

Suffolk Coastal District Council

Monitoring of PM₁₀ at Sinks Pit, Kesgrave

Monitoring results report

October 2001

Entec UK Limited

Report for

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BAM monitoring report V3

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Executive Summary

Particulate matter (PM₁₀) levels were monitored in a location adjacent to Sinks Pit industrial site, Kesgrave, Suffolk, as part of the on-going stage 3 review and assessment of local air quality.

The monitoring of PM₁₀ indicates that it is unlikely that there is a significant risk of the air quality objectives for PM₁₀ not being achieved in this area by 2004.

The three days on which levels of PM₁₀ exceeded the 50 µg/m³ 24 hour limit value, correspond to days where regionally increased levels of PM₁₀ were observed. Extrapolation of this number of days when the 24 hour mean standards for PM₁₀ was exceeded, to the period of a year, predicts that 21 days would be in excess of 50 µg/m³, which is within the allowable number of 35 days where the standard can be exceeded per year.

Contents

1.	Background	1
1.1	Introduction	1
1.2	Location Description	1
1.2.1	Site description	1
1.2.2	Surrounding area	2
1.2.3	Background air pollution	2
1.2.4	Monitoring period	2
1.3	Assessment Criteria	2
1.4	Legislation	2
1.5	Monitoring protocol	3
2.	Results	4
3.	Conclusion	6
Table 1.1	Statutory air quality standards for PM ₁₀	3
Table 2.1	Statistical summary of PM ₁₀ monitoring data	4
Appendix A	Ratified Monitoring Results	
Appendix B	Graph of PM ₁₀ levels monitored at Kesgrave	

1. Background

1.1 Introduction

As part of the UK Air Quality Strategy stage 3 review and assessment, Suffolk Coastal District Council (SCDC) commissioned Entec UK to undertake monitoring of particulate matter (PM₁₀) at a location adjacent to the industrial site at Sinks Pit in Kesgrave.

Monitoring of levels of PM₁₀ at the Sinks Pit site was carried out as a result of a history of nuisance complaints, emanating from activities at the Sinks Pit site, from local residents. The predicted PM₁₀ levels in the area are <25 µg/m³ for 2004, and given that the nearest sensitive receptors are 245 m distant it is unlikely that emissions from the Sinks Pit will be significant.

The monitoring programme was initiated based upon the findings of the interim stage 2 and 3 air quality review and assessment¹, and is additional to the stage 3 air quality review and assessment from road traffic sources².

1.2 Location Description

1.2.1 Site description

As outlined in the Stage 2 review and assessment¹ interim report, a number of activities are undertaken at the Sinks Pit site which may result in fugitive PM₁₀ emissions. These activities, which are currently being wound down include: stockpiling; quarrying; crushing and a roadstone coating plant.

The chosen location for the PM₁₀ monitor was representative of the potentially sensitive receptor locations identified during the interim stage 2 and 3 air quality review and assessment.

The PM₁₀ monitor is located in the rear garden of a residential property, Jordans in Kesgrave. The property is one of a row of houses located along the north boundary of the Sinks Pit site. These properties are the closest potentially sensitive receptors to the quarrying operations, the nearest being 245 m from the emissions sources.

The monitor is situated approximately 10m from a single storey residential property. The garden is a large area with substantial vegetation, including several large trees, shrubs and grasses. The presence of vegetation is likely to provide some screening on any fugitive particulate emissions from Sinks Pit. However, the level of vegetation at Jordans is representative of the area as a whole. The seeding and pollination of nearby vegetation during the summer monitoring period would be expected to increase the monitored levels of particulate matter, including PM₁₀.

¹ Suffolk Coastal District Council: Report: Interim stage 2 and 3 air quality review and assessment (June 2001) Entec UK Limited

² Suffolk Coastal District Council: Local Air Quality Management: Stage 3 local air quality review and assessment- road traffic sources (June 2001) Entec UK Limited

1.2.2 Surrounding area

The monitoring location is in a semi-rural area, approximately 3 miles from central Ipswich. Approximately 250m to the south is the nearest working area on the Sinks Pit site. The A1214, a main route out of east Ipswich, is situated approximately 500m to the south. The east and west of the site are similar detached properties, with substantial quantities of vegetation. To the north of the site is primarily arable land traversed by a small single track road.

1.2.3 Background air pollution

The predicted levels of background PM₁₀ in the Kesgrave area are approximately 23 µg/m³, for 2004³.

1.2.4 Monitoring period

The monitoring period of June-September was selected because PM₁₀ emissions originating from activities at the Sinks Pit site would be at a peak during this period. The prevailing meteorological conditions would be predominately dry and warm, with very little precipitation to damp down particulate emissions.

