FEPTU
Food & Environmental Proficiency Testing Unit
Operated by UK Health Security Agency

Annotated report for drinking water scheme (example)

UK Health Security Agency

Summary of Results

External Quality Assessment of Water Microbiology

Drinking Water Scheme

Distribution Number: W209 **Sample Numbers: W209A, W209B**

Distribution Date:	June 2023
Results Due:	07 July 2023
Report Date:	14 July 2023
Samples prepared and quality control tested by:	Ellie Castello Divya George Nafeesa Hussain Zak Prior Jake Videlefsky
Data analysed by:	Joanna Donn Nita Patel
Report compiled by:	Joanna Donn Nita Patel
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Distribution and sample details

Details of FEPTU staff who prepared samples and report

FEPTU contact details

Number of pages in the report

Report generation date and time

Web links to key documents on our website

For further information on the scheme please refer to:
Scheme Guide: https://www.gov.uk/government/publications/food-and-water-proficiency-testing-schemes-scheme-guide

Guide to Scoring and Statistics:
https://www.gov.uk/government/publications/food-and-water-proficiency-testing-schemes-scoring-systems-and-statistics

General guidance for z-scores:

Participants' enumeration results are converted into z-scores using the following formula:

$$Z = \frac{(x_i - X_{pt})}{\sigma_{pt}}$$

x_i = participants' result expressed (expressed as a $\log_{10}$ value)
X_{pt} = assigned value (participants' consensus median (expressed as a $\log_{10}$ value))
σ_{pt} = the fixed standard deviation for the examination (calculated by FEPTU)

The σpt-value expresses the acceptable difference between the individual participant's result and the participants' consensus median. The σpt-value used for calculating z-scores for all parameters in the Drinking Water Scheme is 0.35. A guide to interpreting z-scores follows, although laboratories must interpret their scores in the context of their own laboratory situation.

z = -1.99 to +1.99	satisfactory
z = -2 to -2.99 or +2 to +2.99	questionable
z= < -3.00 or > + 3.00	unsatisfactory

It is usually recommended that z-scores exceeding +/-2 are investigated to establish the possible cause. As a general rule, UKHSA recommends that all questionable and unsatisfactory results are investigated.

Guidance on z-scores

Information on quality control done in the FEPTU laboratory

FEPTU Quality Control: To demonstrate homogeneity of the sample, a minimum of 10 LENTICULE* discs, selected randomly from a batch, are tested in duplicate for parameters requiring enumeration.

To demonstrate stability of the sample, a minimum of six LENTICULE discs, selected randomly from a batch, are examined throughout the distribution period for enumeration parameters.

UKHSA uses methods stipulated in the Environmental Agency Standing Committee of Analysts series of documents: Microbiology of Water and Associated Materials (2017) - Practices and Procedures for Laboratories. However for *Escherichia coli* and coliform examinations, ISO 9308-1:2014 Water quality - Enumeration of *Escherichia coli* and coliform bacteria Part 1: Membrane filtration method for waters with low bacterial background flora is followed.

The FEPTU results are used for guidance in the preliminary intended results notification, letters are posted on the website immediately after every distribution; electronic notification of their availability is sent to all participants.

Refer to section 17.0 of the Scheme Guide if you have experienced difficulties with any of the examinations.

https://www.gov.uk/government/publications/food-and-water-proficiency-testing-schemes-scheme-guide

Participants are reminded that reporting an incorrect or false negative results could have serious public health implications.

Results, as summarised in the performance assessment sheet included in this report, provide a more effective indication of on-going problems with the enumeration of low levels of indicator organisms in drinking water samples. Performance assessment cannot be undertaken as effectively if laboratories do not participate in all distributions for the Drinking Water Scheme.

