AIR PT

Air and Stack Emissions Proficiency Testing Scheme

Scheme Description

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LGC is the accredited PT provider of this scheme

Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
1	Feb 2014	Issue number one produced as a result of the combination of the WASP and STACKS proficiency testing schemes.	M. Whetton
2	Sept 2014	Additional samples added: 9, 10, 14 and 41.	M. Whetton
3	Jan 2015	Added Acetaldehyde to sample 8. Added new sample 15 for Lactose. Amended sample 10 to be 10A, 10B and 10C with the different matrices specified.	M. Whetton
4	March 2015	Amendments to sample 8 - Analyte names and the reporting units.	M. Whetton
5	September 2015	Changes to the accreditation status for a number of samples.	M. Whetton
6	January 2016	Added new samples for 1A metals on 37mm cassette capsules, 12A VOCs on Carbopack X filled sorbent tubes and 22 for qualitative VOC on Tenax. Number of blank filters supplied for sample 8 Aldehydes increased to three. Removed Hard Copy reports section	M. Whetton A. McCarthy
7	January 2017	New trial diesel fume sample 16 added, new gravimetric sample 17 added. Inclusion of Appendix B; a list of potential compounds for sample 22.	R. Sharma
8	January 2018	New sample 18 added for Beryllium. SPDA set to 10% for sample 40. Amendments to Sample 1/1a – changes to spiking levels. Amendments to Sample 21 – a-pinene removed and replaced with diacetyl (not accredited). Samples 9, 14, 22 and 40 now accredited.	R. Sharma
9	Dec 2018	New sample 1B and IC. Revision of Sample 2 as 2F, 2X and 2I options. Removal of sample 10C and 41. List of potential compounds for sample 22 updated. Website information added to page 3	R. Sharma A. McCarthy

Notes:
Where this document has been translated, the English version shall remain the definitive version

Scheme Aims and Organisation

The Air & Stack Emissions (AIR) Proficiency testing (PT) scheme combines the materials previously offered by the WASP PT scheme, operated by HSL, and the STACKS PT scheme, provided by LGC. This scheme is managed and operated by LGC Standards Proficiency Testing and is supported through technical advice from HSL.

The primary aim of the AIR PT scheme is to enable laboratories performing the analysis of air sampling media (filters, sorbent tubes and stack/impinger solutions) to monitor their performance and compare it with that of their peers. AIR PT also aims to provide information to participants on technical issues and methodologies relating to testing of these test materials.

The AIR PT scheme has been designed to provide external quality assurance for laboratories carrying out chemical analysis of workplace air samples. In many countries, legislation exists to control the exposure of workers to hazardous chemicals, in order to ensure that any risk to personnel is minimised. This may include measurement to assess exposures and to test the effectiveness of containment or ventilation. In response to increasing regulatory requirements, the scheme has subsequently expanded in providing test samples for laboratories undertaking ambient air analysis and for laboratories undertaking material emission testing.

Similarly, legislation exists to control atmospheric pollution, requiring the monitoring of chimney stacks. The AIR PT scheme has been designed to provide external quality assurance for laboratories carrying out chemical analysis of air samples derived from such point sources.

The AIR PT scheme year operates from April to March. Further information about AIR including test material availability, round despatch dates, and reporting deadlines for each round, is available on the current AIR application form and on the LGC website www.lgcstandards.com.

Test Materials

Details of test materials available in the AIR PT scheme are given in Appendix A. The test parameters are continually reviewed to ensure they meet the needs of current laboratory testing and regulatory requirements.

In each distribution (round) participants will receive up to four test specimens, dependant on the sample type that they have subscribed to. Each test specimen can contain one or more measurands (analytes) prepared at various concentrations on appropriate sampling media. Blank media may also be supplied, where appropriate.

Test material batches are tested for homogeneity for at least one test parameter where it is deemed appropriate, to ensure the samples are fit for their intended use. Details of homogeneity tests performed, results and assessment are provided in the AIR PT Scheme Reports.

Further details regarding the sample types, measurands, spike concentrations, preparation and checking of test materials and references to suitable standard methods that may be employed to analyse such samples are available on request.

Some aspects of the scheme, such as test material production, homogeneity testing and stability assessment, can from time to time be subcontracted. When subcontracting occurs, it is placed with a competent subcontractor and LGC is responsible for this work. The planning of the scheme, the evaluation of performance and the authorisation of the final report will never be subcontracted.

