



**Clackmannanshire  
Council**

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## 2012 Air Quality Updating and Screening Assessment for Clackmannanshire Council

In fulfillment of Part IV of the  
Environment Act 1995  
Local Air Quality Management

July, 2012

**TSI Scotland**



<b>Local Authority Officer</b>	Andrew Young
	Environmental Health Officer
<b>Department</b>	Environmental Health
<b>Address</b>	Clackmannanshire Council Kilncraigs Greenside Street Alloa FK10 1EB
<b>Telephone</b>	01259 452 578
<b>e-mail</b>	ayoung@clacks.gov.uk
<b>Report Reference number</b>	TSI/CLA.002-04-03
<b>Date</b>	2/7/12



## Executive Summary

The 2012 Updating and Screening Assessment Report for Clackmannanshire Council was undertaken by TSI Scotland Ltd in accordance with Local Air Quality Management Technical Guidance LAQM.TG(09) (Ref.1).

New monitoring data for NO<sub>2</sub> and PM<sub>10</sub> were analysed to determine if any air quality objectives had been exceeded during 2011. All concentrations were found to be below the objectives.

Examination of the previous 5 years of data show that there is no obvious trend in annual mean NO<sub>2</sub> concentrations across the diffusion tube network although the concentration has decreased at the 5 comparable sites between 2010 and 2011. Data from the particulate automatic monitoring station at South Ring Road, Alloa have shown an annual mean concentration of 15.8-22µg/m<sup>3</sup> in recent years with an average of 17.7µg/m<sup>3</sup>. There was a decrease between 2010 and 2011 with the latest annual mean concentration of PM<sub>10</sub> being 16.5µg/m<sup>3</sup>.

New and changed sources of atmospheric emissions were investigated and assessed to determine if any sources would cause an exceedence of air quality objectives for any pollutant.

A review of planning applications submitted in 2011 showed that there were no new developments likely to result in any exceedences of the AQS objectives for any pollutant.

Consultation with SEPA has confirmed that there are no existing or new installations likely to cause an exceedence of the AQS objectives for any pollutant.

Clackmannanshire Council confirmed that there were no new roads constructed with the potential to result in an exceedence of the AQS objectives.

Since the completion of The Forth Valley College, Alloa in September 2011, traffic congestion has been observed on Auld Brig Road leading up to the Shillinghill

Roundabout especially between 4pm – 6pm. A mini-roundabout at the junction with Devon Road controls flow to and from the College car park. There are residential properties within 3m of the roadside and the other side of the road is quite open. A traffic count survey will be commissioned for Auld Brig Road when staff and equipment resources become available in 2012 in order that a screening assessment of the potential impact can be undertaken in a future report. In the meantime, it is proposed to relocate the NO<sub>2</sub> diffusion tube from Fishcross Primary School to this location to obtain some air quality data.

The Transport Planning Department of Clackmannanshire Council have collected traffic count data from 21 automatic traffic count sites in the Council area in recent years. Due to technical problems extracting the data, there are no figures available for 2011 at these sites. Figures obtained from Transport Scotland for roads within Clackmannanshire were obtained in order to give an indication of the growth across the area.

The AADT flows increased on all of the road links between 2010 and 2011. The maximum increase is 9% on the A876 North of Clackmannanshire Bridge. This is likely to be affected by traffic avoiding the roadworks and restricted speed limit leading to the Forth Road Bridge due to the commencement of works for the new Forth Crossing. It is not expected that there will be any exceedences of the NAQS objectives at nearby receptors due to changes in traffic flow on the trunk roads.

It was determined that there were no other new emission sources, or sources that had not been previously assessed, that could result in air quality objectives being exceeded.

Overall, it was concluded that there is no requirement to proceed to a Detailed Assessment for any pollutant at present. The next report to be completed will be the Progress Report in April 2013.

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# 1 Introduction

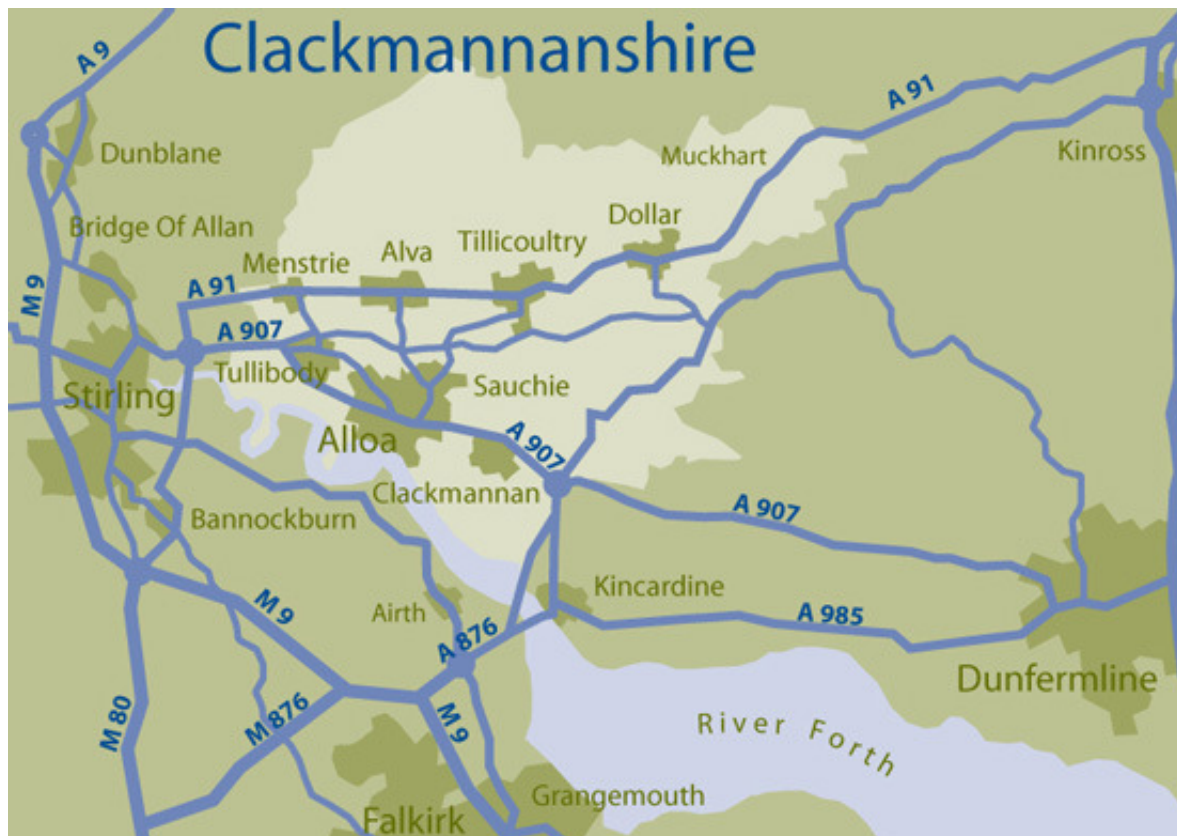
## 1.1 Description of Local Authority Area

Clackmannanshire is the smallest local authority area in mainland Scotland with a population of approximately 50,000 people, of which half live in the main town of Alloa. It is a mainly rural area and shares borders with Falkirk, Perth and Kinross, Fife and Stirling Council areas. The Ochil Hills form the northern border of Clackmannanshire with the River Forth located on the southern border.

The majority of industrial and commercial developments are also located within Alloa and the predominant industries are now agriculture and small to medium sized enterprises.

The Clackmannanshire Council boundary is shown in Figure 1.1

**Figure 1.1 Map of Clackmannanshire Council Area**



## 1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an update of any outstanding information requested previously in Review and Assessment reports.

## 1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **Scotland** are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

**Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland**

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	3.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 $\text{mg}/\text{m}^3$	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM <sub>10</sub> ) (gravimetric)	50 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

## 1.4 Summary of Previous Review and Assessments

Table 1.2 summarises the Air Quality Review and Assessment reports submitted by Clackmannanshire Council since 2004 with the most recent report of 2011 listed first.

