



ENVIRONMENTAL AND CONSUMER PROTECTION

LOCAL AIR QUALITY MANAGEMENT

DETAILED ASSESSMENT 2007

ADDITIONAL MONITORING DATA



ANGUS COUNCIL

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DETAILED ASSESSMENT 2007

ADDITIONAL MONITORING DATAPLAN

Signature: _____ Date: _____

Iain Webster
Acting Head of Environmental and Consumer Protection
County Buildings
Market Street
FORFAR
DD8 3WE

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1. EXECUTIVE SUMMARY

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This report has been produced as the second part of a Detailed Assessment of Particulates~~Particulars~~ in Forfar requested by the Scottish Executive, following their evaluation of Angus Council's Updating and Screening Assessment 2006.

The first part was produced in October 2007 and assessed the emission sources and atmospheric concentrations of PM₁₀ in Forfar. It also included an emissions inventory.

This second part assesses 12 months of gravimetric sampling for particulates~~particulars~~ and compares results between the Partisol Plus 2025 and a Series 8500 FDMS, (recently obtained by Angus Council using Capital Grant funds) over a 3 month period.

The assessment confirmed an Annual Mean of 16.9µg/m³ and therefore below the 2010 National Objective. It revealed that there were 19 exceedances of the 24 hour mean objective of 50µg/m³ which meets the current requirements but not the 2010 Objective. These exceedances occurred during 2 periods and have not been repeated since.

It has not been possible to explain these 19 exceedances but construction/demolition activities are suspected. Delays in setting up a web logger facility prevented real time investigation of these exceedances but the web logger is now in operation and any future exceedances will, indeed, be investigated. There have been no similar exceedances so far in 2008.

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2. INTRODUCTION

2.1 Assessment Criteria

The NAQS details assessment criteria for eight pollutants in the form of atmospheric concentration levels for which an objective deadline is set. The NAQS objectives for PM₁₀ applicable in this assessment are presented in Table 1.

Table 1: Particulate objectives outlined in the NAQS and Air Quality Regulations

Pollutant Particles (PM10)	Air Quality Objective		To Be Achieved By
	Concentration	Measured As	
All authorities	50 µg m ⁻³ , not to be exceeded more than 35 times a year.	24-hour mean	31 December 2004
	40 µg m ⁻³	Annual mean	31 December 2004
Scotland only	50 µg m ⁻³ , not to be exceeded more than 7 times a year.	24-hour mean	31 December 2010
	18 µg m ⁻³	Annual mean	31 December 2010

3. RESULTS OF MONITORING

3.1 Location of Monitoring Site

Appendix 1 identifies the location of the monitoring site in relation adjacent streets and buildings. It should be noted that both monitors are immediately adjacent a bus stop.

3.2 Annual Mean

To date we have been unable to obtain an unbroken calendar year's worth of monitoring. Breaks in the measurement period have been caused by operational errors during the filter cartridge changeover process (6/2/07 - 19/2/07 and 27/6/07 - 11/7/07) and equipment malfunction (11/10/07 - 11/12/07). In light of this an annual mean has been calculated from monitoring results within the period between 12/9/07 and 10/10/07 (inclusive). The results are given in Table 2 below.

3.3 24-hour Mean

The same monitoring data used to calculate an annual mean has also been used to assess compliance with the 24-hour mean air quality objective. The results are given in the Table 2 below.

Table 2: Assessment of measured PM₁₀ levels against air quality objectives

Monitoring Period 12/9/06 – 10/10/07 (365 24-hour means obtained)	
Annual Mean	16.9 $\mu\text{g m}^{-3}$
No of 24-hour means exceeding 50 $\mu\text{g m}^{-3}$	19

4. DISCUSSION

The above monitoring results show that the air sampled meets current Air Quality Objectives in respect of both Annual Mean and 24-hour Mean. The number of exceedances of the 24-hour mean would not however meet the standard to be achieved by the end of 2010.

