



2009 Air Quality Updating and Screening Assessment for

Caradon District Council

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

December 2009

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Executive Summary

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.

The assessment of air quality in 2007 [Air Quality Progress Report (2008)] identified the need to move to a Detailed Assessment of NO₂ at Tideford. The Detailed/Further assessment of air quality at Tideford [Bureau Veritas 2009] has identified the need for an Air Quality Management Area to be declared at Tideford.

The purpose of this report is to assess the quality of air in Caradon during 2008 and consider whether there have been any changes to emissions or whether new sources or receptors have been introduced, which may lead to the risk of an exceedence of an air quality objective.

Continuous monitoring of nitrogen dioxide, PM₁₀, sulphur dioxide and carbon monoxide has identified that all measured concentrations were well below the AQ Objectives, with no exceedences.

Non-continuous monitoring of nitrogen dioxide has identified exceedences of the nitrogen dioxide AQ Objective at Tideford, as expected. Monitoring at Gunnislake has identified that the objective is close to being exceeded.

The assessment of new or significantly changed sources has identified the potential for exceedences of PM₁₀ at Horizon Poultry Farm, Liskeard and has identified the need to proceed to a Detailed Assessment.

The Updating and Screening Assessment has identified the need to increase NO₂ diffusion tube monitoring at Gunnislake.

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1 Introduction

1.1 Description of Local Authority Area

On 1 April 2009 Caradon District Council (CDC), merged with the remaining 6 Cornwall Local Authorities to form Cornwall Council. However, the document reports on 2008 data for the area formerly known as Caradon District Council, and is referred to as such throughout the document.

Caradon District Council covers an area in southeast Cornwall of just under 66304 hectares (256 square miles). It is bounded by the river Fowey to the west of the district, the river Tamar to the east of the district, the A30 to the north and the English Channel to the south. It is predominantly a rural area with five main towns, where populations are in excess of 5,000 people; Liskeard, Saltash, Callington, Torpoint and Looe.

A main rail line runs through the district, in addition to the A38 from Saltash, which is one of the principal road links between Devon and Cornwall (Figure 1.1). Other main routes include the A390, between Gunnislake and Lostwithiel; the A388 through Callington to Saltash; the A377 from Torpoint, which links in with the A38 west of Tideford.



Figure 1.1: map of Caradon

There are a number of industrial installations within the district that are permitted under the Pollution Prevention and Control (England and Wales) Regulations 2000 by Caradon District Council as Part B processes, including quarry and cementitious processes, road-stone coating activities and animal carcass incineration, and by the Environment Agency as Part A processes, including two landfill sites and one clinical incineration plant.

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.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre $\mu\text{g m}^{-3}$ (milligrams per cubic metre, mg 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 Local Air Quality Management in England.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g/m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g/m}^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g/m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g/m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g/m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g/m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g/m}^3$	Annual mean	31.12.2005
Particles (PM ₁₀) (gravimetric)	50 $\mu\text{g/m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g/m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g/m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g/m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g/m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

There are currently no AQMAs in the area of Caradon. No exceedences were identified or predicted in the air quality assessments prior to the assessment of 2007 data in the Air Quality Progress Report dated November 2008. The conclusions of that report are reproduced below, with updates indicated in italics.

- The nitrogen dioxide passive diffusion tube monitoring data for 2007, adjusted by the annual average UK bias adjustment factor of 0.98 and by the local bias adjustment factor of 1:00, indicates that the annual mean objective has been significantly exceeded at Tideford, and the concentrations at Gunnislake are approaching the objective.
- It is therefore recommended that a Detailed Assessment is undertaken at Tideford, that further tubes are placed at all three sites and that the tube shelter currently located at Tideford is relocated to Gunnislake. It is also recommended that further attempts are made to find a suitable site for a continuous analyser at Gunnislake and at Carkeel. **Update:** *a combined detailed/further assessment has been undertaken by Bureau Veritas for the site at Tideford and will be submitted to DEFRA in December 2009. It has not been possible to find a location for a continuous monitor at Gunnislake. It was not possible to find a continuous monitoring site at Tideford. A continuous monitor has been installed at Landrake, which is representative of Tideford*
- In response to the conclusions of the CAQF diffusion tube survey in Liskeard, it is recommended that a number of diffusion tubes are located in relevant locations in Barn Street, Liskeard. **Update:** *two tubes have been placed at relevant exposure in Barn Street for 2009.*
- The results of the continuous monitoring indicate that all measured concentrations fall well below the AQS Objectives. It is therefore recommended that the continuous monitoring sites are reassessed with a view to removing or relocating the analyzers. **Update:** *final decision to be made following assessment of the 2008 data*
- There was no new development during 2007 that will impact on air quality. The A38 Dobwalls bypass will significantly improve the air quality at Dobwalls, and improvements were already seen during 2007, and were likely to be due to new traffic management schemes during construction of the bypass.
- All actions relevant to Caradon in the Cornwall Air Quality Strategy have either been implemented, cancelled in the light of new information, or are in progress.
- No planning applications were received in 2007 for developments for which an air quality assessment was provided.
- The overall five year delivery programme of the Cornwall Transport Plan 2006 – 2011 includes the delivery of traffic management improvements in Liskeard, minor traffic management improvement works and pedestrian ferry link improvements in Torpoint and pedestrian safety improvements in Looe.

Table 1.2: Previous reports		
Name of report	Year assessed	Date of report
Updating and Screening Assessment Outcome: recommended detailed assessment at Dobwalls (DEFRA subsequently advised that not required)	2002	April 2003
Air Quality Progress Report Conclusion: no exceedences identified	2003	April 2004
Air Quality Progress Report Conclusion: no exceedences identified	2004	April 2005
Updating and Screening Assessment Conclusion: no exceedences identified	2005	April 2006
Air Quality Progress Report Conclusion: marginal exceedence at Tideford. Recommended move monitoring to relevant exposure.	2006	May 2007
Air Quality Progress Report Outcome: exceedences identified at Tideford, move to a detailed assessment.	2007	Nov 2008

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Continuous monitoring was undertaken during 2008 at Dobwalls, Callington, Landrake and at three sites in Saltash. Details of the monitoring sites are provided in Table 2.1 and the locations are illustrated in Figure 2.1. Please refer to Appendix A for details of continuous monitoring QA/QC procedures.



Figure 2.1: Location of continuous monitoring sites in Caradon (black circles)

Table 2.1: Details of automatic monitoring sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Saltash1	Roadside	X 241632 Y 059406	NO ₂ PM ₁₀	N	N	3m	Y
Callington	Roadside	X 236040 Y 069528	NO ₂ CO PM ₁₀	N	N	1.5m	Y
Dobwalls	Roadside	X 221135 Y 064998	NO ₂ CO	N	N	1.5m	Y
Landrake	Roadside	X 237380 Y 060671	NO ₂ PM ₁₀	N	N	1.5m	Y
Saltash2	Roadside	X 242823 Y 058910	NO ₂ PM ₁₀	N	N	1.5m	Y
Saltash3	Roadside	X 242776 Y 059342	NO ₂ SO ₂	N	N	1m	Y

2.1.2 Non-Automatic Monitoring

Diffusion tubes are used to monitor nitrogen dioxide at various locations throughout the district. Details of the monitoring sites are provided in Table 2.2 and the locations are illustrated in Figure 2.2. Please refer to Appendix A for details of diffusion tube QA/QC procedures.

