



Update of LAQM Technical Guidance

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Welsh *Air Quality* Forum
Fforwm Ansawdd Awyr Cymru
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Overview

- Consultation Draft issued – responses due by 26 Sept 2008
- Why has the guidance been updated
- Overview of what has changed
- Detailed description of some important changes

Part IV of the Environment Act 1995
Environment (Northern Ireland) Order 2002 Part III
Local Air Quality Management
Technical Guidance
LAQM.TG(08)
Consultation Document



Why has the guidance been updated?

- Changes and improvements to our understanding of science
- Lessons learned from previous rounds of review and assessment
- Various guidance updates in the form of FAQs need to be incorporated
- Outcomes of the 2007 Evaluation Report



2007 Evaluation Report



- Questionnaire sent to LAs.
- Responses related to Technical Guidance and general R&A process were:
 - Parts of the process are repetitive, particularly for less-problematic pollutants
 - Most identified the checklists as being helpful
 - In some parts Guidance is “long-winded” and difficult to find things



What has changed in TG08?

- Restructured layout of the Guidance
- New background maps
- New NO_x to NO₂ function
- New approach to correcting TEOM data
- New guidance on Biomass combustion
- Incorporating revised DMRB Screening Model
- Revised guidance related to railways and airports
- New guidance related to Poultry Farms
- Proposals for web based reporting (covered by Paul Willis)



What has changed in TG08?

- Main Document, consisting of 7 Chapters
- Annex 1 - Monitoring
- Annex 2 - Emissions
- Annex 3 - Modelling



Revised Structure of TG08

- Introduced new Chapters:
- Chapter 2 “Tools and Supporting Information”
 - Use of background maps
 - Future Year projections
 - Calculator for fall-off in NO_2 concentrations with distance from the road
 - Use of DMRB
 - Relationship between NO_x and NO_2
 - Empirical relationships between annual mean and short-term objectives

Revised Structure of TG08

➤ Ch3 “Monitoring”

- Recognises increasing importance of monitoring data as “to be achieved” dates of the objectives now largely passed
- Chapter focuses on NO_2 and PM_{10} (other pollutants addressed in Annex 1)
- Expanded guidance on use of NO_2 diffusion tubes – addresses laboratory performance, bias-adjustment and precision
- Includes a new approach to correct TEOM PM_{10} data to “gravimetric equivalent” concentrations for the purpose of R&A
- Includes informal guidance on $\text{PM}_{2.5}$



Revised Structure of TG08

- Ch4 “Progress Reports”
 - Brings in previous guidance issued in PRG(03) and PRGNI(04)
- Ch7 “Further Assessments”
 - Not intended to be a burden on LAs
 - Recognises that if the work has been completed elsewhere it can be referenced and not repeated as long as it meets TGO8 standard
 - Includes updated example for source apportionment



Revised Structure of TG08

- Ch5 “Updating and Screening Assessments” has been completely restructured:
 - To date, over 200 authorities have declared AQMAs, the majority related to road traffic emissions for exceedence of the annual mean objective for NO_2 , sometimes with exceedences of 24-hr PM_{10}
 - Very few AQMAs related to other source types



Revised Structure of TG08

- Current approach to USA is to consider each pollutant in turn
 - Means that the same sources are considered several times for different pollutants
- New USA guidance is reordered on a source-by-source basis
- Restricted the scope of assessment to “problem pollutants”
 - For a road traffic source, the assessment is now completed once for NO_2 and PM_{10}

