOM * 1.3	Not 'close to the objective' (below).
Appleby Village	TEOM * 1.3	Not 'close to the objective' (below).
Broughton	TEOM * 1.3	Not 'close to the objective' (below).
East Common Lane	TEOM * 1.3 for real-time results, daily correction factor from Scunthorpe Town for R&A reports.	Close to the objective. If change to FDMS, three types of PM <sub>10</sub> monitor in Scunthorpe. Also await Kings College potential development of correction model.
Killingholme	TEOM * 1.3	Not 'close to the objective' (below).
Lincoln Gardens	TEOM * 1.3	Not 'close to the objective' (below).
Low Santon	TEOM * 1.3	Not 'close to the objective' (above).
High Santon	None	Partisol is used, records 'equivalent' results.
Scunthorpe Town	TEOM * 1.3	Co-located Partisol records 'equivalent' results, 15-minute data from TEOM.

Table 2.46: Details of the correction factors to be used at the North Lincolnshire PM<sub>10</sub> monitoring stations in Review and Assessment reports.

The results are not close to the objective at the Allanby St, Appleby Village, Broughton, Killingholme or Lincoln Gardens monitoring sites. Thus the use of the 1.3 correction factor is still valid for these monitoring sites, they are recording exceedances that are significantly below the daily objective.

The results at the Scunthorpe Town TEOM will continue to be adjusted by a 1.3 correction factor, with the Partisol recording equivalent results. The hourly and 15-minute data from the TEOM machines remains extremely useful when considering the affect of meteorological conditions and short-term variations.

The Council and LA Helpdesks (see Appendix Part 7) consider that taking any local correction factor calculated from the co-located Partisol and TEOM at the Scunthorpe Town site and applying it to data from the Low Santon site is not appropriate. This is because the PM<sub>10</sub> being recorded on each side of the industrial site will be different on any particular day or over the course of a year. The results from the TEOM at Low Santon will continue to be corrected by a factor of 1.3 as the results are significantly above the annual and daily objective.

However, the results at East Common Lane can be described as being 'close to the objective', i.e. there were between 30 and 40 exceedances of the daily limit value when a correction factor of 1.3 is used. Thus this data is analysed in greater detail in this Part. It was suggested to the Helpdesks that the daily correction factor from the Scunthorpe Town TEOM and Partisol could be applied to the daily results from East Common Lane results, as this site is only 1.25 km from the Scunthorpe Town site and is on the same (western) side of the steelworks. The full Helpdesk reply is shown in the Appendix Part 7.

Table 2.47 shows the results recorded at East Common Lane in 2007 with a 1.3 correction factor applied to the TEOM results, along with the calculated results using the daily correction factor from the TEOM and Partisol at Scunthorpe Town. It can be seen that if the daily correction factor is applied to the East Common Lane results the number of exceedances falls to 28, this is below the daily objective. Although interestingly the highest daily concentration actually increases to 148.1  $\mu\text{g m}^{-3}$ . As the daily correction factor ranged from 0.586 to 3.233, applying this is more suitable than a correction factor averaged across a whole year.

East Common Lane	TEOM *1.3			Daily Correction Factor		
	Exceedances	Highest daily concentration, ug m <sup>-3</sup>	Data capture, %	Exceedances	Highest daily concentration, ug m <sup>-3</sup>	Data capture, %
2007	34	129	99.7	28	148.1	96.4

Table 2.47: The number of exceedances, highest daily PM<sub>10</sub> concentration and data capture for East Common Lane based on TEOM\*1.3 results and a daily correction factor from Scunthorpe Town.

For 2006 Partisol data is only available from the 23<sup>rd</sup> August for only the Scunthorpe Town site, therefore a daily correction factor for the whole year cannot be calculated. Instead, a graph using the Partisol and TEOM\*1.3 results was drawn with a linear and power lines of best-fit. The equations generated were then applied to the daily TEOM results from East Common Lane, see Table 2.48. The results indicate that after allowing for a Partisol correction the 2006 East Common Lane results were very close to the objective, in fact slightly above the objective with a linear fit and slightly below the objective with a power fit. However, these results should be treated with caution as they are extrapolating a correction factor across a year rather than just a particular day.

East Common Lane	TEOM*1.3 exceedances	TEOM linear best fit, exceedances	TEOM power best fit	Exceedances using daily CF from Sct
2006	<b>43</b>	<b>37</b>	34	n/a

Table 2.48: 2006 results from East Common Lane with various correction factors applied to the TEOM data.

The drawback of using a daily correction factor is that it depends on three machines being operational on any particular day, thus a target of 90% data capture for each individual machine becomes a target of 96.6%. The monitoring to date indicates that results from East Common Lane are close to the objective. On those days that the daily limit value is breached it can be exceeded by a significant margin.

A similar exercise was conducted using the 2006 Scunthorpe Town data as there was only four months of Partisol data available, results are shown in Table 2.49. Again caution should be applied to these results, but they do

indicate that the objective may have been met in 2006 if the TEOM results are corrected by results from the Partisol.

Scunthorpe Town	TEOM*1.3 exceedances	TEOM linear best fit, exceedances	TEOM power best fit exceedances
2006	<b>37</b>	29	29

Table 2.49: 2006 results from Scunthorpe Town with various correction factors applied to the TEOM data.

As part of the 2005 Partisol weighing contract, the contractor was asked to consider a correction factor based on the co-located machines at Scunthorpe Town. The contractor recommended a correction factor of 1.6 be used. However, the filters used during this study were changed and were a compromise between measuring PM<sub>10</sub> and trace metals. Based on the results from the subsequent contracts, which were let to a different contractor, where PM<sub>10</sub> measurement has been the priority, it seems that a 1.6 correction factor is a significant over-estimate and will not be considered further.

The 1.3 correction factor will continue to be used for real-time results for all sites, i.e. for display on the website. However, for Review and Assessment reports the daily TEOM / Partisol correction factor from Scunthorpe Town will be applied to the daily means from East Common Lane. If the data capture is reduced to less than 90% then an annual correction factor will be calculated and applied to those missing days.

A further tool that may be able to correct TEOM results in the future is the development by Kings College London of a volatile correction method.<sup>8</sup> This would enable the TEOM results to be corrected to an 'equivalent' value based on the purge results from a regional FDMS-TEOM. If this is shown to be an equivalent method, the Council will report results using this method from all sites, but the East Common Lane, Low Santon and Scunthorpe Town will be the most important. For this correction model a regional FDMS machine is required; the FDMS monitoring station that is closest to North Lincolnshire is the Hull Freetown site, at a distance of 26 km from Scunthorpe. There are

also other FDMS machines within the 200 km range that the model is expected to work, this reduces the dependence of the model on one FDMS machine.

#### Part 2.6.5: Further Discussion

The Further Assessment for PM<sub>10</sub> indicated that the predominant source of PM<sub>10</sub> in the Scunthorpe area is local in nature, i.e. the local industry, and concentrations are strongly dependent on meteorological conditions.

Even if the daily objective was met in 2007 at East Common Lane the potential to breach is still significant. The situation is less clear at the Scunthorpe Town site, where monitoring suggests that the number of exceedances is lower than East Common Lane for any particular year. The number of exceedances from the TEOM site was within the objective in 2005 and 2007. The results in 2006 indicated a breach, although as discussed in Part 2.6.4 if the Partisol had been running for the whole year then the objective may have been met. However, the results indicate that there has been no significant long-term improvement with the 90.4<sup>th</sup> percentile concentration recorded in 2000 being approximately the same as that in 2007.

Meteorological conditions are likely to have a significant impact on the results, through variation in rainfall, wind direction and wind speed, which are measured by either Corus and/or the Council but also through other factors for which data is less easily available such as atmospheric stability, inversions, humidity and cloud cover. Thus a simple look at the number of exceedances may not provide a clear picture of whether the situation is improving. The Council is not confident that the potential for a breach of the objective has been eliminated at this site. However, it is fairly clear that the sites outside of the AQMA are within the PM<sub>10</sub> objectives.

### Part 2.6.6: Reports

In April 2007 the Council submitted a draft Further Assessment to Defra in relation to the current AQMA, this was followed by the submission of the draft Action Plan in September 2007. A summary of the Further Assessment is shown in Figure 2.50 with copies of both documents being available to download at [www.nlincsair.info](http://www.nlincsair.info). The appraisal by Defra of the draft Action Plan was received in mid-December, following this a letter was sent to Defra regarding clarification of certain points of the appraisal. Copies of these letters and the responses received from other consultees are included in a summary of the consultation in the Appendix, Part 9.

The 'final' Action Plan was submitted to Defra on the 30<sup>th</sup> April 2008, this submission included the Further Assessment as an Appendix. In terms of the actions needed, the Council does not see this as a final document rather as an evolving document. An update on actions in the plan will be provided in April 2009 as part of the USA. Included within the Action Plan are actions from the Local Transport Plan, an update will be provided on these actions in April 2009 as well.

As part of the appraisal of the 2007 Further Assessment Defra requested an additional Detailed Assessment to be completed by April 2008 in relation to the potential breach of the annual mean PM<sub>10</sub> objective in the Santon area. This report was submitted to Defra on the 7<sup>th</sup> February 2008 and has been sent out for consultation. A summary of the report is shown in Figure 2.51 and is available to the public via the Council's dedicated air quality website, [www.nlincsair.info](http://www.nlincsair.info). Defra's appraisal of the report was received on the 15<sup>th</sup> April 2008, the conclusions of the report have been accepted and so the Council now has four months to amend the current AQMA or declare a new AQMA.

Local Air Quality Management is a duty placed upon all Local Authorities. As a result of this process North Lincolnshire Council declared an AQMA in October 2005 in the Scunthorpe area. This was for a potential breach of the Air Quality Objective for the number of daily exceedances allowed in relation to particulate matter of less than 10 micrometres in diameter (PM<sub>10</sub>).

Subsequent monitoring presented in this report indicates that North Lincolnshire Council was correct to declare an AQMA and that the boundaries are approximately correct. However, further monitoring will be needed with regard to a newly identified breach of the annual mean objective for PM<sub>10</sub> at the Santon monitoring site.

Traffic and Bonfire night celebrations have a limited impact on the PM<sub>10</sub> concentrations in the area. It is clear that local industry is responsible for a significant number of the PM<sub>10</sub> exceedances recorded in the Scunthorpe area; it is likely that there is not a single source responsible for the PM<sub>10</sub>.

The data suggests that elevated concentrations are more likely to occur during the daytime, this is particularly true at the Santon site. However, night-time concentrations at Scunthorpe Town are still elevated when the wind originates from the direction of local industry.

In general, more exceedances occur during the summer than the winter. However, the results suggest that wind direction is the most crucial factor and exceedances are most likely to occur in Scunthorpe when the wind originates from an easterly or south-easterly direction, this is demonstrated by the plotting of pollution roses.

The impact that meteorological conditions have on PM<sub>10</sub> concentrations mean that the true percentage improvement needed could be as high as 48% rather than a relatively simple reduction of two exceedances (for Scunthorpe Town) to ensure that the Air Quality Objective is not breached regardless of the prevailing meteorological conditions.

To assist in preparation of the action plan and further source apportionment several further actions, including further Partisol monitoring, traffic counts and observation days are planned to further improve the understanding of the PM<sub>10</sub> problem in Scunthorpe.

