

## INTRODUCTION

This report is a progress report of air quality in West Lothian continued from the Updating and Screening Assessment 2003. This is required to be undertaken by all local authorities that are not proceeding to a Detailed Assessment. The progress reports are only required to be undertaken when the authority is not carrying out an Updating and Screening assessment or a Detailed Assessment. Updating and Screening Assessments are carried out by local authorities every three years and in our assessment last year it was concluded that a Detailed Assessment was not required and therefore a progress report is being submitted this year.

In West Lothian we have continued to monitor for Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Particulate Matter (PM<sub>10</sub>), and Sulphur Dioxide (SO<sub>2</sub>) using our mobile air-quality monitoring unit (Groundhog) which was located in the public car park at Manse Rd, Whitburn from May 2003 to February 2004. The Groundhog was Shutdown on the 18<sup>th</sup> February 2004 and moved back to Linlithgow High St, which was back on line on the 30<sup>th</sup> March 2004.

# CHAPTER 1

## PROGRESS REPORT FOR BENZENE

### INTRODUCTION

Since the Updating & Screening assessment was completed in May 2003 West Lothian has continued to monitor for Benzene using BTX tubes (Benzene, Toluene & Xylene). A recommendation made in the last report was to add some more monitoring sites in West Lothian and it was decided that we should monitor close to the petrol station at Lizzie Bryce Roundabout, Livingston. The new site was added on the 3<sup>rd</sup> February 2004 at 12 Caroline Park, Mid Calder. Benzene results for all three existing sites from January 2003 to December 2003 can be seen at the bottom of this page.

### Standard and Objective for Benzene

*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

All authorities:

**Running annual mean of 16.25 $\mu\text{g}/\text{m}^3$  to be achieved by 31.12.2003**

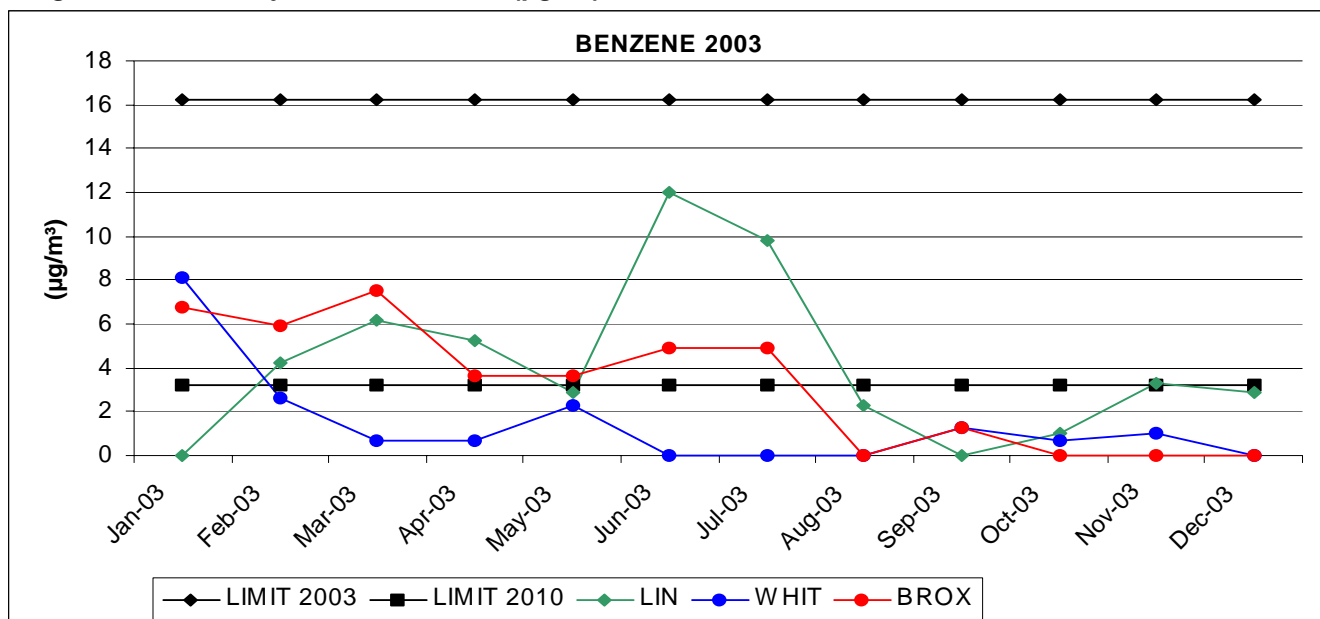
Authorities in Scotland and Northern Ireland only:

**Running annual mean of 3.25 $\mu\text{g}/\text{m}^3$  to be achieved by 31.12.2010**

### MONITORING DATA RESULTS: 2003 TO 2004

The following graph shows the monthly benzene results for 2003 for the three sites in West Lothian. The 3 roadside sites are 212 High St, Linlithgow, 15 East Main St, Whitburn and 18-22 East Main St, Broxburn.

**Figure 1.1 – Monthly Benzene Results ( $\mu\text{g}/\text{m}^3$ ) – Year 2003**



**Table 1.1 – Results for Benzene, Toluene and Xylene – Year 2003**

(Results are in ppb for Toluene and Xylene)

	Linlithgow			Benzene	Whitburn		Benzene	Broxburn	
	Benzene	Toluene	Xylene		Toluene	Xylene		Toluene	Xylene
Jan-03	1.3	4.3	4.1	2.5	13.1	7.3	2.1	7.1	3.4
Feb-03	1.9	6.8	7	0.8	4.4	4.3	1.8	11	7.4
Mar-03	1.6	5.4	4.2	0.2	0.8	0.9	2.3	9	10.4
Apr-03	0.9	2.6	6.1	0.2	0.7	0.5	1.1	3.8	10.5
May-03	3.7	7.7	1.2	0.7	1.3	4	1.1	6	10.2
Jun-03	3	2.9	8.4	<0.2	6.7	7.1	1.5	5.3	12.8
Jul-03	0.7	3.5	0.9	<0.2	0.9	<0.2	1.5	7.7	2.2
Aug-03	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sep-03	0.3	0.4	5.1	0.4	0.2	0.5	0.4	0.3	0.7
Oct-03	1	2.3	3.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nov-03	0.9	1.3	1.4	0.3	0.7	1	<0.2	<0.2	<0.2
Dec-03	<0.2	<0.2	<0.2	<0.2	0.4	0.6	<0.2	0.2	0.3
<b>Average</b>	<b>1.3</b>	<b>3.1</b>	<b>3.5</b>	<b>0.4</b>	<b>2.4</b>	<b>2.2</b>	<b>0.2</b>	<b>4.2</b>	<b>4.8</b>

**Annual Average**

**Benzene** **4.2** **1.3** **0.7**  
 ( $\mu\text{g}/\text{m}^3$ )

The annual average results show that in West Lothian concentrations of benzene are currently being achieved for the air quality objective for 2003 of a running annual mean of  $16.25\mu\text{g}/\text{m}^3$ . In Linlithgow the annual average in 2003 was  $4.2\mu\text{g}/\text{m}^3$  which is above the air quality objective for 2010 of  $3.25\mu\text{g}/\text{m}^3$ . Predictions for benzene levels in 2010 can be seen on the following page (page 4).

## Predictions for Benzene annual mean concentrations in 2010

(Calculation taken from Technical Guidance pg3-6, Box3.4)

**Table 1.2 – Prediction for 2010 using 2003 annual average (see table 1.1)**

Calculation: 2003 Annual Average x 2010 Correction Factor ÷ 2003 Correction Factor

LOCATION	2003 Annual Average	2010 Correction Factor	2003 Correction Factor	2010 Prediction
LINLITHGOW	4.2	0.647	0.871	<b>3.1µg/m<sup>3</sup></b>
WHITBURN	1.3	0.647	0.871	<b>0.97µg/m<sup>3</sup></b>
BROXBURN	0.7	0.647	0.871	<b>0.5µg/m<sup>3</sup></b>

The predictions for benzene for 2010 show that the air quality objective of 3.25µg/m<sup>3</sup> should be achieved in West Lothian even for the Linlithgow site and there is no need to proceed to a detailed assessment.

## CONCLUSION FOR BENZENE

The Benzene tube results show that in West Lothian the air quality standard and objective of 16.25µg/m<sup>3</sup> for 2003 is currently being achieved. The air quality standard of 3.25µg/m<sup>3</sup> for 2010 is predicted to be achieved for 2010 for all three sites in West Lothian. As stated in our previous report there are no significant industrial sources of benzene located either within West Lothian or neighbouring areas which, are likely to adversely affect air quality within West Lothian. Therefore it is not necessary to proceed to a detailed assessment.

In the Updating and Screening assessment 2003 it was recommended that we should add some more monitoring sites for Benzene close to either the petrol station at Lizzie Bryce roundabout, Livingston or Deer Park, Livingston. A site was chosen near to the Petrol Station at Lizzie Bryce roundabout and a BTX tube was located at 12 Caroline Park, Livingston on the 3<sup>rd</sup> February 2004. We are planning to carry out the study at this site over the next 12 months.

## **CHAPTER 2**

### **PROGRESS REPORT FOR 1,3-BUTADIENE**

#### **INTRODUCTION**

Since the updating and screening assessment was completed in May 2003 no further monitoring for 1,3 Butadiene has been carried out. It was identified in the last report that from information supplied by SEPA that there are no significant industrial sources of 1,3 Butadiene located either within West Lothian or in any neighbouring areas.

#### **Standard and Objective for 1,3-Butadiene**

*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

**Running annual mean of 2.25µg/m<sup>3</sup> to be achieved by 31.12.2003**

#### **CONCLUSION FOR 1,3-BUTADIENE**

No further monitoring of 1,3-Butadiene has been carried out in West Lothian since 1998 as the study carried out then showed results were well under the standard of 2.25µg/m<sup>3</sup>. Therefore, since there are no significant industrial sources of 1,3-Butadiene it is not considered necessary to undertake any further monitoring of this pollutant.

