



# West Lothian Council

**ENVIRONMENT ACT 1995**

**PROGRESS REPORT 2007**

**AIR QUALITY IN WEST LOTHIAN**

**APRIL 2007**

**[www.air-quality.net](http://www.air-quality.net)**



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<b>1. Introduction .....</b>	<b>3</b>
1.1. Purpose of Report .....	3
1.2. Local Air Quality Management Areas .....	3
1.3. Detailed Assessments .....	3
1.4. Current Monitoring .....	3
1.4.1. Contaminates measured .....	3
1.4.2. Automated Sites .....	3
1.4.3. Diffusion tubes .....	3
1.4.4. Monitoring of former Polkemmet Colliery Site .....	4
1.5. Site relocation .....	4
<b>2. Air Quality: QA/QC .....</b>	<b>5</b>
2.1. Automated Sites and Equipment .....	5
2.1.1. Groundhog, Carnie Place, Whitburn .....	5
2.1.2. Romon 300, Linlithgow High Street .....	5
2.1.3. Reliability .....	5
2.2. Analyser Maintenance and calibration .....	5
2.2.1. In house procedures .....	5
2.2.2. Procedures specific to the TEOM (tapered element oscillating microbalance) - PM10 Analyser .....	5
2.2.3. Contracted in services .....	6
2.3. Data Acquisition, Security and Dissemination .....	6
2.3.1. Data Aquisition .....	6
2.3.2. Data Security .....	6
2.3.3. Data Dissemination .....	6
2.4. Data Validation .....	6
<b>3. Progress Report for Benzene .....</b>	<b>7</b>
3.1. Introduction .....	7
3.2. Standard and Objective for Benzene .....	7
3.3. Monitoring Results 2006 .....	7
3.4. Conclusion for Benzene .....	9
<b>4. Progress Report for 1,3 – Butadiene .....</b>	<b>10</b>
4.1. Introduction .....	10
4.2. Standard and Objective for 1,3 – Butadiene .....	10
4.3. Conclusion for 1,3 – Butadiene .....	10
<b>5. Progress Report for Carbon monoxide .....</b>	<b>11</b>
5.1. Introduction .....	11
5.2. Standard and Objective for Carbon monoxide .....	11
5.3. Monitoring Results: 2006 .....	11
5.4. Conclusion for Carbon monoxide .....	11
<b>6. Progress Report for Lead .....</b>	<b>12</b>
6.1. Introduction .....	12
6.2. Standard and Objective for Lead .....	12
6.3. Industrial Sources .....	12
6.4. Conclusion for Lead .....	12
<b>7. Progress Report for Nitrogen Dioxide .....</b>	<b>13</b>
7.1. Introduction .....	13
7.1.1. Automated real-time analysers .....	13
7.1.2. Diffusion Tubes .....	13
7.2. Standard and Objective for Nitrogen Dioxide .....	13
7.3. Monitoring Data .....	13
7.3.1. Automated real-time analysers .....	13
7.3.2. Diffusion Tubes .....	14
7.4. Groundhog and Diffusion tube comparison .....	14
7.4.1. Background .....	14
7.4.2. Bias Correction factors: Bias factor Method A: .....	14

7.4.3.	Bias Correction factors: Bias factor Method B:	14
7.4.4	Diffusion Tube Results at Cairnie Place, Whitburn – April 2006 to March 2007	14
7.5.	Diffusion Tube Results: 2006	15
7.6.	Real-time monitoring results: Cairnie Place, Whitburn	16
7.6.1.	1 hour averages	16
7.6.2.	Monthly and Annual averages	22
7.7.	Real-time monitoring results: Linlithgow High Street	23
7.7.1.	1 Hour averages	23
7.7.2.	High St, Linlithgow (Romon): Monthly & annual averages	29
7.8.	Conclusion for Nitrogen Dioxide	29
<b>8.</b>	<b>Progress Report for PM<sub>10</sub></b>	<b>31</b>
8.1.	Introduction	31
8.2.	Standard and Objective for PM <sub>10</sub>	31
8.3.	Monitoring Data Results	31
8.4.	PM <sub>10</sub> Results: Cairnie Place, Whitburn	32
8.4.1.	24 Hour Averages	32
8.4.2.	Monthly & Annual Average	38
8.5.	PM <sub>10</sub> Results: High Street, Linlithgow	39
8.5.1.	24 Hour Averages	39
8.5.2.	Monthly & Annual Average	45
8.6.	Conclusion for PM <sub>10</sub>	46
<b>9.</b>	<b>Progress Report for Sulphur Dioxide</b>	<b>47</b>
9.1.	Introduction	47
9.1.1.	Real-time monitoring	47
9.1.2.	8-port Bubbler Monitoring	47
9.2.	Standard and Objective for Sulphur dioxide	47
9.3.	Monitoring Data Results	47
9.3.1.	Real-time monitoring	47
9.3.2.	8-port Bubbler Sulphur dioxide Results	49
9.4.	Conclusion for Sulphur dioxide	50
<b>10.</b>	<b>Conclusions and Recommendations</b>	<b>51</b>
10.1.	Benzene	51
10.1.1.	Conclusion for Benzene	51
10.1.2.	Recommendation for Benzene	51
10.2.	1,3 – Butadiene	51
10.2.1.	Conclusions for 1,3 – Butadiene	51
10.2.2.	Recommendation for 1,3 – Butadiene	51
10.3.	Carbon monoxide	51
10.3.1.	Conclusions for Carbon monoxide	51
10.3.2.	Recommendation for Carbon monoxide	51
10.4.	Lead	51
10.4.1.	Conclusions for Lead	51
10.4.2.	Recommendation for Lead	51
10.5.	Nitrogen dioxide	52
10.5.1.	Conclusions for Nitrogen dioxide	52
10.5.2.	Recommendation for Nitrogen dioxide	52
10.6.	PM <sub>10</sub>	52
10.6.1.	Conclusions for PM <sub>10</sub>	52
10.6.2.	Recommendation for PM <sub>10</sub>	52
10.7.	Sulphur dioxide	53
10.7.1.	Conclusions for Sulphur dioxide	53
10.7.2.	Recommendation for Sulphur dioxide	53
<b>Appendix 1: Details of real-time monitoring stations</b>		<b>54</b>

# **1. INTRODUCTION**

## **1.1. Purpose of Report**

This is a Progress Report of Air Quality in West Lothian.

## **1.2. Local Air Quality Management Areas**

There are currently no local air-quality management areas in West Lothian.

Linlithgow High Street is showing potential for becoming an Air Quality Management Area due to the number of daily exceedences of the PM<sub>10</sub> standard and the closeness to the annual mean. Details are provided on pages 39-45.

## **1.3. Detailed Assessments**

The Updating and Screening Assessment submitted in July 2006 concluded that it would not be necessary for West Lothian to proceed to a detailed assessment for any of the pollutants. The Scottish Environment Protection Agency (SEPA) and the Scottish Executive agreed with the conclusions.

Monitoring of Benzene has now ceased in West Lothian following a SEPA recommendation to this effect based on the Updating and Screening Assessment submitted in July 2006. Monitoring had found consistent low levels.

## **1.4. Current Monitoring**

### **1.4.1. Contaminates measured**

West Lothian has continued to monitor for Carbon monoxide(CO), Oxides of Nitrogen (NOX), Particulate Matter (PM<sub>10</sub>) and Sulphur dioxide (SO<sub>2</sub>) using the mobile air-quality monitoring unit (Groundhog).

### **1.4.2. Automated Sites**

West Lothian has continued to monitor NOX and PM<sub>10</sub> at Linlithgow High St with a roadside real-time analyser (Romon300). More than 12 months of data is now available. Results can be viewed on pages 23-29 and pages 39-45.

A Streetbox Gold is now located in East Main St, Broxburn (Grid Ref: NT 083 722), being installed on 23<sup>rd</sup> January 2007. Due to data quality problems, this unit will only be used for monitoring nitrogen dioxide for a monthly and annual mean. Daily means and PM<sub>10</sub> results are not considered reliable. This was discussed in detail in the 2006 Update and Screening Report.

A capital bid to the Scottish Executive for a further Romon300 to be located in Broxburn Town Centre has been successful. This was based on the higher levels of Nitrogen dioxide than at other diffusion tube sites in West Lothian. Monitoring of PM<sub>10</sub> has not been carried out in Broxburn, but is appropriate given the Nitrogen dioxide levels found and the nature of the site.

### **1.4.3. Diffusion tubes**

SEPA recommended that the Diffusion tube survey should be extended to incorporate the east end of Linlithgow High Street. Diffusion tubes have been located at High Port, Linlithgow (Grid Ref: NT 004 751).

Monitoring using Diffusion tubes has now been extended to monitor Alderstone Rd, Livingston(Grid Ref: NT 047 673) and Uphall Station(Grid Ref: NT 062 706) which is in close proximity to the M8. Results can be viewed on page 15.

#### 1.4.4. Monitoring of former Polkemmet Colliery Site

The Groundhog has been located at Cairnie Place, Whitburn since 31<sup>st</sup> January 2005 to monitor local air-quality at the open cast activities and reclamation of the burning spoil heaps at the former Polkemmet Colliery. Results for Cairnie Place can be viewed at [www.air-quality.net](http://www.air-quality.net).

### 1.5. Site relocation

Redevelopment of a site immediately adjacent to the Linlithgow High Street Romon (See Appendix 1 for location) is planned. It may be necessary to re-locate the unit to ensure that data can be considered reliable for the duration of the project. Given the space constraints in the area, it may be necessary for the unit to become kerbside rather than roadside as is currently the case.

## **2. AIR QUALITY: QA/QC**

### **2.1. Automated Sites and Equipment**

#### **2.1.1. Groundhog, Carnie Place, Whitburn**

The Groundhog is a mobile air-quality monitoring unit, which has been with West Lothian Council, Environmental Health since September 1999. The Groundhog is used to house real-time analysers measuring Carbon monoxide (CO), Nitrogen dioxide (NO<sub>2</sub>), Oxides of nitrogen (NOX), Nitric oxide (NO), Sulphur dioxide (SO<sub>2</sub>), and Particulate matter (PM<sub>10</sub>). This was originally provided by Casella Eti.

#### **2.1.2. Romon 300, Linlithgow High Street**

The Romon300 roadside analyser has been with Environmental Health since December 2005 and this unit houses two real-time analysers measuring Nitrogen dioxide (NO<sub>2</sub>), Oxides of nitrogen (NOX), Nitric oxide (NO) and Particulate matter (PM<sub>10</sub>).

#### **2.1.3. Reliability**

Both the Groundhog and Romon have an air-conditioning unit to maintain a constant temperature throughout the year. Analysers are therefore less likely to break down. There are also alarm settings on each of the analysers, so that any fault with an analyser can be detected and resolved quickly.

### **2.2. Analyser Maintenance and calibration**

#### **2.2.1. In house procedures**

Weekly quality control/quality assurance procedures are in place to ensure data validity. This includes checking gas levels. Records are kept of new gas cylinder installations, filter changes and other site visits.

The gases zero air, Nitric oxide, Carbon monoxide and Sulphur dioxide are used to calibrate the real-time analysers to ensure the data is valid. These are supplied by Air Liquide.

West Lothian Council performs a manual calibration of the Groundhog and Romon300. This is completed once a fortnight and these results are recorded to establish if there is any kind of drift. A sudden drift between the span measured and span reference would indicate that there may be a fault with the analyser.

If after a manual calibration has been carried out there is still a large drift, Casella Eti will be notified and are contracted to investigate the fault within 48 hours. In such instances, a diagnostics sheet is filled out and faxed through to Casella. This gives the engineer an idea of what the problem is before the visit.

#### **2.2.2. Procedures specific to the TEOM (tapered element oscillating microbalance) - PM10 Analyser**

The filter in the TEOM is changed before the lifetime of the filter reaches 85%. Before the filter is changed, a pre-calibration checklist is completed. Once the filter has been changed, a post-calibration checklist is completed one hour later. This reduces the likelihood of faults induced or associated with the filter change. The TEOM head is also cleaned each time the filter is changed.

### **2.2.3. Contracted in services**

West Lothian Council has a maintenance contract with Casella Eti for both automated sites. This includes:

- Technical support 9am to 5pm, Monday to Friday for the Enviro 2000 software;
- Maintenance of the equipment, with a service carried out every six months;
- 48-hour call-out for any equipment breakdown so that the fault can be quickly identified and rectified to minimise data loss; and
- Daily checks of the ambient data, automatic calibrations and communications. Any anomalies identified are reported to West Lothian council.

## **2.3. Data Acquisition, Security and Dissemination**

### **2.3.1. Data Acquisition**

Data is downloaded to a stand-alone computer for both units through a modem link using Enviro 2000 software twice a day. This permits levels to be checked daily and to identify any exceedences.

### **2.3.2. Data Security**

There are strategies in place to minimise data loss. When a monthly periodic report is carried out the data is transferred into Excel and saved onto CD-ROM to back up the data.

### **2.3.3. Data Dissemination**

Casella Eti provide a web-site for displaying West Lothian Council's air quality data. This includes a twice daily data collection and automatic posting of data onto the web-site.

## **2.4. Data Validation**

A Periodic report in Enviro software is carried out once a month for the pollutants NO<sub>2</sub>, SO<sub>2</sub>, CO & PM10. This is to screen the data and to ensure that any large peaks or high concentrations due to breakdowns of the analyser can be invalidated.

### 3. PROGRESS REPORT FOR BENZENE

#### 3.1. Introduction

West Lothian Council ceased to monitor for Benzene in October 2006 due to levels being consistently below the Standard and Objective for Benzene and a SEPA recommendation to this effect. However results for Benzene monitoring carried out from January to October 2006 at the four locations can be seen below.

#### 3.2. Standard and Objective for Benzene

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

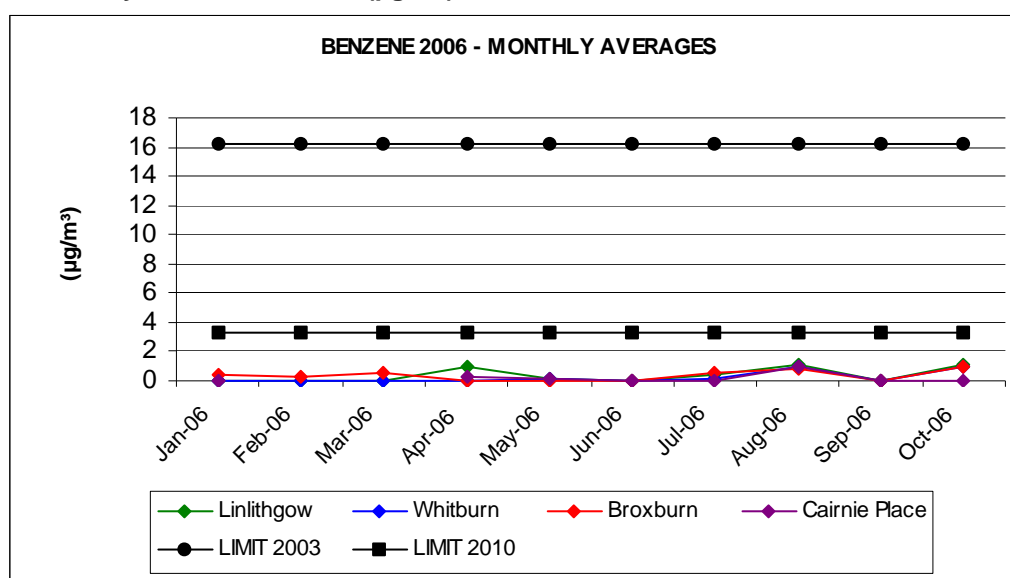
- All authorities: Running annual mean of  $16.25\mu\text{g}/\text{m}^3$  to be achieved by 31.12.2003
- Authorities in Scotland and Northern Ireland only: Running annual mean of  $3.25\mu\text{g}/\text{m}^3$  to be achieved by 31.12.2010

#### 3.3. Monitoring Results 2006

Figure 3.1 below shows the monthly benzene results for January to October 2006 for the four sites in West Lothian. The four sites are:

- 212 High St, Linlithgow;
- 15 East Main St, Whitburn;
- 18-22 East Main St, Broxburn; and
- 12 Caroline Park, Mid Calder.

**Figure 3.1 – Monthly Benzene Results ( $\mu\text{g}/\text{m}^3$ ) – YEAR 2006**





**Table 3.1– Results for Benzene, Toluene and Xylene – Year 2006 (Results are in ppb for toluene and xylene)**

Date	Linlithgow			Whitburn			Broxburn			Cairnie Place		
	Benzene	Toluene	Xylene	Benzene	Toluene	Xylene	Benzene	Toluene	Xylene	Benzene	Toluene	Xylene
Jan-06	<0.2	1.9	1.3	<0.2	0.7	0.4	0.4	2.1	0.5	<0.2	2.7	3.7
Feb-06	<0.2	0.6	3	<0.2	0.9	1.8	0.3	1	0.4			
Mar-06	<0.2	1.7	1.6	<0.2	0.9	0.7	0.6	1.4	1.3			
Apr-06	1	5.9	2.7	<0.2	0.4	1.1	<0.2	0.6	0.8	0.3	0.6	1
May-06	0.2	0.3	0.2	0.2	0.4	4.8	<0.2	0.4	2.1	0.2	<0.2	<0.2
Jun-06	<0.2	0.2	0.6	<0.2	0.7	0.9	<0.2	0.2	0.9	<0.2	<0.2	0.2
Jul-06	0.4	0.8	8.3	0.2	1.9	8.4	0.5	2.2	10	<0.2	0.4	2
Aug-06	1.1	10.6	11.7	0.9	11.1	8.5	0.8	3.5	1.8	0.9	5.8	6.7
Sep-06	<0.2	<0.2	5.3	<0.2	6.7	5	<0.2	8.1	1	<0.2	3.4	4.5
Oct-06	1.1	2.1	0.6	0.9	3.2	0.6	0.9	15.4	3.1	<0.2	2.7	2.6
Nov-06												
Dec-06												
<b>Average(ppb)</b>	<b>0.5</b>			<b>0.3</b>			<b>0.4</b>			<b>0.3</b>		
<b>Average(µg/m³)</b>	<b>1.63</b>			<b>0.97</b>			<b>1.3</b>			<b>0.98</b>		

### **3.4. Conclusion for Benzene**

The Benzene tube results indicate that in West Lothian, the air quality standard and objective of  $16.25\mu\text{g}/\text{m}^3$  and  $3.25\mu\text{g}/\text{m}^3$  are being achieved for all four sites in West Lothian.

Due to consistently low levels over the years, West Lothian Council has decided to cease monitoring of Benzene.

There are no significant industrial sources of benzene located either within West Lothian or neighbouring areas which are likely to adversely affect air quality.

## **4. PROGRESS REPORT FOR 1,3 – BUTADIENE**

### **4.1. Introduction**

No monitoring of 1,3 – Butadiene is carried out in West Lothian.

There are no significant industrial sources of this pollutant within West Lothian and this situation has not changed. There have been no new developments in West Lothian that are likely to emit 1,3 – Butadiene in 2006.

### **4.2. Standard and Objective for 1,3 – Butadiene**

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

- Running annual mean of  $2.25\mu\text{g}/\text{m}^3$  to be achieved by 31.12.2003

### **4.3. Conclusion for 1,3 – Butadiene**

No monitoring of 1,3 – Butadiene is carried out in West Lothian. It is not considered necessary due to the lack of industrial sources within West Lothian.

## 5. PROGRESS REPORT FOR CARBON MONOXIDE

### 5.1. Introduction

Monitoring for Carbon monoxide has continued during 2006 and is measured with the real-time analyser located within the Groundhog. The Groundhog has been located at Cairnie Place, Whitburn since 31<sup>st</sup> January 2005.

