

Appendix 4

QA/QC

Environment Agency Mobile Monitoring Facility
North Lincolnshire Council's Air Quality Analysers
Benzene Diffusion Tube Survey

Environment Agency MMF - Quality Assurance and Quality Control

Quality assurance covers practices that are undertaken prior to data collection in order to ensure that the sampling arrangements and analysers are capable of providing reliable measurements. Quality Control covers practices applied after data collection in order to ensure that the measurements obtained are repeatable and traceable.

In order to ensure that data from the MMF are representative of pollutant concentrations and meet appropriate standards of quality, a number of QA and QC procedures are routinely implemented in the monitoring facility's execution.

Quality assurance included:

Training - all personnel involved with the running of the facility have received appropriate training in the execution of the tasks they are expected to undertake. This training has been recorded in the personal training log of the individuals concerned.

Procedures - all routine activities undertaken in the operation of the facility are clearly and unambiguously laid out in a documented set of procedures.

Analysers selection - careful consideration has been given to the choice of analysers, ensuring that they meet the required standards of accuracy and precision. Also that they can be relied on to be robust and flexible enough to present the data in a suitable format.

Trailer siting - attention is given to how representative the location of the facility is when compared against the objectives of the study.

Quality control included:

Routine calibration - calibrations are performed every two weeks, using traceable gas standards and any adjustments made to the analysers documented.

Routine maintenance - undertaking of stipulated checks and changes of filters.

Periodic maintenance - employment of a qualified engineer to service the analysers twice a year.

Instrument history - all invasive work carried out on analysers is documented and recorded.

Data review - all data is checked to ensure correct scaling, rejecting negative or out-of-range readings, questioning rapid excursions, generally considering the integrity of recorded levels.

Data handling - following recognised procedures to ensure that data capture is maximised. The data is analysed frequently so that measurements affected by instrument fault are recognised quickly.

Data comparison - comparing the collected data sets with data sets from other monitoring studies that are carried out in close enough proximity to be relevant. Consideration of the relationship between different pollutants i.e. some pollutant levels will be expected to rise and fall together.

Data rectification - the adjustment of data to minimise the effects of analyser drift.

Independent assessment - the analysers are regularly assessed by independent specialists to provide documented evidence that the analysers are performing to nationally accepted criteria.

North Lincolnshire Council's Air Quality Analysers

The air quality monitoring stations employed to gather data by North Lincolnshire Council at Killingholme and Keadby are part of the NETCEN Air Monitoring Calibration Club for the purposes of calibration of equipment, and the management and ratification of data. The purpose of the calibration club is to ensure that the data meets the QA/QC standards required by LAQM.TG(03).

The Calibration Club service provides regular compliance testing and calibration of monitoring equipment and data management, meeting the needs of the relevant legislation reducing the risk of the reporting of inaccurate data.

The service provides:

- Independent equipment audits at six-monthly intervals covering all measured pollutants including SO₂ and PM₁₀.
- Audit report and resulting advice on any necessary data management actions.
- UKAS certificate of calibration.
- Traceability to national metrology standards.
- Data collection, screening and provisional scaling;
- Full ratification of datasets;
- Ratified data comparable to that produced within the National Network
- Finalised datasets are provided along with the summary statistic report on a six-monthly basis.

The data management option ensures that automatic monitoring data is managed using the same procedures applied to UK government National Network monitoring stations.

North Lincolnshire Council's other air quality monitoring station, located in Scunthorpe, is affiliated to the national Automatic Urban Rural Network (AURN) and, as such, is subject to the same standards of calibration and data management as those sites in the 'Calibration Club'.

Benzene Diffusion Tube Surveys

Monitoring of benzene is carried out using Chromasorb ATD Tubes, which are supplied and analysed by Harwell Scientifics.

The samples are analysed by thermal desorption gas chromatography-mass spectrometry on a Perkin Elmer ATD.

The laboratory is fully accredited to BS EN ISO 9001 with UKAS accreditation for this analysis.

To ensure this laboratory performances are assessed on the basis of both the Workplace Analysis Scheme for Proficiency (WASP).

- **Workplace Analysis Scheme for Proficiency**

WASP involves analysis of doped tubes, allowing assessment of overall uniformity of data throughout the year. Performance scores are assigned to the reported analysis results, on the basis of their running performance index (RPI).

