



2011 Air Quality Progress Report for Wrexham County Borough Council

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

March 2011

Executive Summary

This Progress Report has considered the seven health based Air Quality objectives as laid down in regulations and whether these levels will or are being breached. If these levels are exceeded a detailed assessment will be required.

Having considered each pollutant and presented evidence to support the assessment of each, it has been concluded that all the Air Quality objectives will be met. There is no requirement for Wrexham County Borough Council (WCBC) to undertake a detailed assessment.

WCBC will continue to maintain its monitoring program to confirm the findings of this report, additionally the diffusion tube co-location study at the Victoria Road network Air Quality station will continue. However, due to budgetary constraints the Isycoed Monitoring Station will be discontinued at the start of 2012.

Summary table:

Objectives	Detailed Assessment Required
Benzene	No
1,3-butadiene	No
Carbon Monoxide	No
Lead	No
Nitrogen Dioxide	No
PM ₁₀	No
Sulphur Dioxide	No

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1 Introduction

1.1 Description of Local Authority Area

Wrexham County Borough is situated in Northeast Wales. Bounded by the Clwydian Hills to the west and the Shropshire and Powys countryside to the south. Approximately 70% of the County Borough could be properly described as rural where agriculture is the predominant land use. Wrexham is bordered by the Welsh unitary authorities of Flintshire, Denbighshire and Powys, and to the north and east by Chester West and Chester Council, and Shropshire County Council. Wrexham County Borough's total population (as at 2007) is estimated to be 131,900. Over 80% of people live within defined urban areas, in the centre of Wrexham itself and in the surrounding urban villages. The major road running north to south through the County Borough is the A483.

Wrexham County Borough has several Industrial Estates within its borders the largest of which is located 5 miles to the east of the main town area and contains approximately 220 businesses of which 20 hold either a Local Authority or Environment Agency Environmental Permit.

Wrexham County Borough Council has not needed to declare any Air Quality Management Areas to date.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, 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 Wales.

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Maximum daily running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
Particles (PM₁₀) (gravimetric)	50 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g}/\text{m}^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

The table below is a summary of Wrexham County Borough Councils previous rounds of Air Quality assessment along with whether a detailed assessment was required. The text following the table provides further details of the reports prepared by the Council.

Table 1 – Summary of previous rounds of Review and Assessment

Report	Year Produced	Conclusions
First stage	1999	Proceed to a Stage 2 assessment for NO ₂ and PM ₁₀
Second Stage	2000	Proceed to a Stage 3 assessment for SO ₂ and PM ₁₀
Third Stage	2001	Elevated particulate levels were likely in a coal burning village (Llay). Implement an AQMA plan
	2002	Air quality plan devised and completed for Llay bringing the levels of PM ₁₀ within standards
Updating and Screening Assessment and Addendum	2003	Air quality objectives have been met.
Progress report	2004	Air quality objectives have been met.
Progress report	2005	Air quality objectives have been met.
Updating and Screening Assessment	2006	Air quality objectives have been met.
Progress report	2007	Air quality objectives have been met.
Progress report	2008	Air quality objectives have been met.
Updating and Screening Assessment	2009	Air quality objectives have been met.
Progress report	2010	Air quality objectives have been met.

The **first stage** of review and assessment was carried out in 1999 / 2000 and made the following recommendation:

This report has identified two pollutants, particulates (PM₁₀) and Nitrogen Dioxide (NO₂), which may not meet the Air Quality standards adopted by the Government. It is therefore necessary to carry out a stage 2 review and assessment. This will include the collation of data with regard to traffic emissions and further monitoring of particulates (PM₁₀) and Nitrogen dioxide. The current air quality monitoring carried out as part of Wrexham County Borough Council's Air Quality Strategy will continue and will be expanded in those areas where further monitoring is required. The methodology will be described within the scope of the second stage review and assessment.

Based on the recommendations of the first round of review and assessment Wrexham County Borough Council proceeded to the **second stage** of review and assessment, which presented the following conclusion:

The Stage 2 assessment has indicated that background air quality will improve up to 2005 throughout the County Borough. The review and assessment process has demonstrated that the predicted emissions from traffic growth have a limited impact on air quality within Wrexham over the next three years. The predictions were carried out to determine a worst case situation. The exceedence of the PM₁₀ and the NO₂ objective from road sources is unlikely at any relevant location. This situation will continue to be reviewed annually as part of the air quality strategy and in the event of any proposed major new development. However, it is recognised that future increased traffic growth may challenge air quality in Wales and the rest of the UK and therefore this situation will need ongoing review. The local sources of pollutants for PM₁₀, and SO₂ which are considered to require a Stage 3 assessment are not expected to give rise to an exceedence of the air quality objective by 2004 / 2005.

The stage two review and assessment commented that there was insufficient monitoring data to be confident that the Air Quality Objectives would not be breached for PM₁₀ and Sulphur Dioxide (SO₂). Hence Wrexham County Borough Council proceeded to the **third stage** of Review and assessment, which made the following conclusion:

The Stage 3 Assessment has indicated elevated particulate emissions from local domestic coal burning in the village of Llay. The results of the investigation indicate that the air quality standard and objective for particulate emissions in Llay may be exceeded.

The Public Protection Service of Wrexham County Borough Council will recommend the declaration of an Air Quality Management Area for Llay. This will include the production of a Stage 4 Report and the implementation of an Air Quality Action Plan during 2002.

An Air Quality Action Plan was implemented in 2003, which introduced a gas supply into the village of Llay. This had the effect of lowering the PM₁₀ levels in the village and bringing them within the national guideline levels. This removed the need to declare an Air Quality Management Area in Llay, as it was completed prior to the objective date.

The **Updating and Screening Assessment** and addendum completed in 2004 concluded:

Results of the screening assessment have shown that no detailed assessment is required with respect to emissions arising from all sources assessed - predictions of air quality in relevant future years indicate that the current air quality objectives will be met at all receptors in Wrexham County Borough.

The USA also stated that:

WCBC will continue with its monitoring programme to confirm the findings of this report. Further work will be undertaken with respect to the performance of diffusion tubes through the use of triplicate tubes at the continuous roadside-monitoring site.

The **Progress Report** completed in 2005 concluded:

That there has not been any change in local circumstances to indicate a possible exceedence of the air quality standards and objectives.

The introduction of a domestic gas supply into the coal-burning region of Llay has had the effect of reducing the PM₁₀ levels, and as a result has improved the Air Quality in the village.

The Updating and Screening Assessment (USA) completed in 2006 concluded that:

No detailed assessment is required with respect to any of the pollutants identified in the Air Quality Strategy and predictions for future years indicate that the Air Quality objectives will be met at all locations in Wrexham County Borough Council.

That there has not been any change in local circumstances to indicate a possible exceedence of the air quality standards and objectives.

That potential changes in local circumstances will most likely relate to increases in traffic (e.g. as a result on increased housing development) at sensitive locations.

The Progress Report completed in 2007 concluded that:

That there has not been any change in local circumstances to indicate a possible exceedence of the air quality standards and objectives.

The Progress Report completed in 2008 also concluded that there has not been a change in local circumstances, which may indicate a possible exceedence.

The Updating and Screening Assessment completed in 2009 which reviewed the County Borough as a whole paying particular attention any new developments that could impact on Air Quality. There were no new or existing areas that were identified as having a detrimental impact on the Air Quality of the County Borough

The last air quality report completed by Wrexham County Borough Council was the Progress Report completed in 2010 and concluded the following:

Wrexham County Borough Council has examined the results from its monitoring in the borough during 2009. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment for any of the pollutants.

As part of its ongoing Air Quality Strategy, Wrexham County Borough Council proposed the following actions:

Neither the monitoring carried out in Wrexham County Borough nor did the consideration of other sources identify an exceedence or a likely exceedence of the Air Quality Objectives. There is no requirement for Wrexham County Borough Council to proceed to a detailed assessment for any of the pollutants.

As part of its Air Quality Strategy, Wrexham County Borough Council will maintain its monitoring program to which new monitoring sites will be added as the need is identified. Wrexham County Borough Council will also continue with its co-location study in order to correct its diffusion tubes and upload the results of this co-location study to the national monitoring spreadsheet.

It is planned that during 2010 Wrexham County Borough will undertake a comprehensive review of its existing diffusion tube network. Details of this review will be published as part of the 2011 Progress Report.

The above reports can be accessed at Wrexham County Borough Councils website http://www.wrexham.gov.uk/english/environment/air_quality/index.htm

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Wrexham County Borough Council maintained two automatic monitoring sites within the Borough during 2010:

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 ?
Victoria Road	Roadside	X 349900 Y 332900	NO _x , SO ₂ PM ₁₀ , PM _{2.5}	n/a	Y (20m)	5m	Y
Wrexham Isycoed	Urban Industrial	X 350260 Y 340355	NO _x , SO ₂ & PM ₁₀	n/a	Y (30m)	n/a	Y

Pollutants key:

NO_x = Oxides of Nitrogen, which is a combination of Nitrogen Oxide (NO) and Nitrogen Dioxide (NO₂).