## CHAPTER 3

# PROGRESS REPORT FOR CARBON MONOXIDE

### INTRODUCTION

In West Lothian we have continued to monitor for carbon monoxide throughout 2003 and 2004 and it is currently still being monitored for using the real-time CO analyser located within the Groundhog (mobile air quality monitoring unit). The mobile air quality monitoring unit stayed in the public car park at Manse Rd, Whitburn from May 2003 to January 2004 but was shutdown on 18<sup>th</sup> February 2004 and located back at Linlithgow High St on the 30<sup>th</sup> March 2004. The monthly maximum 8hr mean results for carbon monoxide at Whitburn from 1<sup>st</sup> May 2003 to 17<sup>th</sup> February 2004 can be seen on the graph at the bottom of this page.

### Standard and Objective for Carbon Monoxide

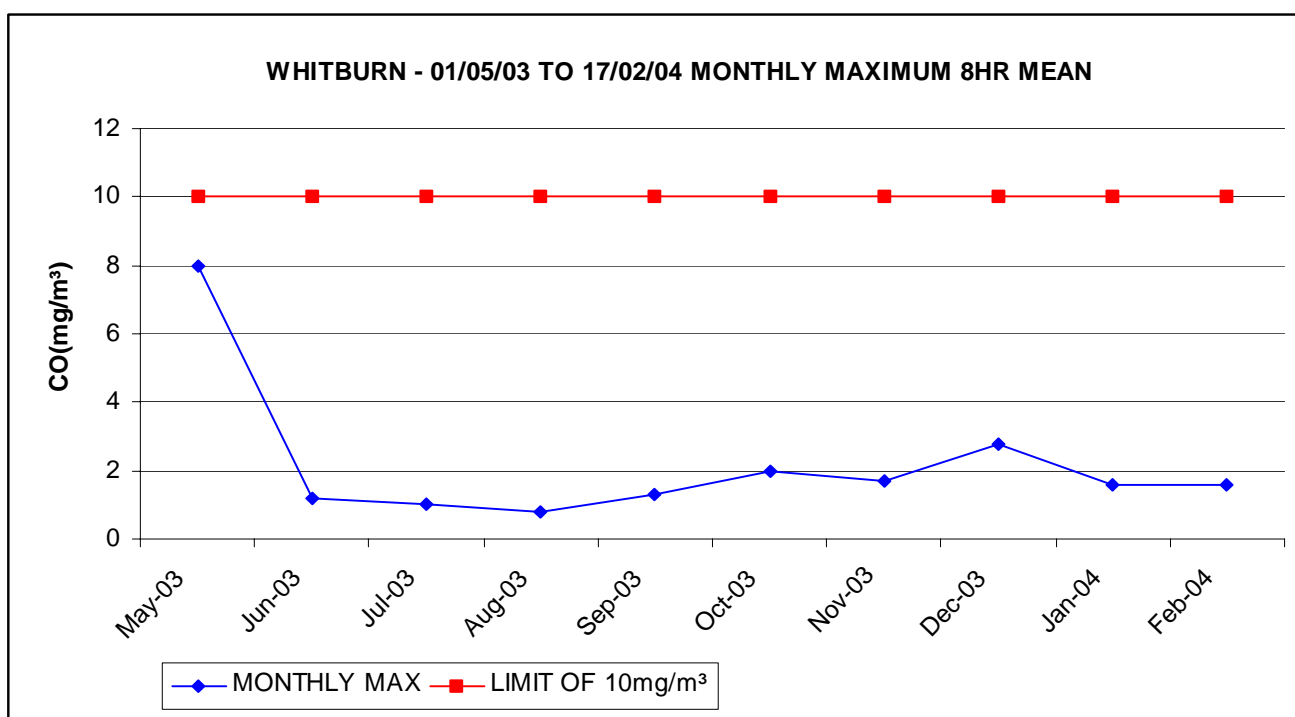
*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

**Maximum daily 8-hr mean of 10.0mg/m<sup>3</sup> to be achieved by 31.12.2003**

### MONITORING DATA RESULTS: 2003 TO 2004

The following graph shows the 8hr monthly maximum mean from 1<sup>st</sup> May 2003 to 17<sup>th</sup> February 2004.

*Figure 3.1 – Whitburn 1<sup>st</sup> May 2003 to 17<sup>th</sup> February 2004 – monthly maximum 8-hr mean*



## **CONCLUSION FOR CARBON MONOXIDE**

As can be seen from the graph (fig 3.1) on page 6 there have been no exceedences of the maximum daily 8-hr mean of  $10\text{mg}/\text{m}^3$  and therefore the air quality objective of  $10\text{mg}/\text{m}^3$  is still being achieved. There is no need to proceed to a detailed assessment this year for carbon monoxide.

## CHAPTER 4

### PROGRESS REPORT FOR LEAD

#### INTRODUCTION

In West Lothian, Lead is not monitored for as there are no significant sources of lead either within West Lothian or in any neighbouring areas and no new industrial sources have been identified since the first stage review and assessment of lead.

#### Standard and Objective for Lead

*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

**Annual mean of 0.5µg/m<sup>3</sup> to be achieved by 31.12.2004**

**Annual mean of 0.25µg/m<sup>3</sup> to be achieved by 31.12.2008**

#### Industrial Sources

As stated in our previous report (updating and screening assessment 2003) no new industrial sources of Lead have been identified by SEPA since the first stage review and assessment of Lead.

There are still two Part A processes within West Lothian, which have the potential to emit significant quantities of Lead.

These Part A processes are:

- (1) Glacier Vander Vell, Whitehill Industrail Estate, Bathgate – Manufacturers of bearings and other products containing lead
- (2) DKL Metals Ltd, Avontoun Works, Linlithgow – Foundry/Diecasting

However, SEPA have notified us that they are both operating satisfactorily and it is unlikely that emissions from these processes would result in exceedences of the air quality objective.

#### CONCLUSION FOR LEAD

No monitoring of lead has been carried out in West Lothian as it has not been identified as being a significant problem and a detailed assessment is not required.



## CHAPTER 5

# PROGRESS REPORT FOR NITROGEN DIOXIDE

### INTRODUCTION

In West Lothian we have continued to monitor for nitrogen dioxide using a real-time analyser located in our air-quality monitoring unit (groundhog) and also using passive diffusion tubes. We currently have six sites in West Lothian for the diffusion tubes with two tubes co-located at five of the sites and three tubes located directly on top of the groundhog for comparison with the real-time analyser.

Four of these diffusion tube sites are part of the U.K Nitrogen Dioxide Network and these sites are at 15 East Main St, Whitburn, 212 High St, Linlithgow, 72 Cedric Rise, Livingston and 59 High St, Bathgate.

### Standard and Objective for Nitrogen Dioxide

*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

**1-hour mean of 200µg/m<sup>3</sup> not to be exceeded more than 18 times a year and to be achieved by 31.12.2005.**

**Annual mean of 40µg/m<sup>3</sup> to be achieved by 31.12.2005.**

### MONITORING DATA RESULTS

#### Groundhog and Diffusion Tube Comparison

Three diffusion tubes have been co-located with the Groundhog since July 2001. The following shows a comparison of the diffusion tubes with the real-time analyser and also how the bias factors have been calculated so they can be applied to the diffusion tube results from other sites in West Lothian.

The bias correction factors for the diffusion tubes were taken from Box 6.4, page 6-7 of the technical guidance (TG03).

#### Bias factor Method A:

$A = C_m/D_m$                     ( $C_m$  = annual mean real-time analyser result)  
                                          ( $D_m$  = annual mean diffusion tube result)

#### Bias factor Method B:

$B = (D_m - C_m) / C_m$

## Whitburn – May 2003 to February 2004 – Table 5.1

The real-time analyser has been located at Manse Rd, Whitburn since July 2002  
The following results are from May 2003 to February 2004 (continued from Updating & Screening Assessment 2003) and three diffusion tubes were co-located at the site during this time.

**Table 5.1**

Whitburn	Groundhog (Real-Time)	Diffusion Tube
May-03	12	13
Jun-03	12	14
Jul-03	8	16
Aug-03	8	22
Sep-03	12	14
Oct-03	12	16
Nov-03	6	21
Dec-03	5	11
Jan-04	1.3	17
Feb-04	4	25
<b>Average (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>8.03</b>	<b>16.9</b>

Bias Factor method A:  $8.03/16.9 = 0.475$

Diffusion tube correction =  $0.475 \times 16.9 = 8.03\mu\text{g}/\text{m}^3$

Bias Factor method B:  $16.9 - 8.03/8.03 = 1.104$  (**110% OVER READ**)

During this ten-month period the diffusion tubes were over reading by **110%**.

## DIFFUSION TUBE RESULTS

The following shows the results for the co-located Diffusion tubes from May 2003 to February 2004 and the Bias Correction factor has been applied to all of the diffusion tube mean results below using the bias factor calculated when the Groundhog was located in Whitburn. There are no results for the diffusion tubes in February located at the Groundhog as the Groundhog was moved during this month. Two diffusion tubes are co-located at each site with three diffusion tubes located with the Groundhog.

The diffusion tubes are prepared and analysed by Analytical & Scientific Services, Edinburgh City Council, 4 Marine Esplanade, Edinburgh. The tubes are prepared using method 1 which is 50% v/v TEA in acetone and the tubes are exposed for 4 or 5 weeks at a time. The diffusion tubes are changed on the dates supplied by AEA Technology as four of the sites are on the U.K Nitrogen Dioxide Network.