However, a breakdown of these exceedances of the 24-hour mean objective reveals that the majority occurred within 2 periods; 12 within a 14 day period (20/2/07 - 5/3/07 inclusive) and 5 within a 6 day period (25/3/07 - 30/3/07 inclusive). Throughout the sampling period various construction/demolition processes have been undertaken within close proximity to the monitoring site. The location and details of such work is shown in Appendix 1. Efforts to establish possible causes of elevated levels during the assessment period have largely proved unsuccessful, mainly due to the time delay between the air being sampled by the Partisol and the results being obtained from the Analyst. This meant that it was virtually impossible to ascertain the likely source(s).

This has been recognised as being unsatisfactory and Angus Council therefore invested in a FDMS TEOM in July 2007 to enable real time access to results which should assist identification of the possible sources of elevated particulate levels more rapidly and efficiently. Unfortunately, IT problems meant that although the web logger was installed at the same time as the FDMS, we were unable to access the information directly until March 2008. Nevertheless, the equipment supplier undertook to immediately advise us of any daily exceedances. We received no such contact during this period.

It should be noted that in the corresponding periods this year (20/2/08 - 5/3/08 and 25/3/08 - 30/3/08), there has been no exceedances of the 24-hour mean objective. Details of results obtained from monitoring since October 2007 will be included in the 2008 Progress Report but we are able to confirm that there have been no exceedances to date in 2008.

5. COMPARISON OF LEVELS OBTAINED USING GRAVIMETRIC AND TEOM/FDMS METHODS

5.1 Background

Angus Council has operated a Partisol-Plus 2025 Particulate monitor at a site in Forfar (shown in Appendix 1) since 2005. In July 2007 a Series 8500 FDMS monitor was also set up in the site and the following part of this report looks at the relationships occurring between the two sets of results obtained between the 12th of July and the 10th of October 2007 (Table 3).

Table 3: Assessment of measured PM₁₀ levels against 24-hour mean air quality objective

Date	Partisol-Plus 2025 ug / m ³	Series 8500 FDMS ug / m ³
12/07/07	11.0	11.98
13/07/07	11.0	11.43
14/07/07	7.7	5.61
15/07/07	9.8	9.02
16/07/07	12.3	11.69
17/07/07	9.0	12.28
18/07/07	12.7	11.88
19/07/07	13.5	11.04
20/07/07	10.2	9.51
21/07/07	6.0	7.96
22/07/07	4.8	6.19
23/07/07	14.0	13.14
24/07/07	12.1	12.60
25/07/07	11.7	11.91
26/07/07	8.8	10.55
27/07/07	7.1	8.56
28/07/07	3.8	5.97
29/07/07	6.3	7.09
30/07/07	5.8	10.44
31/07/07	8.3	9.56
01/08/07	6.3	8.77
02/08/07	7.1	8.50
03/08/07	9.6	12.15
04/08/07	10.0	12.58
05/08/07	5.8	7.24
06/08/07	6.7	8.16
07/08/07	7.7	7.69
08/08/07	11.9	11.43
09/08/07	17.7	14.55
10/08/07	50.2	16.53
11/08/07	12.3	12.04
12/08/07	6.9	8.37
13/08/07	14.8	10.44
14/08/07	14.4	12.65
15/08/07	10.6	8.25
16/08/07	7.3	6.13
17/08/07	12.7	13.20
18/08/07	11.9	12.99
19/08/07	6.5	3.59