### 5.2. Standard and Objective for Carbon monoxide

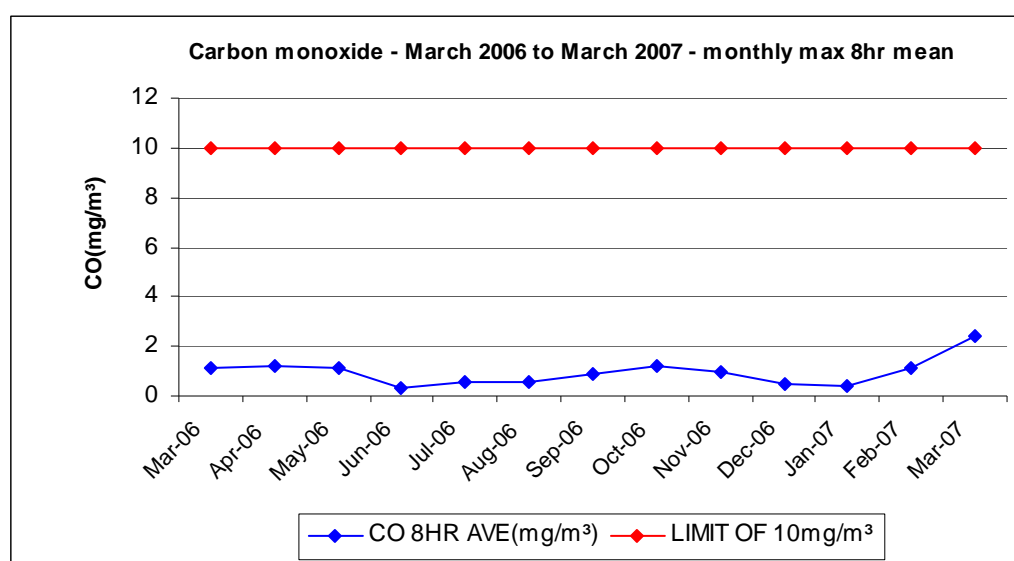
The Air Quality (Scotland) Regulations 2000 and amendment regulations 2002 set the following objectives:-

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

### 5.3. Monitoring Results: 2006

Problems were encountered with the analyser in November 2006 resulting in very low readings. This was traced to a faulty Dayton manifold fan by the Casella Eti Engineer and was repaired on 8<sup>th</sup> December 2006

Figure 5.1 – Cairnie Place – March 2006 to March 2007 – monthly 8hr mean



### 5.4. Conclusion for Carbon monoxide

There have been no exceedences of the air quality standard for Carbon monoxide. Therefore there remains no need to proceed to a detailed assessment.

No changes in Carbon monoxide levels have been observed due to the reclamation of the burning bin at Polkemmet.

## **6. PROGRESS REPORT FOR LEAD**

### **6.1. Introduction**

No monitoring of Lead is carried out within West Lothian as there are no significant sources of lead. There have been no new industrial sources identified this year.

### **6.2. 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

### **6.3. Industrial Sources**

The position stated previously in the last Updating and Screening Assessment submitted in July 2006 remains unchanged. There are no new industrial sources of lead in West Lothian that are likely to affect the air quality objective.

### **6.4. Conclusion for Lead**

No monitoring of lead is carried out in West Lothian. There is no need to proceed to a detailed assessment.

## **7. PROGRESS REPORT FOR NITROGEN DIOXIDE**

### **7.1. Introduction**

Monitoring of Nitrogen dioxide in West Lothian has continued using two real-time analysers and a network of passive diffusion tubes.

#### **7.1.1. Automated real-time analysers**

Real-time analysers are located within the air-quality monitoring unit (Groundhog) at Cairnie Place, Whitburn and within the Romon300 at Linlithgow High Street.

A problem was again encountered with the cooler temperature on the NOX analyser resulting in the analyser being removed on 29<sup>th</sup> September 2006 and sent to the Casella Service centre in Bedford. A spare NOX analyser was provided and installed by the Casella Engineer on the 2<sup>nd</sup> October 2006 resulting in only a few days lost data. A funding bid to the Scottish Executive for a replacement analyser has been successful. This will be installed in the next few months.

#### **7.1.2. Diffusion Tubes**

West Lothian Council has continued monitoring with passive diffusion tubes. The diffusion tube survey has been extended to nine sites. Two tubes are located at eight of the sites and three tubes co-located with the real-time analyser at Cairnie Place.

As detailed in the last Updating and Screening Assessment there is no longer a U.K Nitrogen dioxide network for diffusion tubes. However, data remains valuable and West Lothian Council is committed to making it publicly available. The council has therefore continued to input data on the web based data entry system provided by AEA Technology Environment (NETCEN). AEA continue to provide local authorities with a calendar of suggested exposure periods for monthly changes of the diffusion tubes. Details of the locations of the diffusion tube sites can be seen on page 15.

### **7.2. Standard and Objective for Nitrogen Dioxide**

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

- 1-hr 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

### **7.3. Monitoring Data**

#### **7.3.1. Automated real-time analysers**

The real-time results for both real-time analysers (Groundhog at Cairnie Place, Whitburn and the Romon 300 at Linlithgow High Street) have been reported from March 2006 to February 2007. The results can be seen on pages 16-22 and 23-29 respectively.

### 7.3.2. Diffusion Tubes

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 results for the diffusion tubes for 2006 can be seen on page 15.

## 7.4. Groundhog and Diffusion tube comparison

### 7.4.1. Background

Three diffusion tubes have been co-located with the Groundhog since January 2005. A comparison of the diffusion tubes with the real-time analyser and how the bias factors have been calculated are shown below. These can then be applied to the diffusion tube results for other sites in West Lothian.

The bias correction factors for the diffusion tubes were taken from TG.03, Box 6.4, page 6-7 of the technical guidance.

### 7.4.2. Bias Correction factors: Bias factor Method A:

$A = C_m / D_m$ , where:

- $C_m$  = annual mean real-time analyser result; and
- $D_m$  = annual mean diffusion tube result

### 7.4.3. Bias Correction factors: Bias factor Method B:

$B = (D_m - C_m) / C_m$

### 7.4.4. Diffusion Tube Results at Cairnie Place, Whitburn – April 2006 to March 2007

Three diffusion tubes have been co-located at this site during 2006.

**Table 7.1**

Whitburn	Groundhog (Real-time) Monthly Average( $\mu\text{g}/\text{m}^3$ )	Co-located diffusion tubes (average)
April 2006	14.8	14
May 2006	15.3	13
June 2006	22.9	13
July 2006	18.5	9
August 2006	23.6	15
September 2006	19.0	17
October 2006	21.1	17
November 2006	19.3	17
December 2006	18.6	17
January 2007	14.3	23
February 2007	24.3	27
March 2007	19	7
<b>Annual Average (12 MONTHS)</b>	<b>19<math>\mu\text{g}/\text{m}^3</math></b>	<b>16<math>\mu\text{g}/\text{m}^3</math></b>

Bias factor method A:  $19/16 = 1.19$

Diffusion tube correction =  $1.19 \times 16 = 19.0 \mu\text{g}/\text{m}^3$

Bias factor method B :  $(16 - 19)/19 = -0.16$ (16% UNDER READ)

During this 12-month period the diffusion tubes were under reading by 16%

## 7.5. Diffusion Tube Results: 2006

Table 7.2 – Diffusion tube Results – Year 2006 – Results in  $\mu\text{g}/\text{m}^3$

DATE	WL 1	WL 7	WL 3	WL 8	WL 4	WL 9	WL 5	WL 10	WL 6	WL 11	WL 12	WL 13	WL 14	WL 15	WL 18	WL 16	WL 19	WL 17	WL 20
Location	East Main Street, Whitburn		72 Cedric Rise, Dedridge, Livingston		59 High Street, Bathgate		East Main Street, Broxburn		212 High Street, Linlithgow		Groundhog, Cairnie Place, Whitburn,			High Port, Linlithgow		Uphall Station, Uphall, (Roadside site – Grid		Alderstone Road, Livingston	
Grid Reference	NS 948 651		NT 064 664		NS 978 693		NT 083 722		NS 999 771		NS 944 641			NT 005 771		NT 062 706		NT 047 674	
Type	Roadside site		Background		Background		Roadside		Roadside		Co- located with real-time analyser			Roadside		Roadside		Roadside	
JAN 06	27	18	37	34	27	43	51	35	31	57	46	33	26						
FEB 06	30	35	20	22	19	22	26	36	38	34	22	24	25						
MAR 06	30	28	24	20	16	20	45	38	41	33	20	22	21						
APR 06	11	23	11	10	11	11	34	35	28	29	16	17	10						
MAY 06	24	25	11	16	10	10	26	33	30	28	16	12	11						
JUN 06	28	17	16	11	8	11	29	41	24	20	16	6	17						
JUL 06	27	19	10	13	9	10	36	25	22	19	8	10	10						
AUG 06	23	20	12	12	6	7	27	23	30	40	16	13	15						
SEP 06	21	19	14	10	12	13	30	34	~	~	15	17	18						
OCT 06	22	17	16	37	17	25	33	14	30	10	17	19	15						
NOV 06	<1	<1	13	16	<1	20	40	41	28	24	18	15	18						
DEC 06	20	21	16	13	18	15	37	32	27	28	16	18	17	32	<1	27	29	22	26
AVERAGE	22	20	17	18	13	17	34	32	27	27	19	17	17	32	<1	27	29	22	26
Bias correction (1.19)	26	24	20	21	16	20	41	38	32	32	23	20	20	38	<1	32	35	26	31



## 7.6. Real-time monitoring results: Cairnie Place, Whitburn

### 7.6.1. 1 hour averages

Figure 7.3 – Cairnie Place, Whitburn – March 2006 – 1hr average

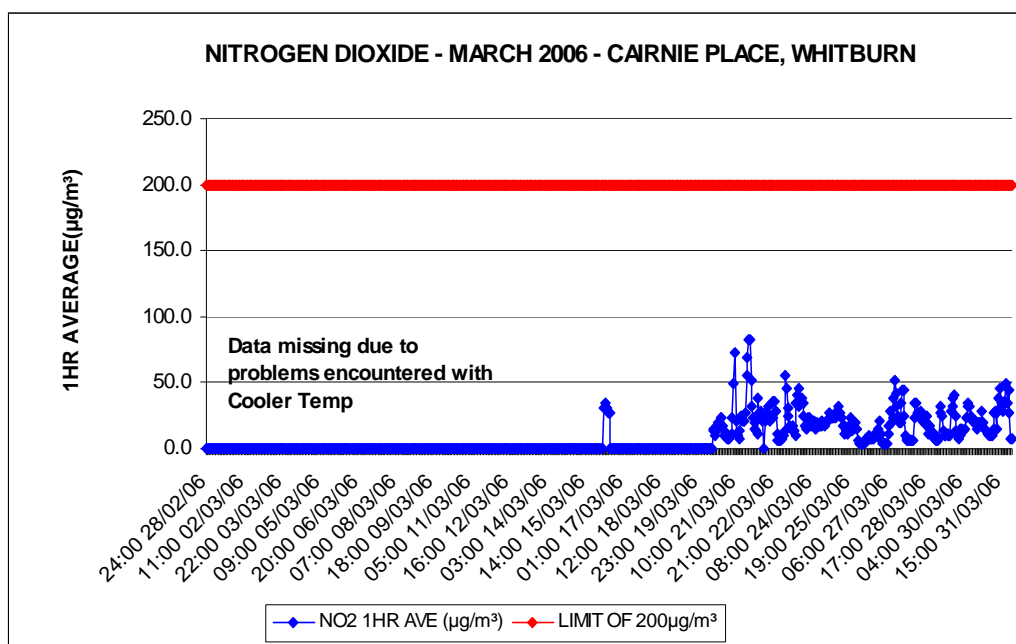
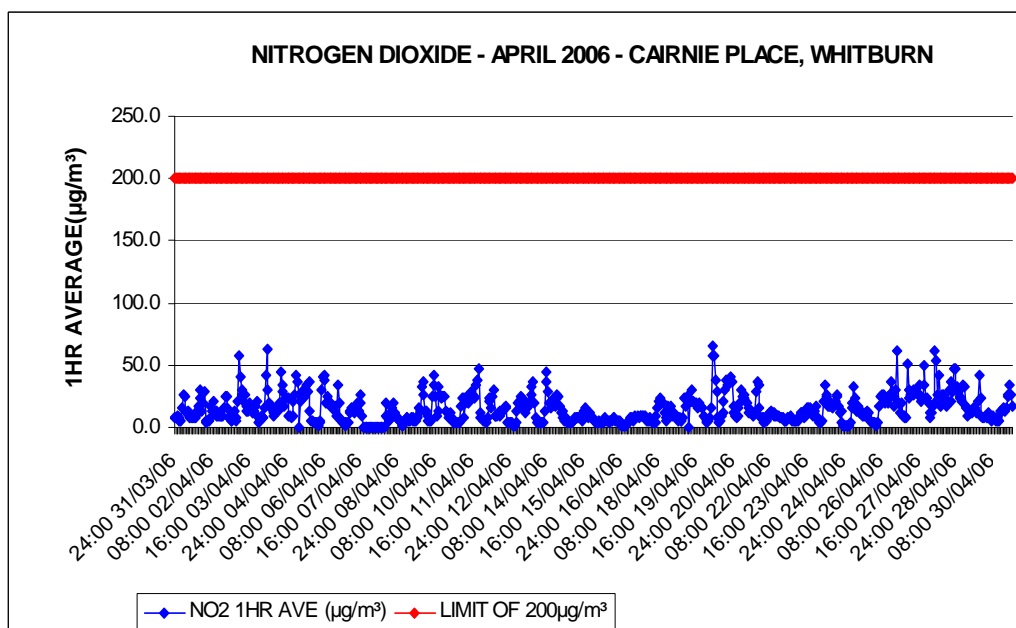
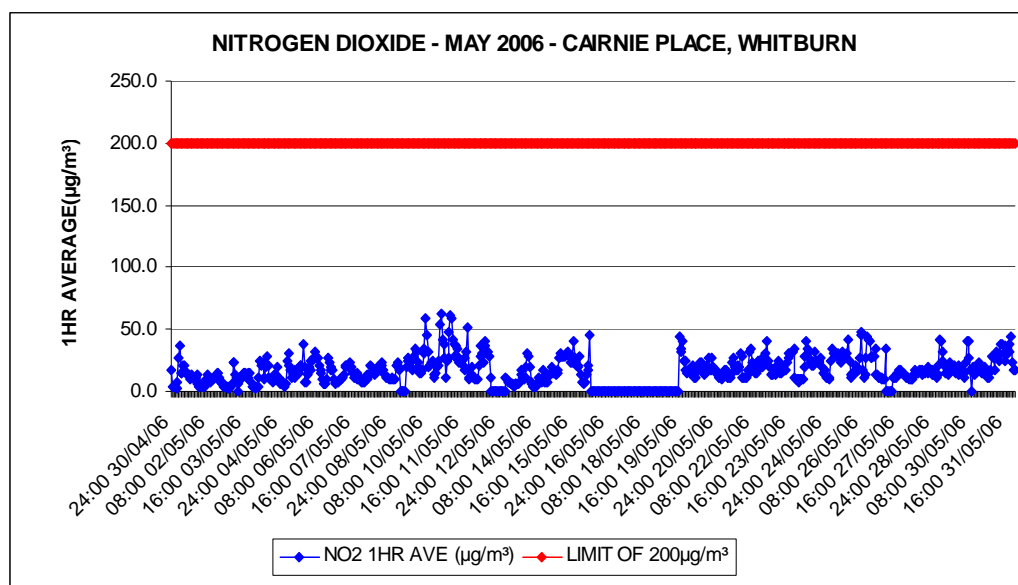


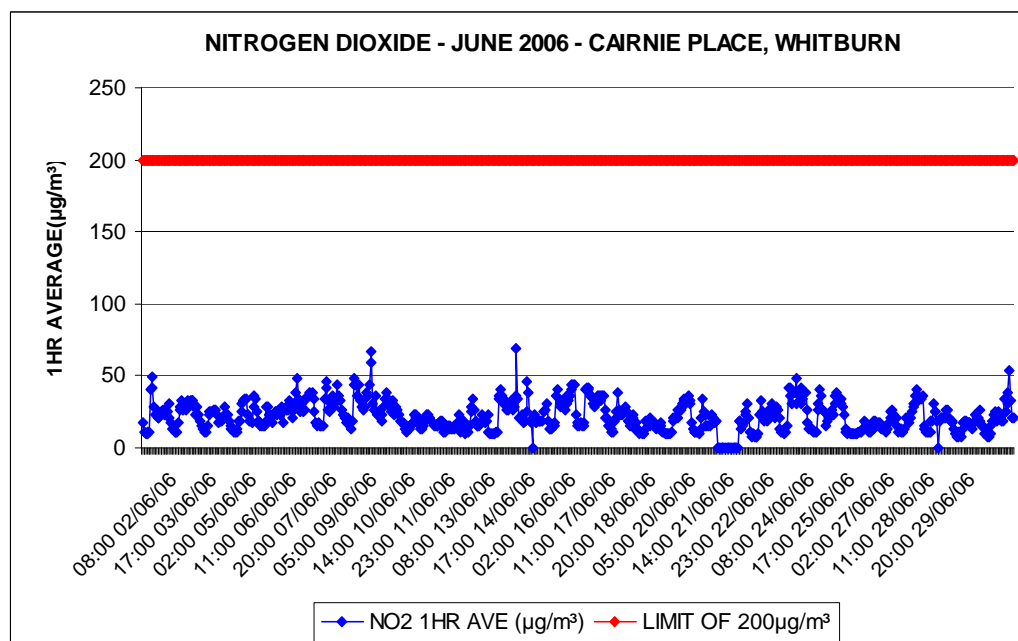
Figure 7.4 – Cairnie Place, Whitburn – April 2006 – 1hr average



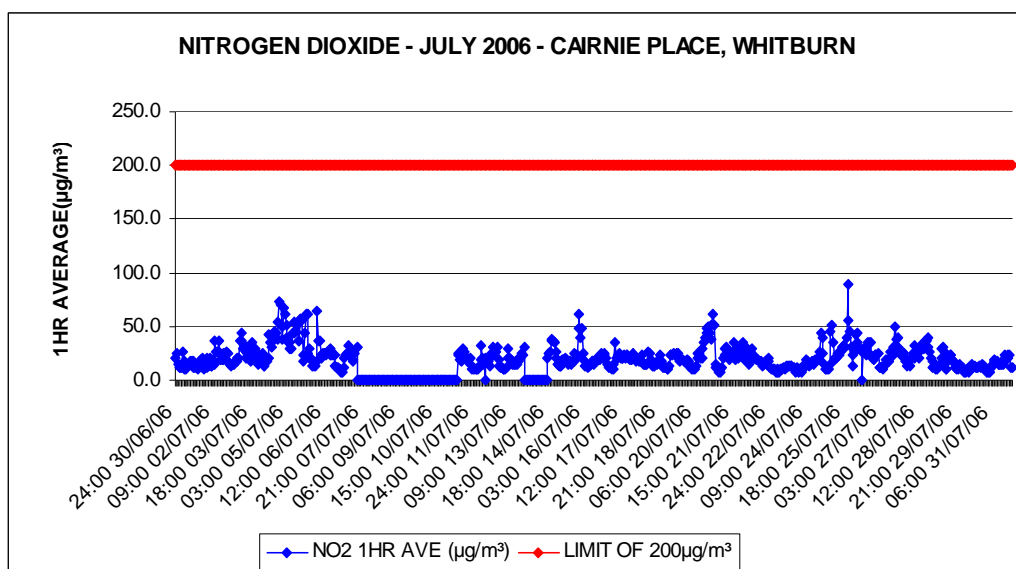
**Figure 7.5 – Cairnie Place, Whitburn – May 2006 – 1hr average**



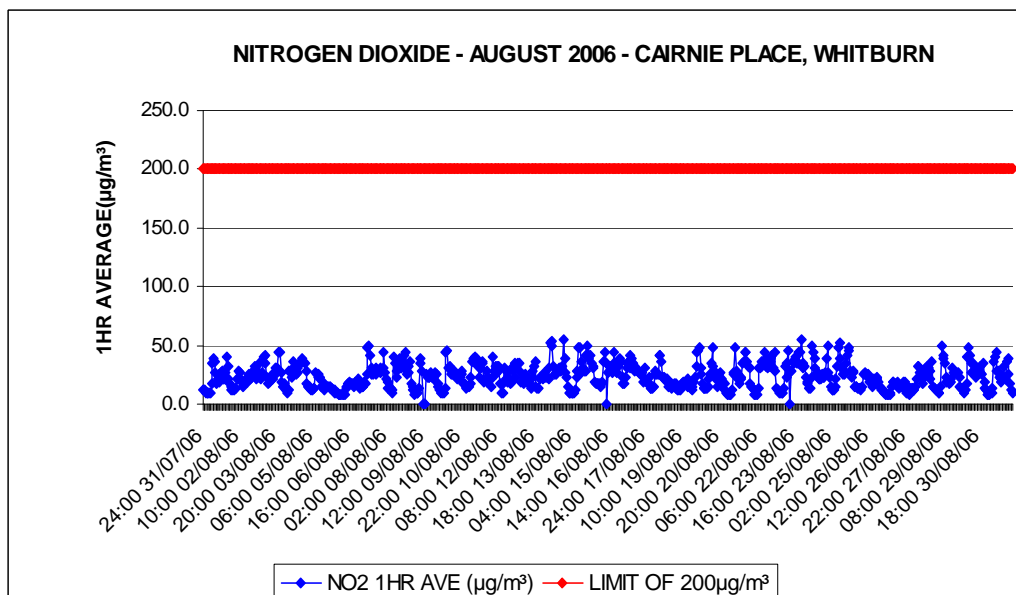
**Figure 7.6 – Cairnie Place, Whitburn – June 2006 – 1hr average**