Current checklists – new roads

Box 6.2: Updating and Screening Checklist Nitrogen dioxide (Continued)		
Source, location, or data that need to be assessed	Steps that must be taken to complete the assessment	Notes relevant to each step
Road Traffic (Continued)		
(G) New roads constructed or proposed since the previous round of R&A	Approach 1	
	1. Check whether an air quality assessment has already been carried out for the new road.	An assessment may already have been carried out as part of the planning process. If this is the case you should confirm that the assessment is sufficient for Review & Assessment purposes. You need only consider proposed roads for which planning approval has been granted.
	Question	
	• Did the assessment predict any exceedences of the objectives at relevant locations?	
	Action	
	If the answer is YES you should proceed to a 'Detailed Assessment' for nitrogen dioxide at these locations.	The Detailed Assessment may be no more than relying on the findings of the air quality assessment. For this to be the case the assessment will have to meet the standards of a Detailed Assessment.
	Approach 2	This approach should be followed if there has been no previous air quality assessment.
	1. Establish whether the traffic flow on the new road is greater than 10,000 vehicles per day or whether the new road has increased traffic flow on existing roads previously identified as having 2005 annual mean concentrations greater than 36 $\mu\text{g}/\text{m}^3$ or more than 15 1-hour exceedences of 200 $\mu\text{g}/\text{m}^3$	The aim is to establish whether there is a risk of exceedences alongside the new road, or existing roads with a significant change in flows You should only proceed if there is relevant exposure within 10 m (20 m in major conurbations). A major conurbation may be considered to be a city with a population in excess of 2 million.
	2. Use the DMRB screening model (Para 6.29) to predict the annual mean in the current year at relevant locations ¹ .	You will require information on the local background concentrations ²
	Questions	
• Are any of the predicted annual means concentrations greater than 40 $\mu\text{g}/\text{m}^3$?		
Action		
If the answer is YES, this indicates a potential exceedence of the annual mean objective. You should then proceed to a 'Detailed Assessment' for nitrogen dioxide at these locations		

Box 8.4: Updating and Screening Checklist PM ₁₀ (Continued)		
Source, location, or data that need to be assessed	Steps that must be taken to complete the assessment	Notes relevant to each step
Road Traffic (Continued)		
F) New roads constructed or proposed since last round of R&A	Approach 1	
	1. Check whether an air quality assessment has already been carried out for the new road.	An assessment may already have been carried out as part of the planning process. If this is the case you should confirm that the assessment is sufficient for Review & Assessment purposes. If the assessment did not cover the new 2010 objectives, then authorities in Scotland will have to use the approach set out in Checklist item (C). You only need to consider proposed roads for which planning approval has been granted.
	Question	
	• Did the assessment predict any exceedences of the objectives at relevant locations?	
	Action	
	If the answer is YES you should proceed to a 'Detailed Assessment' for PM ₁₀ at these locations.	The Detailed Assessment may be no more than relying on the findings of the air quality assessment. For this to be the case the assessment will have to meet the standards of a Detailed Assessment.
	Approach 2	This approach should be followed if there has been no previous air quality assessment.
	1. Establish whether the traffic flow on the new road is more than 10,000 vehicles per day (AADT) or whether the new road has increased traffic flow on existing roads previously identified as having more than 30, 24-hour exceedences of 50 $\mu\text{g}/\text{m}^3$ in the current year (or more than 6 exceedences in 2010 in Scotland).	The aim is to establish whether there is a risk of exceedences alongside the new road or existing roads that will experience increased traffic flows. You should only proceed if there is relevant exposure within 10 m (20 m in major conurbations). A major conurbation may be considered to be a city with a population in excess of 2 million.
	2. Use the DMRB screening model to predict the number of 24-hour exceedences of 50 $\mu\text{g}/\text{m}^3$ in the current year (and for Scotland, the annual mean for 2010) at relevant locations ¹ .	You will require information on the local background concentrations ²
	Questions	
• Are there more than 35, 24-hour exceedences of 50 $\mu\text{g}/\text{m}^3$?		
• Are any of the predicted annual mean PM ₁₀ concentrations in 2010 greater than 18 $\mu\text{g}/\text{m}^3$ (Scotland only)?		
Action		
If the answer is YES you should proceed to a 'Detailed Assessment' for PM ₁₀ at these locations		