Results are classified as follows –

<i>Performance Category</i>	<i>RPI</i>
1	<73
2	73 to 310
3	>310

Harwell Scientifics' latest RPI score was 3 giving the laboratory a performance classification under WASP of 'Category 1'. Therefore, results from North Lincolnshire Council's diffusion tube network can be used with confidence.

Appendix 5

Summary of Environment Agency Air Quality Monitoring at Croxton

Environment Agency Study of Ambient Air Quality at Croxton

Summary

This summary provides the preliminary results from the study of ambient air quality in the vicinity of Croxton. The Environment Agency's Monitoring and Assessment (M&A) process carried out the study on behalf of Environment Agency Wales, between 21 January 2004 and 14 April 2004 (85 days).

M&A deployed its mobile monitoring facility (MMF) at the entrance of Croxton House Farm.

Tables 4.1 and 4.2 summarise the extent of likely compliance/exceedence for each of the species with respect to the AQS objectives at the monitoring site. Tables 4.3 to 4.4 summarise the extent of likely compliance, where appropriate, with other relevant standards. A projected compliance ratio ≤ 1 indicates compliance, whilst a value >1 indicates non-compliance.

Table 4.1 Impact summary for short-term air quality objectives.

Pollutant	Averaging Time	AQS	Standard	Maximum Concentration ($\mu\text{g}/\text{m}^3$)	Permitted Exceedance (A)	Measured Exceedance* (B)	Projected Compliance Ratio (B/A)
PM ₁₀	24-hr (midnight-midnight)	2000	50 $\mu\text{g}/\text{m}^3$	53.6	35/year	9/year	0.26
SO ₂	15-min	2000	266 $\mu\text{g}/\text{m}^3$	66.0	35/year	0/year	0.00
	1-hr	2000	350 $\mu\text{g}/\text{m}^3$	53.2	24/year	0/year	0.00
	24-hr (midnight-midnight)	2000	132 $\mu\text{g}/\text{m}^3$	15.4	3/year	0/year	0.00
NO ₂	1-hr	2000	200 $\mu\text{g}/\text{m}^3$	79.4	18/year	0/year	0.00
CO	8-hr	Addendum 2003	10 mg/m^3	0.54 mg/m^3	0/year	0/year	0.00

* Extrapolated from effective monitoring period

Table 4.2 Impact summary for long-term air quality objectives.

Pollutant	Averaging Time	AQS	Standard (A)	Measurement* (B)	Projected Compliance Ratio (B/A)
PM ₁₀	Year	2000	40 $\mu\text{g}/\text{m}^3$	23.9 $\mu\text{g}/\text{m}^3$	0.60
NO ₂	Year	2000	40 $\mu\text{g}/\text{m}^3$	22.2 $\mu\text{g}/\text{m}^3$	0.56

* Extrapolated from effective monitoring period

Table 4.3 Impact summary for other relevant^Δ, short-term standards.

Pollutant	Averaging Time	Standard	Limit	Permitted Exceedance (A)	Measured Exceedance* (B)	Projected Compliance Ratio (B/A)
PM ₁₀	24-hr (midnight-midnight)	Provisional AQS	50 $\mu\text{g}/\text{m}^3$	7/year	9/year	1.29

^Δ Provisional AQS objectives, purposed AQS objectives and 2000 NAQS objectives for the protection of vegetation and ecosystems.

- Extrapolated from effective monitoring period

Table 4.4 Impact summary for other relevant^Δ, long-term standards.

Pollutant	Averaging Time	Standard	Standard (A)	Measurement* (B)	Projected Compliance Ratio (B/A)
PM ₁₀	Year	Provisional AQS	20 µg/m ³	23.9µg/m ³	1.20
NO _x	Year	2000 AQS	30 µg/m ³	27.4µg/m ³	0.91
SO ₂	Year	2000 AQS	20 µg/m ³	4.4µg/m ³	0.22

Δ Provisional AQS objectives, purposed AQS objectives and 2000 NAQS objectives for the protection of vegetation and ecosystems.

* Extrapolated from effective monitoring period

Comparing the collected data from the monitoring at Croxton with the AQS objectives showed that the monitoring location was subject to concentrations of PM₁₀, SO₂, NO₂, NO_x and CO that were likely to meet their respective AQS objectives.