**Table 5.2**

DATE	WL1	WL7	WL3	WL8	WL4	WL9	WL5	WL10	WL6	WL11	WL12	WL13	WL14
MAY 03	12	12	8	12	7	15	18	30	24	27	14	11	14
JUNE 03	17	16	9	7	6	5	30	25	5	22	11	15	16
JULY 03	20	20	13	12	9	8	25	36	23	23	17	12	20
AUG 03	20	27	12	14	11	4	31	26	10	31	22	18	25
SEPT 03	18	24	16	15	5	8	31	31	14	29	16	11	~
OCT 03	15	22	20	24	13	13	25	30	20	26	10	20	19
NOV 03	~	16	~	~	19	14	41	95	19	37	20	20	24
DEC 03	13	16	~	13	12	19	22	23	22	23	14	7	12
JAN 04	17	~	10	24	26	23	21	12	15	27	11	23	18
FEB 04	24	25	21	21	13	18	28	28	23	21	~	~	~
AVERAGE	16	18	11	14	12	13	27	34	18	27	14	14	15
Bias Correction (0.475)	8	9	5	7	6	6	13	16	9	13	7	7	7

WL 1 & 7 = WHITBURN

WL 3 & 8 = DEDRIDGE, LIVINGSTON

WL 4 & 9 = HIGH ST, BATHGATE

WL 5 & 10 = EAST MAIN ST, BROXBURN

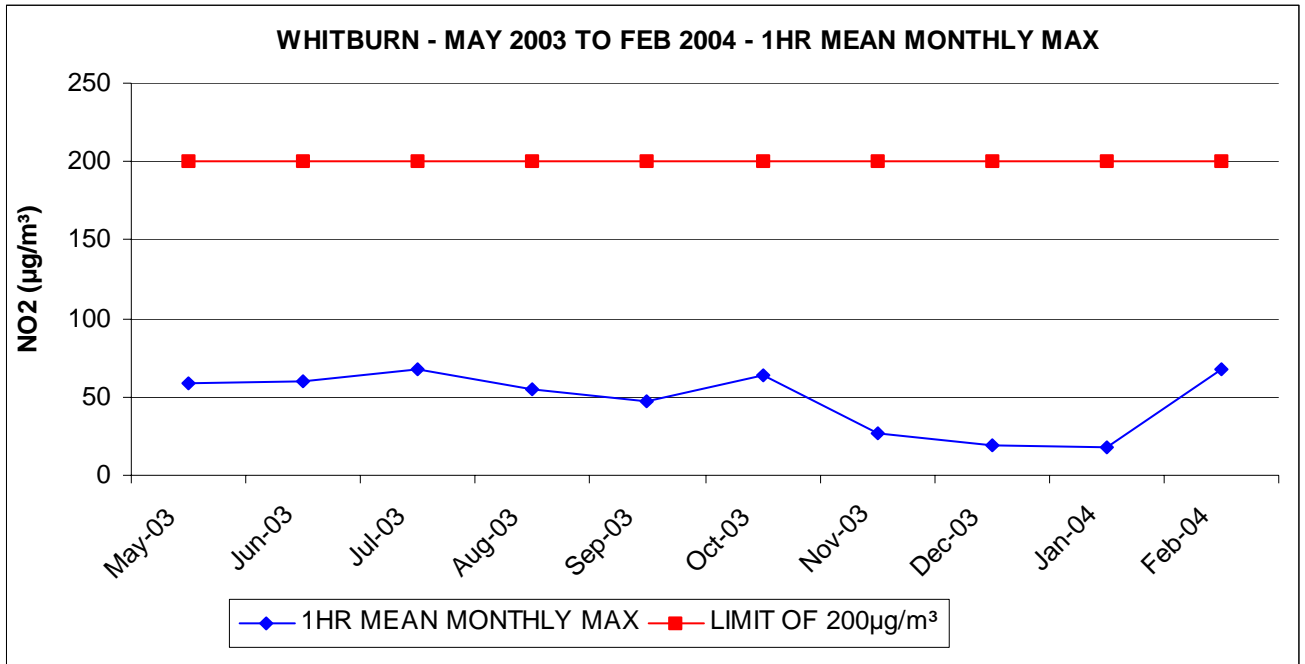
WL 6 & 11 = HIGH ST, LINLITHGOW

WL 12,13 & 14 = GROUNDHOG, WHITBURN (MAY 2003 TO FEBRUARY 2004)

## REAL-TIME MONITORING RESULTS: MAY 2003 TO FEBRUARY 2004

The following graph shows the 1hr average monthly maximum reading for when the Groundhog was located at Manse Rd, Whitburn. Only the maximum 1hr average has been displayed on the graph to show if there have been any exceedences of the 1-hr mean objective.

**Figure 5.1 – Manse Rd, Whitburn**



**Table 5.3**

MONTHLY AVERAGE	NO <sub>2</sub> (µg/m <sup>3</sup> )
May-03	11.6
June-03	12.2
July-03	8.3
Aug-03	8.3
Sept-03	11.8
Oct-03	11.8
Nov-03	5.9
Dec-03	5
Jan-04	1.3
Feb-04	4
<b>ANNUAL AVERAGE (10 MONTHS)</b>	<b>8</b>

From the graph above (figure 5.1) it can be seen that the highest reading for the 1hr mean for nitrogen dioxide from May 2003 to February 2004 was 68µg/m<sup>3</sup> which meets the 1hr standard of 200µg/m<sup>3</sup> for 31.12.2005. Table 5.3 above shows that there was a ten-month average of 8µg/m<sup>3</sup> which again meets the standard of an annual average of 40µg/m<sup>3</sup> for 31.12.2005.

Although we have not had any exceedences, we have noticed that after our service of the Groundhog in October 2003 the results have dramatically decreased and we are concerned that there may be a fault with the analyser. In our Updating &

Screening Assessment 2003 the 10-month average was  $23.7\mu\text{g}/\text{m}^3$  and this year the average over 10 months was only  $8\mu\text{g}/\text{m}^3$ . A service/maintenance engineer has been out to check for any faults but did not find anything wrong with the analyser and our daily calibration report has not indicated any obvious faults either. It is our intention to have the analyser returned to the laboratory and have a thorough check carried out. West Lothian council has recently purchased a Street Box which measures Nitrogen Dioxide and  $\text{PM}_{10}$ , and it is our intention to co-locate this with the Groundhog once it arrives to allow a correlation of the results and to check accuracy. The results of this will be reported in our Progress Report next year.

## **PREDICTIONS FOR 2005**

### **Estimated annual average $\text{NO}_2$ concentrations for 2005 using correction factors**

This has been based on the calculation taken from Box 6.6, page 6-9 of the Technical Guidance (TG03).

Annual Average x correction factor

1. Prediction for 2005 for Whitburn using Whitburn May 2003 to February 2004 annual average (see Table 5.3)

Whitburn annual average =  $8\mu\text{g}/\text{m}^3$

= Whitburn annual average x (2004 correction factor/2005 correction factor)

=  $8 \times (0.915/0.892)$

=  **$8.21\mu\text{g}/\text{m}^3$**

The predicted 2005 annual average for Manse Rd, Whitburn based on 10 months real-time monitoring from May 2003 to February 2004 is  **$8.21\mu\text{g}/\text{m}^3$** .

## **CONCLUSION FOR NITROGEN DIOXIDE**

The real-time monitoring results for nitrogen dioxide indicate that there have been no exceedences of the 1-hour objective from May 2003 to February 2004. The 2005 annual mean objective of  $40\mu\text{g}/\text{m}^3$  is also currently being achieved as we had an average of  $8\mu\text{g}/\text{m}^3$  based on 10 months data.

The 2005 annual mean objective has been predicted to be achieved and therefore, there is no need to proceed to a detailed assessment for nitrogen dioxide. However, due to having very low readings after October 2003 we are intending to look further into this to find out if there are any faults with our real-time analyser.

There are no roads in West Lothian that have significant changes in traffic flows and no new developments that would impact on air quality by increased traffic flows.

As notified by SEPA there are no new industrial sources of nitrogen dioxide within West Lothian.

## CHAPTER 6

### PROGRESS REPORT FOR PM<sub>10</sub>

#### INTRODUCTION

In West Lothian we have continued to measure PM<sub>10</sub> using the TEOM analyser in our mobile air-quality monitoring unit and it was located at Manse Rd, Whitburn from May 2003 until 17<sup>th</sup> February 2004. It was recently located back at Linlithgow High St on 30<sup>th</sup> March 2004 where it will be located for approximately the next 12 months. Particulate Matter (PM<sub>10</sub>) is known as particles, whatever their source or composition, which fall within the appropriate size range. Particles, which are smaller than 10µm in diameter are more likely to reach the lung and therefore, the mass fraction of these particles, are known as PM<sub>10</sub>.

#### Standard and Objective for PM<sub>10</sub>

*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

**24-hour mean of 50µg/m<sup>3</sup> not to be exceeded more than 35 times a year to be achieved by 31.12.2004**

**Annual mean of 40µg/m<sup>3</sup> to be achieved by 31.12.2004**

**For Local Authorities in Scotland only there are two objectives for 2010:-**

**24-hour mean of 50µg/m<sup>3</sup> not to be exceeded more than 7 times a year to be achieved by 31.12.2010**

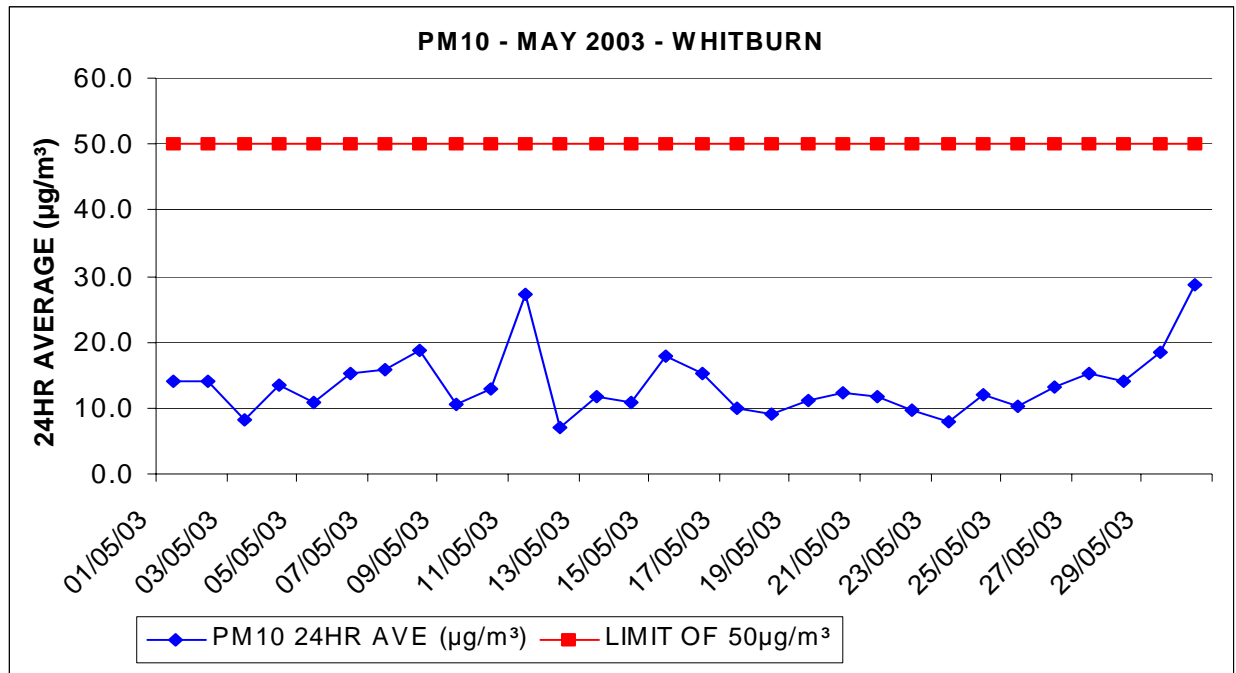
**Annual mean of 18µg/m<sup>3</sup> to be achieved by 31.12.2010**

#### MONITORING DATA RESULTS

The following graphs (pages 15-19) show the results for PM<sub>10</sub> at the site in Manse Rd, Whitburn from 1<sup>st</sup> May 2003 to 17<sup>th</sup> February 2004 and shows the 24-hour mean for each month. The PM<sub>10</sub> results from the TEOM have been converted into gravimetric concentrations by multiplying the results by the 1.3 default factor.