SO₂ = Sulphur Dioxide

PM₁₀ = Particulate matter with a diameter of 10 µm (microns. 1 µm is equal to 1 millionth of a metre)

PM_{2.5} = Particulate matter with a diameter of 2.5 µm (microns. 1 µm is equal to 1 millionth of a metre)

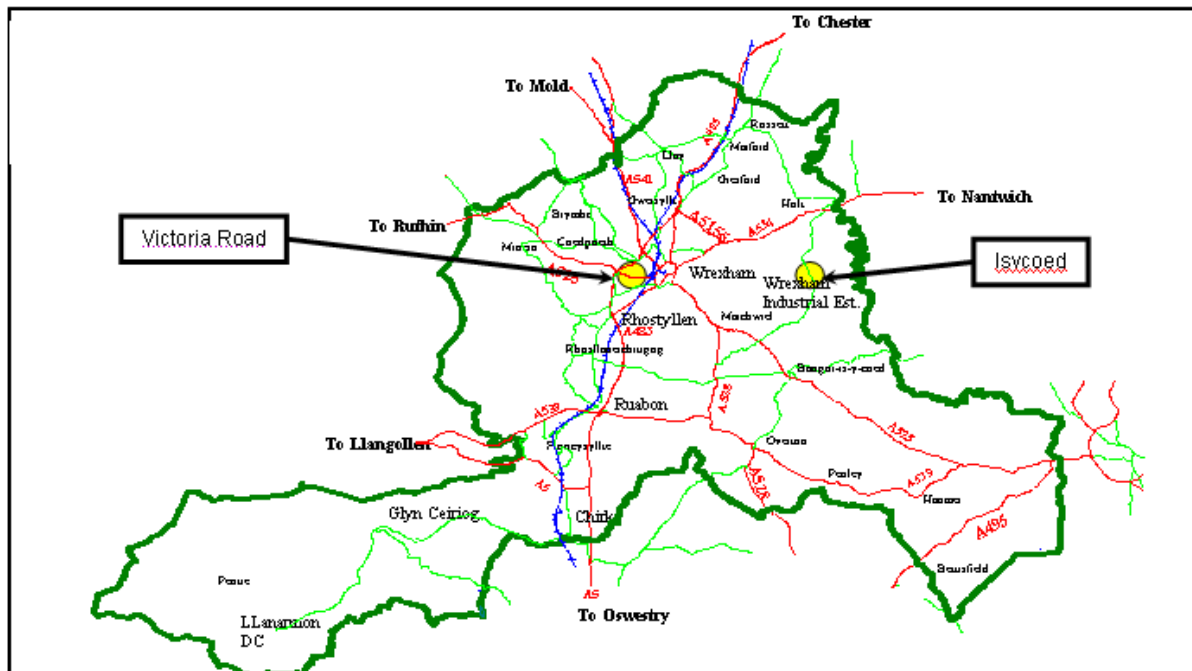
Further details of the Victoria Road and Wrexham Isycoed sites can be found at: www.welshairquality.co.uk.

The Victoria Road station has been operating since March 2003, with PM_{2.5} monitoring starting in December 2009. It is part of the Automatic Urban and Rural Network (AURN) of stations in the UK, hence the Quality Assurance / Quality Control (QA/QC) of the data is carried out by AEA Technology and Bureau Veritas, who are the environmental consultants contracted by Defra and the Welsh Assembly Government (WAG) to provide this service. These two companies are also responsible for arranging the annual site audit and six monthly service visits. Both the PM₁₀ and PM_{2.5} monitor's are Partisol daily gravimetric analyser and therefore the data is not subject to any corrections. WCBC maintains an NO₂ diffusion tube co-location study at this station. The station is located in a car park on the opposite side of the road to the Victoria Road Infants School. So where the above table indicates that it is 20 meters way from the school, it can be taken that the same levels of Nitrogen Dioxide, Sulphur Dioxide and Particulate Matter (10 & 2.5µm) will be experienced at both the School and the Air Quality Station.

The Wrexham Isycoed site has been operating since January 2006 and is located within the school grounds at Isycoed (the nearest school building is 30 meters away). The site is near to the main Industrial Estate in Wrexham. It is part of the Welsh Air

Quality Forums (WAQF) network of sites and hence QA/QC of the data is undertaken by AEA as part of their contract with the WAQF. The station is calibrated annually and service every six months by SupportingU. This station also includes weather monitoring equipment to allow better analysis of any pollution events which may occur. As is the case with the Victoria Road station, the PM₁₀ monitor is a Partisol daily gravimetric analyser and therefore the data is not subject to any corrections. Due to budgetary constraints this station will be discontinued at the start of 2012.

Figure 2.1 Map(s) of Automatic Monitoring Sites (if applicable)



2.1.2 Non-Automatic Monitoring Sites

At the start of 2010 Wrexham County Borough Council undertook a comprehensive evaluation of its diffusion tube network which:

- 1) Identified new areas within the County Borough to monitor for Nitrogen Dioxide based on perceived traffic flows. These were:
 - 1 – Acrefair
 - 2 – Coed Poeth
 - 3 – Gwersyllt
 - 4 – Rossett
- 2) Identified areas where monitoring was no longer required based on historical information for both Nitrogen Dioxide and Benzene:
 - 1) Chester Street (Nitrogen Dioxide)
 - 2) Redwither Tower – Wrexham industrial Estate (Nitrogen Dioxide)
 - 3) Plas Madoc housing estate (Nitrogen Dioxide)
 - 4) Grosvenor road (Benzene)
- 3) Removed all Sulphur Dioxide diffusion tubes as the data provided did not relate to the Air Quality Standards
- 4) Removed the Ozone diffusion tube tubes as the data provided did not relate to the Air Quality Standards.

The above review left Wrexham County Borough Council with a diffusion tube network of 18 tubes, which consists of 17 Nitrogen Dioxide tubes and 1 Benzene tube:

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 ?
Grosvenor Rd, Wrexham	Roadside	X 350600 Y 333200	NO ₂	n/a	N	5m	Y
Ceiriog School, Chirk	Suburban	X 338300 Y 329300	NO ₂	n/a	Y (25) (60)	2m	Y
Gardden View, Ruabon	Roadside	X 344600 Y 330300	NO ₂	n/a	Y (15)	7m	Y
Hugmore Lane, Wrexham Industrial Estate	Roadside	X 351800 Y 337700	NO ₂	n/a	Y (15)	2m	Y
Old Farm Rd, Rhostyllen	Roadside	X 349000 Y 332000	NO ₂	n/a	Y (40)	2m	Y
Mold Rd, Wrexham	Roadside	X 351000 Y 332600	NO ₂	n/a	Y (30)	7m	Y
Chester Rd, Wrexham	Intermediate	X 352900 Y 333700	NO ₂	n/a	Y (16)	3m	Y
Holt Rd, Wrexham	Roadside	X 350700 Y 334100	NO ₂	n/a	Y (30)	2m	Y
Holyhead Rd, Chirk	Intermediate	X 338700 Y 328900	NO ₂	n/a	Y (55) (30)	30m	Y
The Sycamores, Chester Road	Roadside	X 353222 Y 333887	NO ₂	n/a	Y (25)	n/a	Y
Rhostyllen Roundabout, Wrexham (A483)	Roadside	X 348170 Y 330950	NO ₂	n/a	Y (35)	4m	Y
Bus Station, Wrexham	Roadside	X 350590 Y 333350	NO ₂	n/a	N	2m	Y
Smithfield Road	Roadside	X 333981 Y 350171	NO ₂	n/a	Y (4)	1m	Y
Coed Poeth	Roadside	X 329017 Y 351002	NO ₂	n/a	Y (8)	9m	Y
Acrefair	Roadside	X 327630 Y 342990	NO ₂	n/a	Y (2)	2m	Y
Gwersyllt	Roadside	X 332097 Y 352665	NO ₂	n/a	Y (17)	4m	Y
Rossett	Roadside	X 336635 Y 357211	NO ₂	n/a	Y(7)	3m	Y
Llwyneinion Rd Rhosllanerchrugog	Urban Background	X 347400 Y 328700	C ₆ H ₆	n/a	N	n/a	n/a

The diffusion tubes used by Wrexham County Borough Council are supplied by Environmental Services Group (ESG) who use the 20% Trietholamine (TEA) in water method of preparation for the Nitrogen Dioxide tubes. ESG have also stated that they follow the methods set out in the Harmonisation Practical Guidance. ESG also took part in the Workplace Analysis Scheme for Proficiency (WASP) scheme for 2010

where they were they achieved a result of good for both the 'old' and 'new' criteria (source <http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>).

Since 2004 Wrexham County Borough Council carried out its own co-location study at the Victoria Road AURN station. Where reporting time has allowed, the results of this study have been uploaded onto the Review and Assessment helpdesk spreadsheet. This website has given a Bias Adjustment Factor (BAF) of 0.84 as an average for the ten co-location studies submitted for 2010. It is this value that has been applied to the Nitrogen Dioxide diffusion tubes that Wrexham County Borough Council used in 2010.

Appendix A shows details of Wrexham County Borough Councils Co-Location study and laboratory details.

The table below discusses the locations of the diffusion tubes in relation to sensitive receptors.