Table 2.2: Details of non-automatic monitoring sites

Site Name	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Liskeard Barrass Street	R	X225106 Y064508	NO ₂	No	Y (façade)	1.5m	Y
Doubleboise A38	R	X220011 Y064906	NO ₂	No	Y (façade)	1.5m	Y
Millbrook West Street	R	X240089 Y052016	NO ₂	No	Y (façade)	0m	Y
Torpoint Harvey Street	R	X243945 Y055146	NO ₂	No	Y (façade)	1.5m	Y
Tideford A38 Mill Road	R	X234729 Y059689	NO ₂	No	Y (façade)	3m	Y
Tideford A38 Mill Road (box)	R	X234729 Y059689	NO ₂	No	Y (façade)	3m	Y
Tideford A38 Quay Road	R	X234848 Y059733	NO ₂	No	Y (façade)	1.5m	Y
Tideford Bridge Road	R	X234810 Y059712	NO ₂	No	Y (façade)	5m	N
Tideford Corner House	R	X234810 Y059699	NO ₂	No	Y (façade)	10m	N
Saltash Edwards Crescent	UB	X240916 Y058934	NO ₂	No	N/A	10m	N/A
Saltash Fore Street	R	X242916 Y058887	NO ₂	No	Y (2m)	3m	Y
Carkeel A388	R	X241094 Y060496	NO ₂	No	Y (façade)	1.5m	Y
Callington St Therese	UB	X236450 Y069458	NO ₂	No	N/A	1m	N/A
Gunnislake A390 Fore Street	R	X243187 Y071703	NO ₂	No	Y (façade)	1.5m	Y
Gunnislake Swiss Cottage	R	X243240 Y071793	NO ₂	No	Y (façade)	0m	Y
Gunnislake Under Road 1	R	X243217 Y071748	NO ₂	No	Y (façade)	3m	N
Gunnislake Under Road 2	R	X243223 Y071743	NO ₂	No	Y (façade)	5m	N



Figure 2.2: Location of NO₂ diffusion tube monitoring in Caradon (pink circles)

The main areas of concern are Tideford and Gunnislake, and this is reflected in the number of tubes at these sites. The small village of Tideford straddles a busy section of the A38, where the dual carriageway reduces to single lane as it passes through the village, and a 40 mph speed restriction is in force. The A38 at Mill Road, Tideford has a TRF AADT of 28400 and a HCV MGW component of 2300; the A38 at Quay Road has a TRF AADT of 31200 with a HCV MGW value of 2300. During peak periods traffic queues along this stretch of road on the west-bound carriageway due to the hill, the speed restriction and tailbacks at Trerulefoot roundabout. There are no industrial sites nearby and the main nitrogen dioxide source is traffic.



Figure 2.3: Location of tubes at Tideford: 2008 tube locations are indicated by a red circle and the discontinued 2006 tube site by a yellow circle.

Gunnislake is located on the A390 on the Cornwall/Devon border and is the main route into Cornwall from West Devon. The A390 between Newbridge Hill and Fore Street has a TRF AADT of between 6300 and 7900, with a HCV AADT component of between 260 and 280. After crossing border the road travels approximately 100m up a hill to traffic lights, where there are regular queues outside residential properties. Traffic through the main village street, Fore Street, is controlled by 3-way traffic lights that only allow one stream of traffic through at a time. Traffic is the main source of nitrogen dioxide emissions in Gunnislake.



Figure 2.4: Location of nitrogen dioxide diffusion tubes at Gunnislake 2007: the tubes are indicated by a red point.

2.2 Comparison of Monitoring Results with AQ Objectives

The air quality objectives apply to locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective.

2.2.1 Nitrogen Dioxide

The continuous monitoring results for nitrogen dioxide are shown in Tables 2.3a and 2.3b, and illustrated in Figure 2.5.

Automatic Monitoring Data

Table 2.3a: Results of automatic monitoring for nitrogen dioxide: comparison with annual mean objective

Site ID	Location	Within AQMA?	Proportion of year with valid data 2008 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
				2006	2007	2008
Saltash1	Callington Road	N	99	14.1	17.7	16.3
Callington	Saltash Road	N	71	22.0*	15.2	17.8*
Dobwalls	A38	N	47	38.2	25.7	34.7*
Landrake	A38	N	92	n/a	n/a	25.2
Saltash2	Victoria Park Gardens	N	49	18.1*	11.3	19.3*
Saltash3	New Road	N	90	20.2*	14.3*	12.0

* indicates data capture of <90%

Table 2.3b: Results of automatic monitoring for nitrogen dioxide: comparison with 1-hour mean objective

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean ($200 \mu\text{g}/\text{m}^3$)		
				2006 *	2007 *	2008
Saltash1	Callington Road	N	99	0	0	0
Callington	Saltash Road	N	71	0	0	0
Dobwalls	A38	N	47	5	1	0
Landrake	A38	N	92	n/a	n/a	0
Saltash2	Victoria Park Gardens	N	49	0	2	0
Saltash3	New Road	N	90	0	0	0

The annual mean objects were not exceeded at any of the continuous monitoring sites. However, there is a concern regarding the accuracy of the data at Landrake, which is further discussed in Appendix A.

The only site approaching the annual mean objective is at Dobwalls, but the new Dobwalls bypass opened towards the end of 2008 and the continuous monitor has since been removed. The Highways Agency anticipates that the bypass will reduce the traffic by Dobwalls by 90% [Highways Agency (2009)]. It was intended to leave the monitor in for a further year to monitor improvements. However, the street light on which the monitor was mounted was removed in January 2009 and the cost of re-locating the monitor was prohibitive.

None of the sites recorded more than the permitted 18 exceedences of the 1-hour mean.

None of the sites are at relevant exposure. However, all represent worst case scenario. Since there were no exceedences it is therefore not necessary estimate the concentration at the nearest receptor.

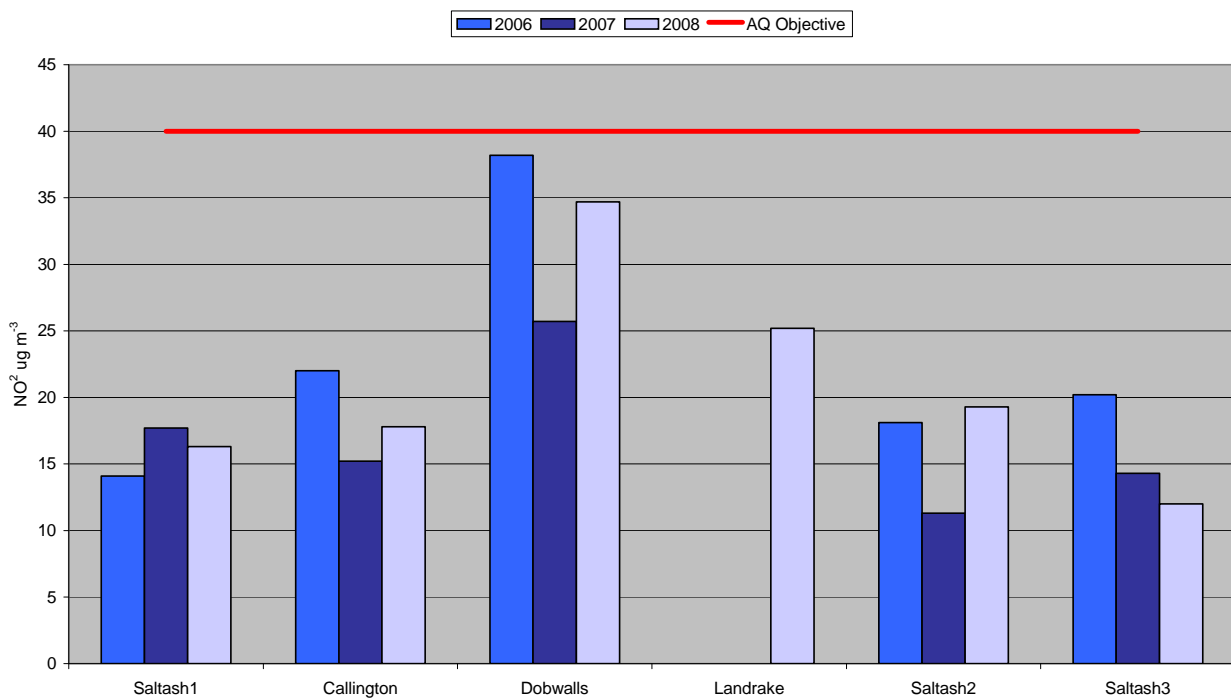


Figure 2.5: Graph of NO₂ continuous monitoring results 2006-2008

Figure 2.5 illustrates that there appears to be little consistency in the comparative nitrogen dioxide concentrations from year to year throughout the district. For example, even the three sites in Saltash show differing patterns. This, however, is likely to be due to the very poor data capture at the Airpointer sites, compared with the consistently high data capture at Saltash1. The slight reduction in nitrogen dioxide concentrations at the Saltash1 site between 2007 and 2008 is also reflected in the majority of the diffusion tube monitoring results, outlined below.