Statistical Analysis

Information on the statistical methods used in the AIR PT scheme can be found in the LGC, General Protocol and in the reports provided for the scheme. Methods for determining assigned values and the values for SDPA used for individual samples are provided in Appendix A.

Methods

Methods are listed in Appendix A and PORTAL. Please select the most appropriate method from the list. If none of the methods are appropriate, then please report your method as 'Other' and record a brief description in the Comments Section in PORTAL.

Results and Reports

AIR PT results are returned through our electronic reporting software, PORTAL, full instructions for which are provided by email. However, participants may request result submission forms on which to report and return results if they are unable to report through electronic means. This will incur an additional charge.

AIR PT reports will be available on the website within 10 working days of round closure. Participants will be emailed a link to the report when it is available.

For some samples previously provided in the WASP PT scheme, arrangements exist to permit the release of results and laboratory identity in specific circumstances only. These are:

- Enrolment in AIR PT for samples 7, 8 and 12 only for those laboratories joining via AIHA Industrial Hygiene Proficiency Analytical Testing (IHPAT) program requires agreement on behalf of these participants that the results shall be released to AIHA Laboratory Accreditation Programs (AIHA-LAP) for accreditation purposes.
- Enrolment in AIR PT by UK laboratories, for sample 11 only, requires agreement on behalf of these participants that summary performance shall be released to the UK Department, Food and Rural Affairs (DEFRA) and subsequently published on the DEFRA Local Air Quality Management (AQM) website.

APPENDIX A - Description of abbreviations used

Assigned Value (AV)

The assigned value may be derived in the following ways:

- From the robust mean (RMean). This is the median of participant results after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. Generally, the assigned value will be set using results from all methods, unless the measurement is considered method-dependant, in which case the assigned value will be set by method as illustrated in the report tables.
  For some analytes, where there is a recognised reference method for that type of measurement, this may be used as the assigned value for a particular analyte i.e. it would be applied to results obtained by any method.

  Traceability: Assigned values which are derived from the participant results, or a sub-set of the results are not traceable to an international measurement standard. The uncertainty of assigned values derived in this way is estimated from the participant results, according to ISO 13528.

- From a formulation value (Formulation). This denotes the use of an assigned value derived from sample preparation details, where known and exact quantities of analyte have been used to prepare the sample.

  Traceability: Assigned values calculated from the formulation of the test sample are traceable, via an unbroken metrological traceability chain, to an international measurement standard. The measurement uncertainty of the assigned value is calculated using the contributions from each calibration in the traceability chain.

- From a qualitative formulation (Qual Form). This applies to qualitative tests where the assigned value is simply based on the presence/absence of the analyte in the test material.

  Traceability: Assigned values calculated from the qualitative formulation of the test sample are traceable to a certified reference standard or a microbiological reference strain.

- From expert labs (Expert). The assigned value for the analyte is provided by an 'expert' laboratory.

  Traceability: Assigned values provided by an 'expert' laboratory may be traceable to an international measurement standard, according to the laboratory and the method used. The uncertainty of measurement for an assigned value produced in this way will be provided by the laboratory undertaking the analysis. Details of traceability and the associated uncertainty will be provided in the report for the scheme/round.

Range

This indicates the concentration range at which the analyte may be present in the test material.

SDPA
SDPA represents the ‘standard deviation for proficiency assessment’ which is used to assess participant performance for the measurement of each analyte. This may be a fixed value (as stated), a percentage (%) of the assigned value or based on the robust standard deviation of the participant measurement results, either across all methods or by method depending on whether the measurement made is method dependent (see assigned value).

Units
This indicates the units used for the assessment of data. These are the units in which participants should report their results. For some analytes in some schemes participants may have a choice of which units to report their results, however, the units stipulated in this scheme description are the default units to which any results reported using allowable alternative results will be converted to.

DP
This indicates the number of decimal places to which participants should report their measurement results.