Table 2.2a Details of Non- Automatic Monitoring Sites and sensitive Receptors

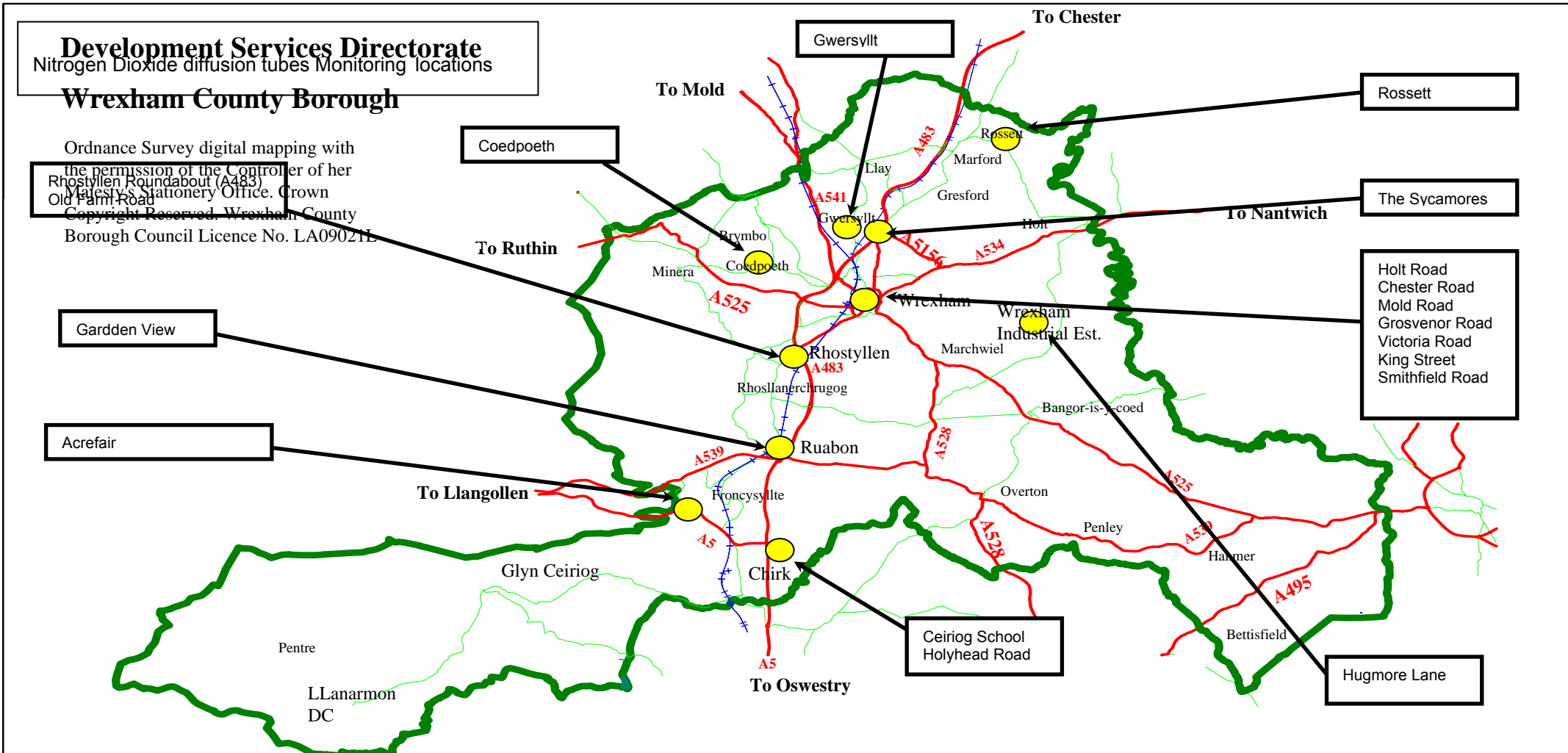
Site Name	Site Type	Pollutants Monitored	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Comments
Grosvenor Rd, Wrexham	Roadside	NO ₂	N	A busy road during the rush hours though contains no sensitive receptors. Monitoring undertaken for comparative purposes and in the event of a planning application for a sensitive receptor.
Ceiriog School, Chirk	Suburban	NO ₂	Y (25)	The diffusion tube is located on a roadside near the school, though the closet receptor is on the opposite side of the road 25 metres from the tube. The School building is 60 metres away and the playing fields some 30 metres away from the tubes location. The tubes is located an equivalent distance back from the roadside as the domestic property is on the opposite side of the road.
Gardden View, Ruabon	Roadside	NO ₂	Y (15)	The diffusion tube is located on the side of the main road approaching the village.
Hugmore Lane, Wrexham Industrial Estate	Roadside	NO ₂	Y (15)	This is one of the main roads onto the Wrexham Industrial Estate and hence experiences large volumes of traffic. The tube is located at the boundary of a residential properties garden.
Old Farm Rd, Rhostyllen	Roadside	NO ₂	Y (40)	The diffusion tube is located on the side of the main road through the village.
Mold Rd, Wrexham	Roadside	NO ₂	Y (30)	The diffusion tube is located at the boundary of the car park for the university. This is one of the main access roads into the town of Wrexham.
Chester Rd, Wrexham	Intermediate	NO ₂	Y (16)	The diffusion tube is located on the side of a main route from the A483 into Wrexham town.
Holt Rd, Wrexham	Roadside	NO ₂	Y (30)	The nearest receptor is 30 metres away from the tube on the opposite side of the road but is the same distance from the roadside as the tube is and is therefore exposed to equivalent levels
Holyhead Rd, Chirk	Intermediate	NO ₂	Y (55) (30)	The nearest receptor is 55 metres away from the tube on the opposite side of the road. Though is approximately the same distance back from the road as the diffusion tube approximately 20 meters from the roadside.

Site Name	Site Type	Pollutants Monitored	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Comments
The Sycamores, Chester Road	Roadside	NO ₂	Y (25)	The diffusion tube is located within the garden area of a block of flats that is next to a filter lane for the A483. The tube is located on the filter lane said of the property and is a useful comparator to the Chester Road diffusion tube which is 320 metres away.
Rhostyllen Roundabout, Wrexham (A483)	Roadside	NO ₂	Y (35)	Diffusion tube is on the opposite side of the road some 35 metres away from nearest receptor. Though the tube is an equivalent distance back from the roadside as the property on the other side of the road.
Bus Station, Wrexham	Roadside	NO ₂	N	Diffusion tube is located at the bus station in Wrexham town.
Smithfield Road	Roadside	NO ₂	Y (4)	The diffusion tube is located at the garden boundary of a property near the entrance/ exit to the car park at the new Eagles Meadow Arcade.
Coed Poeth	Roadside	NO ₂	Y (8)	The diffusion tube is located by the main road through the village. This site was identified during the 2010 review of the diffusion tube network as the Council holds no data on any impact from traffic through the village
Acrefair	Roadside	NO ₂	Y (2)	The diffusion tube is located at the garden boundary of a property near the main road through the village. This is a new site identified during the 2010 review of the diffusion tube network as the Council holds no data on any impact from traffic through the village
Gwersyllt	Roadside	NO ₂	Y (17)	The diffusion tube is located by one of the main rush hour routes through Wrexham. This site was identified during the 2010 review of the diffusion tube network as the Council holds no data on any impact from traffic through the village
Rossett	Roadside	NO ₂	Y(7)	The diffusion tube is located by the main road through the village. This site was identified during the 2010 review of the diffusion tube network as the Council holds no data on any impact from traffic through the village

Site Name	Site Type	Pollutants Monitored	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Comments
Llwyneinion Rd Rhosllanerchrugog	Urban Background	C ₆ H ₆	N	Diffusion tube is located near an acid tar lagoon to monitor hydrocarbon levels.

Development Services Directorate
 Nitrogen Dioxide diffusion tubes Monitoring locations
Wrexham County Borough

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2.2 Comparison of Monitoring Results with Air Quality Objectives

The following section shows the results of the monitoring or assessment undertaken by Wrexham County Borough Council in 2010 for each of the pollutants identified in the Air Quality Objectives.

2.2.1 Nitrogen Dioxide

Nitrogen Dioxide is monitored for at two automatic sites and seventeen diffusion tube sites in Wrexham County Borough.

Automatic Monitoring Data

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
				2008	2009	2010
AURN	Victoria Road	n/a	96.7	20.3	21.3	24.2
WI	Isycoed	n/a	93.1	9.8	8.8	7.8

The above trend chart shows that the levels of NO_2 recorded at the two sites have been fairly stable over the monitoring period.

Table 2.3a Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations ($\mu\text{g}/\text{m}^3$)		
						2008	2009	2010
AURN	Victoria Road	n/a	Y	96.7	96.7	20.3	21.3	24.2
WI	Isycoed	n/a	Y	93.1	93.1	9.8	8.8	7.8

Figure 2.3 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Automatic Monitoring Sites.

The chart below shows the Nitrogen Dioxide trend levels at the Victoria Road AURN and Isycoed sites.