Diffusion Tube Monitoring Data

All non-automatic monitoring is undertaken at the building facades of residential properties and is relevant exposure for the annual mean. There are three tubes co-located at the continuous monitors in Landrake and at Saltash1. Further information regarding calculation and use of the bias adjustment factors is found in Appendices B and C.

The nitrogen dioxide diffusion tube monitoring results are shown in Table 2.4a and illustrated in Figure 2.6. The monthly data is shown in Appendix D. The annual mean objective was exceeded at Tideford, which is not in an existing AQMA. Gunnislake is representative of a borderline case. The UK bias adjusted data is approaching the objective, whereas the local bias adjusted data has reached the objective.

Table 2.4a: Results of nitrogen dioxide diffusion tubes

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) adjusted for bias			
				2006	2007	2008	
Bias adjustment factor				UK ¹ 1.04	local 1.00	UK factor 0.94	local factor 0.99
Liskeard, Barrass Street		N	100	39 ²	29	25	26
Doubleboise, A38		N	67		24	23	24
Millbrook, West Street		N	92	27	28	23	25
Torpoint, Harvey Street		N	92		27	25	26
Tideford A38, Mill Road		N	100		60	57	60
Tideford A38, Mill Road (box)		N	100		54	49	52
Tideford A38, Quay Road		N	100		55	52	55
Tideford, Bridge Road		N	100		31	29	30
Tideford, Corner House		N	100		24	23	24
Saltash, Edwards Crescent		N	75		10	7	8
Saltash, Fore Street		N	92	29	29	27	28
Carkeel, A388		N	100		35	30	32
Callington, St Therese		N	100	8	9	8	9
Gunnislake A390, Fore Street		N	100	37	37	38	40
Gunnislake, Swiss Cottage		N	92		38	38	40
Gunnislake, Under Road 1		N	92		23	20	22
Gunnislake, Under Road 2		N	83		19	14	15

Notes

1 – no local factor available

2 – not representative of relevant exposure – tube subsequently moved

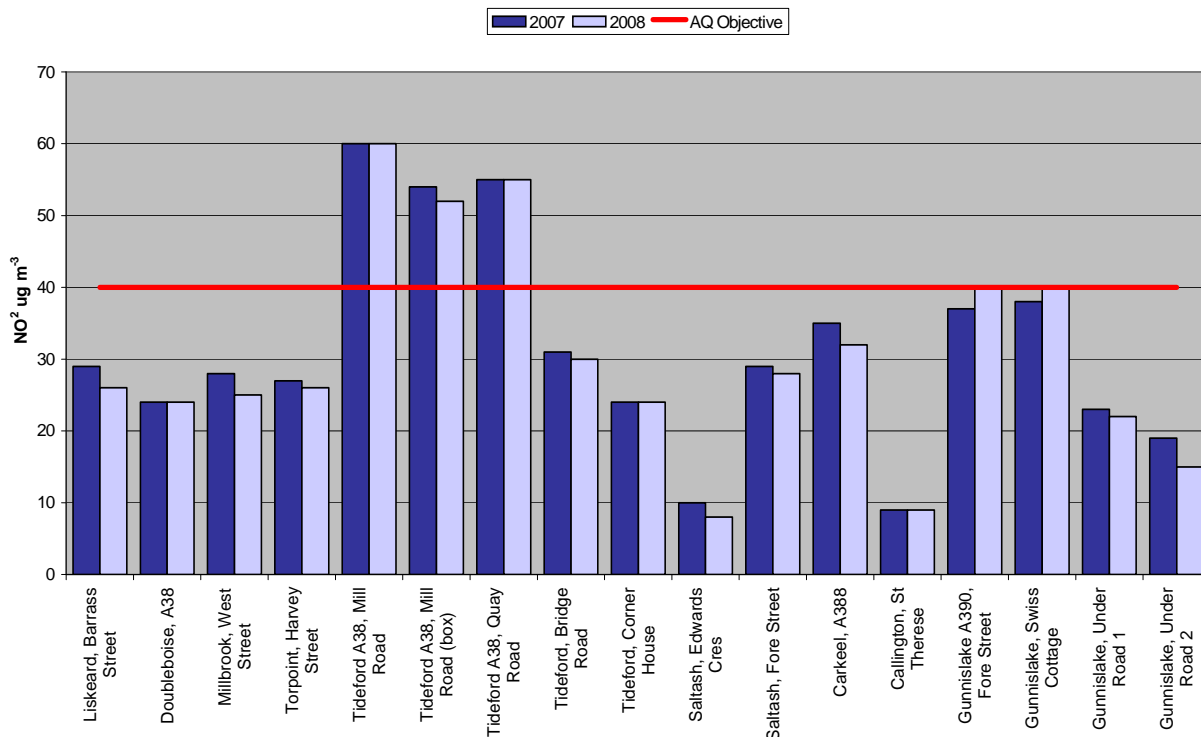


Figure 2.6: Graph of NO₂ diffusion tube monitoring results 2007-2008 (local bias)

Figure 2.6 illustrates that at the majority of sites there has been either no change or a small decrease in nitrogen dioxide concentrations between 2007 and 2008. The exception is at the two main monitoring sites in Gunnislake, where an increase of 2 µg m⁻³ has been measured.

There is one long-term background monitoring site at Callington although it has been subject to changes; for example in 2005 the tube was moved a few meters to Hazelwood Road due to road works in St Therese, and remained there throughout the year. The tube was returned to St Therese for 2006, where it has since remained. Figure 2.7 illustrates a level trend in background NO₂ concentrations.

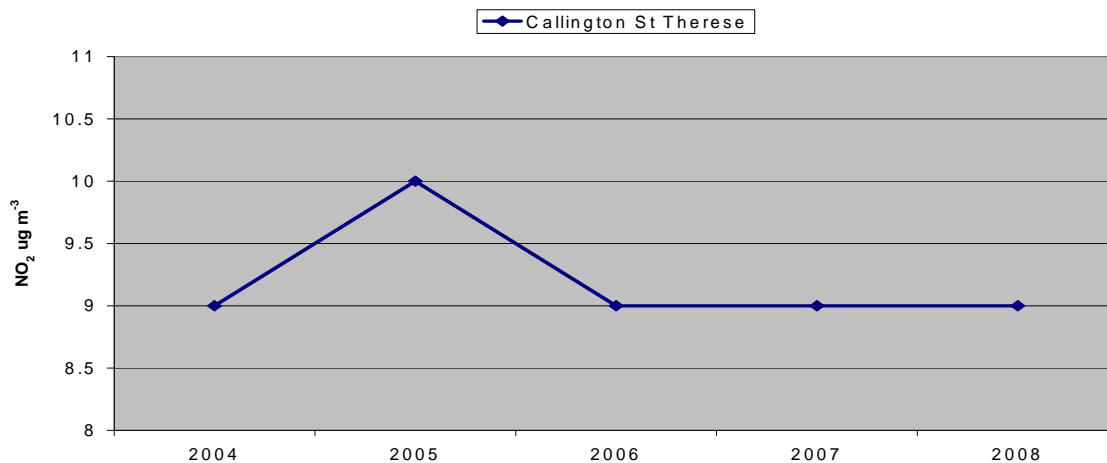


Figure 2.7: Chart illustrating trend in nitrogen dioxide concentrations at the Callington background site between 2004 and 2008

2.2.2 PM₁₀ Concentrations

PM₁₀ concentrations are measured throughout the area with TEOM analysers. The results of PM₁₀ monitoring are shown in Tables 2.5a and 2.5b below. The data illustrates that the air quality objectives for PM₁₀ have not been exceeded at any of the monitoring sites.

None of the sites are at relevant exposure. However, all represent worst case scenario. Since there were no exceedences, it is therefore not necessary estimate the concentration at the nearest receptor.

The values for 2006, 2007 and 2008 have been factored by 1.3 in accordance with the guidance in order to obtain an indicative estimate of gravimetric equivalent concentrations for comparison with the objective.

There are no FDMS monitors within this area. However, VCM data was taken from a similar area in Wales using data from Twynyrodyn, Swansea and Port Talbot. This reduced the value of the 1.3 factored data by around 10%. This could be critical if the values were close to the AQ Objective; however, all values are appreciably below the annual mean objective.