Revised checklists – new roads

A.5 New roads constructed or proposed since the last round of review and assessment		
Relevant Pollutants	Steps that must be taken to complete the assessment	Notes relevant to each step
Nitrogen dioxide PM ₁₀	Overview The approach to considering new roads will depend on whether or not an assessment was carried out in advance of building the new road. The assessment needs to consider both nitrogen dioxide and PM ₁₀ .	
	Approach 1 This approach should be followed if an air quality assessment has been undertaken for the new or proposed road in question.	
	1. Obtain details of the air quality assessment that has been carried out for the new road.	It will be important to confirm that the assessment is sufficient for review & assessment purposes, i.e. it should meet the requirements set out in this guidance. Only consider proposed roads for which planning approval has been granted. If the assessment did not cover the new 2010 objectives, then local authorities in Scotland will have to use the approach set out in Checklist item A.4 above (junctions and busy roads in Scotland)
	Question • Have any exceedences of the nitrogen dioxide or PM ₁₀ objectives been predicted at relevant locations?	
	Action If the answer is YES, it will be necessary to proceed to a 'Detailed Assessment' for nitrogen dioxide and/or PM ₁₀ at these locations.	The Detailed Assessment may be no more than relying on the findings of the air quality assessment for the road. For this to be the case the assessment will have to meet the standards of a Detailed Assessment.
	Approach 2 This approach should be followed if there has been no previous air quality assessment.	
	1. Establish whether the traffic flow on the new road is greater than 10,000 vehicles per day or whether the new road has increased traffic flow on existing roads previously identified as having a) nitrogen dioxide annual mean concentrations greater than 36 µg/m ³ , or b) more than 30, 24-hour exceedences of the PM ₁₀ objective of 50 µg/m ³ (or more than 6 exceedences in 2010 in Scotland).	The aim is to establish whether there is a risk of exceedences alongside the new road, or existing roads with a significant change in flows. Only proceed if there is relevant exposure within 10m (20m in major conurbations). A major conurbation may be considered to be a city with a population in excess of 2 million.
	2. Use the DMRB screening model (Para 2.19 to 2.28) to predict the current nitrogen dioxide annual mean at relevant locations and/or the number of PM ₁₀ 24-hour exceedences of 50 µg/m ³ , (and for Scotland the annual mean for 2010) at relevant locations.	Information will be required on traffic flows, speeds, and the proportion of different vehicle types, as well as on local background concentrations.
	Questions • Do any of the predicted concentrations exceed the air quality objectives?	
	Action If the answer is YES, it will be necessary to proceed to a 'Detailed Assessment' at these locations	



Checklist approach for new industrial sources

Source, location or other data to be assessed	Steps that need to be taken to complete the assessment	Notes relevant to each step
Box 5.5: Updating and Screening Checklist (C) Industrial sources		
C.1 Industrial Processes		
Relevant Pollutants	Steps that must be taken to complete the assessment	Notes relevant to each step
All pollutants	<p>Overview</p> <p>Industrial sources are unlikely to make a significant local contribution to annual mean concentrations, but could be significant in terms of the short-term objectives. Remember to consider sources in neighbouring authorities. Particular attention should be paid to the combined impact of several sources, including those outside the local authority area. The approach to the assessment will depend on whether an assessment has been carried out as part of the planning or permitting process. The assessment should consider all of the regulated pollutants, although those most at risk of requiring further work are sulphur dioxide, nitrogen dioxide, PM₁₀ and benzene.</p> <p>Approach 1</p> <p>This approach should be followed if an air quality assessment has been undertaken for the new or proposed source in question.</p> <ol style="list-style-type: none"> Obtain details of the air quality assessment that has already been carried out for the new industrial source. <p>Question</p> <ul style="list-style-type: none"> Have any exceedences of the objectives been predicted at relevant locations? <p>Action</p> <p>If the answer is YES, it will be necessary to proceed to a 'Detailed Assessment' for the relevant pollutant(s) for this source.</p> <p>Approach 2</p> <p>This approach should be followed where emissions have increased substantially or new relevant exposure has been introduced.</p> <ol style="list-style-type: none"> Determine whether any of the sources identified during previous rounds of review and assessment have: <ol style="list-style-type: none"> experienced substantially increased emissions; received new relevant exposure in their vicinity. Obtain information on the total annual emission of the pollutant, and the height of the emission. Use the nomograms to determine if the source requires further assessment. <p>Questions</p> <ul style="list-style-type: none"> Do the emissions exceed the threshold in the relevant nomogram? <p>Action</p> <p>If the answer is YES, it will be necessary to proceed to a 'Detailed Assessment' for the relevant pollutant at these locations.</p>	<p>The Detailed Assessment may be no more than relying on the findings of the air quality assessment. For this to be the case the assessment will have to meet the standards of a Detailed Assessment.</p> <p>A 'substantial' increase can be taken to be one greater than 30%.</p> <p>See Para 5.32 onwards, and Annex 2. If it is proving difficult to obtain the information on the emissions contact the Local Authority Air Quality Support Helpdesk (see Box 1.1).</p> <p>The nomograms for the various pollutants are set out in Paras 5.30 onwards.</p>



