

North Lincolnshire Council

# Detailed Assessment of PM<sub>10</sub>, 2008



## Executive Summary

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.

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## Abbreviations

Numbers in superscript indicate references, which are detailed in the Appendix.

AQMA	Air Quality Management Area.
AURN	Automatic Urban and Rural Network.
Defra	Department of the Environment, Food and Rural Affairs.
EPAQS	Expert Panel on Air Quality Standards.
EU	European Union.
LAQM	Local Air Quality Management.
LSO	Local Site Operator.
NAQS	National Air Quality Strategy.
NO <sub>2</sub>	Nitrogen dioxide.
NO <sub>x</sub>	Oxides of nitrogen.
PAHs	Poly-aromatic Hydrocarbons.
PM <sub>10/2.5</sub>	Particulate matter less than 10 or 2.5 µm in diameter.
QA/QC	Quality Assurance / Quality Control.
µg m <sup>-3</sup>	Micrograms (1 millionth of a gram) per cubic metre.
UKAS	United Kingdom Accreditation Service.

Any Tables or Figures with an 'A' preceding the number are located in the Appendix.

## 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 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 and are 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. 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 must 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). Over 215 Local Authorities have to date declared AQMAs.<sup>1</sup>

This report aims to establish whether the annual PM<sub>10</sub> air quality objective is being breached in an area of North Lincolnshire. If after consultation, an AQMA is declared, the Council is then required to make a further assessment into the sources of the pollutant. This is followed by the development and implementation of an action plan setting out measures to reduce concentrations of the pollutant.

Pollutant	Objective		To Be Achieved By
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running Annual Mean	31/12/2003
	5 $\mu\text{g}/\text{m}^3$	Annual Mean	31/12/2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running Annual Mean	31/12/2003
Carbon Monoxide	10.0 $\text{mg}/\text{m}^3$	Maximum Daily Running 8-Hour Mean	31/12/2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual Mean	31/12/2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual Mean	31/12/2008
Nitrogen Dioxide	200 $\mu\text{g}/\text{m}^3$	1-Hour Mean not to be exceeded more than 18 times a year.	31/12/2005
	40 $\mu\text{g}/\text{m}^3$	Annual Mean	31/12/2005
Particles (PM <sub>10</sub> )	50 $\mu\text{g}/\text{m}^3$	24-Hour Mean not to be exceeded more than 35 times a year.	31/12/2004
	40 $\mu\text{g}/\text{m}^3$	Annual Mean	31/12/2004
Sulphur Dioxide	350 $\mu\text{g}/\text{m}^3$	1-Hour Mean not to be exceeded more than 24 times a year.	31/12/2004
	125 $\mu\text{g}/\text{m}^3$	24-Hour Mean not to be exceeded more than 3 times a year.	31/12/2004
	266 $\mu\text{g}/\text{m}^3$	15-Minute Mean not to be exceeded more than 35 times a year.	31/12/2005

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

References 1 and 2.

## Part 1.2: North Lincolnshire

North Lincolnshire is an area of around 85,000 hectares with a population of around 157,000, it is located on the southern side of the Humber estuary and occupying 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 surrounded by many small villages. The exception to this is the substantial 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 and still relies upon traditional industries such as steel manufacturing (and related 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 and M181 motorways and several 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.

Air Quality monitoring conducted by North Lincolnshire Council consists of:

- 8 TEOMs for the detection of particulate matter less than 10 micrometres in diameter (PM<sub>10</sub>).
- 2 Partisol 2025s for gravimetric, 'equivalent' measurement of PM<sub>10</sub>.
- 40 diffusion tubes to record nitrogen dioxide (NO<sub>2</sub>).
- 5 sites, including 2 Airpointers, to record oxides of Nitrogen (NO<sub>x</sub>).
- 3 sites capable of recording sulphur dioxide.
- 3 PAH monitors, LSO duties are conducted on behalf of Defra.
- A benzene diffusion tube survey was conducted between November 2003 and November 2004.

### Part 1.3: Definition and Health Effects of PM<sub>10</sub>

The definition of PM<sub>10</sub> is the fraction of particulate matter capable of passing through an inlet of defined characteristics at 50% sampling efficiency with 10 µm aerodynamic diameter.<sup>3</sup> PM<sub>10</sub> has been assigned an Air Quality Standard as evidence suggests it has a range of effects on human health, concentrated specifically on the cardiovascular and respiratory systems as listed in Table 1.2.