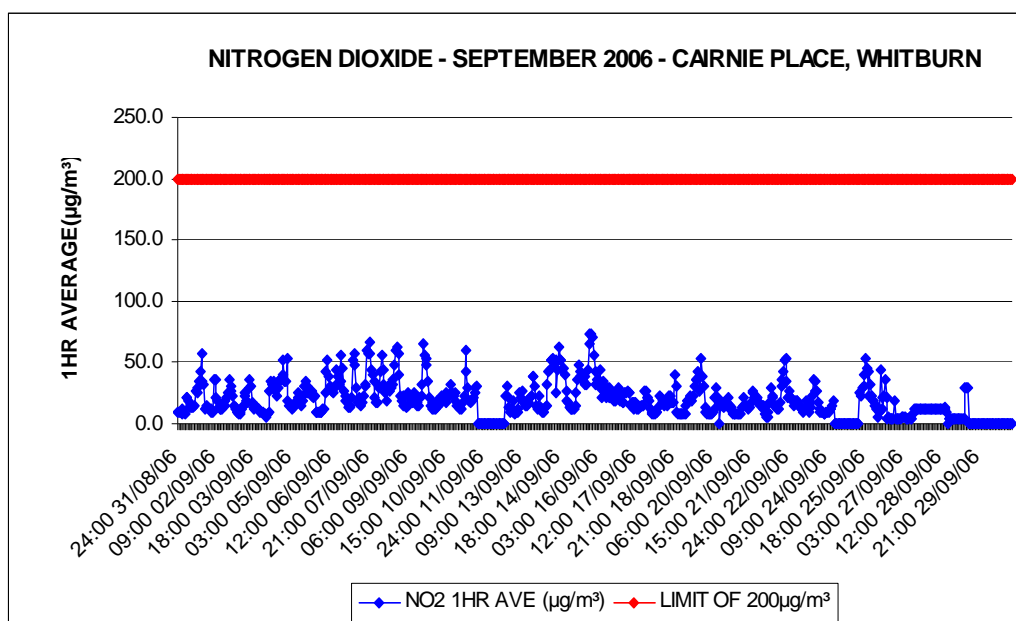
**Figure 7.7 – Cairnie Place, Whitburn – July 2006 – 1hr average**



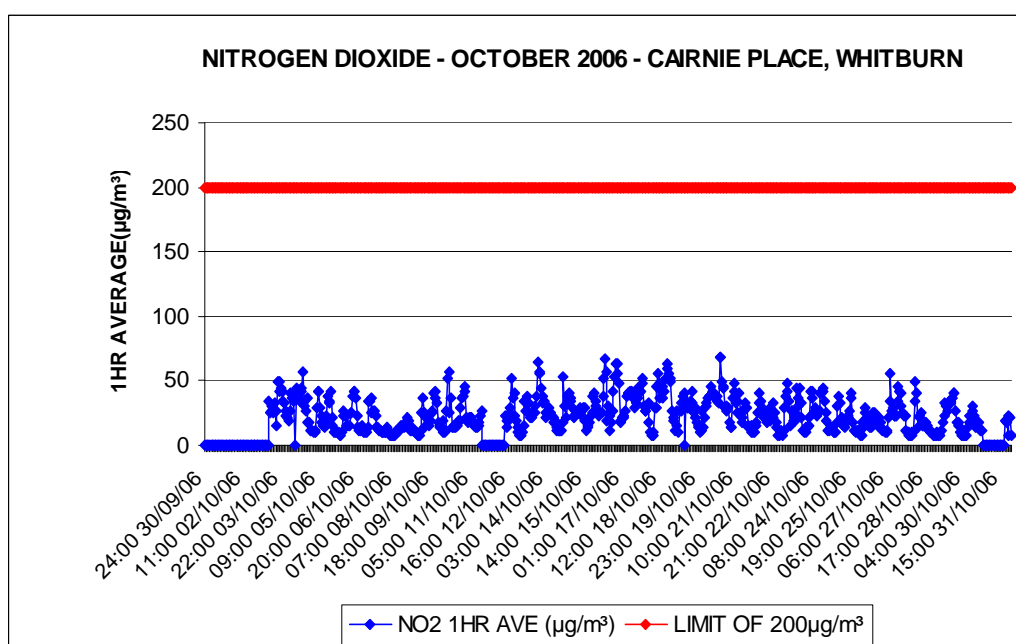
**Figure 7.8 – Cairnie Place, Whitburn – August 2006 – 1hr average**



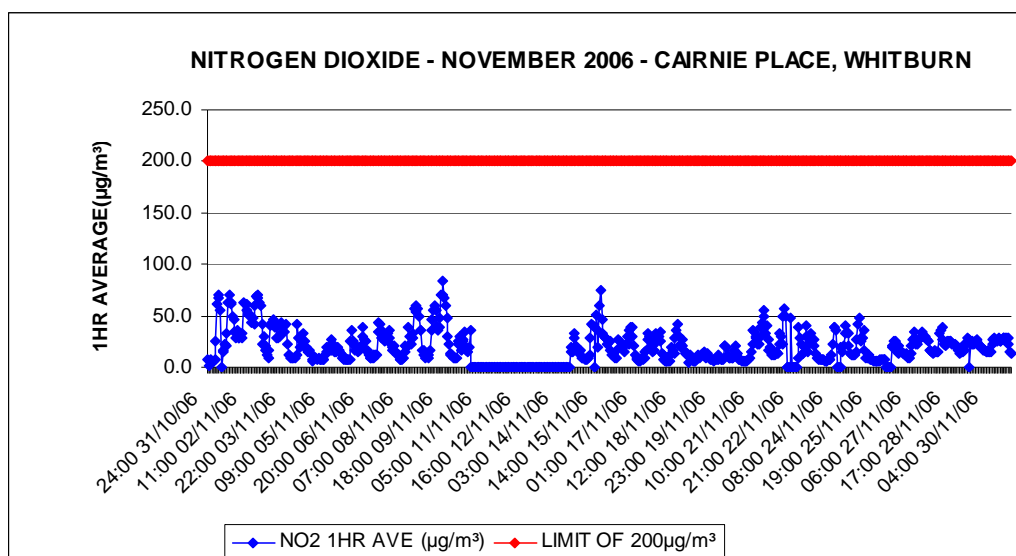
**Figure 7.9 – Cairnie Place, Whitburn – September 2006 – 1hr average**



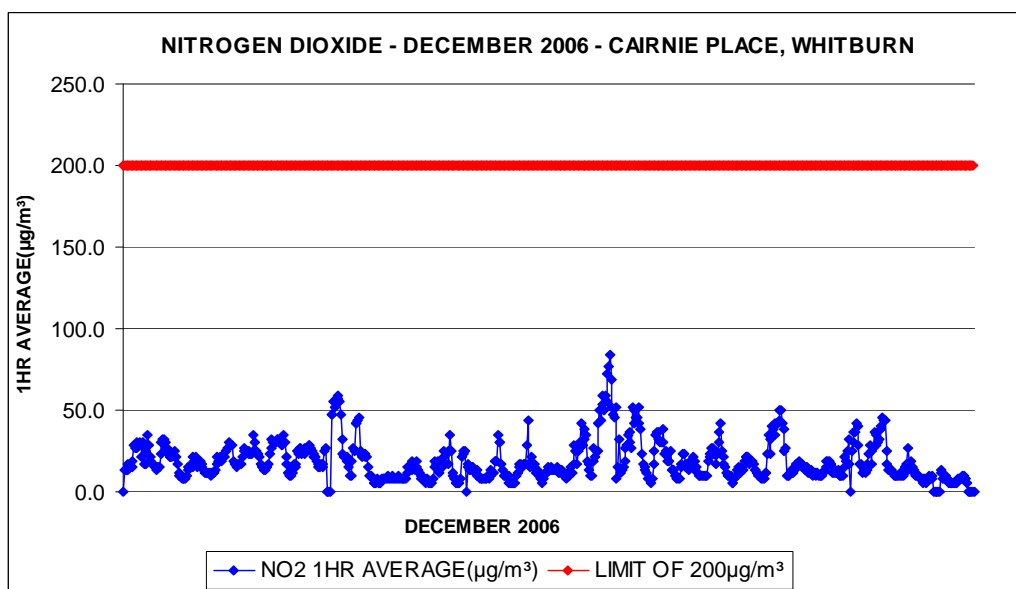
**Figure 7.10 – Cairnie Place, Whitburn – October 2006 – 1hr average**



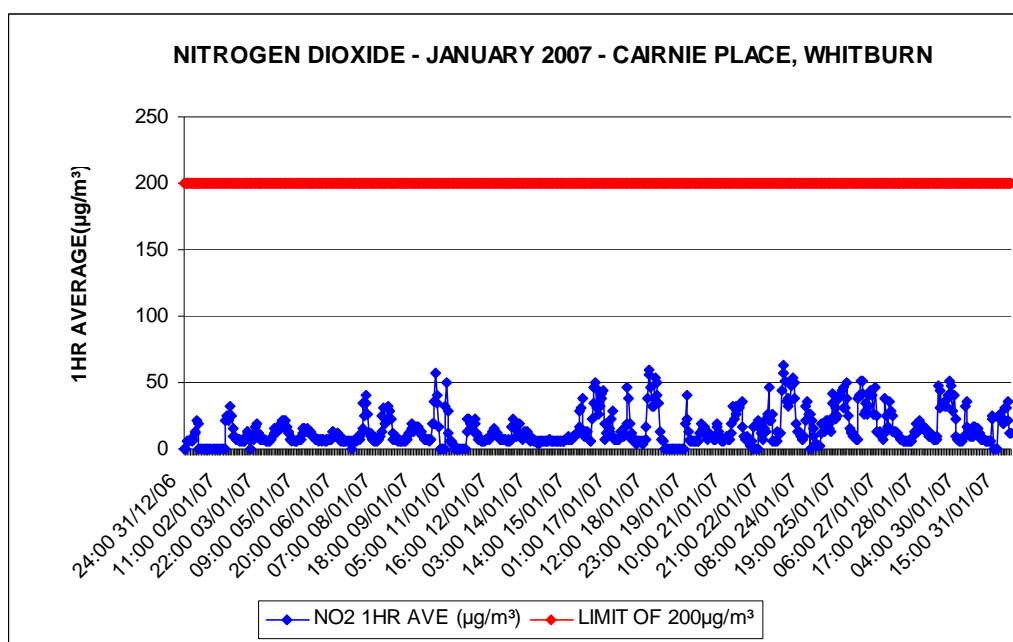
**Figure 7.11 – Cairnie Place, Whitburn – November 2006 – 1hr average**



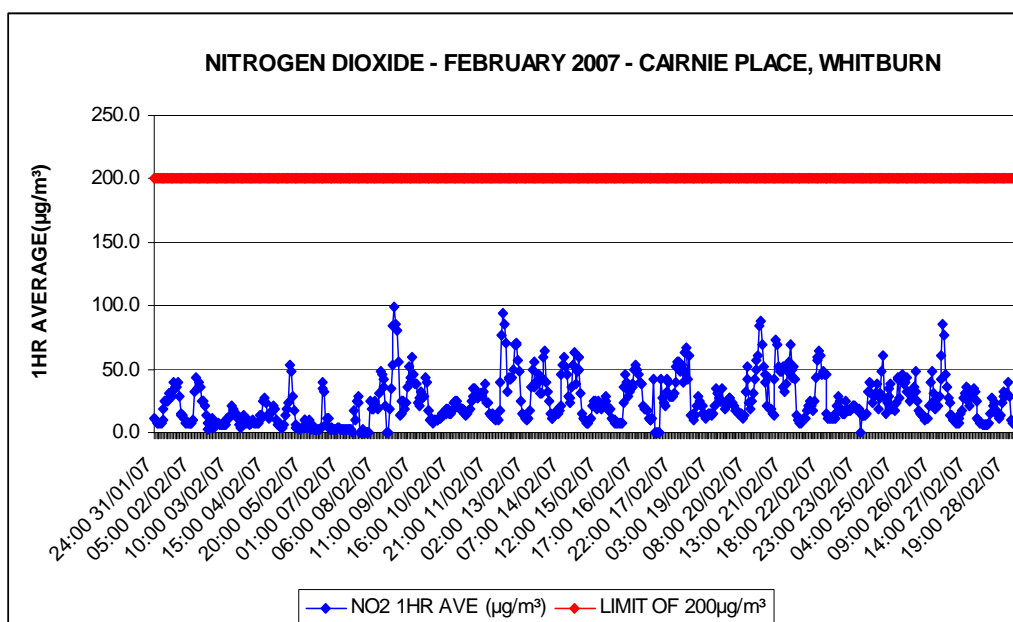
**Figure 7.12 – Cairnie Place, Whitburn – December 2006 – 1hr average**



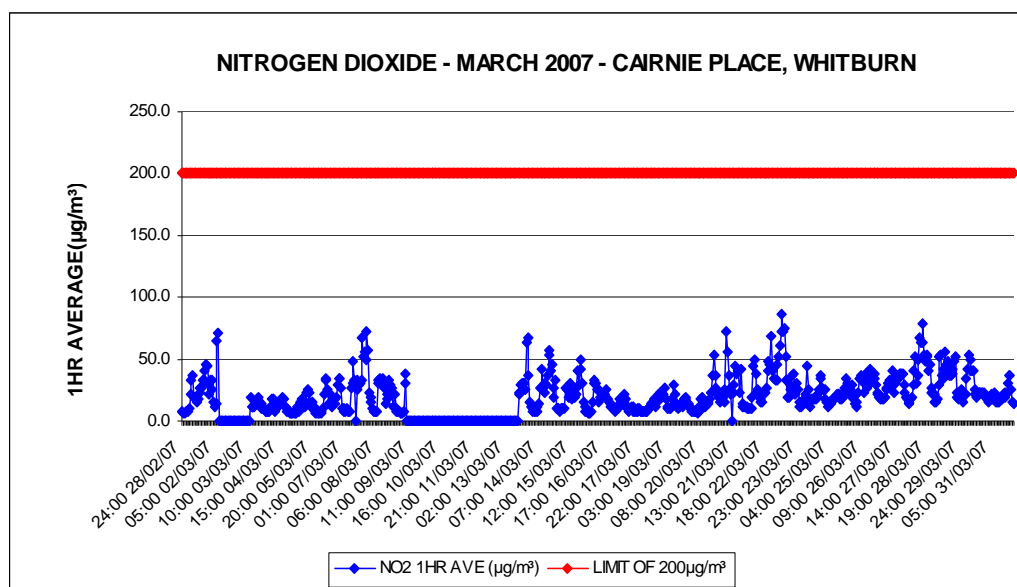
**Figure 7.13 – Cairnie Place, Whitburn – January 2007 – 1hr average**



**Figure 7.14 – Cairnie Place, Whitburn – February 2007 – 1hr average**



**Figure 7.15 – Cairnie Place, Whitburn – March 2007 – 1hr average**



#### 7.6.2. Monthly and Annual averages

**Table 7.3 – Cairnie Place, Whitburn – monthly & annual averages**

MONTHLY AVERAGE	NO <sub>2</sub> (µg/m <sup>3</sup> )
April 2006	14.8
May 2006	15.3
June 2006	22.9
July 2006	18.5
August 2006	23.6
September 2006	19.0
October 2006	21.1
November 2006	19.3
December 2006	18.6
January 2007	14.3
February 2007	24.3
March 2007	19.0
<b>ANNUAL AVERAGE (12 MONTHS)</b>	<b>19.2µg/m<sup>3</sup></b>

From figures 7.3 to 7.15 the highest reading for the 1hr mean for Nitrogen dioxide from April 2006 to March 2007 was 99.3µg/m<sup>3</sup>, which meets the 1hr standard of 200µg/m<sup>3</sup> for 31.12.2005. Table 7.3 shows that there was a 12 month average of 19.2µg/m<sup>3</sup> for Nitrogen dioxide when the Groundhog was located at Cairnie Place, Whitburn which meets the annual mean of 40µg/m<sup>3</sup>.

## 7.7. Real-time monitoring results: Linlithgow High Street

### 7.7.1. 1 Hour averages

Figure 7.15 – Linlithgow High St – March 2006 – 1hr average

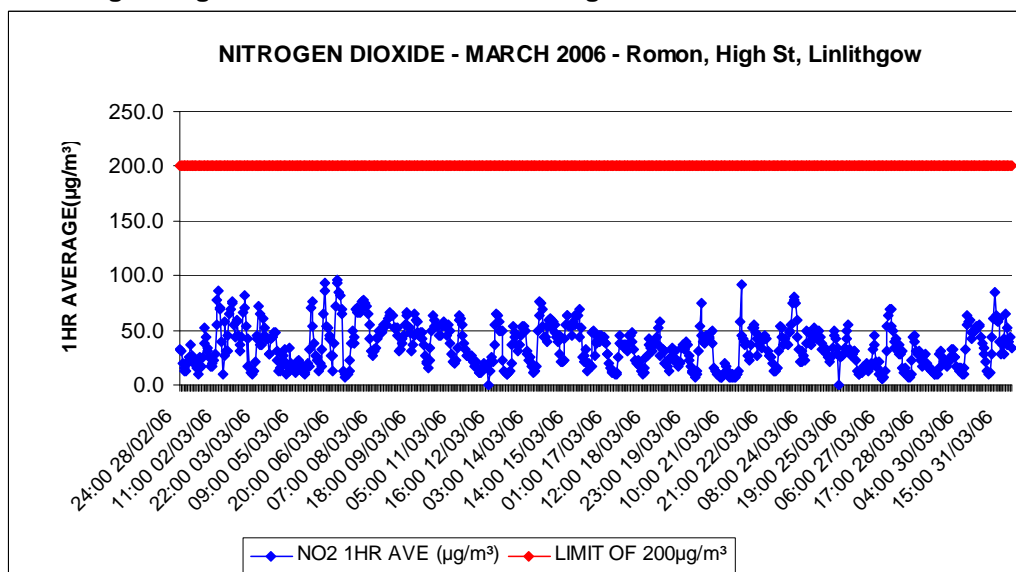
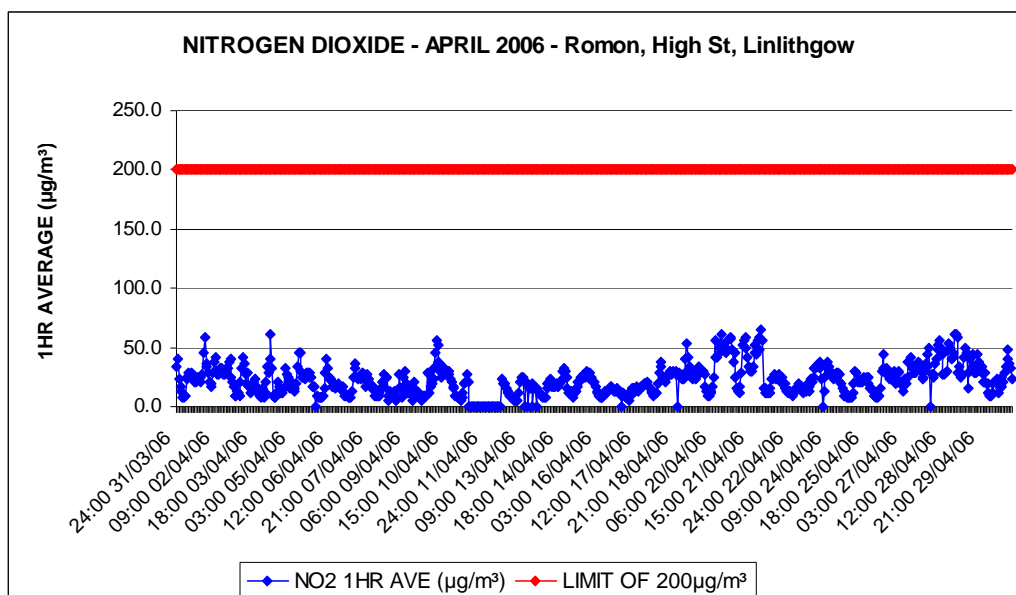
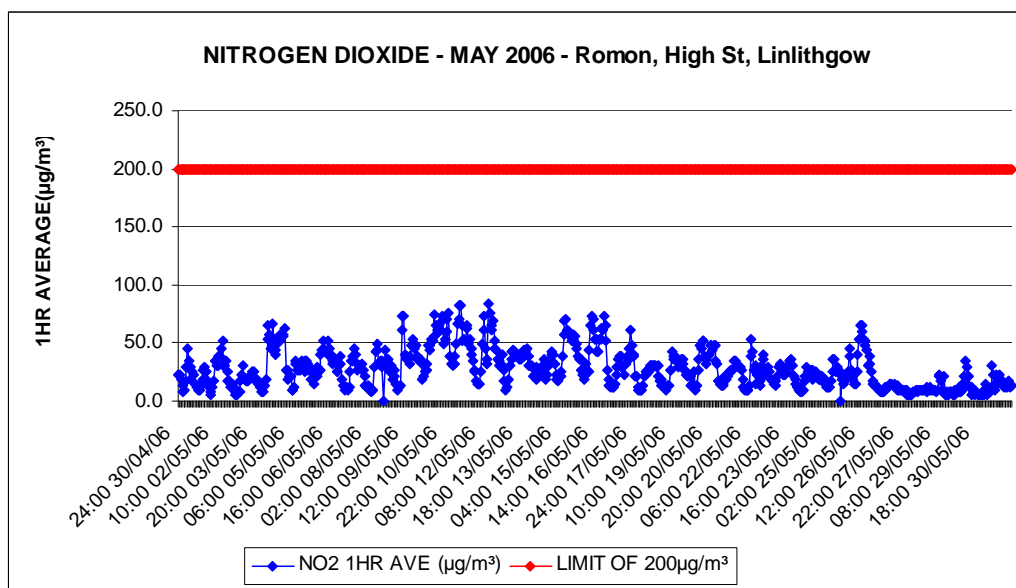