**Table 1.1 Summary of Previous Air Quality Review and Assessment Reports 2004-2011**

Report	Date Completed	Summary and Conclusions
Progress Report 2011 (Ref.2)		<p>New monitoring data confirmed that there were no exceedences of the Air Quality Strategy (AQS) objectives for nitrogen dioxide (NO<sub>2</sub>) and (PM<sub>10</sub>) during 2010. Shillinghill/Bridge Terrace and Clackmannanshire Rd in Alloa were identified as having an annual mean concentration of NO<sub>2</sub> of 38ug/m<sup>3</sup> (objective level is 40ug/m<sup>3</sup>). South Ring in Alloa also recorded an annual mean concentration of PM<sub>10</sub> of 17ug/m<sup>3</sup> compared with the objective of 18ug/m<sup>3</sup>.</p> <p>5 NO<sub>2</sub> diffusion tube sites were decommissioned at the end of 2010 due to a history of low concentrations.</p> <p>Further guidance is awaited regarding the impact on local air quality of intensive poultry farms before deciding to proceed to a Detailed Assessment for Cambusview Poultry Farm.</p> <p>It was also concluded that there was no risk of exceedences of any other AQS pollutant objectives.</p>
Progress Report 2010 (Ref.3)	July 2010	<p>New monitoring data confirmed that there were no exceedences of the Air Quality Strategy (AQS) objectives for nitrogen dioxide (NO<sub>2</sub>) and (PM<sub>10</sub>) during 2009. However one site, Shillinghill/Bridge Terrace in Alloa was identified as having an annual mean concentration of NO<sub>2</sub> of 39ug/m<sup>3</sup> (objective level is 40ug/m<sup>3</sup>). South Ring in Alloa also recorded an annual mean concentration of PM<sub>10</sub> of 17ug/m<sup>3</sup> compared with the objective of 18ug/m<sup>3</sup>. The elevated concentrations were recorded during a period of construction close-by in August 2009 so may not be representative. It was recommended that monitoring at these locations should continue.</p>

		<p>Further guidance is awaited regarding the impact on local air quality of intensive poultry farms from monitoring studies carried out elsewhere in the UK, before deciding to proceed to a Detailed Assessment for Cambusview Poultry Farm.</p> <p>It was also concluded that there was no risk of exceedences of any other AQS pollutant objectives.</p>
Updating and Screening Assessment 2009 (Ref.4)	July 2009	<p>New monitoring data confirmed that there were no exceedences of the Air Quality Strategy (AQS) objectives for nitrogen dioxide (NO<sub>2</sub>) and (PM<sub>10</sub>) during 2008. It was also concluded that there was no risk of exceedences of any other AQS pollutant objectives.</p> <p>Intensive poultry farms were added to the updated Technical Guidance LAQM.TG(09) for assessment. One such farm, Cambusview Poultry Farm was identified as being recommended for Detailed Assessment to determine if there was a likelihood of exceedence of the PM<sub>10</sub> objectives in an area of relevant exposure.</p>
Progress Report 2008 (Ref.5)	March 2008	<p>New monitoring data confirmed that there were no exceedences of the AQS objectives for NO<sub>2</sub> and during 2007. The PM<sub>10</sub> objectives were exceeded at South Ring, Alloa but were attributed to construction of a new roundabout in the vicinity. Elevated concentrations were clearly identified during the construction period in the latter half of the year. It was recommended that Clackmannanshire Council should continue monitoring PM<sub>10</sub> at this location for a further year before determining the need for a Detailed Assessment.</p>
Progress Report 2007 (Ref.6)	May 2007	<p>New monitoring data confirmed that there were no exceedences of the AQS objectives for NO<sub>2</sub> and during 2006. The PM<sub>10</sub> objectives were exceeded at South Ring, Alloa but were attributed to construction work being carried out in the vicinity. It was recommended that Clackmannanshire Council should continue monitoring PM<sub>10</sub> at this location in order to verify the likelihood of exceedence of the objectives.</p>
Updating and Screening Assessment 2006 (Ref.7)	August 2006	<p>New monitoring data confirmed that there were no exceedences of the AQS objectives for NO<sub>2</sub> and PM<sub>10</sub> during 2005. It was also concluded using the methodology in the technical guidance to project forward that there was no risk of</p>

		exceedence of any of the AQS objectives in future years.
Progress Report 2005 (Ref.8)	April 2005	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO <sub>2</sub> and PM <sub>10</sub> during 2004. It was also concluded using the methodology in the technical guidance to project forward that that there was no risk of exceedence of any of the AQS objectives in future years.
Progress Report 2004 (Ref.9)	April 2004	New monitoring data confirmed that there were no exceedences of the AQS objectives for NO <sub>2</sub> and PM <sub>10</sub> during 2003. It was also concluded that there was no risk of exceedences of any of the AQS pollutants in future years based on a 58% data capture.

## **2 New Monitoring Data**

### **2.1 Summary of Monitoring Undertaken**

Monitoring is carried out for NO<sub>2</sub> and PM<sub>10</sub> in Clackmannanshire. During 2011, Clackmannanshire Council monitored NO<sub>2</sub> at six locations using passive diffusion tubes and PM<sub>10</sub> at one location using a Tapered Element Oscillating Microbalance (TEOM) automatic analyser.

#### **2.1.1 Automatic Monitoring Sites**

The TEOM is located in a Groundhog unit in a car park immediately adjacent to South Ring Road, Alloa. It is a busy road with a pedestrian crossing and housing nearby. It is considered a busy pedestrian thoroughfare. The site is classified as a Roadside site and also records ambient temperature. The details of the site are shown in Table 2.1. A photograph of the unit and a map showing the location of the monitoring site are shown in Figures 2.1 and 2.2.

The data capture for the site was 99.3% for PM<sub>10</sub>. Routine calibrations are carried out by Casella and 6 monthly site audits are carried out by AEA. The QA/QC procedures and data ratification reports are described in more detail in Appendix A.