<ul style="list-style-type: none"><li>• Increased use of asthma medication.</li><li>• Attacks of asthma in pre-existing cases.</li><li>• Attacks of chronic obstructive pulmonary disease.</li><li>• Admission to hospital for cardiovascular causes.</li><li>• Deaths from heart attacks, strokes and respiratory causes.</li></ul>
--

Table 1.2: A list of possible effects of PM<sub>10</sub> on human health.<sup>4</sup>

The effects of particulate matter described in Table 1.2 are most likely to be suffered by susceptible groups in the population who already have a pre-existing heart or lung condition. The PM<sub>10</sub> fraction is currently monitored as it is thought that particles of this size can penetrate the larynx and enter the thoracic region of the respiratory system.<sup>5</sup> The smaller the particle the further it penetrates into the lung, hence the 2007 Air Quality Strategy introduced a new objective for PM<sub>2.5</sub> (particles less than 2.5 µm in diameter).

Epidemiological studies have consistently shown a link between health effects and PM<sub>10</sub>. In a COMEAP (Committee on the Medical Effects of Pollutants) report on Cardiovascular Disease and Air Pollution a summary of the health effects of PM<sub>10</sub> in a variety of studies was given. The percentage change in the outcome measure varied from 0.4 to 1.4% per 10 µg m<sup>-3</sup> increase in PM<sub>10</sub> concentrations.<sup>6</sup> Although this is a small effect the large potential exposure (i.e. a whole population within a given area) could mean the public health impact is large. It is thought there is no concentration that can give complete protection to particulate matter, as threshold levels have not been identified.<sup>7</sup>

PM<sub>10</sub> is also linked to other problems, it can cause a reduction in local and regional visibility. It has been implicated in climate change through a possible cooling effect<sup>8</sup> and may also provide a surface for chemical reactions to occur.

## Chapter 2: Detailed Assessment of PM<sub>10</sub>

### Part 2.1: Background

In November 2005 North Lincolnshire Council declared an Air Quality Management Area (AQMA) for a breach of the daily PM<sub>10</sub> objective in the Scunthorpe area. As a result of this declaration the mobile Groundhog monitoring unit (including a TEOM) was moved to Low Santon, which is located on the eastern side of the steelworks industrial site. Other additional monitoring stations were also installed in and around the AQMA.

The draft Further Assessment and draft Action Plan relating to the daily PM<sub>10</sub> AQMA were submitted to Defra in mid-April and mid-September 2007 respectively. As part of the Further Assessment PM<sub>10</sub> results for all of North Lincolnshire Council's monitoring stations were reviewed. In this report it was highlighted that the number of exceedances of the daily limit value recorded in 2006 at Low Santon was 158, the annual mean recorded was 58.9 µg m<sup>-3</sup>. This was a breach of the daily and annual PM<sub>10</sub> objectives.

At the time of the Further Assessment the 2006 results were based on a dataset of 6 months ratified data and 6 months provisional data. Since then the remainder of the 2006 dataset has been ratified and is presented in this report, data from 2007 is also included.

This report will concentrate on the PM<sub>10</sub> concentrations in the Santon area with results from the Low Santon TEOM and High Santon Partisol sites reported. The results from the Council's other PM<sub>10</sub> monitoring sites are not considered and are dealt with in other Review and Assessment reports.

## Part 2.2: Location and Description of Monitoring Sites

Figures 2.1 and 2.2 display the locations of the Low Santon TEOM and High Santon Partisol monitoring stations. In Figure 2.1 the other red dots are the locations of North Lincolnshire Council's other current and previous monitoring locations.

The current AQMA is shown by the black line in Figure 2.1 and runs along the main railway line to the north of Santon, thus it encompasses both monitoring stations.

The analysers at the Low Santon monitoring station are housed within an enclosed air-conditioned Groundhog unit to the north east of Scunthorpe, on the eastern boundary of the steelworks. Dawes Lane is 5 m to the south of the monitoring station, running from a rural location in the east through the steelworks and into Scunthorpe. A raised embankment 5 m north of the site carries freight traffic along one of the major rail lines into the steelworks. The surrounding area consists of arable fields with a number of trees and to the east, a small residential area.

