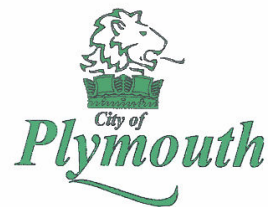


Updating and Screening
Assessment
Of
Air Quality
In
Plymouth

May 2006



Summary

The Environment Act 1995 requires local authorities to review air quality within its area on a regular basis. Local authorities are required to consider the guidance when completing a review of air quality. Revised checklists for the updating and screening assessment were issued in January 2006. The last report regarding the review and assessment process was the progress report completed in April 2005.

The updating and screening assessment covers new monitoring data, new objectives, new sources or significantly changed sources, other local changes that might affect air quality etc. If the updating and screening assessment identifies a risk that an air quality objective will be exceeded at a particular location with relevant public exposure, then the authority will be required to complete a detailed assessment.

This report details the second updating and screening assessment carried out for Plymouth. The report has been completed following the revised checklist headings provided in guidance. All pollutants have been considered and the results of whether a detailed assessment is required and for which pollutants is detailed in the Table below.

Pollutant	Updating and screening assessment	Declared AQMA, monitoring continuing	Further monitoring required outside an AQMA	Detailed Assessment Required
Carbon monoxide	√	X	X	X
Benzene	√	√	X	X
1,3-butadiene	√	X	X	X
Lead	√	X	X	X
Nitrogen dioxide	√	√	X	X
Sulphur dioxide	√	X	X	X
PM10	√	X	√	X

Monitoring will continue within the AQMA's for nitrogen dioxide and benzene. The further assessment is due to be submitted later this year. Further monitoring will continue with regard to PM₁₀ at Victoria Wharves.

There were no other significant changes within Plymouth and as a result it has not been necessary to carry out any detailed assessments.

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Nomenclature

The following nomenclature apply to the report.

ug/m ³	micrograms per metre cubed
CO	carbon monoxide
NO ₂	nitrogen dioxide
PM ₁₀	particulate matter of more than 10 microns in size.
SO ₂	sulphur dioxide
DMRB	Design manual for roads and bridges
AADT	Annual Average Daily Traffic
Aaquire	Air quality modelling package

1.0: Introduction

The Environment Act was introduced in 1995, and established the statutory provisions for local air quality management for the first time in the UK. This implemented the UK National Air Quality Strategy.

Part IV of the Environment Act 1995 requires each local authority periodically to review air quality in its area. The Air Quality Regulations 1997 were introduced in December 1997 and later revised in January 2000. In addition to the objectives set out in the Air Quality Regulations 2000, and the Air Quality (Amendment) Regulations 2002 ('the Regulations'), the EU has set limit values in respect of nitrogen dioxide and benzene, to be achieved by 2010, as well as indicative limit values for PM₁₀, also to be achieved by 2010. Local authorities have to consider the present quality of the air in their district and that for future years. It is necessary to assess which pollutants, if any, will exceed the prescribed objectives (Table 1.1).

Table 1.1: Summary of objectives of the UK Air Quality Strategy

Pollutant	Objective	Measured as	To be achieved by
Benzene	5 µg/m ³	Annual Mean	31 December 2010
1,3-Butadiene	2.25 µg/m ³ (1 ppb)	Running Annual Mean	31 December 2003
Carbon monoxide	10 mg/m ³ (10 ppm)	Running 8 Hour Mean	31 December 2003
Lead	0.5 µg/m ³	Annual Mean	31 December 2004
	0.25 µg/m ³	Annual Mean	31 December 2008
Nitrogen dioxide*	200 µg/m ³ (105 ppb) Not to be exceeded more than 18 times per year	1 Hour Mean	31 December 2005
	40 µg/m ³ (21 ppb)	Annual Mean	31 December 2005
Particles (PM₁₀)	50 µg/m ³ Not to be exceeded more than 35 times per year	24 Hour Mean	31 December 2004
	40 µg/m ³	Annual Mean	31 December 2004
Sulphur dioxide	266 µg/m ³ (100 ppb) Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	350 µg/m ³ (132 ppb) Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg/m ³ (47 ppb) Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004

Notes:

µg/m³ - micrograms per cubic metre

mg/m³ - milligrams per cubic metre

ppb - parts per billion

ppm - parts per million

* The objectives for nitrogen dioxide are provisional

1.1: The phased approach to review and assessment.

The first step of the phased approach of the review and assessment process is an updating and screening assessment (Table 1.2). This is based on a checklist to identify those matters that have changed since the first round was completed, and which may now require further assessment. The updating and screening process covers: new monitoring data; new objectives; new sources or significant changes to existing sources, either locally or in neighbouring authorities; other local changes that might affect air quality, etc. If there is a risk that these changes may be significant, then a simple screening assessment should be carried out.

Table 1.2: The phased approach to review and assessment,

Level of assessment	Objective	Approach
Updating and Screening Assessment	To identify those matters that have changed since the last review and assessment, which might lead to a risk of an air quality objective being exceeded.	Use a checklist to identify significant changes that require further consideration. Where such changes are identified, then apply simple screening tools to decide whether there is sufficient risk of an exceedence of an objective to justify a detailed assessment.
Detailed Assessment	To provide an accurate assessment of the likelihood of an air quality objective being exceeded at locations with relevant exposure. This should be sufficiently detailed to allow the designation or amendment of any necessary AQMAs.	Use quality-assured monitoring and validated modelling methods to determine current and future pollutant concentrations in areas where there is a significant risk of exceeding an air quality objective.

For Plymouth each pollutant has been considered and the updated checklists followed. The information obtained and the outcome for each pollutant are discussed in this report.

Where the updating and screening process identifies a risk that an air quality objective may be exceeded at a location with relevant public exposure (Table 1.3) the authority will be required to undertake a detailed assessment. The aim of the detailed assessment should be to identify with reasonable certainty whether or not a likely exceedence will occur. An Air Quality Management Area (AQMA) should not be declared unless a detailed assessment has been completed.

Table 1.3 Examples of where the Air Quality Objectives should/should not apply.

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, libraries etc.	Building facades of offices or other places of work where members of the public do not have regular access. Gardens of residential properties. Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply. Gardens of residential properties	Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (e.g. pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend 1-hour or more. Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	

1.2: The Plymouth Area

Plymouth has a population of about 250,000 and is the largest city in the South West. As well as being a prime tourist area, it is also a large Naval port. The bulk of the city lies on a peninsula of land between two rivers, the Tamar to the west and the Plym to the east. The city is bounded to the north by Dartmoor and is surrounded by smaller conurbation's, housing many of the employees for the city.

Plymouth City Council has carried out air quality monitoring in some form since the 1960s. At this time only smoke and sulphur dioxide monitoring was undertaken as part of the national network. However, continuous analysers to

monitor for sulphur dioxide, oxides of nitrogen and ozone were installed in 1992. In 1997, the site became part of the Automatic Urban Network (AUN) (Figure 1.1) and DEFRA added more equipment to the network in the form of a carbon monoxide analyser and a TEOM particulate monitor. In 2002, a pumped benzene diffusion tube sampler was added to the suite of equipment. The site is situated in Armada Way.

Figure 1.1: Automatic Urban Monitoring Site in Armada Way, Plymouth



Information from this network is now available on the internet at www.airquality.co.uk. The site is regarded as an urban background monitoring station, and LAQM.TG(03) specifies this site as an urban location distanced from sources and therefore broadly representative of city-wide background conditions such as urban residential areas.

Quality Assurance and Quality Control (QA/QC) measures are detailed in Appendix 1 for both the AUN site and diffusion tube monitoring.

The surrounding local authorities have smaller populations but are much larger in geographical areas. The neighbouring local authorities includes the South Hams to the East, and in Cornwall, Caradon to the West, as shown in Figure 1.2.

Figure 1.2 Local Authorities Surrounding Plymouth.



A Consultation exercise was carried out at the air quality focus group meeting which is part of the Devon Chief Officers Environmental Protection Sub Group. Regular meetings take place between representatives from each of the local authorities within Devon to discuss issues that affected neighbouring authorities, with regard to air quality, including new or substantially changed industrial processes.

2.0 Review and Assessment of Carbon Monoxide

Pollutant	Objective	Measured as	To be achieved by
Carbon monoxide	10 mg/m ³ (10 ppm)	Running 8 Hour Mean	31 December 2003

Conclusions from the first Updating and Screening Assessment 2003.
Monitoring data indicates that the concentration of CO within Plymouth is well below the objective level. There are no busy roads and consequently there is no need to proceed to a detailed assessment.

Updating and Screening Checklist

Table 2.1 Summary of the updating and screening checklist approach for carbon monoxide.

Item No.	Source, location or data to be assessed
A	Monitoring Data
B	Very busy roads or junctions in built-up areas

2.1 A: Monitoring Data

Plymouth is part of the national Air Quality Monitoring Network and data has been collected from the AUN, located in Plymouth City Centre, at an urban background site. Although this does not directly represent a relevant exposure location, it is the only continuous monitoring data available. LAQM.TG (03) states that it is considered unlikely that any authority will need to proceed beyond the updating and screening assessment for carbon monoxide.

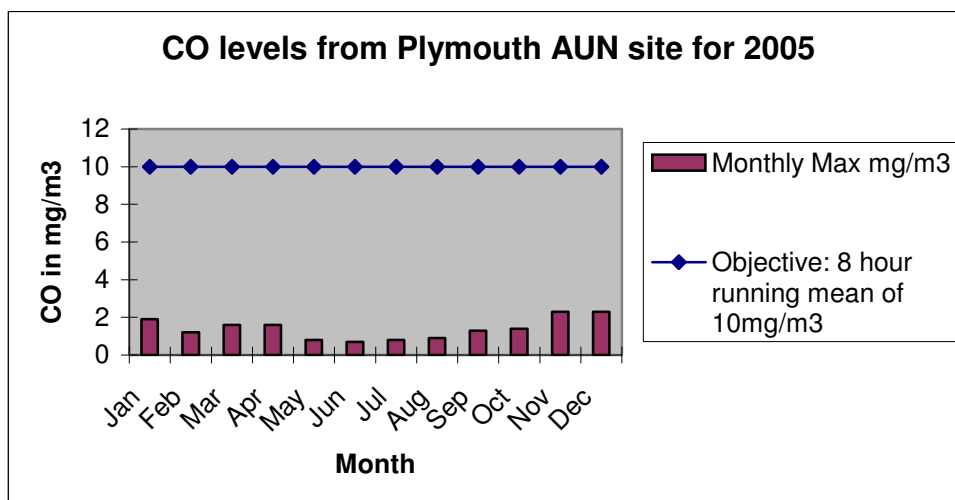
The data is ratified on average every six months, by NETCEN. Details of the QA/QC procedures are provided in Appendix 1.

This data has been used to calculate the monthly maximum in mg/m³, to give the worst case scenario. These results can be seen in table 2.2 and figure 2.1.

Table 2.2 Table to show the maximum daily running 8 hour mean CO concentrations measured at Plymouth AUN site since 1999.