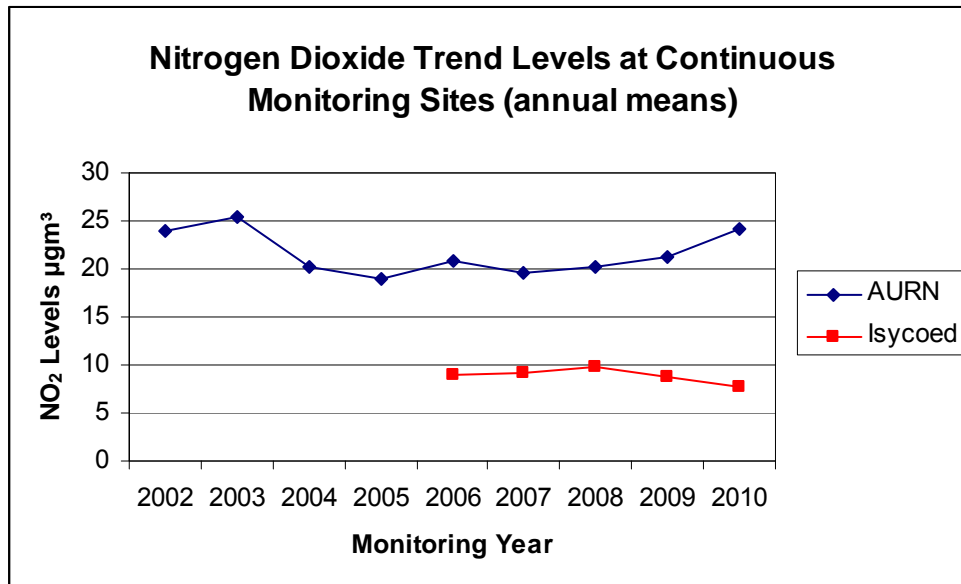


Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Relevant public exposure? Y/N	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Number of Exceedences of hourly mean (200 µg/m³)		
						2008	2009	2010
AURN	Victoria Road	n/a	Y	96.7	96.7	0	0	0
WI	Isycoed	n/a	Y	93.1	93.1	0	0	0

As the above tables and charts demonstrate the Nitrogen Dioxide levels recorded at the two automatic monitoring sites have not exceeded the objective levels and have remained fairly stable over the monitoring period.

Diffusion Tube Monitoring Data

The table below shows the results of the Nitrogen Dioxide diffusion tube monitoring program undertaken by Wrexham County Borough Council during 2010. The annual mean values quoted in the table have all been Bias Adjusted and in the case of the 2010 results a factor of 0.84 was used as this represented the average of the eight authorities who submitted their co-location results to the website (<http://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html>)

Table 2.4a Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture for monitoring period 2010 %	Data Capture for full calendar year 2010 %	Annual Mean Concentrations ($\mu\text{g}/\text{m}^3$)		
					2008	2009	2010
WBC-001	Grosvenor Road, Wrexham	n/a	91.7	91.7	33.7	35.2	37.8
WBC-010	Ceiriog School, Chirk	n/a	83.3	83.3	13.3	17.5 (18.4)	15.4
WBC-015	Gardden View, Ruabon	n/a	91.7	91.7	18.8	20.5 (21.5)	19.9
WBC-017	Hugmore Lane, Wrexham Industrial Estate	n/a	91.7	91.7	20.9	20.7	23.8
WBC-018	Old Farm Road, Rhostyllen	n/a	100	100	19.4	21.2	24.3
WBC-019	Mold Road, Wrexham	n/a	100	100	24.1	24.9	27.4
WBC-020	Chester Road, Wrexham	n/a	91.7	91.7	30.2	34.1	32.6
WBC-021	Holt Road, Wrexham	n/a	91.7	91.7	23.2	23.1	24.7
WBC-022	Holyhead Road, Chirk	n/a	91.7	91.7	15.4	19.4	21.0
WBC-028	The Sycamores, Chester Road	n/a	100	100	29.8	30.5	35.1
WBC-030	Rhostyllen Roundabout, Wrexham (A483)	n/a	100	100	28.6	27.7 (28.5)	26.3
WBC-031	Bus Station, Wrexham	n/a	100	100	34.4	35.8	28.0
WBC-033	Smithfield Road Wrexham	n/a	91.7	91.7	n/a	21.4 (23.8)	13.4
WBC-034	Coed Poeth	n/a	88.9	66.7	n/a	n/a	13.4 (12.1)
WBC-036	Acrefair	n/a	77.8	58.3	n/a	n/a	30.7 (22.4)
WBC-035	Gwersyllt	n/a	100	75	n/a	n/a	24.5 (23.8)
WBC-037	Rossett	n/a	100	75	n/a	n/a	23.9 (17.4)

Where monitoring was either not carried out for the full calendar year or fell short of nine months worth of data the values have been 'annualised' in accordance with the instructions in box 3.2 of the Technical Guidance manual LAQM.TG(09). The annualising was done by comparison with the two automatic monitoring sites located in

Wrexham. These annualised values are shown in parenthesis in the above table. Further details of the annualising procedure are provided in Appendix A, Table A2.

The complete dataset for diffusion tube monitoring undertaken by Wrexham County Borough Council during 2010 is shown in Appendix A Table A5.

The above results have been Bias Adjustment Factor (BAF) corrected using the following BAF's:

For 2008 = 0.83

For 2009 = 0.81

For 2010 = 0.84

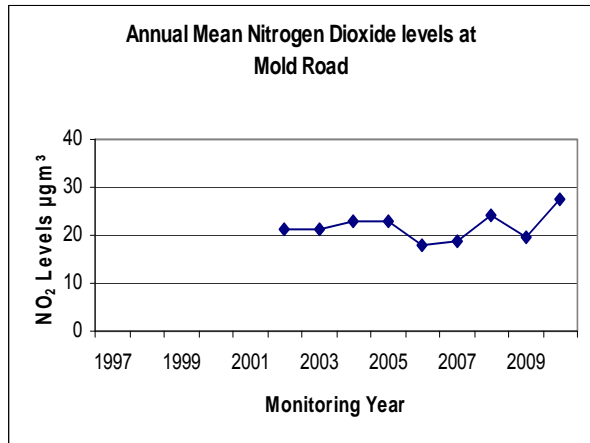
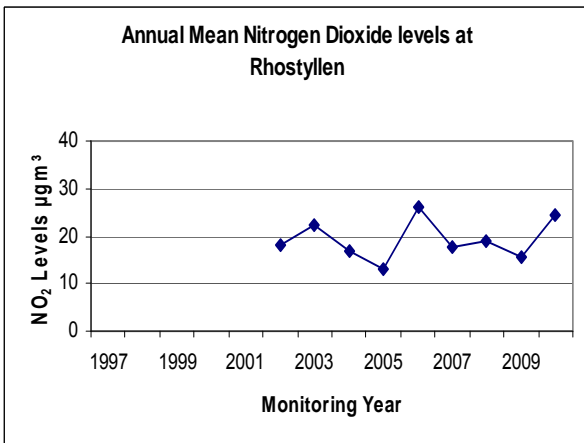
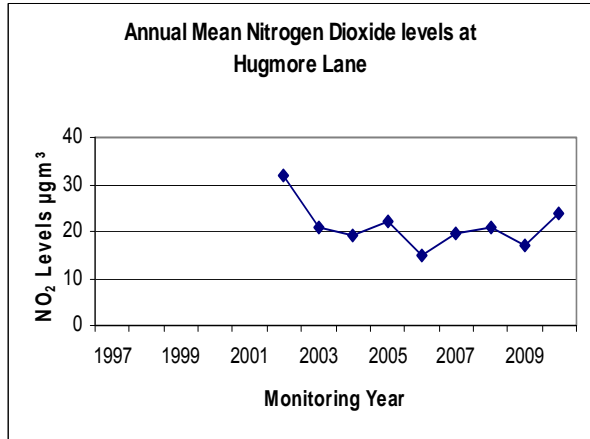
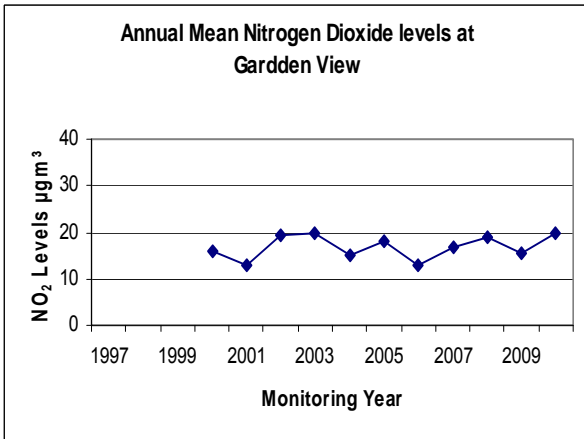
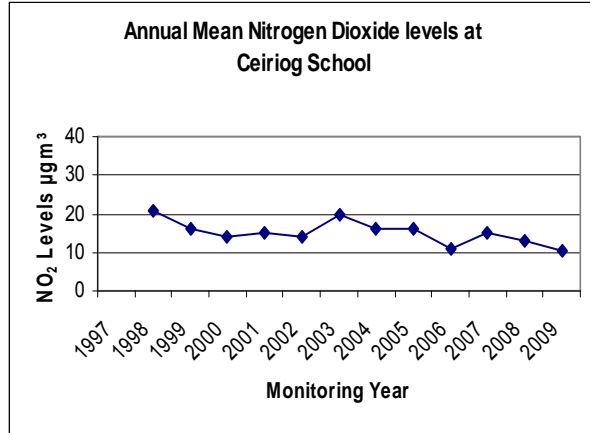
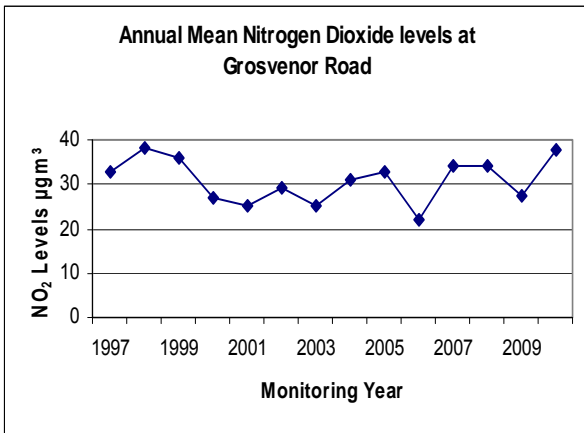
The following table shows the sites where monitoring has been undertaken for five of more years:

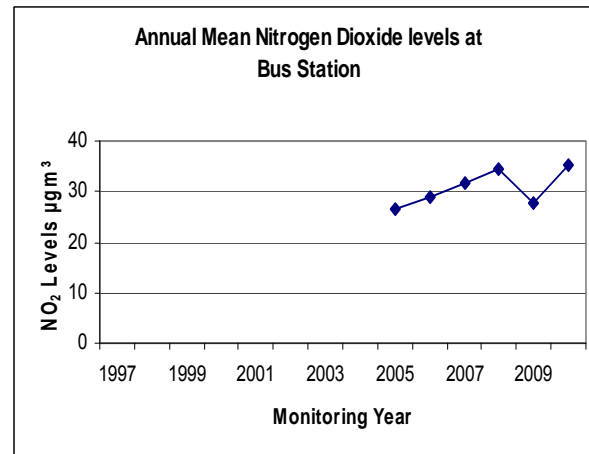
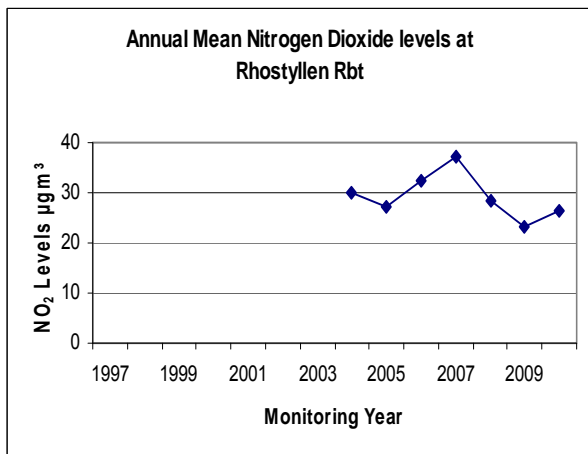
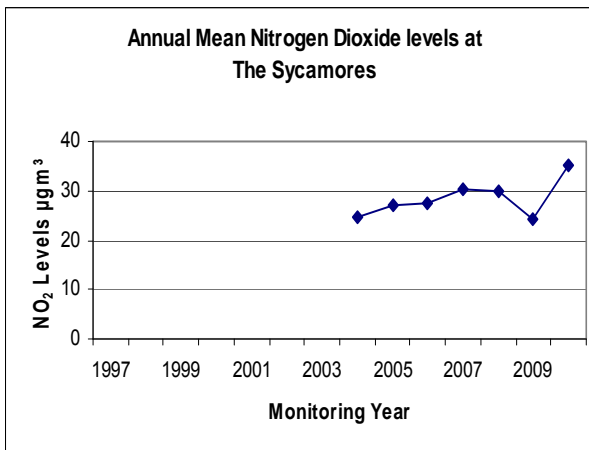
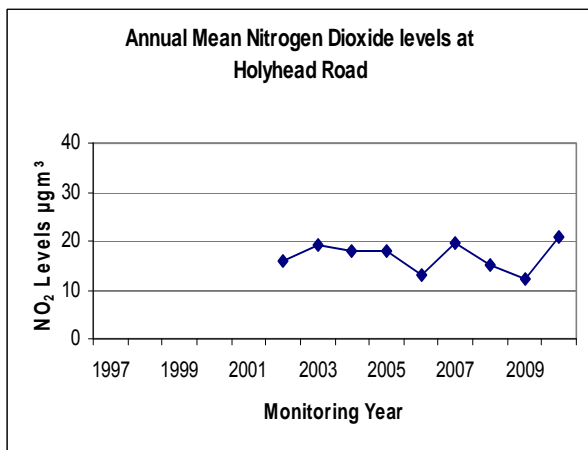
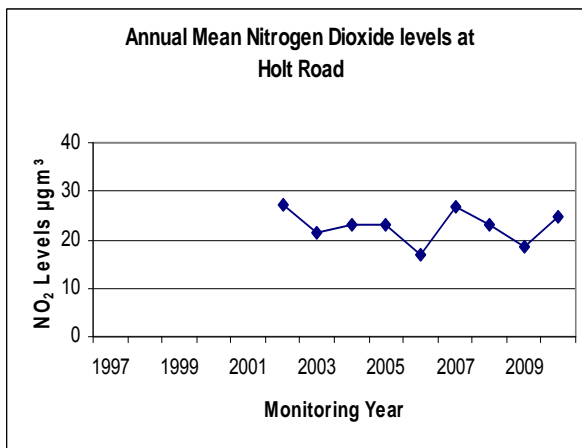
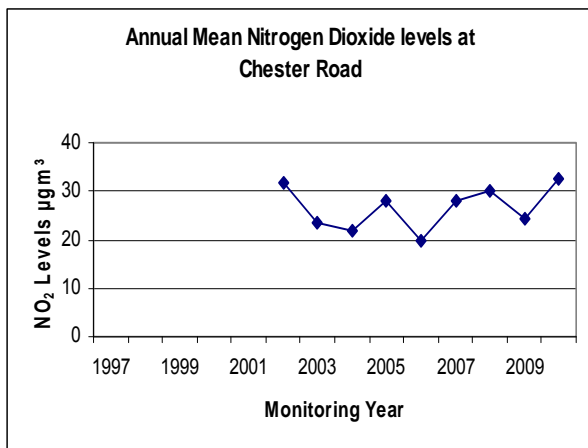
Table 2.4b Nitrogen Dioxide Diffusion tube sites with more than Five Years of Monitoring

Site	Monitoring Start Date
Grosvenor Road	May 1996
Garden View	May 2000
Plas Madoc	Jan 2002
Hugmore Lane	Jan 2002
Rhostyllen	Jan 2002
Mold Road	Jan 2002
Chester Road	Jan 2002
Holt Road	Jan 2002
Holyhead Road	Jan 2002
The Sycamores	Feb 2004
Rhostyllen Roundabout	Feb 2004
Bus Station	Nov 2004

The charts below show the overall trends for the above twelve locations:

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentration Measured at Diffusion Tube Monitoring Sites.





Each of the above charts shows a reasonable level of consistency over the monitoring period, though with the following exceptions:

- a) Ceiriog School and Hugmore lane are showing downward trends.
- b) The Sycamores and the bus station are both showing upwards trends, though neither have breached the objective levels

Each chart also shows that none of the monitoring sites have exceeded the Air Quality objectives at any point over the monitoring period. These results show that there is no need to proceed to a detailed assessment for Nitrogen Dioxide.

2.2.2 PM₁₀

Wrexham County Borough Council operated two PM₁₀ monitors during 2010. Both of which were Partisol PM₁₀ monitor's which, being gravimetric, meet the European equivalence testing requirement and therefore the data is not subject to any correction.

In addition to the above a PM_{2.5} monitor was installed at the Wrexham AURN site on Victoria Road in December 2009. PM_{2.5} is not currently included in the regulations, though some guideline objectives have been published within them, for this reason the results of the PM_{2.5} monitoring will also be included in section 2.2.5 'Other pollutants monitored'. This unit is also a Partisol gravimetric unit and like the PM₁₀ monitors is not subject to any correction.

Table 2.5a Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

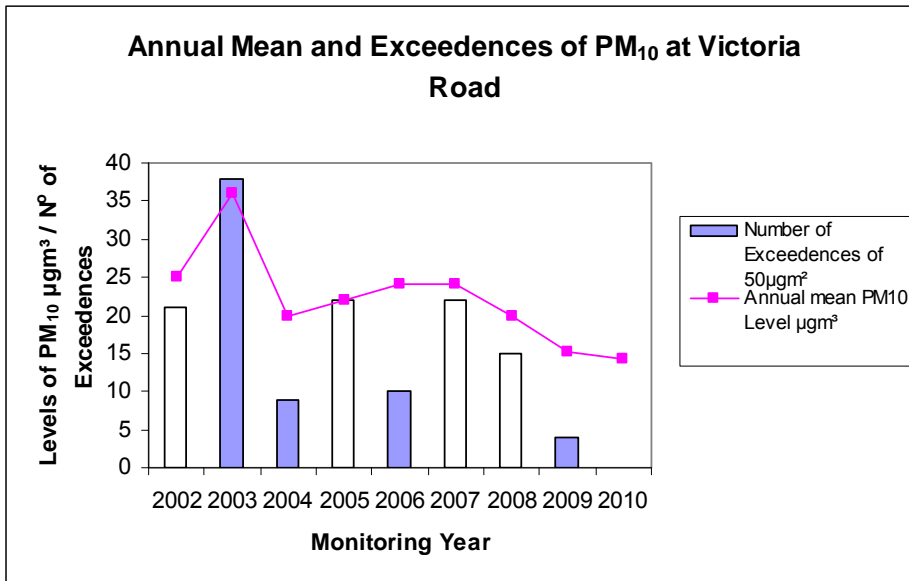
Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations (µg/m ³)		
					2008	2009	2010
AURN	Victoria Road	n/a	86	86	20.3	15.2	14.3
WI	Isycoed	n/a	31	31	9.8	18.2 (23.6)	14.5 (13.1)

