QWAS

Quality in Water Analysis Scheme

Scheme Description

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ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
2	01/09/08	Updated with UKAS logo for single scope (0001) and removed reference to scheme year. Updated procedures for electronic reporting.	T.Noblett
3	06/08/09	Operational issues common to all schemes moved to General Protocol. List of abbreviations added. New PORTAL system added. Change SDPA for 416. Added 422 details in Appendix A.	T.Noblett
4	Aug 2010	Addition of new sample 423. Changes in descriptions of samples 413, 417/8, 421.	T.Noblett
5	Jan 2011	Change of address. Addition of yeast and mould as separate parameters.	N. Stephenson
6	May 2011	Addition of details for trial mineral water sample	T.Noblett
7	Aug 2011	Addition of details for presence/absence of indicator organisms in potable water sample. Removed target SDPA for sample 424. Changed information for sample 423. Added units for qualitative tests.	K. Cliff
8	June 2013	Amended details for 417 and 418 to allow separate reporting by cultural and PCR methods.	T.Noblett
9	Sept 2013	Added microbiological methods. Separated sample 417 and 418 into two separate samples and added 'Enumeration of sulphite-reducing Clostridia' to sample 421	T.Noblett
10	Sept 2014	Added Staphylococcus species to 421. Inclusion of traceability information in Appendix A. Inclusion of subcontracting information in 'Test Materials' section.	R.Lathall
11	Sept 2015	Corrected SPDA for 416 to 0.5 Included samples previously included in QMIS, i.e. identification test, paper exercise. Methods updated Removed Hard copy report information	A.S.Eden S.Fairless A.McCarthy
12	Aug 2016	Updated details for Sample 427 regarding setting of assigned value by formulation	T.Noblett

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

Scheme Aims and Organisation
The primary aim of the Quality in Water Analysis Scheme (QWAS) is to enable laboratories performing the microbiological analysis of water to monitor their performance and compare it with that of their peers. QWAS also aims to provide information to participants on technical issues and methodologies relating to microbiological testing of water and related materials.

The QWAS scheme year operates from January to December. Further information about QWAS, including test material availability, round despatch dates and reporting deadlines, are available on the current QWAS application form.

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

Test material batches are tested for homogeneity for at least one test parameter where deemed appropriate. Details of homogeneity tests performed and results are given in the QWAS Scheme Reports.

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 statistics used in QWAS can be found in the General Protocol and in the Scheme Report. Methods for determining assigned values and the values for SDPA used for individual samples are given 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.

Abbreviations for microbiological method codes can be found in Appendix A. The time and temperature of incubation does not need to be reported.

Results and Reports
QWAS 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.

QWAS 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.

APPENDIX A - Description of abbreviations used

Assigned Value (AV)

The assigned value may be derived in the following ways:

- From the robust mean (median) of participant results (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 and indicated 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 (Form). 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.

APPENDIX A

Sample 412 **Indicator organisms in potable water**
Supplied as: 10ml vial (to be resuscitated to final volume of 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Total aerobic count @ 22°C Total aerobic count @ 37°C	Yeast extract agar Plate count agar Tryptone soy agar	RMean	0 to 1000	$\log_{10}$ 0.35	cfu ml^{-1}	0
Enumeration of *Escherichia coli*	Membrane Filtration MPN Colilert	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0
Enumeration of coliforms	Membrane Filtration MPN Colilert	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0
Enumeration of Enterococci	Membrane Filtration MPN	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0

Sample 413 **Clostridium/Pseudomonas in potable water**
Supplied as: 10ml vial (to be resuscitated to final volume of 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of *Clostridium perfringens*	Membrane/TSC Membrane/MCP	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0
Enumeration of sulphite-reducing Clostridia	Membrane/TSC Membrane/MCP Membrane/ISA	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0
Detection of sulphite-reducing Clostridia	Membrane/TSC Membrane/MCP Membrane/ISA	QualForm	0 to 1000	NA	cfu 100 ml^{-1}	NA
Enumeration of *P.aeruginosa*	Membrane/CN agar Membrane/CFC agar	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0
Enumeration of sulphite-reducing Clostridia spores ONLY	Membrane/TSC Membrane/MCP Membrane/ISA	RMean	0 to 1000	$\log_{10}$ 0.35	cfu 100 ml^{-1}	0

Sample 414 **Microorganisms in Process water**
Supplied as: 10ml vial (to be resuscitated to final volume of 100 ml)