**PM<sub>10</sub> RESULTS – MANSE RD WHITBURN**

**Figure 6.1 – Manse Rd, Whitburn – May 2003**



**Figure 6.2 – Manse Rd, Whitburn – June 2003**

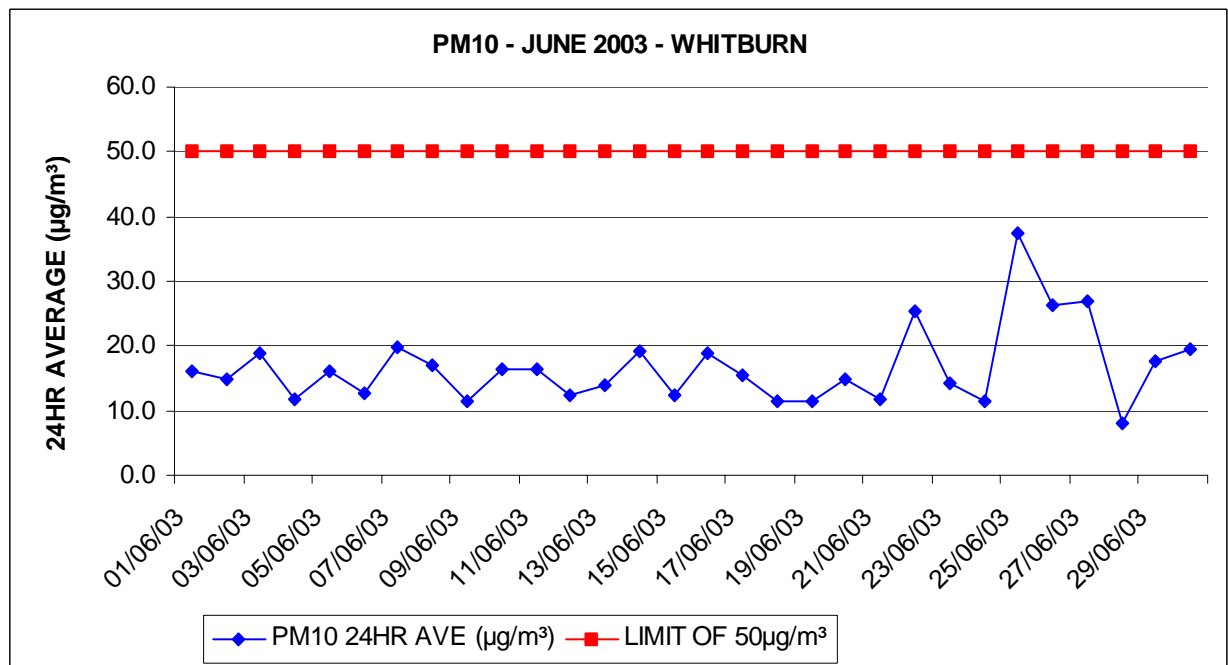


Figure 6.3 – Manse Rd, Whitburn – July 2003

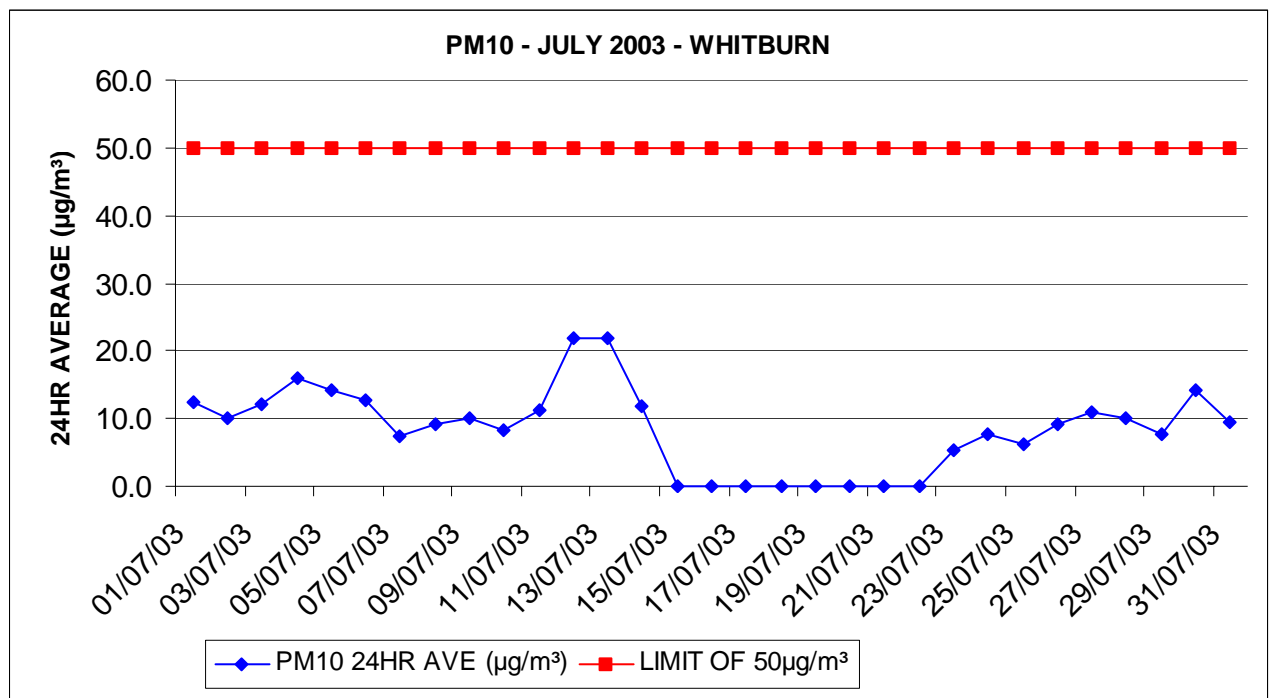


Figure 6.4 – Manse Rd, Whitburn – August 2003

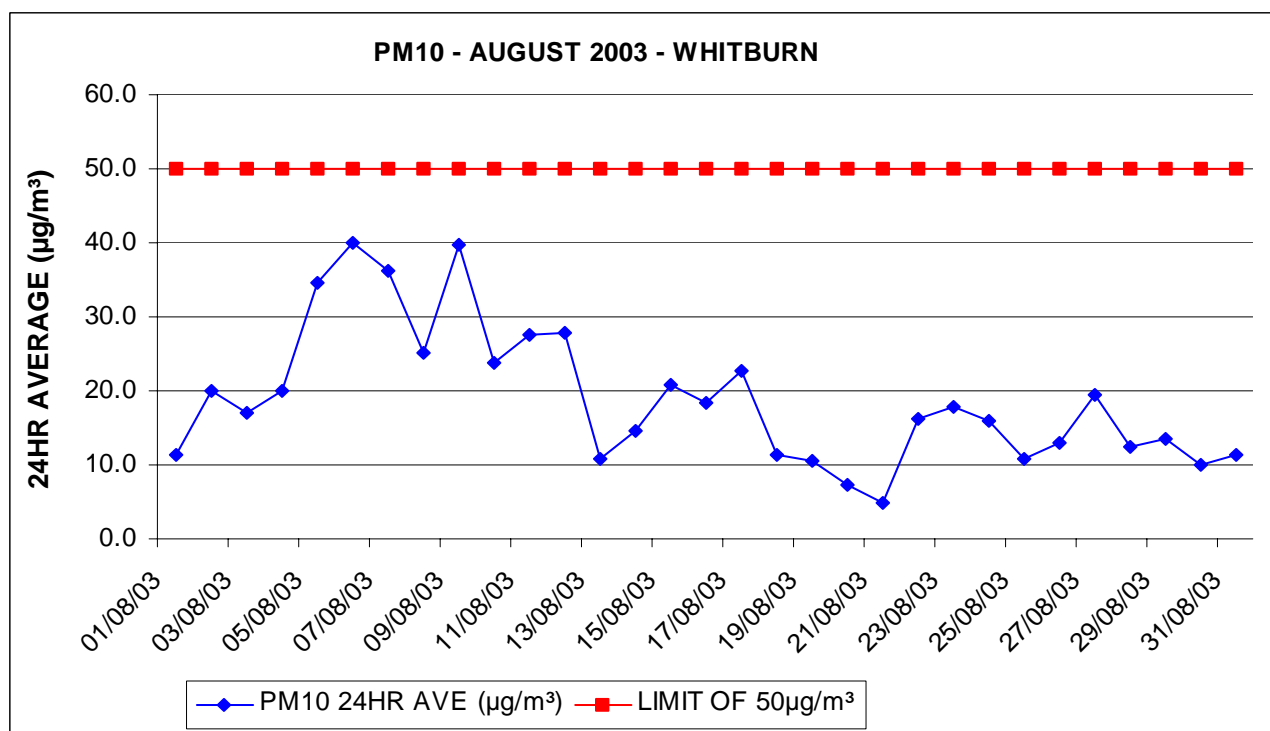




Figure 6.5 – Manse Rd, Whitburn – September 2003

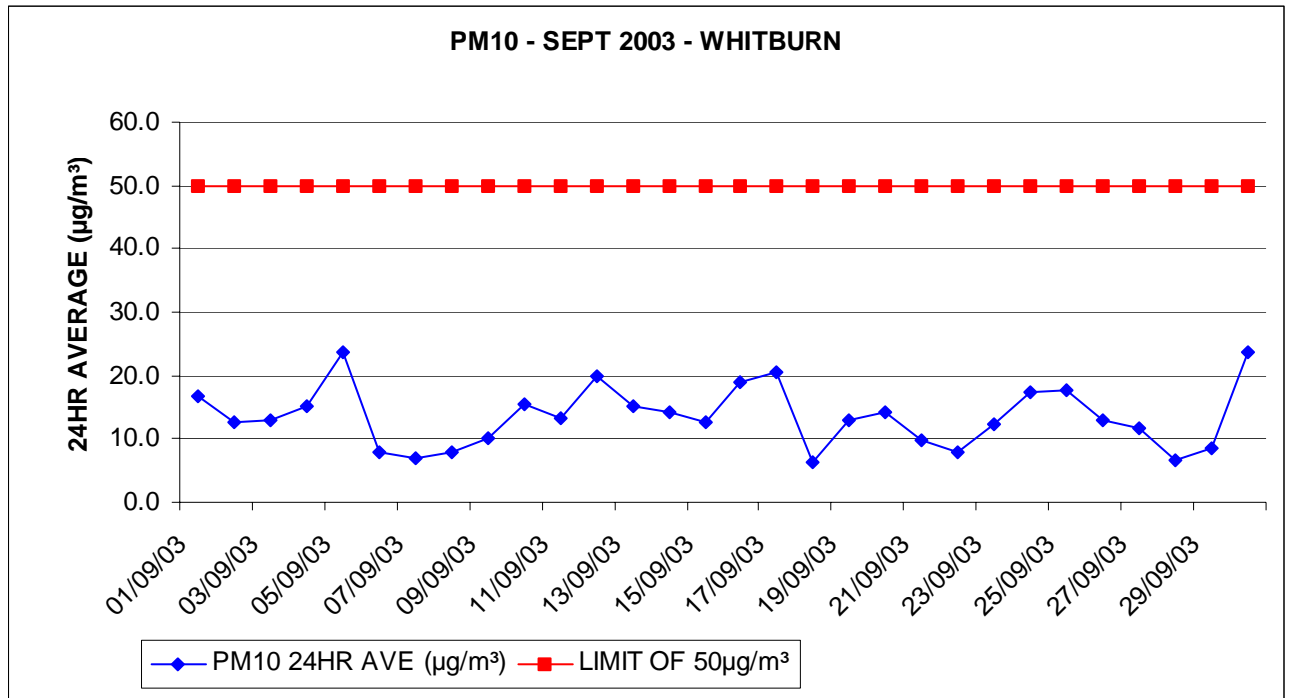


Figure 6.6 – Manse Rd, Whitburn – October 2003

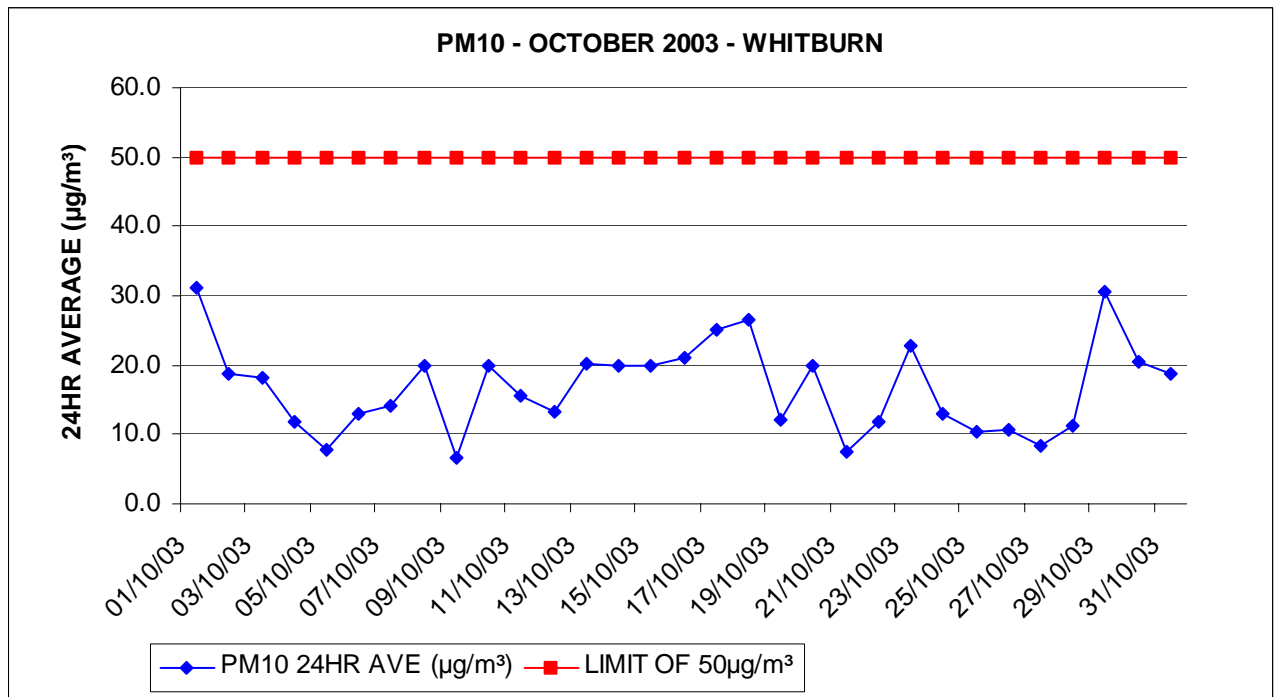


Figure 6.7 – Manse Rd, Whitburn – November 2003

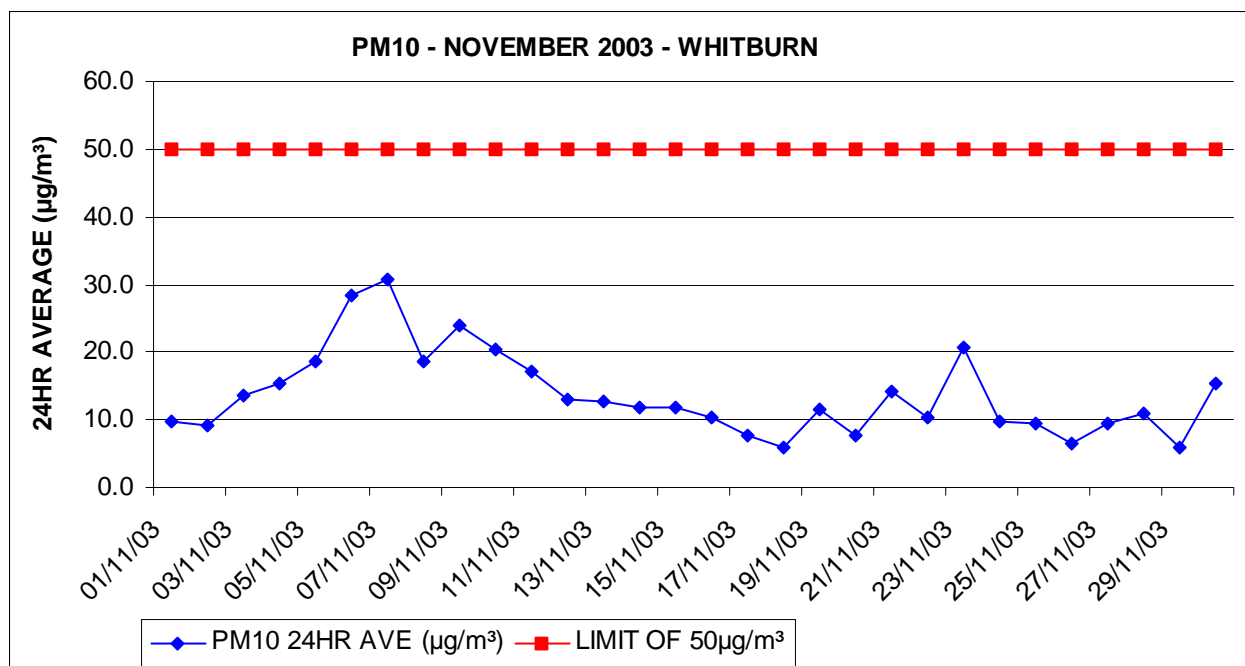


Figure 6.8 – Manse Rd, Whitburn – December 2003

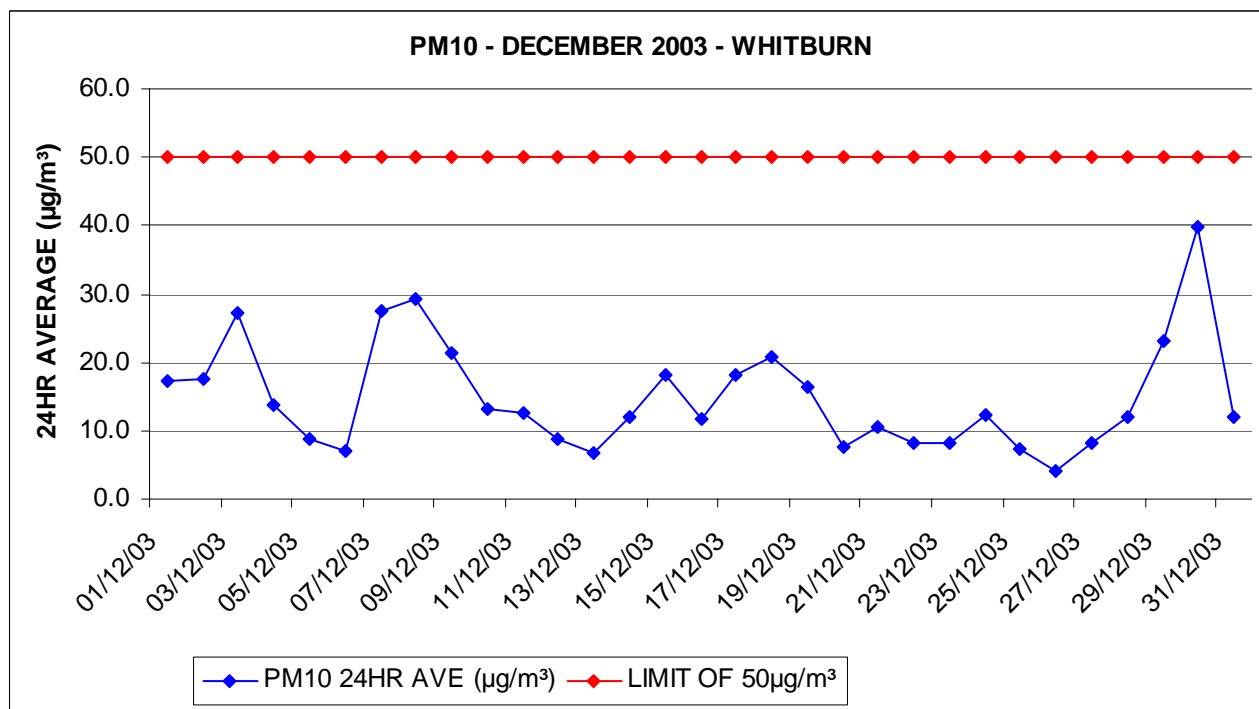


Figure 6.9 – Manse Rd, Whitburn – January 2004

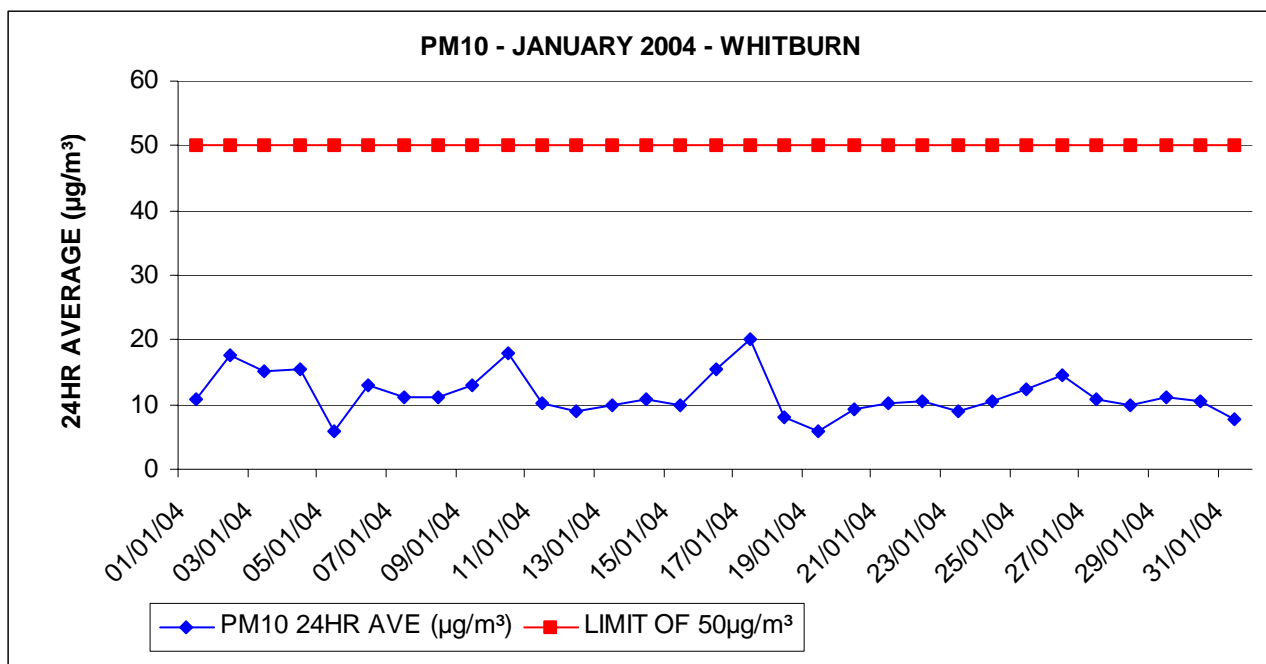
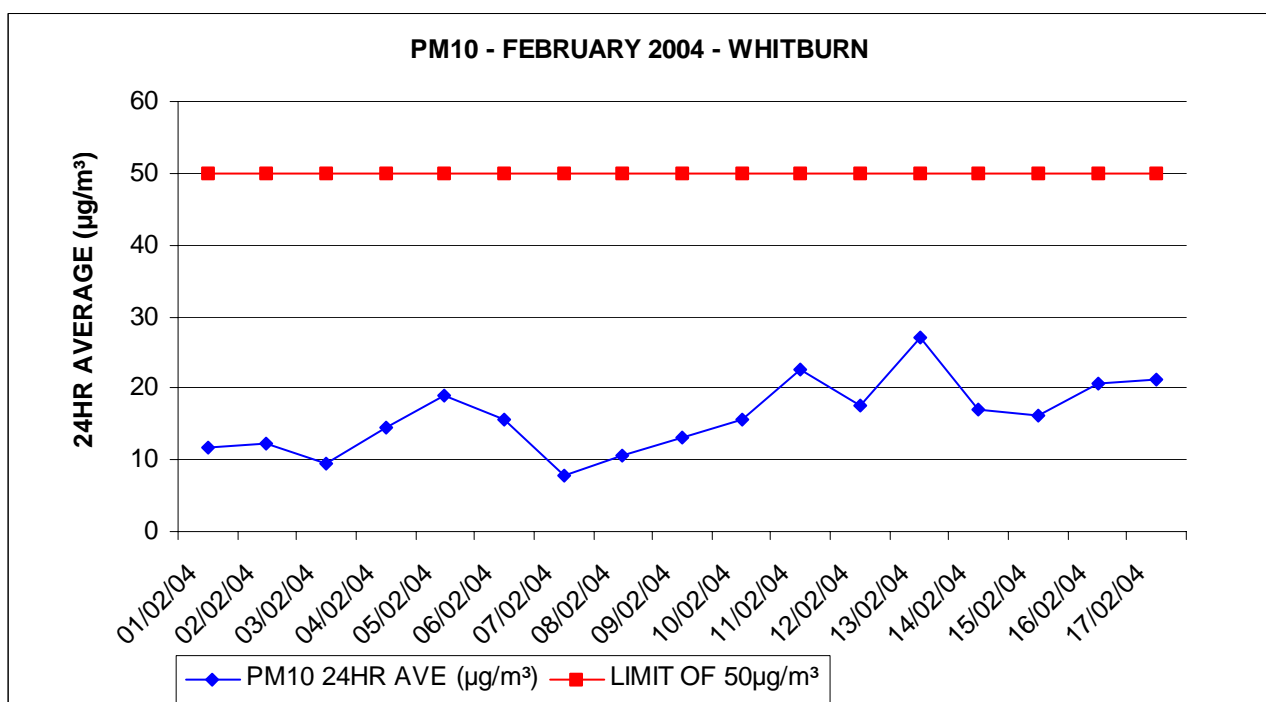


Figure 6.10 – Manse Rd, Whitburn – 1<sup>st</sup> February to 17<sup>th</sup> February 2004



## PM<sub>10</sub> – Whitburn - May 2003 to February 2004 – Monthly & Annual Average

It can be seen from the graphs (figs 6.1 to 6.10) that there were no exceedences of the 24-hour objective and therefore we have met the objective for 2004 & 2010.