Year	Maximum daily running 8 hour mean concentration in mg/m ³
1999	2.8
2000	3.5
2001	3.4
2002	2
2003	1
2004	1.7
2005	1.4

Figure 2.1: Maximum Monthly 8 hour running mean CO levels in Plymouth for 2005



The estimated annual mean background concentration for 2001 has been mapped for the UK. The highest concentration that was estimated for Plymouth is 0.38mgm^{-3} . When this figure is forecast for 2005, using the air pollution year adjustment calculator provided on www.airquality.co.uk it is calculated to be 0.26mg/m^3 .

Question

Are any maximum daily 8-hour concentrations greater than 10mg/m^3 ?

Action

No. There is no need to proceed to a detailed assessment.

2.2 B: Very busy roads or junctions in built up areas.

From traffic data provided by our Transport department there are no roads within Plymouth that can be classed as "very busy". The remainder of the checklist with regard to this section is therefore not relevant.

Question

Are any predicted annual mean concentrations greater than 2mg/m^3 ?

Action

No. There is no need to proceed to a detailed assessment.

2.3: Conclusion

Conclusion

Monitoring data indicates that the CO levels within Plymouth are well below the objective level. There are no very busy roads and consequently there is no need to proceed to a detailed assessment.

3.0 Review and Assessment of Benzene

Pollutant	Objective	Measured As	To be achieved by
Benzene	5µg/m ³	Running Annual Mean	31 December 2010

Conclusion from Detailed Assessment for benzene, April 2004

It has been decided to declare an Air Quality Management Area, due to the sensitivity of the exposed population. The monthly results from Exeter Street petrol station do cause concern, primarily as the young children at the school could potentially be exposed to concentrations of benzene in excess of 5µg/m³.

Plymouth City Council are satisfied that there is a likelihood of the 2010 objective of 5µg/m³ not being met, as there are no plans to install Stage 2 vapour recovery at the present time. In addition, due to the monitoring being carried out over the winter months, higher concentrations could be expected during the summer months when wind speeds are expected to be lower and there is less dispersion of benzene.

The diffusion tube monitoring however has an accuracy of +/- 25%, which could mean the results are under or over 5µg/m³.

When the five months of results taken at the school in 2003 are forecast to 2010, using the calculation suggested in LAQM.TG(03) they are expected to meet the 2010 objective, however, there are no plans to install stage 2 vapour recovery at this time. This result should be viewed with caution and is not relevant should abatement technology not be fitted.

Further detailed monitoring will be required to provide a more accurate picture of the concentrations of benzene in the vicinity of the school.

Updating and Screening Checklist

Table 3.1 Summary of the updating and screening checklist approach for benzene.

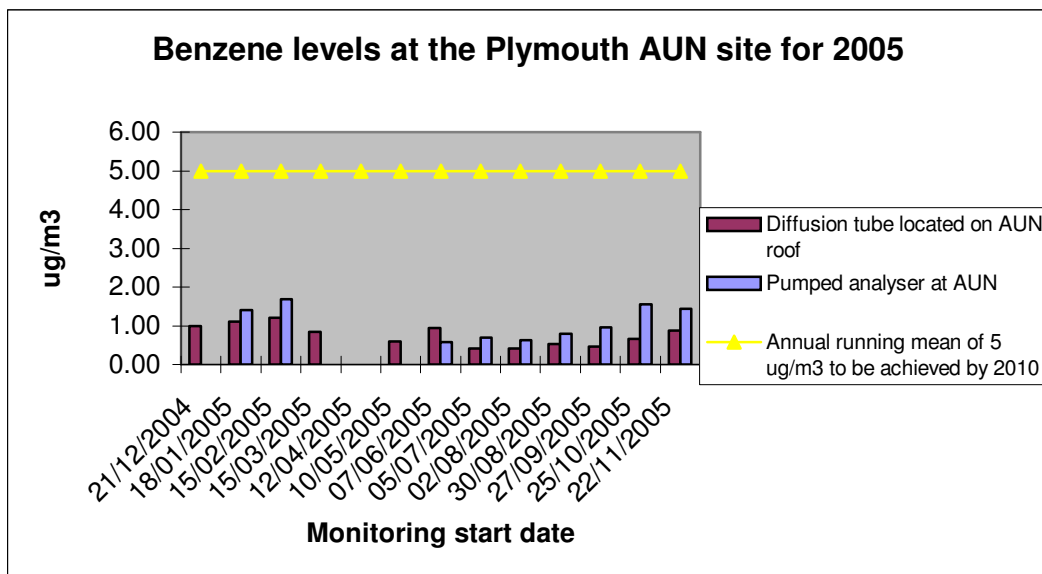
Item No.	Source, location or data to be assessed
A	Monitoring Data outside an AQMA
B	Monitoring Data within an AQMA
C	Very busy Roads or junctions in built up areas
D	New industrial sources
E	Industrial sources with substantially increased emissions, or new relevant exposure
F	Petrol stations
G	Major fuel storage depots (petrol only)

3.1 A: Monitoring data outside an AQMA

A1 Collate all Benzene monitoring data.

Benzene monitoring is carried out at the AUN site in Plymouth centre, using a pumped diffusion tube sampler and also a single diffusion tube located on the roof. Details of the QA/QC procedures are in Appendix 1. Although this does not directly represent relevant exposure location, it is the only continuous monitoring available outside an AQMA. The results are shown in Figure 3.1. The mean figure taken from these results is $0.75\mu\text{g}/\text{m}^3$ for the diffusion tube and $1.09\mu\text{g}/\text{m}^3$ for the pumped analyser.

Figure 3.1 : Graph to show the results of benzene monitoring at the Plymouth AUN site for 2005.



Using the year adjustment calculator spreadsheet on www.airquality.co.uk, this data can be forecast forward to 2010. The forecast concentrations are shown in Table 3.2.

Table 3.2: Table to show forecast concentrations of Benzene at Plymouth AUN site for 2010.

Year	Benzene concentration in $\mu\text{g}/\text{m}^3$	Benzene concentration in $\mu\text{g}/\text{m}^3$
	Diffusion Tube	Pumped Analyser
2005	0.75	1.09
2010	0.64	0.92

A2 Ratify your local monitoring data

The data for the pumped analyser is collated by the National Physics Laboratory and is scaled and ratified as necessary.

A3 Calculate annual means from the data and identify the highest values.

The annual mean for 2005 for the pumped analyser at the Plymouth AUN site was $1.09\mu\text{g}/\text{m}^3$. The annual mean for 2005 for the diffusion tube located on the AUN roof was $0.75\mu\text{g}/\text{m}^3$. The discrepancy between these two results will be discussed in the following section, monitoring within an AQMA.

A4 Roadside locations

This section does not apply as monitoring is carried out at an urban background site.

Questions

Are any running means greater than $16.25\mu\text{g}/\text{m}^3$?

Are any annual means greater than $5\mu\text{g}/\text{m}^3$?

Action

No, no need to proceed to detailed assessment.

3.2 B: Monitoring data within an AQMA.

B1 Collate all benzene monitoring data.

An AQMA for benzene was declared on 25th May 2005. This was due to the fact that there was a school and student accommodation located within 10m of petrol pumps and monitoring had indicated an exceedance of the 2010 objective of $5\mu\text{g}/\text{m}^3$.

Further monitoring has been carried out within the AQMA on Exeter Street. Firstly diffusion tube monitoring has been carried out at a number of sites around the school grounds, and at the newly constructed student residence at St Theresa's House, directly adjacent to the petrol station. Also a continuous pumped analyser has been installed at the school, with the inlet tube located close to one of the current diffusion tube locations. Figure 3.2 shows the location of the monitoring.

The results of the monitoring carried out on Exeter Street are shown in Figure 3.3. The annual averages of these results are shown in table 3.2.

From the results it can be seen that there is a marked difference in the values between the pumped sampler and the co-located diffusion tube. This was also noted from the results at the AUN site in Plymouth city centre. The results for these two co-location studies are shown in Figures 3.1 and 3.5.

Figure 3.2: Map to show the location of the diffusion tube monitoring and the pumped sampler at Holy Cross School. (Green dots represent diffusion tubes, and the pink square is the pumped sampler.)

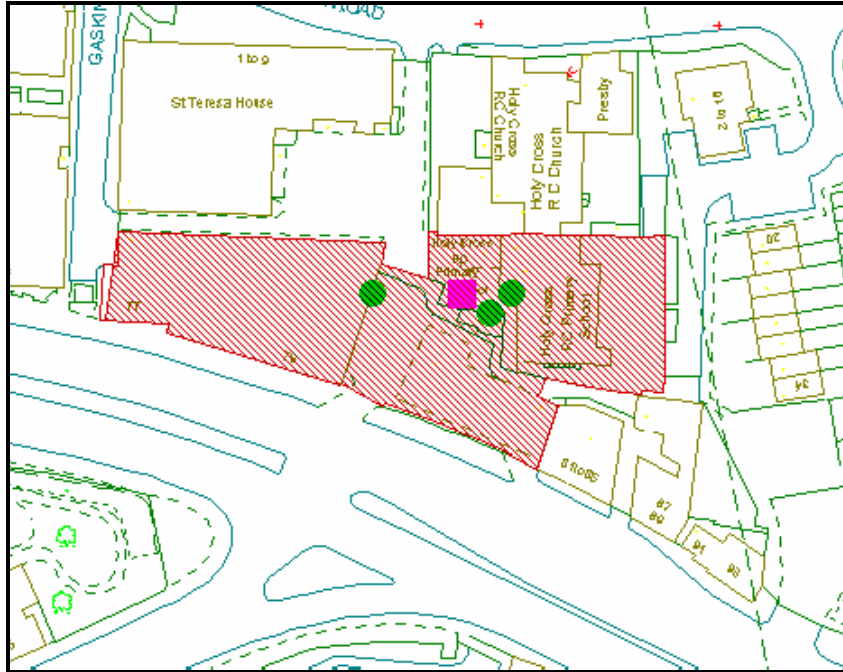


Figure 3.3 Results of Benzene monitoring within the Exeter Street area.