Box 5.5: Updating and Screening Checklist		
(C) Industrial sources		
C.1 Industrial Processes		
Relevant Pollutants	Steps that must be taken to complete the assessment	Notes relevant to each step
All pollutants	<p>Overview</p> <p>Industrial sources are unlikely to make a significant local contribution to annual mean concentrations, but could be significant in terms of the short-term objectives. Remember to consider sources in neighbouring authorities. Particular attention should be paid to the combined impact of several sources, including those outside the local authority area. The approach to the assessment will depend on whether an assessment has been carried out as part of the planning or permitting process. The assessment should consider all of the regulated pollutants, although those most at risk of requiring further work are sulphur dioxide, nitrogen dioxide, PM₁₀ and benzene.</p> <p>Approach 1</p> <p>This approach should be followed if an air quality assessment has been undertaken for the new or proposed source in question.</p> <ol style="list-style-type: none"> Obtain details of the air quality assessment that has already been carried out for the new industrial source. <p>Question</p> <ul style="list-style-type: none"> Have any exceedences of the objectives been predicted at relevant locations? <p>Action</p> <p>If the answer is YES, it will be necessary to proceed to a 'Detailed Assessment' for the relevant pollutant(s) for this source.</p> <p>Approach 2</p> <p>This approach should be followed where emissions have increased substantially or new relevant exposure has been introduced.</p> <ol style="list-style-type: none"> Determine whether any of the sources identified during previous rounds of review and assessment have: <ol style="list-style-type: none"> experienced substantially increased emissions; received new relevant exposure in their vicinity. Obtain information on the total annual emission of the pollutant, and the height of the emission. Use the nomograms to determine if the source requires further assessment. <p>Questions</p> <ul style="list-style-type: none"> Do the emissions exceed the threshold in the relevant nomogram? <p>Action</p> <p>If the answer is YES, it will be necessary to proceed to a 'Detailed Assessment' for the relevant pollutant at these locations.</p>	<p>The Detailed Assessment may be no more than relying on the findings of the air quality assessment. For this to be the case the assessment will have to meet the standards of a Detailed Assessment.</p> <p>A 'substantial' increase can be taken to be one greater than 30%.</p> <p>See Para 5.32 onwards, and Annex 2. If it is proving difficult to obtain the information on the emissions contact the Local Authority Air Quality Support Helpdesk (see Box 1.1).</p> <p>The nomograms for the various pollutants are set out in Paras 5.30 onwards.</p>

Revised scope of USA

Box 5.1: Summary of emission sources and relevant pollutants to be considered as part of the Updating and Screening Assessment

Overview

In each case, these sources need only be considered in they are new, if they have not previously been considered, or if there have been significant changes since the last round of review and assessment.

Reference No.	Emission sources to be assessed	Relevant Pollutants
A: Road transport sources		
A.1	Narrow congested streets with residential properties close to the kerb	Nitrogen dioxide
A.2	Busy streets where people may spend 1-hour or more close to traffic	Nitrogen dioxide
A.3	Roads with a high flow of buses and/or HGVs.	Nitrogen dioxide, PM ₁₀
A.4	Junctions (including busy roads and junctions in Scotland and Northern Ireland)	Nitrogen dioxide, PM ₁₀
A.5	New roads constructed since the last round of review and assessment	Nitrogen dioxide, PM ₁₀
A.6	Roads/junctions identified as being close to the objective during the previous round of review and assessment	Nitrogen dioxide, PM ₁₀
A.7	Roads with significantly changed traffic flows	Nitrogen dioxide, PM ₁₀
A.8	Bus stations	Nitrogen dioxide

Revised scope of USA

B: Other transport sources		
B.1	Aircraft	Nitrogen dioxide
B.2	Railway Stations and Depots (diesel and steam trains)	Sulphur dioxide, nitrogen dioxide
B.3	Ports (shipping) ¹	Sulphur dioxide
C: Industrial sources		
C.1	Industrial processes (new processes and those with significantly increased emissions)	Benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide, PM ₁₀
C.2	Major petrol storage depots	Benzene
C.3	Petrol Stations	Benzene
C.4	Poultry farms	PM ₁₀
D: Commercial and domestic sources²		
D.1	Biomass combustion	Nitrogen dioxide, PM ₁₀
D.2	Domestic solid-fuel burning	Sulphur dioxide
E: Fugitive or uncontrolled sources		
E.1	Quarries, landfill sites, opencast coal mining, waste transfer sites, materials handling (i.e. ports, major construction sites)	PM ₁₀