**Table 6.1 – monthly and annual averages for PM<sub>10</sub> – May 2003 to February 2004**

MONTHLY AVERAGE	PM <sub>10</sub> (µg/m <sup>3</sup> )
May-03	14
June-03	17
July-03	8
Aug-03	19
Sept-03	14
Oct-03	17
Nov-03	14
Dec-03	15
Jan-04	12
Feb-04	16
<b>Annual Average</b>	<b>15</b>

Table 6.1 above shows that there was an annual average of 15µg/m<sup>3</sup> which meets the standards of 40µg/m<sup>3</sup> for 2004 & 18µg/m<sup>3</sup> for 2010.

## ANNUAL MEAN PREDICTIONS FOR 2004 & 2010

Calculation taken from Box 8.6, page 8-10 of technical guidance (TG03)  
(Approach to correcting measured PM<sub>10</sub> concentrations to 2004 & 2010)

### Predictions for 2004 at Manse Rd, Whitburn

*Calculations using Whitburn May 2003 to February 2004 10-month average – see Table 6.1*

Step 1: **CG<sub>2003</sub> = 15µg/m<sup>3</sup>** (no need to multiply by 1.3 as results are already gravimetric)

Step 2: Secondary PM<sub>10</sub> from internet maps 2001  
(C<sub>sec2001</sub>) = **3.86µg/m<sup>3</sup>**

Step 3: Estimate local secondary PM<sub>10</sub> for 2003 (C<sub>sec2003</sub>) using correction factors in Box 8.7, i.e. [C<sub>sec2003</sub> = C<sub>sec2001</sub> x 0.955]

$$= 3.86 \times 0.955 = \mathbf{3.69\mu g/m^3}$$