Analyte	Method	AV	Range	SDPA	Units	DP
Total aerobic count	Plate count agar Yeast extract agar	RMean	0 to 100000	log_{10} 0.35	cfu ml^{-1}	0
Enumeration of *Pseudomonas* species	CN agar CFC agar	RMean	0 to 100000	log_{10} 0.35	cfu ml^{-1}	0
Enumeration of yeast and mould (total) Enumeration of yeast Enumeration of mould	OGYE agar Malt extract agar RB agar Petrifilm	RMean	0 to 100000	log_{10} 0.35	cfu ml^{-1}	0

Sample 416 **Salmonella/E.coli in Effluent sludge**
Supplied as: 2 x 10g simulated sludge sample

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of *Salmonella* species	Enrichment/culture VIDAS TECRA PCR	QualForm	0 to 10000	NA	cfu 100 ml^{-1}	NA
Enumeration of *Escherichia coli*	Membrane Filtration MPN Colilert	RMean	0 to 100000	log_{10} 0.50	cfu ml^{-1}	0

Sample 417 ***Legionella pneumophila* in environmental waters**
Supplied as: 1 x 10ml vial (to be resuscitated to final volume of up to 10 x 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of *Legionella pneumophila* by culture	BCYE GVPC GVPN MWY	RMean	0 to 100000	log_{10} 0.50	cfu L^{-1}	0
Detection of *Legionella pneumophila*	BCYE GVPC GVPN MWY PCR	QualForm	0 to 100000	NA	cfu L^{-1}	NA

Enumeration of *Legionella pneumophila* by PCR	PCR	RMean	0 to 100000	log_{10} 0.50	genomic units L^{-1}	0
Identification of *Legionella pneumophila*	Latex agglutination Molecular methods Immunofluorescence	NA	NA	NA	NA	NA

Sample 418 **Legionella species in environmental waters**
Supplied as: 1 x 10ml vial (to be resuscitated to final volume of up to 10 x 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of *Legionella* species by culture	BCYE GVPC GVPN MWY	RMean	0 to 100000	log_{10} 0.50	cfu L^{-1}	0
Detection of *Legionella* species	BCYE GVPC GVPN MWY PCR	QualForm	0 to 100000	NA	cfu L^{-1}	NA
Enumeration of *Legionella* species by PCR	PCR	RMean	0 to 100000	log_{10} 0.50	genomic units L^{-1}	0
Identification of *Legionella* species	Latex agglutination Molecular methods Immunofluorescence	NA	NA	NA	NA	NA

Sample 419 **Microorganisms in Surface/Waste/Bathing waters**
Supplied as: 10ml vial (to be resuscitated to final volume of up to 10 x 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of total coliforms	Membrane Filtration MPN Colilert	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Enumeration of faecal coliforms	Membrane Filtration MPN Colilert	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Enumeration of *Escherichia coli*	Membrane Filtration MPN	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0

	Colilert					
Enumeration of enterococci	Membrane Filtration MPN	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Detection of *Salmonella* species	Enrichment/culture VIDAS TECRA PCR	QualForm	<10000	NA	cfu L^{-1}	NA

Sample 420 **Microorganisms in Mineral water**
Supplied as: 10ml vial (to be resuscitated to final volume of up to 10 x 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Total aerobic count at 22°C Total aerobic count at 37°C	Yeast extract agar Plate count agar Tryptone soy agar	RMean	0 to 1000	log_{10} 0.35	cfu ml^{-1}	0
Enumeration of *Escherichia coli*	Membrane filtration MPN Colilert	RMean	0 to 1000	log_{10} 0.35	cfu 250 ml^{-1}	0
Enumeration of enterococci	Membrane filtration MPN	RMean	0 to 1000	log_{10} 0.35	cfu 250 ml^{-1}	0
Enumeration of *Pseudomonas aeruginosa*	CN agar CFC agar	RMean	0 to 1000	log_{10} 0.35	cfu 250 ml^{-1}	0

Sample 421 **Microorganisms in Surface/Bathing/Recreational water**
Supplied as: 10ml vial (to be resuscitated to final volume of 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of coagulase-positive staphylococci Enumeration of *Staphylococcus* species	Membrane/Baird Parker agar Membrane/Baird Parker and RPF Membrane/Mannitol salt agar	RMean	0 to 100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Enumeration of sulphite-reducing Clostridia	Membrane/TSC Membrane/MCP Membrane/ISA	RMean	0 to 100000	log_{10} 0.35	cfu 100 ml^{-1}	0