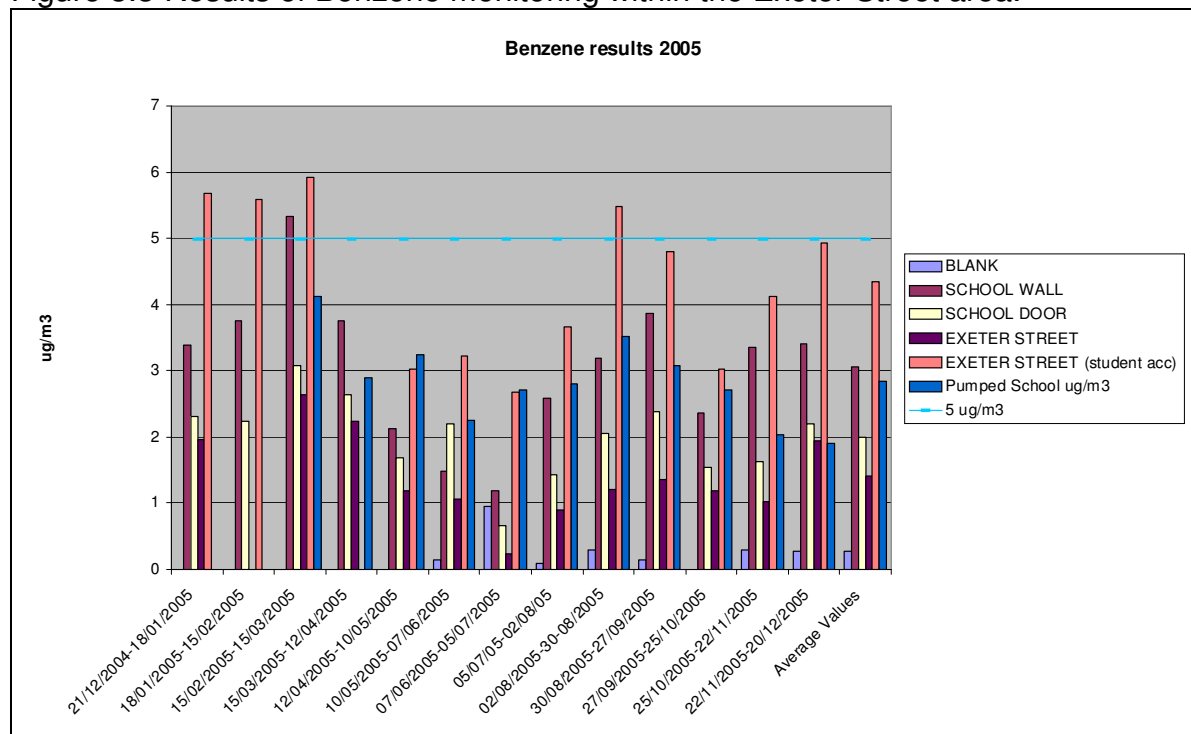


Table 3.3: The annual averages for benzene monitoring at Exeter Street in 2005.

Location	Annual average in $\mu\text{g}/\text{m}^3$
School wall	3.06
School door	2.00
Exeter St Student Accommodation	4.35
Exeter Street Flats	1.41
Blank	0.27
Pumped Sampler	2.84

Figure 3.4 Results from co-location of the benzene pumped sampler and diffusion tube at Holy Cross School located on the school door.

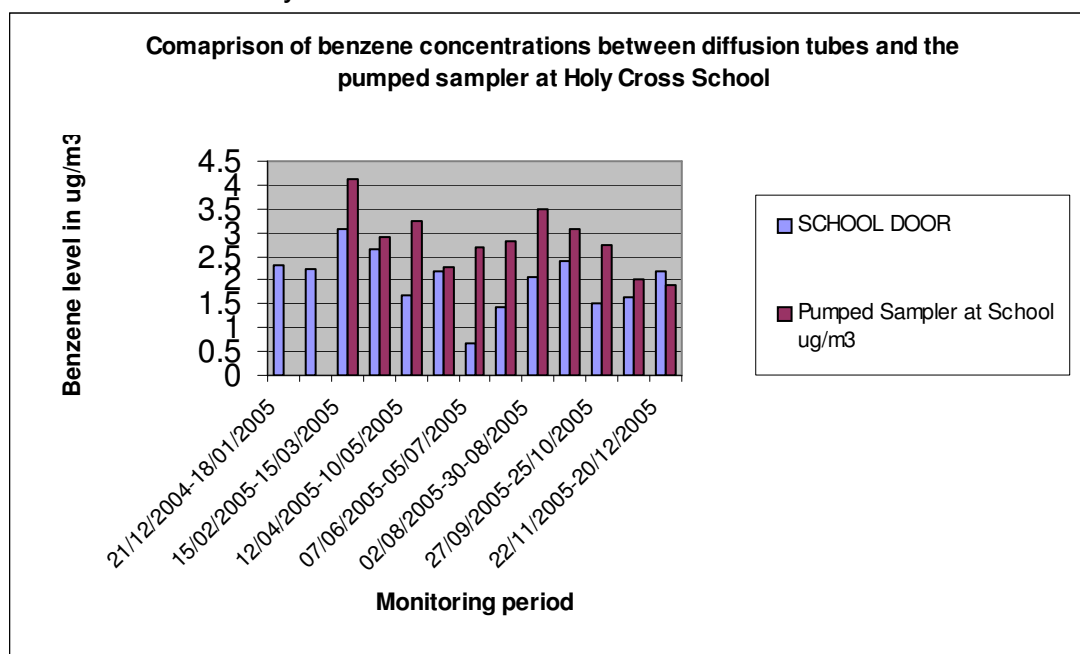


Table 3.4 Annual average results for the co-location of benzene diffusion tubes and the pumped sampler.

	Diffusion Tube	Pumped Sampler
AUN Site	0.75	1.09
Holy Cross School	2.00	2.84

The annual average results for the two co-location studies are shown in table 3.3. From the results it can be seen that the average result for the diffusion tube is much lower than that of the pumped sampler. A bias correction factor can therefore be calculated. The same approach as calculating a nitrogen dioxide bias correction factor from Box 6.4 in LAQM.TG(03) was used. The calculation and results are shown in Table 3.5.

Table 3.5: Calculation for the bias correction factor for benzene diffusion tube data in 2005.

<p>Bias Adjustment A bias adjustment factor is calculated as follows. $A = C_m/D_m$</p> <p>C_m = Annual mean sampler concentration. D_m = Annual mean diffusion tube concentration.</p> <p>AUN site bias adjustment. $C_m = 1.09$ $D_m = 0.75$ $A = 1.09/0.75$ $A = 1.45$ This means the tubes under read by 31.2%</p> <p>School bias adjustment $C_m = 2.84$ $D_m = 2.00$ $A = 2.84/2.00$ $A = 1.42$ This means the tubes under read by 29.6%</p> <p>An average of these two bias adjustment factors is 30.4%</p>
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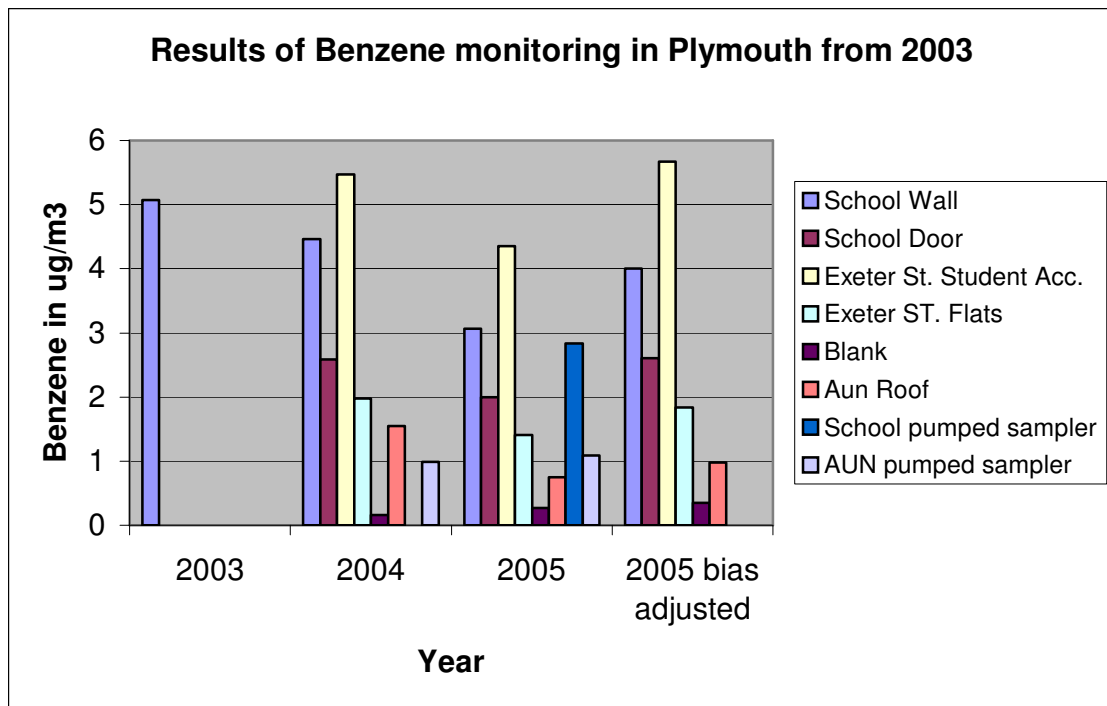
The bias adjustment correction factor is 1.435, which means that the benzene diffusion tubes under read by 30.4%. Since this figure seemed high the matter was discussed with David Butterfield from NPL and he confirmed that this factor was correct. Derby Council have carried out a survey for the last 18 months and have found the same, that the tubes under read the pumped sampler by around 30%. Table 3.6 shows the annual average results and the corrected results using the bias adjustment factor.

Table 3.6 Bias adjusted results for benzene.

Location	Annual average in $\mu\text{g}/\text{m}^3$.	Bias adjustment Tubes under read by 30.4 %
School wall	3.06	4.00
School door	2.00	2.61
Exeter St Student Accommodation	4.35	5.67
Exeter Street Flats (not in AQMA)	1.41	1.84
Blank	0.27	0.35
AUN roof	0.75	0.978
School Pumped Sampler	2.84	
AUN pumped sampler	1.09	

To show a yearly trend the annual averages for the last few years are shown in Figure 3.5.

Figure 3.5 Results of Benzene monitoring in Plymouth from 2003



B2 Ratify your local monitoring data.

The data for the pumped analyser is collated by the National Physics Laboratory and is scaled and ratified as necessary. QA/QA procedures are in Appendix 1.

B3 Calculate annual means from the data and identify the highest values.

The annual mean values within the Exeter Street AQMA are shown below in Table 3.7.

Location	Annual average in $\mu\text{g}/\text{m}^3$.	Bias adjustment Tubes under read by 30.4 %
School wall	3.06	4.00
School door	2.00	2.61
Exeter St Student Accommodation	4.35	5.67
School Pumped Sampler	2.84	

The highest value when the diffusion tube results are bias adjusted is 5.67 $\mu\text{g}/\text{m}^3$

B4 Roadside locations

This section does not apply as monitoring is carried out at an urban background site.

Questions

Are any running means greater than $16.25\mu\text{g}/\text{m}^3$?

Are any annual means greater than $5\mu\text{g}/\text{m}^3$?

Action

Yes, one of the annual means is greater than $5\mu\text{g}/\text{m}^3$. Therefore further monitoring will continue within the AQMA on Exeter Street for Benzene.

3.3 C: Very busy roads or junctions in built up areas.

From analysis of traffic data supplied by the Transport Department of Plymouth City Council, it is evident that there are no roads or junctions in built up areas that can be classified as “very busy”, as specified in the guidance document LAQM.TG(03) Updated - January 2006.

Therefore the remainder of the section does not apply.

3.4 D: New industrial sources.

Having reviewed Annex 2 in LAQM.TG(03) there have been no new significant industrial sources within Plymouth since the last updating and screening assessment that require further consideration.

3.5 E: Industrial sources with substantially increased emissions, or new relevant exposure?

There are no industrial sources from the previous round of updating and screening assessment that have substantially increased emissions or new relevant exposure.

3.6 F: Petrol stations.

There are no petrol stations, with an annual throughput of more than 2000m^3 of petrol, located on a busy roads that have not been considered in previous rounds of the review and assessment process.