1.3 Assessment Criteria

From the perspective of air quality, quarrying activities are primarily associated with increases in levels of particulate matter both as dust and as PM₁₀. PM₁₀ is defined as particulate matter collected when a sample of air is passed through a 10 µm particle sampling head with a collection efficiency of 50%. This rather cumbersome definition reflects the workings of the monitoring equipment and the fact that particles of ≤10µm in diameter are associated with negative health effects. Dust is defined as particulate matter in the size range 1-75 µm, and is associated with nuisance from soiling, rather than negative health effects.

For the purposes of the UK Air Quality Strategy the levels of PM₁₀ at sensitive receptors must be assessed. Any effects of dust deposition are regulated under the Environmental Protection Act 1990 and are not assessed in this report.

1.4 Legislation

The Air Quality Limit Values Regulations 2001 set out statutory requirement for levels of eight pollutants, including ambient PM₁₀ to not exceed specified values at sensitive receptors. Table 1.4.1 illustrates the two standards applicable to ambient PM₁₀.

³ <http://netcen.aeat.co.uk/cgi-bin/concmaps1.pl>

Table 1.4.1 Statutory air quality standards for PM₁₀

PM₁₀ level	Averaging period	Date to be achieved
40 µg/m ³	Annual mean	31 st December 2004
50 µg/m ³	24 hour mean not to be exceeded more than 35 times per annum	31 st December 2004

The sensitive receptor is defined as any non-occupational location where individuals may reasonably be expected to be present for the duration of the averaging period. In this instance the primary sensitive receptors are nearby residential locations.

1.5 Monitoring protocol

The monitoring of PM₁₀ levels was undertaken using a BAM-1020 (Beta Attenuation Monitor). The BAM is accredited by the USEPA and for use in the UK Automatic Urban Network (AUN).

The BAM samples by drawing ambient air through the PM₁₀ sample head onto a tape running beneath the sample port. The tape is advanced once an hour, from which a reading of ambient PM₁₀ is made by beta attenuation.

Measurements of hourly ambient PM₁₀ were begun on the 20th June 2001 and concluded on the 19th September 2001.

Site servicing visits were carried out throughout the monitoring period for each three week monitoring period. The site visits were undertaken to carry out visual and logistical instrument checks, downloading of all collected data, and to carry out routine maintenance such as cleaning the sample inlet head.

2. Results

Table 2.1.1 illustrates the statistical summary of the monitoring data. A complete table of monitoring results is contained in appendix A.

Table 2.1.1 Statistical summary of PM₁₀ monitoring data

Monitoring period	20/06/01 to 26/08/01	
Total Number of monitoring days		
Number of valid days (as percent in brackets)	49 (69%)	
Maximum PM ₁₀ µg/m ³	Hourly	124.0
	Daily	59.7
Minimum PM ₁₀ µg/m ³	Hourly	1.0
	Daily	11.8
Daily average PM ₁₀ µg/m ³	26.8	
Number of days >50 µg/m ³ during monitoring period	3.0	
Average PM ₁₀ levels for duration of monitoring period µg/m ³	26.8	

Notes

1: Data capture was limited by equipment failure 26-06-01 to 10-07-01.

Appendix B illustrates the trend in PM₁₀ levels during the monitoring period.

The PM₁₀ levels monitored at the site, ranged from a minimum recorded concentration of 11.8 to a maximum concentration of 59.7 µg/m³, for 24-hour mean concentration values, with three days exceeding the 24-hour mean standard. The three days on which the 24-hour mean standard was exceeded were during a regional increase in PM₁₀ levels⁴, and therefore cannot be attributed solely to activities at Sinks Pit.

The average for the period was 26.8 µg/m³. This compares to a predicted annual mean background concentration of PM₁₀ of 23 µg/m³, in 2004. The current average monitored PM₁₀ level is 54% of the annual mean standard, indicating that the standard is not at risk of being exceeded.

⁴ Based on data from the AURN site in Norwich

source: http://www.aeat.co.uk/netcen/aqarchive/data/autodata/2001/nor2_pm1.htm

During the three month monitoring period, data collection was interrupted by equipment failure between the 26-06-01 and the 10-07-01. The cause of the equipment failure was a tape break in the BAM unit, the problem was corrected during the next site servicing visit but the data collection time had been lost. The instrument failure is, unfortunately, a game of chance.

However, the data collected indicates that PM₁₀ levels are not likely to exceed the relevant air quality standards.

3. Conclusion

The background levels of PM₁₀ at Kesgrave are predicted to be approximately 23 µg/m³, in 2004 and since the nearest sensitive receptors are 245 m from the closest working area at Sinks Pit, the levels of PM₁₀ generated from the site would have to be very considerable in order that the PM₁₀ standard was at risk of being exceeded. The pollutant specific guidance⁵ states that for the review of PM₁₀, properties within 200-400 m of dust sources, where background concentrations of PM₁₀ are predicted to be < 25 µg/m³, there is no need to take investigation to further stages. The monitoring at Kesgrave was carried out as a precautionary approach for the review and assessment of PM₁₀ in the area, in view of the record of environmental nuisance complaints received from local residents regarding activities at the Sinks Pit site.