Figure 7.16 – Linlithgow High St – April 2006 – 1hr average

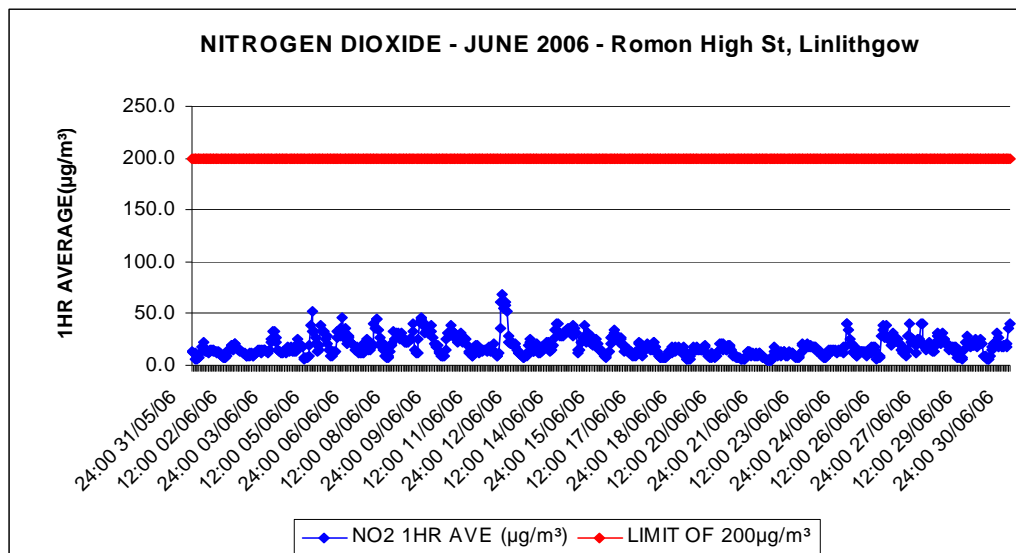




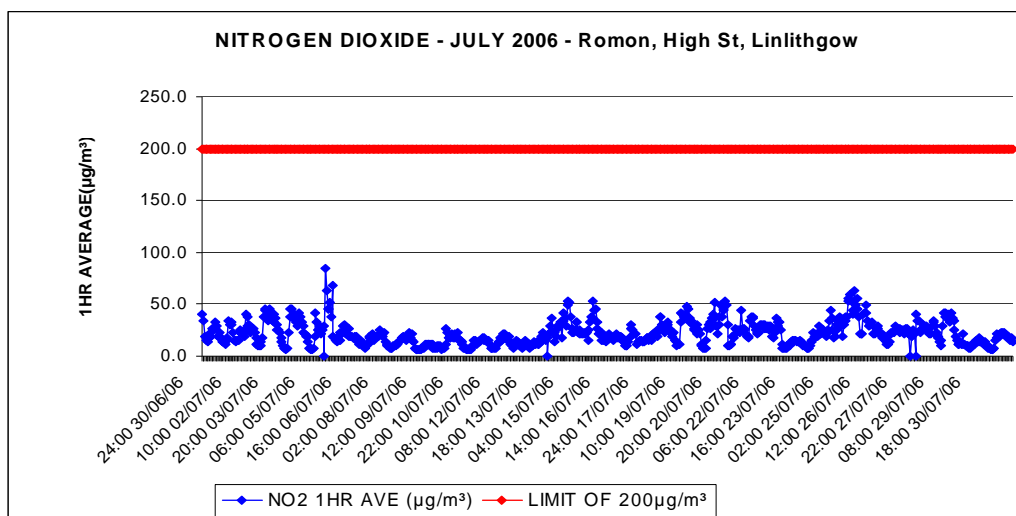
**Figure 7.17 – Linlithgow High St – May 2006 – 1hr average**



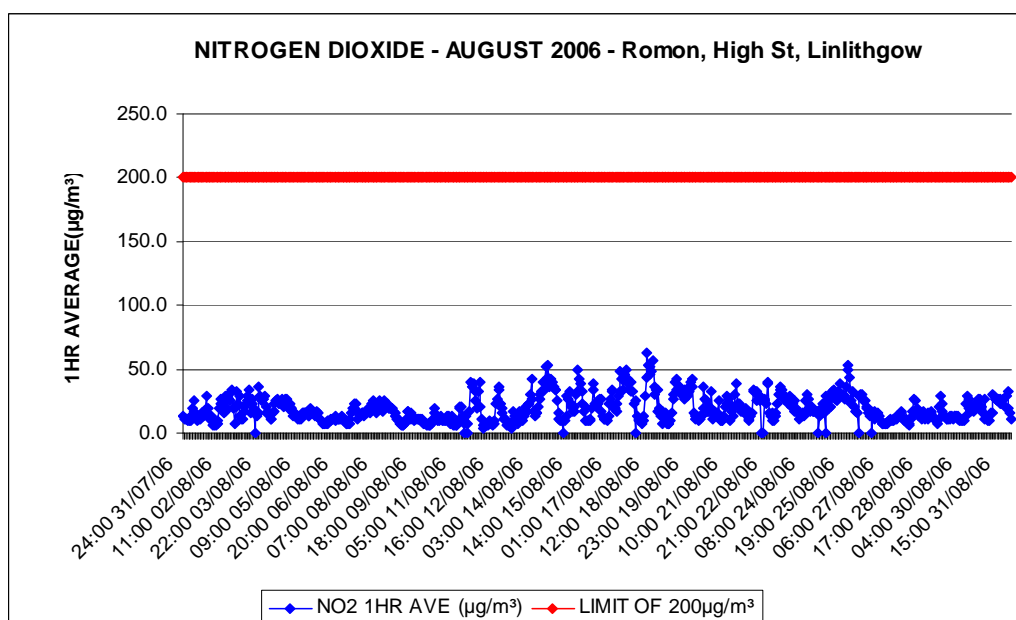
**Figure 7.18 – Linlithgow High St – June 2006 – 1hr average**



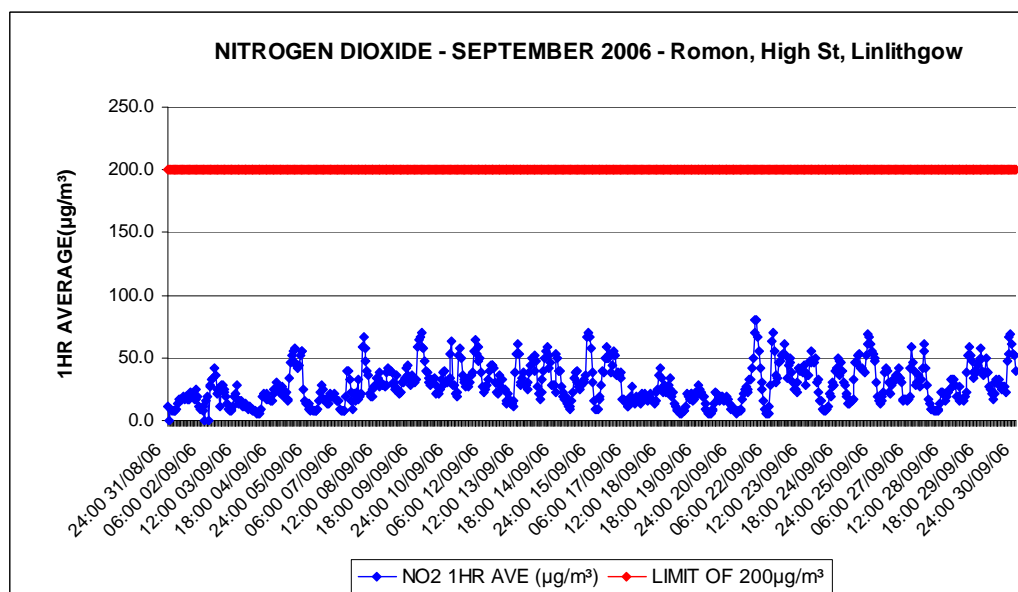
**Figure 7.19 – Linlithgow High St – July 2006 – 1hr average**



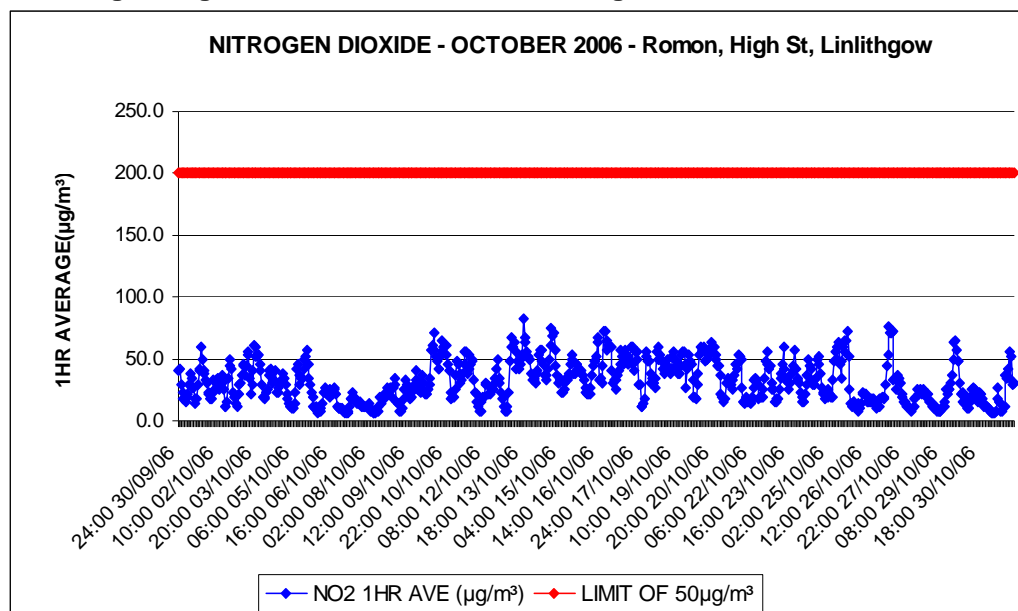
**Figure 7.20 – Linlithgow High St – August 2006 – 1hr average**



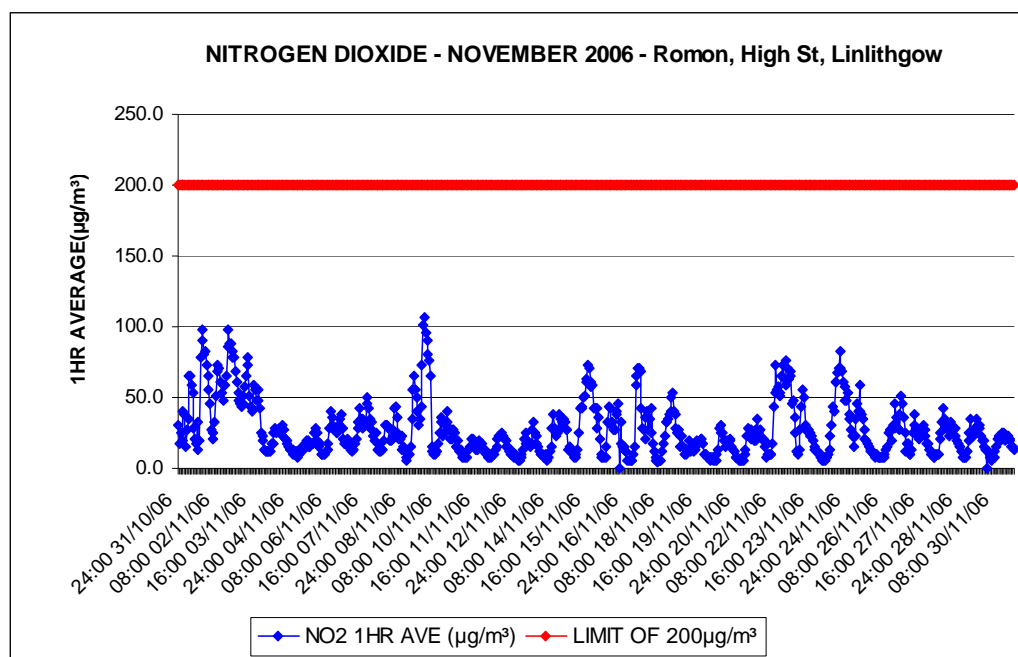
**Figure 7.21 – Linlithgow High St – September 2006 – 1hr average**



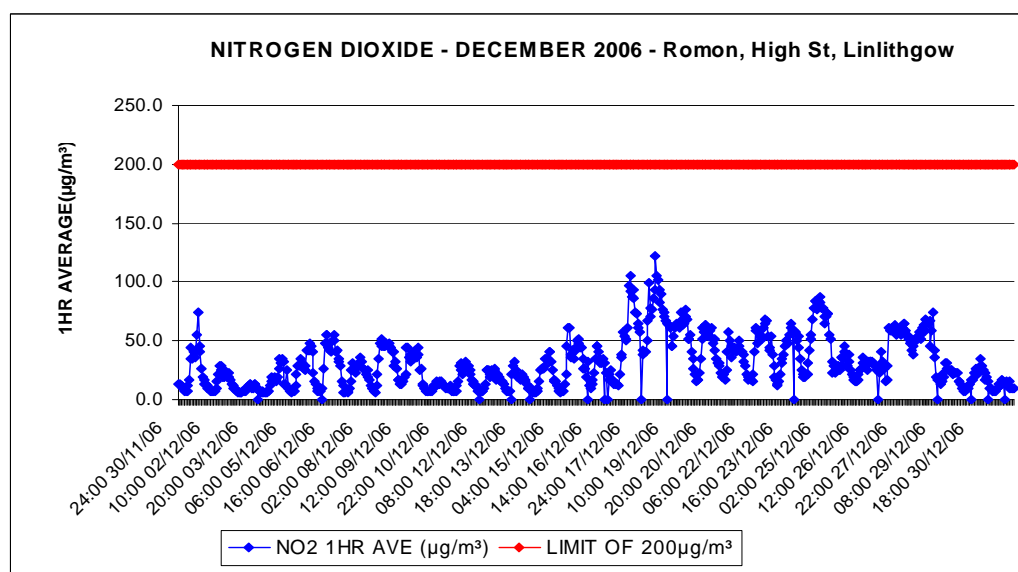
**Figure 7.22 – Linlithgow High St – October 2006 – 1hr average**



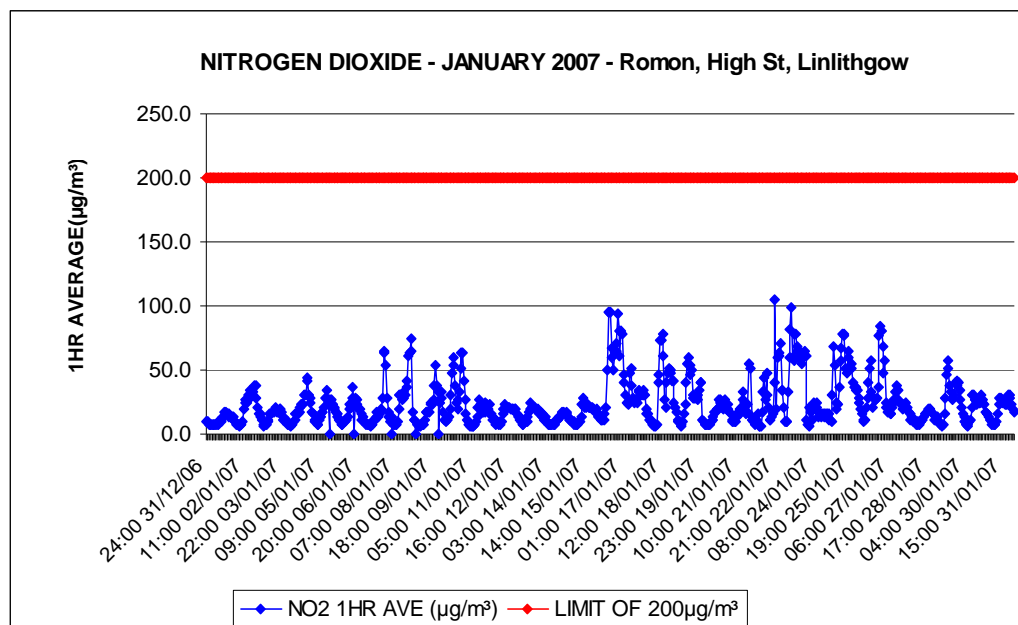
**Figure 7.23 – Linlithgow High St – November 2006 – 1hr average**



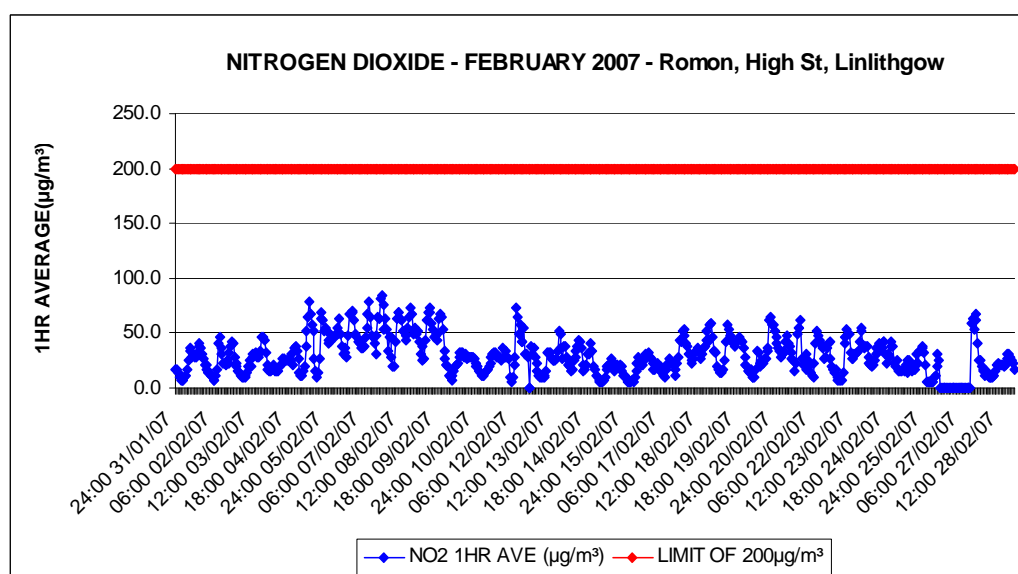
**Figure 7.24 – Linlithgow High St – December 2006 – 1hr average**



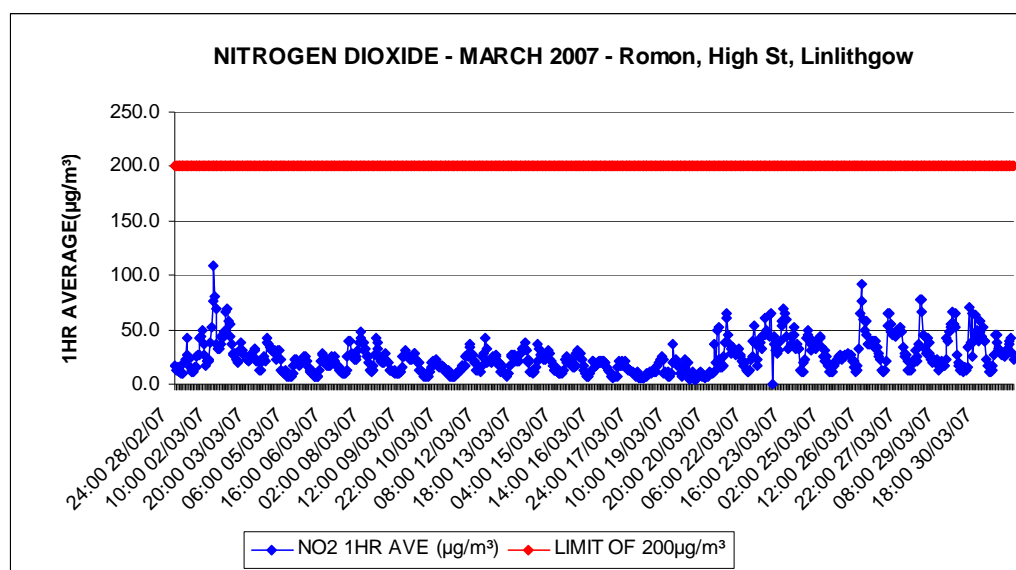
**Figure 7.25 – Linlithgow High St – January 2007 – 1hr average**



**Figure 7.26 – Linlithgow High St – February 2007 – 1hr average**



**Figure 7.27 – Linlithgow High St – March 2007 – 1hr average**



#### 7.7.2. High St, Linlithgow (Romon): Monthly & annual averages

**Table 7.4 – High St, Linlithgow– monthly & annual averages**

MONTHLY AVERAGE	NO2(µg/m³)
April 2006	22.1
May 2006	27.9
June 2006	18.3
July 2006	21.6
August 2006	19
September 2006	28.4
October 2006	31.5
November 2006	26.9
December 2006	30.9
January 2007	23.4
February 2007	29.4
March 2007	24.9
<b>ANNUAL AVERAGE (12 MONTHS)</b>	<b>25.4µg/m³</b>

From the figures 7.15 to 7.27 the highest reading for the 1hr mean for Nitrogen dioxide at Linlithgow High Street from April 2006 to March 2007 was 122.2µg/m³, which meets the 1hr standard of 200µg/m³ for 31.12.2005. Table 7.4 shows that there was a 12 month average of 25.4µg/m³ for Nitrogen dioxide at Linlithgow High St, which meets the annual mean of 40µg/m³. Monitoring of Nitrogen dioxide will continue at Linlithgow High Street.

