

WASP – Annual Performance Criteria for NO₂ Diffusion Tubes used in Local Air Quality Management (LAQM), 2008 onwards, and Summary of Laboratory Performance in Rounds 98-102.

Prepared by AEA on behalf of Defra and the Devolved Administrations.

Introduction

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL).

WASP formed a key part of the former UK NO₂ Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The WASP scheme is operated independently by HSL. The cost of operating the WASP scheme itself is borne by the laboratories, who pay an annual fee to HSL.

However, Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the WASP scheme. For this reason, although WASP remains an independent proficiency testing scheme, laboratory performance in WASP is also assessed by AEA, according to criteria which have been agreed with Defra, the Devolved Administrations and HSL. (This forms part of AEA's work for Defra and the Devolved Administrations under their contract "Support to Local Authorities for LAQM").

AEA, in co-operation with HSL, have therefore compiled the list below, which is posted on the LA Air Quality Support web-pages at <http://www.laqmsupport.org.uk/index.php> , of the laboratories who have demonstrated satisfactory performance in WASP over the past year. This list is to be updated quarterly. It should be noted that WASP results themselves are not shown, as they are subject to certain confidentiality provisions. Also, only those laboratories who have met the agreed performance criteria are included. If information on any laboratory's performance is required, please contact the laboratory directly.

About the WASP Scheme

The WASP performance testing scheme uses artificially spiked diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis. Every quarter, (in January, April, July and October each year) each laboratory (of which there are currently approximately 20) receives four diffusion tubes doped with an amount of nitrite known to HSL but not the participants. At least two of the tubes are usually duplicates, which enables precision, as well as accuracy, to be assessed. The mass of nitrite on the spiked tubes is different each quarter, and reflects the range encountered in actual ambient monitoring. (HSL advises that the spike levels are accurate, with standard deviation around 0.5%). The participants analyse the tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

Performance scores are currently based upon the Z-score statistic but HSL are moving towards a scoring system based on the Rolling Performance Indicator from April 2009, and it is this new scoring system which is used here. Results are communicated to each participating laboratory (and to AEA), by HSL.

Performance Index

The Performance Index statistic is calculated from the four sample results in each round, as specified in Appendix 1 of the WASP participants' handbook¹¹ (at <http://www.hsl.gov.uk/proficiency-testing/waspinfo.pdf>). This is calculated as in Equation 1:

Equation 1:

$$\text{Performance Index} = \frac{\sum_{s=1}^4 \left(\frac{x_s}{\bar{x}} - 1 \right)^2 \times 10,000}{4}$$

- where x_s is the result obtained by the laboratory for sample number s (of four), and \bar{x} is the assigned value for sample 's'. (The ratio x_s / \bar{x} is the "standardised result", i.e. the result obtained by the participant, divided by the "assigned value".) (The multiplication factor of 10,000 is arbitrary, to avoid having to deal with very small numbers).

Rolling Performance Index

The Rolling Performance Index (RPI) allows long-term trends in performance to be monitored. It is calculated as the arithmetic mean of the *best four Performance Index values from the most recent five rounds*, as also specified in Appendix 1 of the WASP participants' handbook. (If a participant has participated in less than four of the last five rounds, it is not possible to calculate an RPI).

Performance Criteria

The performance criteria set by HSL for accuracy *at present* are as based on the z-score method, not the PI or RPI, but equate to the following:

- **GOOD:** Results obtained by the participating laboratory are on average within 13% of the assigned value. This equates to an **RPI of 169 or less**.
- **ACCEPTABLE:** Results obtained by the participating laboratory are on average within 13- 26% of the assigned value. This equates to an **RPI of 169 - 676**.
- **WARNING:** Results obtained by the participating laboratory are on average within 26 – 39% of the assigned value. This equates to an **RPI of 676 - 1521**.
- **FAILURE:** Results obtained by the participating laboratory differ by more than 39% of the assigned value. This equates to an **RPI of greater than 1521**.

As of Round 105 (April 2009), the performance criteria set by HSL will be based upon the RPI statistic, and will be tightened to the following:

- **GOOD:** Results obtained by the participating laboratory are on average within 7.5% of the assigned value. This equates to an **RPI of 56.25 or less**.
- **ACCEPTABLE:** Results obtained by the participating laboratory are on average within 15% of the assigned value. This equates to an **RPI of 225 or less**.
- **UNACCEPTABLE:** Results obtained by the participating laboratory differ by more than 15% of the assigned value. This equates to an **RPI of greater than 225**.

Both sets of performance criteria that have been used to compile Table 1 below, which shows laboratories which have demonstrated acceptable performance in the WASP scheme, over rounds 98 (July 2007) to 102 (July 2008). Due to WASP's confidentiality provisions, laboratories that have not demonstrated satisfactory performance over the past five rounds (based on the new criteria) are not included.

Table 1 Laboratories that have demonstrated satisfactory performance in the WASP scheme for analysis of NO₂ diffusion tubes, July 2007 – July 2008.

Laboratory	Performance on basis of RPI, OLD CRITERIA, best 4 out of the 5 rounds 98 – 102	Performance on basis of RPI, NEW CRITERIA, best 4 out of the 5 rounds 98 – 102
Aberdeen Public Analysts	Good	Good
Bodycote Clyde Analytical	Good	Acceptable
Bristol City Council	Good	Good
Cardiff Scientific Services	Good	Good
Dundee City Council	Good	Acceptable
Edinburgh City Council	Good	Good
Glasgow Scientific Services	Good	Good
Gradko	Good	Good
Harwell Scientifics	Good	Good
Jesmond Dene Lab	Good	Acceptable
Kent Scientific Services	Good	Acceptable
Kirklees MBC	Good	Acceptable
Lambeth Scientific Services	Good	Acceptable
Milton Keynes Council	Acceptable	Acceptable
Northampton Borough Council	Good	Good
South Yorkshire Laboratories	Good	Good
Staffordshire County Council	Good	Acceptable
University of Essex	Good	Good
Walsall MBC	Good	Acceptable
West Yorks Analytical Services	Good	Good

For further information about any particular laboratory's performance, please contact the laboratory directly.

If you have any questions about these performance criteria, or the context in which they apply, please contact Alison Loader at AEA, on 0870 190 6518, or e-mail alison.loader@aeat.co.uk. For more general enquiries about the WASP scheme, please contact Hannah Clark at HSL, hannah.clark@hsl.gov.uk.

¹ The Health & Safety Laboratory: "WASP The Workplace Analysis Scheme for Proficiency - Information For Participants" Buxton, 2004.