The monitoring equipment at this station consists of a Signal Ambitech Ambirak analyser, monitoring sulphur dioxide and oxides of nitrogen, and a Rupprecht & Patterschnick TEOM 1400a monitoring PM<sub>10</sub>. In September 2007 a Digitel DHA-80 high volume sampler began monitoring for PAHs. As part of the expansion of the Defra co-ordinated heavy metals network it is anticipated that a Partisol 2000 will begin operation in the vicinity in the near future. The Groundhog has previously been located in Appleby and Keadby Villages for previous detailed assessment work; it began operation in Low Santon on the 1<sup>st</sup> October 2005.

Two photos of the Low Santon TEOM monitoring site are shown in Figures 2.3a and 2.3b. The yellow barriers were installed in September 2007 to give easy access to the roof for the LSOs and the Council's contractors so that the TEOM and PAH heads can be cleaned or changed in a safe manner.

The High Santon 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 of the Santon TEOM site. The Partisol began operation in High Santon on the 5<sup>th</sup> January 2007.

The results from both monitoring stations are reported in Part 2.4 and discussed in Part 2.5.

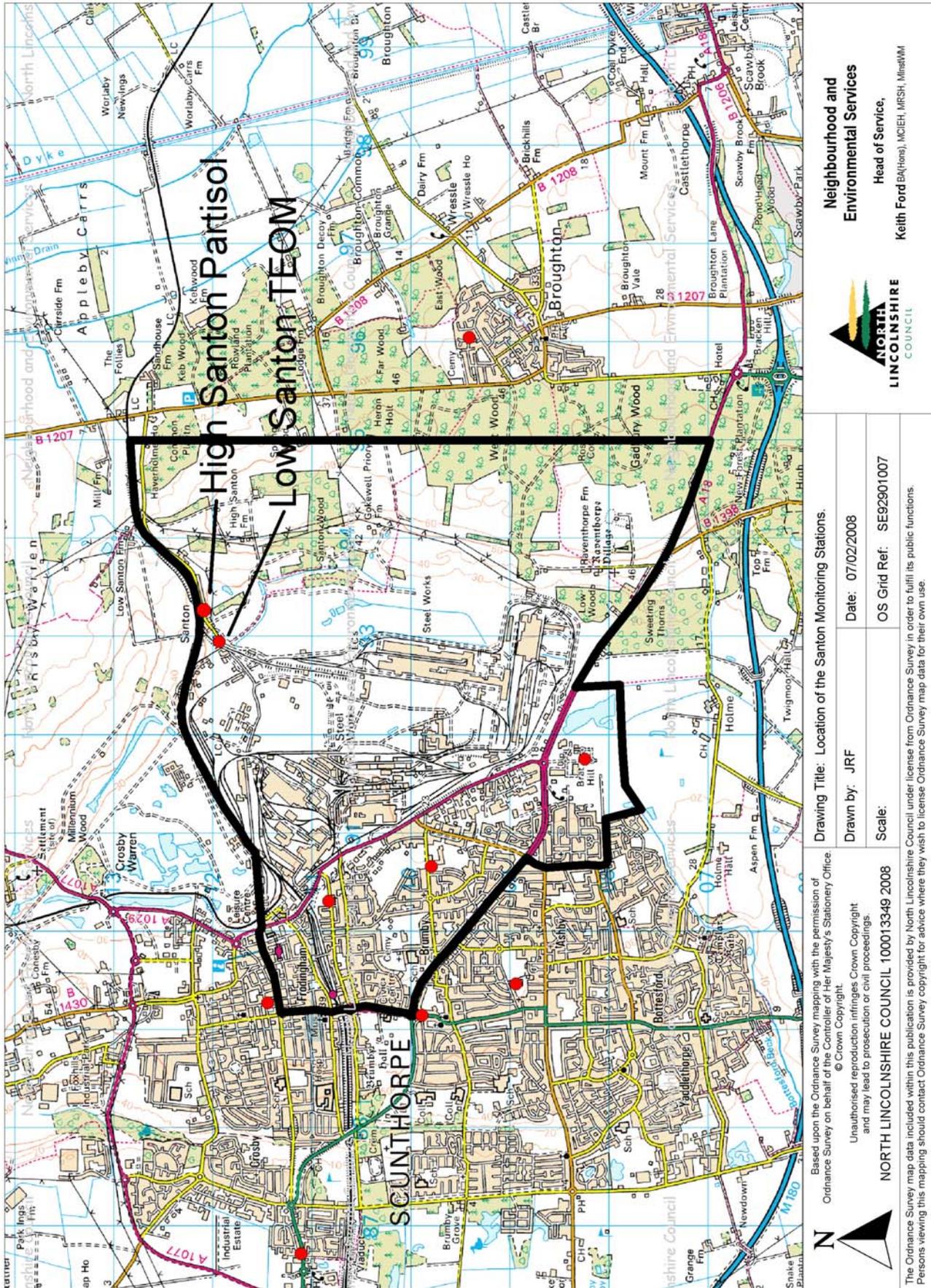


Figure 2.1: The location of the Low Santon TEOM and High Santon Partisol monitoring stations, the other red dots indicate other current or previous monitoring stations. The black line shows the existing AQMA.