Background maps

- National background maps available on 1x1 km grid basis for the UK. For pollutants other than NO_x, NO₂ and PM₁₀ these remain unchanged
- Two important changes for NO_x, NO₂ and PM₁₀
 - Maps are derived from a 2006 base year and are provided for all years up to 2020
 - The source contributions to the background concentration in each 1 x 1 km grid square are now explicitly provided for NO_x and PM₁₀

Background maps- sectors

➤ NO_x

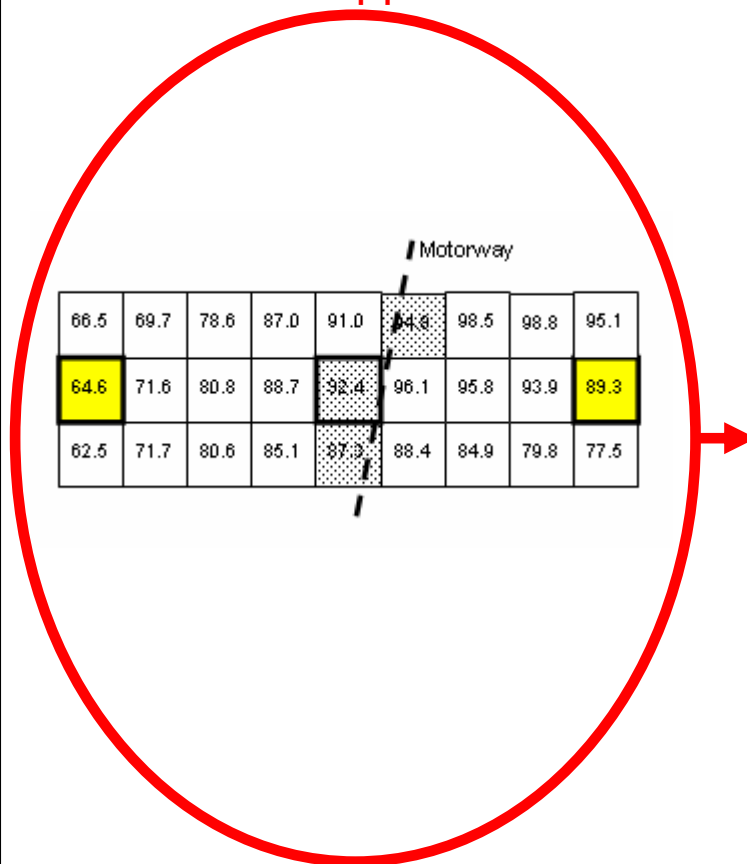
- Motorways
- A roads
- Industry
- Domestic/commercial
- Aircraft
- Regional rural
- Other

➤ PM₁₀

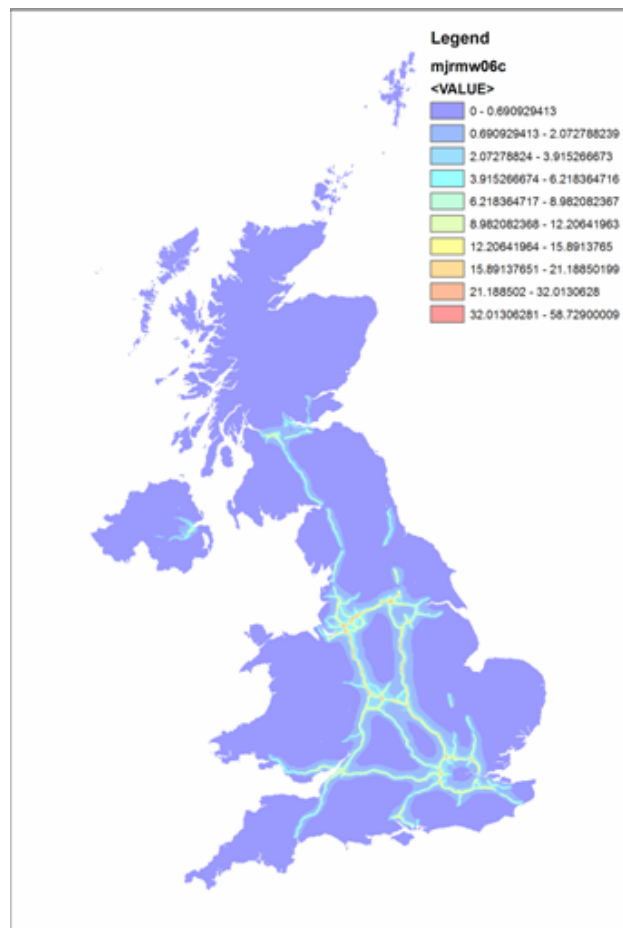
- Motorways
- A roads
- Industry
- Domestic/commercial
- Secondary
- Sea salt/regional primary
- Other
- Brake & tyre wear