Table 2.5a: Results of PM₁₀ automatic monitoring: comparison with annual mean objective.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations $\mu\text{g m}^{-3}$			
				2006	2007	2008	
				x 1.3	x 1.3	x 1.3	VCM
Saltash1	Callington Road	N	89	22.3*	21.3	20.3	18.5
Callington	Saltash Road	N	74	26.3*	24.6	24.0	21.9
Landrake	A38	N	66	n/a	n/a	29.2	25.4
Saltash2	Victoria Park Gardens	N	81	19.9*	21.1	22.2	20.3

* indicates data capture of <90%

Table 2.5b: Results of PM₁₀ automatic monitoring: comparison with 24-hr mean objective.

Site ID	Location	Within AQMA?	Data Capture 2008 %	Number of Exceedences of hourly mean ($50 \mu\text{g/m}^3$) <i>If data capture < 90%, include the 90th %ile of hourly means in brackets.</i>		
				2006	2007	2008
Saltash1	Callington Road	N	89	1	3	1
Callington	Saltash Road	N	74	1	1	2
Landrake	A38	N	66	n/a	n/a	4
Saltash2	Victoria Park Gardens	N	81	0	1	3

2.2.3 Sulphur Dioxide

Sulphur dioxide was monitored at Saltash3 during 2008. None of the three objectives were exceeded during this period.

Sulphur dioxide			
	15-Minute Mean $\mu\text{g m}^{-3}$	1-Hour Mean $\mu\text{g m}^{-3}$	24-Hour Mean $\mu\text{g m}^{-3}$
Minimum value	0	0	0
Average value	6.0	6.0	6.0
Maximum value	136.2	66.1	17.2
Data Capture	90%	90%	90%

2.2.4 Benzene

Benzene is not monitored within south-east Cornwall

2.2.5 Other Pollutants monitored

Carbon monoxide was measured at two sites in southeast Cornwall; both were well below the objective. The data capture at both sites was poor.

Carbon monoxide		
	Callington	Dobwalls
	8-hr running mean mg m^{-3}	8-hr running mean mg m^{-3}
Minimum value	0	0
Average value	0.5	0.4
Maximum value	1.8	5.8
Data Capture	60%	37%

3 Road Traffic Sources

3.1 Narrow congested streets with residential properties close to the kerb

Caradon District 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

Caradon District 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.

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

3.4 Junctions

Caradon District Council confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New roads constructed or proposed since the last round of review and assessment

The A38 Dobwalls bypass was completed in December 2008. The traffic levels experienced on the A38 through Dobwalls caused congestion that was not only inconvenient but had a serious adverse effect on the village environment, causing community severance, noise and air pollution. The bypass of Dobwalls is anticipated to reduce traffic through the village by about 90% [Highways Agency (2009)].

An assessment of air quality was provided by the Highways Agency during the planning process in the Environmental Statement [Highways Agency (2005)]. The following summary paragraph is taken from Section 10.7.4 of the document:

In terms of DMRB Local Air Quality Assessment, no exceedances of the current air quality objectives for human health have been predicted at any of the receptors in either the baseline or operational scenarios. No adverse impacts on local air quality or adverse effects on local residents (including the two properties identified as 'sensitive receptors') are expected as a result of the Published Scheme. The Generalised Local Impact Assessment has predicted a decrease in pollution exposure on the local community as a whole.

[Highways Agency (2005)]

Caradon District Council has assessed the newly constructed road and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with significantly changed traffic flows

Caradon District Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and coach stations

Caradon District Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

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

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary trains

The main train line runs through southeast Cornwall, with stations at Saltash, St Germans, Menheniot and Liskeard. There are approximately 26 train journeys a day through these stations. However, since none are terminal stations, it is unlikely that the trains will be stationary for periods of 15-minutes or more. Observations at Liskeard station show that the train only waits for a few minutes to allow people to get on and off the train.

There are also two other routes: the Tamar Valley line between Plymouth and Gunnislake; and the Looe Valley line between Liskeard and Looe. Looe and Gunnislake are both end-of-line stations with the potential for trains to wait. However, an analysis of the train timetables shows an average turn-around time of 4 minutes at Gunnislake, with a maximum of 7 minutes, and an average turn-around of 3 minutes at Looe, with a maximum of 6 minutes.

Caradon District Council therefore 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.

4.2.2 Moving Trains

Caradon District 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)

The nearest port is Plymouth which has three main shipping areas. The one likely to affect the area of Caradon is the Naval base on the River Tamar, which divides the City of Plymouth from Caradon, and has over 5000 movements per annum. However Plymouth City Council has assessed SO₂ in respect of the Port, and drew the following conclusion in their 2009 USA:

Caradon District Council

The shipping emissions from the above areas of the Plymouth Harbour were factored in previous reports; no exceedence of the SO₂ AQO was predicted. There have been no significant changes in the number of shipping movements and no new areas of relevant exposure; therefore there is no need to proceed further with this section.

[Plymouth City Council (2009)]

Caradon District Council has identified a port meeting the criteria specified in TG(09), which has been assessed by Plymouth City Council as not requiring further assessment.

5 Industrial Sources

5.1 Industrial installations

5.1.1 New or proposed installations for which an Air Quality Assessment has been carried out

Caradon District 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.

5.1.2 Existing installations where emissions have increased substantially or new relevant exposure has been introduced

Caradon District 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

Caradon District 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

The only road in Caradon that has an AADT of over 30,000 is the A38 at Saltash. There are two petrol stations near the A38 at this point, but neither have relevant exposure within 10m of the pumps.

Caradon District Council therefore confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry farms

Horizon Poultry Farm, Tremar, Liskeard is part of the Stonegate Horizon Group. It is permitted as an A1 installation under the Pollution Prevention and Control Act 1999 (Environmental Permitting Regulations 2007). The farm has a capacity to house 500,000 birds and the sheds are mechanically ventilated. There is residential property on the site itself and two other residential properties within 100m of the poultry units.

Caradon District Council has identified a poultry farm meeting the specified criteria, and will need to proceed to a Detailed Assessment for PM₁₀.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Duchy Timber, located in a rural, sparsely populated area on the outskirts of Lostwithiel, received planning permission in July 2007 for the installation of a 1670 kW woodchip boiler.

Caradon District Council has assessed the biomass combustion plant in respect of PM₁₀ and NO₂ annual mean emissions (see Appendix E), and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.2 Biomass Combustion – Combined Impacts

PM₁₀ emissions from combined impacts have been estimated using domestic fuel use data obtained from Community Energy Plus (see Table F1 Appendix F). However, the calculation has only gone as far as to estimate emission per Ward, without breaking it down to emissions per 500 x 500 m square, since the estimated emissions are so low. Furthermore, the background value of 15.206 µg m⁻³ is extremely low, which means that any additional emissions are unlikely to take the total emissions anywhere near the AQ Objective.

Caradon District Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

Community Energy Plus has collected data on domestic fuel use in Caradon. Of those households that supplied data (7683) 2.2% used anthracite nuts, house coal and smokeless fuel.

Having assessed the number of houses burning coal/smokeless fuel (see Table F2 in Appendix F) Caradon District Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

The local background PM₁₀ concentrations in south-east Cornwall are 15.206 µg m⁻³; well below 26 µg m⁻³. “Near” is therefore defined as being within 200m of the source of the dust emission.

	Is there relevant exposure “near” to a source of dust emissions?	Are there recent complaints about dust?	Does visual inspection indicate significant dust emissions or dust tracked out of the site on to public roads?
Lean Quarry (landfill, roadstone coating, quarry processes)	Yes	No	No
Connon Bridge (landfill and household waste recycling)	Yes	No	No
Hingston Down Quarry	Yes	No	No
Lantoom Quarry	No	No	No
CPL Distribution (coal yard – Kelly Bray)	Yes	No	No

Caradon District Council confirms that there are the potential sources of fugitive particulate matter emissions in the Local Authority area have been assessed, and there is no need to progress to a detailed assessment of these sources.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Continuous monitoring of nitrogen dioxide, PM₁₀, sulphur dioxide and carbon monoxide has identified that all measured concentrations were well below the AQ Objectives, with no exceedences.