Workplace Air Samples

Sample 1 **Metals**
Supplied as: 4 x 25 mm diameter mixed cellulose ester filter spiked with metal solutions plus 2 x blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Cadmium	All	Robust Mean	5-50	5%	ug	1
Chromium	All	Robust Mean	10-200	5%	ug	1
Cobalt	All	Robust Mean	10-200	5%	ug	1
Copper	All	Robust Mean	10-200	5%	ug	1
Iron	All	Robust Mean	10-250	5%	ug	1
Manganese*	All	Robust Mean	10-200	5%	ug	1
Nickel	All	Robust Mean	10-200	5%	ug	1
Lead	All	Robust Mean	10-200	5%	ug	1
Zinc	All	Robust Mean	10-200	5%	ug	1

*For this sample, the manganese measurand is not included in LGC's UKAS scope of accreditation.

Sample 1A** **Metals**
Supplied as: 4 x 37 mm diameter cellulose acetate "cassette capsule" spiked with metal solutions plus 2 x blank capsules

Analyte	Method	AV	Range	SDPA	Units	DP
Cadmium	All	Robust Mean	5-50	5%	ug	1
Chromium	All	Robust Mean	10-200	5%	ug	1
Cobalt	All	Robust Mean	10-200	5%	ug	1
Copper	All	Robust Mean	10-200	5%	ug	1
Iron	All	Robust Mean	10-250	5%	ug	1
Manganese	All	Robust Mean	10-200	5%	ug	1
Nickel	All	Robust Mean	10-200	5%	ug	1
Lead	All	Robust Mean	10-200	5%	ug	1
Zinc	All	Robust Mean	10-200	5%	ug	1

** This sample is not included in LGC's UKAS scope of accreditation.

Sample 1B** **Metals**
Supplied as: 4 x 37 mm diameter mixed cellulose ester filters spiked with metal solutions plus 2 x blank capsules

Analyte	Method	AV	Range	SDPA	Units	DP
Cadmium	All	Robust Mean	5-50	5%	ug	1
Chromium	All	Robust Mean	10-200	5%	ug	1
Cobalt	All	Robust Mean	10-200	5%	ug	1
Copper	All	Robust Mean	10-200	5%	ug	1
Iron	All	Robust Mean	10-250	5%	ug	1
Manganese	All	Robust Mean	10-200	5%	ug	1
Nickel	All	Robust Mean	10-200	5%	ug	1
Lead	All	Robust Mean	10-200	5%	ug	1
Zinc	All	Robust Mean	10-200	5%	ug	1

** This sample is not included in LGC's UKAS scope of accreditation.

Sample 1C** **Metals**
Supplied as: 4 x 25 mm diameter 'Zefon Disposable Inhalable Sampler' mixed cellulose ester filter inserts spiked with metal solutions plus 2 x blank filter inserts

Analyte	Method	AV	Range	SDPA	Units	DP
Cadmium	All	Robust Mean	5-50	5%	ug	1
Chromium	All	Robust Mean	10-200	5%	ug	1
Cobalt	All	Robust Mean	10-200	5%	ug	1
Copper	All	Robust Mean	10-200	5%	ug	1
Iron	All	Robust Mean	10-250	5%	ug	1
Manganese	All	Robust Mean	10-200	5%	ug	1
Nickel	All	Robust Mean	10-200	5%	ug	1
Lead	All	Robust Mean	10-200	5%	ug	1
Zinc	All	Robust Mean	10-200	5%	ug	1

** This sample is not included in LGC's UKAS scope of accreditation.

Sample 2 **Direct on filter measurement of Quartz**
Supplied as: 4 x 25 mm diameter PVC filters (GLA5000) loaded with aerosolised quartz by employing the BCIRA respirable sampler (Higgins-Dewell design). One blank filter supplied for participants using XRD technique (sample 2X), up to four blank filters for participants using FTIR technique (sample 2F).

Analyte	Method	AV	Range	SDPA	Units	DP
Respirable grade quartz	All	Robust Mean	60-460	10%	ug	1

Sample 2I **Indirect measurement of Quartz by ashing and redeposition onto analytical filter or by KBr disc**
Supplied as: 4 x 25 mm diameter PVC filters (GLA5000) loaded with aerosolised quartz by employing the BCIRA respirable sampler (Higgins-Dewell design). One blank filter supplied for participants (Sample 2I).