Figure 2.50: A summary of the Further Assessment into PM<sub>10</sub> in the Scunthorpe area.

“In November 2005 North Lincolnshire Council declared an Air Quality Management Area for a breach of the daily PM<sub>10</sub> objective in and around the steelworks industrial site in Scunthorpe. As a result of the Air Quality Management Area declaration the number and location of several monitoring sites in the Scunthorpe area was changed significantly, this included the installation of a TEOM in Low Santon.

In April 2007 the Council submitted its Further Assessment in relation to the original AQMA declaration. The results stated in this report indicated a potential breach of the annual mean objective at the Low Santon TEOM monitoring station. Once a potential breach of the annual objective was considered likely a Partisol was located at High Santon Villas, approximately 350 m away. As part of the Further Assessment appraisal Defra requested an additional Detailed Assessment to be submitted in 2008. This was to enable a year’s worth of monitoring to be conducted at the High Santon Partisol, which commenced operation in January 2007.

The results presented indicate that the annual PM<sub>10</sub> objective has been breached in the vicinity of the Low Santon TEOM monitoring station in 2006 and 2007. The mean concentration recorded between October and December 2005 was also greater than 40 µg m<sup>-3</sup>. The TEOM results have been calculated using a correction factor of 1.3, in line with the current Defra guidance. Data capture for the High Santon Partisol was slightly below the recommended 90% target. However, it is clear that the annual mean objective was not breached in 2007 in the vicinity of the High Santon Partisol.

The two monitoring stations discussed are both within the current AQMA (for a breach of the daily objective) and the monitoring results presented show that both have recorded breaches of the daily PM<sub>10</sub> objective. QA/QC procedures are in place for both the TEOM and Partisol.

The Council considers that both monitoring stations are in locations that represent relevant receptors. The data identifies a breach of the annual objective, thus an AQMA should be declared in the area around the Low Santon TEOM monitoring station. “

Figure 2.51: A summary of the Detailed Assessment into PM<sub>10</sub>, 2008.

#### Part 2.6.7: Osiris Monitors

The Council has purchased second-hand Osiris monitors, these measure total suspended particulates (TSP), PM<sub>10</sub>, PM<sub>2.5</sub> and PM<sub>1</sub>. The Osiris is a light scattering device, it is not regarded as being an 'equivalent' monitor but provides an indicative measure of particulate concentrations.

Initially there were plans to locate the monitors in various parts of the steelworks site, however, access, power and health and safety issues have altered these plans. One of these monitors is to be located in South Ferriby where there is cement works operated by Cemex. Another monitor will be located between Tarmac's operations (near the Low Santon monitoring station) and the Dawes Lane Coke Ovens, at the same time one of the EA's Mobile Monitoring Facilities will be co-located for a period of six-months. Initially there were plans to locate the monitors in various parts of the steelworks site, however, access, power and health and safety issues have altered these plans.

#### Part 2.6.8: AEA Grades

In July 2007 the Council received a request from AEA Energy and Environment for permission to use the 2006 data from the East Common Lane and Low Santon TEOMs in a submission to the EU as part of Defra's reporting requirements. This exercise included assessing the sites suitability with respect to the quality of the data and its location. This process was conducted because although local authority monitoring data may be adequate for LAQM purposes, its quality may not match the stricter standards that are required for national reporting to the EU. Figure 2.52 shows the assessment criteria with Figure 2.53 showing the grades given to East Common Lane and Low Santon.

**Suitability Assessment 2006**

<b>Criteria</b>
<p><b>Data Capture</b></p> <ul style="list-style-type: none"> <li>• A+: &gt;=90%</li> <li>• A: &lt;90%; &gt;=75%</li> <li>• B: &lt;75%; &gt;=50% or non-calendar year &gt;=50%</li> <li>• C: &lt;50%; &gt;=25% for annual means; &lt;50% for short term LV &amp; objectives</li> </ul>
<p><b>Ratification Status</b></p> <ul style="list-style-type: none"> <li>• A: AURN, Regional Network or equivalent ratification and QA procedures</li> <li>• B: Documented QA procedures but not fully equivalent to AURN</li> <li>• C: Unknown QA status or little QA done</li> </ul>
<p><b>Data Quality Issues</b></p> <ul style="list-style-type: none"> <li>• A: Ambient data look okay compared to other nearby sites and follow expected seasonal trends for this site type</li> <li>• B: Ambient data look okay with some minor issues e.g. 1 or 2 odd spikes or negatives,</li> <li>• C: Ambient data contains extended periods of spurious looking results.</li> </ul>
<p><b>Site Location</b></p> <ul style="list-style-type: none"> <li>• A: Acceptable to AURN standard</li> <li>• B: Not sure or borderline</li> <li>• C: Not applicable (i.e. site in wrong place)</li> </ul>

Figure 2.52: Criteria for assessing the suitability of local air quality monitoring data in relation to national standards.

Assessment Criteria	East Common Lane	Low Santon
Data capture	A+	A+
Data quality issues	A	B
QA/QC	A	A
Site location	A	A

Table 2.53: The grades given by AEA to the East Common Lane and Low Santon monitoring stations in relation to assessment criteria in Figure 2.52. <sup>21</sup>

### Part 2.6.9. Wind and Pollution Roses

In the Further Assessment for PM<sub>10</sub>, wind and pollution roses for 2006 were shown, these are updated in this Part. Figure 2.54 shows the wind roses from Scunthorpe Town for 2006, 88.5% data capture, and 2007, 98% data capture. Pollution roses have been plotted for the three sites in the AQMA, East Common Lane, Low Santon and Scunthorpe Town, Figure A25 in the Appendix shows the roses for 2006 based on a ratified data set. Figure A26 shows the roses for data from 2007.

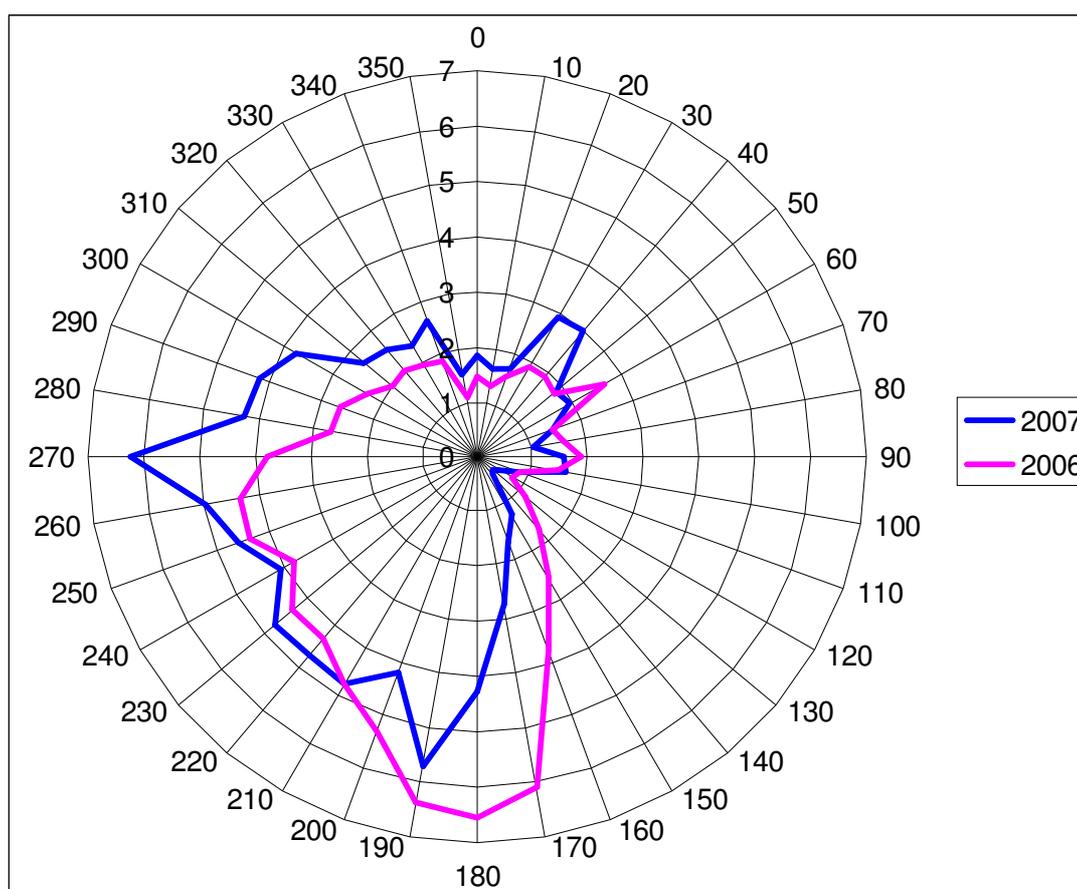


Figure 2.54: Wind rose from Scunthorpe Town for 2006 and 2007.

Figure 2.54 shows that south-easterly winds were more predominant in 2006, whilst westerly and north-easterly winds were more prevalent in 2007. This could affect the concentrations of pollutants being recorded in North Lincolnshire, particularly within the AQMA.

## **Part 2.7: Sulphur Dioxide (SO<sub>2</sub>)**

### **Part 2.7.1: Monitoring**

Since the 2006 USA there have been no changes to the location or number of automatic SO<sub>2</sub> monitors in North Lincolnshire. The monitors operate at the Scunthorpe Town site, the Low Santon site and in Killingholme. Table A1 in the Appendix details the start and finish date of monitoring, the OS grid reference and the type of monitor used at each monitoring station.

### **Killingholme Results**

Tables 2.55 and 2.56 detail the number of exceedances of the SO<sub>2</sub> limit values, the hourly data capture, maximum 15-minute and annual mean SO<sub>2</sub> concentrations at the Killingholme monitoring site between 2003 and 2007.

The hourly data capture has been greater than 90% in all years of operation, therefore the results can be easily compared to each other. The SO<sub>2</sub> objectives have not been breached at the Killingholme monitoring station since operation began in 2003. There is no clear downward trend for the maximum concentration recorded, but the number of exceedances of the 15-minute limit value has decreased from three in 2003 to zero in 2007. Although not covered by an objective the annual mean concentration has also shown a decrease from 7.8 µg m<sup>-3</sup> in 2003 to 4.4 µg m<sup>-3</sup> in 2007.

Year	Exceedances of 15-minute limit value.	Exceedances of hourly limit value	Exceedances of daily limit value
2003 (from 8th March)	3	0	0
2004	0	0	0
2005	0	0	0
2006	1	0	0
2007	0	0	0

Table 2.55: The number of exceedances of the 15-minute, hourly and daily limit values for SO<sub>2</sub> at Killingholme between 2003 and 2007.

Note: The objectives for SO<sub>2</sub> allow 35 exceedances of the 15-minute limit value, 24 exceedances of the hourly limit value and 3 exceedances of the daily limit value. The (stricter) 15-minute objective was set by the UK, whilst the EU set the hourly and daily objectives.

Year	Hourly Data Capture, %	Maximum 15-minute Concentration, ug m-3	Annual Mean
2003 (from 8th March)	99.7	340.5	7.8
2004	99.5	223.4	5.5
2005	95.6	255.4	5.3
2006	91.2	316.5	4.4
2007	99.1	266	4.4

Table 2.56: The hourly data capture, maximum 15-minute concentration and annual mean concentration of SO<sub>2</sub> recorded at Killingholme between 2003 and 2007.