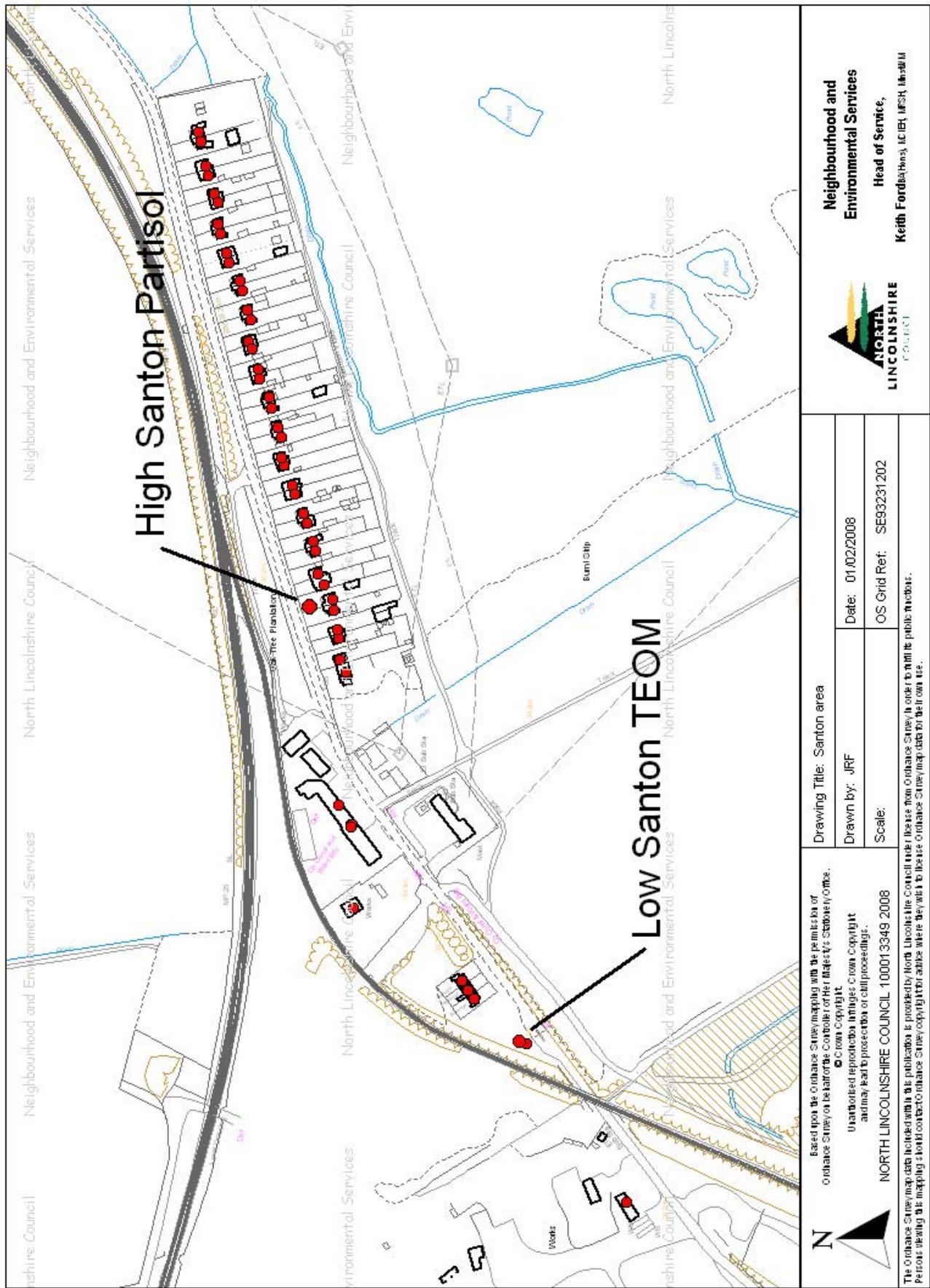


Figure 2.2: A closer view of the Santon monitoring stations.



Figure 2.3a: A photo of the Low Santon TEOM monitoring station, towards the southwest.



Figure 2.3b: A photo of the Low Santon TEOM monitoring station, towards the east.

### Part 2.3: Quality Assurance and Control Procedures

In order to minimise measurement uncertainty it is important to apply stringent quality assurance and quality control (QA/QC) procedures to monitoring programmes. North Lincolnshire Council therefore subscribe to a service known as the 'Calibration Club' operated by AEA Energy and Environment, the Low Santon TEOM is part of this service.

AEA Energy and Environment carry out data management services on behalf of the Council using the same procedures as those applied to UK Government National network monitoring stations (i.e. The AURN). This service incorporates:

- Daily data collection,
- Screening and provisional scaling of data,
- Full ratification of data sets,
- Independent equipment audits at six-monthly intervals,
- An audit report detailing any required data management actions.

The TEOM receives fortnightly site visits from a member of the Environmental Protection Team, which on an alternating basis entail:

- i.) F1 being pressed; as a result the machine performs internal calibrations.
- ii.) F1 pressed, a filter change (this is done earlier if the load on the filter reaches 80%) and the TEOM head cleaned.

The contract for the supply and weighing of Partisol filters is currently let to AEA Energy and Environment. Cassettes of fourteen Emfab filters are exchanged on a fortnightly basis, AEA dial into the Partisol on a daily basis to download appropriate data and check its operation.

The filters are conditioned in-line with BS EN 12341:1999 and weighing procedures utilise UKAS calibrated precision balances. AEA are also independently certified to ISO 9001 and ISO14001 for their quality and environmental management systems. With regards to balance drift the data being produced in line with NPL recommendations.<sup>9</sup> Results are typically received 3 weeks after the cassette has been received by AEA.