Avoiding double counting

Current Approach



New Approach



Future Year Projections

- The approach used for 1,3-butadiene, benzene, carbon monoxide, lead and sulphur dioxide is unchanged
- For NO_x, NO₂ and PM₁₀, there are mapped data available for each year
 - To adjust measured background data from e.g. 2008 to 2010, use ratio of the 2008 and 2010 maps
- Cannot use the above approach to adjust measured NO₂ concentrations at roadsides, due to differing f-NO₂ in each year. Adjustment factors have been prepared with different factors for London (Central, Inner and Outer) and Rest of UK

NO_x:NO₂ Relationships

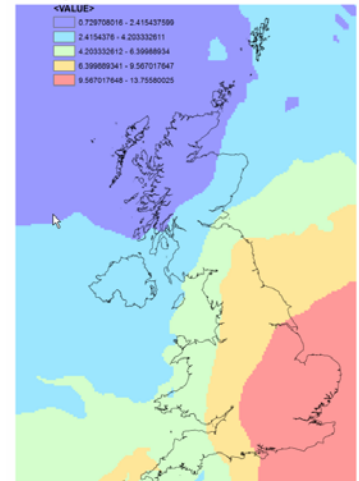
- An approach to calculating NO₂ from NO_x developed for TG03
- Updated in March 2007 to take account of the historic change in primary NO₂ emissions (f-NO₂)
- Always recognised that such an empirical approach not well suited to prediction of NO₂ concentrations in future years as f-NO₂ changes
- New approach developed which takes account of the difference between fresh emissions of NO_x and background NO_x, the O₃ concentrations, and the different proportions of f-NO₂ in different years
- In simple terms the model calculates the annual average NO₂ concentration at the roadside apportioned in terms of the background contribution, the primary NO₂ contribution, and the secondary NO₂ contribution (NO+O₃)

NO_x:NO₂ Model

Spreadsheet Model being prepared

- Determine year of assessment
- Use dispersion model to predict road-NO_x increment
- Determine background NO_x (from 1 x 1 km maps)
- Input total NO_x and road-NO_x to spreadsheet
- Select Local Authority (from drop-down menu)
 - Automatically assign default f-NO₂ values (option to manually assign if data are known)
 - Automatically assign the regional NO_x and TO_x (NO₂+O₃) values from 5x5 km maps

Regional NO_x 2006 (µg-m⁻³, as NO₂)
regnox2006



PM₁₀ monitoring - use of TEOM data

- Wherever practicable, authorities are encouraged to use instruments that are equivalent to the reference method
- Important consideration when purchasing new instruments, or where measured concentrations are close to the objective
- Recognised that many authorities use TEOM analysers, and considered appropriate that these remain suitable for R&A
- **BUT**
 - The 1.3 correction factor should no longer be used
 - Authorities should use the Volatile Correction Model (VCM)



Volatile Correction Model

- VCM uses the FDMS “purge” measurement as an indicator of the volatile component of PM_{10}
- Four steps to applying VCM correction
 1. Remove the default “USEPA correction factor”
 2. Correct measurements to atmospheric temp and pressure
 3. Derive Regional Purge Concentration. Calculated from the mean of up to 3 nearest FDMS analysers in national networks
 4. Calculate the $TEOM_{VCM}$ concentration

$$TEOM_{VCM} PM_{10} = \left\{ \left[\frac{TEOM PM_{10} - 3}{1.03} \right] \times \frac{1}{P} \times \frac{T + 273}{273} \right\} - 1.87 \times \text{Regional Purge Concentration}$$