**Figure 2.1** Photograph of Automatic Monitoring Site at South Ring Road, Alloa





**Figure 2.2 Location Map of Automatic Monitoring Site at South Ring Road, Alloa**

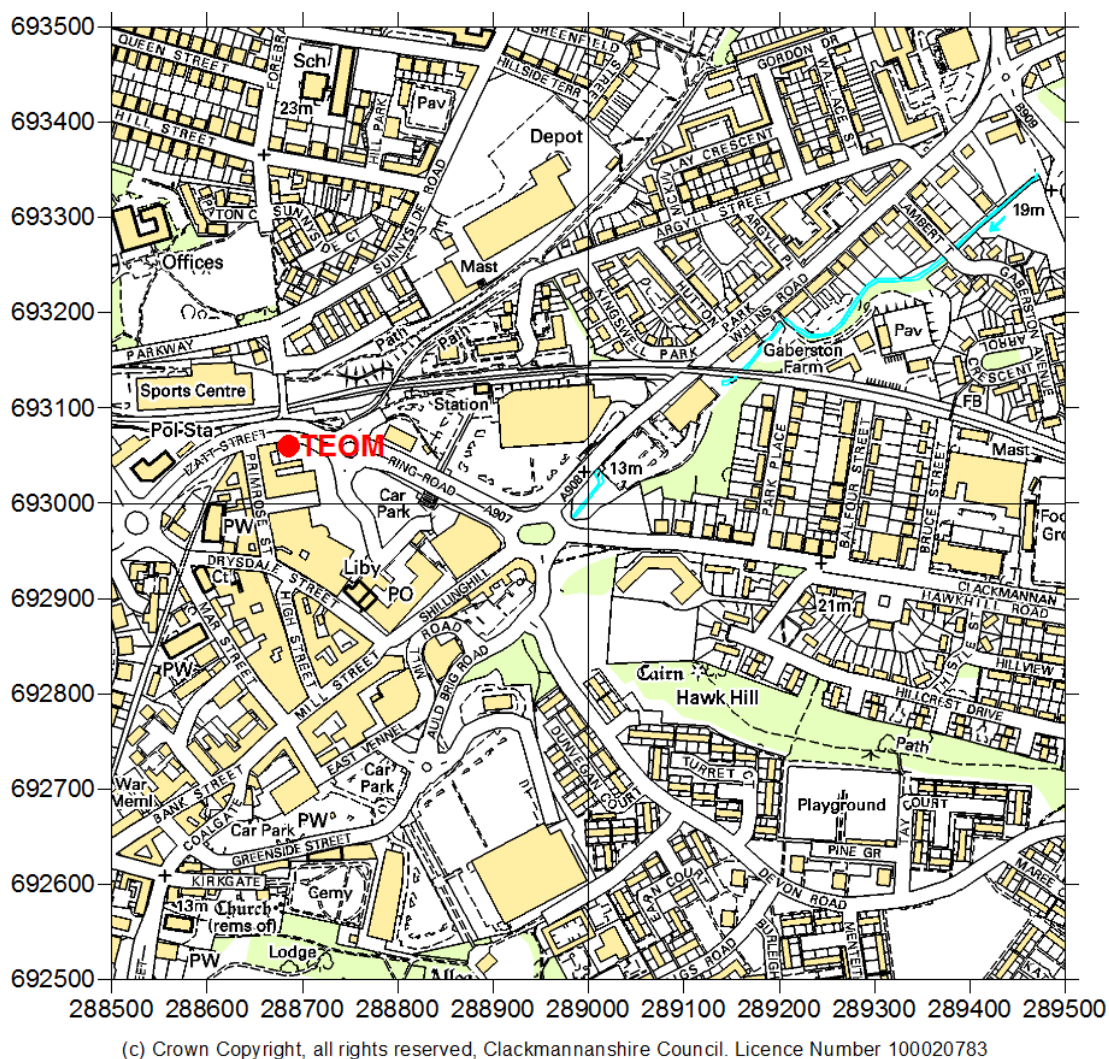


Table 2.1 Details of South Ring Road, Alloa Automatic Monitoring Site

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
South Ring Road, Alloa	Roadside	288685	693060	PM <sub>10</sub>	N	TEOM	Y (8m)	8.5m	Y

### **2.1.2 Non-Automatic Monitoring Sites**

Non-automatic monitoring of NO<sub>2</sub> was undertaken at 6 locations within Clackmannanshire Council in 2011 using passive diffusion tubes. The location and description of each site is shown in Table 2.2. All sites are classified as kerbside sites except South Ring Road, Alloa, which is a roadside site. A map showing the locations of the monitoring sites is shown in Figure 2.3.

The tubes are provided and analysed by Glasgow Scientific Services using 20% TEA in Acetone and are changed on a monthly basis by Clackmannanshire Council personnel. The data capture was above 90% for 5 sites and 66% for Fishcross Primary as it was May before this new site was operational. The QA/QC for diffusion tube analysis is included in more detail in Appendix A.

Figure 2.3 Map of Non-Automatic Monitoring Sites





Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Norwood Avenue	Kerbside	287600	693600	NO <sub>2</sub>	N	N	Y (2m)	1.7m	Y
Clackmannan Road	Kerbside	289300	692900	NO <sub>2</sub>	N	N	Y (2m)	2m	Y
Bus Station, Alloa	Kerbside	288800	692900	NO <sub>2</sub>	N	N	Y (2m)	1.3m	Y
Shillinghill/Bridge Terrace, Alloa	Kerbside	288900	692900	NO <sub>2</sub>	N	N	Y (2m)	1.4m	Y
South Ring Road, Alloa	Roadside	288685	693060	NO <sub>2</sub>	N	N	Y (8m)	8.5m	Y
Fishcross Primary School	Kerbside	289900	695300	NO <sub>2</sub>	N	N	Y (2m)	2m	Y

## **2.2 Comparison of Monitoring Results with AQ Objectives**

### **2.2.1 Nitrogen Dioxide**

#### **Diffusion Tube Monitoring Data**

A summary of the bias-adjusted annual mean diffusion tube concentrations of NO<sub>2</sub> across the monitoring network for 2011 is shown in Table 2.3. The raw monthly results are included in Appendix A. A summary of data for the last five years is shown in Table 2.4.

A trend graph is shown in Figure 2.4 which illustrates that there is no clear trend but that the annual mean NO<sub>2</sub> concentration has consistently remained below the limit concentration of 40µg/m<sup>3</sup> during the last 5 years with a decrease at all comparable sites between 2010 and 2011.

Table 2.3 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment Factor = 0.94)
								2011 ( $\mu\text{g}/\text{m}^3$ )
1	Norwood Avenue	Kerbside	N	N	100	N	N	11.7
2	Clackmannan Road	Kerbside	N	N	100	N	N	32.6
3	Bus Station, Alloa	Kerbside	N	N	91.7	N	N	31.7
4	Shillinghill/Bridge Terrace, Alloa	Kerbside	N	N	100	N	N	29.5
5	South Ring Road, Alloa	Roadside	N	N	100	N	N	22.4
6	Fishcross Primary School	Kerbside	N	N	66.7	Y	N	17.0*

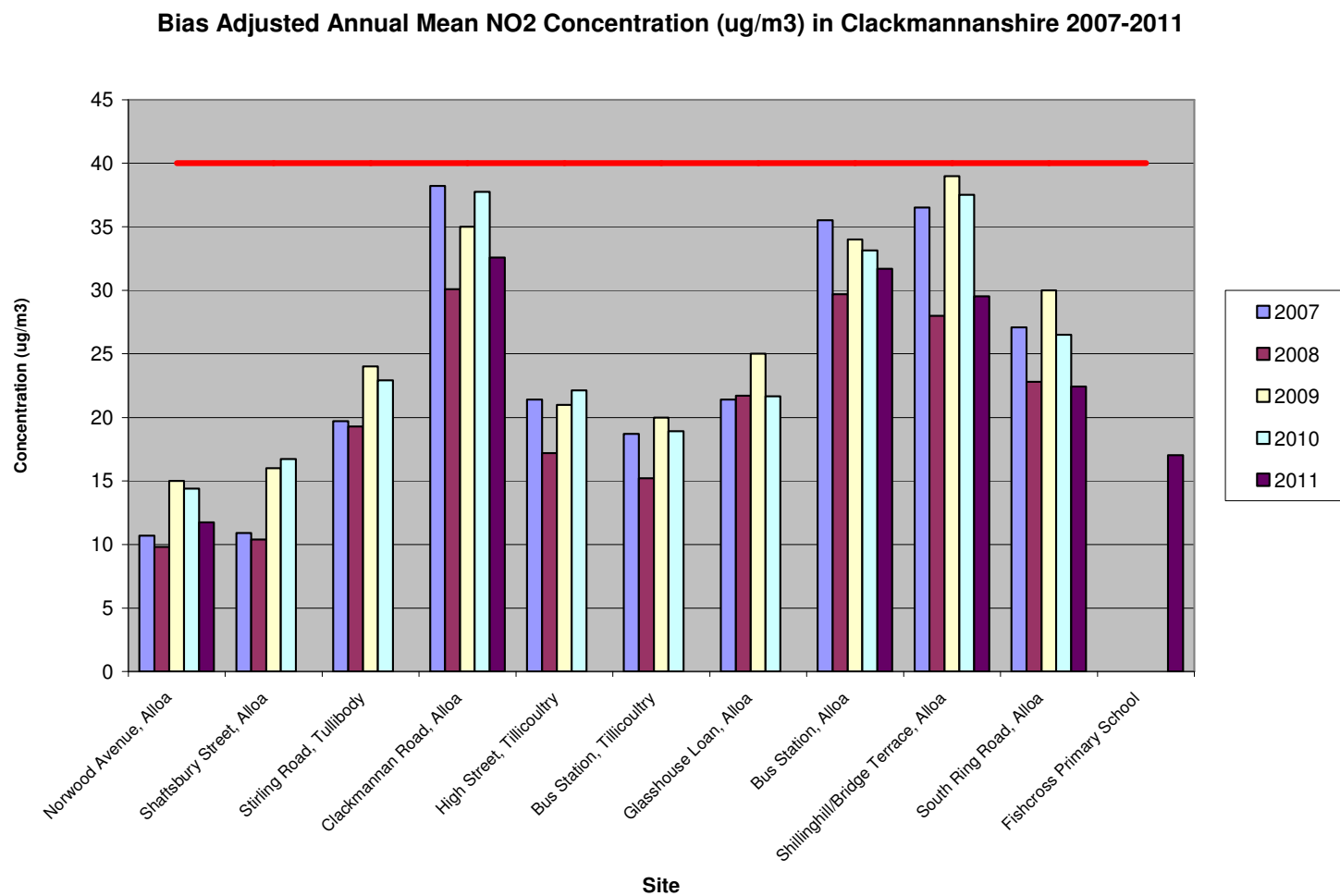
Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
			2007 (Bias Adjustment Factor = 1.09)	2008 (Bias Adjustment Factor = 0.97)	2009 (Bias Adjustment Factor = 1.23)	2010 (Bias Adjustment Factor = 1.1)	2011 (Bias Adjustment Factor = 0.94)
1	Norwood Avenue	N	10.7	9.8	15	14	11.7
2	Clackmannan Road	N	38.2	30.1	30.1	38	32.6
3	Bus Station, Alloa	N	35.5	29.7	34	33	31.7
4	Shillinghill/Bridge Terrace, Alloa	N	36.5	28	39	38	29.5
5	South Ring Road, Alloa	N	27.1	22.8	30	27	22.4
6	Fishcross Primary School	N	-	-	-	-	17.0*