\* Period data capture quoted, annual data capture was 81.7%.

### Low Santon Results

Year	Exceedances of 15-minute limit value	Exceedances of hourly limit value	Exceedances of daily limit value
Oct to Dec 2005	0	0	0
2006	1	0	0
2007	0	0	0

Tables 2.57 and 2.58 detail the number of exceedances of the SO<sub>2</sub> limit values, the hourly data capture and maximum 15-minute concentrations. Figure 2.59 then shows the 99.9<sup>th</sup> percentile concentrations.

Table 2.57: The number of exceedances of the 15-minute, hourly and daily limit values at Low Santon in 2005, 2006 and 2007.

Note: The SO<sub>2</sub> objectives allow 35 exceedances of the 15-minute limit value, 24 exceedances of the hourly limit value and three exceedances of the daily limit value.

Year	Hourly data capture, %	Maximum 15-minute concentration, ug m <sup>-3</sup>
Oct to Dec 2005	99.9 *	90.4
2006	93.4	268.7
2007	52.3	162.3

Table 2.58: The hourly data capture and maximum 15-minute concentration at Low Santon in 2005, 2006 and 2007.

Note: Period data capture quoted, annual data capture was 25.2%.

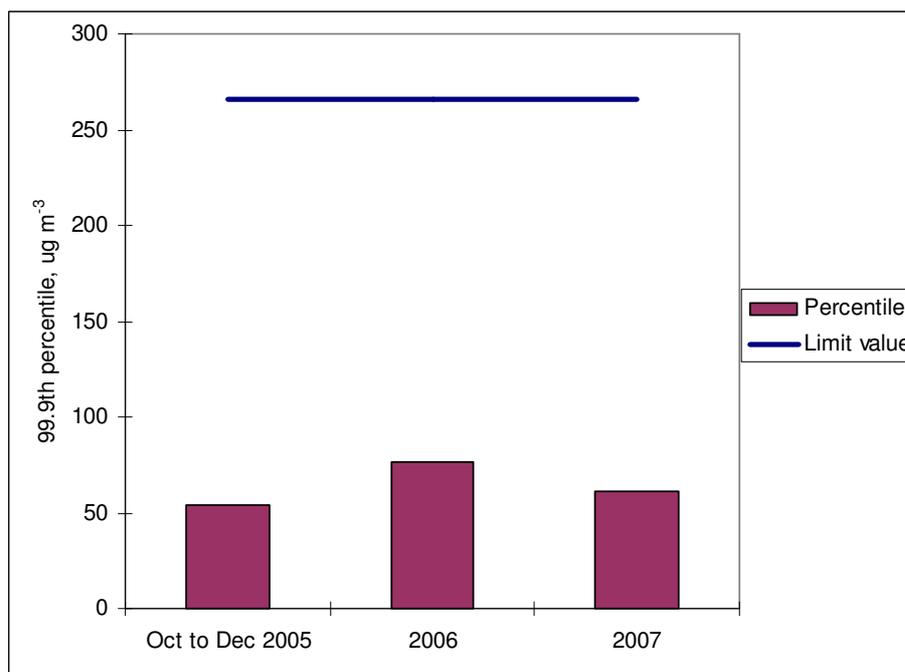


Figure 2.59: The 99.9<sup>th</sup> percentile concentrations at Santon in 2005, 2006 and 2007.

Note: The 99.9<sup>th</sup> percentile should be compared to the 15-minute limit value of 266  $\mu\text{g m}^{-3}$ .

The Low Santon site commenced operation on the 1<sup>st</sup> October 2005, the maximum 15-minute concentration recorded in 2005 was 90.4  $\mu\text{g m}^{-3}$ . In 2006, 90% data capture was achieved and only one exceedance of the 15-minute limit value was recorded, this is lower than the 35 exceedances allowed by the objective.

Unfortunately six months of data was lost between mid-December 2006 and May 2007, as it was discovered during the six-monthly service that the sample manifold had pulled away from the manifold, therefore reducing the flow. This reduced data capture to 52.3% for 2007. If the data capture is less than 90% then the 99.9<sup>th</sup> percentile concentration should be compared to the 15-minute limit value. This percentile concentration (Figure 2.59) was below 266  $\mu\text{g m}^{-3}$  in 2005, 2006 and 2007, therefore it is considered that the objective has been met.

There are no plans to move the Low Santon monitoring station given the PM<sub>10</sub> concentrations being recorded at the site and so SO<sub>2</sub> will continue to be monitored in the area.

### Scunthorpe / Scunthorpe Town Results

The Scunthorpe monitoring site on Cottage Beck Road began operation in mid-December 1997, in June 2004 the site was moved to Rowland Road and was given the name of Scunthorpe Town. Tables 2.61 and 2.63 and Figures 2.60 and 2.62 show the number of exceedances of the SO<sub>2</sub> limit values, the data capture, 99.9<sup>th</sup> percentiles and highest hourly concentration recorded at the Scunthorpe / Scunthorpe Town monitoring sites between 1998 and 2007.

The SO<sub>2</sub> objectives have not been breached at the Scunthorpe or Scunthorpe Town sites since monitoring began on the 15<sup>th</sup> December 1997. In the 2005 Progress Report it was reported that the SO<sub>2</sub> concentrations and the number of exceedances of the 15-minute limit value was decreasing. This trend has continued, with no exceedances of the 15-minute limit value in 2005, 2006 or 2007. The number of exceedances of the 15-minute limit value and the highest 15-minute and hourly concentrations has also decreased noticeably since 1998. No exceedances of the daily limit value have been recorded since monitoring commenced, whilst a breach of the hourly limit value has not been recorded since 2000.

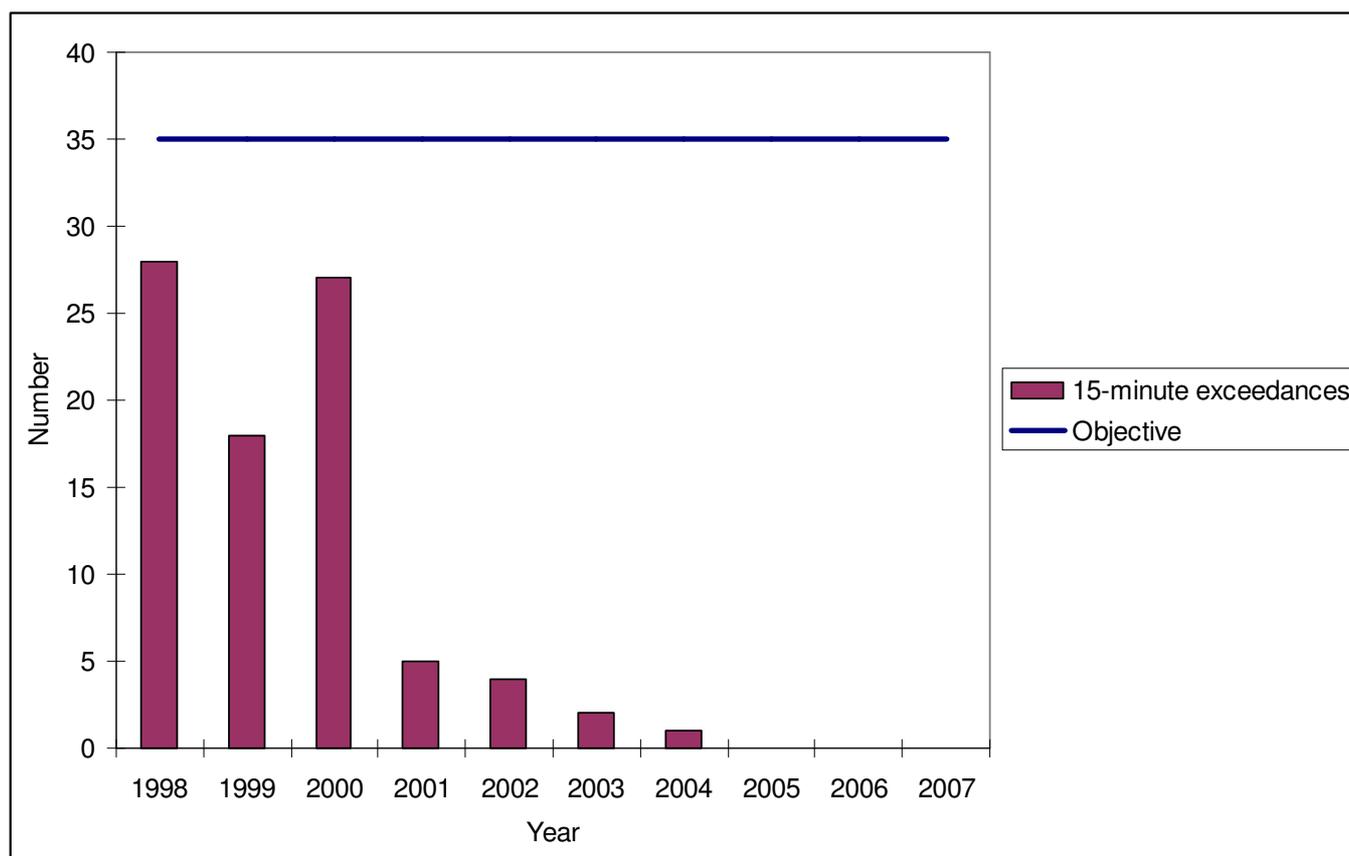


Figure 2.60: The number of exceedances of the 15-minute limit value at Scunthorpe / Scunthorpe Town between 1998 and 2007.

Year	99.9th percentile of 15-minute data, $\mu\text{g m}^{-3}$	Highest 15-minute concentration, $\mu\text{g m}^{-3}$
1998	258	535
1999	221	572
2000	250	529
2001	192	319
2002	189	327
2003	186	298
2004	149	295
2005	101	205
2006	138	263
2007	120	253

Table 2.61: The 99.9<sup>th</sup> percentile and highest 15-minute SO<sub>2</sub> concentrations at the Scunthorpe/Scunthorpe Town site between 1998 and 2007.

Note: The 99.9<sup>th</sup> percentile should be compared to the 15-minute limit value of 266  $\mu\text{g m}^{-3}$ .