Non-continuous monitoring of nitrogen dioxide has identified exceedences of the nitrogen dioxide AQ Objective at Tideford, which was expected. Monitoring at Gunnislake has identified that the objective is close to being exceeded.

8.2 Conclusions from Assessment of Sources

The assessment of new or significantly changed sources has identified the potential for exceedences of PM₁₀ at Horizon Poultry Farm, Liskeard.

8.3 Proposed Actions

The Updating and Screening Assessment has identified the need to proceed to a Detailed Assessment of PM₁₀ at Horizon Poultry Farm, Liskeard.

The Updating and Screening Assessment has identified the need to increase NO₂ diffusion tube monitoring at Gunnislake. Since further tubes have been placed at Gunnislake since January 2009, and this report has not been finalised until December 2008, the decision on whether a Detailed Assessment is required will be taken in the Assessment of 2009 data in the 2010 Progress Report.

The detailed/further assessment of air quality at Tideford [Bureau Veritas 2009] has identified the following actions:

- Considered declaration of an Air Quality Management Area (AQMA) for the A38 at Tideford, based on predicted exceedences of the annual mean objective at locations of relevant exposure
- Continue the programme of NO₂ diffusion tube monitoring in Tideford to identify any future changes in NO₂ concentrations.
- Move forward with development of an Air Quality Action Plan for the proposed Tideford AQMA

9 References

Bureau Veritas (2009), *LAQM Detailed/Further Assessment 2009 - A38 Tideford, Saltash, Cornwall*

Census 2001 <http://www.statistics.gov.uk/census2001/profiles/15UB.asp>

DEFRA 2009: The Department for the Environment, Food and Rural Affairs 2003, *Local Air Quality Management: technical guidance LAQM TG(03)*, HMSO, London.

Highways Agency (2009), Webpage "*Non-technical summary of the Environmental Statement*" available at <http://www.highways.gov.uk/roads/projects/6236.aspx>

Highways Agency (2005), *A38 Dobwalls Bypass Environmental Statement*, Volume 1 Section 10

Plymouth City Council (2009), *2009 Air Quality Updating and Screening Assessment for Plymouth City Council*

UWE 2008: University of the West of England, Air Quality Management website, *FAQ – Roads and NO₂, question 6*, webpage. Available at: <http://www.uwe.ac.uk/aqm/review/mfaqroad.html>

Appendices

Appendix A: QA/QC Data

Appendix B: Bias Adjustment

Appendix C: Calculation of local and national bias adjustment factors

Appendix D: Monthly NO₂ diffusion tube data

Appendix E: Assessment of biomass boiler

Appendix F: Assessment of biomass combustion

Appendix A: QA:QC Data

QA/QC of automatic monitoring

All the automatic analysers are serviced bi-annually and housed in air-conditioned units. The NO_x analyser at the Saltash1 site is automatically calibrated on a daily basis from certified gas cylinders, and the filters are changed on a regular basis. The TEOM filter at all sites is changed at around 80% and new filters are stored within the TEOM unit to maintain the same temperature.

The NO_x analysers at the remaining sites are fitted with an automatic zero system which switches the sample inlet to zero air each night at between midnight and 0100hrs. The system is also subjected to manual span calibrations during service visits. A certified gas is introduced to the system at atmospheric pressure and the values compared with the certificate.

The data for the continuous monitoring site at Saltash1 has been calibrated and validated in accordance with the technical guidance [DEFRA 2009]. The data for the remaining air quality sites is essentially screened, raw data, due to infrequent calibration, and should be considered as indicative monitoring rather than compliance monitoring.

QA/QC of diffusion tube monitoring

Gradko International has demonstrated satisfactory performance in the Workplace Analysis Scheme for Proficiency (WASP) for the analysis of NO₂ diffusion tubes for the period January 2008 – January 2009.

WASP results for 01.08 to 01.09 were as follows:

Jan08 Round 100 : Ref Value : 1.36ugNO₂ Measured Value : 1.34 ugNO₂ Z score -0.1 Satisfactory
1.47ugNO₂ Measured Value : 1.50 ugNO₂ Z score 0.2 Satisfactory
March08 Round 101 Ref Value : 0.92ug NO₂ Measured Value : 0.95ugNO₂ Z Score 0.2 Satisfactory
Ref Value : 1.86ugNO₂ Measured Value : 1.85ugNO₂ Z Score 0 Satisfactory
July 08 Round 102 Ref Value : 1.37ugNO₂ Measured Value : 1.42ugNO₂ Z Score 0.3 Satisfactory
Ref value : 2.28ugNO₂ Measured Value : 2.21ugNO₂ Z score -0.2 Satisfactory
Jan09 Round 104 Ref Value : 2.02ugNO₂ Measured Value : 1.85ugNO₂ Z Score -0.7 Satisfactory
Ref Value : 1.22ug NO₂ Measured Value : 1.21ugNO₂ Z Score - 0.1 Satisfactory

The following statement has been received from Gradko International in respect of the Harmonisation Practical Guidance. *'Our NO₂ diffusion tube procedures have been amended to follow the guidelines of the DEFRA Harmonisation document related to the preparation, extraction, analysis and calculation procedures for NO₂ passive diffusion tubes. As most of the procedures were already carried the out before the introduction of the Guidelines, the amendments are minimal . Our internal analysis procedures are assessed by U.K.A.S. on an annual basis for compliance to ISO17025'*

Appendix B: Bias Adjustment

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are prepared with a 50% TEA in acetone absorbent and are supplied and analysed by Gradko Environmental (a division of Gradko International Ltd). The 2008 national bias adjustment factor for Gradko tubes has been compiled from 18 studies with values ranging from 0.76 to 1.63, and the overall factor has been determined as 0.94 (see Appendix C).

Factor from Local Co-location Studies (if available)

Two triple co-location studies were undertaken for comparison with the reference method during 2008; one at the Saltash1 site, and the other at the Landrake site. The data was entered into the AEA Energy & Environment spreadsheet to check the precision and accuracy of triplicate tubes and to calculate a bias adjustment factor. The spreadsheets are reproduced in Appendix C.

Both sites achieved an overall 'good' precision result for the tube data and for the automatic monitor data. A bias adjustment factor of 0.99 was calculated for the Saltash data, which when compared with the calculated value of 1.00 for the previous year, is indicative of a consistent performance. This also compares well with the national bias adjustment factor of 0.94.

However, a bias adjustment factor of 0.5 was calculated at the Landrake site. The continuous monitor measured an annual mean of $25 \mu\text{g m}^{-3}$ compared with a tube annual mean of $51 \mu\text{g m}^{-3}$. This is very busy single-lane section of the A38 at a roadside location with an AADT of 29500. The tubes at Tideford are measuring similar values to the tubes at Landrake, and the evidence suggests that the continuous monitor is significantly under-measuring. A recent investigation by Airmonitors has identified a catastrophic failure of one of the important components of the analyser. This calculated bias adjustment factor will therefore be discounted.

Discussion of Choice of Factor to Use

The decision on whether to use either the local or national bias adjustment depends upon a number of factors that will need to be considered [UWE 2008]. The table below indicates that both methods have equal weighting and therefore the data has been reported using both bias adjustment factors (Appendix D). However, a bias adjustment is only really relevant when an unadjusted value is close to the objective, and when the application of a bias adjustment factor is likely to tip the scale.

This is relevant to the Gunnislake data. The local bias adjustment factor reduces the annual mean to $40 \mu\text{g m}^{-3}$, which equals the AQ Objective. The national bias adjustment factor, however, reduces the annual mean to $38 \mu\text{g m}^{-3}$, which although flags the site up as one with potential problems, would be unlikely to prompt a detailed assessment. Since further tubes have been placed at Gunnislake since January 2009, and this report has not been finalised until December 2008, the decision on whether a Detailed Assessment is required will be taken in the Assessment of 2009 data in the 2010 Progress Report.