\* Annualised Mean from 8-month Mean. Uses method in Box 3.2 in TG(09) (Ref.1) although not all sites are background sites. These are the closest sites using the same laboratory and method for analysis for which data capture is above 90% for the annual period of 2011



Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites



### 2.2.2 $PM_{10}$

#### Automatic Monitoring Data

A summary of the ratified monitoring data for  $PM_{10}$  at the automatic site at South Ring Road, Alloa is shown in Tables 2.5 and 2.6.

A trend graph is shown in Figure 2.5. The annual mean concentration of  $PM_{10}$  over the period 2007-2011 has ranged between  $15.8-22\mu g/m^3$  with an average of  $17.7\mu g/m^3$ . There was a decrease between 2010 and 2011 with the latest annual mean being  $16.5\mu g/m^3$ .

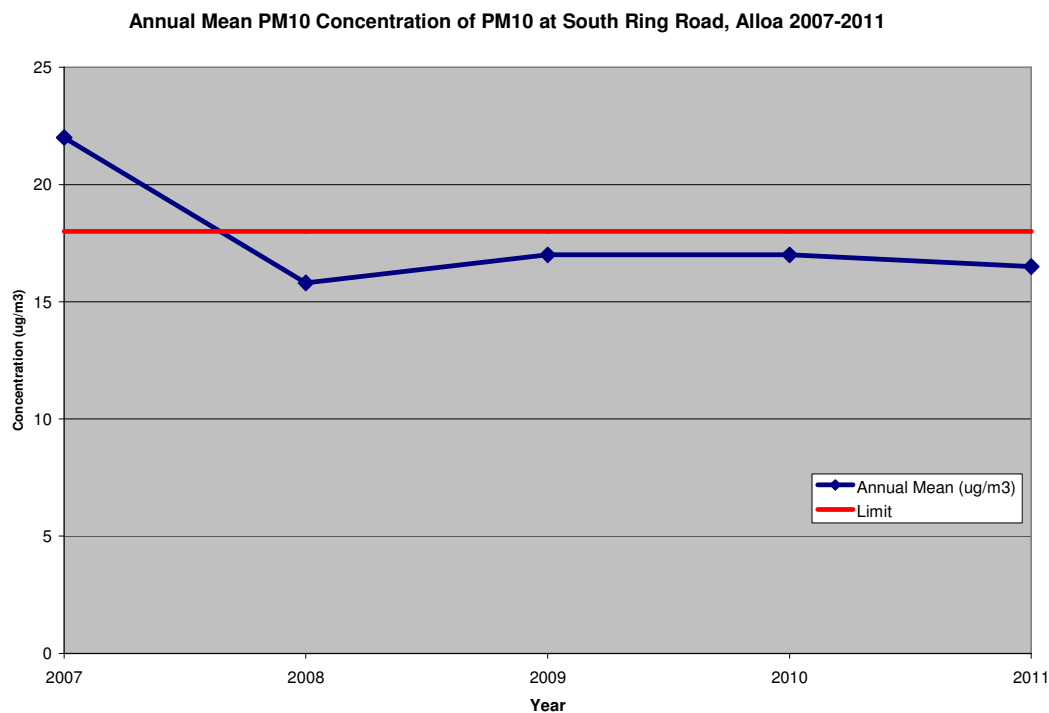
The Gravimetric adjustment factor of 1.3 was applied to TEOM results up to 2007. All results from 2008-2011 have been corrected using the Volatile Correction Method (VCM) (latest version Ref.10).

**Table 2.5 Results of Automatic Monitoring of PM<sub>10</sub>: Comparison with Annual Mean Objective of 18µg/m<sup>3</sup>**

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg/m <sup>3</sup>				
						2007	2008	2009	2010	2011
5-South Ring Rd, Alloa	Roadside	N	99.3	99.3	Y	22	15.8	17	17	16.5

**Table 2.6 Results of Automatic Monitoring for PM<sub>10</sub>: Comparison with 24-hour mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2011 %	Confirm Gravimetric Equivalent (Y or NA)	Number of Exceedences of 24-Hour Mean (50 µg/m <sup>3</sup> )				
						2007	2008	2009	2010	2011
5-South Ring Rd, Alloa	Roadside	N	99.3	99.3	Y	9	0	3	1	2

**Figure 2.5 Trends in Annual Mean PM<sub>10</sub> Concentration**

### 2.2.3 Other Pollutants

There is no monitoring for any other pollutants within the Clackmannanshire Council area

### 2.2.4 Summary of Compliance with AQS Objectives

Clackmannanshire Council has examined the results from monitoring in the Council area. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment.