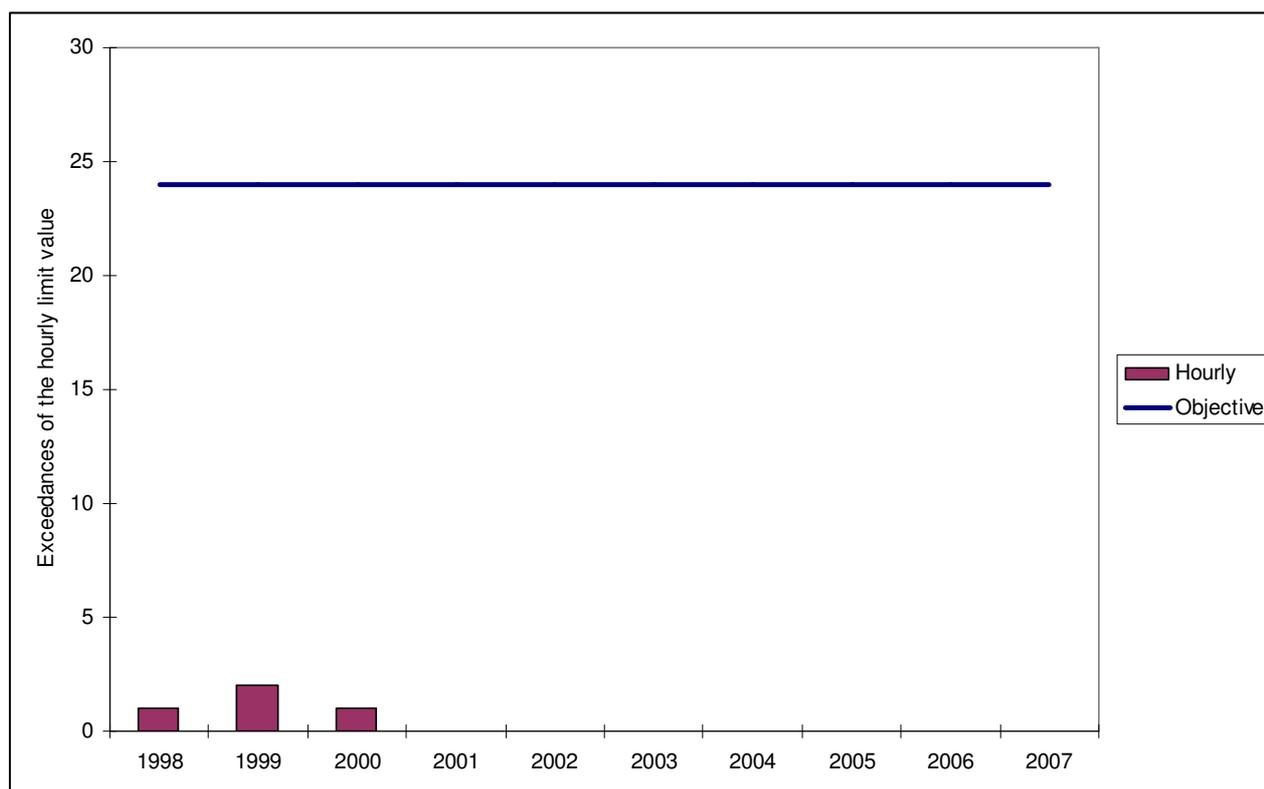


Figure 2.62: The number of exceedances of the hourly limit value at Scunthorpe and Scunthorpe Town between 1998 and 2007.

Year	Hourly data capture, %	99.7th percentile of hourly means, $\mu\text{g m}^{-3}$	Maximum hourly concentration, $\mu\text{g m}^{-3}$
1998	92.7	181	481
1999	99.3	146	396
2000	97.0	168	460
2001	97.9	130	261
2002	96.3	128	239
2003	96.0	138	258
2004	76.5	112	234
2005	73.6	69	165
2006	94.1	101	226
2007	96.9	85	162

Table 2.63: The hourly data capture, 99.7<sup>th</sup> percentile and maximum hourly concentration recorded at Scunthorpe and Scunthorpe Town between 1998 and 2007.

Note: The 99.7<sup>th</sup> percentile should be compared to the hourly limit value of  $350 \mu\text{g m}^{-3}$ .

### Part 2.7.2: Other Information

As part of a recent PPC permit application (permit issued December 2007) ConocoPhillips conducted further detailed modelling of the impact of their emissions, this included SO<sub>2</sub>. This modelling highlighted a potential breach of the 15-minute limit value (not the objective) at the fire station in Killingholme under modelling scenario 2, see map in Figure 2.64. Scenario 2 occurs when four of the stacks are operating at their maximum emission loadings.

However, the Council does not propose proceeding to a Detailed Assessment. This is because planning permission has already been granted to increase the height of the calciner stack to 100 m, this increase was also included in the new PPC permit. The modelling shows that SO<sub>2</sub> concentrations at the fire station will be reduced to below the limit value once this work has been completed. At the beginning of April 2008 ConocoPhillips issued an update to the EA, a copy of which was sent to the Council and is shown in Figure 2.65.

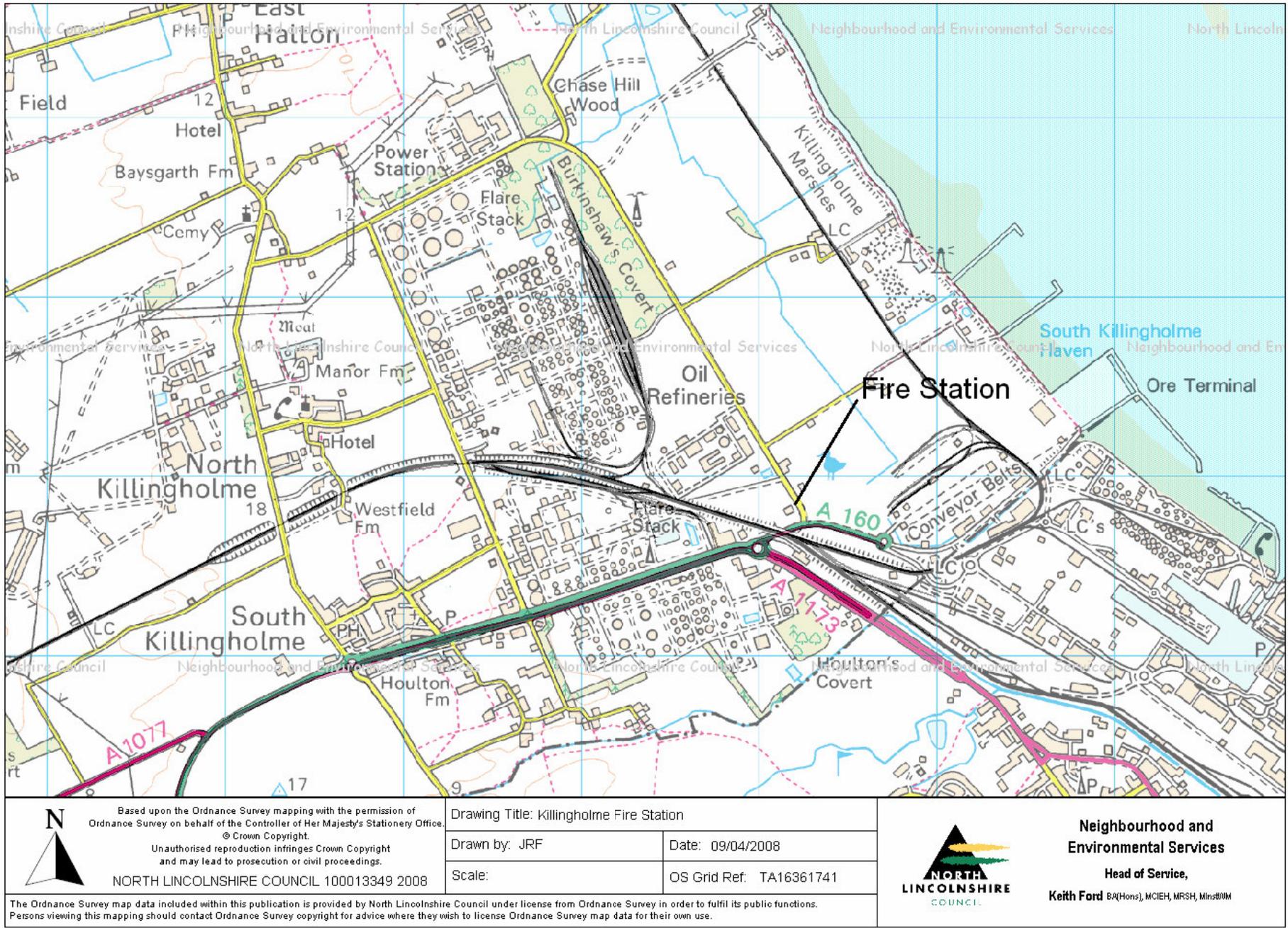


Figure 2.64: The location of Killingholme fire station.

"No.3 Calciner combined stack, ST5601 (release point A9)

A project is underway to improve the dispersion of releases to air from the No.3 Calciner combined stack (ST5601) by installing a new, taller 100m stack. Capital funds for this project were approved in 2007. Detailed engineering and procurement is complete, and the project is now entering the construction phase.

Original projections, and subsequent communications to the Environment Agency, indicated that the new stack may have been installed by end of Q3 2008. However, this date has now slipped by about three months due to a re-scheduling of the maintenance outage that is required for the installation of the new stack tie-ins into the existing process. This project is currently planned for mechanical completion in early December 2008.

The scope of this project includes provision of a CEMs suite to measure the concentration of: sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), particulate matter, carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>) and moisture, plus flue gas flowrate. Commissioning of these analysers follows mechanical completion and is currently scheduled to take place during mid-December 2008."

Figure 2.65: An update provided by ConocoPhillips refinery on the project to increase the height of the calciner stack.<sup>9</sup>

### Chapter 3: Progress on Non-LAQM Pollutants

There are many air pollutants present in the atmosphere other than those described in Chapter 2. Local Authorities **are not** required to review or monitor for these pollutants, instead a national approach is taken with monitoring being co-ordinated by Defra.

However, this report aims to give a comprehensive review of air pollution in North Lincolnshire, as most people will not be worried about whether the Council or Defra are responsible for reviewing and monitoring a particular pollutant. Environmental Protection Team staff conduct the LSO duties for the monitors that are located in North Lincolnshire.

In this Chapter the latest monitoring results and work in relation to the following pollutants will be described: heavy metals, ozone, PAHs (Benzo-a-pyrene) and PM<sub>2.5</sub>. All these pollutants fall outside the LAQM regime.

### Part 3.1: Heavy Metals

As discussed in Part 2.4 monitoring for lead was carried out by the Council as part of work for the 2007 Detailed Assessment. The Council is not required to conduct ambient monitoring for other heavy metals. However, the UK heavy metals network, run by Defra, is currently undergoing expansion and as part of this, two Partisol 2000 machines are being installed in North Lincolnshire.

NPL<sup>10</sup> have informed the Council that the filters will be analysed for Arsenic (As), Cadmium (Cd), Nickel (Ni), Lead (Pb), Mercury (particulate phase, Hg), Chromium (Cr), Copper (Cu), Iron (Fe), Manganese (Mn), Platinum (Pt), Vanadium (V) and Zinc (Zn). Members of the Environmental Protection Team will conduct the weekly filter changes and other LSO duties as required for these sites. The results, primarily for lead but also for the other metals will be included in future review and assessment reports. In addition to the objective for lead (Table 1.1), the target values for three heavy metals as detailed in the Air Quality Standards Regulations 2007 are shown in Table 3.1.

Pollutant	Target Value		To be achieved by
	Concentration, ng m <sup>-3</sup>	Measured as	
Arsenic	1	In PM <sub>10</sub> fraction, annual mean.	31/12/2012
Cadmium	5	In PM <sub>10</sub> fraction, annual mean.	31/12/2012
Nickel	20	In PM <sub>10</sub> fraction, annual mean.	31/12/2012

Table 3.1: The target values associated with arsenic, cadmium and nickel.

One monitor will be located at the Low Santon site and one at the Scunthorpe Town site; hence for the most frequent wind direction one site will be downwind from the steelworks and one upwind. The Council has assisted NPL with the planning applications and installation of the concrete bases and electrics for both sites. Planning permission has been granted for both sites and their installation was completed on the 17<sup>th</sup> April 2008, with monitoring to begin in early May.