Signal Ambitech are contracted on a 48-hour emergency callout basis to deal with any faults with the Low Santon analysers, they also conduct six monthly services. Airmonitors are contracted to do the same for the High Santon Partisol, except the callout is on a 5-day basis.

## Part 2.4: Monitoring Results

### a.) Low Santon TEOM.

The TEOM, NO<sub>x</sub> and SO<sub>2</sub> analysers began operation at Low Santon on the 1<sup>st</sup> October 2005. Table 2.1 shows the number of exceedances of the daily limit value and the mean PM<sub>10</sub> concentration recorded between October and December of 2005, 2006 and 2007. The TEOM data is ratified from October 2005 to the end of June 2007. The data from July 2007 onwards is provisional but will be ratified in due course.

Table 2.2 shows the data capture, the highest daily mean concentrations recorded and the 90.4<sup>th</sup> percentiles for the site. The data capture takes account of all lost data, whether it was due to machine breakdowns, calibrations or any other issues. As required by the Regulations the mean concentrations have been calculated using the available daily mean concentrations. The 90.4<sup>th</sup> percentiles are included to enable a comparison with regards to the daily objective between the High Santon Partisol and Low Santon TEOM.

The raw TEOM results have been corrected using a factor of 1.3 and it is these adjusted results that are presented in this report. The issue of equivalence and the applicability of this factor are discussed in Part 2.5.

Year	Exceedances	Mean, ug m <sup>-3</sup>
Oct to Dec 2005	41	49.1
2006	158	58.9
2007	133	51.1

Table 2.1: The number of exceedances of the daily limit value and the mean PM<sub>10</sub> concentration recorded by the Low Santon TEOM between October 2005 and December 2007.