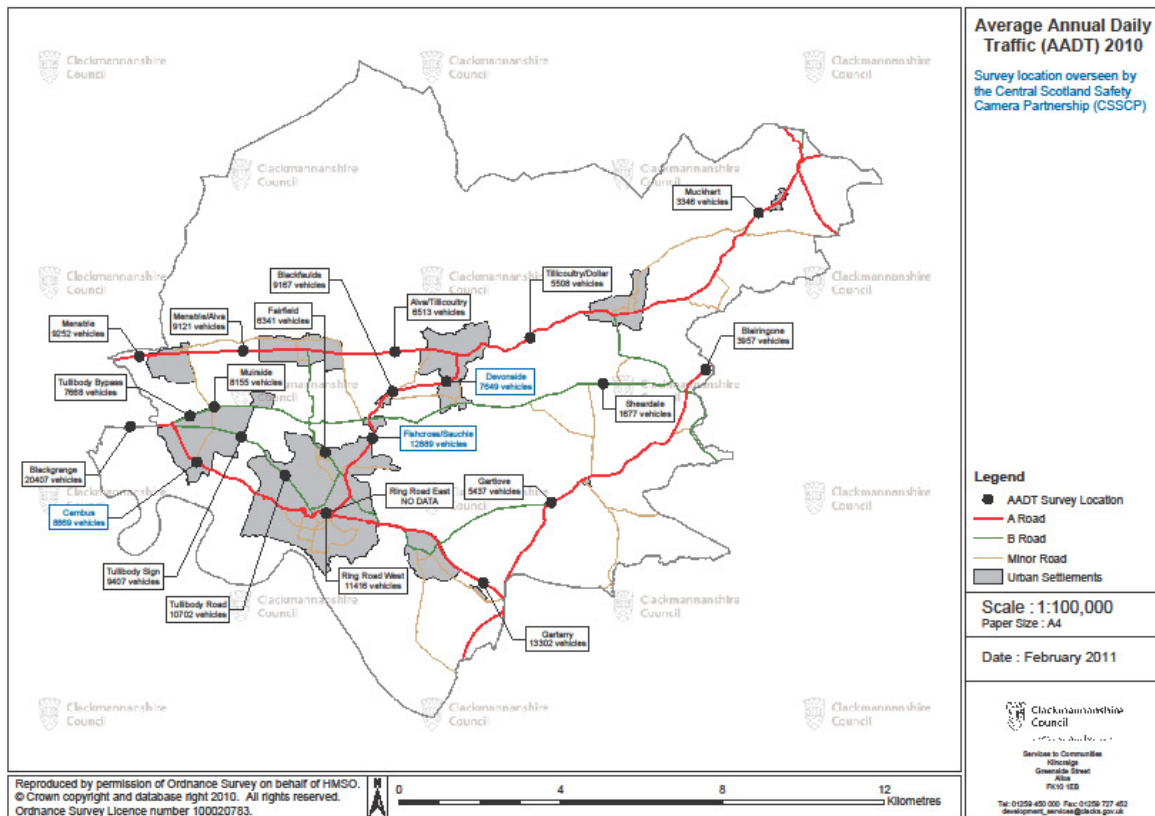
### 3 Road Traffic Sources

The Transport Planning Department of Clackmannanshire Council was consulted in order to check if there were any new potential road traffic sources or significantly changes traffic sources within the Clackmannanshire Council area that could result in exceedences of air quality standards. Data have been collected from 21 automatic traffic count sites in the Council area in recent years. Due to technical problems extracting the data, there are no figures currently available for 2011 at these sites. It is anticipated that the data will be available later in 2012 and will form part of the next Progress Report. The figures for 2008-2010 are summarised in Table 3.1. A location map of the monitoring sites showing 2010 AADT counts is shown in Figure 3.1.

**Table 3.1 Summary of Traffic Survey Data for Clackmannanshire Council 2008-2010**

ID	Description	Speed	AADT		
			2008	2009	2010
49	A977 Gartlove	60	5325	5949	5437
287	A907 Blackgrange	60	22896	20768	20407
288	A907 Cambus	40	10182	9027	8869
292	A907 Ring Road Westbound	30	12259	11915	11416
295	A907 Clackmannanshire Bypass	60	12431	14395	13302
300	A908 Fishcross Primary School	30	12204	12341	12889
301	A908 Blackfaulds	40	8574	9061	9167
302	A908 Devonside	30	7274	7388	7649
309	A91 Menstrie/Alva	60	10559	9758	9121
311	A91 Menstrie Mains	60	10458	9760	9252
314	A91 Tillicoultry	30	7641	7225	6513
321	A91 Muckhart	60	3543	3545	3346
50	A977 Blairingone	60	4631	5355	3957
581	B908 Fairfield	30	5699	6178	6341
589	B9096 Tullibody Sign	30	10291	9517	9407
590	B9096 Tullibody Road	30	11048	10746	10702
625	B9096 Tullibody Bypass	60	8435	7567	7668
626	B9140 Muirside	60	8116	7739	8155
634	B9140 Sheardale	60	1874	1639	1677
317	A91 Tillicoultry/Dollar	60	5977	5652	5508
49	A977 Gartlove	60	5325	5949	5437

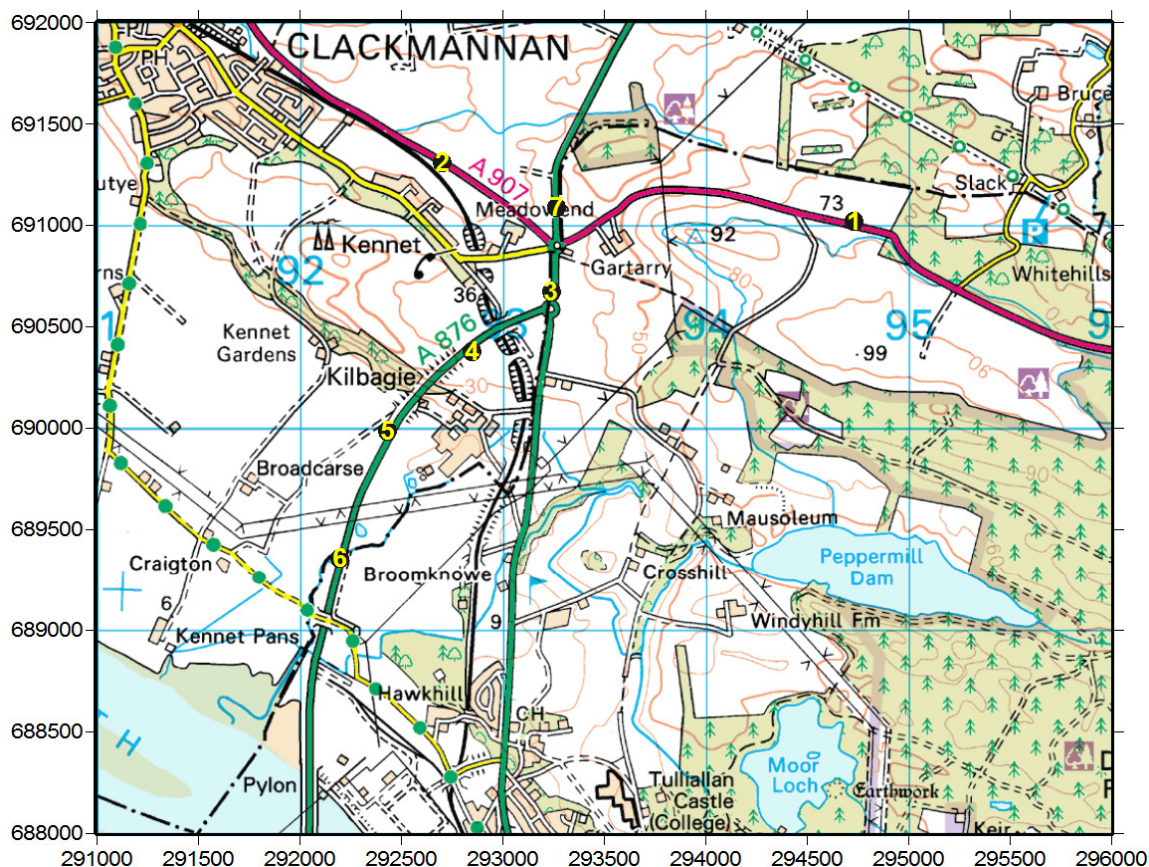
**Figure 3.1 Location Map of Automatic Traffic Counts in Clackmannanshire**



For the majority of roads, the Annual Average Daily Traffic (AADT) count decreased between 2009-2010. One link, the A908 near Fishcross Primary School was identified in the 2011 Progress Report (Ref.2) as having an increase of 4.4% in an area of relevant public exposure with the school and residential properties adjacent to it. A diffusion tube was added to the network in this location from April 2011 and gave an annualised annual mean NO<sub>2</sub> concentration of 17µg/m<sup>3</sup>. It is an open area and while monitoring continued for 4 months of 2012 in order to obtain 12 months of data, Clackmannanshire Council intend to stop NO<sub>2</sub> monitoring at this location.

In the absence of traffic count data from the Council network of automatic monitoring sites for 2011, data were obtained from Transport Scotland for the trunk roads monitored within Clackmannanshire Council. A map showing the count locations is shown in Figure 3.2 and the data for 2009-2011 are summarised in Table 3.2.