### Part 3.2: Ozone

Currently no ozone monitoring is conducted in North Lincolnshire. The objective for ozone is a daily maximum eight-hour mean of  $100 \mu\text{g m}^{-3}$ , with 10 exceedances permitted. <sup>1</sup>

The two closest AURN sites to North Lincolnshire that monitor ozone are in Bottesford, Nottinghamshire (not the suburb of Scunthorpe) a suburban site approximately 50 km south of the North Lincolnshire boundary. The other site is Hull Freetown and is an urban centre site located five km from the north-eastern edge of North Lincolnshire. For indication only, Figure 3.2 details the number of exceedances of the limit value recorded at these two sites from 2003 to 2007.

Site	Daily maximum 8-hour running mean $> 100 \mu\text{g m}^{-3}$				
	2003	2004	2005	2006	2007
Bottesford	33	12	15	30	14
Hull Freetown	31	14	10	23	12

Figure 3.2: The number of exceedances of the ozone limit value at Bottesford (Nottinghamshire) and Hull.

Figure 3.2 shows that the ozone objective has been breached at Bottesford (Nottinghamshire) in all five years whilst the objective was breached at Hull Freetown in all years except 2005. This data is shown to illustrate the monitoring that is carried out closest to the North Lincolnshire area, it does not imply that the objective was either met or breached in North Lincolnshire.

### Part 3.3: PAHs

Poly-Aromatic Hydrocarbons are a group of chemical compounds, for air quality monitoring purposes one particular compound, benzo(a)pyrene, is used as an indicator for general PAH concentrations. The EU limit value is 1 ng m<sup>-3</sup> of benzo(a)pyrene with a compliance deadline of 2012, this objective was laid out within the 2007 Air Quality Strategy. The UK strategic target value is set at the lower concentration of 0.25 ng m<sup>-3</sup>. The compliance deadline is 2010, but it should be noted that this latter objective is not specified in any legislation.

On behalf of Defra, members of the Environmental Protection Team act as LSOs for three PAH monitors in North Lincolnshire. There are co-located monitoring stations at Scunthorpe Town; a modified Andersen instruments sampler and a newer Digitel DHA-80 high-volume sampler. The Digitel machine was installed in December 2006, whilst the Andersen machine has been operating at the current Scunthorpe Town site since 2004, it was previously located close by on Cottage Beck Road (known as the 'Scunthorpe' site). As part of the expansion of the PAH monitoring network a Digitel machine was installed at the Low Santon site in September 2007.

Figure 3.3 shows the annual mean concentration of benzo(a)pyrene for the Scunthorpe/Scunthorpe Town site between 1999 and 2006, the EU limit value and the UK strategic target values are also shown for reference. Figure 3.4 shows that the EU limit value was breached at the Scunthorpe site in 2000, 2002 and 2003, the UK strategic value has been breached in every year since 1999. There is no clear trend to indicate that concentrations are decreasing and in 2006 Scunthorpe recorded the highest annual mean benzo(a)pyrene concentration in the current UK network, although this was mostly as a result of a significant decrease in concentrations at the Kinlochleven site.

All results in this Part have been attained from the Air Quality Archive, [www.airquality.co.uk](http://www.airquality.co.uk), at the time of writing results from 2007 were not available.



Figure 3.3: The annual mean concentration, ng m<sup>-3</sup>, of benzo(a)pyrene recorded in Scunthorpe between 1999 and 2006.

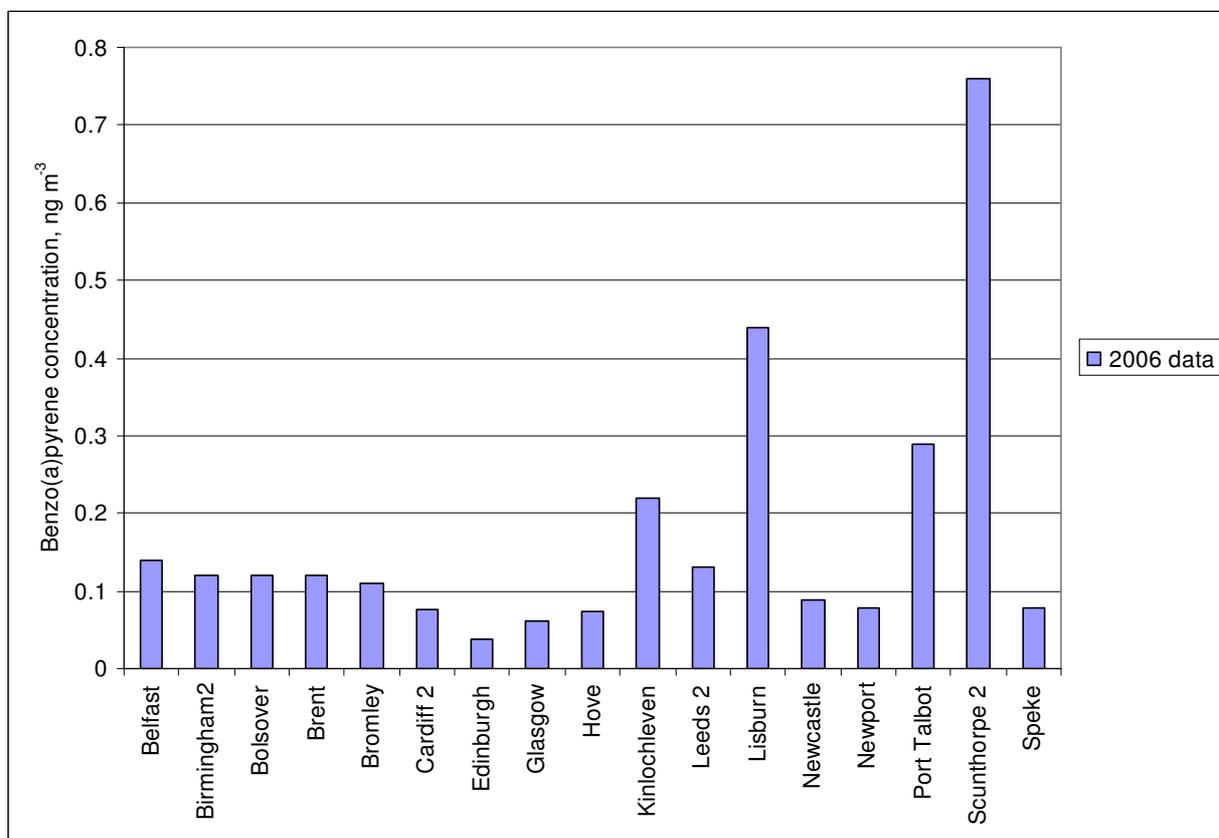


Figure 3.4: Annual mean concentrations of benzo(a)pyrene in 2006 across the UK.

### Part 3.4: PM<sub>2.5</sub>

In July 2007 Defra published its latest version of the Air Quality Strategy, as a result, new objectives for PM<sub>2.5</sub> were included with the provisional 2010 PM<sub>10</sub> objectives being dropped. PM<sub>2.5</sub> is defined as particulate matter of less than 2.5 µm in diameter, the objectives for PM<sub>2.5</sub> are shown in Figure 3.5. As with the other pollutants discussed in this chapter, the nationwide monitoring for PM<sub>2.5</sub> is mainly being co-ordinated and funded by Defra.

However, the Environment Agency (EA) has attained funding for a PM<sub>2.5</sub> monitor. The EA's initial plan was to hire a monitor for six to nine months and locate this at Low Santon. Although after discussions with the EA, a collaboration has now been set up with the Council to conduct this monitoring. The EA and Council will contribute towards the funding of the monitoring. The Council is also responsible for purchasing and installing the monitor, arranging the six-monthly services and emergency callout, performing the LSO duties and will write a report after 12 months of monitoring. As a result the monitor will be in place for at least 12 months and potentially for a much longer period. The monitor will be installed by the end of May 2008.

Pollutant	Applies	Objective	Measured as	Date to achieved by	EU obligations	Date to be achieved
PM <sub>2.5</sub>	UK	25 ug m <sup>-3</sup>	Annual mean	2020	Target value: 25 ug m <sup>-3</sup>	2010
	UK urban areas	15% reduction at urban background		Between 2010 and 2020	Target of 20% reduction at urban background	Between 2010 and 2020

Table 3.5: The PM<sub>2.5</sub> objectives as detailed in the Air Quality Strategy 2007. <sup>11</sup>

The primary objective of monitoring will be to establish the ratio of PM<sub>2.5</sub> to PM<sub>10</sub> in the Low Santon area. A secondary objective is to measure the annual mean concentration of PM<sub>2.5</sub>, this can be compared to the objectives shown in Table 3.5.

## Chapter 4: New Developments in North Lincolnshire

Developments can either release pollutants into the atmosphere, eg. new industrial processes, or they can introduce new receptors into an area, eg. A new housing development can release pollutants indirectly through more road traffic, as well as introduce more people into a particular area. This Part will detail any changes to Pollution Prevention and Control (PPC) regulated processes and new developments that have been granted planning permission since the 2006 USA.

### Part 4.1: Industrial

The Environment Agency is responsible for regulating the larger Part A1 processes as required under the PPC Regulations. The Council is responsible for regulating Part A2 and Part B industrial processes. The area covered by North Lincolnshire Council is split between two Environment Agency regions: Anglian and Midlands.

Two new Part A1 processes have been identified and will be considered in the 2009 USA, see Table 4.1.

Permit	Operator Name	Installation name	Issue Date	Activity Reference	Activity Description	Address	Grid Reference
BP3438LD	National Grid Gas PLC	Keadby Power Station	20/12/2006	1.2 B a)	Gasification, liquification and refining, odourising natural gas/lpg.	Trentside, Scunthorpe, DN17 3EF	SE82701156
BV9772IT	ColepCCL UK Limited	Personal Care Works	12/02/2007	4.1 A(1) a) (xi)	Organic chemicals, surface active agents.	Atkinsons Way, Scunthorpe, DN15 8QJ	SE88581321

Table 4.1: The new Part A1 processes in North Lincolnshire.

Since the 2006 USA pig and poultry operations have fallen under the remit of PPC and are regulated by the Environment Agency. Thus any odour issues from these operations will be dealt with via the PPC process. The operations in North Lincolnshire are listed in Table A28 in the Appendix. A Frequently Asked Question on the Review and Assessment Helpdesk states:

"At this stage, unless the authority is aware of any local circumstances that indicate an exceedence of the PM<sub>10</sub> objectives is likely, there is no need to take any further action." <sup>12</sup>

Thus no further work will be conducted in the respect of air quality for these operations.

One A2 process has closed in North Lincolnshire since April 2006, see Table 4.2.

<b>Operator</b>	<b>Process</b>	<b>SG or PG note</b>	<b>A2/B</b>
MFI UK Ltd	Wood Manufacture and Wood Coating	SG6	A2

Table 4.2: The Part A2 process that has closed in North Lincolnshire since April 2006.

The Part B processes (including dry cleaners and petrol stations) that have closed in North Lincolnshire since April 2006 are shown in Table 4.3.