When to use the local and national bias adjustment factors			
When to use the local factor		When to use the national factor	
When to exposure periods are other than monthly	x	When the exposure periods are monthly	✓
If the co-location site is unusual	x	Where the source of NO ₂ at the co-location site is traffic	✓
For tubes exposed in a similar setting to the co-location site	✓	Where tubes are exposed over a range of settings that differ from the co-location site	x
Where the duration of the whole diffusion tube study is less than one year and less than 9 months	✓	Where the co-location study is for less than 9 months and the tubes are for a longer period	x
Where national value contains less than five studies	x	Where the national value contains more than five studies	✓
Where the co-location study is spread across more than one calendar year	x	Where the automatic analyser has been operated using local, QA/QC procedures	✓
For co-location sites with good precision for the diffusion tubes	✓	For co-location sites with poor precision	x
For co-location sites with high quality chemiluminescence results	✓	Where data capture is less than 90%	x

PM Monitoring Adjustment

The PM₁₀ concentrations have been factored by 1.3 in accordance with the guidance in order to obtain an indicative estimate of gravimetric equivalent concentrations for comparison with the objective.

There are no FDMS monitors within this area. However, VCM data was taken from a similar area in Wales using data from Twynyrodyn, Swansea and Port Talbot. This reduced the value of the 1.3 factored data by around 10%. This could be critical if the values were close to the objective, however, all values are significantly below the annual mean objective.

Appendix C: Calculation of bias adjustment factor

Saltash AMU

Checking Precision and Accuracy of Triplicate Tubes

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	03/01/2008	30/01/2008	16.7	17.2	17.5	17	0.4	2	0.9
2	30/01/2008	27/02/2008	24.4	24.7	27.4	25	1.7	7	4.1
3	27/02/2008	01/04/2008	14.2	15.0	15.4	15	0.6	4	1.5
4	01/04/2008	30/04/2008	16.3	16.2	16.8	16	0.3	2	0.7
5	30/04/2008	29/05/2008	14.3	17.6	14.8	16	1.8	12	4.4
6	29/05/2008	02/07/2008		11.1	13.1	12	1.4	12	12.7
7	02/07/2008	30/07/2008	11.3	12.1	11.4	12	0.4	4	1.1
8	30/07/2008	03/09/2008	11.2	10.8	11.2	11	0.2	2	0.6
9	03/09/2008	01/10/2008	15.6	16.3	13.8	15	1.3	8	3.2
10	01/10/2009	29/10/2009	19.4	18.7	18.9	19	0.4	2	0.9
11	29/10/2009	04/12/2009	18.9	18.8	17.9	19	0.6	3	1.4
12	04/12/2009	12/01/2009	26.9	22.4	23.4	24	2.4	10	5.8
13									

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

AEA Energy & Environment
From the AEA group

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
16.6	100	Good	Good
26.6	100	Good	Good
15.3	100	Good	Good
17.1	100	Good	Good
19	100	Good	Good
12	91	Good	Good
10	100	Good	Good
8	100	Good	Good
15	100	Good	Good
17	100	Good	Good
17	100	Good	Good
25.7	100	Good	Good

Overall survey -->

Good precision	Good Overall DC
-----------------------	------------------------

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Saltash AMU - Casella
-----------------------	-----------------------

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)

WITH ALL DATA

Bias calculated using 12 periods of data

Bias factor A 0.99 (0.91 - 1.09)

Bias factor B 1% (-9% - 10%)