**Figure 3.2 Location Map of Transport Scotland Automatic Traffic Counts in Clackmannanshire**



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- 1-A907 East of A977
- 2-A907 West of A977
- 3-A977 North of A876
- 4-A876 South of A977
- 5-A876 Clackmannanshire Bridge Approach
- 6-A876 North of Clackmannanshire Bridge
- 7-A977 North of Gartarry Roundabout

**Table 3.2 Summary of Transport Scotland Trunk Road Traffic Count Data for Clackmannanshire 2009-2011**

ID	Description	AADT			% Change 2010-2011
		2009	2010	2011	
1	A907 East of A977	3082	2874	3075	7
2	A907 West of A977	14247	13934	14507	4
3	A977 North of A876	17620	17795	18573	4
4	A876 South of A977	14359	14281	14839	4
5	A876 Clackmannanshire Bridge Approach	14387	14228	14598	3
6	A876 North of Clackmannanshire Bridge	14428	14133	15349	9
7	A977 North of Gartarry Roundabout	6009	5459	5475	0.3

The AADT flows have increased on all of the road links between 2010 and 2011. The maximum increase is 9% on the A876 North of Clackmannanshire Bridge. This is likely to be affected by traffic avoiding the roadworks and restricted speed limit leading to the Forth Road Bridge due to the commencement of works for the new Forth Crossing. It is not expected that there will be any exceedences of the NAQS objectives at nearby receptors due to changes in traffic flow on the trunk roads.



### **3.1 Narrow Congested Streets with Residential Properties Close to the Kerb**

Clackmannanshire Council confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

### **3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic**

Clackmannanshire Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

### **3.3 Roads with a High Flow of Buses and/or HGVs.**

Clackmannanshire Council confirms that there are no new/newly identified roads with high flows of buses/HGVs.

### **3.4 Junctions**

Auld Brig Road in Alloa has been observed to have significantly changed traffic flow patterns following the construction and opening of Forth Valley College resulting in congestion at certain times of the day. This is discussed in more detail in Section 3.6. Clackmannanshire Council intend to commission a traffic count survey on this section of road and commence NO<sub>2</sub> diffusion tube monitoring at the nearest sensitive receptors 3m from the roadside.

Clackmannanshire Council has assessed new/newly identified junctions. It is not yet known if the traffic flow meets the criteria in Section A.4 of Box 5.3 in TG(09) but congestion has been observed. Plans are in place to undertake a traffic count and diffusion tube monitoring and it is concluded that it will not be necessary to proceed to a Detailed Assessment at this time.

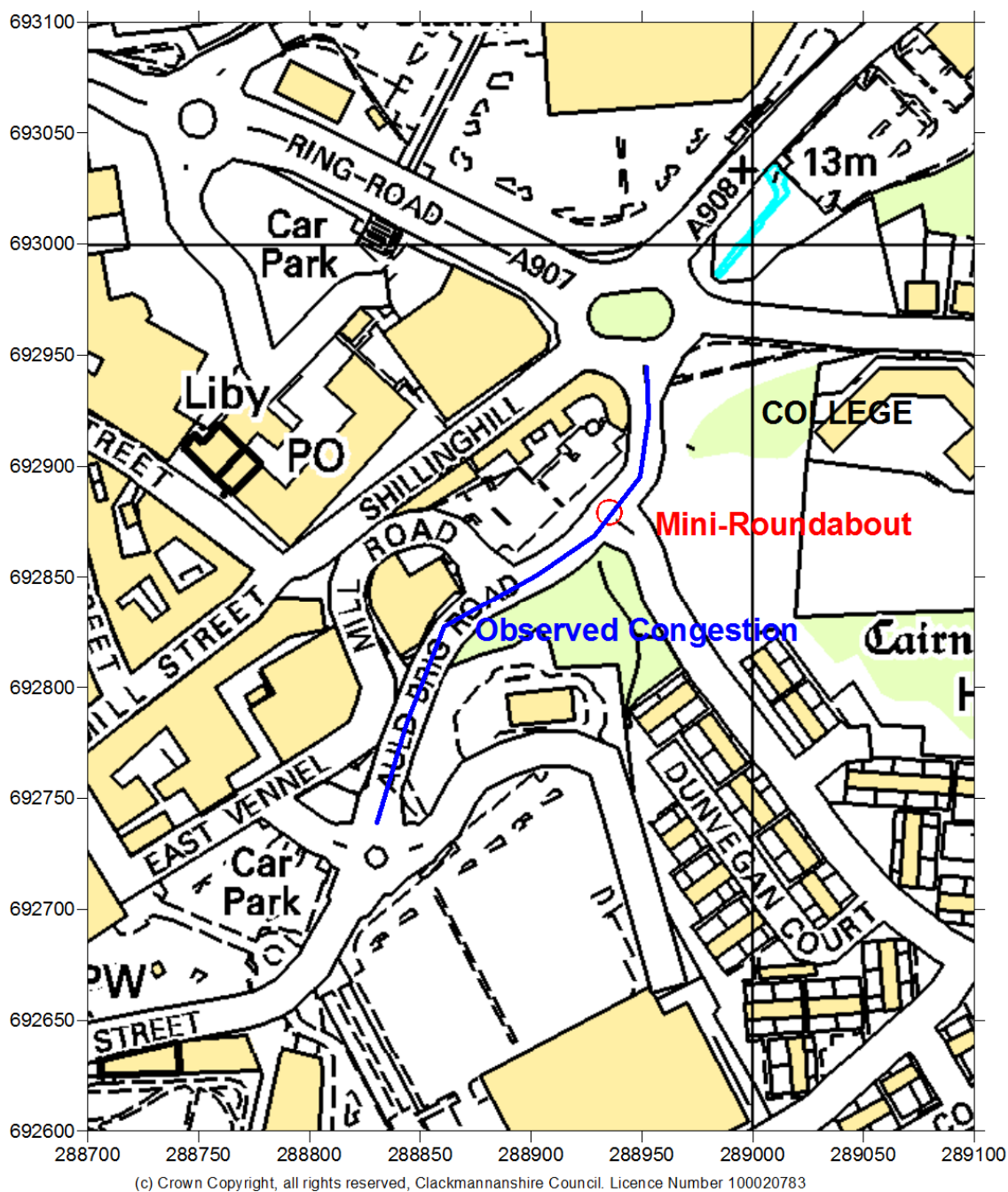
### **3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment**

Clackmannanshire Council confirms that there are no new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **3.6 Roads with Significantly Changed Traffic Flows**

The Forth Valley College, Alloa Campus was completed and opened in September 2011. It is located on the corner of Clackmannan Road and Auld Brig Road at Shillinghill roundabout in Alloa. During 2011 and 2012 up to the time of writing, traffic congestion has been observed on Auld Brig Road leading up to the roundabout especially between 4pm – 6pm. A mini-roundabout controls flow to and from the College car park which is accessed via Devon Road. There are residential properties within 3m of the roadside although the other side of the road is quite open. A detailed view of this location is shown in Figure 3.3.

Figure 3.3 Location Map of Congested Road Near Forth Valley College, Alloa



A traffic count survey will be commissioned for Auld Brig Road when staff and equipment resources become available in order that a screening assessment of the potential impact can be undertaken in a future report. In the meantime, it is proposed to relocate the NO<sub>2</sub> diffusion tube from Fishcross Primary School to this location to obtain some air quality data.

Clackmannanshire Council has assessed new/newly identified roads with significantly changed traffic flows, and identified one road where congestion has been observed. Plans are in place to undertake a traffic count and diffusion tube monitoring at this location and it is concluded that it will not be necessary to proceed to a Detailed Assessment at this time.

### **3.7 Bus and Coach Stations**

There are two bus stations within the Council area, one in Alloa and the other in Tillicoultry. However bus movements at both locations are substantially below the 2,500 criterion for assessment. In addition, NO<sub>2</sub> concentrations are monitored using diffusion tubes at Alloa bus station and the monitoring results are substantially below the annual mean NO<sub>2</sub> objective of 40 µg/m<sup>3</sup>.

It is concluded that it is unlikely that NO<sub>2</sub> objectives will be exceeded due to bus movements within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no relevant bus stations in the Local Authority area that require Detailed Assessment.

## **4 Other Transport Sources**

### **4.1 Airports**

There are no Airports within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no airports in the Local Authority area.

### **4.2 Railways (Diesel and Steam Trains)**

There is one train station within Clackmannanshire Council at Alloa which has been assessed in previous rounds of Review and Assessment for the potential impact from stationary trains. There has been no increase in the number of stationary trains with engines running within relevant exposure. No further assessment was therefore undertaken.