<b>Operator</b>	<b>Process</b>	<b>SG or PG note</b>	<b>A2/B</b>
A B Ports	Coal and Coke Products	PG3/5	B
Sandtoft Roof Tiles	Manufacture of Heavy Clay and Refractory Goods	PG3/2	B
Scangrit	Coal and Coke Products	PG3/5	B
Scunthorpe Sheet Metal Company	Respraying of Road Vehicles	PG6/34	B
T & T Aggregates	Mobile Crushing	PG3/16	B
Weightlifter bodies	Respraying of Road Vehicles	PG6/34	B
Parkside Services	Southcliff Road, Kirton-Lindsey	Petrol Station	

Table 4.3: The Part B processes that have closed in North Lincolnshire since April 2006.

Table 4.4 shows the new Part B processes that have been issued with a permit in North Lincolnshire since April 2006.

<b>Operator</b>	<b>Process</b>	<b>SG or PG note</b>	<b>A2/B</b>
Aquarius	Dry Cleaners		B
Johnsons (Three)	Dry Cleaners		B
CW Fields	Manufacture Wood/Timber	PG6/2	B
CW Fields	Wood Coating Processes	PG6/33	B
Hargreaves	Coal, Coke, Coal Product and Petroleum Coke	PG3/5	B
Mel Hudson	Waste oil burner	PG1/1	B
Morrisons	Dry Cleaners		B
Rapter	Mobile crushing and screening	PG3/16	B

Table 4.4: The new part B processes in North Lincolnshire since April 2006.

Hargreaves does not need to be considered any further, as it is the former Associated British Ports permit and so is effectively an existing operation. The new waste oil burner has yet to start operation, it only needs to be considered further for 1,3 butadiene if used in the process or for sulphur dioxide if heavy fuel oil is used, both are unlikely.

The other processes do not need to be considered any further as they are not highlighted in Appendix E of LAQM.TG(03) as being likely to need further consideration. In addition, Rapter's mobile crusher is currently operating in Gunthorpe, this is outside the current AQMA.

The Part B processes that have undergone significant changes since April 2006 are shown in Table 4.5.

<b>Operator</b>	<b>Process</b>	<b>SG or PG note</b>	<b>A2/B</b>
Lebus Furniture	Manufacture of Timber Products	PG6/2	B
Howarth Timber Importers	Manufacture of Timber Products	PG6/2	B
Morris Young Motors Ltd	Respray Road Vehicles	PG6/34	B
Welham Estates	Pet Food Manufacturing	PG6/24b	B

Table 4.5: Part B processes in North Lincolnshire that have undergone significant changes.

The substantial changes detailed in Table 4.5 do not need to be considered any further as the processes are not highlighted in Appendix E of LAQM.TG(03) as being likely to need further consideration.

Hull and Goole Port Health Authority have confirmed that there have been no new or substantial changes to the PPC processes in the North Lincolnshire part of their area. A list of the PPC processes regulated by the Port Health Authority are shown in Table 4.6, with the Local Authority regulated processes shown in the Appendix, Table A28.

Operator	Process	
Associated British Ports (Humber International Terminal)	Other Mineral Activities - Coal	3.5
Humber Sea Terminal (Simon distribution)	Combustion Activities - Waste Oil	1.1
Humber Sea Terminal (Simon Group)	Other Mineral Activities - Coal and Loading of Cement Clicker only.	3.5 and 3.1
New Holland Bulk Services Ltd	Other Mineral Activities - Coal	3.5
Norec Limited	Other Mineral Activities - Coal	3.5
PD Port Services Ltd	Other Mineral Activities - Coal	3.5
RMS Europe Ltd (Flixborough Wharf)	Other Mineral Activities - Coal	3.5
RMS Europe Ltd (Gunness Wharf)	Other Mineral Activities - Coal	3.5
Wharton Grove Wharf Ltd	Other Mineral Activities - Coal	3.5
Wharton Grove Wharf Ltd	Treatment of animal and vegetable matter.	6.8
Wharton Grove Wharf Ltd	Production of Cement and Lime	3.1

Table 4.6: Processes in North Lincolnshire regulated by the Hull and Goole Port Health Authority, correct as of 26<sup>th</sup> February 2008. <sup>13</sup>

In April 2008 the Environmental Permitting Regulations replaced the PPC Regulations. The first phase of the programme (EPP1) went live on the 6<sup>th</sup> April 2008. It is a better regulation initiative that replaces over 40 statutory instruments with a single set of Regulations, the Environmental Permitting Regulations, one third of the length of the previous legislation. EPP1 delivers more flexibility for industry, a simpler risk-based system for regulators and continued protection of the environment and human health. The new EP system has streamlined and combined Waste Management Licence and PPC into creating a common approach to permit applications, maintenance, surrender and enforcement. Where an operation falls within the Environmental Permitting system, the operator must either obtain a permit or register a waste exemption. Regulators supervise these activities in accordance with permit conditions or the terms of the exemption. Many operators are already familiar with the systems of PPC and Waste Management Licensing. <sup>14</sup>

Part 4.2: Landfills, Quarries, Opencast coal and Mineral Processes

Table 4.7 details the appropriate planning applications that have been granted planning permission since April 2006. The Table also discusses whether a Detailed Assessment is required, based on the LAQM.TG(03) Technical Guidance. There is no need to proceed to a Detailed Assessment for any of the operations.

The Council is not aware of any new fuel storage depots or > 5 MW combustion plants in North Lincolnshire. Table A27 in the Appendix details the planning applications that are currently under consideration; these are included for easy reference in the preparation of the 2009 USA.

Site Name or Area	Planning Application Number	Description of Process	Grid reference	Distance to relevant receptor, m	Background PM <sub>10</sub> concentration (2004), ug m <sup>-3</sup>	Dust complaints ?	DA?	Reason
Land off Ermine Street, Winteringham.	MIN/2006/0095	Quarry, stockpile and process topsoil, silica sand and gravel.	494006 421839	175	16.7	N	N	No dust complaints.
Elsham Airfield, Middlegate Lane, Elsham.	MIN/2006/0125	Remove planings, chalk hardcore, concrete, reinstatement to agricultural land.	503550 413696	120	18.5	N	N	No dust complaints.
Land adjacent to River Torme, Sandtoft Road, Epworth.	MIN/2006/0199	Quarry and remove sand to form fishing pond.	475621 406725	230	17.2	n/a	N	Background conc. < 26 ug m-3 and nearest receptor >200m.
Land at Mill Lane, Brigg.	MIN/2006/1251	Import excavated soil, tip on existing agricultural land to increase level by 1m.	499718 406239	210	23.3	n/a	N	Background conc. < 26 ug m-3 and nearest receptor >200m.
John P Bell, Winterton Road, Scunthorpe.	WD/2006/0077	Relocate waste transfer and recycling facility.	490159 412153	530	21.2	n/a	N	Background conc. < 26 ug m-3 and nearest receptor >200m.
Roxby Landfill Site	WD/2006/0411	Vary condition 7 of 2002/1134 to allow tipping and phased restoration.	491024 417023	300	18.1	Odour but not dust.	N	Existing site, background concentration < 26 ug m-3 and nearest receptor >200m, no dust complaints.
Site adjacent to Judge Transport, Sandtoft Industrial Estate Road, Belton.	WD/2006/0670	Outline application for transfer station, recycling non-toxic waste.	476153 408160	300	18.4	n/a	N	Background conc. < 26 ug m-3 and nearest receptor >200m.
Trent Remine, Dawes Lane, Crosby, Scunthorpe.	WD/2006/1650	Inert waste and soil recycling facility.	490549 411712	460	31	N	N	Just outside current AQMA, likely receptors within current AQMA.

Table 4.7: Mineral Planning applications that have been granted since April 2006 (mineral processes etc.), with background concentrations and details of complaints.

### Part 4.3: Commercial, Residential and Retail Developments

Table 4.9 detail the significant commercial, residential and retail developments in North Lincolnshire that may have an impact on air quality. The NSCA (now EPUK) guidance has been used as a guide to selecting those applications that may have a significant impact on air quality. The exception to this is for developments in the AQMA, where a threshold of ten new dwellings rather than 80 has been used. There is some duplication between this Table 4.9 and Table 4.7 that details the planning applications in relation to landfill site, quarries and open-cast coal and mineral processes.

The housing development near the Gallagher Retail Park has been included as although it has yet to be granted planning permission it is a potentially significant development for the area. As the Transport Planning Manager details in Part 9 of the Appendix, building of houses could commence on the land to the north of Gallagher Retail Park in 2008/9 subject to highways conditions being met. An automatic NO<sub>x</sub> monitor is currently located next to the Gallagher Retail Park and indicates that both NO<sub>2</sub> objectives are currently being met. Presently there are no plans to move this automatic analyser. There is also a NO<sub>2</sub> diffusion tube close to the orbital road.

There are currently 800 houses being built on an area of land known as Lakeside, in the southern part of Scunthorpe. In the 2005 Progress Report it was stated that monitoring conducted between July 2004 and January 2005 indicated that the daily PM<sub>10</sub> objective would be met. However, further monitoring conducted between the 23<sup>rd</sup> February and the 31<sup>st</sup> December 2005 indicated that the daily objective would be breached, results are shown in Table 4.8. The Lakeside area was subsequently included within the current AQMA declaration. However, it should be noted that the contractor in 2004 was different to 2005. In addition, the filter media was changed during the 2005 monitoring, trace metals were also measured during this monitoring campaign thus there was deviation from EN12341.

It is anticipated that PM<sub>10</sub> monitoring, possibly through a re-located TEOM, will resume in the area once the houses begin to be occupied and other

construction activities are reduced. There is currently a NO<sub>2</sub> diffusion tube on Lakeside Parkway; this will be re-located once the houses begin to be occupied.

<b>Lakeside</b>	
Start date	23rd February 2005
Finish date	31st December 2005
Data capture, %	88
Mean, ug m <sup>-3</sup>	28.9
Number of exceedances	36

Table 4.8: The monitoring results from the Partisol at Lakeside in 2005.

Planning application number	Detail	Location	Status
PA/2006/0294	Planning permission to erect a high bay warehouse (17650 m2)	Land South Of, Nisa Way, Flixborough	Granted
PA/2006/0464	55 residential apartments, 12 garages, 5 offices, refurbish 6 town houses.	Station road, Kirton Lindsey	Granted
PA/2006/0577	Non-food retail warehouse unit (3,133 m2) with associated parking.	Winterton Road, Scunthorpe	Appeal lodged
PA/2006/0670	Outline application for a transfer station for re-cycling of non-toxic waste and siting of an industrial building	Sandtoft Industrial Estate Road 1, Belton, DN9 1PN	Granted
PA/2006/0801	Planning permission for a convenience store (Class A1) at ground floor, including replacement single-storey rear extension and installation of ATM, with associated parking provision and access alterations, also alterations to first floor to provide 3 2-bedroom residential units	311 Ashby High Street, Scunthorpe, DN16 2RY	Granted
PA/2006/0846	Planning permission to erect 3 bulk storage warehouses and a 2 storey office block and a weighbridge	Volvo Cargo Terminal, Land West Of, Lancaster Approach, North Killingholme, DN40 3JZ	Granted
PA/2006/0871	To erect 8 industrial units and a workshop with associated yard and car parking and fencing	Plot 44, Midland Road, Scunthorpe, DN16 1DQ	Granted
PA/2006/0964	Planning permission to erect new process plant (HDS3) and new substation	Lindsey Oil Refinery, Eastfield Road, North Killingholme, North Lincolnshire, DN40 3LW	Granted
PA/2006/1263	Planning permission to erect an extension to existing offices and erect a new warehouse and yard area including shot blast and paint spray facility.	Kass Steel Stockholders Ltd, Glebe Road, Scunthorpe, DN15 6AF	Granted
PA/2006/1650	Planning permission to construct an inert waste and soil recycling facility	Trent Remine, Access Roads In Quarry Off Dawes Lane, Crosby Warren, DN15 6UW	Granted
PA/2006/1673	Planning permission to retain a waste transfer station and mixed use of the site for recycling of non-toxic waste transport and haulage from yard and B2 use including manufacture of timber and concrete products	Site Adj Judge Transport, Sandtoft Industrial Estate Road 1, Belton, DN9 1PN	Granted

Table 4.9: Developments (commercial, residential or retail) in North Lincolnshire that may impact on air quality in the future.