Diffusion Tubes Mean: 17 μgm^{-3}

Mean CV (Precision): 6

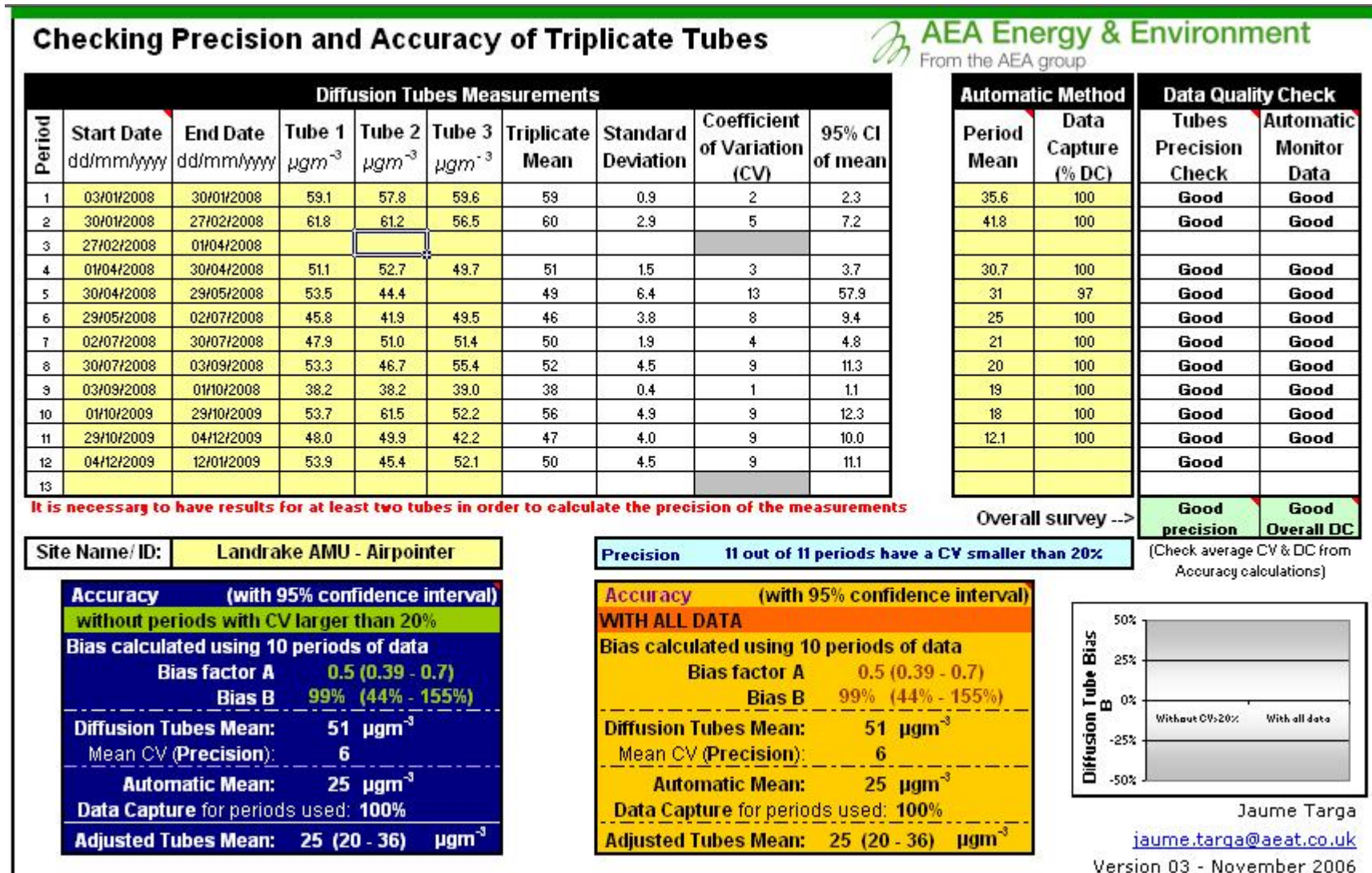
Automatic Mean: 17 μgm^{-3}

Data Capture for periods used: 99%

Adjusted Tubes Mean: 17 (15 - 18) μgm^{-3}

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Version 03 - November 2006

Landrake AMU



National bias adjustment factor

Step 1:							Step 2:		Step 3:		Step 4:							
Select the Laboratory that Analyses Your Tubes from the Drop-Down List							Select a Preparation Method from the Drop-Down List		Select a Year from the Drop-Down List		<p>Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor³ shown in blue at the foot of the final column.</p> <p>If you have your own co-location study then see footnote⁴. If uncertain what to do then contact the Review and Assessment Helpdesk. 0117 328 3668 aqm-review@uwe.ac.uk.</p>							
If a laboratory is not shown, we have no data for this laboratory.							If a preparation method is not shown, we have no data for this method at		If a year is not shown, we have no data ²									
Analysed By ¹							Method <small>To undo your selection, choose (All) from the pop-up list</small>		Year ² <small>To undo your selection, choose (All)</small>		Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ⁵	Bias Adjustment Factor (A) (Cm/Dm)
Gradko							50% TEA in Acetone	2008	R	Boston BC	12	45	36	27.3%	G	0.79		
Gradko							50% TEA in Acetone	2008	R	LB Hammersmith and Fulham	10	90	68	32.4%	S	0.76		
Gradko							50% TEA in Acetone	2008	UB	Reading BC	12	26	23	13.4%	G	0.88		
Gradko							50% TEA in Acetone	2008	UC	Uttlesford DC	11	26	28	-7.0%	G	1.08		
Gradko							50% TEA in Acetone	2008	R	Stevenage BC	12	37	29	26.5%	G	0.79		
Gradko							50% TEA in Acetone	2008	R	LB Hounslow	12	58	59	-0.2%	G	1.00		
Gradko							50% TEA in Acetone	2008	R	LB Hounslow	12	69	72	-4.6%	G	1.05		
Gradko							50% TEA in Acetone	2008	UB	LB Hounslow	10	38	30	24.9%	G	0.80		
Gradko							50% TEA in Acetone	2008	R	LB Redbridge	12	46	46	-0.2%	G	1.00		
Gradko							50% TEA in Acetone	2008	R	LB Redbridge	11	50	55	-10.1%	G	1.11		
Gradko							50% TEA in Acetone	2008	UB	LB Redbridge	12	37	32	13.9%	G	0.88		
Gradko							50% TEA in Acetone	2008	K	LB Redbridge	10	52	53	-2.4%	G	1.03		
Gradko							50% TEA in Acetone	2008	K	AEA Tech Intercomparison	12	103	116	-10.7%	G	1.12		
Gradko							50% TEA in Acetone	2008	R	Horsham DC	11	34	30	12.7%	G	0.89		
Gradko							50% TEA in Acetone	2008	R	LB Lewisham	10	69	63	8.1%	G	0.93		
Gradko							50% TEA in Acetone	2008	UC	Sheffield CC	12	33	30	10.8%	G	0.90		
Gradko							50% TEA in Acetone	2008	R	LB Richmond	11	27	45	-38.7%	P	1.63		
Gradko							50% TEA in Acetone	2008	B	LB Richmond	11	45	29	52.6%	G	0.66		
Gradko							50% TEA in Acetone	2008		Overall Factor³ (18 studies)				Use	0.94			

Appendix D: Monthly NO₂ tube data

2008	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	Annual mean (national)	Annual mean (local)	No. of month's data
	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	ug m ⁻³	2008.0	ug m ⁻³ bias adjusted	ug m ⁻³ bias adjusted	
Bias Adjustment factor														0.94	0.99	
Liskeard Barrass Street	26.48	34.96	18.34	26.54	31.67	20.29	21.84	20.87	30.98	24.81	25.96	31.13	26.2	24.59	25.89	12
Doubleboise A38	22.09	28.43	17.32	25.66	23.71	24.02			27.91		23.25		24.0	22.61	23.81	8
Millbrook West Street	25.47	28.34	26.68	26.38	15.63	24.28	25.70	26.84	21.75	25.73	26.98		24.9	23.40	24.64	11
Torpoint Harvey Street	29.60	34.15	24.89	26.38	21.77	21.97	23.25	22.14	25.56	27.33		29.81	26.1	24.51	25.82	11
Tideford A38 (Mill Road)	60.36	77.10	54.08	55.82	59.99	54.68	60.17	62.05	59.80	58.69	55.44	65.81	60.3	56.71	59.73	12
Tideford A38 (Mill Road)(box)	62.38	65.10	45.84	50.88	57.01	56.22	57.40	57.58	43.12	48.20	55.92	28.41	52.3	49.20	51.81	12
Tideford A38 (Quay Road)	68.89	61.00	51.12	52.41	48.44	53.09	55.86	65.71	53.51	47.48	52.40	59.32	55.8	52.42	55.21	12
Tideford Bridge Road	31.95	35.47	31.65	30.05	32.73	27.49	27.01	28.31	26.03	27.94	33.49	36.56	30.7	28.88	30.42	12
Tideford Corner House	23.76	30.79	26.69	25.18	23.83	21.95	20.04	18.67	20.76	21.01	30.14	30.71	24.5	22.99	24.22	12
Saltash Edwards Crescent	8.29	15.83		7.61	7.02	6.16		4.35	7.99	8.71	5.52		7.9	7.47	7.86	9
Saltash Fore Street	25.60	35.97	30.49	24.61	32.21	23.11	22.51	18.99	30.01	27.33	31.55	37.53	28.3	26.63	28.04	12
Carkeel A388	28.82	38.98	29.29	26.24	36.40	33.36	28.65	22.94		30.84	34.17	42.22	32.0	30.07	31.67	11
Callington St Therese Close	10.80	15.16	7.60	8.84	7.25	5.84	5.93	6.44	7.30	8.64		12.48	8.8	8.23	8.67	11
Gunnislake Fore Street A390	39.17		67.73	32.92	27.17	33.33		51.63	26.97	35.44	45.29	45.27	40.5	38.06	40.09	10
Gunnislake Swiss Cottage	51.35	49.52	33.70	34.72	37.23	31.73	40.77		34.76	44.30	41.00	45.48	40.4	37.99	40.01	11
Gunnislake Under Road 1	24.85	28.23	22.42	20.29	17.47		18.25	20.05		21.19		23.47	21.8	20.49	21.58	9
Gunnislake Under Road 2		19.15	14.50	15.12	13.49		12.09	10.92		13.08		19.10	14.7	13.80	14.53	8

Appendix E: Assessment of biomass boiler

Assessment of PM₁₀ from Duchy biomass combustion plant in accordance with paragraphs 5.77- 5.80

Background-adjusted emission rate (E_A)

$$E_A = E/(32 - G)$$

Where E is the emission rate in g s⁻¹ (this value is taken from the Chimney Height calculation)

Where G is the annual average background concentration in µg m⁻³ (value obtained from www.airquality.co.uk/archive/laqm/tools)

$$E_A = 0.176/(32 - 15.206)$$

$$E_A = 0.010 \text{ g s}^{-1}$$

Effective stack height U_{eff}

The effective stack height should be used where the height of release is greater than 3 m above the building on which it sits, but less than 2.5 times the height of the tallest adjacent building. The height of release is 12m above ground and is 6 m above the building on which it sits. The nearest tallest building is 5.89 m high. So the height of release at 12 m is greater than 3 m above the building on which it sits, but less than 2.5 times the height of the nearest tallest building (5.89 x 2.5 = 14.725). The effective stack height must therefore be used.

$$U_{\text{eff}} = 1.66(U_{\text{act}} - H)$$

Where H is the height (m) of the tallest adjacent building

Where U_{act} is the actual physical stack height

$$U_{\text{eff}} = 1.66(12 - 5.89)$$

$$U_{\text{eff}} = 10.14 \text{ m}$$

Diameter of stack

The diameter of the stack is 500 mm (0.5 m)

Assessment

The above values were located on the nomogram below (Figure E1), which shows that the background-adjusted emission rate is less than the threshold emission rate.

Figure 5.19: Particulate Matter emissions to give a 90th percentile of 24-hour mean ground-level PM₁₀ concentrations of 1 µg/m³