## 7.8. Conclusion for Nitrogen Dioxide

The real-time monitoring data for Cairnie Place, Whitburn and High Street, Linlithgow indicates that there were no exceedences in the last twelve months. There is no need for West Lothian to proceed to a detailed assessment for Nitrogen dioxide.

As a result of the ongoing reliability problems with the Groundhog NOx analyser, a funding bid for a replacement was made to the Scottish Executive.

This was successful and a new analyser will be installed in the next few months.

West Lothian has continued with the existing diffusion tube sites and three additional sites were added in November 2006.

Real-time monitoring of Nitrogen dioxide will continue at Cairnie Place, Whitburn and High St, Linlithgow. Passive monitoring using diffusion tubes will continue at the nine sites identified in this chapter.

## **8. PROGRESS REPORT FOR PM<sub>10</sub>**

### **8.1. Introduction**

Monitoring for PM<sub>10</sub> has continued during 2006 using the TEOM analysers in the Groundhog located at Cairnie Place, Whitburn and in the Romon at Linlithgow High Street.

West Lothian Council submitted a bid to the Scottish Executive to purchase an additional Romon with the intention of locating this in Broxburn Town Centre. This has been approved and will be installed in the next few months.

In addition, the Scottish Executive has approved funding to upgrade the TEOM at Linlithgow High Street to FDMS. This to ensure the best quality of data for this site. PM<sub>10</sub> levels are nearing those at which a Local Air Quality management Area must be declared.

### **8.2. 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

### **8.3. Monitoring Data Results**

Figures 8.1 to 8.13 show the results for PM<sub>10</sub> at Cairnie Place, Whitburn from March 2006 to March 2007 and the 24-hour mean for each month.

Figures 8.14 to 8.25 show the results for PM<sub>10</sub> at Linlithgow High Street from March 2006 to March 2007 and the 24-hour mean for each month.

The PM<sub>10</sub> from the TEOM have been converted into gravimetric concentrations by multiplying the monthly results by the 1.3 default factor. The annual average results have been multiplied by both the 1.3 and 1.14 factor.



## 8.4. PM<sub>10</sub> Results: Cairnie Place, Whitburn

### 8.4.1. 24 Hour Averages

Figure 8.1 – Cairnie Place, Whitburn – March 2006

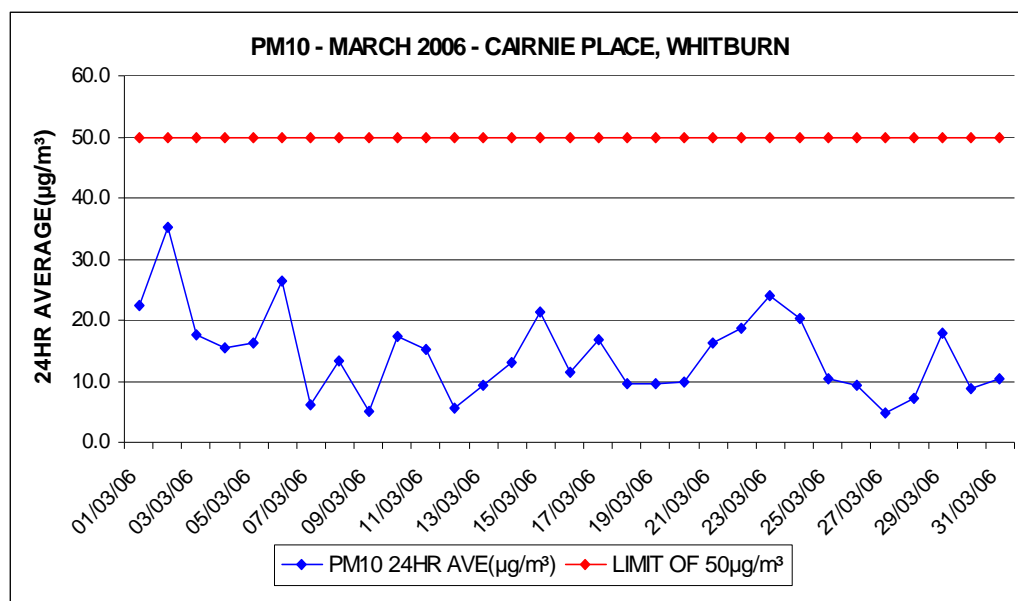
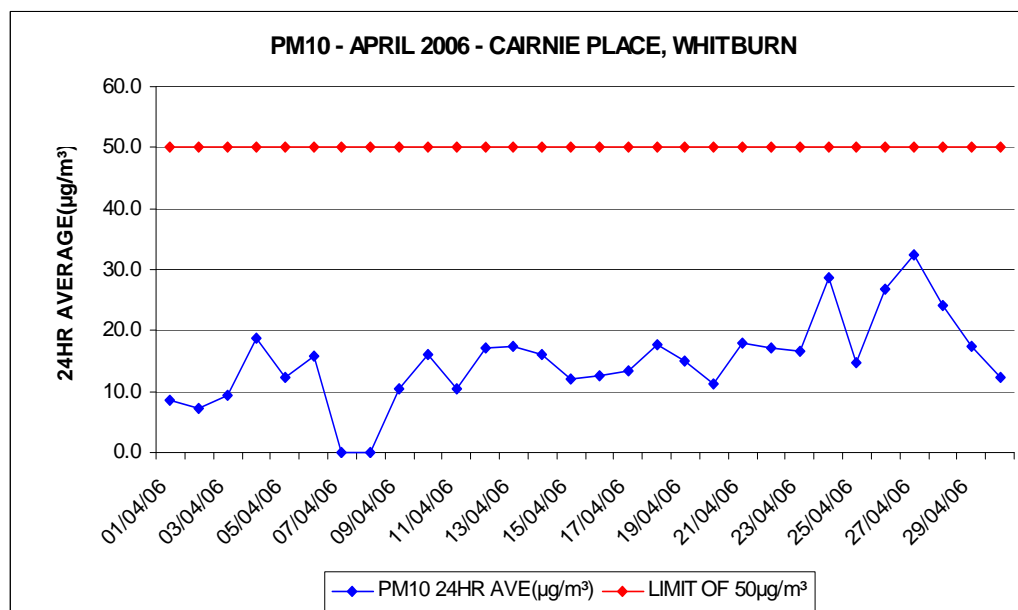
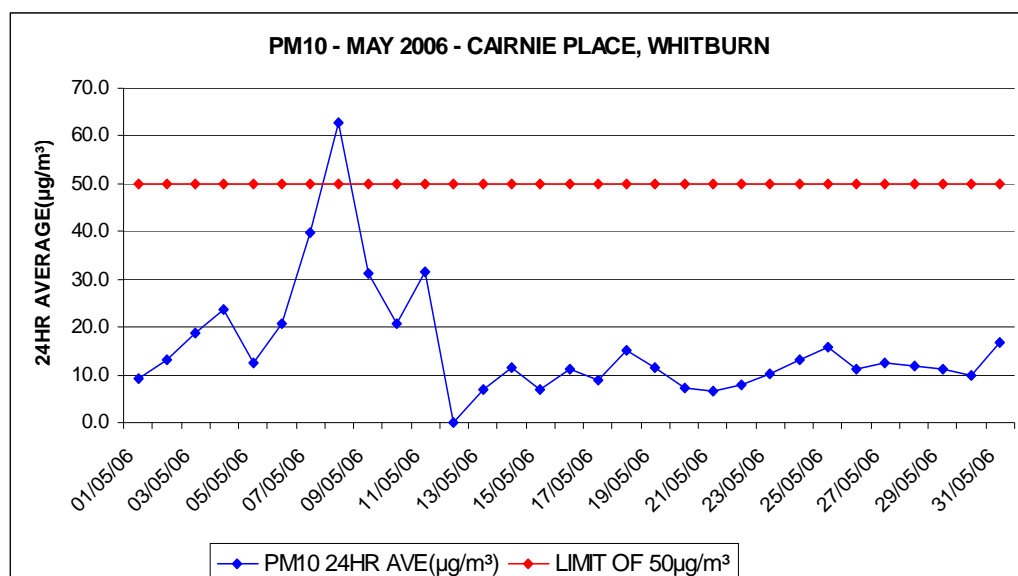


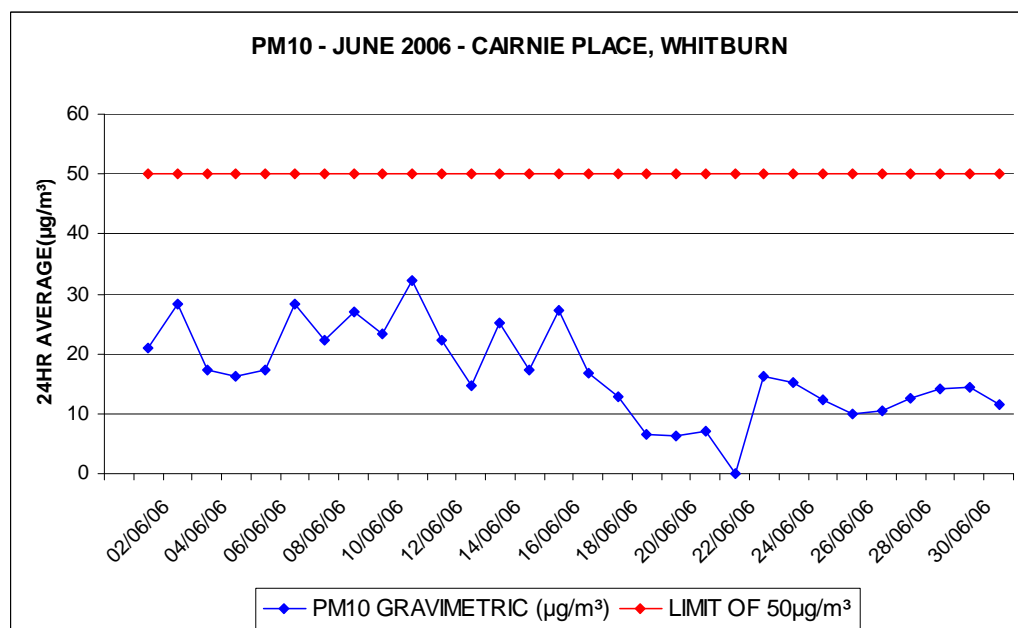
Figure 8.2 – Cairnie Place, Whitburn – April 2006



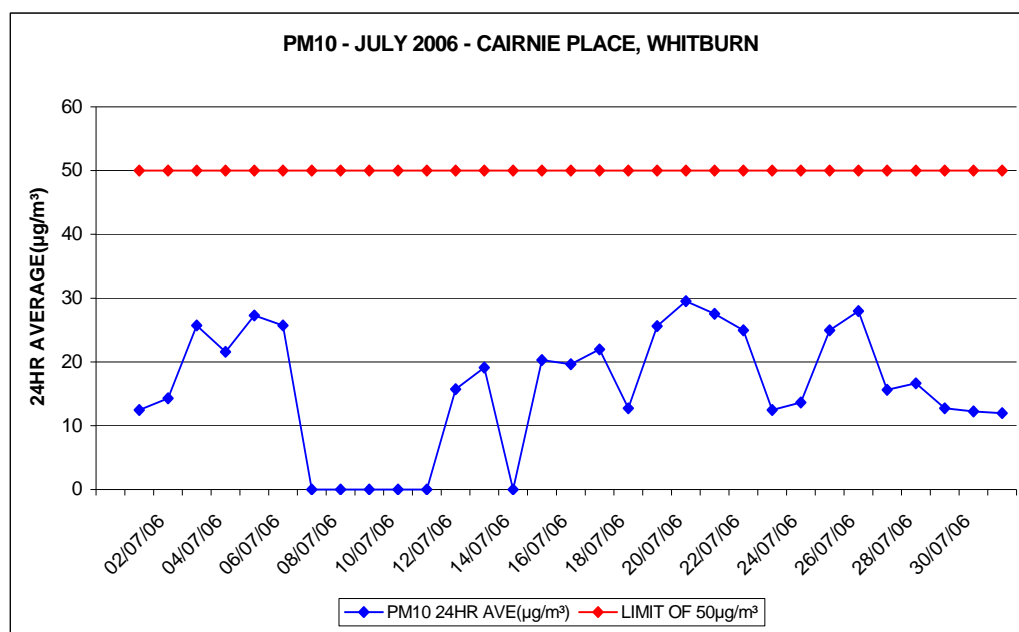
**Figure 8.3 – Cairnie Place, Whitburn – May 2006**



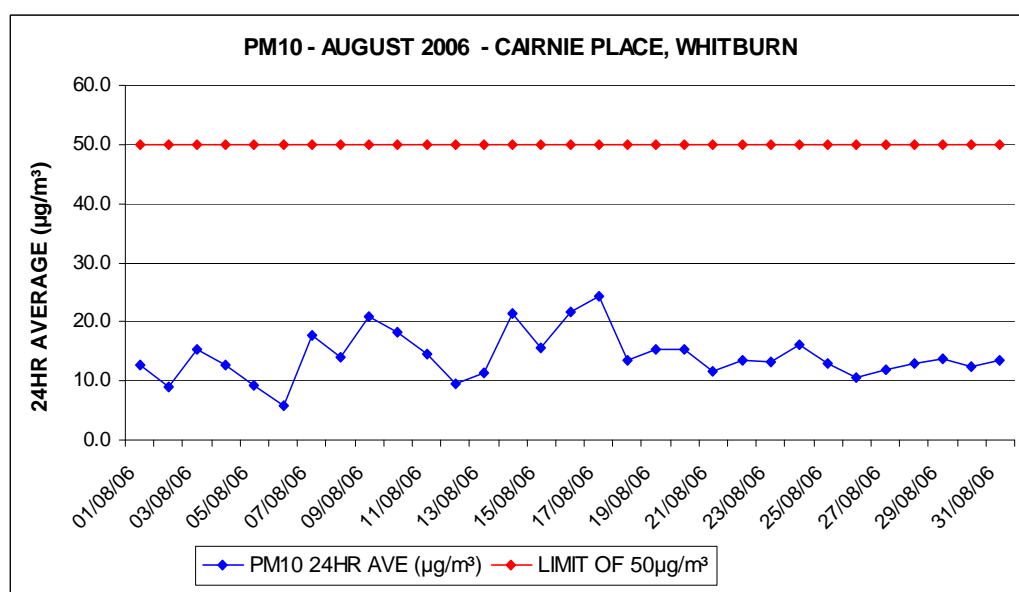
**Figure 8.4 – Cairnie Place, Whitburn – June 2006**



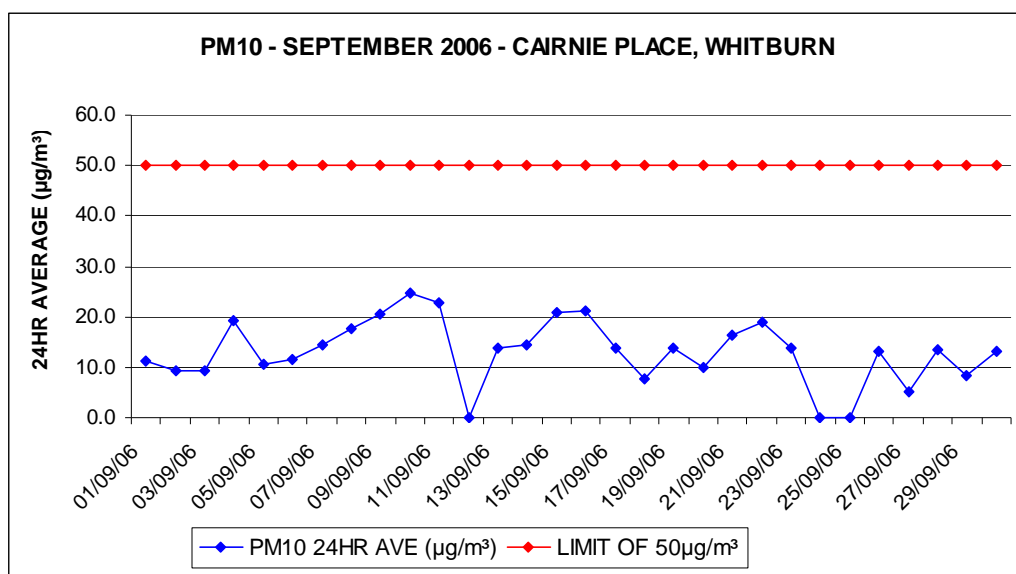
**Figure 8.5 – Cairnie Place, Whitburn – July 2006**



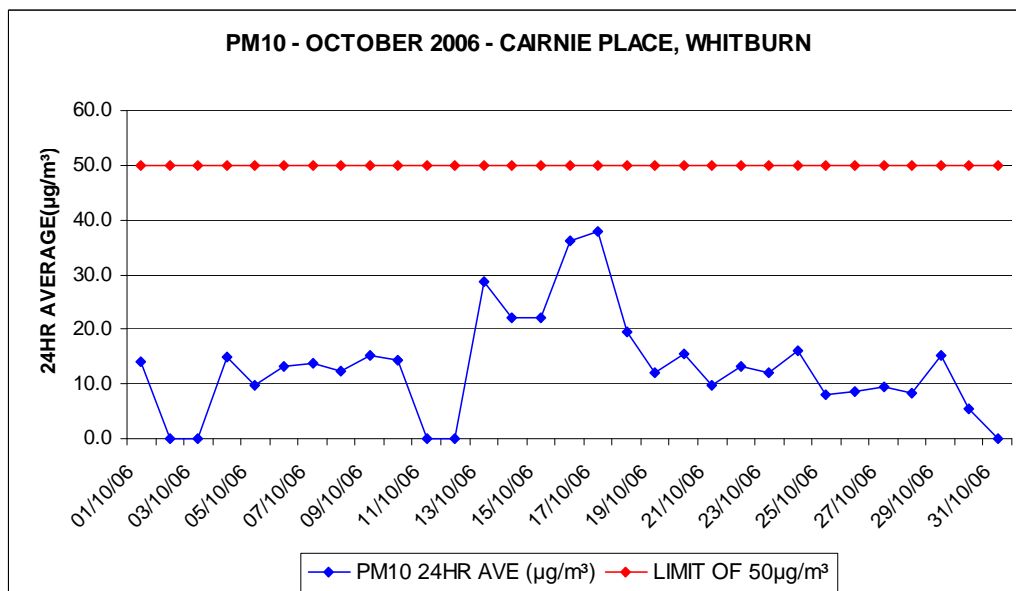
**Figure 8.6 – Cairnie Place, Whitburn – August 2006**