Table 2.5b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

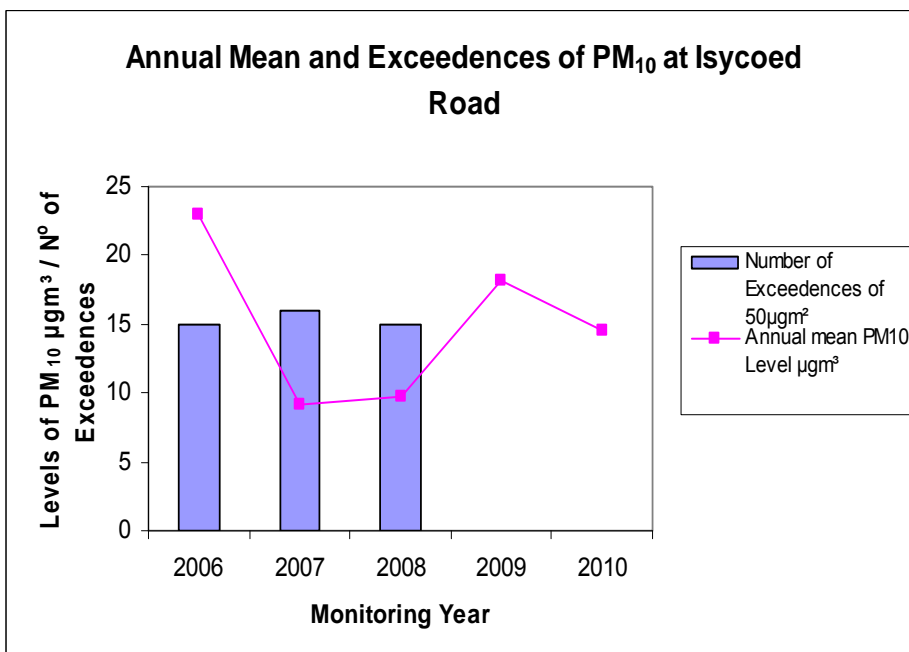
Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture 2010 %	Number of Exceedences of daily mean objective (50 µg/m ³)		
					2008	2009	2010
AURN	Victoria Road	n/a	86	86	15	4	0
WI	Isycoed	n/a	31	31	15 (41.3)	0 (27.1)	0 (24.4)

As can be seen from the above chart the Isycoed site continued to experience major faults with the PM₁₀ monitor during 2010 which gave only a 31% capture rate. These faults mainly centred on the pump and filter change mechanism within the unit. The data recorded at this site has been included in this report for completion and 'annualised' as per the instructions in box 3.2 of the Technical guidance LAQM.TG(09), this value is shown in parenthesis. The number of exceedences of the daily objective is determined by taking the 90th Percentile of the captured data and comparing it to the objective level (i.e. 50µgm³). The annualising was done by comparison to the AURN automatic monitoring site detailed on the table above. Further details of the annualising are shown in Appendix A table A3.

Figure 2.5 Trends in Annual Mean PM₁₀.



The above chart shows a general downward trend of the annual mean objective levels over the monitoring period with the obvious exception of 2003, when the whole of the UK experienced high particulate matter counts. The last four years of monitoring have also shown a downward trend of the number of exceedences with this year showing zero exceedences. However, when the trend in the number of exceedences is looked at over the whole monitoring period it can be seen to be quite variable with no absolute conclusions possible.



The above chart shows an overall consistent level of PM₁₀ was experienced at Isycoed over the monitoring period, though the values should not be treated as absolute as data has been lost over the last three years resulting in low overall capture rates which will also effect trend interpretation. However, both 2009 and 2010 showed a decrease in the

number of exceedences of the daily PM₁₀ objective and the mean results are generally comparable to those experienced at the AURN site on Victoria Road.

The above data and annualised values calculated to compensate for the low capture rate at Isycoed are within the objective levels and therefore there is no need to proceed to a detailed assessment for PM₁₀

Both the actual values recorded for annual mean concentrations and number of exceedences show that the Air Quality Objectives were only exceeded in 2003. Details of which can be found in the 2003 Updating and Screening Assessment and Addendum, which can be accessed on the Wrexham County Borough Council web site under Air Quality. Where the Data Capture for the year was below 90% the 90th percentile is shown, which also didn't exceed 50 µg/m³ and hence there is no requirement to proceed to a detailed assessment for PM₁₀

2.2.3 Sulphur Dioxide

Wrexham County Borough Council has two automatic Sulphur Dioxide (SO₂) monitors within the County Borough. The review into the diffusions tube network carried out during 2010 removed the SO₂ diffusion tubes from the monitoring network as the data provided by these did not relate to the objective levels for SO₂ as defined in the standards, which define SO₂ levels in terms of 15 minute, hourly and daily levels whereas the diffusion tubes only provide annual data in any reliable form.

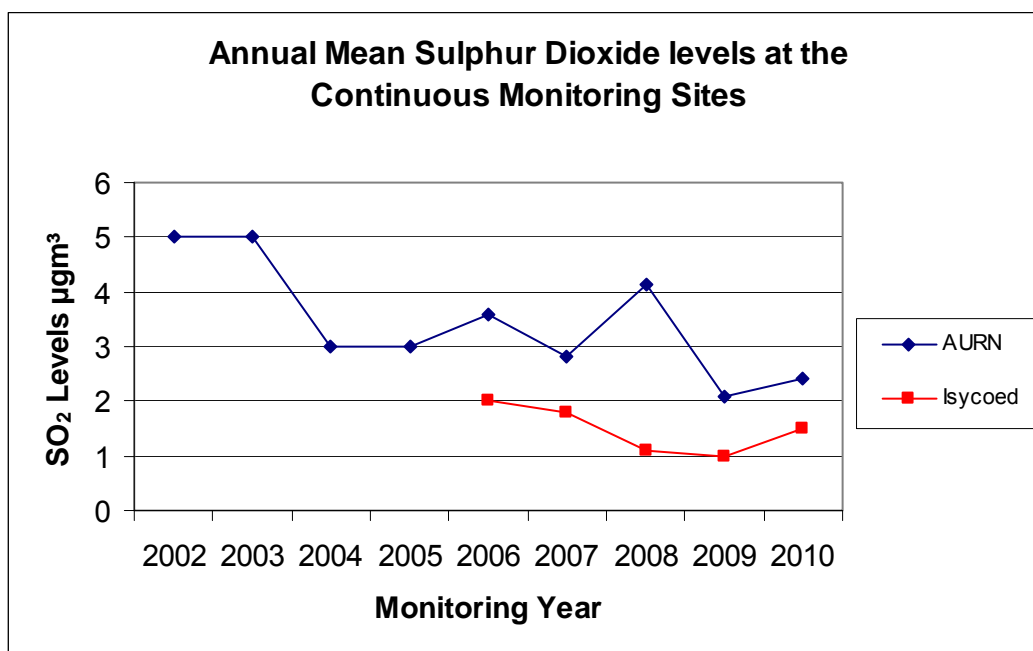
The following table shows the results of the SO₂ monitoring from the two automatic monitoring sites in Wrexham.

Table 2.6 Results of SO₂ Automatic Monitoring: Comparison with Objectives

Site	Location	Within AQMA	Data Capture for monitoring period %	Data Capture 2010 %	Number of Exceedences of:		
					15-minute Objective (266 µg/m ³)	1-hour Objective (350 µg/m ³)	24-hour Objective (125 µg/m ³)
AURN	Victoria Road	n/a	97.1	97.1	0	0	0
WI	Isycoed	n/a	95.2	95.2	0	0	0

Figure 2.6 Trends in Sulphur Dioxide.

The following chart shows the annual means at the two continuous monitoring sites in Wrexham. As has been previously mentioned, there is no annual objective in the Air Quality Standards for Sulphur Dioxide and the following chart is used solely to illustrate trends in the SO₂ levels in Wrexham County Borough.



The above chart shows a downward trend in the SO₂ levels recorded at the two monitoring sites. The Isycoed site has recorded the lower SO₂ levels and it has remained more consistent over the monitoring period than the AURN site in Wrexham.

The monitoring carried out at both the continuous monitoring stations has shown the SO₂ levels in Wrexham are well within the objective levels. There is therefore no need to proceed to a detailed assessment for SO₂.

