PETERBOROUGH CITY COUNCIL

Detailed Assessment for Sulphur Dioxide

September 2006

Growing the right way for
a bigger, better Peterborough

Executive Summary

Local authorities have a statutory duty to assess certain air pollutants within their administrative area. Local Air Quality Management is the name given to work undertaken by local authorities on air quality. The Local Air Quality Management regime works in a staged approach with review and assessments undertaken every three years with progress reports in the in-between years. If at any time the local authority has sufficient information to expect an air quality objective breach they should move to produce a Detailed Assessment to assess the extent and source of the pollutant exceedence. Once this has been achieved an Air Quality Management Area should be declared covering relevant receptors.

In 2004 information supplied by Fenland District Council and the Environment Agency suggested that an industrial premise may be the cause of a breach of the 15 minute mean sulphur dioxide objective.

After discussions with the operator, regulator and the various local authorities which might be affected, it was decided to wait until sufficient information was obtained from real time emission capture and out of site monitoring stations before an Air Quality Management Area was declared.

In September 2006 Fenland District Council had collected sufficient information and declared an Air Quality Management Area within its borders. Following consideration of the information supplied by Fenland District Council, Peterborough City Council has determined an area that has been assessed as exceeding the air quality objectives in relevant locations within Peterborough.

Contents

Introduction

Under the Environment Act 1995 the Government was required to produce an air quality strategy to map out the future of ambient air quality policy in the United Kingdom. Following a period of consultation in 1996 the first strategy, *The United Kingdom National Air Quality Strategy* was published in March 1997 (given statutory force by the *Air Quality Regulations 1997*). The main objective of the strategy is to provide the best practicable protection to human health by setting health-based objectives for eight main air pollutants. The pollutants covered by the strategy are listed below.

- Benzene
- 1,3-butadiene
- Carbon monoxide (CO)
- Lead
- Nitrogen dioxide (NO_2)
- Ozone
- Particles (PM_{10})
- Sulphur dioxide (SO_2)

A revised version of this strategy was published in January 2000 - *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air* (given statutory force by the *Air Quality (England) Regulations 2000.*). The strategy has been revised to include changes in objectives with the last revision being consulted in the summer of 2006.

Local Air Quality Management

Local Air Quality Management (LAQM) which came into effect in December 1997 in England, Scotland and Wales requires local authorities to periodically review and assess the current and future quality of air in their areas. The aim of the review is to assess whether air quality standards and objectives are being achieved, or are likely to be achieved, as measured against the National Air Quality Strategy.

Any part of a local authority where standards or objectives are not being met, or are unlikely to be met must be designated an 'air quality management area' (AQMA). Where an AQMA is designated the local authority must draw up an action plan setting out how it aims to meet air quality standards in that area.

Under local air quality management (LAQM), local authorities must work towards achieving the objectives for seven of the pollutants: see appendix 1. Ozone levels are affected by pollutants produced outside the UK and are therefore not assessed by local authorities as part of the air quality review and assessment process.

The Review and Assessment process

The first round of reviews and assessments were to be completed by all local authorities by June 2000 with AQMAs designated where applicable by October 2000. Four guidance notes were issued to local authorities by the Department of the Environment Transport and the Regions (DETR) to assist them in undertaking the first round of review and assessment.

The first air quality review and assessment in Peterborough was carried out by Peterborough City Council in 1998. Results showed the air quality objectives were

likely to be achieved by the relevant deadline in all areas of the local authority. As a result no Air Quality Management Areas were required in Peterborough.

In order to keep air quality in the forefront of local authorities thinking, a new timetable for review and assessment of air quality was issued in February 2003 by the Department for Environment Food and Rural Affairs (DEFRA) called 'Local Air Quality Management Technical Guidance' (LAQM. TG(03)). The LAQM. TG(03) required local authorities to carry out an Updating Screening and Assessments (USA) of air quality in their area every three years starting in 2003 with a progress report in the intervening years. If screening shows any potential exceedences, a detailed assessment is to be produced which will go into detail the extent of the exceedence and its source. Once the detailed assessment is completed an Air Quality Management Area (AQMA) will be declared for any relevant receptors within the area of exceedence, and an action plan drawn up to control the levels of pollution.

The second air quality review and assessment was published in 2003. Results showed the air quality objectives were likely to be achieved by the relevant deadline in all areas of the local authority. As a result no Air Quality Management Areas were required in Peterborough.