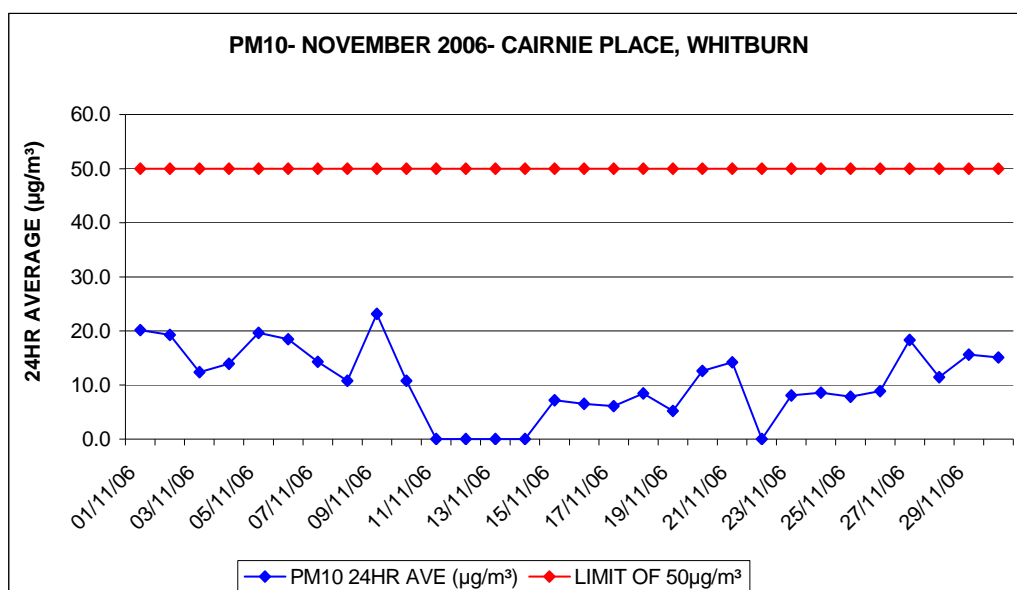
**Figure 8.7 – Cairnie Place, Whitburn – September 2006**



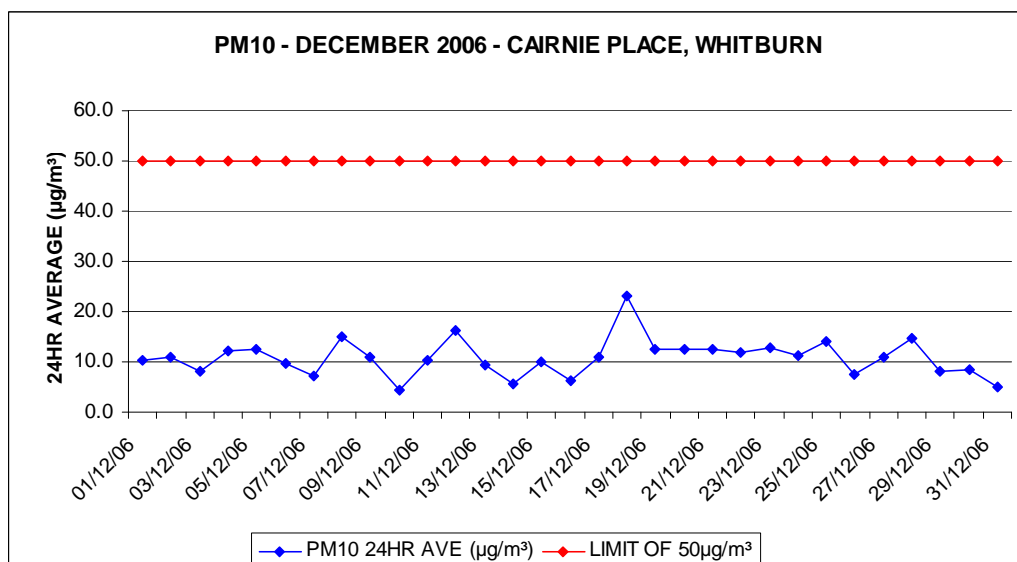
**Figure 8.8 – Cairnie Place, Whitburn – October 2006**



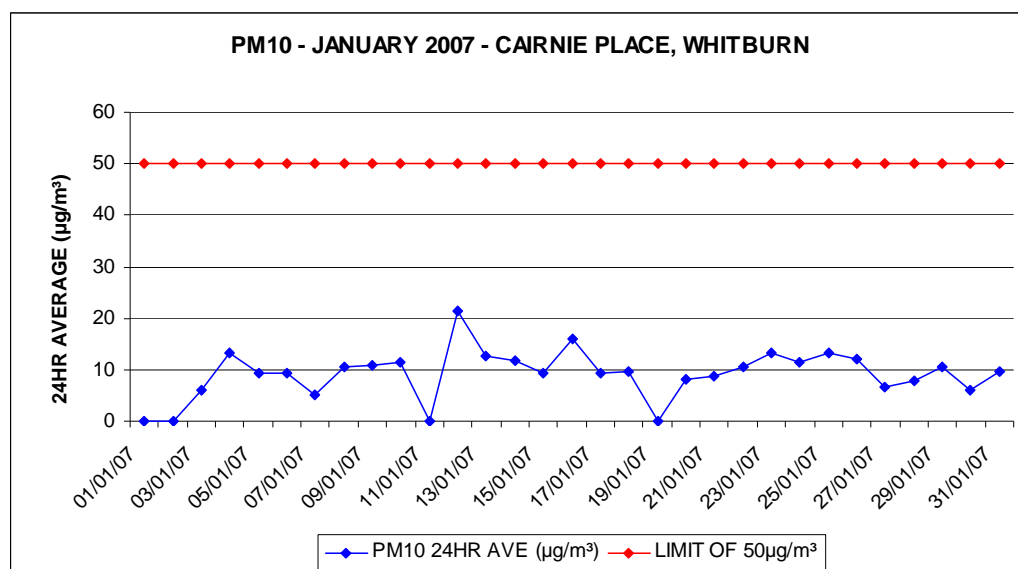
**Figure 8.9 – Cairnie Place, Whitburn – November 2006**



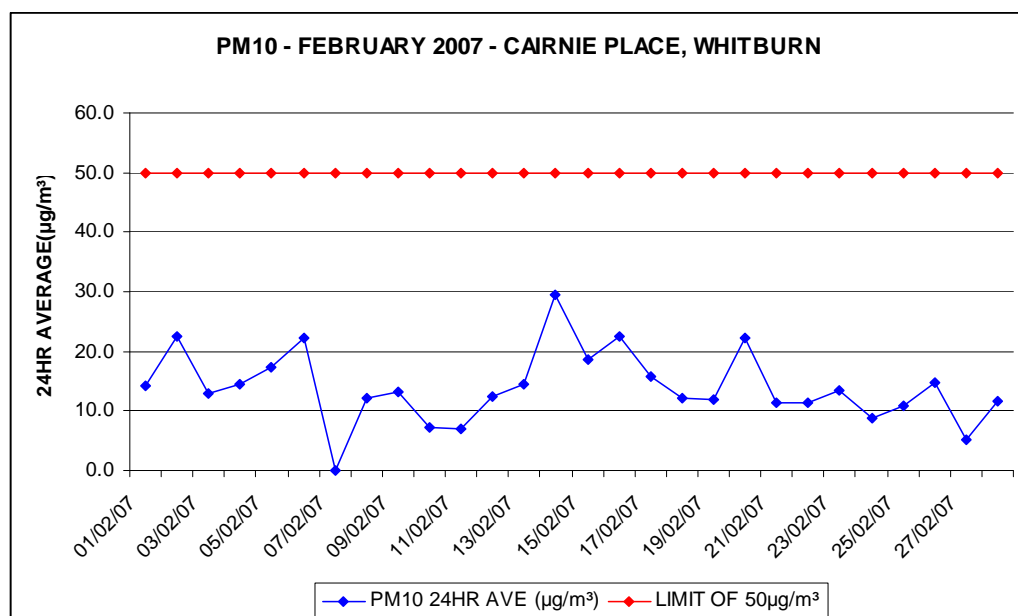
**Figure 8.10 – Cairnie Place, Whitburn – December 2006**



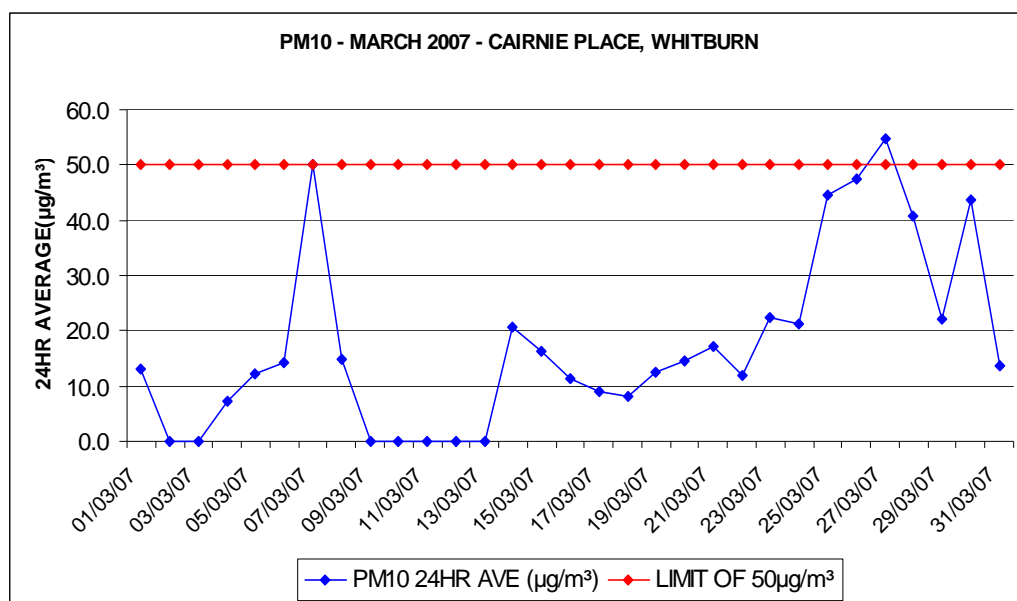
**Figure 8.11 – Cairnie Place, Whitburn – January 2007**



**Figure 8.12 – Cairnie Place, Whitburn – February 2007**



**Figure 8.13 – Cairnie Place, Whitburn – March 2007**



Figures 8.1 to 8.13 show that there were two exceedences on 8<sup>th</sup> May 2006 and 27<sup>th</sup> March 2007 of the 24-hour objective for 2010. This objective has been achieved.

#### 8.4.2. Monthly & Annual Average

**Table 8.1 – Monthly and annual averages for PM<sub>10</sub> – April 2006 to March 2007**

MONTHLY AVERAGE	PM <sub>10</sub> (µg/m³)
April 2006	15.0
May 2006	15.8
June 2006	16.8
July 2006	15.9
August 2006	14.2
September 2006	12.6
October 2006	13.2
November 2006	10.6
December 2006	10.8
January 2007	9.2
February 2007	13.9
March 2007	17.6
<b>Annual Average (1.3 factor)</b>	<b>13.8µg/m³</b>
<b>Annual Average (1.14 factor)</b>	<b>12.1µg/m³</b>

Table 8.1 shows an annual average of 13.8µg/m³ when multiplied by the 1.3 default factor and an annual average of 12.1µg/m³ when multiplied by the 1.14 default factor. The PM<sub>10</sub> 2010 objective of 18µg/m³ is therefore being achieved at Cairnie Place.

## 8.5. PM<sub>10</sub> Results: High Street, Linlithgow

### 8.5.1. 24 Hour Averages

Figure 8.14 – Romon, Linlithgow High St – March 2006

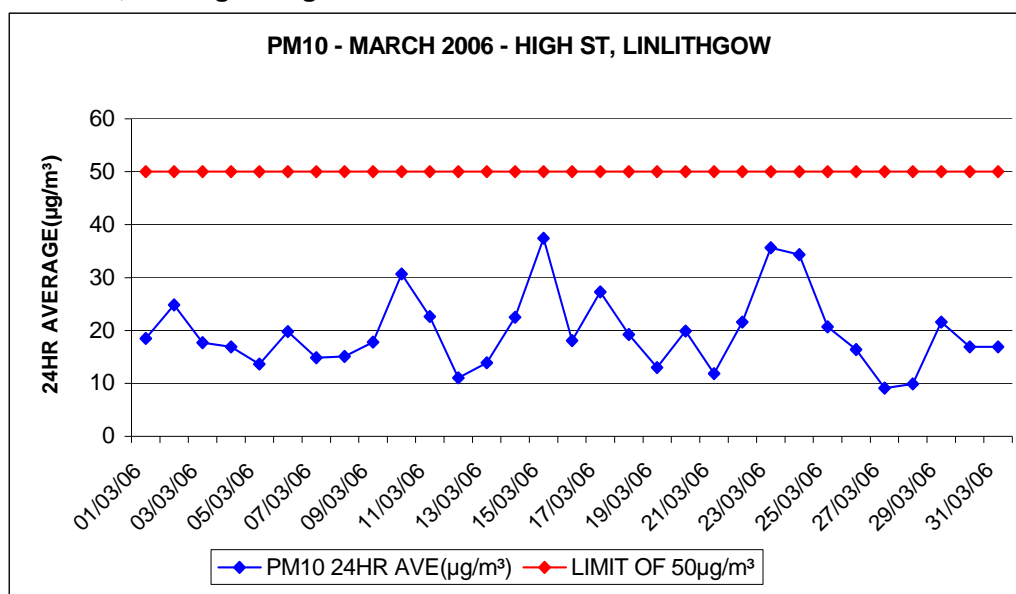
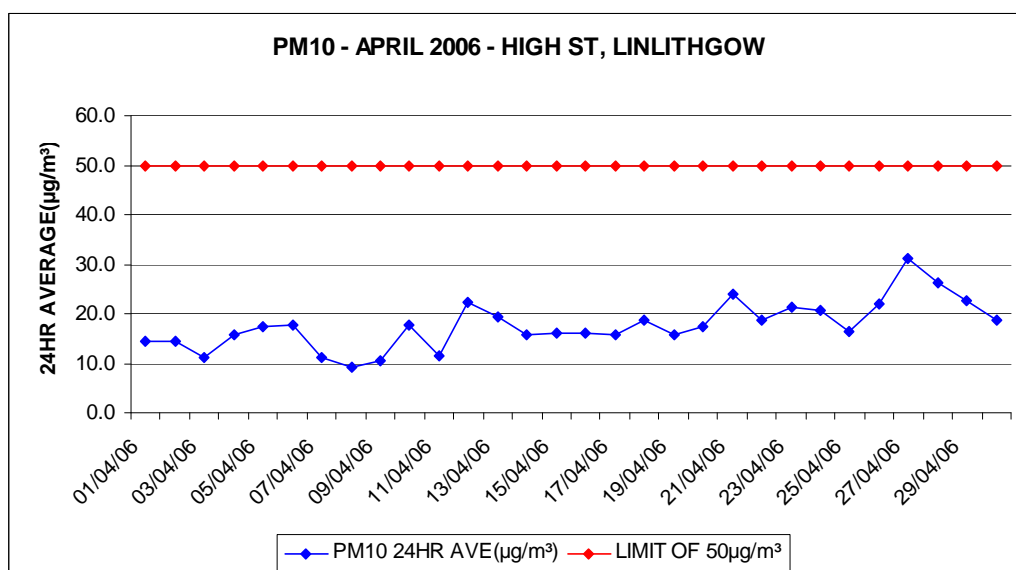
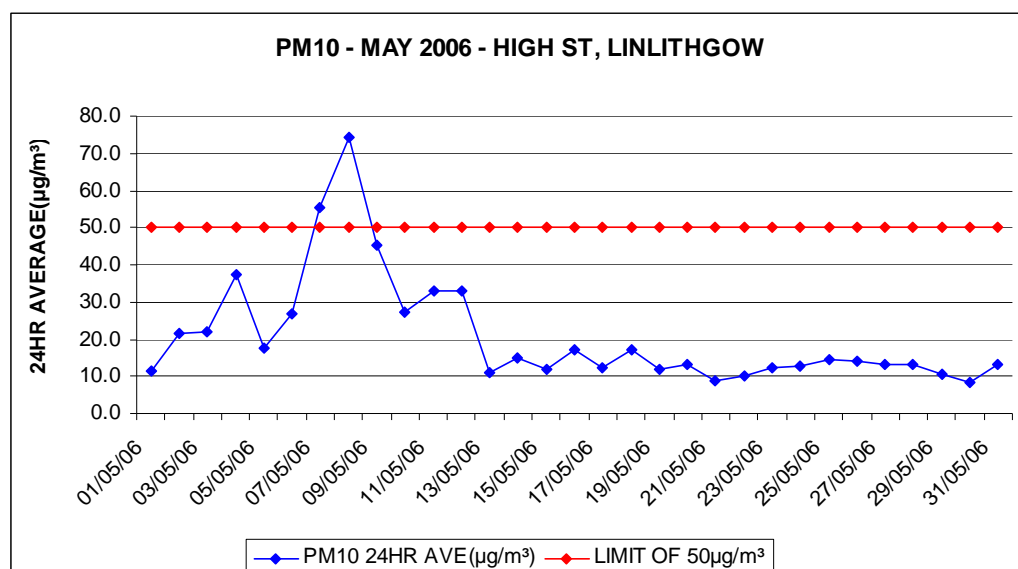


Figure 8.15 – Romon, Linlithgow High St – April 2006

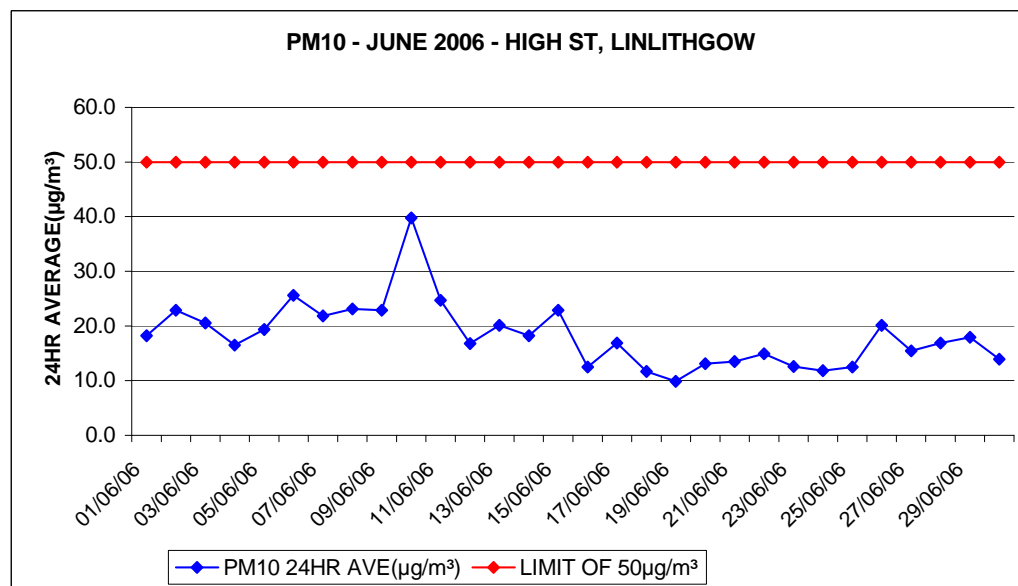




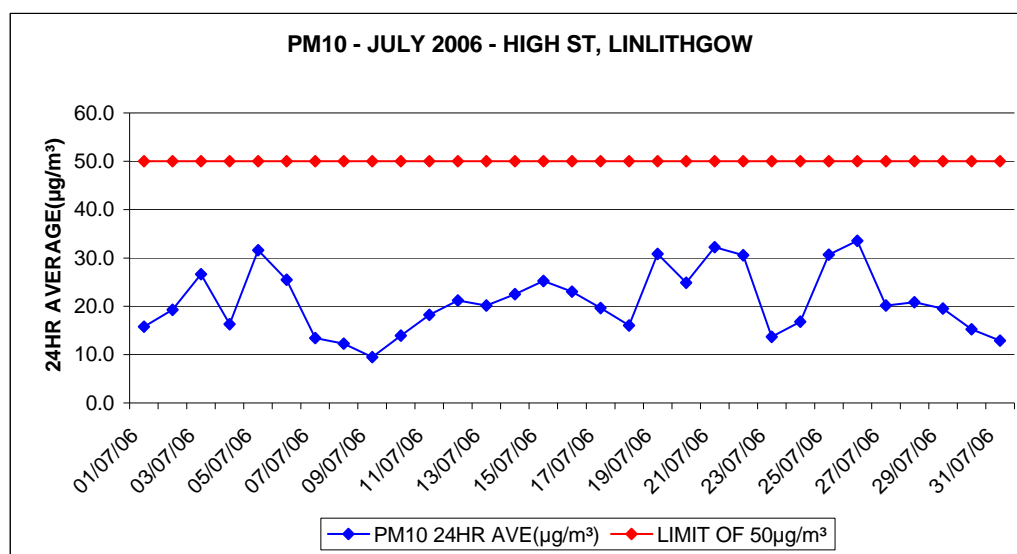
**Figure 8.16 – Romon, Linlithgow High St – May 2006**