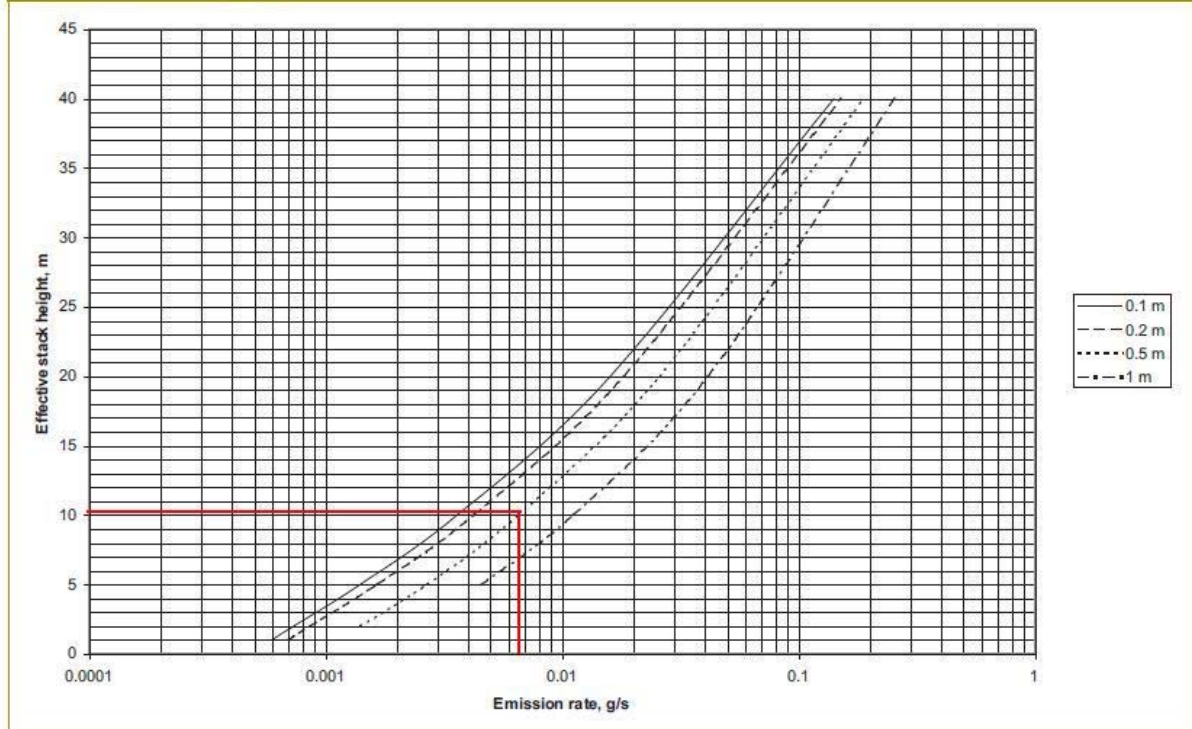


Figure E1: Calculated values entered on to PM₁₀ nomogram

Assessment of NO₂ from biomass combustion plant in accordance with paragraphs 5.81- 5.83

Background-adjusted emission rate (E_A)

$$E_A = E / (40 - G)$$

Where E is the emission rate in g s⁻¹ (this value is taken from the Chimney Height calculation)

Where G is the annual average background concentration in µg m⁻³ (value obtained from www.airquality.co.uk/archive/laqm/tools)

$$E_A = 0.264 / (40 - 6.561)$$

$$E_A = 0.008 \text{ g s}^{-1}$$

Assessment

The above values were located on the nomogram below (Figure E2), using the effective stack height calculated in the PM₁₀ calculation above. The nomogram shows that the background-adjusted emission rate is less than the threshold emission rate.

Figure 5.20: nitrogen dioxides emissions to give an annual mean ground-level nitrogen dioxides concentration of $1 \mu\text{g}/\text{m}^3$

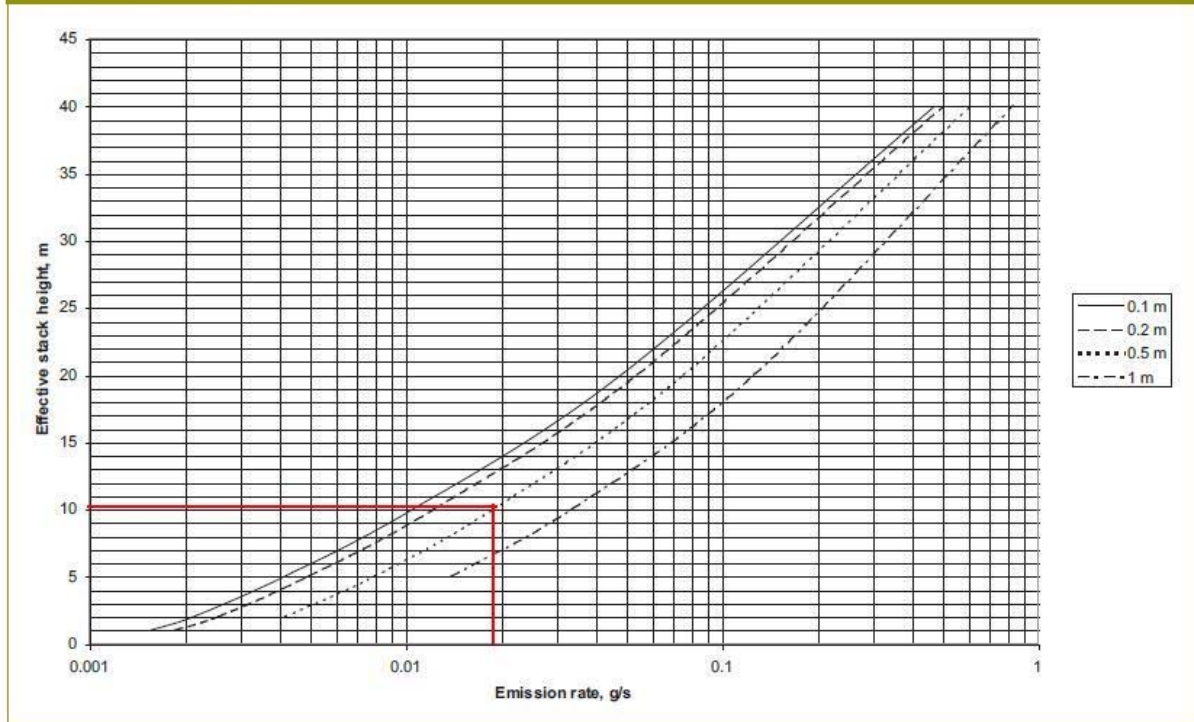


Figure E1: Calculated values entered on to NO_2 nomogram

There is no requirement to assessment for exceedences of the hourly mean as there is no relevant exposure.

Appendix F: Assessment of biomass combustion

Table F1: Assessment of combined impacts of PM₁₀ from biomass combustion plant

	A	B	C	D	E	F
Coal/Smokeless Fuel (CSF)	Households using csf and wood	Households surveyed	% of households surveyed using csf and wood	Actual number of households in Ward	Estimated no. of households in Ward using csf and wood	Estimated PM ₁₀ emissions (kg) per year per ward
					D x C	E x 27.27 (Note 1)
Callington	4					
Calstock	58	887	6.5%	2617	171	4667
Devioc and Shevioc	18					
Dobwalls and District	26	437	5.9%	1586	94	2573
Duloe, Lansallos and Pelynt	15					
Landrake and St Dominick	23					
Lanteglos and St Veep	6					
Liskeard	10					
Lynher	4					
Menheniot and St Ive	20					
Millbrook	1					
Rame Peninsula	12					
Saltash	10					
St Cleer and St Neot	26	526	4.9%	1841	91	2482
St Germans	4					
Torpoint East	2					
Total	239					

NOTE 1 Value taken from Table 5.3 of TG(09) used as worse case scenario

The highlighted wards are those with the highest number of households using csf and wood. Since all fall within limit, no need to calculated the others

Table F2: Assessment of SO₂ emissions from domestic solid fuel burning

Coal/Smokeless Fuel (CSF)	Households using csf	Households surveyed	% of households surveyed using csf	Actual number of households in Ward	Estimated no. of households in Ward using csf	No of 500 x 500 m squares in ward	Density of csf per 500 x 500 m square	Estimated no. of populated 500 x 500 m squares in ward	Number of households using csf per 500 x 500 m square per ward
						Note 1		Note 2	
Callington	4								
Calstock	42	887	4.7%	2617	124	94	1.3	12	10
Devioc and Shevioc	13								
Dobwalls and District	18	437	4.1%	1586	65	223	0.3	8	8
Duloe, Lansallos and Pelynt	9								
Landrake and St Dominick	16								
Lanteglos and St Veep	4								
Liskeard	8								
Lynher	4								
Menheniot and St Ive	10								
Millbrook	1								
Rame Peninsula	10								
Saltash	6								
St Cleer and St Neot	22	526	4.2%	1841	77	0.4	174.4	11	7
St Germans	1								
Torpoint East	2								
Total	170								

The highlighted wards are those with the highest number of households using csf and wood. Since all fall within limit, no need to calculated the others

Note 1 – each Ward covers a large area, of which only a small fraction is populated. This value is the actual number of 500 x 500 m squares in the whole ward

Note 2 – this value is the estimated number of 500 x 500 m squares in the ward that are populated.