Planning application number	Detail	Location	Status
PA/2006/1759	Planning permission to change the use from wasteland to the storage and distribution of aggregates	Old Railway Sidings, A18 From Althorpe To Gunness, Althorpe, North Lincolnshire	Granted
PA/2006/1804	Planning permission for change of use of agricultural land to a temporary car park for 600 cars and associated works	Lindsey Oil Refinery, Total UK, Eastfield Road, North Killingholme, DN40 3LJ	Granted
PA/2006/1876	Planning permission to erect 10 houses in two blocks of 5 with associated car parking (to include demolition of existing commercial garage)	128 Rowland Road, Scunthorpe, North Lincolnshire, DN16 1TE	Granted
PA/2007/0110	Outline planning permission to erect dwellings (15).	Land Off, Crowberry Drive, Scunthorpe.	Granted
PA/2007/0235	Outline planning permission to erect 10, 2-bedroom dwellings and associated car parking with new access from Leven Road (to include demolition of Church Hall).	St Catherines Church Hall, Land At, Ancholme Road, Scunthorpe, DN16 2NS	Granted
PA/2007/0322	Planning permission for the change of use to vehicle reclamation including the delivery/collection of motor vehicles, the crushing and processing of vehicles and the collection/storage of scrap, including non-ferrous and scrap metal, and the recycling of parts, including oils and batteries.	Former Normanby Construction Premises, Mannaberg Way, Scunthorpe, DN15 8QZ	Granted
PA/2007/0449	Planning permission to erect 26 dwellings, associated garaging, pumping station and compound.	Land at Brat Hill Farm, Off Staindale Road, Scunthorpe	Granted
PA/2007/0643	Planning permission to erect factory (2200 m <sup>2</sup> ) and offices (312m <sup>2</sup> ).	Plot 23, Nisa Way, Flixborough, Normanby Enterprise Park	Granted
PA/2007/0828	Outline planning permission for residential development, open space, primary school and associated access and landscaping (1200 houses).	Tesco, Land rear of, Doncaster Road, Flixborough/Gunness/Scunthorpe, East of A1077	Under consideration
PA/2007/1321	Planning permission to erect 19 units to be used for B1 offices (2905 m <sup>2</sup> )	Plot 7, Warren Road, Scunthorpe	Granted
PA/2007/1569	Planning permission to erect a 100 metre high exhaust chimney to replace existing chimney	ConocoPhillips Refinery Site, Eastfield Road, South Killingholme, DN40 3DW	Granted

Table 4.9: Developments (commercial, residential or retail) in North Lincolnshire that may impact on air quality in the future, continued.

#### Part 4.4: Transport

This Part considers any potentially significant changes to transport schemes and movements in North Lincolnshire that may have an impact on air quality.

Roads with an AADT predicted to be greater than 10,000 in 2008, have been considered for this report in relation to any increases since 2006. There are no roads where the traffic flow has increased by more than 25%, see Appendix Table A31. The road with the biggest increase is Bridge Street in Brigg, with an increase of 20%. This road is part of the main road through Brigg, the A18. A diffusion tube is located at Barnard Avenue, which is slightly further along the A18, where this part of the road is busier and so does not need to be considered further.

A 2.2% increase in HDVs was recorded at Humber Road, Killingholme, again this area is covered by two diffusion tubes.

Three new roads were identified as having an AADT greater than 10000, Table A32:

- Lakeside Parkway, currently covered by a diffusion tube,
- Access road to Gallagher Retail Park. No receptors for this particular road but automatic monitor in the area due to Doncaster Road.
- Market Lane, Barton, is a short stretch of road linking Holydyke with Barrow Road in Barton. A diffusion tube is already in place at Holydyke, so therefore does not need to be considered further.

In her response to the Detailed Assessment the Transport Planning Manager highlighted three potential changes in relation to road traffic that could impact on air quality:

- “Highways & Planning are currently looking at a scheme to improve traffic flows at the Lakeside roundabout and remove significant numbers of HGVs from the junction, although we are only in the initial feasibility stage. There is therefore, potential to counteract some of the

air quality impact at this junction caused by the full opening of the residential development.

- Humber Road. This area is a significant development area and traffic levels will increase. The predominant vehicles are likely to be for heavy goods. Development of the land is already underway and a large part is subject to an imminent planning application with contracts for development likely to be in place for 18-24 months. A scheme to dual the A160 and improve the junction is also being promoted which will improve traffic flow and attract more business to the area. The ports (ABP & Humber Sea Terminal) also have expansion plans which will lead to an increase in HGVs.
- The Gallagher site to the north of Tesco is likely to see house building commence 2008/2009 (subject to highway & planning requirements being met in the first part of 2008. “

Diffusion tubes or automatic monitors currently cover all three areas, however, the potential development around Humber Road is noted for future review and assessment reports.

During the review of the NO<sub>2</sub> tube route at the end of 2007, potential receptors were identified near the M180 motorway. The receptors are at the end of a private road, which runs down to a farm and new barn conversions. The estate agent was asked to pass contact details on to the developer, requesting permission for the access and location of a diffusion tube. However, no return contact has ever been made.

Thus a DMRB run has been conducted instead. The background concentrations used were downloaded from the Air Quality Archive and corrected to a concentration for 2008. The exception is benzene, where the concentration from the background tube in the 2004 monitoring campaign was used; this was also corrected. No average speed data was available the run was performed at three average speeds: 90, 100 and 110 km h<sup>-1</sup>.

The highest calculated NO<sub>2</sub> concentration was 34.2 µg m<sup>-3</sup>, which was recorded with an average speed of 110 km h<sup>-1</sup>, although this speed is unlikely given the relatively high percentage of HDVs. It is unlikely that there will be a breach of either the NO<sub>2</sub> or other air quality objectives. The DMRB inputs and outputs are shown in the Appendix, Tables A9 and 10.

In previous review and assessment reports, only one location was identified where diesel or coal powered locomotives could be stationary for 15-minutes or more, the train operator (at the time) was requested to switch off the engine at this location. Two local train companies were contacted First TPE and Northern Rail for this report but did not respond in time for the report. This will be followed up for 2009 USA.

Hull and Goole Port Health Authority have confirmed that there has been no significant increase in shipping since 2006. <sup>15</sup>

There is one significant airport inside North Lincolnshire, Humberside, and one airport that is close to the border of North Lincolnshire, Robin Hood. Robin Hood airport opened in April 2005 and given that it is an expanding airport, the number of passengers and amount of freight lifted has been considered for 2007.

Figure 4.10 shows the number of transport movements, number of passengers and freight lifted at the two airports for 2005 and 2007. <sup>16,17</sup> The calculated million passengers per annum equivalent value are still below the five mppa threshold detailed in LAQM.TG03 for both airports. Therefore they do not need to be considered any further.

Airport	Air transport movements		Passengers, 000s		Freight lifted, tonnes.		Mppa equivalent
	2005 *	2007	2005 *	2007	2005 *	2007	
Humberside	13,392	13,270	467	472	2,700	4,053	0.513
Robin Hood	7,561	17,058	837	1,088	590	671	1.095

Table 4.10: The number of air transport movements, passengers and freight lifted at Humberside and Robin Hood Airports, with the mppa equivalent for 2007.  
 Note: \* 2005 data for Robin Hood refers to April 2005 and April 2006.

## Chapter 5: Air Quality Complaints and Enquiries

This Chapter details the number of complaints and enquiries received by the Council in relation to odour, dust, smoke and bonfires from either industrial or domestic premises. It should be noted that not all complaints received are justified, however, they still require investigation.

Figure 5.1 shows the number of complaints and enquiries received by the Council for each year between 1998 and 2007. The highest number of complaints or enquires received was 352 in 2002, with 2003 just below this at 342. It should be noted that 2005 is likely to be an underestimate as there was a changeover in the database used.

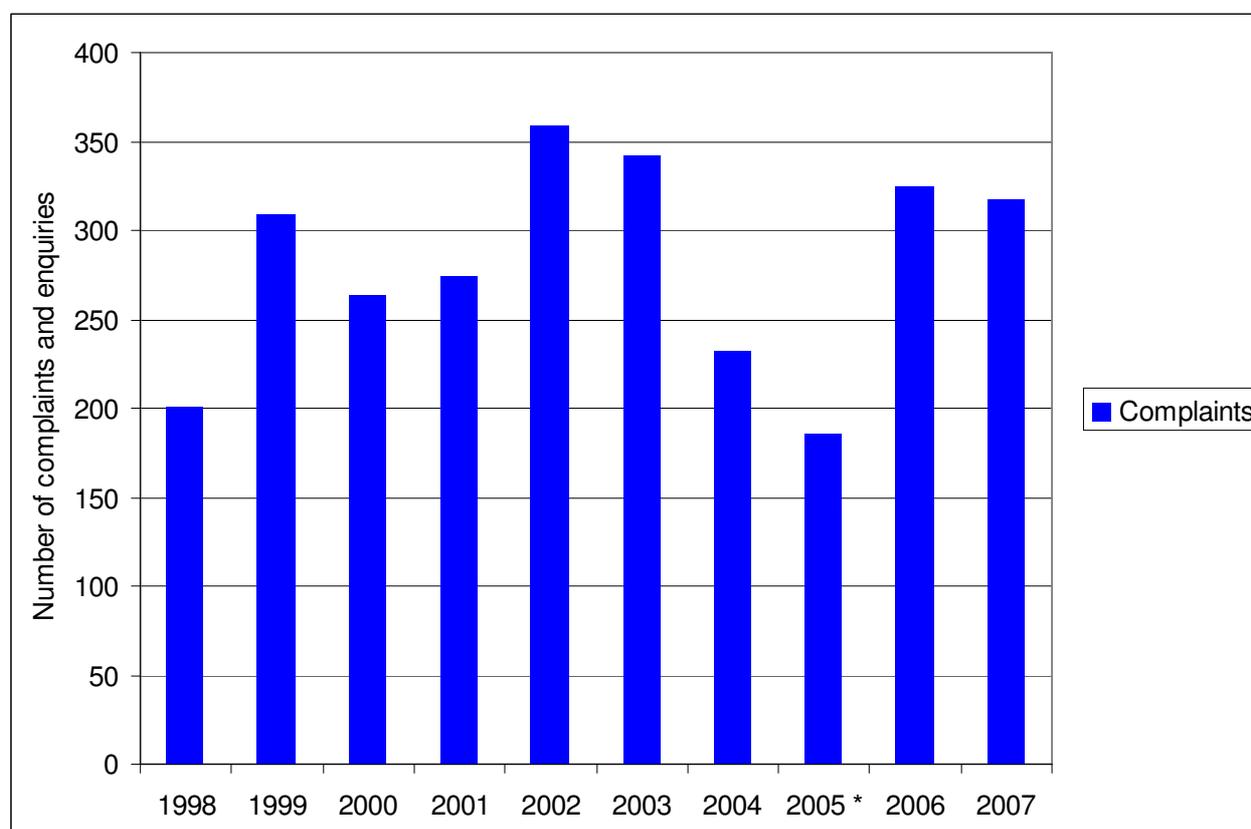


Figure 5.1: The number of complaints and enquiries in relation to odours, dust, smoke and bonfires from either industrial or domestic premises between 1998 and 2007.