3.7 G: Major fuel Storage depots (petrol only)

During the first round of Updating and Screening Assessments it was identified that there were two major fuel storage depots handling petrol. After further consideration and use of the nomograms in figure 3.3 of LAQM.TG(03) it was found that that there was no need to proceed to a detailed assessment.

The combined throughput of the two depots, Texaco and Conoco in 2003 was 514803 tonnes per annum. The combined throughput in 2005 was 499945 tonnes per annum.

It can therefore be seen that the throughput has reduced and therefore there is no need to proceed further.

Question

Does the source exceed the threshold in the nomograms.

Action

No. There is no need to proceed to a detailed assessment.

3.8 Conclusion

Conclusion

Monitoring within the AQMA is continuing to indicate an exceedence of the annual mean of $5\mu\text{g}/\text{m}^3$ and as a result monitoring will continue. An action plan is due to be released later in 2006.

Outside the AQMA there have been no significant changes and a detailed assessment is not required.

4.0 Review and Assessment of 1,3-butadiene.

Pollutant	Objective	Measured As	To be achieved by
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running Annual Mean	31 December 2003

Conclusion from the last updating and screening assessment 2003

There is no need to proceed to a detailed assessment.

Updating and Screening Checklist.

Table 4.1: Summary of the updating and screening checklist approach for 1,3-butadiene.

Item No.	Source, location or data to be assessed
A	Monitoring Data
B	New industrial sources
C	Industrial sources with substantially increased emissions, or new relevant exposure

4.1 A: Monitoring Data

No local data is available for 1,3-butadiene. The nearest monitoring location that is part of the national network is situated at Cardiff Centre since Bristol stopped monitoring in 2000. The Cardiff Centre site has been monitoring 1,3-butadiene since 5th September 2002. The annual running mean since then is shown below in Table 4.2. QA/QC information and procedures for the national monitoring network are provided in Appendix 1.

Table 4.2: Annual running mean for 1,3-butadiene at Cardiff Centre since 2003.

Year	1,3-butadiene annual running mean, in $\mu\text{g}/\text{m}^3$
2003	0.15
2004	0.11
2005	0.11

From the background maps the highest predicted concentration for Plymouth in 2003 was 0.246 $\mu\text{g}/\text{m}^3$. When the air pollution adjustment calculator is used to predict the figure in 2006 the value is calculated as 0.18 $\mu\text{g}/\text{m}^3$. This figure is well below the objective.

Question

Are any current running annual means greater than $2.25\mu\text{g}/\text{m}^3$?

Action

No.

4.2 B: New Industrial Sources

Having reviewed the checklist in Annex 2 of LAQM.TG(03) there are no new industrial sources within Plymouth that require further investigation.

4.3 C: Industrial sources with substantially increased emissions, or new relevant exposure.

There are no industrial sources with substantially increased emissions of 1,3-butadiene or new relevant exposure within Plymouth.

4.4 Conclusion

Conclusion

There are no industrial sources within Plymouth with the potential to emit 1,3-butadiene. From monitoring at the closest location and the background maps the level of 1,3-butadiene is well within the objective. Therefore there is no need to proceed to a detailed assessment.

5.0 Review and Assessment of Lead

Pollutant	Objective	Measured As	To be achieved by
Lead	0.5µg/m ³	Annual Mean	31 December 2004
	0.25µg/m ³	Annual Mean	31 December 2008

Conclusions from the last updating and screening assessment 2003.

There are no industrial sources of lead within Plymouth. Monitoring at the closest location to Plymouth indicates concentrations of lead to be well below the objective. Consequently, there is no need to proceed to a detailed assessment.

Updating and Screening Checklist.

Table 5.1 shows a summary of the updating and screening checklist approach for lead.

Item No.	Source, location or data to be assessed
A	Monitoring Data
B	New industrial sources
C	Industrial sources with substantially increased emissions, or new relevant exposure

5.1 A: Monitoring Data

A1 Collate all lead monitoring data.

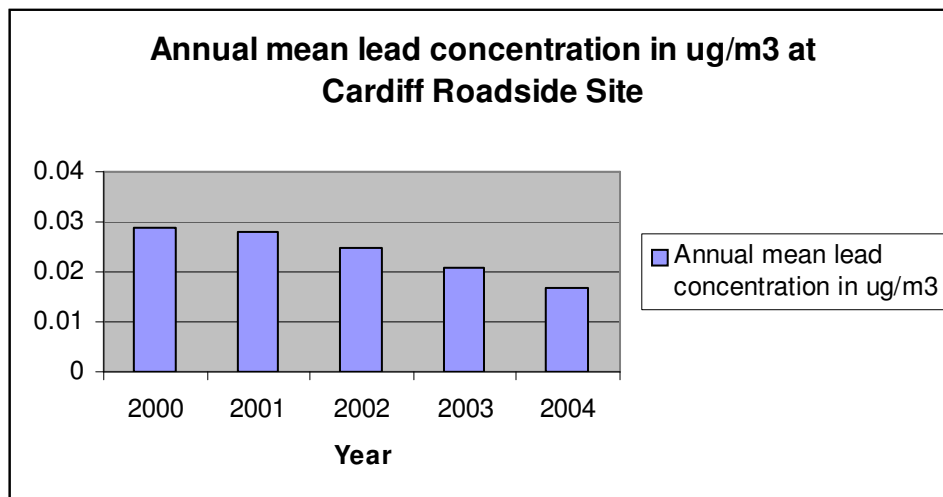
Monitoring of lead is not carried out within Plymouth. Reference was made to LAQM.TG(03) and the nearest monitoring location is a roadside site in Cardiff. QA/QC information and procedures for the national monitoring network are provided in Appendix 1.

Table 5.2 below shows the annual mean lead in air concentration for the last few years in Cardiff.

Year	Annual mean lead concentration in µg/m ³
2000	0.029
2001	0.028
2002	0.025
2003	0.021
2004	0.017

As can be seen from Figure 5.1 the annual mean level has dropped each year since 2000, and the concentration in 2004 was well below the objective of $0.25\mu\text{g}/\text{m}^3$.

Figure 5.1: Trend in the annual mean level of roadside concentrations of lead in Cardiff.



Question

Are any current annual means greater than $0.5\mu\text{g}/\text{m}^3$?
 Are any current annual means greater than $0.25\mu\text{g}/\text{m}^3$?

Action

No. There is no need to proceed to a detailed assessment.

5.2 B: New industrial sources, Approach 2.

Having referred to the checklist in Annex 2 there are no new industrial processes within Plymouth that need considering further.

Question

Does the source exceed the threshold in the nomograms?

Action

No. There is no need to proceed to a detailed assessment.

5.3 C: Industrial sources with substantially increased emissions, or new relevant exposure.

There are no processes with the potential to emit lead within Plymouth.

Question

Does the source exceed the threshold in the nomograms?

Action

No. There is no need to proceed to a detailed assessment.

5.4 Conclusion

Conclusion

There are no new industrial sources or ones with substantially increased emissions of lead or new relevant exposure within Plymouth. Monitoring at the closest location to Plymouth indicates that the concentrations are well below the objective of $0.25\mu\text{g}/\text{m}^3$. Therefore there is no need to proceed to a detailed assessment.

6.0 Review and Assessment of Nitrogen Dioxide

Pollutant	Objective	Measured As	To be achieved by
Nitrogen Dioxide	200 $\mu\text{g}/\text{m}^3$ (105ppb) Not to be exceeded more than 18 times per year	1 Hour Mean	31 December 2005
	40 $\mu\text{g}/\text{m}^3$	Annual Mean	31 December 2005

Conclusions from the Detailed Assessment 2004

As there is a likelihood that the objectives for NO₂ will be exceeded in 2005 at two locations in Plymouth, it has been decided that air quality management areas will be declared in both Exeter Street and Mutley Plain, despite the modelling results indicating that the objective will be met by the end of 2005. Further monitoring will be undertaken to examine the extent of the AQMA at both locations.

Updating and Screening Checklist.

Table 6.1 is a summary of the updating and screening checklist approach for nitrogen dioxide.

Item No.	Source, location or data to be assessed
A	Monitoring Data outside an AQMA
B	Monitoring Data within an AQMA
C	Narrow congested streets with residential properties close to the kerb
D	Junctions
E	Busy streets where people may spend 1-hour or more close to traffic
F	Roads with high flow of buses and/or HGV's
G	New roads constructed or proposed since the previous round of R & A
H	Roads with significantly changed traffic flows or new relevant exposure.
I	Bus Stations
J	New Industrial Sources
K	Industrial sources with substantially increased emissions, or new relevant exposure
L	Aircraft

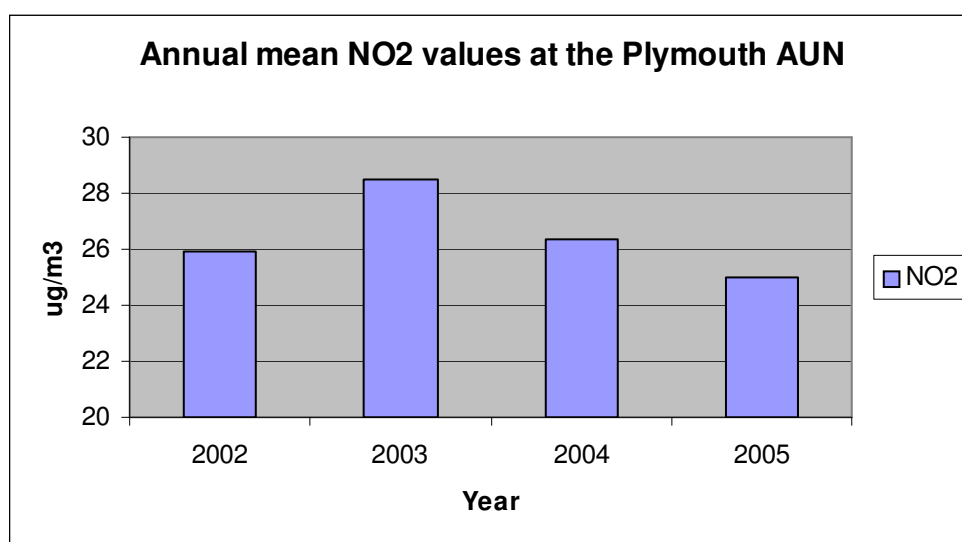
6.1 A: Monitoring data outside an AQMA

Plymouth is part of the national Air Quality Monitoring Network and data has been collected from the AUN, located at an urban background site located in Plymouth City Centre. The data is ratified every 6 months, by Netcen. Only ratified data is used in this report.

QA/QC procedures for both the AUN site and diffusion tube monitoring is detailed in Appendix 1.

Annual mean concentrations for the past few years monitoring at the AUN site in Plymouth are shown in Figure 6.1.

Figure 6.1 Annual mean concentrations at the AUN site in Plymouth.



As Plymouth is part of the national air quality monitoring network, with an AUN site at an urban background location, it has been possible to conduct a co-location exercise, using triplicate diffusion tubes to obtain a relevant bias adjustment factor.

The diffusion tubes have been supplied and analysed by Gradko, using the 20% TEA in water preparation method. QA/QC details are provided in Appendix 1.