Step 4: Estimate the local primary PM<sub>10</sub> in 2003 (C<sub>prim2003</sub>) by subtracting the 2003 secondary concentration and the PM<sub>10</sub> coarse concentration (10.5µg/m<sup>3</sup>) from the measured concentration, i.e.

$$C_{\text{prim2003}} = [CG_{2003}] - [C_{\text{sec2003}}] - 10.5$$

$$= 15 - 3.69 - 10.5 \\ = \mathbf{0.81\mu g/m^3}$$

Step 5: Adjust the local PM<sub>10</sub> from 2003 to 2004 using table correction factors from Box 8.7

$$\begin{aligned}C_{\text{prim}2004} &= [C_{\text{prim}2003}] \times (0.930/0.954) \\&= 0.81 \times 0.930/0.954 \\&= \mathbf{0.78\mu\text{g}/\text{m}^3}\end{aligned}$$

Step 6: Calculate the Secondary PM<sub>10</sub> in the same future year 2004 using table correction Factors in Box 8.7

$$\begin{aligned}[C_{\text{sec}2004}] &= [C_{\text{sec}2003}] \times 0.932 \\&= 3.69 \times 0.932 \\&= \mathbf{3.44\mu\text{g}/\text{m}^3}\end{aligned}$$

Step 7: Calculate the total estimated PM<sub>10</sub> in 2004 by adding the components together

$$\begin{aligned}[CG_{2004}] &= [C_{\text{prim}2004}] + [C_{\text{sec}2004}] + 10.5 \\&= 0.78 + 3.44 + 10.5 \\&= \mathbf{14.72\mu\text{g}/\text{m}^3}\end{aligned}$$

The predicted 2004 annual mean PM<sub>10</sub> concentration at Manse Rd, Whitburn based on 10 months real-time monitoring data from May 2003 to February 2004 is **14.72μg/m<sup>3</sup>**.