Volatile Correction Model

- The calculations can be carried out via the King's College London "VCM web portal" to provide time series of hourly or daily corrected data
<http://www.volatile-correction-model.info/>

▶ Accessibility ▶ Contact ▶ Help



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Volatile Correction Model

Home



Welcome to the Volatile Correction Model (VCM) web portal. This web portal is funded by defra and is designed for users of TEOM PM₁₀ measurements; it allows you to correct TEOM measurements for the loss of volatile components of particulate matter that occur due to the high sampling temperatures employed by this instrument. The resulting corrected measurements have been demonstrated as equivalent to the gravimetric reference equivalent.

Flow chart describing data manipulation in the VCM web portal

The VCM works by using the volatile particulate matter measurements provided by nearby FDMS instruments (within 130 km) to assess the loss of PM₁₀ from the TEOM; this value is then added back onto the TEOM measurements. The area over which the model has been demonstrated to work is shown in the map image on this page.

Start your correction

Site Map | Terms & Conditions | Last Modified 18 July 2008






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Biomass combustion

- USA checklists provide new guidance for screening assessment of biomass boilers
- Considers both individual installations and combined impacts of small installations

Individual installations

- Guidance deals with biomass plant up to 2MWth
- Covers both NO₂ and PM₁₀
- Approach follows that for other industrial installations, but uses revised nomograms

Biomass combustion

Combined impacts

- Guidance deals with combined PM_{10} impacts from domestic and service sector heating
- Approach replaces guidance issued in TG03 for assessing PM_{10} emissions from domestic solid fuel burning
- Takes into account improved emissions performance of modern appliances
- Based on estimating emissions in 500x500m grid
 - Identify types of appliances
 - Calculate domestic emission from numbers of each appliance type multiplied by an annual household emission
 - Calculate service sector emissions from floorspace occupied by each appliance type multiplied by annual service sector emission
 - Calculate emissions density (kg PM_{10} per square)
 - Compare with nomogram

DMRB Model

Guidance will incorporate the revised DMRB model (currently being prepared by Highways Agency)

Current

- Professional judgement and manual measurements
- 1 receptor
- NO_x, NO₂, PM₁₀, CO, benzene, 1,3-butadiene
- Straight roads
- Doesn't consider road width
- Excel spreadsheet

Proposed

- Automated process
- Multi receptor
- NO_x, NO₂, PM₁₀, PM_{2.5}
- Complex road geometries
- Consider road width
- Excel spreadsheet & calculation engine for GIS
- Include revised DfT emissions rates
- Include revised background method and NO_x to NO₂ approach



Other Issues

- Railways – new requirement to consider NO_2 in close proximity to busy lines with diesel trains (screening criteria provided)
- Airports – threshold for assessment of NO_2 has been relaxed to 10 mppa. No requirement for PM_{10}
- Poultry farms – screening criteria provided based on size of installation and ventilation type



TG08 Consultation Website

- Various documents and reports available on website throughout (and following) consultation period

www.airquality.co.uk/archive/tg-08consult.php

- DfT are currently consulting on new emissions factors (closing date 24 Oct 2008)
 - Can't finalise final background maps
 - DMRB revision cannot be finalised

LAQM Helpdesks

Box 1.1: Helpdesks for Local Authorities

Helpdesk	Operated by	Contact Details
Review & Assessment	Air Quality Consultants and University of West of England, Bristol	0117 328 3668 aqm-review@uwe.ac.uk www.uwe.ac.uk/aqm/review
Local Authority Air Quality Support (Monitoring, Modelling and Emissions Inventories)	AEA Energy & Environment, Air Quality Consultants and Bureau Veritas	0870 190 6050 lasupport@aeat.co.uk laqmsupport.org.uk
Action plan	AEA Energy & Environment	0870 190 6050 lasupport@aeat.co.uk laqmsupport.org.uk

- Increasing proportion of information available via the Internet only
- Authorities should register with one of the Helpdesks – ensure updates are automatically notified