20/08/07	9.0	7.35
21/08/07	12.5	12.08
21/08/07	12.5	12.08
22/08/07	20.2	18.51
23/08/07	14.0	17.94
24/08/07	16.5	13.74
25/08/07	9.4	7.12
26/08/07	10.6	8.36
27/08/07	12.3	10.51
28/08/07	15.2	12.29
29/08/07	14.8	10.48
30/08/07	9.0	7.58
31/08/07	8.5	6.07
01/09/07	11.0	7.15
02/09/07	6.0	7.19
03/09/07	11.9	9.64
04/09/07	15.0	11.50
05/09/07	10.8	7.44
06/09/07	30.0	7.84
07/09/07	7.5	8.51
08/09/07	10.4	9.42
09/09/07	7.9	6.52
10/09/07	14.6	12.20
11/09/07	15.0	14.31
12/09/07	22.5	20.21
13/09/07	20.0	20.28
14/09/07	13.8	10.79
15/09/07	13.8	12.32
16/09/07	6.3	4.78
17/09/07	5.4	6.68
18/09/07	10.0	8.75
19/09/07	12.7	15.71
20/09/07	11.5	11.69
21/09/07	16.9	13.39
22/09/07	11.5	10.62
23/09/07	18.1	13.12
24/09/07	10.2	9.42
25/09/07	13.1	8.45
26/09/07	15.6	10.45
27/09/07	13.1	13.28
28/09/07	16.9	14.52
29/09/07	16.5	14.17
30/09/07	11.9	14.82
01/10/07	16.9	19.37
02/10/07	21.9	21.43
03/10/07	28.3	29.20
04/10/07	11.3	10.66
05/10/07	13.3	15.54
06/10/07	18.3	19.35
07/10/07	10.4	10.71
08/10/07	12.9	12.66
09/10/07	17.9	20.88
10/10/07	23.3	23.17
Average 24-hour concⁿ	12.56	11.63
Number of exceedances of 24-hour mean AQO	1	0

5.2 Data Analysis

The data set obtained from the FDMS monitor was plotted against the set from its gravimetric counterpart with a slope of 0.7706 (e.g. Gravimetric Data x 0.7706 = FDMS Data). This is shown in Appendix 2, Table A. It can be seen within this plot that the data from two days (10th August and the 6th September) appear to have little agreement with the rest of the data. Enquiries have shown no elevated levels were obtained from other sites in Scotland on the days in question and it is therefore assumed that the Partisol reading obtained on both occasions are false, possibly as a result of contamination or wetting of the filters.

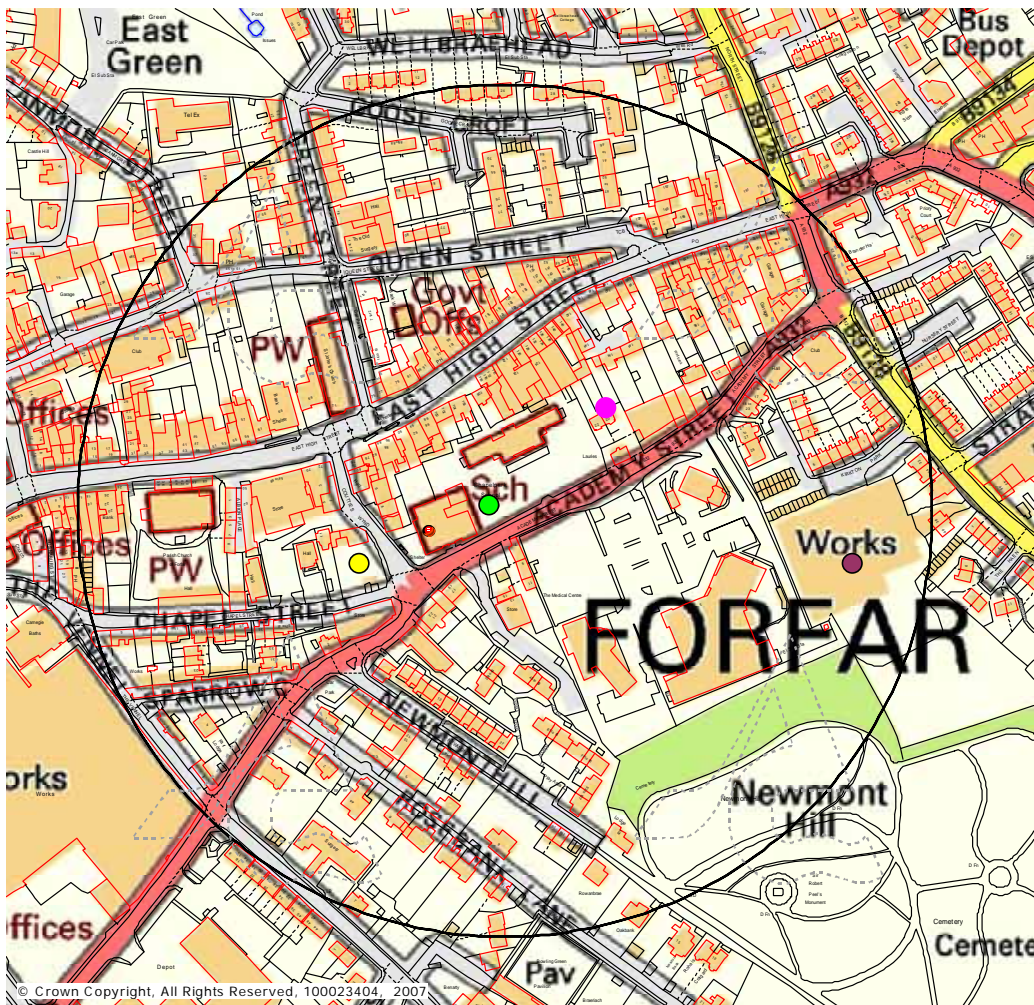
A second plot with the data from the 2 obvious outliers removed was then carried out and this shows a slope of 0.913 (Appendix 1, Table B).