Please contact FEPTU staff for advice and information:

Repeat samples	Carmen Gomes or Kermin Daruwalla	**Tel:** +44 (0)20 8327 7119
Data Analysis	Nita Patel	**Fax:**
Microbiological advice	Nita Patel or Zak Prior	**Email:** foodeqa@ukhsa.gov.uk
General comments and complaints	Nita Patel or Zak Prior	FEPTU's website
Scheme consultants	Stephen Bullock	
Scheme Co-ordinator	Nita Patel	

Accreditation: UKHSA Water EQA Scheme for Drinking Water is accredited by the United Kingdom Accreditation Service (UKAS) to ISO/IEC 17043:2010.

UKAS PROFICIENCY TESTING
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Details of FEPTU key personnel and accreditation details

Sample number and contents

Sample: W209B

Contents: *Enterococcus faecalis* (31) (wild strain), *Pseudomonas aeruginosa* (13) (wild strain), *Clostridium perfringens* (44) (wild strain), *Pseudomonas fluorescens* (6) (wild strain) - see comment on page 20 of this report

Expected Results:

All counts are expressed as colony forming units (cfu) per 100mL except the colony counts at 37°C/48h and 22°C/72h which are cfu per mL.

List of parameters

Assigned value for each parameter

Expected range calculated for each parameter

Your results

Your UKHSA scores and z-scores

Parameter	Coliform bacteria	E.coli	Enterococci	P.aeruginosa	C.pefringens	Colony count 37°C/48h	Colony count 22°C/72h
FEPTU median	0	0	31	13	43	2	6
No. results returned	137	141	128	109	98	130	121
Assigned value (Participants median all results)	0	0	38	10	40	1	6
Uncertainty of assigned value*	N/A	N/A	0.01	0.04	0.02	0.05	0.05
Participants Algorithm A mean (all results)	0	0	37	10	41	0	6
Expected Range	N/A	N/A	12 - 119	1 - 32	13 - 126	0 - 4	1 - 19
Standard deviation** (log_{10})	N/A	N/A	0.11	0.29	0.16	0.45	0.43
No of outlying counts	N/A	N/A	6	8	9	8	24
False positives	4	3	N/A	N/A	N/A	N/A	N/A
False negatives	N/A	N/A	3	5	6	0	18
Your result	0	0	46	18	18	0	8
Score for performance assessment	2	2	2	2	2	2	2
Z-score	N/A	N/A	0.26	0.73	-0.99	N/A	0.36
Analyst 2 Result	0	0	32	21	14	0	16
Analyst 2 Z-score	N/A	N/A	-0.2	0.92	-1.3	N/A	1.22
Analyst 3 Result	0	0	44	18	NE	0	21
Analyst 3 Z-score	N/A	N/A	0.2	0.73	N/A	N/A	1.55

Explanation of symbols in the table

* $U(Xpt)$ is based on results transformed to a log_{10} scale

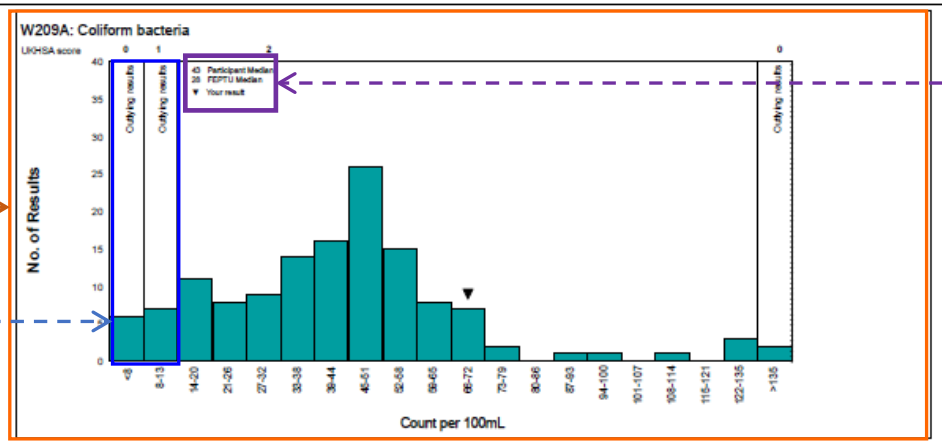
** Robust S^* based on median absolute deviation about the participants' median (*MADe*) and is based on logged data