Analyte	Method	AV	Range	SDPA	Units	DP
Respirable grade quartz	All	Robust Mean	60-460	10%	ug	1

Sample 3 **Filters, dust analysis**
Supplied as: 4 x 25mm diameter glass fibre (GFA) filters, will be spiked with sodium borate salt as a mass surrogate plus 3 x blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Mass of solids	Gravimetry	Robust Mean	0.2-2.0	10%	mg	3

Sample 4 **Filters, dust analysis**
Supplied as: 4 x 37mm diameter glass fibre (GFA) filters, will be spiked with sodium borate salt as a mass surrogate plus 3 x blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Mass of solids	Gravimetry	Robust Mean	0.2-2.0	10%	mg	3

Sample 5 **Volatile Organic Compounds**
Supplied as: 4 x charcoal filled glass sorbent tubes dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by solvent desorption plus 4 x blank sorbent tubes. Two of these blank sorbent tubes are unopened to be used if required by participant for internal spike recovery tests

Analyte	Method	AV	Range	SDPA	Units	DP
Benzene	All	Robust Mean	10-400	5%	ug	1
Toluene	All	Robust Mean	50-2500	5%	ug	1
Xylene (all isomers)	All	Robust Mean	50-5000	5%	ug	1
Ethyl benzene	All	Robust Mean	20-400	5%	ug	1

Sample 6 **Volatile Organic Compounds**
Supplied as: 4 x charcoal filled glass sorbent tubes dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by solvent desorption plus 4 x blank sorbent tubes. Two of these blank sorbent tubes are unopened to be used if required by participant for internal spike recovery tests.

Analyte	Method	AV	Range	SDPA	Units	DP
1,1,1,-trichloroethane	All	Robust Mean	250-12000	5%	ug	1
n-hexane	All	Robust Mean	25-1000	5%	ug	1
n-butyl acetate	All	Robust Mean	250-12000	5%	ug	1
Trichloroethylene	All	Robust Mean	80-7000	5%	ug	1
Tetrachloroethene	All	Robust Mean	100-4000	5%	ug	1

Sample 7 **Volatile Organic Compounds**
Supplied as: 4 x Tenax TA filled sorbent tubes (Perkin Elmer type-6.4mm OD, 5 mm ID and 90 mm long) dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by thermal desorption plus 2 x blank sorbent tubes.

Analyte	Method	AV	Range	SDPA	Units	DP
Benzene	All	Robust Mean	0.5-15	5%	ug	1
Toluene	All	Robust Mean	2-200	5%	ug	1
Xylene (all isomers)	All	Robust Mean	2-200	5%	ug	1
Ethyl benzene	All	Robust Mean	0.5-50	5%	ug	1

Sample 8 **Aldehydes**
Supplied as: 4 x 25 mm diameter glass fibre filters (GFA) spiked with formaldehyde and acetaldehyde, 2,4,DNPH derivatives, plus 3 x DNPH only treated blanks.

Analyte	Method	AV	Range	SDPA	Units	DP
Formaldehyde	All	Robust Mean	1.5-30	5%	ug	2
Acetaldehyde	All	Robust Mean	1.5-30	5%	ug	2

Sample 9 **Chromium (VI)**
Supplied as: 4 x 25 mm diameter NaOH treated Millipore PVDF filters spiked with Cr(VI) plus 2 x NaOH only blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Chromium (VI)	All	Formulation	5-50	10%	ug	1

Sample 10A / 10B* ** **Metals in Dust**
Supplied as: 1 x powder sample reflecting metal containing dusts/fumes encountered in the workplace environment. Sample matrices:

10A: Welding fume derived from mild and stainless steel welding process.

Analyte*	Method	AV **	Range	SDPA	Units	DP
Chromium	All	Formulation/Expert	0.1-20	10%	% (m/m)	2
Cobalt	All	Formulation/Expert	0.1-20	10%	% (m/m)	2
Copper	All	Formulation/Expert	0.1-20	10%	% (m/m)	2
Iron	All	Formulation/Expert	0.1-70	10%	% (m/m)	2
Manganese	All	Formulation/Expert	0.1-30	10%	% (m/m)	2
Nickel	All	Formulation/Expert	0.1-20	10%	% (m/m)	2
Zinc	All	Formulation/Expert	0.1-30	10%	% (m/m)	2

10B: Lead containing dusts

Analyte	Method	AV **	Range	SDPA	Units	DP
Lead	All	Formulation/Expert	0.1-50	10%	% (m/m)	2

*One or more of the above elements will be included in each round.
**Depending upon the dust sample selected either a formulation or an expert value will be used. The AV used will be documented in the round report
***These samples 10A and 10B are <u>not</u> included in LGC's UKAS scope of accreditation.