2.2.4 Benzene

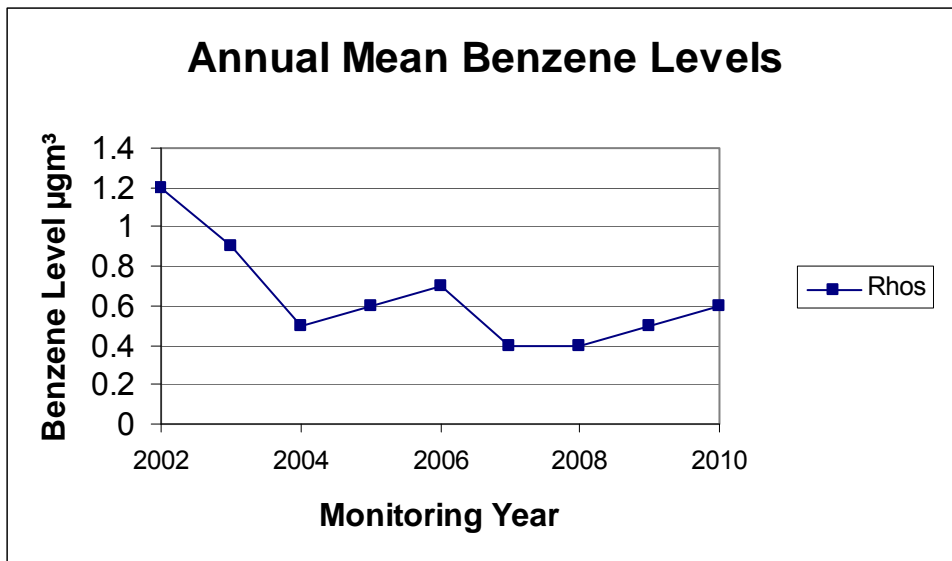
Wrexham County Borough Council maintains one diffusion tubes for monitoring Benzene. The other tube was removed from the monitoring program during a review in 2010, as the results had been below the objective level's since monitoring began in 1997 (historic monitoring results are available in previous review and assessment reports).

Table 2.7a Results of Benzene Diffusion Tubes

Site ID	Location	Within AQMA?	Data Capture 2010 %	Annual mean concentrations (µg/m ³)		
				2008	2009	2010
WCBC26	Llwyneinion Rd (Rhos)	n/a	83.3	0.4	0.5	0.6

As the above site has been monitored at for in excess of five years a chart can be created showing the trends in the monitoring:

Figure 2.7 Trends in Annual Mean Benzene Concentrations Measured at Diffusion Tube Sites



The above trend chart shows the levels of Benzene recorded in Rhosllanerchrugog have been decreasing since monitoring began and remain below the objective levels in the Air Quality Standards. There is therefore no need to proceed to a detailed assessment based on the above results.

2.2.5 Other pollutants monitored

In December 2009 a PM_{2.5} monitor was installed at the Victoria Road AURN site. This monitors for particulate matter just like the PM10 but instead only determines particles of 2.5µgm³. Whereas this pollutant is listed in the Air Quality Standards it is not currently included in the regulations. The monitor is also a Partisol gravimetric analyser and therefore is not subject to any correction of the raw data.

Table 2.8 Results of PM_{2.5} Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for monitoring period %	Data Capture for full calendar year 2010 %	Annual mean concentrations (µg/m ³)		
					2008	2009	2010
AURN	Victoria Road	n/a	86	86	n/a	n/a	9.8

The annual mean concentration recorded at Victoria Road is less than the 25 µgm³ guideline published in the Air Quality Standards.

Wrexham County Borough Council does not monitor for any other pollutant listed on the Air Quality Standards having not identified any existing sources or new sources that may lead to an exceedence of the air quality objectives. Wrexham County

Borough Council has previously monitored for Ozone by use of a diffusion tube in Chirk. This was removed from the monitoring program during a recent review as it is not actually included in the regulations and the targets quoted relate to 8 hour running or hourly means, neither of which the diffusion tube is able to demonstrate compliance with.

2.2.6 Summary of Compliance with AQS Objectives

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

3 New Local Developments

3.1 Road Traffic Sources

At the end of 2010 a planning application was received for a new supermarket on Ruthin Road in Wrexham. Ruthin Road has a large number of residences at both ends of the road as well as just off it. The development was deemed to lead to an increase in traffic on this road and so an Air Quality assessment was required as part of the planning procedure. This assessment was undertaken by Air Quality Consultants who modelled the impact of the extra traffic on the sensitive receptors. It concluded that:

The report concludes that the Air Quality objectives shall be met at all sensitive receptors except at one end of the road where the model predicts an exceedence of the Nitrogen Dioxide annual mean objective. The report does follow this with the statement that:

In the professional opinion of AQC, it is unlikely that the annual mean nitrogen dioxide concentrations at (this location) will exceed the objective, with or without the scheme.

The location identified is approximately 90 meters north of the AURN station on Victoria Road and on a small roundabout. Based on the monitoring data recorded at this station Wrexham County Borough Council agreed with the assessment of Air Quality Consultants. However, in order to demonstrate that this will be the case a Nitrogen Dioxide diffusion tube was placed at the sensitive receptor identified in the report and also towards the opposite end of Ruthin Road, hence a Nitrogen Dioxide diffusion tube is in situ on either side of the development. The results of this will be carefully monitored in order to determine compliance with the Air Quality Objectives.

There were no other new or newly identified road traffic sources identified within Wrexham County Borough during 2010.

3.2 Other Transport Sources

There were no new or newly identified non-road traffic sources within Wrexham County Borough during 2010.

3.3 Industrial Sources

There were no new or newly identified Industrial sources within Wrexham County Borough during 2010.

3.4 Commercial and Domestic Sources

In 2010 a planning application was received for an industrial biomass burner to be located on the Wrexham Industrial Estate. Whereas the nearest residential property is some 580 meters north of the proposed development an Air Quality assessment was still submitted as part of the Environmental Impact Assessment (EIA). The

biomass plant is to consist of six 500 hundred kilowatt (kW) boilers which will vent through a single stack so the facility was considered as a single 3000 kW boiler.

Environmental consultants Royal Haskoning were contracted by the operators to undertake a modelling program with scope for monitoring should the model demonstrate this was needed. The model demonstrated that biomass boilers will not cause a ground level increase of PM₁₀ of 1 µgm³ in the vicinity of the application site or an hourly mean NO₂ concentration in excess of 40 µgm³. Wrexham Councils assessment of the report verified the results by use of the techniques and nomograms contained in Local Air Quality Management Technical Guidance LAQM.TG(09) and the Technical Guidance: Screening assessment for biomass boilers produced by AEA Energy and Environment.

At the time of this report a decision on the planning application is still pending.

3.5 New Developments with Fugitive or Uncontrolled Sources

There were no new or newly New Developments with Fugitive or Uncontrolled Sources within Wrexham County Borough during 2010.

Wrexham County Borough Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Wrexham County Borough Council confirms that all the following have been considered –

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Conclusions and Proposed Actions

4.1 Conclusions from New Monitoring Data

Wrexham County Borough Council has examined the results from its monitoring in the borough during 2010. Concentrations are all below the objectives, therefore there is no need to proceed to a Detailed Assessment for any of the pollutants.

4.2 Conclusions relating to New Local Developments

The new superstore on Ruthin Road has been modelled as having a potential impact on the NO₂ levels at one of the considered properties. Wrexham County Borough Council has put diffusion tubes on this road in order to determine if there will be an impact. The tubes have been placed prior to the development starting in order to provide accurate historical data for comparison with the data provided when the supermarket opens.

4.3 Proposed Actions

Neither the monitoring carried out in Wrexham County Borough nor the consideration of other sources identify an exceedence or a likely exceedence of the Air Quality Objectives. There is no requirement for Wrexham County Borough Council to proceed to a detailed assessment for any of the pollutants.

As part of its Air Quality Strategy, Wrexham County Borough Council will maintain its monitoring program to which new monitoring sites will be added as the need is identified. Wrexham County Borough Council will also continue with its co-location study in order to correct its diffusion tubes and upload the results of this co-location study to the national monitoring spreadsheet. As has been mentioned previously the Isycoed monitoring station will be discontinued at the start of 2012 due to funding shortfall.

5 References

Previous reports for Review and Assessment carried out by Wrexham County Borough Council can be viewed on the following web site:

http://www.wrexham.gov.uk/english/environment/air_quality/reports.htm

Appendices

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors

Test laboratory:

Environmental Services Group Ltd
139 Summerlee Street
Queenslie
Glasgow
G33 4DB

Quality Control:

UKAS accredited for Nitrogen Dioxide diffusion tube analysis.

Tube preparation method:

20% Triethanolamine (TEA) in water.

During the latest round of the WASP scheme (for 2009/10) ESG were listed as 'Good' for both:

- 1) Performance on basis of RPI, OLD CRITERIA, best 4 out of the 5 rounds
105-109
- 2) Performance on basis of RPI, NEW CRITERIA, best 4 out of the 5 rounds
105-109

Where reporting time has allowed, the results of Wrexham County Borough Councils co-location study have been up loaded onto the Review and Assessment helpdesk. This website has given a Bias Adjustment Factor (BAF) of 0.84 for 2010 as an average for all authorities who submitted their co-location studies for Environmental Services Group in 2010. It is this value that has been applied to the Nitrogen Dioxide diffusion tubes that Wrexham County Borough Council used in 2010

Factor from Local Co-location Studies

Wrexham County Borough Councils own collocation study is carried out at the Victoria Road AURN station and for 2010 gave a Bias Adjustment Factor (BAF) of 0.93. This value was submitted to the Review and Assessment helpdesk along with co location studies from seven other Authorities. The table below shows the results from these organisations:

Table A1 Organisations who have submitted BAF data for Environmental Service Group

Authority	Tube Precision	Bias Adjustment factor
Chichester DC	P	0.66
Wrexham CBC	P	0.93
Warrington BC	G	1.14
Dumfries and Galloway Council	G	0.92
North East Lincolnshire Council	G	0.85
North East Lincolnshire Council	P	0.54
North East Lincolnshire Council	P	1.13
Horsham DC	P	0.84
Marylebone Road Intercomparison	G	0.81
North Down BC	G	0.74
Factor to Use		0.84

The results of Wrexham County Borough Council's Co-location study are shown later in this appendix.