Sample 422 **Microorganisms in Sea Water**
Supplied as: 10ml vial (to be resuscitated to final volume of up to 10 x 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of total coliforms	Membrane Filtration MPN Colilert	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Enumeration of faecal coliforms	Membrane Filtration MPN Colilert	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Enumeration of *Escherichia coli*	Membrane Filtration MPN Colilert	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Enumeration of enterococci	Membrane Filtration MPN	RMean	<100000	log_{10} 0.35	cfu 100 ml^{-1}	0
Detection of *Salmonella* species	Enrichment/culture VIDAS TECRA PCR	QualForm	<10000	NA	cfu L^{-1}	NA

Sample 423 **Legionella in Potable Water (Presence/absence)**
Supplied as: 10ml vial (to be resuscitated to final volume of 10 x 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of *Legionella* species at low levels	BCYE GVPC GVPN MWY PCR	QualForm	0 to 1000	NA	NA	NA

Sample 424 **Microorganisms in Mineral water (Presence/absence)**
Supplied as: 10ml vial (to be resuscitated to final volume of 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP

Detection of coagulase-positive staphylococci	Membrane/Baird Parker agar Membrane/Baird Parker and RPF Membrane/Mannitol salt agar	QualForm	0 to 1000	NA	cfu 250 ml^{-1}	0
Detection of sulphite-reducing Clostridia	Membrane/TSC Membrane/MCP Membrane/ISA	QualForm	0 to 1000	NA	cfu 50 ml^{-1}	0
Detection of spores of sulphite-reducing Clostridia	Membrane/TSC Membrane/MCP Membrane/ISA	QualForm	0 to 1000	NA	cfu 50 ml^{-1}	0

Sample 425 **Indicator organisms in potable water (Presence/absence)**
Supplied as: 10ml vial (to be resuscitated to a final volume of 1 litre)

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of *Escherichia coli*	Membrane filtration MPN Colilert	QualForm	0 to 100	NA	cfu 100 ml^{-1}	NA
Detection of coliforms	Membrane filtration MPN Colilert	QualForm	0 to 100	NA	cfu 100 ml^{-1}	NA
Detection of enterococci	Membrane filtration MPN Colilert	QualForm	0 to 100	NA	cfu 100 ml^{-1}	NA

Sample 426 **Identification Test (non-pathogen)**
Supplied as: Participants will be provided with a vial of freeze-dried material containing a single organism which will need to be cultured on non-selective agar before test. The sample may contain biosafety level 1 or 2 organisms typically found in water.
The organism should be identified to the correct family, genus or species level.

Analyte	Method	AV	Range	SDPA	Units	DP
Identification of unknown organism	Morphological e.g Gram reaction, appearance Serological e.g. slide agglutination, ELISA Biochemical e.g. API, VITEK, Biolog Protein analysis e.g.	Formulation	NA	NA	NA	NA

	electrophoresis Genotypic e.g. PCR, ribotyping, BAX Spectrometry e.g. MALDI-TOF					

Sample 427 **Paper exercise**
Supplied as: Participants will be provided with a photograph and a scenario in order to count the number of colonies and calculate the number of microorganisms in the original sample.

Analyte	Method	AV	Range	SDPA	Units	DP
Counting of colonies and calculation of number of microorganisms	Visual count only	Formulation	0 to 300	Greater of robust SD or log 0.05	cfu/ml	NA

ABBREVIATIONS FOR MICROBIOLOGICAL METHOD CODES

BCYE = Buffered charcoal yeast extract agar
CN = cetrimide, nalidixic acid
CFC = cetrimide, fucidin and cephalosporin
GVPC = Glycine, vancomycin, polymyxin, cycloheximide
GVPN = Glycine, vancomycin, polymyxin, natamycin
ISA = Iron sulphite agar
MPN = Most probable number
MCP = Membrane Clostridium perfringens agar
MWY = Modified Wadowsky Yee
OGYE = Oxytetracycline glucose yeast extract
PCR = Polymerase chain reaction
RB = Rose Bengal agar
RPF = Rabbit plasma fibrinogen
TSC = Tryptone sulphite cycloserine agar

All analytes will also have ‘OTHER’ as a method choice in case your method is not listed