There has been no significant increase in the number of diesel passenger trains on the main train lines throughout the Clackmannanshire Council area since the last round of Review and Assessment. No further assessment was therefore undertaken.

Network Rail is consulting on the Edinburgh Glasgow Improvement Programme (EGIP) which is anticipated to deliver environmental benefits on the Stirling to Glasgow line through Clackmannanshire due to electrification. The completed project will deliver shorter journey times on a new fleet of lighter, quieter trains which are more efficient to operate and maintain; benefiting commuters as well as line-side neighbours. The project is expected to be complete in 2016.

Clackmannanshire Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

Clackmannanshire Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

### **4.3 Ports (Shipping)**

There are no ports within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no ports or shipping within the Local Authority area.

## 5 Industrial Sources

### 5.1 Industrial Installations

#### 5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

The Scottish Environment Protection Agency (SEPA) and The Planning Department of the Council were contacted to obtain up to date information on industrial processes within the Clackmannanshire Council area. It was confirmed that there are no new or proposed installations for which an Air Quality Assessment has been carried out.

Clackmannanshire Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

#### 5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced

SEPA was contacted to obtain up to date information on regulated industrial processes within the Clackmannanshire Council area. It was confirmed that there are no existing installations where emissions have increased substantially or new relevant exposure has been introduced.

Clackmannanshire Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

#### 5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

After consultation with SEPA, it was confirmed that there are no new or significantly changed industrial installations with no previous air quality assessments within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

## **5.2 Major Fuel (Petrol) Storage Depots**

There are no major fuel (petrol) storage depots within the Local Authority area.

## **5.3 Petrol Stations**

There are no new petrol stations with annual throughput of over 2000m<sup>3</sup> of petrol.

Clackmannanshire Council confirms that there are no petrol stations meeting the specified criteria.

## **5.4 Poultry Farms**

Cambusview Poultry Farm was identified in the 2009 USA as having the potential to cause an adverse impact on air quality at a number of residential properties close to the unit. The Scottish Government was consulted in February 2011 regarding the availability of new guidance for the assessment of such installations. It is understood that Detailed Assessments have been carried out at several Local Authorities in England to inform such guidance. Some of these studies are still in progress and the Council was advised that this installation should be assessed in the appropriate manner once UK-wide guidance is issued. Guidance is still not available for this USA and the impact of poultry farms will be assessed when such guidance becomes available. To date, there have been no complaints from local residents related to air quality in the vicinity of the site.



Clackmannanshire Council confirms Cambusview Poultry Farm was identified in the 2009 USA as having the potential to cause an adverse impact on air quality at a number of residential properties close to the unit. Guidance is still not available for assessment of poultry farms and this will be assessed in a future report when such guidance becomes available.

## **6 Commercial and Domestic Sources**

### **6.1 Biomass Combustion – Individual Installations**

There are no biomass installations within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no Biomass installations within the Council area and that it will not be necessary to proceed to a Detailed Assessment.

### **6.2 Biomass Combustion – Combined Impacts**

There are no biomass installations within the Clackmannanshire Council area.

Clackmannanshire Council confirms that there are no Biomass installations within the Council area and that it will not be necessary to proceed to a Detailed Assessment.

### **6.3 Domestic Solid-Fuel Burning**

Previous reports concluded that there were no areas of domestic solid-fuel burning with a density of greater than 100 houses in a 500 x 500m area. There have been no new areas of development with significant solid-fuel burning and it is therefore not necessary to undertake any further assessment.

Clackmannanshire Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

## 7 Fugitive or Uncontrolled Sources

SEPA confirmed that there were no new industrial sources of fugitive emissions within Clackmannanshire Council.

Clackmannanshire Council confirms that there are no potential sources of fugitive emissions that have not been previously assessed within the local authority area.

## **8 Conclusions and Proposed Actions**

### **8.1 Conclusions from New Monitoring Data**

During 2011, Clackmannanshire Council undertook monitoring of NO<sub>2</sub> and PM<sub>10</sub> concentrations at various locations. The results indicate that the NO<sub>2</sub> and PM<sub>10</sub> air quality objectives were met during 2011 at all monitoring locations. There are no existing AQMAs within the Council area and it is concluded that no Detailed Assessment is required because of monitoring data.

### **8.2 Conclusions from Assessment of Sources**

The assessment has been conducted in accordance with the TG09 Technical Guidance. Updated information of road, rail, industrial, domestic and fugitive emissions sources including biomass installations has been obtained and compared against the criteria and conditions described in the Guidance. It was determined that there is no need to proceed to a Detailed Assessment for any of the emissions sources.

Cambusview Poultry Farm will be assessed when formal guidance has been published.

### **8.3 Proposed Actions**

Clackmannanshire Council plan to maintain the monitoring network throughout 2012. All sites will be unchanged with the exception of the Fishcross Primary School NO<sub>2</sub> diffusion tube site. It is proposed to relocate it to a kerbside site on Auld Brig Road where traffic congestion has been observed since the opening of the new Forth Valley College on the corner of Shillinghill Roundabout in Alloa. A traffic count survey is also planned for this section of road once staff and equipment resources within the Transport Planning Department become available.

The next report to be submitted is the 2013 Progress Report.

## 9 References

- Ref.1 Local Air Quality Management Technical Guidance LAQM.TG(09),  
Department for Environment, Food and Rural Affairs, 2009
- Ref.2 2011 Air Quality Progress Report for Clackmannanshire Council, TSI Scotland  
Ltd, CLA-001-03-03, April 2011
- Ref.3 2010 Air Quality Progress Report for Clackmannanshire Council, AEA  
Technology plc, AEAT/ENV/R/3044/Issue1, 1<sup>st</sup> July 2010
- Ref.4 2009 Air Quality Updating and Screening Assessment for Clackmannanshire  
Council, BMT Cordah Ltd, G\_CLA\_019, July 2009
- Ref.5 LAQM Progress Report 2008, BMT Cordah Ltd, G\_CLA\_018/04-02-01, 31<sup>st</sup>  
March 2008
- Ref.6 Clackmannanshire Council LAQM Progress Report 2006/7, AEA,  
AEAT/ENV/R/2458/Issue 2, 6<sup>th</sup> July 2007
- Ref.7 LAQM Updating and Screening Assessment 2006, BMT Cordah Ltd,  
E\_CLA\_015, 31<sup>st</sup> August 2006
- Ref.8 LAQM Progress Report 2005, BMT Cordah Ltd, E\_CLA\_013, 28<sup>th</sup> April 2005
- Ref.9 LAQM Progress Report 2004, BMT Cordah Ltd, April 2004
- Ref.10 Volatile Correction Model, Environmental Research Group, King's College  
London, SE1 9NH – <http://www.volatile-correction-model.info/>
- Ref.11 [http://laqm.defra.gov.uk/documents/Diffusion Tube Factors v04 11 v6.xls](http://laqm.defra.gov.uk/documents/Diffusion_Tube_Factors_v04_11_v6.xls)



# Appendices

Appendix A: QA/QC Data

## Appendix A: QA:QC Data

The raw monthly average NO<sub>2</sub> diffusion tube results are summarised in Table A:1



Table A1: Raw Unadjusted Monthly Diffusion Tube NO<sub>2</sub> Concentrations

ID	SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	Data Capture %
1	Norwood Avenue	20.7	23.9	18	9.2	9.1	10.2	8.6	2.9	8.6	8.5	21.9	8.1	12.5	100.0
2	Clackmannan Road	44	51.4	41.1	34.4	29.4	37.1	30	17.3	24.4	31.9	50.3	24.5	34.7	100.0
3	Bus Station, Alloa	33.7	39.3	43.9	36.5	31.6	37.4	32.1	13	38.1	-	44.6	20.9	33.7	91.7
4	Shillinghill/Bridge Terrace, Alloa	37	40.3	39	34.7	29.1	28	28.1	14.5	25.9	28.3	47.8	24.1	31.4	100.0
5	South Ring Road, Alloa	34.4	31.8	33.5	22.5	23	27.3	21	12.8	17.4	18.3	33.4	10.8	23.9	100.0
6	Fishcross Primary School	-	-	-	-	14.7	14.4	19.2	9.7	10.2	14.5	33.2	9.6	15.7	66.7

### **Factor from Local Co-location Studies (if available)**

There is no co-location study within Clackmannanshire Council.