The third air quality review and assessment was undertaken in 2006. Results showed the air quality objectives were likely to be achieved by the relevant deadline in most of the local authority. The only area which showed that an objective was unlikely to be achieved was in respect of sulphur dioxide.

The Local Air Quality Management technical guidance note LAQM. TG(03) states that "Where the Updating and Screening Assessment has identified a risk that an air quality objective will be exceeded at a location with relevant public exposure, the authority will be required to undertake a Detailed Assessment. The aim of this Detailed Assessment should be to identify with reasonable certainty whether or not a likely exceedence will occur."

Sulphur dioxide

Sources

The main source of emissions of sulphur dioxide in the United Kingdom is from the power station sector. In 2000 it was estimated that power stations accounted for 71% of total releases, with emissions from transport being relatively unimportant, less than 1%, although the contribution of diesel fuel can make a significant contribution to background levels in urban areas. Other significant sources of sulphur dioxide came from the industrial sector including refineries or other industries which use fuels with a high sulphur content. Domestic sources only accounted for approximately 4% of emissions (DEFRA 2003).

Local Sources

Four installations have been identified in the last review and assessment as likely to release emissions which may cause an exceedence of an air quality objective in relation to sulphur dioxide. These sites are Centrica PB Ltd (gas power station), National Grid Plc (Gas compressor station), Hanson Building Products Ltd (brick manufacture) and Castle Cement Ltd (Cement manufacture). Centrica PB Ltd and National Grid Plc are both located within Peterborough City Council's borders while

Hanson Building Products Ltd is located in Fenland District Council and Castle Cement Ltd is located in Rutland District Council.

The 2006 Updating and Screening Assessment concluded that emissions from the Centrica PB Ltd, National Grid Plc and Castle Cement Ltd will not result in any exceedences of the objectives, while emissions of sulphur dioxide from the Hanson Building Products Ltd may result in an exceedence of the 15 minute mean objective of 266 µg/m^3 not to be exceeded more than 35 times a year.

Hanson Building Products Ltd

Location

Hanson Building Products Ltd installation is located on the outskirts of a small town called Whittlesey within the borders of Fenland District Council, which lies southeast of Peterborough: see appendix 2. The installation's primary business is the manufacture of bricks known as Fletton bricks.

The brick-making process

The brickworks at Whittlesey manufactures Fletton bricks by firing Lower Oxford Clay in Hoffmann kilns. The installation consists of two works, each situated at the bottom of a quarry: Saxon works with two kilns, S1 and S2; and King's Dyke with four kilns, KD1, KD2, KD3 and KD4. Each kiln consists of 34 interconnected firing chambers. Around 500,000m^3 of clay are processed per year to manufacture up to 390 million bricks.

The Lower Oxford Clay that is fired to make the Fletton bricks has unique qualities that are exploited in the process. The clay has a high carbon content that provides most of the energy for firing the bricks. The gases from the firing process are collected and dispersed through stacks up to 120 metres high, which are the main release points from the installation.

The clay arrives by conveyor from a local quarry, which is not part of the installation. It is milled, screened and pressed into 'green' (unfired) bricks. The green bricks can be textured or coated before firing. The green bricks are placed and sealed inside a kiln chamber ready for firing. Cementitious material is mixed at Pug plants at both works, which is used to seal the ends of the kiln chambers. A different process, extrusion, is also operated at King's Dyke to prepare the green bricks. Additives are used in the preparation of these extruded bricks to give the required body structure for successful firing. These additives include wood chips, pulverised fuel ash, and blast furnace slag. The green bricks can be pre-dried to around 8% moisture content in gas fired drying sheds before being sealed in the kiln chamber. Green bricks prepared at one works can be fired at the other works.

The kiln chambers are connected in such a way that the flow of the gases can be manipulated to optimise the use of energy, with the gas flow being governed by a natural draught process. The firing zone moves progressively from chamber to chamber as the bricks are dried, fired and cooled in position. The temperature throughout the firing process is continuously monitored. Natural gas is used to assist the firing at certain stages of the process. The process operates continuously with the firing zones moving around the kiln, and the chambers emptied and refilled after the firing zone has passed through the chamber. The kilns can operate continuously for many years before shut down. A kiln refurbishment programme is currently being

carried out at the installation.