Data from the AUN site is ratified by NETCEN on a six monthly basis. The bias adjustment factor has been calculated following Box 6.4 in the Technical Guidance document LAQM.TG(03). The data for the co-location study is shown in Table 6.2.

All the data used has been ratified and there are no periods of less than 90% data capture.

Table 6.2: Data for co-location study at Plymouth AUN site. All results in $\mu\text{g}/\text{m}^3$.

Date Out	Date in	AUN1	AUN2	AUN3	Average AUN	AUN Chem
21/12/2004	18/01/2005	24.73	25.38	24.18	24.76	24.96
18/01/2005	15/02/2005	30.78	30.62		30.70	24.57
15/02/2005	15/03/2005	33.02	33.67	42.55	36.41	31.86
15/03/2005	12/04/2005	35.29	35.66	34.62	35.19	24.58
12/04/2005	10/05/2005	26.41	30.19	29.7	28.77	21.96
10/05/2005	07/06/2005	29.48	30.81	29.36	29.88	22.41
07/06/2005	05/07/2005	26.32	27.5	23.85	25.89	19.51
05/07/2005	02/08/2005	26.12	26.29	23.04	25.15	18.96
02/08/2005	30/08/2005	18.51	18.51	21.53	19.52	18.03
30/08/2005	27/09/2005	31.35	19.4	32.08	27.61	26.17
27/09/2005	25/10/2005	28.84	25.91	28.27	27.67	27.46
25/10/2005	22/11/2005	34.07	33.62	35.08	34.26	28.00
22/11/2005	20/12/2005	36.34	30.46	35.1	33.97	36.48

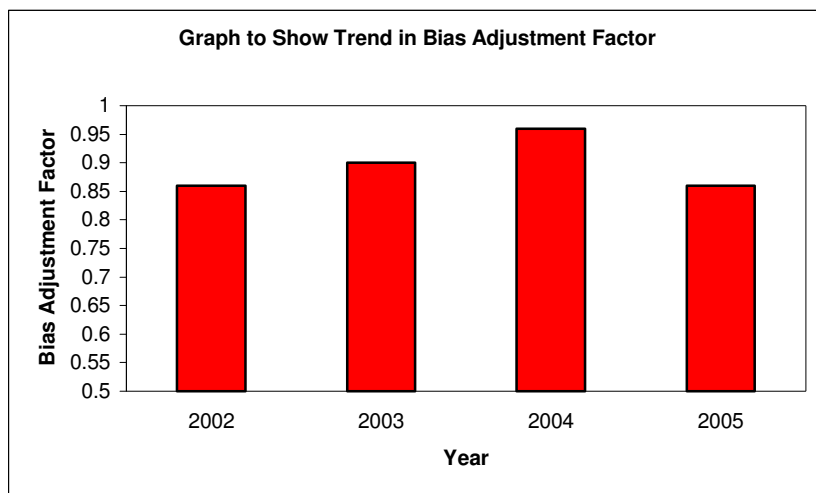
Using the data from Table 2.6 the bias adjustment factor can be calculated. The data for this is shown in Table 6.3.

Table 6.3: Data used to calculate the bias adjustment factor.

	Dm	Cm	Bias Adjustment factor for 2005
All ratified data and no periods of less than 90% data capture.	29.21	25.00	0.86

Therefore the bias adjustment factor for 2005 is 0.86. The bias adjustment factors since 2002 are shown in Figure 6.2.

Figure 6.2 Trend in bias adjustment factors since 2002.



Monitoring has been underway at various locations within Plymouth on major transportation networks where there is relevant exposure in close proximity to the roadside. The sites were chosen due to their close proximity to residential properties and are in areas of potential concern. The mean average results for 2005 for monitoring locations outside an AQMA are shown in Table 6.4.

Table 6.4 Table to show the annual mean concentrations for monitoring at locations around Plymouth, and the predictions for 2010, using Box 6.6 of LAQM.TG(03).

	Mean Average	Bias 0,86	Prediction 2010
1 - Control	0.0	0	0
7 - Woodford Avenue	29.7	25.56	21.29
8 - Outland Road	32.6	28.02	23.34
13 - Pennycomequick (flats)	36.4	31.27	26.04
14 - Caprera place	37.0	31.82	26.50
29 - Phonix House	37.6	32.30	26.91
30 - Notte Street	34.5	29.68	24.72
31 - Oxford Street	36.8	31.68	26.39
32 - Coburg Street	39.7	34.14	28.43
34- Tavistock Road	44.0	37.86	31.53

It must be noted that monitoring on Tavistock Road only commenced late into the year and therefore there are only a few months of data and not a full year. Monitoring is continuing on Tavistock Road as this is the highest result from locations outside an AQMA.

It can also be seen that the predictions for 2010 do not show any exceedences of the $40\mu\text{g}/\text{m}^3$ annual mean objective.

With regard to the 1 hour mean objective of $200\mu\text{g}/\text{m}^3$ that is not to be exceeded more than 18 times per year, data from the Air Quality Archive indicates that there were only 2 exceedences in 2005. This was an exception as there had been no other exceedences since 2000.

Question

Are any annual mean concentrations greater than $40\mu\text{g}/\text{m}^3$?
Are there more than 18 exceedences of $200\mu\text{g}/\text{m}^3$, or are any 99.8th percentiles greater than $200\mu\text{g}/\text{m}^3$?

Action

No, there is no need to proceed to a detailed assessment.

6.2 B: Monitoring data within an AQMA.

Within Plymouth there are two transport related AQMA's with regard to nitrogen dioxide. They are Exeter Street and Mutley Plain. The AQMA's were declared in May 2005. Monitoring has been increased in each of these areas using predominantly diffusion tubes.

6.2.1 Mutley Plain AQMA.

The locations of the monitoring sites within the Mutley Plain AQMA are shown in Figure 6.3.

Figure 6.3: Locations of the monitoring sites within the Mutley Plain AQMA.

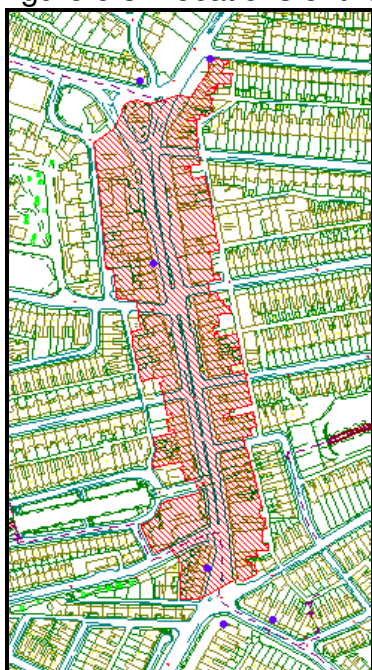


Table 6.5 shows the annual mean concentrations for monitoring locations in and around the Mutley Plain AQMA, and the predictions for 2010, using Box 6.6 of LAQM.TG(03).

	Mean Average 2005	Bias Adjustment 0.86	Prediction 2010
Mutley Plain (shop)	51.17	44.01	36.21
Hyde Park Rd (surgery)	34.25	29.46	24.24
Mutley Plain (Hair Salon)	49.37	42.46	34.94
Connells (Manamead Rd)	38.41	33.03	27.18
14a Mutley plain	47.41	40.77	33.55
140 Mutley Plain/North Hill	35.94	30.91	25.43
24 - Greenbank Road	35.68	30.68	25.25

Table 6.6 shows the results of the chemiluminescent monitoring data from Mutley Plain compared to the diffusion tube data.

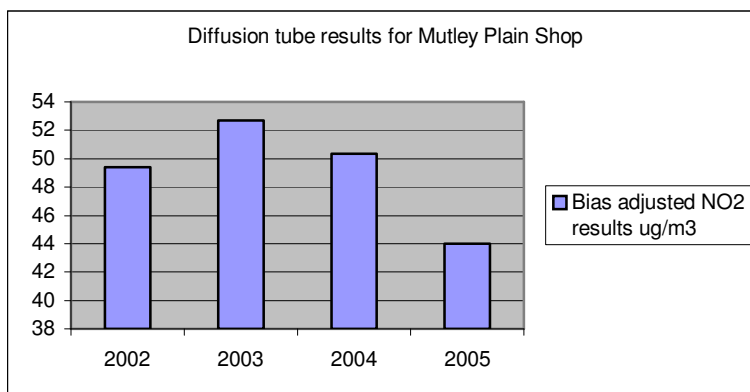
Mutley Analyser

Year	Mean in ug/m3	1 hour mean exceedences	Diffusion Tube	Diffusion Tube Bias adjusted
2005	38.5	0	51.17	44.01

The above result for the chemiluminescent analyser on Mutley Plain indicates that the level is much lower than that of the diffusion tube. Unfortunately due to initial complications and misinformation from the suppliers, incorrect procedures for the calibration were followed. This has resulted in the fact that we have not had the correct information to ratify the data. These problems have now been corrected and the current data collection and calibration procedures are giving much more accurate results.

The graph in Figure 6.4 shows the bias adjusted results for the diffusion tube located at the Mutley Plain Shop for the past few years.

Figure 6.4 Results from diffusion tube monitoring at the Mutley Plain Shop since 2002.



Questions

Are all annual mean concentrations less than $40\mu\text{g}/\text{m}^3$?

No

Are there 18 or fewer 1-hour exceedences of, or 99.8th percentiles less than, $200\mu\text{g}/\text{m}^3$?

Yes

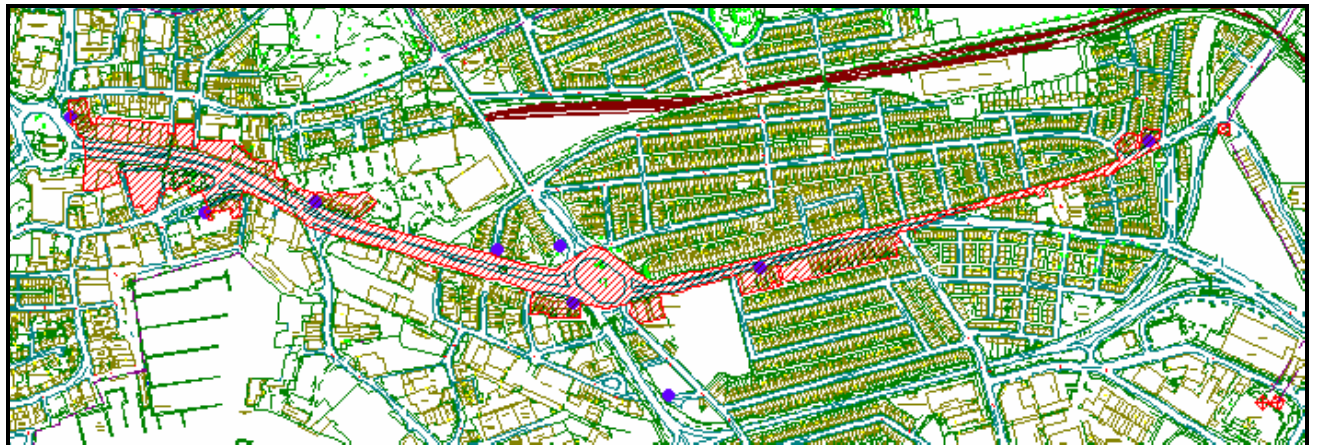
Action

An AQMA has already been declared and monitoring will continue .