Year	Annual data capture, %	Period data capture, %	Highest daily mean concentration, ug m <sup>-3</sup>	90.4th percentile
Oct to Dec 2005	25.2	100	143	75.4
2006	96.7	n/a	279	118
2007	90.4	n/a	260	99.8

Table 2.2: The annual and period data capture, the highest daily mean PM<sub>10</sub> concentration and the 90.4<sup>th</sup> percentile for the Low Santon TEOM between October 2005 and December 2007.

### b.) High Santon Partisol.

The Partisol commenced operation at its High Santon location on the 5<sup>th</sup> January 2007. The results in this report cover the period from the 5<sup>th</sup> January 2007 to the 1<sup>st</sup> January 2008 (inclusive). Table 2.3 shows the number of exceedances, the annual mean concentration, data capture, 90.4<sup>th</sup> percentile and the highest daily mean concentration for the High Santon Partisol.

The annual mean concentration has been calculated using the available daily mean concentrations. The data capture takes account of any lost data, whether due to machine breakdowns, calibrations or any other issues.

No correction factor is required for Partisol results as it is deemed to be an equivalent method of PM<sub>10</sub> measurement, the data is also regarded as being ratified. Unfortunately there have been numerous technical problems with the Partisol since its relocation, thus reducing the data capture to 84.8%.

Annual mean, ug m <sup>-3</sup>	Data capture, %	Number of exceedances	90.4th percentile, ug m <sup>-3</sup>	Highest daily mean concentration, ug m <sup>-3</sup>
30.5	84.8	34	53.0	93

Table 2.3: The annual mean, data capture, number of exceedances, 90.4<sup>th</sup> percentile and highest daily mean concentration from the High Santon Partisol for the period 5<sup>th</sup> January 2007 to 1<sup>st</sup> January 2008 (inclusive).

At the time of writing all of the Santon TEOM data and Partisol data through to the 22<sup>nd</sup> October 2007 is available to view and download from the Council's dedicated air quality website, [www.nlincsair.info](http://www.nlincsair.info).

## Part 2.5: Discussion

### a.) Results.

#### - Annual Objective

It is clear that the annual PM<sub>10</sub> objective is being breached at the Low Santon TEOM site. The mean concentration during this period was greater than 40 µg m<sup>-3</sup>. The monitoring in subsequent years has shown that the annual mean objective was breached in 2006 and 2007 with concentrations of 58.9 and 51.1 µg m<sup>-3</sup> respectively.

The Council is satisfied that annual mean objective was not broken in 2007 at the High Santon Partisol, the concentrations being recorded are clearly lower than those at the Low Santon TEOM site.

With regards to the data capture of the High Santon Partisol, Part A1.93 of LAQM.TG(03) states that:

“A data capture of 90% for ratified (i.e. usable) data is recommended as a target for monitoring. For screening studies 75% data capture of ratified data is recommended provided the objectives of the survey are met.”

The data capture at the Low Santon TEOM has been greater than 90% throughout its operation. The data capture recorded at the High Santon Partisol was not above the recommended 90%, however, it was above 75%. It was considered inappropriate to attempt to estimate the Partisol concentrations for the days when the machine was not working because the difference between the TEOM and Partisol results varies significantly from day to day. See Helpdesk reply Appendix A3.

In addition, the objective under question is an annual objective rather than a 15-minute objective, usually the shorter the averaging period of the objective the more crucial it is that 90% data capture is achieved. There are no plans to move either the TEOM or Partisol from their current locations and thus monitoring results will remain under constant review.

#### - Daily Objective

The Low Santon TEOM has shown a clear breach of the daily objective. The site began operation in October of 2005 and in only 3 months of monitoring in 2005, the daily objective was breached with 41 exceedances, with monitoring in 2006 and 2007 continuing to show this breach.

If the data capture is below 90% then the 90.4<sup>th</sup> percentile is quoted to enable a comparison to the daily objective. In this case the 90.4<sup>th</sup> percentile for the High Santon Partisol was 53.0 µg m<sup>-3</sup>, this is greater than the daily limit value of 50 µg m<sup>-3</sup> and is thus considered a breach of the objective. In addition, with 34 exceedances being recorded it is quite likely that 2 more exceedances would have been recorded with a higher data capture. The Low Santon TEOM and High Santon Partisol are both within the current AQMA for a breach of the daily objective.

b.) Location.