5.3 Discussion

The removal of the 2 days data as detailed above demonstrates that the two monitors have operated within 10% agreement of each other. Our equipment supplier (for both samplers) advises that they believe this to be a good agreement when consideration is given to the uncertainty of the gravimetric method when weighing such a small mass of material.

APPENDIX 1

MAP SHOWING LOCATION OF MAJOR DEVELOPMENTS WITHIN 250m RADIUS OF FORFAR PM10 MONITORING SITE



Key

- Monitoring Site
- Planning Application No. 04/01616/FUL - Demolition of Existing Commercial Building and Erection of 2 Dwellinghouses. Commenced End of 2006, completed November 2007.
- Planning Application No. 06/01452/FUL - Change of Use From Redundant Church Hall to Health and Fitness Studio. Commenced April 2007, work ongoing.
- Planning Application No. 06/00507/FUL - Demolition of Industrial Buildings and Erection of Residential Development comprising 18 social houses for rent and private retirement complex. Commenced October 2006, completion expected April 2008.

APPENDIX 2

GRAPH PLOTS OF FDMS DATA SET AGAINST GRAVIMETRIC DATA SET

Table A:

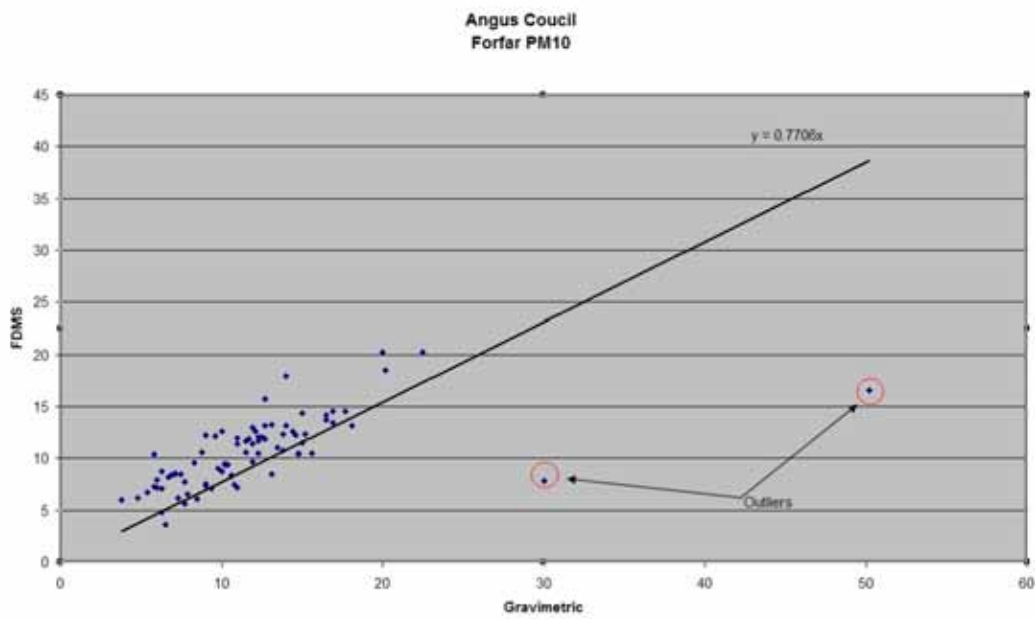
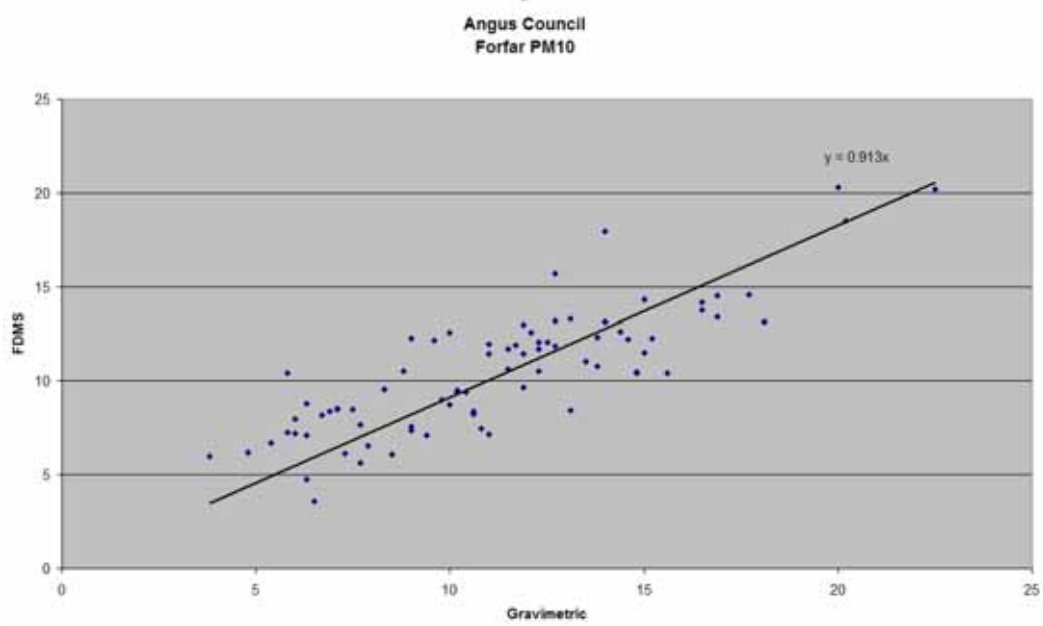


Table B:



6. CONCLUSION

The previous Detailed Assessment produced in October 2007 concluded that PM₁₀ concentrations are predicted to decline within Forfar.

This additional assessment supports this view. The Annual Mean has not been exceeded over the 12 month period assessed and, although 19 exceedances of the 24 hour period occurred, these were associated with 2 specific episodes. It is suspected that nearby construction activity was responsible. Access to real-time monitoring should assist in identifying the cause of any future incidents.

Comparisons between readings obtained from the TEOM FDMS and the gravimetric results showed a good level of agreement which suggests that every confidence can be placed in data obtained from the FDMS.

Details of further monitoring data and comparison data will be included in the 2008 Progress Report.