6.2.2 Exeter Street AQMA

The Exeter Street AQMA is monitored using only diffusion tubes. The locations of these tubes are shown in Figure 6.5.

Figure 6.5 Map to show the monitoring location in the vicinity of the AQMA for Exeter Street.



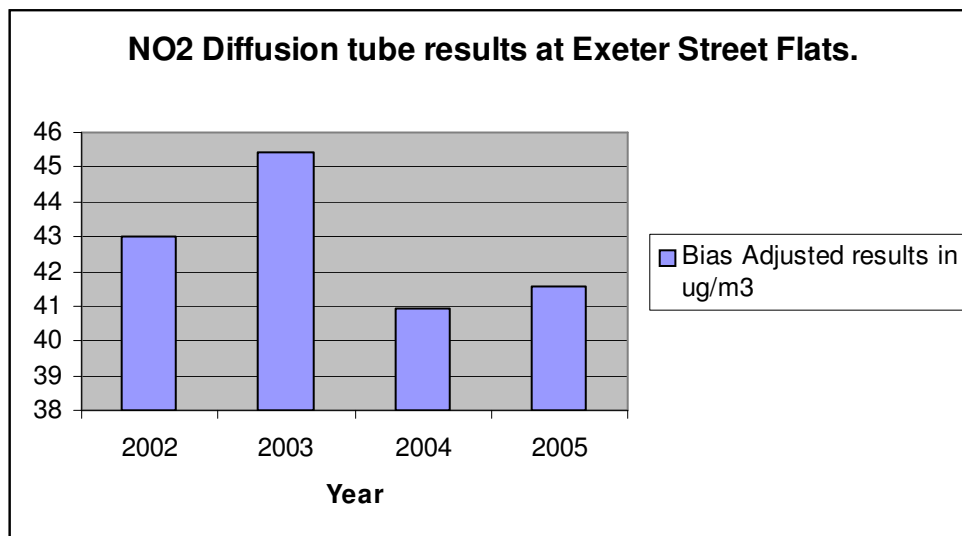
The results for the monitoring can be seen in Table 6.7

Table 6.7 Table to show the annual mean concentrations for monitoring at locations in and around the Exeter street AQMA, and the predictions for 2010 using box 6.6 of LAQM.TG(03).

	Mean Average	Bias adjusted 0.86	Prediction 2010
Charles Cross	42.22	36.31	23.77
Mariners Court	36.40	31.31	20.50
Exeter Street (flats)	48.35	41.58	27.22
St Judes Road	35.47	30.51	19.97
Greenbank Road	35.68	30.68	20.09
11 Tothill Road	33.17	28.53	18.68
212a Exeter Street	41.03	35.29	23.10
5 - Embankment Rd (House)	41.81	35.96	23.54
6 - Embankment Rd (Portakabin)	30.24	26.01	17.03
22 - 44 Embankment Road	48.98	42.13	27.58
21 - Cattedown Road	37.13	31.93	20.91

The graph in Figure 6.6 shows the results since 2002 for diffusion tube results at Exeter Street Flats.

Figure 6.6 Diffusion tube results at Exeter Street Flats



There is no continuous analyser located on Exeter Street and therefore it is not possible to know if there have been any exceedences of the 1 hour objective. However, since there have not been any exceedences in other parts of Plymouth it is unlikely that there would have been any within the Exeter Street AQMA.

Questions

Are all annual mean concentrations less than $40\mu\text{g}/\text{m}^3$?

No

Are there 18 or fewer 1-hour exceedences of, or 99.8th percentiles less than, $200\mu\text{g}/\text{m}^3$?

Yes

Action

An AQMA has already been declared and monitoring will continue.

6.3 C: Narrow congested streets with residential properties close to the kerb.

Any potential locations with narrow congested streets with relevant exposure within 5m of the kerb have been assessed during previous rounds of the review and assessment process. The location that was identified as being a potential problem now forms part of the Exeter Street AQMA. Since there are no further locations there is no need to proceed further with this section.

6.4 D: Junctions

There are a number of junctions within Plymouth that have been considered during previous rounds of the review and assessment process. From local knowledge and data provided by the transport department there are no further junctions that need consideration. Therefore there is no need to proceed further with this part.

6.5 E: Busy streets where people spend 1-hour or more close to traffic.

These types of locations were considered in previous rounds of the review and assessment process and from local knowledge it was determined that there were no streets in Plymouth where this would apply. Having once again considered the criteria, there are still no busy streets where people spend 1-hour or more close to traffic within Plymouth.

6.6 F: Roads with high flow of buses and/or HGV's

From analysis of recent traffic data and local knowledge it has been determined that there are no streets in Plymouth where this would apply. Consequently, no further consideration of this part is required.

6.7 G: New roads constructed or proposed since the previous round of review and assessment.

There have been no new roads constructed or proposed since the previous round of the review and assessment. Therefore there is no need to proceed further with this section.

6.8 H: Roads with significantly changed traffic flows, or new relevant exposure.

Having analysed recent traffic data, there are no roads within Plymouth with an increase of traffic flow of more than 25% .

6.9 I: Bus Stations

There are two bus stations within Plymouth, both of which were considered during the first round of the Updating and Screening process. The bus movements were below the 1000 movements per day and there is no relevant exposure within 10m. Therefore there is no need to proceed further with this part.

6.10 J: New Industrial Sources

Part A/A1 Industrial Processes

Approach 1

Planning permission has been granted for a gas fired power station within the neighbouring district to Plymouth, being South Hams District Council with permission to use heavy distillate fuel oil in the event of interruption of the fuel supply for a maximum of 240 hours per annum. The development has been granted planning permission but is still subject to planning conditions to be complied with prior to the commencement of any development. An application is currently being considered by the Environment Agency for an A1 Permit, which was submitted in August 2004. As Plymouth City Council is not a statutory consultee for this application, then comment cannot be passed. However, the site lies within 550 metres from residents of Plymouth. The application for the A1 permit detailed that the flue gases will be discharged via a multi-flued stack, a maximum of 65 metres high, above a stack base elevation of 90 metres. The application states that the emissions will not have an adverse impact on meeting the air quality strategy objectives for any pollutant in either South Hams or Plymouth. Various scenarios have been modelled, in which some circumstances may lead to a breach of the EA guidance note H1, however, this is based on highly unlikely situations using fuel oil for in excess of 250 hours per annum.

Due to the predominant wind direction and nature of the terrain, the location of the maximum annual average of NO₂ is to the north-east and at a distance of less than 3km from the stack, which is in the opposite direction to the Plymouth boundary.

In conclusion, the maximum long term concentration of NO₂ due to the plant emissions are a small percentage of the long term NO₂ objective, and are just above the target threshold of 0.4µg/m³. However, this is based on absolute maximum operation and therefore the predictions are overestimates. The maximum short-term concentrations of NO₂ are well below the air quality objectives in all locations and will therefore never generate in isolation an exceedence of these standards.

Question

Did the assessment predict any exceedences of the objective at relevant locations?

Action

No, there is no need to proceed to a detailed assessment.

Part B Industrial Processes

Approach 2

Fine Tubes have applied for a Part B application for the surface treatment of metal, likely to result in the release into air of any acid forming oxides of nitrogen. This was granted since the last detailed assessment on 17th November 2004. Reference was made to Appendix E of LAQM.TG(03) which stated that this will not have any impact on emissions of the air quality strategy pollutants and as such it has been regarded as insignificant. Paragon Materials were issued with a Part B permit on 28th May 2004, for the storage and unloading of cement in bulk prior to further transportation. Reference was made to Appendix E of LAQM.TG(03) which stated that this process will not have any impact on emissions of the air quality strategy pollutants and as such it has been regarded as insignificant.

Question

Does the source exceed the threshold in the nomograms?

Action

No, there is no need to proceed to a detailed assessment.

6.11 K: Industrial sources with substantially increased emissions, or new relevant exposure.

There are no industrial sources within Plymouth, or close to the boundary, with an increase in emissions greater than 30%. Consequently there is no need to proceed further with this section.

6.12 L: Aircraft

Plymouth Airport was considered during the initial updating and screening assessment in 2003. In 2000 there were only 113,167 passengers and 83,000 tonnes of freight lifted at Plymouth Airport. It is not expected that these figures will have increased significantly and with the loss of one of the airlines, Airwales, the predicted annual throughput is well below 5 million passengers per year. Consequently there is no need to proceed with this section further.

6.13 Conclusion

Conclusion

Monitoring will continue within the two existing AQMA's. Monitoring is continuing outside the AQMA's. There are no exceedences of the air quality objectives and a detailed assessment is not required. No new sources have been identified on the checklists and there is no need to proceed to a detailed assessment.

7.0: Review and Assessment of Sulphur Dioxide

Pollutant	Objective	Measured as	To be achieved by
Sulphur dioxide	266 µg/m ³ (100 ppb) Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	350 µg/m ³ (132 ppb) Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg/m ³ (47 ppb) Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004

Conclusions from the last round of updating and screening assessment 2003.

The only area of concern was at Plymouth Railway Station, but after further investigation, guidance issued to drivers enforces that engines are switched off after 10 minutes. An electrical shore supply is provided for use for all trains for use when the time of engine running is likely to exceed 10 minutes, or during extremes of weather. Therefore, there is no need to proceed to a detailed assessment.

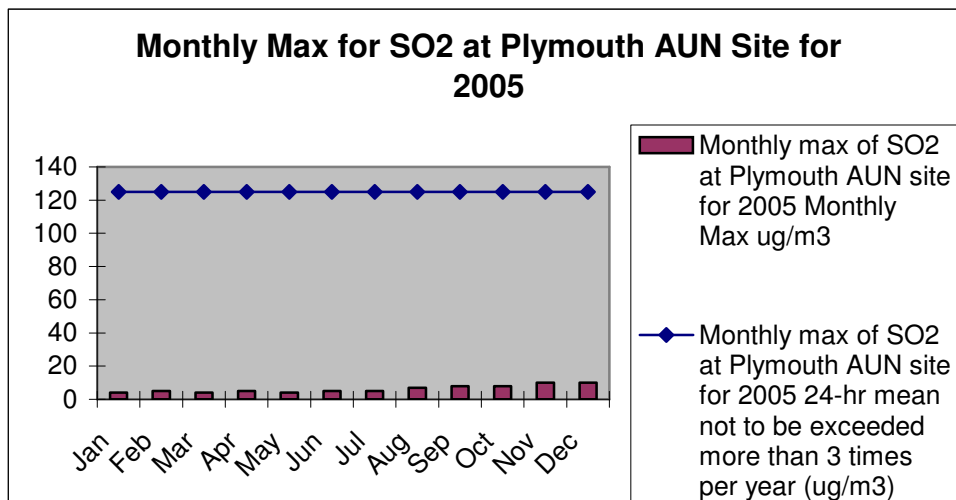
Updating and Screening Checklist

Table 7.1 Summary of the updating and screening checklist approach for SO₂

Item No.	Source, location or data to be assessed
A	Monitoring Data outside an AQMA
B	Monitoring Data within an AQMA
C	New industrial sources
D	Industrial sources with substantially increased emissions, or new relevant exposure
E	Areas of domestic coal burning
F	Small Boilers >5MW _(thermal)
G	Shipping
H	Railway Locomotives

7.1 A: Monitoring Data outside an AQMA

Monitoring for sulphur dioxide is carried out at Plymouth AUN site. A graph showing the monthly daily max levels of SO₂ in ug/m³ is shown in Figure 7.1.