Sample 15** **Lactose**
Supplied as: 4 x 25 mm diameter glass fibre filters (GFA) spiked with lactose plus 2 x blank filters and based upon analytical procedures recommended by the International Society for Pharmaceutical Engineering in their good practice guide: assessing the particulate containment performance of pharmaceutical equipment.

Analyte	Method	AV	Range	SDPA	Units	DP
Lactose	All	Robust mean	5 - 250	10 %	ng	1

**This sample is not included in LGC's UKAS scope of accreditation.

Sample 16** **Diesel Fume**
Supplied as: 4 x 25 mm diameter quartz fibre filters loaded with diesel fume plus 3 x blank filters (for analysis in accordance with NIOSH 5040, VDI 2465 part 2 or equivalent).

Analyte	Method	AV	Range	SDPA	Units	DP
Elemental carbon	All	Robust mean	10 - 250	Robust SD	ug	1

**This sample is not included in LGC's UKAS scope of accreditation.

Sample 18** **Beryllium**
Supplied as: 4 x 37 mm diameter mixed cellulose ester filter spiked with beryllium solutions plus 2 x blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Beryllium	All	Formulation	0.02 - 20	10%	ug	1

** This sample is not included in LGC's UKAS scope of accreditation.

Ambient Air Samples

Sample 11 **Nitrogen Dioxide**
Supplied as: 4 x Palmes-type diffusion tubes spiked with sodium nitrite as a surrogate for Nitrogen dioxide (NO_2)

Analyte	Method	AV	Range	SDPA	Units	DP
NO_2 as nitrite	All	Robust Mean	0.4-3	7.5%	ug	2

Sample 12 **Volatile Organic Compounds**
Supplied as: 4 x Tenax TA filled sorbent tubes (Perkin Elmer type - 6.4mm OD, 5 mm ID and 90 mm long) dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by thermal desorption plus 2 x blank sorbent tubes

Analyte	Method	AV	Range	SDPA	Units	DP
Benzene	All	Robust Mean	25-1000	7.5%	ng	1
Toluene	All	Robust Mean		7.5%	ng	1
Xylene (all isomers)	All	Robust Mean		7.5%	ng	1
Ethyl benzene	All	Robust Mean		7.5%	ng	1

Sample 12A** **Volatile Organic Compounds (Fenceline monitoring according to EPA 325B)**
Supplied as: 4 x Carbopack X filled sorbent tubes (Perkin Elmer type - 6.4mm OD, 5mm ID and 90mm long) dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by thermal desorption plus 2 x blank sorbent tubes

Analyte	Method	AV	Range	SDPA	Units	DP
Benzene	All	Robust Mean	25-1000	7.5%	ng	1
Toluene	All	Robust Mean		7.5%	ng	1
Xylene (all isomers)	All	Robust Mean		7.5%	ng	1
Ethyl benzene	All	Robust Mean		7.5%	ng	1

**This sample is <u>not</u> included in LGC's UKAS scope of accreditation.

Sample 13** **Metals at Ambient air concentrations**
Supplied as: 4 x 47 mm diameter quartz fibre filters spiked with metal solutions plus 2 x blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Cadmium	All	Formulation	10-500	10%	ng	1
Nickel	All	Formulation	50-15,000	10%	ng	1
Lead	All	Formulation	1000-20,000	10%	ng	1
Arsenic	All	Formulation	10-500	10%	ng	1

**This sample is not included in LGC's UKAS scope of accreditation.

Sample 14 **Anions on filters**
Supplied as: 4 x 47 mm diameter quartz filters spiked with anion solutions plus 2 x blank filters.

Analyte	Method	AV	Range	SDPA	Units	DP
Chloride	All	Formulation	5-50	10%	ug	1
Nitrate	All	Formulation	5-50	10%	ug	1
Sulfate	All	Formulation	5-50	10%	ug	1

Sample 17** **Filters, dust analysis**
Supplied as: 4 x 47 mm diameter quartz fibre filters, will be spiked with sodium borate salt as a mass surrogate plus 3 x blank filters (for analysis in accordance with EN 12341).