### **Diffusion Tube Bias Adjustment Factors**

The national bias adjustment factor spreadsheet v03\_12 (<http://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>) (Ref.11) was used to calculate the national bias adjustment factor for diffusion tubes analysed by Glasgow Scientific Services during 2011. The factor was found to be 0.94.

### **PM Monitoring Adjustment**

AEA has been funded by The Scottish Government to provide Volatile Correction Model (VCM) corrected TEOM (Tapered Element Oscillating Microbalance) data to Local Authorities under the Scottish Air Quality Database and Website (SAQD) project.

The VCM uses purge (volatile) particulate matter measurements provided by FDMS (Filter Dynamics Measurement System) instruments located within 130 km of the TEOM in question to assess the loss of particulate matter (PM<sub>10</sub>) from the TEOM. The TEOM measurements are then corrected to ambient pressure and temperature using meteorological data from met monitoring sites within 260 km of the TEOM. The volatile fraction is then added back onto the TEOM measurements to give Gravimetric Equivalent mass concentrations. Hourly average purge measurements from all Scottish FDMS monitoring sites within the Scottish Government-run network (SAQD) and the national network (AURN) were used for the correction.

The VCM method (Ref.11) was used to correct data from the Alloa site and is ratified by AEA.

**QA/QC of automatic monitoring**

The automatic monitoring equipment is audited every 6 months by AEA, Glengarnock Technology Centre, Lochshore Business Park, Glengarnock. It is serviced and calibrated bi-annually by Casella Measurement. Available reports are shown below.

# Service Report

# CASELLA

## MONITOR

Customer : Clackmannanshire Council

Job No: V1674A-5-5157

Date: 27.7.11

Site: King St, Alloa

Reported Fault: Teom leak test failed

Sample line changed

☐ Yes
☐ No (give reason below)
☒ N/A

Follow Up site visit required to complete repair / callout

☐ Yes
☒ No

Sample inlet cleaned

☐ Yes
☒ No

Comms test passed

☐ Yes
☐ No

☒ N/A

### TEOM 1400

Performed leak check and found a very small on the AUX line

Found that the leak was on a faulty fitting on the AUX line filter.

Replaced fitting and performed leak check - ALL OK

Fault Code

Leak Within Analyser

Repair Code

Leak Repaired

### Parts Required

Agresso No.	Manufacturer No.	Description	Qty

### Parts Used

Agresso No.	Manufacturer No.	Description	Qty

CALL-Callout

travel time

2 hrs

Time Started

09:30

time on site

1 hrs

Time finished

10:30

Richard Greenwood VN75

total

3

# Service Report

# CASELLA

## MONITOR

Customer : Gillian Mclean

Job No: V1674A-5/5208

Date: 27/10

Site: Alloa King Street

Period: 200529w/e-16/01/2005 ▼

Reported Fault: None

Sample line changed

☐ Yes
☒ No (give reason below)
☐ N/A

Follow Up site visit required to complete repair / callout

☐ Yes
☐ No

Sample inlet cleaned

☒ Yes
☐ No

Comms test passed

☒ Yes
☐ No

Action Taken:

I cleaned the team head and serviced the team. I changed the DFU and varified the flows before leaving.

Fault Code

No Fault Found ▼

Repair Code

Serviced ▼

## Parts Required

Agresso No.	Manufacturer No.	Description	Qty

## Parts Used

Agresso No.	Manufacturer No.	Description	Qty
SPA00349		DFU	1

RS-Routine Service ▼

 travel time  
 time on site  
 total

1	hrs
2	hrs
3	

 date started  
 date finished

13:10
15:00

**QA/QC of diffusion tube monitoring**

The NO<sub>2</sub> diffusion tubes used by Clackmannanshire Council were prepared and analysed by the Glasgow Council Scientific Services Laboratory (GSS). The Laboratory is UKAS accredited and has good performance in both WASP and NPL QA schemes. The laboratory demonstrated satisfactory performance in the Workplace Analysis Scheme for Proficiency (WASP) over the past four quarterly rounds with Z scores between -1.9 and 0.9.

**WASP (4 tubes)**

Round 112	Z-Scores	0.2	0.5	0.3	0.4
Round 113	Z-Scores	-0.7	-1.0	-1.4	-1.9
Round 114	Z-Scores	0.6	0.9	0.1	0.9
Round 115	Z-Scores	-0.2	0.0	-0.1	-0.2

The general classification of a Z-Score is:

$Z < \pm 2$	Satisfactory
$Z > \pm 2$ and $< \pm 3$	Warning
$Z > \pm 3$	Unsatisfactory

The results of the NPL Intercomparison Study are shown below. The overall survey had good precision and data capture with a bias correction factor of 0.86.

## Results of NPL Inter Comparison Study for GSS

## Checking Precision and Accuracy of Triplicate Tubes

 **AEA Energy & Environment**  
From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{gm}^{-3}$	Tube 2 $\mu\text{gm}^{-3}$	Tube 3 $\mu\text{gm}^{-3}$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	05/01/2011	02/02/2011	110.0	122.0	123.0	118	7.2	6	18.0
2	02/02/2011	02/03/2011							
3	02/03/2011	30/03/2011	115.0	120.0	90.7	109	15.7	14	38.9
4	30/03/2011	27/04/2011	116.0	117.0	131.0	121	8.4	7	20.8
5	27/04/2011	01/06/2011	116.0	120.0	119.0	118	2.1	2	5.2
6	01/06/2011	29/06/2011	91.9	106.0	91.4	96	8.3	9	20.6
7	29/06/2011	03/08/2011	96.3	89.3	78.2	88	9.1	10	22.7
8	03/08/2011	31/08/2011	88.6	89.2	108.0	95	11.0	12	27.4
9	31/08/2011	28/09/2011	138.0	146.0	160.0	148	11.1	8	27.7
10	28/09/2011	31/10/2011	73.4	71.5	84.1	76	6.8	9	16.9
11	18/11/2011	14/12/2011	163.0	162.0	167.0	164	2.6	2	6.6
12	30/11/2011	04/01/2012	137.0	143.0	118.0	133	13.1	10	32.4
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
91.2	93.3	Good	Good
111.7	93.3		Good
95.7	96.8	Good	Good
106.4	97.5	Good	Good
99.9	97.4	Good	Good
93.1	90.8	Good	Good
86.1	91.1	Good	Good
82.2	97.7	Good	Good
108.5	96.1	Good	Good
108.2	96.5	Good	Good
110.2	97.4	Good	Good
105.4	96.6	Good	Good

Overall survey → **Good precision** **Good Overall DC**

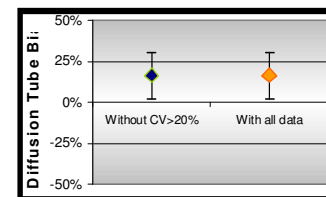
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:  

Accuracy (with 95% confidence interval)	
without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.86 (0.77 - 0.97)
Bias B	17% (3% - 30%)
Diffusion Tubes Mean:	115 $\mu\text{gm}^{-3}$
Mean CV (Precision):	8
Automatic Mean:	99 $\mu\text{gm}^{-3}$
Data Capture for periods used:	96%
Adjusted Tubes Mean:	99 (89 - 112) $\mu\text{gm}^{-3}$

Precision **11 out of 11 periods have a CV smaller than 20%**

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.86 (0.77 - 0.97)
Bias B	17% (3% - 30%)
Diffusion Tubes Mean:	115 $\mu\text{gm}^{-3}$
Mean CV (Precision):	8
Automatic Mean:	99 $\mu\text{gm}^{-3}$
Data Capture for periods used:	96%
Adjusted Tubes Mean:	99 (89 - 112) $\mu\text{gm}^{-3}$



Jaume Targa, for AEA  
Version 04 - February 2011