There have been concerns raised about the location of the Low Santon TEOM site. A railway embankment surrounds the area around the Low Santon site and the lie of the land is slightly below that of the surrounding area, thus some have suggested the site is not suitable as a monitoring location. However, the Council considers that the Low Santon TEOM monitoring station sufficiently represents the three occupied dwellings that are close to the monitoring station for ambient air quality purposes. i.e. The station samples air that the occupiers of those houses are likely to be exposed to.

The monitoring site is in as much of an open situation as the local dwellings and immediately above the station is open sky. The site may not be suitable for an industrial emissions monitoring scheme but it is perfectly adequate for an ambient air quality monitoring programme.

In July 2007 the Council received a request from AEA Energy and Environment for permission to use the 2006 Low Santon TEOM data in a submission to the EU as part of Defra's reporting requirements. This exercise included assessing Santon's 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.

The Santon site ratings are detailed in Table 2.4.

Data capture	A+
Data quality issues	B
QA/QC	A
Site location	A

Table 2.4: The Low Santon site ratings as given by AEA.<sup>10</sup>

A full explanation of these ratings is shown in the Appendix, Table A1, but with regards to the site location and QA/QC, 'A' is equivalent to AURN standard.

c.) Equivalence.

The Partisol 2025 was shown to be equivalent to the reference method in the equivalence trials.<sup>11</sup> Therefore the monitoring results from High Santon can be compared directly with the air quality objectives.

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 widely used by Local Authorities in the UK, the Review and Assessment Helpdesk has issued a Frequently Asked Question that deals with the continued use of TEOMs, this is shown in Figure 2.4. The Helpdesks were also consulted, see Appendix A3.

“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 2.4: The Helpdesk FAQ relating to the use of the 1.3 correction factor for TEOMs.<sup>12</sup>

The 1.3 correction factor can continue to be used provided that the number of exceedances recorded is not ‘close to the objective’. It suggests that close to the objective is likely to be considered in the range of 30 to 40 days, although no guidance is given as to what would be regarded as being close to the objective for the annual mean.

Within this definition the results from the Low Santon TEOM are not close to the daily objective. The Council therefore considers that applying the 1.3 correction factor to the raw Low Santon TEOM results is currently justified, thus the results shown in this report can be compared to the air quality objectives. Although this FAQ relates to the daily objective, two correction factors cannot be applied to the same dataset for two different objectives, therefore the 1.3 correction factor is applicable to the annual mean as well.

In addition, the Council and LA Helpdesks (see Appendix A2) 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 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.

Some of the other monitoring sites in Scunthorpe are recording numbers of exceedances that could be considered ‘close to the daily objective’. This issue will be discussed in greater detail in the Progress Report 2008.

#### d.) Relevant Receptors.

The Council considers that the Low Santon TEOM and High Santon Partisol are in a suitable location with regards to relevant receptors for both the daily and annual PM<sub>10</sub> objectives. As shown in Figure 2.2 there are three dwellings in the immediate vicinity of the Low Santon TEOM monitoring station, these dwellings are occupied. The High Santon Partisol adequately represents the dwellings of High Santon Villas.

Box 1.4 of the Technical Guidance LAQM.TG(03) states that the annual objective should not generally apply to building façades of offices or other places of work where members of the public do not have regular access. The only business between the two monitoring stations where members of the public are likely to require regular access to is a café, but exposure time is likely to be short-term. This café is in the western end of the largest building shown in Figure 2.2. Although it could be considered to be a relevant receptor

for a short-term objective (i.e.15-minute or hourly), it is unlikely that this can be considered a relevant receptor for an annual objective. There are no other receptors on the northern side of the Low Santon TEOM site.

Given that there is a breach of the annual mean objective at the Low Santon monitoring station and relevant receptors, an AQMA is required in the Low Santon area.

### Chapter 3: Conclusions

In conclusion the monitoring results in the Santon area show that the annual mean PM<sub>10</sub> objective is being breached in the area around the Low Santon TEOM monitoring station, but not in the area around the High Santon Partisol. The Low Santon area contains receptors that are relevant to the annual mean objective and thus an AQMA is required.