Analyte	Method	AV	Range	SDPA	Units	DP
Mass of solids	All	Robust Mean	0.2-8.0	10%	mg	3

**This sample is not included in LGC's UKAS scope of accreditation.

Indoor/Chamber Air Samples

Sample 21 **Volatile Organic Compounds at Chamber air concentrations**
Supplied as: 4 x Tenax TA filled sorbent tubes (Perkin Elmer type - 6.4mm OD, 5 mm ID and 90 mm long) dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by thermal desorption plus 2 x blank sorbent tubes.

Analyte	Method	AV	Range	SDPA	Units	DP
n-hexane, Benzene, MIBK, Toluene, Butyl acetate, Cyclohexanone, p-Xylene, Diacetyl*, Phenol, 124-TMB, Limonene, 4-PCH, Dodecane	All	Robust Mean	25-1000	15%	ng	0

*For this sample, the diacetyl measurand is not included in LGC's UKAS scope of accreditation.

Sample 22 **Qualitative determination of Volatile Organic Compounds**
Supplied as: 2 x Tenax TA filled sorbent tubes (Perkin Elmer type - 6.4mm OD, 5 mm ID and 90 mm long) dynamically loaded from the gas phase (prepared in accordance with procedures set out in ISO 6145 part 4) for analysis by thermal desorption plus 2 x blank sorbent tubes.

Analyte	Method	AV	Range	SDPA	Units	DP
Qualitative determination of VOCs including alcohol, aliphatic, aromatic, ester, halocarbon and terpene compounds	All	Formulation	25-1000	N/A	ng	N/A

A list of potential compounds is provided in Appendix B.

STACK EMISSIONS Samples

Sample 31 **Mercury**
Supplied as: 1 x variable volume 2.2% m/m potassium permanganate/6% m/m sulphuric acid impinger solution (prepared in accordance with BS EN 13211) containing mercury.

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	90-110	5%	mL	0
Mercury	All	Formulation	0.005-0.5	25%	mg/L	3

Sample 32 **Mercury**
Supplied as: Up to 2 x variable volume 4% m/m potassium dichromate/20% m/m nitric acid impinger solution (prepared in accordance with BS EN 13211) containing mercury

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	100-200	5%	mL	0
Mercury	All	Formulation	0.005-0.5	25%	mg/L	3

Sample 33 **Metals**
Supplied as: 1 x variable volume 3.3% nitric acid impinger solution (prepared in accordance with BS EN 14385) containing trace elements

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	150-300	5%	mL	0
Antimony	All	Formulation	0.005-0.5	5%	mg/L	3
Arsenic	All	Formulation	0.005-0.5	5%	mg/L	3
Cadmium	All	Formulation	0.005-0.5	5%	mg/L	3
Chromium	All	Formulation	0.005-0.5	5%	mg/L	3
Cobalt	All	Formulation	0.005-0.5	5%	mg/L	3
Copper	All	Formulation	0.005-0.5	5%	mg/L	3
Lead	All	Formulation	0.005-0.5	5%	mg/L	3
Manganese	All	Formulation	0.005-0.5	5%	mg/L	3
Nickel	All	Formulation	0.005-0.5	5%	mg/L	3
Thallium	All	Formulation	0.005-0.5	5%	mg/L	3
Vanadium	All	Formulation	0.005-0.5	5%	mg/L	3

Up to six of the trace elements listed above will be included in each round

Sample 34 **Sulfur dioxide**
Supplied as: 1 x variable volume hydrogen peroxide impinger solution (prepared in accordance with BS EN 14791) containing sulfur dioxide. Sulfur dioxide is determined by the measurement of sulfate (SO_4) present in the solution.