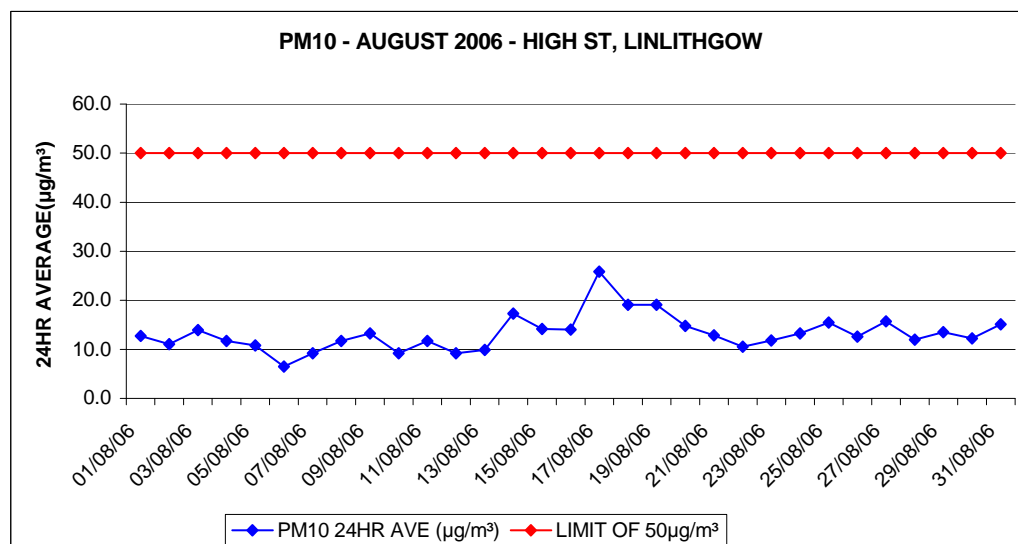
**Figure 8.17 – Romon, Linlithgow High St – June 2006**



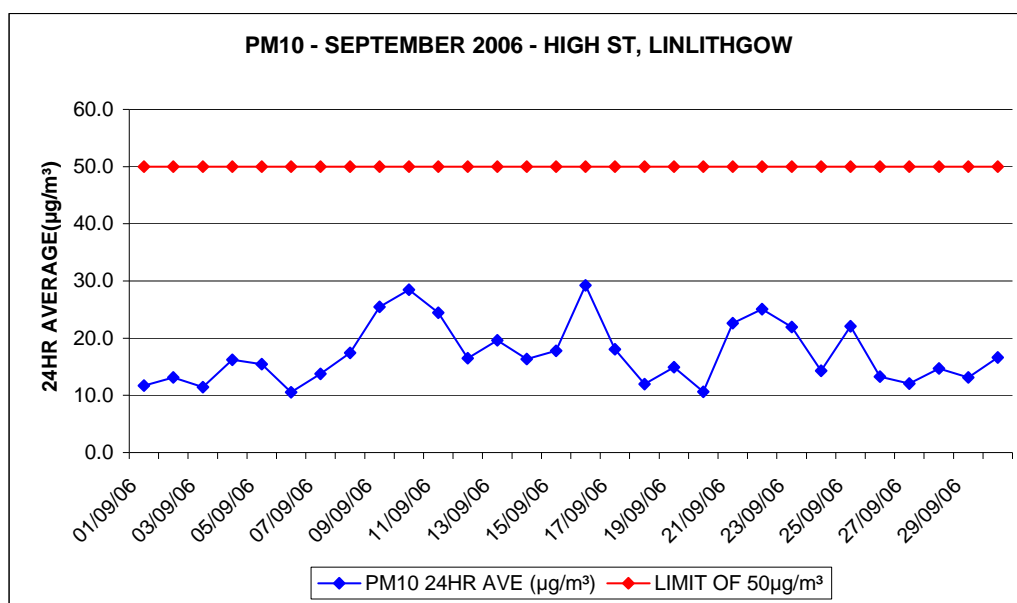
**Figure 8.18 – Romon, Linlithgow High St – July 2006**



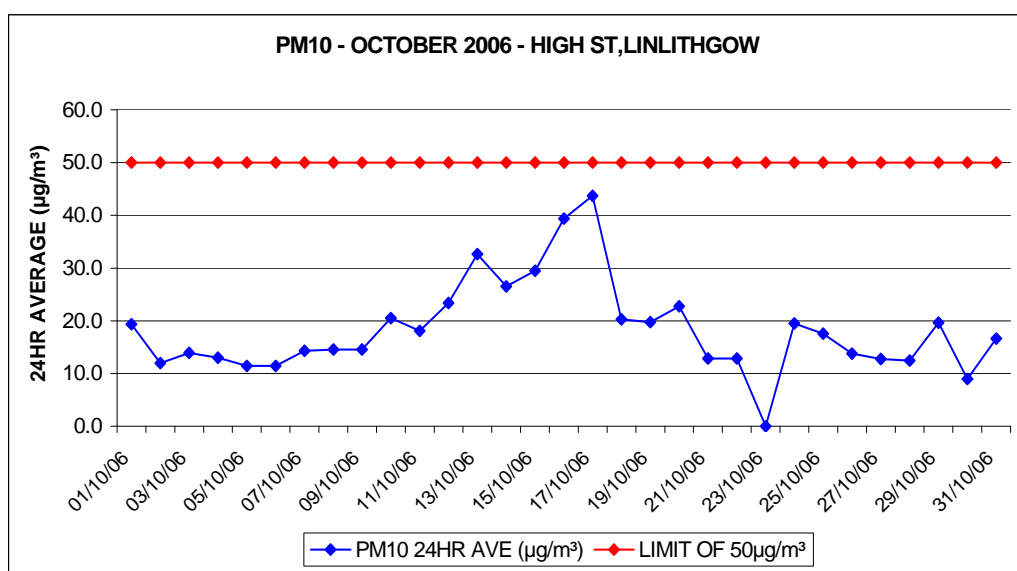
**Figure 8.19 – Romon, Linlithgow High St – August 2006**



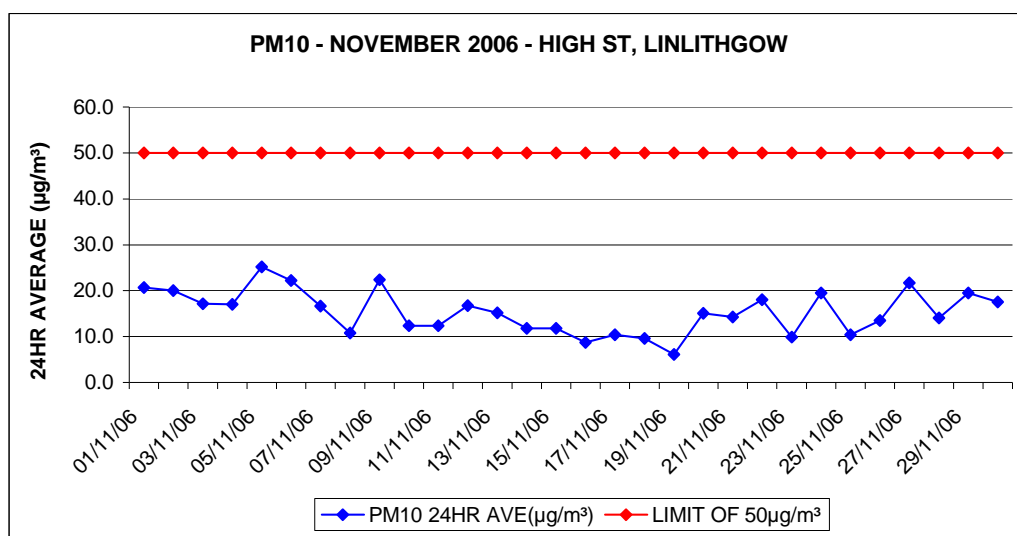
**Figure 8.20 – Romon, Linlithgow High St – September 2006**



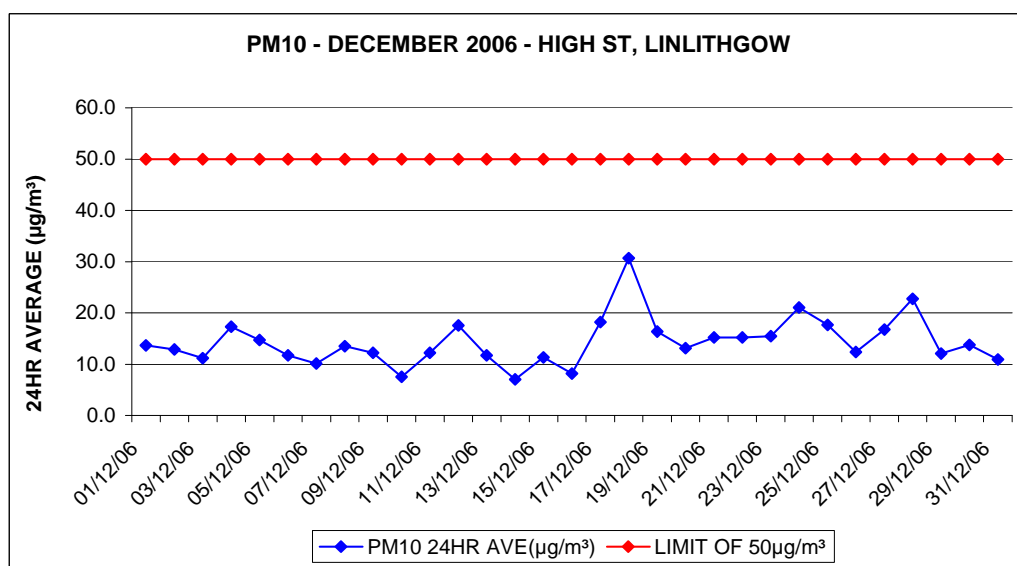
**Figure 8.21 – Romon, Linlithgow High St – October 2006**



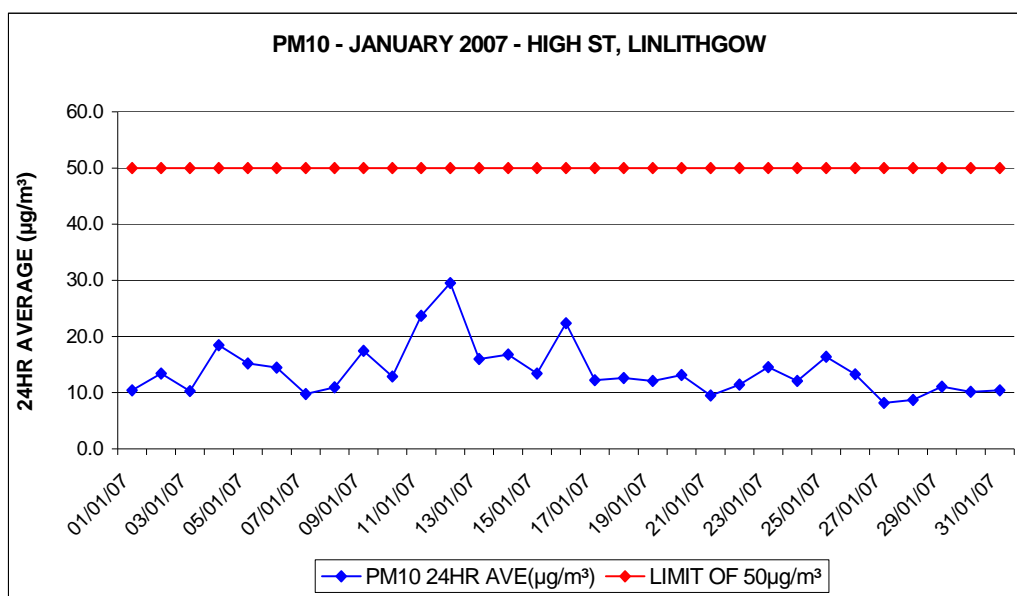
**Figure 8.22 – Romon, Linlithgow High St – November 2006**



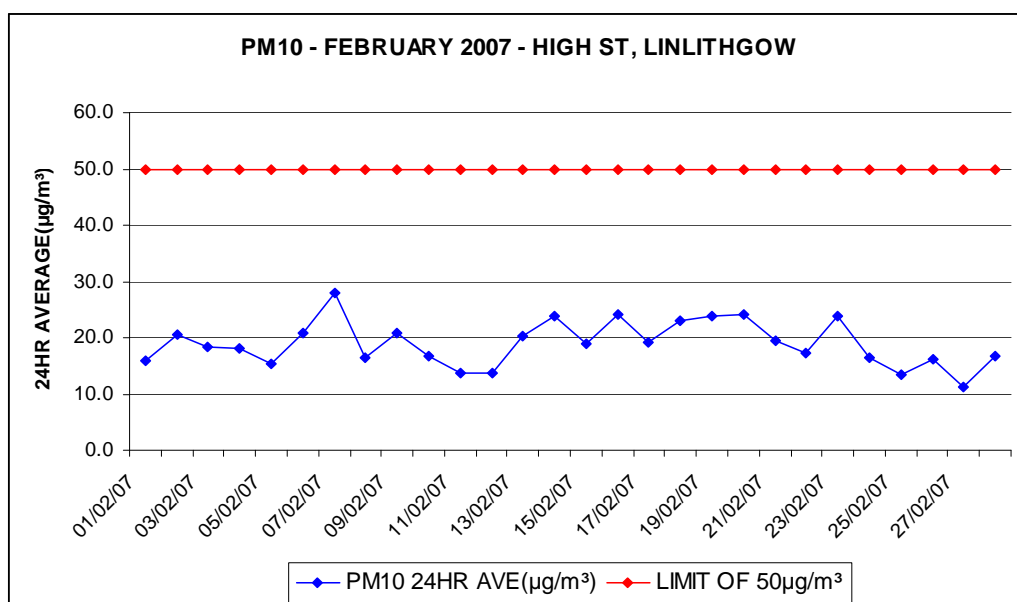
**Figure 8.23 – Romon, Linlithgow High St, December 2006**



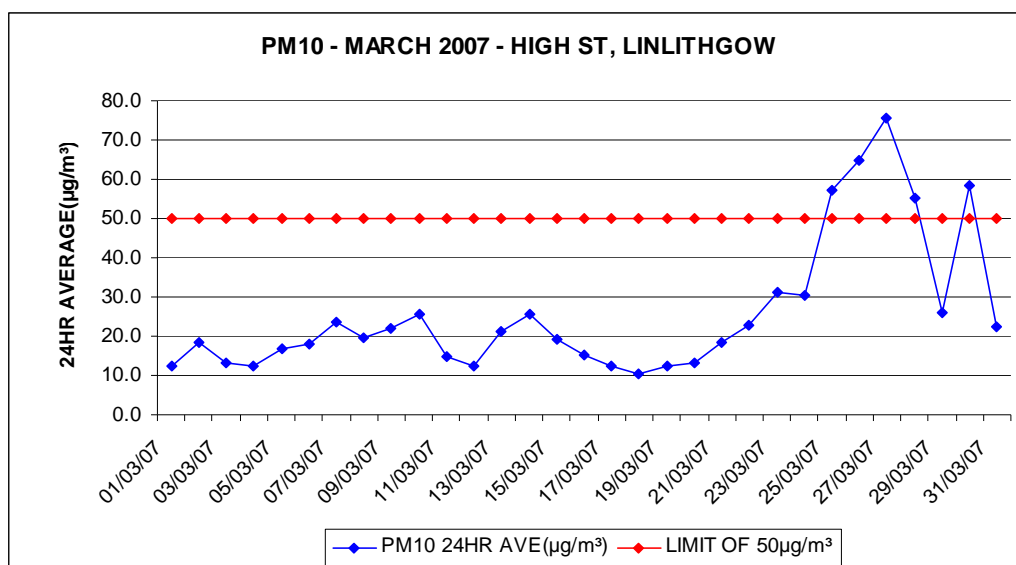
**Figure 8.24 – Romon, Linlithgow High St, January 2007**



**Figure 8.25 – Romon, Linlithgow High St, February 2007**



**Figure 8.26 – Romon, Linlithgow High St, March 2007**



As the figures 8.14 to 8.26 show there have been seven exceedences of the 24-hour objective and therefore the 24-hour objective for 2010 is still being met. Five of the exceedences occurred in the last week of March 2007. However, one further exceedence will result in breach of the 2010 24 hour objective.

#### 8.5.2. Monthly & Annual Average

**Table 8.2 – Monthly and annual averages for PM10 – April 2006 to March 2007**

MONTHLY AVERAGE	PM <sub>10</sub> (µg/m <sup>3</sup> )
April 2006	17.6
May 2006	20.8
June 2006	18.2
July 2006	21.0
August 2006	13.2
September 2006	17.3
October 2006	18.3
November 2006	15.4
December 2006	14.3
January 2007	13.9
February 2007	18.9
March 2007	25.8
<b>Annual Average(1.3)</b>	<b>17.9µg/m<sup>3</sup></b>
<b>Annual Average(1.14)</b>	<b>15.7µg/m<sup>3</sup></b>

Table 8.2 shows an annual average of 17.9µg/m<sup>3</sup> when multiplied by the 1.3 default factor and a period mean of 15.7µg/m<sup>3</sup> when multiplied by the 1.14 default factor. The PM<sub>10</sub> 2010 objective of 18µg/m<sup>3</sup> is therefore borderline at present due to an increase in PM<sub>10</sub> at the end of March 2007.

Further monitoring of PM<sub>10</sub> will continue at Linlithgow High St.

## **8.6. Conclusion for PM<sub>10</sub>**

The real – time monitoring data results for PM<sub>10</sub> at Cairnie Place, Whitburn, and High Street, Linlithgow indicate that in West Lothian the standards for PM<sub>10</sub> are being achieved at Cairnie Place, Whitburn and at High St, Linlithgow. However, at Linlithgow this is very marginal.

Linlithgow High Street had an annual average of 17.9µg/m<sup>3</sup> (when applied by 1.3 factor and an average of 15.7µg/m<sup>3</sup> when applied by 1.14 factor). There were seven exceedences of the 24-hr objective of 50µg/m<sup>3</sup> for High St, Linlithgow. As highlighted in the previous report the exceedences which occurred on 7<sup>th</sup> & 8<sup>th</sup> May 2006 were believed to have been caused by large scale crop stubble burning in northern Russia. The exceedences which occurred at the end of March 2007 (25-28<sup>th</sup> and 30<sup>th</sup> March) were also a national event as exceedences also occurred at Dundee and Cupar, Fife. SEPA and the Scottish Executive have advised that these exceedences will not be discounted as local authorities are required to monitor all PM<sub>10</sub> irrespective of where it comes from. These exceedences are therefore included, but are not solely due to local air quality. The 24-hr objective for PM<sub>10</sub> at Linlithgow High St has still been achieved as local authorities are permitted seven exceedences.

Cairnie Place, Whitburn had an annual average of 13.8µg/m<sup>3</sup> (when applied by 1.3 factor and an average of 12.1µg/m<sup>3</sup> when applied by 1.14 factor). There were two exceedences of the 24-hr objective in the last 12 months.

It is concluded that there is no need to proceed to a detailed assessment for PM<sub>10</sub> at present but real-time monitoring will continue at Cairnie Place, Whitburn and High St, Linlithgow. The TEOM PM10 monitor at High Street, Linlithgow is to be upgraded to FDMS to remove the need to use the varying default correction factors which currently result in figures straddling a range up to the annual average objective figure of 18µg/m<sup>3</sup>.

## **9. PROGRESS REPORT FOR SULPHUR DIOXIDE**

### **9.1. Introduction**

#### **9.1.1. Real-time monitoring**

Monitoring for Sulphur dioxide has continued using the real-time analyser located in the Groundhog at Cairnie Place, Whitburn.

#### **9.1.2. 8-port Bubbler Monitoring**

Two 8-port bubblers are used for measuring daily levels of Sulphur dioxide. The 8-port bubblers are located at Atlas Cottages, Armadale and Netherton Place, Whitburn.