There are no current plans to move either monitoring station in the Santon area, thus PM<sub>10</sub> results from the area will continue to be assessed as part of the Review and Assessment process.

## References

- 1.) Air Quality Archive,  
<http://www.airquality.co.uk>
- 2.) Air Quality Strategy 2007, Defra.
- 3.) Airborne Particles Expert Group, Source apportionment of airborne particulate matter in the UK, DETR, 1999.
- 4.) Dr J.Lightbody, Mr G.Hutchinson, Prof K.Donaldson, Dr V.Stone, The influence of particle composition and size on in-vitro and in-vivo biological methods, EPG1/3/147, June 2003.
- 5.) Expert Panel on Air Quality Standards (EPAQS), Airborne Particles, What is the appropriate measurement on which to base a standard? DETR, 2001.
- 6.) A report by the Committee on the Medical Effects of Air Pollutants Chairman: Professor JG Ayres, Cardiovascular Disease and Air Pollution, Feb 2006.
- 7.) WHO air quality guidelines global update 2005 Report on a Working Group meeting, Bonn, Germany, 18-20 October 2005.
- 8.) R.M.Harrison (editor), Pollution: causes, effects and control, RSc, 4<sup>th</sup> edition, 2001.
- 9.) Personal communication, Brian Donovan, AEA Energy and Environment.
- 10.) Personal communication, John Branson, AEA Energy and Environment.
- 11.) UK Equivalence Programme for Monitoring of Particulate Matter, produced by Bureau Veritas on behalf of Defra, June 2006.
- 12.) Review and Assessment Helpdesk,  
<http://www.uwe.ac.uk/aqm/review/mfaqpm.html#PM10>

All websites were accessible in January 2008.

## Appendix

### Suitability Assessment 2006

Criteria
<b>Data Capture</b> <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>
<b>Ratification Status</b> <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>
<b>Data Quality Issues</b> <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>
<b>Site Location</b> <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>

Table A1: Details of the grades given to Local Authority monitoring data. <sup>10</sup>

A2: Extract from LA Helpdesk reply, 2<sup>nd</sup> October 2007.

"In using a local daily correction factor it is still important to at least consider the geographical relationship between monitoring stations and the main sources with regard to wind direction. The most appropriate factor would be very different for sites downwind to those upwind of the sources."

A3: LA Helpdesk reply, 21<sup>st</sup> January 2008.

"From the data you have provided, I think that it is fairly clear that the Santon site is exceeding the annual objective -and the decision to extend the AQMA to include the annual average ensures that efforts to protect public health will be taken (the main concern would be if the 1.3 factor showed results just below the objective and no AQMA was declared). Could you clarify though that the figures you cite are already adjusted by 1.3?"

Regarding the second question, it may be worth comparing the datasets from the two sites to estimate whether the concentrations would be higher or lower than the average on the days when the partisol wasn't working. Let me know if you have any questions about how to do this. However, as there are clearly exceedences of the daily mean here then there needs to be an AQMA and action plan in force and so annual mean exceedences would not make a significant difference to proposed actions (particularly as the TEOM site in Q1 is showing annual mean exceedences)."

Any requests for information about Air Quality issues within North Lincolnshire, or requests to obtain a copy of this Report should be made to the:

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Environmental Health Division  
Church Square House  
PO Box 42  
Scunthorpe  
North Lincolnshire  
DN15 6XQ

Telephone: 01724 297318  
Fax: 01724 297898

Email: [environmental.health@northlincs.gov.uk](mailto:environmental.health@northlincs.gov.uk)

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**No English?**

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08000 193532 (Cantonese) 欲知粵語版的消息, 請致電: 08000 193532

08000 193533 (Hindi) हिन्दी में जानकारी के लिये 08000 193533 पर फोन करें

08000 193537 (Kurdish Sorani) بۆ زانیاری به کوردی سۆرانی تەلەفۆن بۆ ژماره 08000 193537

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08000 195587 (Polish) Nie mówisz po angielsku? Po informacji zadzwoń pod numer 08000 195587

08000 195586 (Russian) Не знаете английский? Для информации звоните 08000 195586

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**Draft, February 2008**