The AQS objective for the protection of vegetation and ecosystems has an annual standard for NO_x of 30µg/m³. The mean NO_x concentration during the period of study was 27.4 µg/m³, i.e. 91% of the AQS standard.

Although the concentration of PM₁₀ at the monitoring site did not exceed the current AQS objectives the levels exceeded both of the provisional PM₁₀ AQS objectives.

2 References

1. Department of the Environment (January 2000), *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, (HMSO)

Appendix 6

Glossary Of Terms

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AQMA	Air Quality Management Area. A legally defined area identified as one in which the statutory Air Quality Objectives will not be met. An action plan must be drawn up to improve air quality.
Air Quality Objective	An air quality standard that includes a date by which it must be achieved.
Air Quality Standard	The maximum acceptable level of a pollutant in the air that will not present a risk to the health of the most susceptible groups in the population.
Average Time	The period of time over which a pollutant level must be measured and the average result calculated. This can be a different period for each pollutant and directly affects which locations can be considered relevant.
C ₆ H ₆	Benzene.
CO	Carbon Monoxide.
DETR	Department of Environment, Transport and the Regions. The Government department responsible for U.K. air quality.
Diffusion Tube	A simple, cheap monitoring device. Can be subject to inaccuracies and can only be used to measure Air Quality Objectives over longer time periods such as year. Relatively cheap compared to continuous analysers so a larger number can be used.
Dispersion Model	A computer program which uses emissions inventory data and meteorological data to predict the concentration and distribution of pollutants in the atmosphere.
Emissions Inventory	A catalogue of the sources of a pollutant in an area, with information about their positions and the quantities emitted. Used in dispersion models.
EPAQS	The Expert Panel on Air Quality Standards. The U.K. group appointed by the government to set standards for maximum acceptable levels of pollutants.

Exceedence	Any period of time where the concentration of a pollutant is greater than the appropriate Air Quality Standard.
Fugitive Emissions	Emissions of pollutants from a vent point other than a stack.
$\mu\text{g}/\text{m}^3$	Micrograms per cubic metre.
mg/m^3	Milligrams per cubic metre.
NAQS	National Air Quality Strategy.
NO	Nitrogen Oxide.
NO ₂	Nitrogen Dioxide.
NO _x	Oxides of Nitrogen.
Part A Processes	An industrial process that is required to obtain authorisation from the Environment Agency. Regulation of the emissions to air is included in the authorised document.
Part B Processes	An industrial process that is required to obtain authorisation from the local authority in order to operate. Regulation of the emissions to air is included in the authorised document.
Particulates	Particles so small that they are suspended in the atmosphere, usually invisible, and small enough to be breathed in.
Pb	Lead.
Percentile	The percentage of items in a set of data lying above or below a particular value, e.g. concentration of a pollutant. For example for Nitrogen Dioxide the hourly mean of $200\mu\text{g}/\text{m}^3$ can be exceeded up to 18 times a year. This is the equivalent of the 99.8 th percentile being less than $200\mu\text{g}/\text{m}^3$ because in one year there are 8760 hours of which 18 hours are 0.2% so 99.8% must be lower than the objective.
PM ₁₀	Particulate matter less than 10 microns (millionths of a metre) in diameter.
ppb	Parts per billion.
ppm	Parts per million.

QA/QC	Quality Assurance/Quality Control. Procedures to ensure that data from pollutant monitoring equipment is representative of the site with good accuracy, precision and data capture.
Relevant Locations	These can differ for each pollutant according to the averaging period considered. Relevant locations are those areas where the public might reasonably be exposed to a pollutant over its averaging time. Long averaging times such as a year mean relevant locations could include schools, houses, hospitals etc. Short averaging times widen the scope, as less exposure time is needed.
Running Mean	As an example the air quality standard for Carbon Monoxide is 11.6mg/m^3 as a running 8-Hour Mean. To assess measured levels against this standard it is necessary to calculate the average of eight consecutive hourly values, e.g. from midnight to 8:00a.m. then from 1:00a.m. to 9:00a.m. and so on throughout the period of interest. As each calculation of the "Running 8-Hour Mean" gives a result there will be 24 opportunities for the standard to be assessed each day. This will hold true for whether an 8-Hour, 24- Hour or Annual Running Mean is the time period under consideration.
SO ₂	Sulphur Dioxide.