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	150-400	5%	mL	0
Sulfur dioxide	All	Formulation	0.2-25	10%	mgSO_4/L	2

Sample 35 **Hydrogen fluoride**
Supplied as: 1 x variable volume 0.1M sodium hydroxide impinger solution (prepared in accordance with BS EN 15713) containing hydrogen fluoride

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	150-250	5%	mL	0
Hydrogen fluoride	All	Formulation	0.02-1	10%	mgHF/L	2

Sample 36 **HCl (hydrogen chloride and hydrochloric acid)**
Supplied as: 1 x variable volume impinger solution (prepared using chloride-free reagents, in accordance with BS EN 1911-2) containing hydrogen chloride

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	150-300	5%	mL	0
Hydrogen chloride	All	Formulation	0.2-20	10%	mgHCl/L	2

Sample 37 **Ammonia**
Supplied as: 1 x variable volume 0.28% sulfuric acid impinger solution (prepared in accordance with US EPA method 26) containing ammonia

Analyte	Method	AV	Range	SDPA	Units	DP
Volume	Various	Formulation	150-400	5%	mL	0
Ammonia	All	Formulation	0.2-20	10%	mgNH_3/L	2

Sample 38** **Metals (on filters)**
Supplied as: 1 x 47 mm diameter Quartz filter containing trace elements and fly ash (prepared in accordance with BS EN 14385)

Analyte*	Method	AV	Range	SDPA	Units	DP
Antimony	All	Formulation	1-500	10%	ug	1
Arsenic	All	Formulation	1-500	10%	ug	1
Cadmium	All	Formulation	1-500	10%	ug	1
Chromium	All	Formulation	1-500	10%	ug	1
Cobalt	All	Formulation	1-500	10%	ug	1
Copper	All	Formulation	1-500	10%	ug	1
Lead	All	Formulation	1-500	10%	ug	1
Manganese	All	Formulation	1-500	10%	ug	1
Nickel	All	Formulation	1-500	10%	ug	1
Thallium	All	Formulation	1-500	10%	ug	1
Vanadium	All	Formulation	1-500	10%	ug	1

*Up to six of the trace elements listed above will be included in each round.
**This sample is not included in LGC's UKAS scope of accreditation.

Sample 39** **Rinsing solution, dust analysis (by Gravimetry)**
Supplied as: 1 x 250mL rinsing solution containing dissolved and suspended solids (prepared in accordance with EN 13284-1)

Analyte	Method	AV	Range	SDPA	Units	DP
Total Solids	Gravimetry	Formulation	2.5-20	Robust SD	mg	2

**This sample is not included in LGC's UKAS scope of accreditation.

Sample 40 **Filters, dust analysis (by Gravimetry)**
Supplied as: 4 x 47mm diameter Quartz filters, will be spiked with potassium hydrogen phthalate salt as mass surrogate (for analysis in accordance with EN 13284-1)

Analyte	Method	AV	Range	SDPA	Units	DP
Mass of solids	Gravimetry	Robust Mean	2.5-20	10%	mg	2

APPENDIX B – Potential Compounds

Chemical
1-Methoxy-2-propanol (propylene glycol monomethyl ether)
1-Methoxy-2-propylacetate (propylene glycol monomethyl ether acetate)
1,2-Dichlorobenzene
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
1,4-Dichlorobenzene
1,4-Dioxane
2-Butoxyethyl acetate
2-Ethyl-1-hexanol
2-Methyl-2-butanol
2-Phenoxyethanol
2,3-Pentanedione
2,4-Dimethylphenol
4-Methylpentan-2-ol
a-Pinene
a-Terpineol
Benzene
Benzyl chloride
Butan-2-ol
Butoxyethanol
Butyl acrylate
Camphene
Cumene
Cyclohexane
Cyclohexene
Chlorobenzene
Decamethyltetrasiloxane
Diacetone alcohol
Diacetyl (2,3-Butanedione)
Ethyl acrylate
Ethylbenzene
Furfural
g-Terpinene

Chemical
Isobutyl acetate
Isobutanol
Isooctane (2,2,4-Trimethylpentane)
Limonene
Linalool
Octamethylcyclotetrasiloxane (OMCTS)
Methylcyclopentane
Methyl ethyl ketone
Methyl isobutyl ketone
Methyl methacrylate
Methyl salicylate
m-Cresol
n-Butanol
n-Butyl acetate
n-Dodecane
n-Hexane
n-Octane
n-Nonane
n-Propyl acetate
Naphthalene
N-Methyl-2-pyrrolidinone (NMP)
Octan-3-one
Pentan-2-one
p-Xylene
Phenol
Propylbenzene
o-Xylene
Styrene
Tetrachloroethylene
Tetrahydrofuran
Tetralin (1,2,3,4-Tetrahydronaphthalane)
Toluene
Trichloroethylene