### **Predictions for 2010 at Manse Rd, Whitburn**

Step 1:  $[CG_{2003}] = \mathbf{15\mu\text{g}/\text{m}^3}$

Step 2:  $[C_{\text{sec}2001}] = \mathbf{3.86}$

Step 3:  $[C_{\text{sec}2003}] = [C_{\text{sec}2001}] \times 0.955$

$$\begin{aligned}&= 3.86 \times 0.955 \\&= \mathbf{3.69}\end{aligned}$$

Step 4:  $C_{\text{prim}2003} = 15 - [C_{\text{sec}2003}] - 10.5$

$$\begin{aligned}&= 15 - 3.69 - 10.5 \\&= \mathbf{0.81}\end{aligned}$$

Step 5:  $C_{\text{prim}2010} = [C_{\text{prim}2003}] \times 0.815/0.954$

$$\begin{aligned}&= 0.81 \times 0.854 \\&= \mathbf{0.69}\end{aligned}$$

Step 6:  $C_{\text{sec}2010} = [C_{\text{sec}2003}] \times 0.795/0.955$

$$\begin{aligned}&= 3.69 \times 0.83 \\&= \mathbf{3.06\mu\text{g}/\text{m}^3}\end{aligned}$$

Step 7:  $CG_{2004} = [C_{prim2010}] + [C_{sec2004}] + 10.5$

$= 0.69 + 3.06 + 10.5$

$= 14.3\mu\text{g}/\text{m}^3$

The predicted 2010 annual mean  $PM_{10}$  concentration at Manse Rd, Whitburn based on 10 months real-time monitoring data from May 2003 to February 2004 is **14.3 $\mu\text{g}/\text{m}^3$** .

## **CONCLUSIONS FOR $PM_{10}$**

The real-time monitoring data results for  $PM_{10}$  from May 2003 to February 2004 indicate that the 2004 & 2010 objectives can still be achieved. There were no exceedences over this period for either the 24-hour objective or annual mean objective. The predictions for 2010 for the annual mean objective also indicate that  $PM_{10}$  levels will be achieved.

In West Lothian there have not recently been any new developments that would increase traffic flows and impact on air quality. As stated in the Updating and Screening assessment 2003, the Whitburn site is located in a car park just off the traffic lights, making it the worst case scenario. This is because cars often sit in the car park with engines running and deliveries to some shops in West Main St are delivered via the car park.

# CHAPTER 7

## PROGRESS REPORT FOR SULPHUR DIOXIDE

### INTRODUCTION

In West Lothian, since May 2003 we have continued to measure for sulphur dioxide using the real-time analyser located in our mobile air-monitoring unit and also currently still use three 8-port bubblers for measuring daily levels of sulphur dioxide. These 8-port bubblers are located at Atlas Cottages, Armadale, Brucefield Church, Whitburn and Netherton Place Whitburn. Atlas Cottages and Brucefield Church are both on the national air quality network.

The results for the real-time analyser can be seen on the graphs on pages 23 & 24 and show the 15min monthly max, 1hr monthly max and 24hr monthly max from May 2003 to February 2004.

The results for the 8-port bubblers can also be seen on page 25 and show the monthly maximum 24-hour level from January 2003 to February 2004.

### Standard and Objective for Sulphur Dioxide

*The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-*

**1-hour mean of 350µg/m<sup>3</sup> not to be exceeded more than 24 times a year**

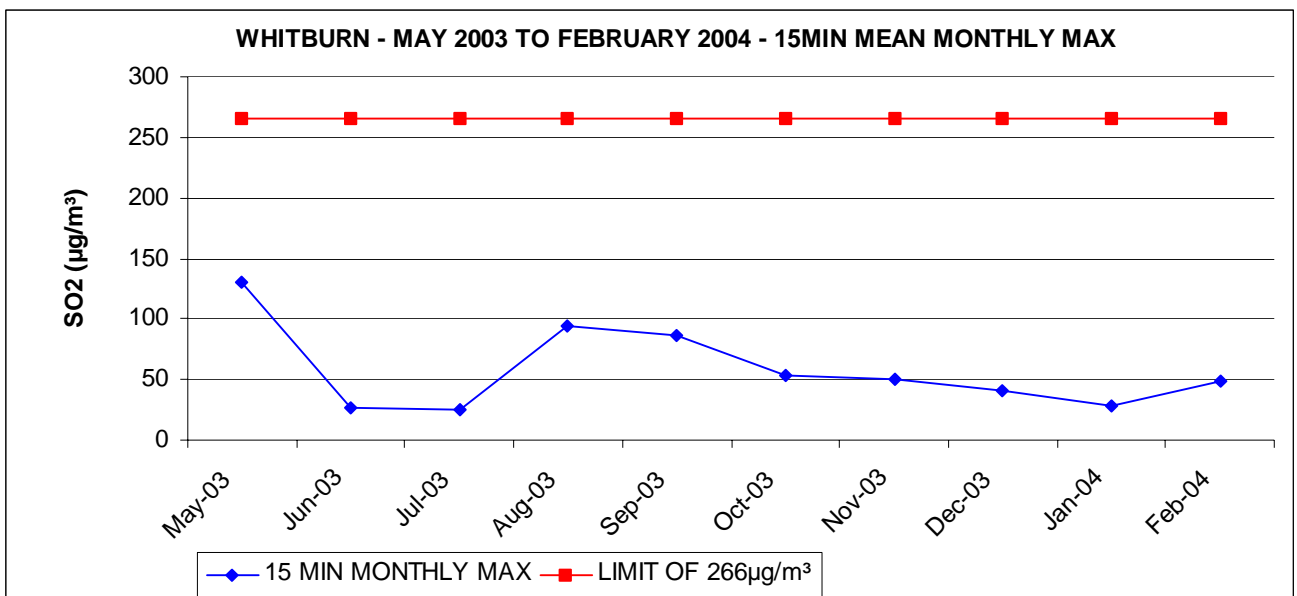
**24-hour mean of 125µg/m<sup>3</sup> not to be exceeded more than 3 times a year**

**15-minute mean of 266µg/m<sup>3</sup> not to be exceeded more than 35 times a year**

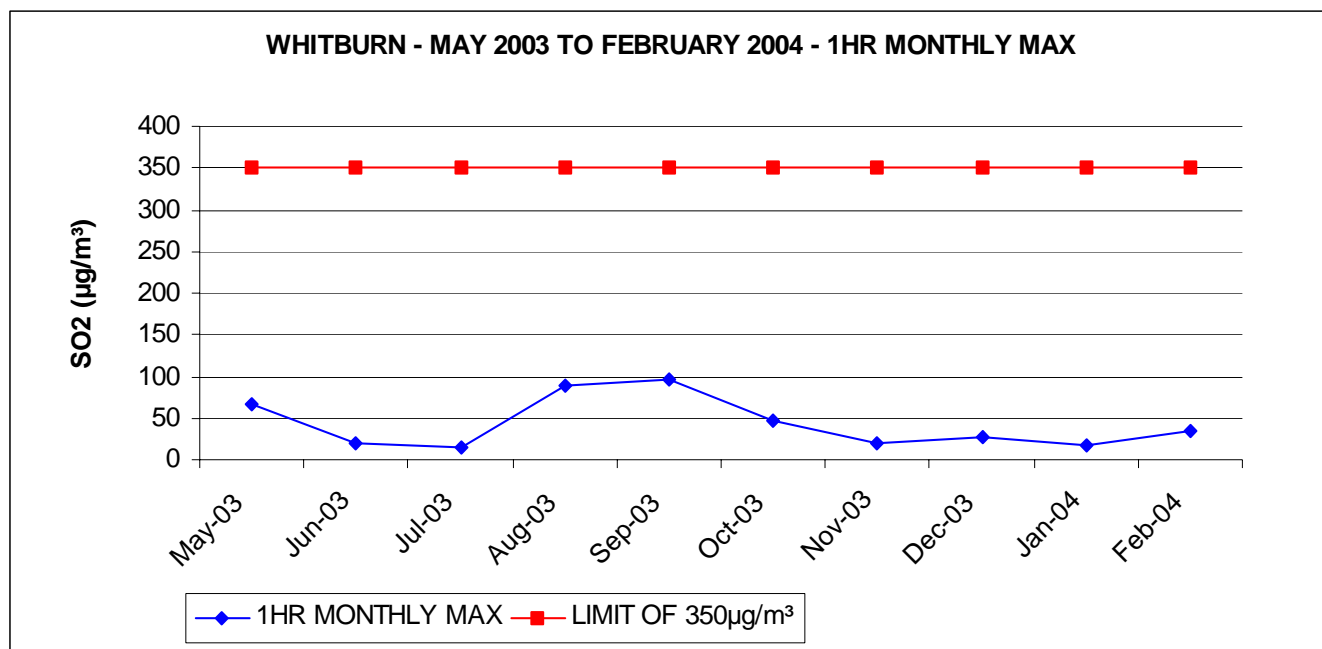
### MONITORING DATA RESULTS

The following graphs show the 15-min mean, 1-hr mean and 24-hr mean for sulphur dioxide from May 2003 to February 2004 when the air-quality monitoring unit was located at Manse Rd, Whitburn.