The majority of the releases to air from the process are liberated during the firing stage and dispersed through the tall chimneys. The most environmentally significant emission is sulphur dioxide, which is released from the firing of the naturally occurring components of the raw clay material. There are also emissions of nitrogen oxides, particulates, fluorides, chlorides, volatile organic compounds and carbon monoxide, although these other emissions are not considered to cause a significant environmental impact. A Continuous Emission Monitoring System for sulphur dioxide and particulates has been fitted to one stack, with a programme for installation on all the other stacks. This will enable further refinement of process parameters to manage and minimise the effects of the emissions.

Regulatory and emissions history

The installation was regulated by the Environment Agency under the Integrated Pollution Prevention and Control regulations. During these years the Environment Agency reported that the emissions from the installation were not sufficient to cause an exceedence in any of the air quality objectives.

Due to changes in legislation Hanson Building Products Ltd applied for a Pollution Prevention and Control Permit in 2004. Part of the permit application included a section on emissions to atmosphere including sulphur dioxide. The section on emissions concluded that there would be a small area which would exceed the 15 minute mean sulphur dioxide air quality objective. During this period the Environment Agency undertook some modelling which predicted that there would also be a significantly larger area of exceedence which included areas in Fenland, Peterborough and Huntingdon District Council. See appendix 3 for the different model results. Neither models had been validated and as the Environment Agency used the worst case scenario the results for both models varied considerably.

The permit was granted in December 2004 and included an improvement programme detailing specific works including installation of continuous monitoring systems on the stacks and installation of an air quality monitoring station.

Fenland District Council

As the Hanson Building Products Ltd installation is in Fenland District Council's area it is their responsibility to undertake the initial assessment. Discussions were taken with the relevant local authorities, the Environment Agency and Hanson Building Products Ltd, and the Air Quality Management Resource Centre was consulted over the best approach.

It was decided that due to the uncertainty of the two models, and as the operator was implementing real time monitoring and was looking at locations to install an air quality monitoring station that until this information is available to validate the models it is impossible to provide an accurate map for any AQMA.

In February 2006 Fenland District Council released their draft Detailed Assessment for consultation: see appendix 4, which was ratified once the Air Quality Management Area was declared. The Detailed Assessment used the monitoring data obtained from the operator and produced a more accurate map of the potential area of exceedence see Appendix 5. This area of exceedence included a small area within Peterborough City Council's borders. The Detailed Assessment was ratified by

DEFRA and an Air Quality Management Area was declared in Fenland on 1 September 2006: see appendix 6.

Peterborough City Council

In the first two rounds of review and assessment Peterborough City Council concluded that there were no areas in Peterborough which were likely to exceed an air quality objective by the target date. In 2004 new information was released that an installation may cause an exceedence of an air quality objective.

As the installation which is responsible for the exceedence is located within the borders of Fenland District Council they are the lead authority in the investigation. During the initial discussions it was decided the most suitable course of action was to wait for sufficient monitoring data to be able to populate the model to produce an accurate area of exceedence: see appendix 5. Peterborough City Council, therefore, waited for Fenland District Council to complete its Detailed Assessment before deciding on its Air Quality Management Area.

Proposed Air Quality Management Area

In August 2006 Fenland District Council was satisfied that it had sufficient information to be able to declare an Air Quality Management Area (AQMA) on 1st September 2006: see appendix 6. This AQMA was in relation to emissions of sulphur dioxide from a point source industrial premise exceeding the 15 minute mean objective level of 266 $\mu g/m^3$ not to be exceeded more than 35 times a year. Fenland District Council only declared for the relevant locations within their own borders.

Using information from Fenland District Council's Detailed Assessment a potential Air Quality Management Area has been proposed in the Peterborough City Council authority area: see appendix 7. The area was decided by identifying all the relevant locations within area of exceedence. A relevant location being somewhere where a member of the public might reasonably spend 15 minutes out of doors.

Conclusion

The aim of a Detailed Assessment is to "identify with reasonable certainty whether or not a likely exceedence will occur." LAQM. TG(03). Peterborough City Council has assessed the work undertaken by Fenland District Council on the initial models submitted as part of the operators Pollution Prevention and Control permit application and their subsequent works with the monitoring data.

Peterborough City Council is prepared to accept the work undertaken by Fenland District Council as sufficient to be able to reasonably identify areas within Peterborough as likely to exceed an air quality objective in a relevant location.

Peterborough City Council intends to declare one air quality management area for all the relevant locations.

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