Figure 7.1: Monthly max levels of SO₂ at Plymouth AUN site.

From information provided by the Air Quality Archive web site there were no exceedences of the time weighted objectives in 2005. All the data is ratified and scaled by Netcen, details of the QA/QC procedures are in Appendix 1.

Question

- Are there currently more than 35, 15 minute exceedences of 266 $\mu\text{g}/\text{m}^3$?
- Are there currently more than 24, 1 hour exceedences of 350 $\mu\text{g}/\text{m}^3$?
- Are there currently more than 3, 24hour exceedences of 125 $\mu\text{g}/\text{m}^3$?

Action

No.

7.2 B: Monitoring Data within an AQMA.

There is not an AQMA for sulphur dioxide within Plymouth.

7.3 C: New Industrial Sources

Having reviewed Annex 2 in LAQM.TG(03) there have been no new significant industrial sources with regard to sulphur dioxide within Plymouth since the last updating and screening assessment that require further consideration.

7.4 D: Industrial sources with substantially increased emissions, or new relevant exposure.

There have been no industrial sources identified that have emissions of SO₂. There are also no processes that have substantially changed with regard to relevant exposure within Plymouth. Therefore, there are no processes with substantially increases emissions.

7.5 E: Areas of domestic coal burning

For the updating and screening assessment in 2003 a comprehensive investigation was carried out over a 500m x 500m area where significant coal burning still takes place. The results showed that there were significantly less than 100 houses using wood or coal as their main fuel. The situation since this investigation has not changed and therefore there is no need to progress with this section further.

7.6 F: Small Boilers >5MW_(thermal)

During the updating and screening assessment in 2003 a number of sites with small boilers were examined and it was found that none exceeded the thresholds in the nomograms. There have been no new small boilers installed within Plymouth. Consequently, there is no need to progress with this section further.

7.7 G: Shipping

The three shipping areas within Plymouth were considered during the updating and screening process in 2003. No areas were identified as being a potential problem and there was no need to proceed to a detailed assessment. Therefore, there is no need to proceed further with this section.

7.8: H: Railway locomotives

This section was covered in the updating and screening process in 2003. It was found that the procedures for trains remaining at the station for more than 15 minutes required them to turn their engines off and if necessary connect to a shore supply.

There has been no change in the train service. Consequently there is no need to proceed with this section further.

7.9 Conclusion

Conclusion

There have been no significant changes with regards to sulphur dioxide emissions in this authority and as such a Detailed Assessment will not be required

8.0 Review and Assessment of PM₁₀

Pollutant	Objective	Measured as	To be achieved by
Particles (PM ₁₀)	50 µg/m ³ Not to be exceeded more than 35 times per year	24 Hour Mean	31 December 2004
	40 µg/m ³	Annual Mean	31 December 2004

Conclusions from the Progress Report 2005

Monitoring has been carried out at the flats adjacent to Victoria Wharves for a number of months. The annual mean objective of 40µg/m³ has been met during each year of monitoring but 2004 provides the only complete year of data. There are intermittent problems with the equipment which has resulted in a significant loss of data, but this matter is being dealt with.

With regard to the 24-hour objective, there were 18 exceedences in 2004, but there were 72 days of lost data. If a factor is applied to these exceedences to represent 365 days, then the number of exceedences would still be below 35. However, this is not an acceptable method of calculating the number of days where exceedences may occur.

Monitoring will continue at this location to enable an accurate assessment to be made of both the annual and 24-hour mean objectives and this will be further assessed at the end of 2005.

Updating and Screening Checklist

Table 8.1 Summary of the updating and screening checklist approach for PM₁₀

Item No.	Source, location, or data to be assessed
A	Monitoring data outside an AQMA
B	Monitoring data within an AQMA
C	Busy roads and junctions in Scotland
D	Junctions
E	Roads with high flow of buses and HGV's
F	New roads constructed or proposed since first round of R & A
G	Roads with significantly changed traffic flow, or new relevant exposure
H	Roads close to the objective during the second round of Review and Assessment

I	New industrial sources
J	Industrial sources with substantially increased emissions, or new relevant exposure
K	Areas of domestic solid fuel burning.
L	Quarries, landfill sites, open cast coal, handling of dusty cargoes at ports, etc.
M	Aircraft

8.1 A: Monitoring data outside an AQMA

Monitoring is carried out using a TEOM at the Plymouth AUN site for PM₁₀'s. LAQM.TG(03) indicates that for measurements using a TEOM, the results have to be multiplied by a factor of 1.3, to be comparable with the gravimetric method of monitoring. The graph in Figure 8.1 shows the maximum monthly 24-hour mean value at Plymouth AUN site for 2005. Figure 8.2 shows the PM10 monthly mean data for Plymouth AUN site. The data has been ratified and scaled by NETCEN. Details of the QA/QC procedures are provided in Appendix 1.

Figure 8.1: Graph to show the maximum monthly 24-hour mean value at Plymouth AUN site for 2005. Data has been scaled.

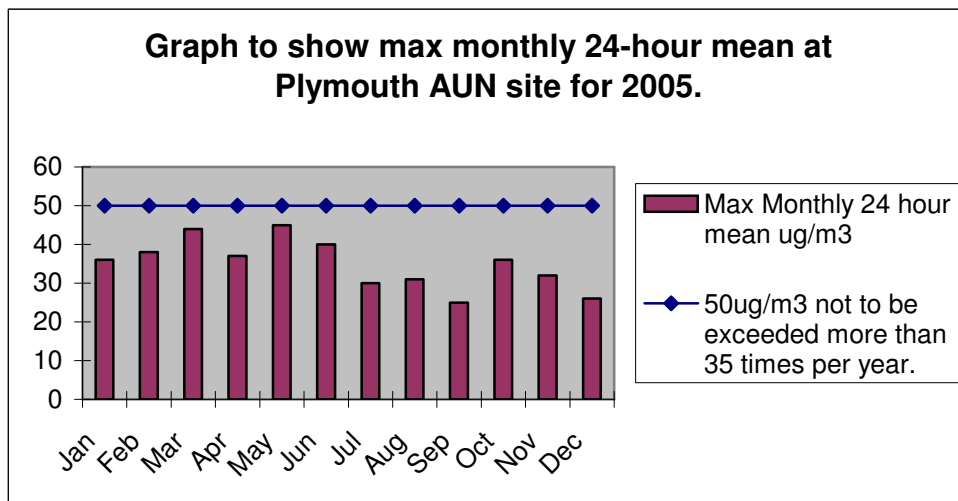
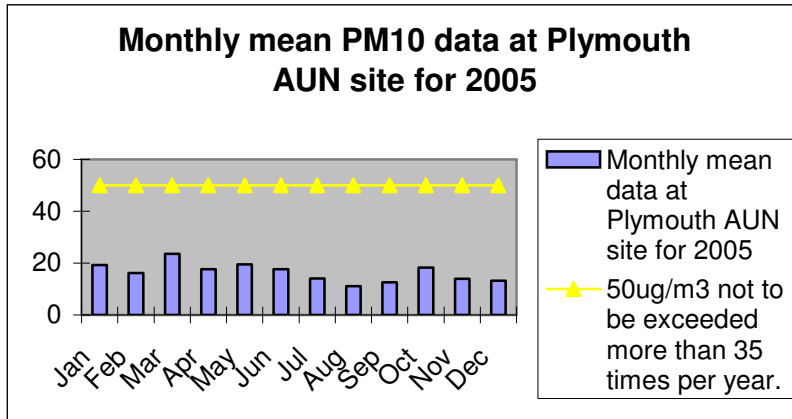


Figure 8.2: Graph to show the PM₁₀ monthly mean data for the Plymouth AUN site.



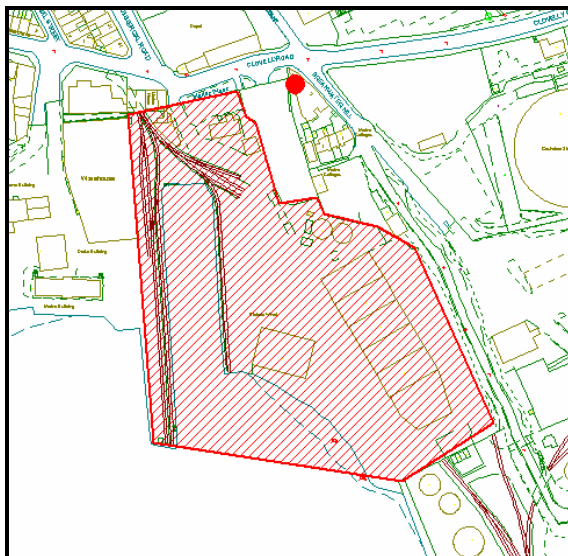
The annual mean level of PM₁₀ at Plymouth AUN site in 2005 was 16.42µg/m³, which is well below the objective of 40µg/m³. In 2005 there were no exceedences of the 50µg/m³ 24 hour mean objective.

8.1.1 Victoria Wharves.

Victoria Wharves is a commercial port, which primarily deals with the loading and unloading of China Clay product. The Wharves have been in operation for a significant period of time and is located in a relatively commercial area. However, there are a number of properties located within close proximity, the closest being 77 metres from the dockside which are the source of a number of dust complaints about the activities at the port.

Monitoring has been underway at Victoria Wharves since October 2003 using a sequential Partisol Sampler. A map to show the location of the site is shown in Figure 8.3.

Figure 8.3 Location of the Partisol sampler at the relevant exposure location adjacent to Victoria Wharves.



Details of the QA/QC procedures are included in Appendix 1. During 2004 there were a number of breakdowns associated with the equipment which resulted in a significant loss of data. The equipment was eventually replaced in June 2005, but once again it has made it difficult to assess the data against the number of exceedences per annum and the annual mean figure. Complaints continue to be received about the loading activities at the port, and statutory nuisance action has been taken, resulting in a number of presecutions for breaching an abatement notice. Results and amount of data loss from the Partisol 2025, since it was installed are shown in Table 8.2.

Table 8.2: Annual exceedences and mean figures for the Partisol at Victoria Wharves.

Year of monitoring	Annual Mean figure $\mu\text{g}/\text{m}^3$	Number of exceedences of 24 hour average	Number of days of lost data
2003 (Oct-Dec)	32.49	7	25
2004	25.87	18	72
2005	26.63	15	100

The results indicate that the annual mean objective has been met for each year and that the number of exceedences of the 24-hour objective has not exceeded the limit 35. However due to the considerable amount of data loss monitoring will continue to assess the situation further.

Questions

For 2004 objectives:

Are there more than 35 predicted 24-hour exceedences of $50\mu\text{g}/\text{m}^3$ (or is the 90th percentile greater than $50\mu\text{g}/\text{m}^3$)?