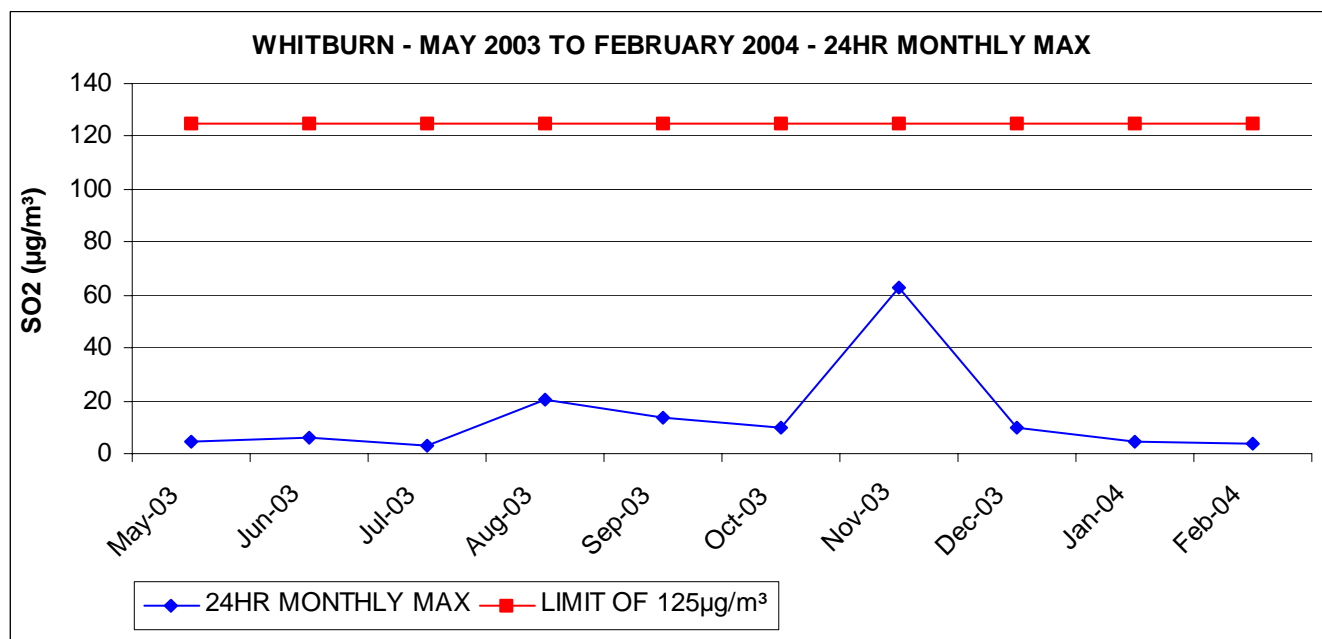
**Figure 7.1 – Whitburn – May 2003 to February 2004 – 15min mean monthly max**



**Figure 7.2 – Whitburn – May 2003 to February 2004 – 1hr mean monthly max**



**Figure 7.3 – Whitburn – May 2003 to February 2004 – 24hr mean monthly max**



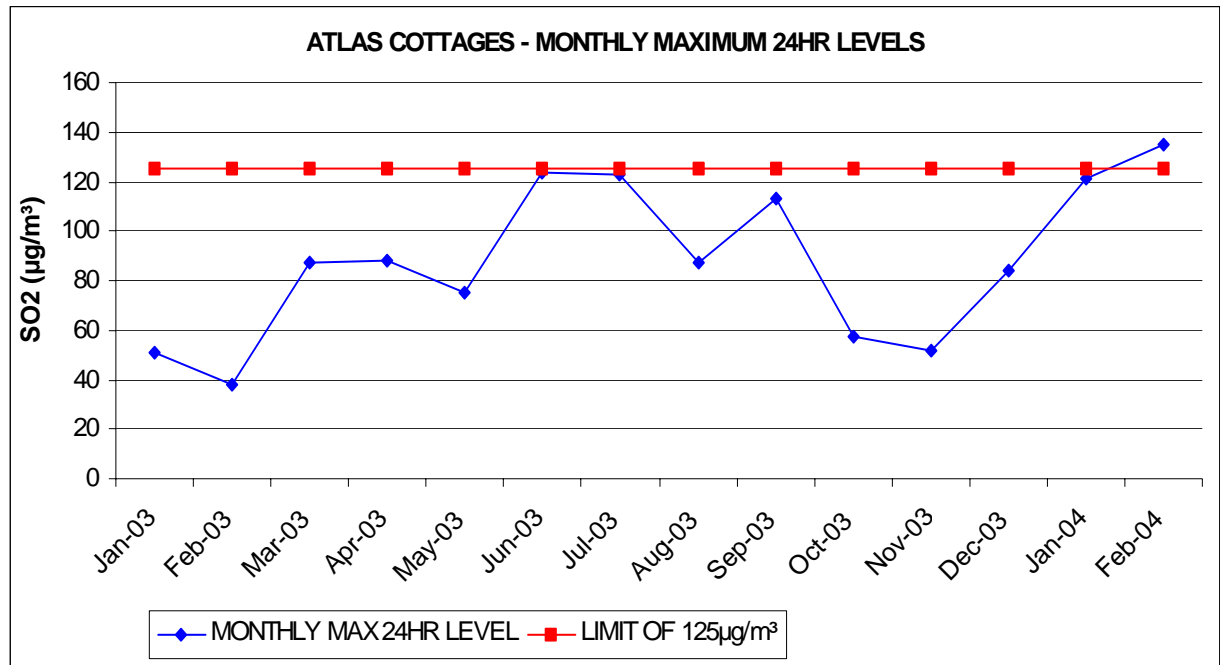
It can be seen from the graphs (figs 7.1 to 7.3) that from May 2003 to February 2004 there have been no exceedences for any of the three objectives for sulphur dioxide.



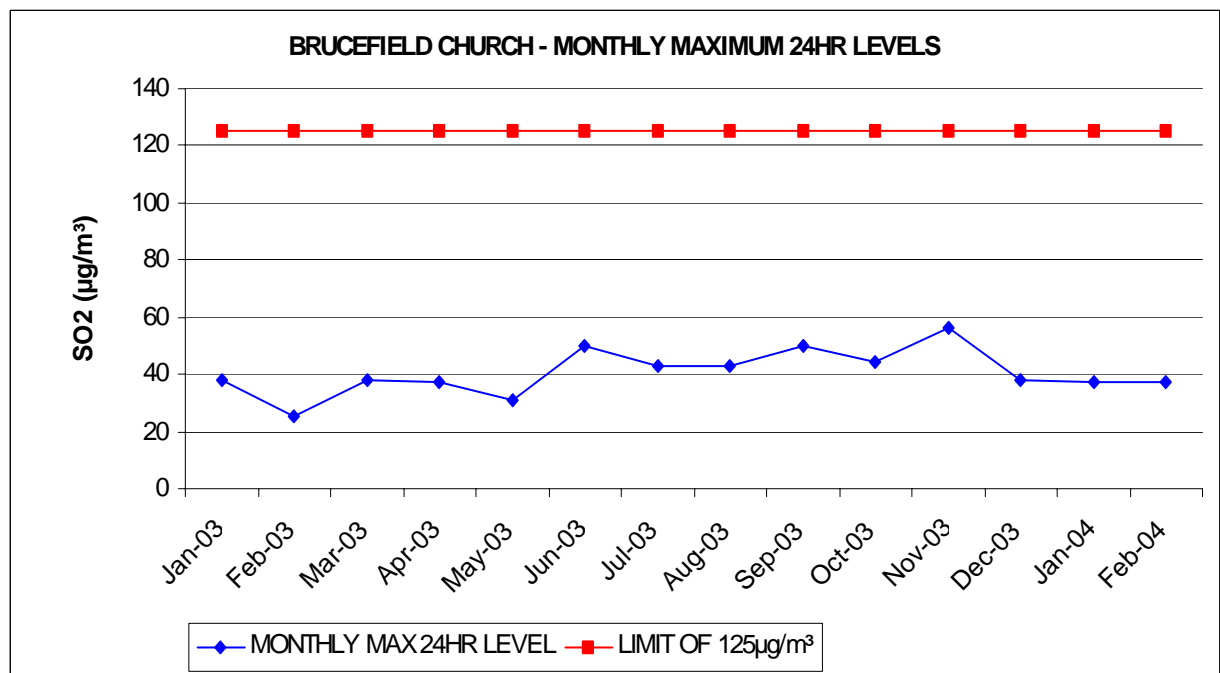
### 8-port Bubbler Sulphur Dioxide Results – National Network Sites

The following graphs (figs 7.4 & 7.5) show the monthly maximum daily 24-hour levels for the two 8-port bubblers. These are located at Atlas Cottages, Armadale & Brucefield Church, Whitburn and the results shown are from January 2003 to February 2004.

**Figure 7.4 – Atlas Cottages, Armadale – monthly maximum 24-hour level**



**Figure 7.5 – Brucefield Church, Whitburn – monthly maximum 24-hour level**



The above graph (fig 7.4) shows an exceedence in February 2004 at Atlas Cottages of 135µg/m<sup>3</sup> but as explained in the previous report (Updating & Screening Assessment 2003) the elevated concentrations are due to Atlas Cottages being located next to Caradale Brickworks.

Table 7.1 below shows the maximum daily 24hr average at Atlas Cottages and Brucefield Church from January 2003 to February 2004. The 1hr means and 15min means have been calculated using a calculation taken from page 7-3 of the Technical guidance (TG03).

#### Calculations

15min mean = 1.8962 x 24hr maximum daily value

1hr mean = 1.3691 x 24hr maximum daily value

**Table 7.1**

SITE	YEAR	24HR MAX DAILY VALUE (µg/m <sup>3</sup> )	15min mean (µg/m <sup>3</sup> )	1hr mean (µg/m <sup>3</sup> )	Exceedences (Yes/No)
Atlas Cottages	2003 to 2004	135	256	185	YES (24hr exceedence)
Brucefield Church	2003 to 2004	56	106	77	NO

## CONCLUSION FOR SULPHUR DIOXIDE

The real-time monitoring data for sulphur dioxide from May 2003 to February 2004 indicates that we do not have a problem with this pollutant in West Lothian as there have been no exceedences of the 15min objective, 1-hr objective or 24-hr objective. On the evidence of the real-time monitoring data there is no need to proceed to a detailed assessment this year. The 8-port bubbler located at Atlas Cottages, Armadale next to the point source Caradale Brick Works (Part B process) did have a 24-hour exceedence in February 2004. As mentioned in our Updating and Screening Assessment 2003 in the recommendation paragraph on sulphur dioxide it is our intention to liaise with SEPA and do some real-time monitoring around the Caradale Brickworks. However, having recently spoken to John Lamb at SEPA, the two analysers that they have are currently being used and so it will not be until next year that we will be able to under take any real-time monitoring at Atlas Cottages.

As notified by SEPA there are no industrial sources with substantially increased emissions of sulphur dioxide. As stated in our Updating and Screening Assessment 2003 there are no areas where significant coal burning takes place that is likely to affect air quality within West Lothian.