Discussion of Choice of Factor to Use

The national Bias Adjustment Factor (0.84) has been used to correct the diffusion tube results received during 2010. This was seen as a more representative, being a combination of a total of eight studies.

PM Monitoring Adjustment

Both the Particulate Matter (PM₁₀) monitors operated in Wrexham County Borough are Partisol 2025's, which are gravimetric analysers. These have been shown to meet the European equivalence test and therefore no adjustments are needed for the monitored results.

Short-term to Long-term Data adjustment

The Local Air Quality Management Technical Guidance LAQM.TG(09), requires and provides a methodology whereby monitoring sites with a low data capture percentage, can be annualised in order to provide an indication of what might be a yearly figure. This method is described in Box 3.2 of the LAQM.TG(09). Four of the Nitrogen Dioxide diffusion tubes gave a low capture rate during 2010 which were the four new sites which were started after Wrexham County Borough Councils review of its monitoring network.

The four Nitrogen dioxide diffusion tube sites that gave low capture rates were compared to the two Automatic Monitoring sites located in Wrexham. As differing months were missing from each data set the table below shows the values used in the adjustment calculations:

Table A2 Nitrogen Dioxide Diffusion tube Annualisation data

Site	Type	Months Missing from Data Set	Annual Mean		Period Mean		Ratio Used to Annualise Results
			Victoria Road	Isycoed	Victoria Road	Isycoed	
Coed Poeth	Roadside	Jan, Feb, Mar, Aug	24.2	7.8	27.2	8.7	0.9
Acrefair	Roadside	Jan, Feb, Mar	24.2	7.8	32.6	10.8	0.73
Gwersyllt	Roadside	Jan, Feb, Mar, Aug, Sep	24.2	7.8	25.4	8.0	0.97
Rossett	Roadside	Jan, Feb, Mar	24.2	7.8	32.6	10.8	0.73

The Particulate Matter (PM₁₀) monitor located at Isycoed also returned a low capture rate and this was adjusted by comparison to the Victoria Road AURN PM₁₀ monitor:

Table A3 Annualisation data for Wrexham Isycoed PM₁₀ Monitor

Site used for adjustment	Type	Annual Mean	Period Mean	Ratio Used to Annualise Results
Victoria road	Roadside AURN	14.3	15.9	0.9

QA/QC of automatic monitoring

The QA/QC of both the Automatic monitoring sites in Wrexham are undertaken by AEA Technology. This is done under the AURN contract for the Victoria Road site and under the Welsh Air Quality Forum's (www.welshairquality.c.uk) contract for the Wrexham Isycoed site.

The Victoria Road AURN site annual calibration and six monthly audit are arranged by AEA Technology and carried out by the contracted organisation.

The Wrexham Isycoed site is annually calibrated and six monthly audited by SupportingU. Additionally to this AEA Technology carries out its own annual audit.

Table A4 QA/QC of diffusion tube monitoring

The following table show the results of the Wrexham County Borough Co-location study:

Checking Precision and Accuracy of Triplicate Tubes													
Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu\text{g}/\text{m}^3$	Tube 2 $\mu\text{g}/\text{m}^3$	Tube 3 $\mu\text{g}/\text{m}^3$	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (DC)	Tubes Precision Check	Automatic Monitor Data Capture Check
1	14/12/2010	20/01/2010	18	32	33	28	8.4	30	20.8	33.56	99.8	Poor Precision	Good
2	20/01/2010	03/03/2010	23	38.61	42.23	35	10.2	30	25.4	35.26	99.5	Poor Precision	Good
3	03/03/2010	14/04/2010	29.7	27.5	31.31	30	1.9	6	4.8	25.84	97.8	Good	Good
4	14/04/2010	28/04/2010	34.59	35.81	32.77	34	1.5	4	3.8	25.35	100	Good	Good
5	28/04/2010	03/06/2010	21.09	20.86	24.84	22	2.2	10	5.6	20.38	99.5	Good	Good
6	03/06/2010	30/06/2010	21.27	23.15	22.21	22	0.9	4	2.3	19.68	99.8	Good	Good
7	30/06/2010	11/08/2010	12.64	18.66	11.84	14	3.7	26	9.3	11.45	99.8	Poor Precision	Good
8	11/08/2010	03/09/2010	15.85	15.11	15.11	15	0.4	3	1.1	14.85	98.7	Good	Good
9	03/09/2010	29/09/2010	20.6	19.9	22.1	21	1.1	5	2.8	16.32	95.5	Good	Good
10	29/09/2010	10/11/2010	26.6	26	24.9	26	0.9	3	2.1	23.7	96.6	Good	Good
11	10/11/2010	01/12/2010	36.7	34.6	33.7	35	1.5	4	3.8	44.43	70	Good	Poor Data Capture
12	01/12/2010	12/01/2011	33.1	34.1	32.4	33	0.9	3	2.1	35.22	99.4	Good	Good
13													

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

Overall survey --> Poor precision Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ID:	Wrexham AURN site (42)
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Accuracy (with 95% confidence) without periods with CV larger than 20%	Precision 9 out of 12 periods have a CV smaller than 20%
Bias calculated using 8 periods of data Bias factor A 0.894 +/- 0.084 Bias B 13 +/- 10 %	Bias calculated using 11 periods of data Bias factor A 0.944 +/- 0.110 Bias B 10 +/- 10 %
Diffusion Tubes Mean: 25 $\mu\text{g}/\text{m}^3$ Mean CV (Precision): 5	Diffusion Tubes Mean: 25 $\mu\text{g}/\text{m}^3$ Mean CV (Precision): 11 caution
Automatic Mean: 23 $\mu\text{g}/\text{m}^3$ Data Capture for periods used: 98	Automatic Mean: 24 $\mu\text{g}/\text{m}^3$ Data Capture for periods used: 99
Adjusted Tubes Mean: 23 +/-2 $\mu\text{g}/\text{m}^3$	Adjusted Tubes Mean: 24 +/-3 $\mu\text{g}/\text{m}^3$

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Version 01 - April 2005

Table A5 Complete Data Sets for Diffusion Tube monitoring undertaken by Wrexham County Borough Council during 2010**Nitrogen Dioxide (NO₂)**

WCBC	NO2 CONCENTRATION µgm ³	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	GROSVENOR ROAD	73	50.68	43.8	50.07	39.88	40.67	33.58		19.5	40.9	48.8	54.7
10	CEIRIOG SCHOOL	34			2	20.39	12.22	12.27	16.89	16.1	17.3	25.7	26.9
15	GARDDEN VIEW	27	31.97	25.31		17.81	17.83	14.88	17.26	20.2	23.2	32.5	33
17	HUGMORE LANE	27	41.93	25.11	30.16	26.04	25.03			36.4	20.6	31.9	29.7
18	RHOSTYLLEN	26	47.36	24.91	39.82	26.01	24.71	18.32	17.99	21.3	26.9	39.4	34.9
19	MOLD ROAD	39	41.32	29.99	37.29	24.4	23.46	20.71	22.77	27.6	32.8	42.6	49.1
20	CHESTER ROAD	48	54.9	40.42	46.59	32.34	32.86	12.69	26.44	29.3		50.7	53
21	HOLT ROAD	39	41.63	30.97	34.39	22.76	22.21	12.87	19.1	23.3		39.9	37.6
22	HOLYHEAD ROAD	28	31.37	31.97	41.02	17.34	16.29	14.48		18.2	21.1	25.7	29.1
28	SYCAMORES	54	55.2	34.99	54.46	39.84	38.16	27.55	32.31	30.3	36.3	47.6	50.1
30	RHOSTYLLEN RBT	36	40.72	19.29	32.58	30.23	27.53	25.14	22.03	30	34.3	40.1	37.6
31	BUS STATION	57	53.45	39.9	49.01	35.62	33.21	28.35	32.31	34.5	46.1	52	44.8
33	SMITHFIELD ROAD	39	44.94	28.13	33.78	34.92	23.77		23.87	22.7	30.3	44.3	40.6
2	COED POETH				2.41	17.58	13.79	12.41		14.4	18.5	23.8	24.5
3	GWERSYLLT				32.58	27.89	23.81	21.92			47.4	51.9	50.7
4	ACREFAIR				33.78	27.18	31.33	20.51	19.83	24	31.5	34.7	39.4
17	ROSSETT				35.7	27.65	18.8	20.91	20.2	23.7	31.1	38.3	39.7

April 2011

Wrexham County Borough Council

Benzene (C₆H₆)

C ₆ H ₆ CONCENTRATION µgm ³	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LLWYNEINION ROAD	1.1	1.2		0.9	0.4	0.5	0.3	0.6	0.5	0.05		0.26