Note: \* 2005 is likely to be an underestimate due to issues with the database.

Table 5.2 shows the number of complaints and enquiries separated into different categories for 2003 through to 2007. The number of odour

complaints was highest in 2003, with the number of bonfire complaints being highest in 2006 and 2007.

Categories	Complaints, 2003	Complaints, 2004	Complaints, 2005	Complaints, 2006	Complaints, 2007
Air pollution miscellaneous	5	5	2	9	9
Dust	48	34	14	57	54
Fumes	7	7	6	8	7
Odour	148	59	49	81	60
Bonfire/smoke, trade or industrial	69	59	37	53	78
Bonfire/smoke, domestic	48	59	66	103	97
Other	17	9	12	14	13

Table 5.2: The number of complaints and enquiries received by the Council for 2003 through to 2007, separated into different categories.

Notes: Dust consists of complaints for Corus, grit and other dust, acid smuts, PPC installations and A1 processes.

Odour consists of complaints for slurry spread, industrial, agricultural and other.

Other consists of complaints for smoke from industrial or domestic chimneys, cable burning and stubble burning.

Corus are regulated by the Environment Agency, however, both the Council and the Environment Agency receive complaints from the public regarding the company. Corus keep a record of all complaints received and so were contacted directly for this information <sup>18</sup>, the number of justified complaints for 2005, 2006 and 2007 are shown in Figure 5.3.

The Environmental Protection Team also deals with requests for air quality data in relation to assessments being done by consultancy firms, but also requests for data from MSc and PhD students and academics that are studying air quality. The air quality website, see Part 6.1, has meant these requests are much easier to facilitate, site visits to Scunthorpe by the students have also been arranged. The Team requests a copy of the students report in return for this data.

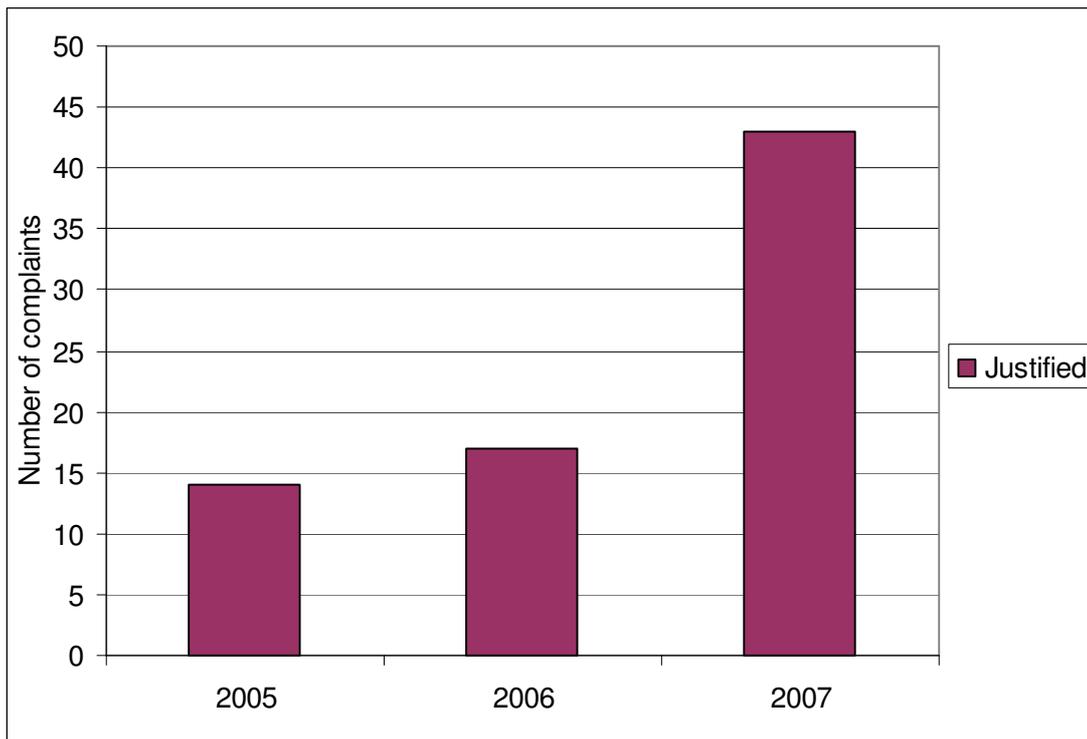


Figure 5.3: The number of justified complaints received about Corus from 2005, 2006 and 2007.

## Chapter 6: General Air Quality Actions

This Chapter details other actions that are in progress or have been completed in relation to air quality in North Lincolnshire.

### Part 6.1: Air Quality Website

A dedicated air quality website for North Lincolnshire has been developed by AEA Energy and Environment on behalf of the Council, with additional funding being received from Defra and the Environment Agency. It is available to view at [www.nlincsair.info](http://www.nlincsair.info), with much of the information documented in this report available on the website. As part of the Calibration Club contract described in Appendix Part 3 all of the automatic data is uploaded to the database on the website and an additional part of the contract allows for ongoing maintenance of the website.

Data from the real-time monitoring stations is uploaded and available to view on the website. The data is available to view and download on-screen but is also converted to show the results in the Defra Air Pollution bandings. For each real-time monitoring station (i.e. the Partisols are not included) a summary of the data is provided, along with photos, information on the site, detailed statistics and graphs.

Other data such as diffusion tube and Partisol results are also uploaded to the website as appropriate. All of the Council's LAQM reports are available on this website and it will now be the primary method for consultation on LAQM reports.

The data section has three parts, the first two provide similar capabilities to the national Air Quality Archive, e.g the downloading of air quality data and statistics. The third section enables the user to draw graphs, pollution roses, wind speed roses and wind frequency roses. For each of these options the user can select the time period they wish, this can be quite specific, for example, weekdays only or exceedance days only. Additionally, the pollution rose is placed on a map at the position of that particular monitoring station.

The website has advantages for both the public, Council staff and local industry. The original air quality directives require monitoring data to be available to the public in a clear, simple and timely manner (compared to the relevant objective). This website helps to fulfil this requirement for North Lincolnshire data. The Calibration Club contract and website mean that Council staff have quick and easy access to the data. The wind direction and speed data may also be useful in dealing with odour and other air quality complaints such as bonfires.

In addition, staff members at the most significant A1 processes in North Lincolnshire receive an automatic email when a limit value has been breached at one of the automatic monitoring stations. If they so wish, they can then compare their operating records and activities with the monitoring data much more quickly.

The website has been publicly available since the 16<sup>th</sup> January 2008, a briefing for Councillors and senior members of Council staff is currently being organised.

#### Part 6.2: IAPSC

On the 3<sup>rd</sup> December 2007 two members of the Environmental Protection Team gave a presentation at IAPSC (Investigation of Air Pollution Standing Conference) in relation to the PM<sub>10</sub> issue in the Scunthorpe area. A copy of the presentation is available at [www.iapsc.org.uk/papers](http://www.iapsc.org.uk/papers). This was one of three presentations that concentrated on steelwork industrial sites, with the other presentations being given by a representative of the Environment Agency, who deals with the Port Talbot site, and by a Corus representative.

#### Part 6.3: Local Liaison Meetings

There are currently five part A1 operations in the Killingholme area, three power stations and two of the UK's nine refineries. A liaison meeting is held three times per year with the members consisting of the operators, the Environment Agency, Officers from the Environmental Protection Team and local Councillors.

Since the declaration of the PM<sub>10</sub> AQMA the Corus liaison meetings have been replaced with meetings between the Health Protection Agency, the local Primary Care Trust and the EA to discuss AQMA issues. It is anticipated that the original Corus liaison meetings, which will discuss all issues, will recommence during 2008.

Cemex who operate a cement works in the village of South Ferriby organise a liaison meeting four times per year. The committee consists of Cemex representatives, local Councillors and Officers from the Environment Protection Team.

#### Part 6.4: 'R' Project

The Environmental Protection Team is also working with Dr David Carslaw of Leeds University and AEA Energy and Environment in the development of open access software called 'R', which will provide a set of open-source tools for the air quality community. The data collected within the North Lincolnshire Air Quality Network will be used as one of the case studies. The aims of the project are:

1. To make available a growing set of free open-access tools for the analysis of air pollution data.
2. To develop tools to make the process of analysing and thinking about air pollution data easier.
3. To develop these tools in the open access software 'R', which is freely available to everyone.
4. To make available innovative methods that organisations do not currently have access to.
5. To provide a focus point for the development of such tools and encourage the exchange of best practice across a range of stakeholders.

## Chapter 7: Conclusions and Future Actions

- Reported emissions from the refineries indicate the benzene and 1,3 butadiene objectives will continue to be met in the Killingholme area.
- Monitoring of heavy metals and PM<sub>2.5</sub> will commence in May 2008.
- Nitrogen dioxide concentrations have decreased at Killingholme and Scunthorpe Town. Concentrations at Kingsway House and the Brigg Road/A18 junction will remain under review.
- The UK strategic target value for PAHs continues to be breached at the Scunthorpe Town site, the EU limit value was met in 2006.
- The PM<sub>10</sub> annual and daily objective is being breached in Low Santon. An additional Detailed Assessment in relation to the annual objective was submitted in February 2008, with the Defra appraisal accepting the report.
- The PM<sub>10</sub> daily objective was met at the other monitoring stations in 2007, although the potential to breach is still present.
- The decrease in sulphur dioxide concentrations at Scunthorpe Town reported in the 2005 Progress Report has continued.
- ConocoPhillips is working towards increasing the calciner stack height to reduce SO<sub>2</sub> concentrations in the area.
- The final Action Plan for the current AQMA was submitted to Defra on 30<sup>th</sup> April 2008 Progress on Action Plan will be detailed in the 2009 Updating and Screening Assessment.
- There have been no significant changes to road traffic flows or other transport. A DMRB run was performed for newly identified receptors next to the M180 and indicates the objectives will be met.
- Mineral and other planning applications have been noted for the 2009 Updating and Screening Assessment.
- Changes to Council, Environment Agency and Port Health Authority regulated PPC processes have been discussed or noted for the 2009 Updating and Screening Assessment.
- The North Lincolnshire air quality website has been available to the public since mid-January 2008.

### Future Actions

Anticipated future actions prior to the 2009 USA:

- Conduct consultation on Progress Report,
- Implement current action plan for PM<sub>10</sub> AQMA,
- Declaration of AQMA or amendment of current AQMA for breach of annual objective in Low Santon,
- Liase with ConocoPhillips on stack improvement timetable,
- Commence weekly LSO duties for heavy metals Partisols,
- Continue updating website as necessary,
- Work with David Carslaw and AEA on 'R' project,
- Help with the testing of the King's College web tool for the volatile correction model (June 2008.)