The annual mean level, based on the monitoring undertaken would be in the region of 26.8 µg/m³. Based on the pollutant specific guidance⁵ this value is predicted to decrease further before 2004.

The monitoring undertaken within the vicinity of the Sinks Pit site was conducted at the period of the year when the highest emissions of dust and PM₁₀ would be expected. That is warm dry periods when natural dust suppression by precipitation would be minimised⁶. During the remainder of the year emissions from the Sinks Pit site would be expected to be lower than those identified during the monitoring period. The likelihood is that the emissions of PM₁₀ would not occur at sufficient levels to lead to either PM₁₀ standard being exceeded.

The three days on which levels of PM₁₀ exceeded 50 µg/m³ correspond to days where regionally increased levels of PM₁₀ were observed⁷. However the regional levels were lower than those observed here. Extrapolation of this number of days when the 24 hour mean standards for PM₁₀ was exceeded, to the period of a year, predicts that 21 days would be in excess of 50 µg/m³, which is within the allowable number of 35 days where the standard is exceeded per year.

The results available from the data capture over the three month monitoring period were referred to the DEFRA Review & Assessment Helpline to find out if the results would be accepted even though a full three months was not collected. Discussion entered with the Helpline⁸ concluded that the monitoring program was initially set-up as a confidence check to the review and assessment process, therefore confidence in the data that was collected being significantly lower than the PM₁₀ air quality objective level was accepted. To repeat the monitoring would be costly and time consuming and following the logic of the previous review

⁵ Local Air Quality Management. Review and Assessment: Pollutant Specific Guidance. LAQM.TG4(00) May 2000. DETR

⁶ The Environmental Effects of Dust from Surface Mineral Workings (1996) HMSO London

⁷ Based upon data from the AURN site in Norwich

source: http://www.aeat.co.uk/netcen/aqarchive/data/autodata/2001/nor2_pm1.htm

⁸ Reference to e-mail confirming discussion between Entec and UWE (Aqm-Review@uwe.ac.uk)

and assessment report could only viably be carried out during the next set of dry summer months (summer 2002).

Based upon the data collected during the period of the year when particle emissions from processing activities are expected to be elevated, due to the dry summer period, the monitoring data indicates that it is unlikely that the PM₁₀ objective levels will be exceeded in the vicinity of the Sinks Pit site. Activities at the Sinks Pit site are being reduced and the likelihood is that there is no significant risk of the air quality objective for PM₁₀ not being achieved in this area, by 2004.

Appendix A

Ratified Monitoring Results

1 Page

Date	$\mu\text{g}/\text{m}^3$	Date	$\mu\text{g}/\text{m}^3$	Date	$\mu\text{g}/\text{m}^3$
20/06/01	23.4	14/07/01	13.0	07/08/01	25.4
21/06/01	17.4	15/07/01	15.9	08/08/01	16.9
22/06/01	14.1	16/07/01	17.0	09/08/01	15.3
23/06/01	11.8	17/07/01	37.5	10/08/01	27.5
24/06/01	25.9	18/07/01	18.1	11/08/01	21.3
25/06/01	40.3	19/07/01	20.8	12/08/01	21.2
26/06/01	n/d	20/07/01	17.1	13/08/01	35.5
27/06/01	n/d	21/07/01	13.8	14/08/01	46.4
28/06/01	n/d	22/07/01	22.2	15/08/01	54.3
29/06/01	n/d	23/07/01	30.3	16/08/01	22.6
30/06/01	n/d	24/07/01	25.4	17/08/01	18.0
01/07/01	n/d	25/07/01	27.1	18/08/01	59.7
02/07/01	n/d	26/07/01	36.3	19/08/01	31.3
03/07/01	n/d	27/07/01	39.7	20/08/01	21.7
04/07/01	n/d	28/07/01	43.5	21/08/01	31.2
05/07/01	n/d	29/07/01	43.4	22/08/01	32.8
06/07/01	n/d	30/07/01	39.5	23/08/01	n/d
07/07/01	n/d	31/07/01	30.9	24/08/01	n/d
08/07/01	n/d	01/08/01	17.5	25/08/01	n/d
09/07/01	n/d	02/08/01	50.0	26/08/01	n/d
10/07/01	n/d	03/08/01	47.8	27/08/01	n/d
11/07/01	16.9	04/08/01	12.5	28/08/01	n/d
12/07/01	12.5	05/08/01	18.8	29/08/01	n/d
13/07/01	12.5	06/08/01	20.0		

Appendix B

Graph of PM₁₀ Levels Monitored at Kesgrave

1 Page

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