Action

No

8.2 B: Monitoring data within an AQMA.

This section is not applicable as there is currently no AQMA for PM_{10} within Plymouth.

8.3 C: Busy roads and junctions in Scotland

This section is not applicable to Plymouth.

8.4 D: Junctions

There are a number of junctions within Plymouth that have been considered during previous rounds of the review and assessment process. From local knowledge and traffic data provided by the transport department, there are no further junctions that need consideration. Therefore there is no need to proceed further with this part.

8.5 E: Roads with high flow of buses and HGV's

From analysis of recent traffic data and local knowledge it has been determined that there are no streets in Plymouth where this would apply. There are no roads with over 20% buses or HGV's within Plymouth. Consequently, no further consideration of this part is required.

8.6 F: New roads constructed or proposed since the previous round of review and assessment.

There have been no new roads constructed or proposed since the previous round of the review and assessment. Therefore there is no need to proceed further with this section.

8.7 G: Roads with significantly changed traffic flows, or new relevant exposure.

Having analysed recent traffic data, there are no roads within Plymouth with an increase of traffic flow of more than 25%. Therefore there is no need to proceed with this section further.

8.8 H: Roads close to the objective during the second round of Review and Assessment.

A number of roads have been considered previously. There were no roads identified where between 25 and 35 days of the 24 hour exceedence were predicted at relevant locations. The highest predicted concentration from previous investigations was $20.55\mu\text{g}/\text{m}^3$. The revised background PM_{10} maps were checked and it was found that the levels had decreased. Therefore there is no need to progress with this section further.

8.9 I: New industrial sources

A number of processes were identified that have been authorised since the last review and assessment. Reference was made to the checklist provided in Appendix E of LAQM.TG(03) and these processes were found not to be considered significant in terms of their air quality impact.

The only processes of concern were the proposed extension to the quarry, and the new proposal for a gas fired power station within the neighbouring council. Extensive modeling has been carried out for the power station and it suggests that this is not expected to increase the background levels of PM_{10} significantly.

With regard to the quarry, LAQM.TG(03) was followed with regard to the background concentrations and the distance to the closest receptor, and the site was not considered to require a detailed assessment.

8.10 J: Industrial sources with substantially increased emissions, or new relevant exposure.

There are no industrial sources within Plymouth, or close to the boundary, with an increase in emissions greater than 30%. Consequently there is no need to proceed further with this section.

8.11 K: Areas of domestic solid fuel burning.

For the updating and screening assessment in 2003, a comprehensive investigation was carried out over a 500m x 500m area where significant coal burning still takes place. The results showed that there were significantly less than 100 houses using wood or coal as their main fuel. The situation since this investigation has not changed and therefore there is no need to progress with this section further.

8.12 L: Quarries, landfill sites, open cast coal, handling of dusty cargoes at ports, etc

There were a number of sites identified in previous rounds of the review and assessment process that fell into this category. Plymouth has a landfill site, quarry and ports handling dusty cargoes. However when they were investigated further it was found that the landfill and quarry were not likely to be an issue.

There is a proposed extension to the quarry, however, LAQM.TG(03) was followed with regard to the background concentrations and the distance to the closest receptor, and the site was not considered to require a detailed assessment.

The situation with the port has been discussed previously in section A.

Question

Are there recent complaints about dust?

Does visual inspection indicate significant dust?

Action

No

8.13 M: Aircraft.

Plymouth Airport was considered during the initial updating and screening assessment in 2003. In 2000 there were only 113,167 passengers and 83,000 tonnes of freight lifted at Plymouth Airport. It is not expected that these figures will have increased significantly and with the loss of one of the airlines, Airwales, the predicted annual throughput is well below 5 million passengers per year. Consequently there is no need to proceed with this section further.

8.14: Conclusion

Conclusion

Monitoring will continue at Victoria Wharves to assess the number of exceedences of the 24 hour average and to gain comprehensive data. New equipment has been installed which should overcome the problems of data loss.

No other significant changes with regard to PM₁₀ emissions in this authority and as such a detailed assessment will not be required.

Appendix 1: Quality Assurance and Control Measures

Nitrogen Dioxide Diffusion Tubes

Where NO₂ is monitored using diffusion tubes, the standard method recommended by NETCEN and the analytical laboratory undertaking analysis (Gradko) is followed. Gradko are a fully accredited establishment and supply tubes to many local authorities.

NO₂ diffusion tubes are clear plastic tubes, with one open end and a closed end containing a NO₂ absorbing chemical matrix (triethanoamine). The type of tubes used are 20% TEA in water. The open end is sealed with a plastic cap before it is transported to the monitoring location. At the site the cap is removed and the tube is mounted vertically with the open end at the bottom.

The interval between preparation and deployment is kept to a minimum. During storage the tubes are kept in a sealed plastic bag in the refrigerator. A blank tube is sent which remains in the sealed bag during the monitoring period and is returned with the rest of the tubes to the laboratory for analysis.

Monitoring sites were identified upon relevant exposure or those that were considered to be representative of a relevant exposure location. The tubes were mounted mostly on drainpipes. Ideally, the tubes should be mounted on to spacer blocks and not attached directly to any surface. Tubes, however, are prone to theft and are, therefore, attached using strong tape above head height. The tubes are exposed for a period of four weeks and the exposure time noted in hours.

Quality assurance is given by participation in the Working Sampling Proficiency Programme (WASP). These tests provide a regular independent check on the calibration. Gradko also participate in the Field Intercomparison Tube Survey carried out by NETCEN where diffusion tubes are co-located against an AUN site. This gives a bias adjustment factor A of 0.82±0.1. When this is compared to the bias adjustment factor calculated using the co-location study at Plymouth AUN site a good correlation is found.

The analytical lab used was Gradko International Ltd., St Martins House, 77 Wales Street, Winchester, Hampshire SO23 0RH.

Benzene Diffusion Tubes

Benzene diffusion tubes are supplied by Gradko. Analysis is carried out using gas chromatography/ Thermal desorption techniques. Standard solutions are prepared covering the concentration range 10-2000ng and there is an uptake rate of 1.28ng per ppm per minute.

The exposed tubes are thermally desorbed and the vapour phase transferred to a gas chromatography system. Calibration determinations are made for every batch of tubes analysed.

Results are issued in parts per billion and are then converted to µg/m³. The interval between preparation and deployment is kept to a minimum and after tubes are dispatched they are stored within the refrigerator until deployment to

site. A blank tube has now commenced with a tube being left within the refrigerator for the exposure period and returned with the tubes after exposure.

Monitoring locations have been chosen to represent relevant exposure locations to represent the annual mean concentration, although the accuracy of the tubes may be +/-25%. When the tubes are placed out at the monitoring locations, the red cap is removed and a filter is placed on the end of the tube. The tubes are left for 4 weeks and when collected, the filter is removed and the cap is placed on the tube. The tubes are then sent away to the laboratory for analysis.

Quality assurance is given by the participation in the WASP scheme. The analytical laboratory take part in the Workplace Analysis Scheme for Proficiency (WASP) run by the UK Health and Safety Laboratories. Samples of BTEX loaded tubes are sent to each laboratory three times per year for analysis.

The laboratory methods and procedures used for this analysis form part of the Quality Management Systems which has been written to comply with the requirement of UKAS.

Pumped Benzene Diffusion Tube.

The National Physics Laboratory co-ordinate a national survey, that Plymouth participate in. The pumped sampler for the national survey is located at the AUN site, in Armada Way, and is considered an urban background site. Benzene tubes are provided fortnightly and the local site operator changes the tubes, checks and adjusts the flow rate accordingly. All procedures in the manual provided by NPL are followed.

NPL audit the sampler every six months to check that the box is not leaking, measure the flow through the two tubes and correct it if it is more than 10% out. If the flow is greater than 10% out then the data is scaled accordingly. The absorbent is carbopack x. The uptake rate does not apply due to it being a pumped sampler.

A second NPL sampler has been installed at Holy Cross School, and is exactly the same equipment as above. All procedures are followed in an identical manner, and are analysed in the same way.

AUN Network

Monitoring data obtained from Plymouth City Council's automatic monitoring site in Armada Way is affiliated to the DEFRA's AUN network. As such it follows all QA/QC procedures set out in the local site operators manual. Daily internal calibrations are conducted as well as fortnightly calibrations to check equipment performance and internal instrument parameters. Provisionally scaled data is available on the internet. Performance audits and inter calibrations are additionally conducted by agencies appointed by the DEFRA.

The data is ratified every 6 months by NETCEN, and is reported every 6 months in the QA/QC Data Ratification Report for the Automatic Urban Network. This is, a report produced for the Department for Environment, Food and Rural Affairs, Scottish Executive, Welsh Assembly Government and the DoE in Northern Ireland.

NO₂ chemiluminescent monitor

Monitoring at the location of Mutley Plain is not linked to any particular network. However, procedures have been written to ensure a calibration is carried out two weekly at the site. The data is due to be loaded in to a software programme at the main office via a modem but due to difficulties this has yet to be done. The data has been collected to date from Eti head office and sent via e-mail to the Civic Centre. The data is examined for any spurious results or anomalies, and these are removed. The results have been averaged over 24 hours and calculated as monthly mean figures.

Routine site visits are carried out to maximise data capture and integrity of data. These operations include:-

- Ensuring the proper running of the equipment
- Performing instrument calibrations and diagnostic checks
- Minimising instrument down time by anticipating problems prior to them occurring
- Carrying out essential routine functions such as filter changes
- Performing checks of the automatic calibration system.

To enable the data to be scaled, it is necessary to calibrate the equipment using a gas mixture of known concentration. Calibrations are conducted as a daily automatic calibration and as a two weekly manual calibration. These are carried out in accordance with the manual provided by the manufacturer.

An ongoing maintenance contract is in place with Casella Eti, the supplier of the equipment, and it is intended to visit the site six monthly to service the equipment. However, as the equipment is new and still undergoing work to download the data, visits are occurring more regularly at the current time. The service contract also covers attendance at site in the event of a breakdown.

Data capture has not been assessed at the moment due to missing data for the first few weeks of monitoring, and the inability at the current time to connect with the monitor on a daily basis. This is currently a subject of discussion between the supplier and the council, but will be resolved at the earliest opportunity.

Gravimetric Partisol Monitor

The Partisol has a filter that is exposed to the air for a period of 24 hours and at midnight the filter changes to allow the next 24-hour monitoring to commence. This allows a direct comparison to be made with the 24 hour average objective of 50µg/m³. In addition, an annual mean figure can be calculated from the results.

Filters are supplied preconditioned by Advance Environmental, at Exeter University, and are returned to them for analysis. Filters, each with a unique identification number, were conditioned at approximately 20°C (+/- 1 C) and 50% relative humidity for 48 hours before weighing. This procedure was followed both prior to and after deployment to site and was undertaken in order to both minimise the effect of retained moisture on the filter and allow equilibration with laboratory conditions. This permitted the mass concentration to be calculated for each sample. All data was blank corrected.

External calibration of the Sartorius R180D analytical balance is undertaken annually (current certificate number 104859483), whilst internal calibration was undertaken prior to weighing.