There is no longer a national air-quality network for Sulphur dioxide but West Lothian Council has taken the decision to continue with the two bubblers, This is due to the unit at Netherton Place being located near to Polkemmet Colliery and the unit at Atlas Cottages located next to the Brickworks in Armadale.

### **9.2. Standard and Objective for Sulphur dioxide**

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

- 1-hr mean of 350µg/m<sup>3</sup> not to be exceeded more than 24 times a year
- 24-hr 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 15 times a year

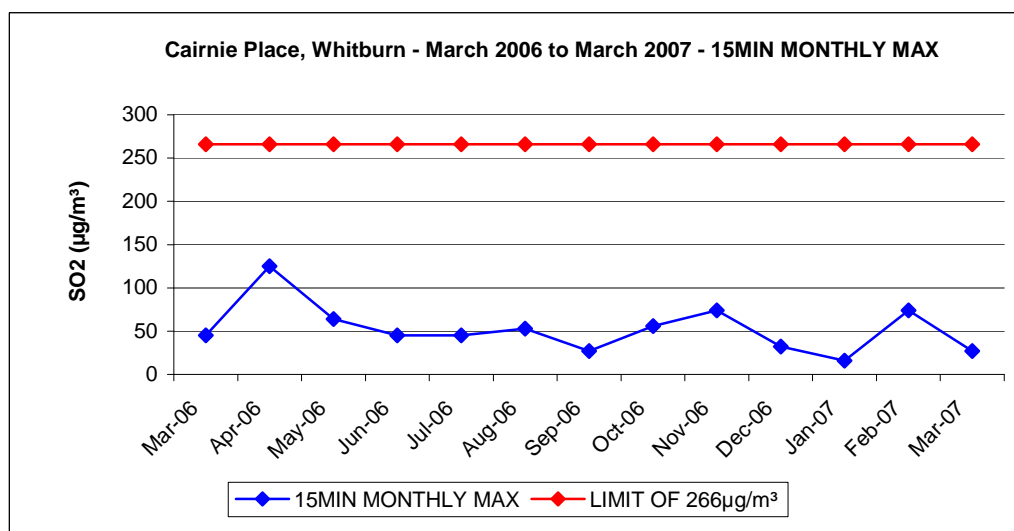
### **9.3. Monitoring Data Results**

#### **9.3.1. Real-time monitoring**

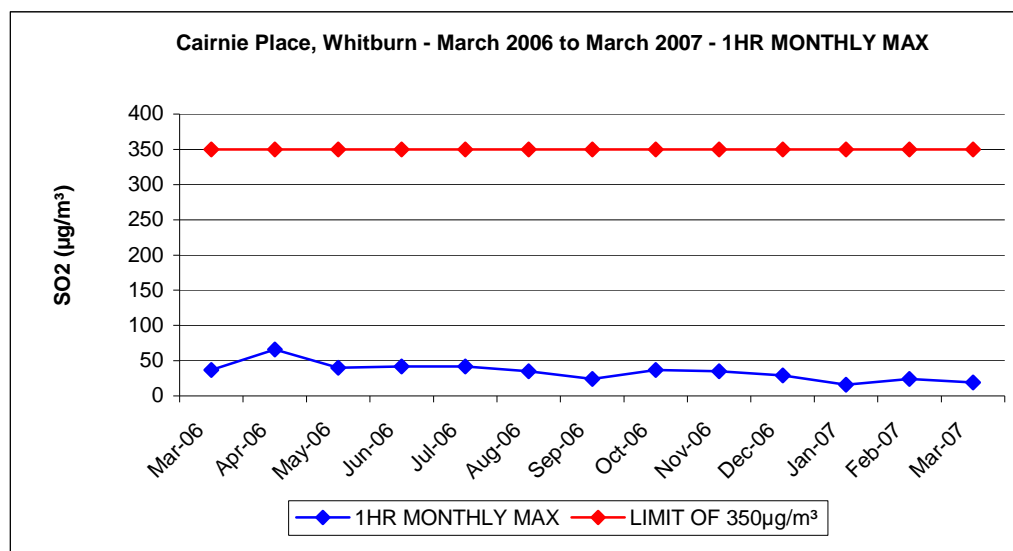
Figures 9.1 to 9.3 show the monthly maximum reading for the 15-min mean, 1-hr mean and 24-hr mean for Sulphur dioxide from March 2006 to March 2007 for the Groundhog at Cairnie Place, Whitburn.



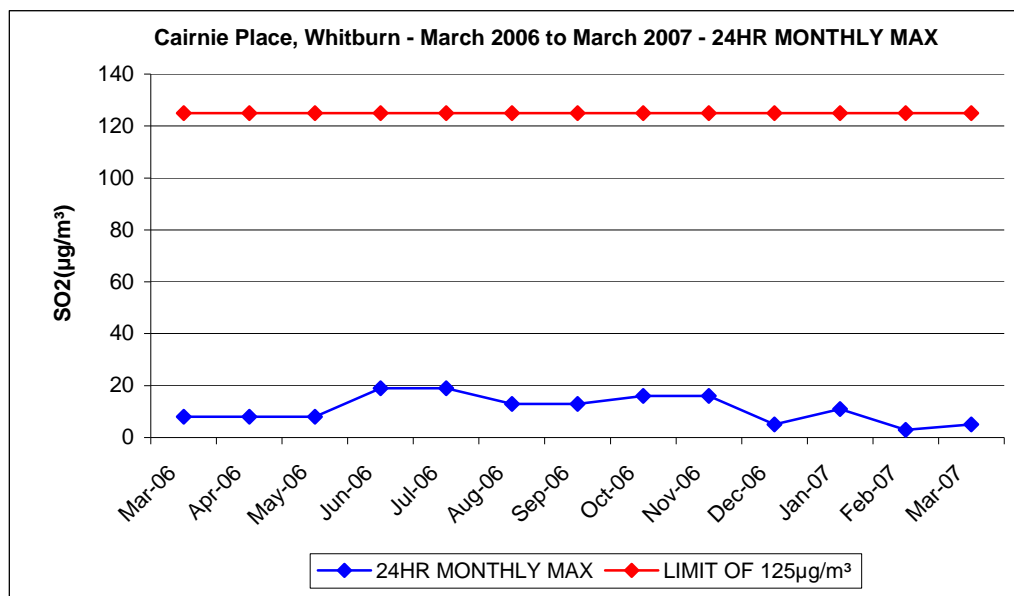
**Figure 9.1 – Cairnie Place – March 2006 to March 2007 – 15min mean monthly max**



**Figure 9.2 – Cairnie Place – March 2006 to March 2007 – 1hr mean monthly max**



**Figure 9.3 – Cairnie Place – March 2006 to March 2007 – 24hr mean monthly max**



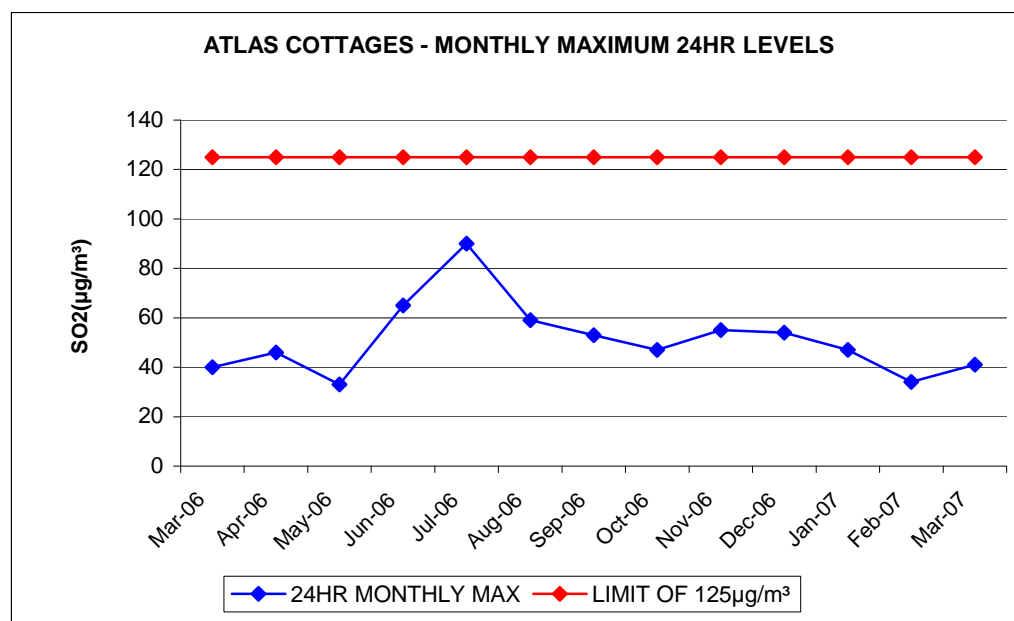
It can be seen from the graphs (figs 9.1 to 9.3) that from March 2006 to March 2007 there have been no exceedences for any of the three objectives for Sulphur dioxide.

### 9.3.2. 8-port Bubbler Sulphur dioxide Results

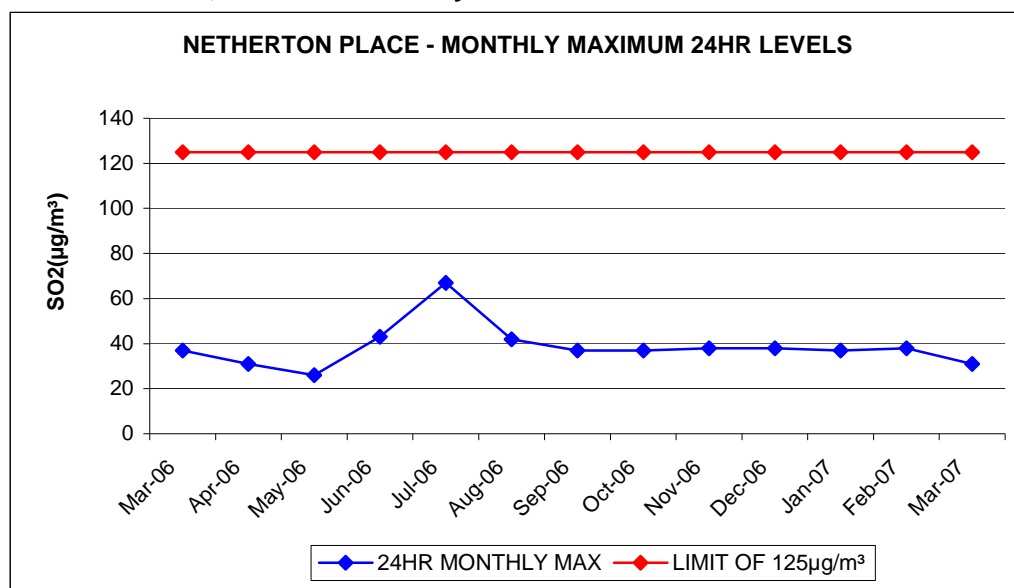
Figures 9.4 & 9.5 show the monthly maximum daily 24-hour levels for the two 8-port bubblers. The maximum daily mean concentration for readings over 100µg/m³ has been multiplied by 1.25 to take account of a tendency for the bubblers to under-read at high concentrations. This is in accordance with recommendations from the review and assessment help desk.

The results shown are from March 2006 to March 2007.

**Figure 9.4 – Atlas Cottages, Armadale – monthly maximum 24-hr level**



**Figure 9.5 - Netherton Place, Whitburn - monthly maximum 24-hr level**



Figures 9.4 & 9.5 above indicate that there have been no exceedences of the 24-hr objective for both the sites at Atlas Cottages, Armadale and Netherton Place, Whitburn.

West Lothian will continue to monitor Sulphur dioxide with the two 8-port bubblers.

#### **9.4. Conclusion for Sulphur dioxide**

The real-time monitoring data for Sulphur dioxide indicates that levels of this pollutant in West Lothian are very low. There have been no exceedences of the 15min, 1hr or 24hr objective.

Neither the 8-port bubbler located at Atlas Cottages, Armadale next to Caradale Brickworks nor that located at Netherton Place, Whitburn had any exceedences in the last 12 months.

Both 8-port bubblers will remain at both locations in the near future. However, it is proposed to cease monitoring when existing stocks of reagents run out.

There is no need for West Lothian Council to proceed to a detailed assessment this year for Sulphur dioxide.

## **10. CONCLUSIONS AND RECOMMENDATIONS**

### **10.1. Benzene**

#### **10.1.1. Conclusion for Benzene**

There are no significant industrial sources of benzene located either within West Lothian or neighbouring areas which are likely to adversely affect air quality.

Monitoring has indicated that the two air quality standards and objectives of  $16.25\mu\text{g}/\text{m}^3$  for 2003 and  $3.25\mu\text{g}/\text{m}^3$  for 2010 are being complied with in West Lothian.

#### **10.1.2. Recommendation for Benzene**

Monitoring of Benzene has now ceased in West Lothian and there is no need to proceed to a detailed assessment.

### **10.2. 1,3 – Butadiene**

#### **10.2.1. Conclusions for 1,3 – Butadiene**

There are no significant industrial sources of 1,3 – Butadiene located either within West Lothian or neighbouring areas which are likely to adversely affect air quality.

#### **10.2.2. Recommendation for 1,3 – Butadiene**

There is no need to monitor for this pollutant and no need to proceed to a detailed assessment.

### **10.3. Carbon monoxide**

#### **10.3.1. Conclusions for Carbon monoxide**

There are no significant industrial sources of Carbon monoxide located either within West Lothian or neighbouring areas which are likely to adversely affect air quality.

Real-time monitoring during 2006 has indicated that the air quality standard and objective of  $10\text{mg}/\text{m}^3$  is currently being achieved.

#### **10.3.2. Recommendation for Carbon monoxide**

There is no requirement to proceed to a detailed assessment and real-time monitoring of Carbon monoxide will continue at Cairnie Place, Whitburn.

### **10.4. Lead**

#### **10.4.1. Conclusions for Lead**

There are no new industrial sources of lead in West Lothian and no new sources with substantially increased emissions of lead.

There is no requirement to proceed to a detailed assessment.

#### **10.4.2. Recommendation for Lead**

No monitoring of Lead will be carried out in West Lothian.

## **10.5. Nitrogen dioxide**

### **10.5.1. Conclusions for Nitrogen dioxide**

Real-time monitoring of Nitrogen dioxide during 2006 has indicated that there has been no exceedence of the 1-hr mean of  $200\mu\text{g}/\text{m}^3$  at Cairnie Place, Whitburn or High St, Linlithgow. The annual mean of  $40\mu\text{g}/\text{m}^3$  is also being achieved at both sites.

Diffusion tube monitoring has indicate the need for increased monitoring in Broxburn.

There is no requirement to proceed to a detailed assessment.

### **10.5.2. Recommendation for Nitrogen dioxide**

Real-time monitoring for Nitrogen dioxide will continue at Cairnie Place, Whitburn and High St, Linlithgow.

Real-time monitoring will be introduced in Broxburn.

The diffusion tube network will be maintained and adapted to the increasing traffic flows in West Lothian.

## **10.6. PM<sub>10</sub>**

### **10.6.1. Conclusions for PM<sub>10</sub>**

The real – time monitoring data results for PM<sub>10</sub> at Cairnie Place, Whitburn and High Street, Linlithgow indicate that in West Lothian the standards for PM<sub>10</sub> are being achieved at Cairnie Place, Whitburn and at High St, Linlithgow for the annual average. However, Linlithgow High Street is very marginal.

Linlithgow High Street had an annual average of  $17.9\mu\text{g}/\text{m}^3$  (when applied by 1.3 factor and an average of  $15.7\mu\text{g}/\text{m}^3$  when applied by 1.14 factor). This is just below the  $18\mu\text{g}/\text{m}^3$  2010 objective. In addition, there were seven exceedences (the maximum permitted) of the 24-hr objective of  $50\mu\text{g}/\text{m}^3$ .

Cairnie Place, Whitburn had an annual average of  $13.8\mu\text{g}/\text{m}^3$  (when applied by 1.3 factor and an average of  $12.1\mu\text{g}/\text{m}^3$  when applied by 1.14 factor). There were two exceedences of the 24-hr objective in the last 12 months.

It is concluded that there is no need to proceed to a detailed assessment for PM<sub>10</sub> at present but real-time monitoring will continue at Cairnie Place, Whitburn and High St, Linlithgow.

### **10.6.2. Recommendation for PM<sub>10</sub>**

Real-time monitoring of PM<sub>10</sub> will continue at High St, Linlithgow and Cairnie Place, Whitburn during 2007.

An additional Scottish Executive funded Romon300 Roadside (to measure Nitrogen dioxide and PM<sub>10</sub>) is to be situated in Broxburn town centre. The TEOM PM10 monitor at High Street, Linlithgow is to be upgraded to FDMS to remove the need to use the varying correction factors which currently result in figures bordering the annual average objective figure of  $18\mu\text{g}/\text{m}^3$ .

## **10.7. Sulphur dioxide**

### **10.7.1. Conclusions for Sulphur dioxide**

There are no new industrial sources of Sulphur dioxide in West Lothian and no industrial sources with substantially increased emissions of Sulphur dioxide.

The real-time analyser results at Cairnie Place have indicated that there has not been any exceedence of the 1-hr mean of  $350\mu\text{g}/\text{m}^3$ , the 24-hr mean of  $125\mu\text{g}/\text{m}^3$ , or the 15-minute mean of  $266\mu\text{g}/\text{m}^3$ .

No exceedences occurred in the last twelve months with the 8-port bubblers located at Atlas Cottages, Armadale and Netherton Place, Whitburn.


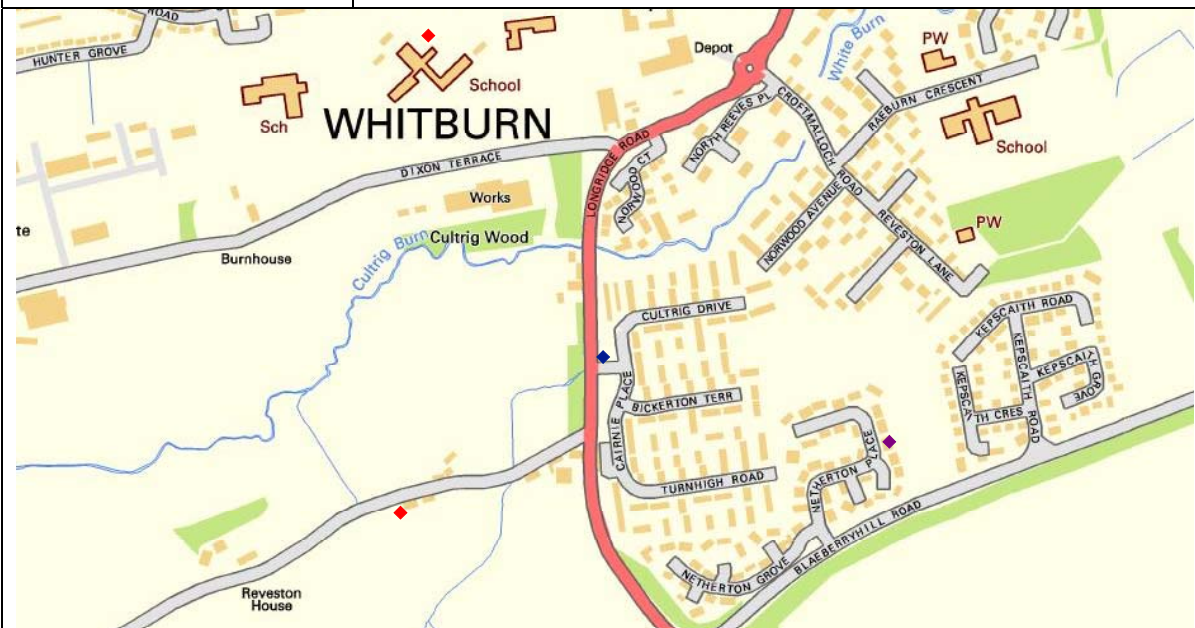
There is no need to proceed to a detailed assessment.

### **10.7.2. Recommendation for Sulphur dioxide**

Real-time monitoring of Sulphur dioxide will continue at Cairnie Place, Whitburn during 2007.

The two 8-port bubblers will continue to be used at Atlas Cottages, Armadale and Netherton Place, Whitburn until existing stocks of reagents expire. After this it proposed to cease the use of this equipment.

## APPENDIX 1: DETAILS OF REAL-TIME MONITORING STATIONS

<p>Groundhog Cairnie Place, Whitburn, West Lothian, EH47 Grid reference: NS 944 641</p>	
<p>Pollutants monitored: NOX;SO2;CO;PM<sub>10</sub></p>	
	



Romon 300  
High Street, Linlithgow,  
West Lothian, EH49  
Grid reference: NS 1000  
771

Pollutants monitored:  
PM10  
NOx