Total sent samples	148
Not examined	2
Non returns	4
Late returns	0

Graph of the all the enumeration results reported by participants

Outliers for sample

Participants' and FEPTU's median results



Method based presentation

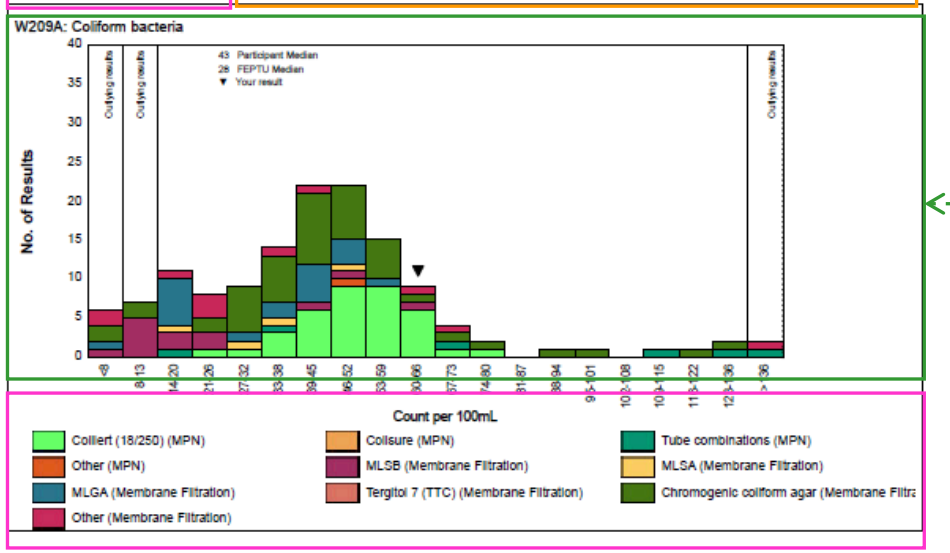
W209A : Coliform bacteria

FEPTU Method: Chromogenic coliform agar

Method	Number of Results	Excluded Results	Percentage of the total	Median	Robust S^* (Log_e)	Range Reported
Colilert (18/250)	37	0	27	51	0.09	21 - 74
Colisure	0	0	0			
Tube combinations	6	0	4			
Other (MPN)	1	0	0			
MLSB	13	0	9	15	0.37	4 - 62
MLSA	4	0	2			
MLGA	19	0	13	38	0.17	4 - 53
Tergitol 7 (TTC)	0	0	0			
Chromogenic coliform agar	46	0	33	42	0.17	3 - 130
Other (Membrane filtration)	11	0	8	25	0.36	4 - 165

Table summarises the data for each method shown

Lists of methods used



Graph of all the results reported by method used

Results for your laboratory for the last six distributions

Overall performance of your results submitted

Notes on performance assessment

Comments on performance Assessment and information on where get advice

Performance Assessment Sheet

Distribution	Sample	Coliform bacteria score	*Escherichia coli* score	Enterococci score	*Pseudomonas aeruginosa* score	*Clostridium perfringens* score	Colony Count 37°C/48 h score	Colony Count 22°C/72 h score
W209	W209A	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
	W209B	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
W208	W208A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
	W208B	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
W207	W207A	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	0 / 2	2 / 2
	W207B	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
W206	W206A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
	W206B	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
W205	W205A	2 / 2	2 / 2	2 / 2	2 / 2	1 / 2	2 / 2	2 / 2
	W205B	1 / 2	2 / 2	2 / 2	2 / 2	0 / 2	2 / 2	2 / 2
W204	W204A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
	W204B	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
Total maximum possible score		11 / 12	12 / 12	12 / 12	12 / 12	9 / 12	10 / 12	12 / 12
Total percentage		91.7	100.0	100.0	100.0	75.0	83.3	100.0

Your laboratory should have performed 42 enumeration for the last six distributions.

Your total score was 78 out of 84 (92.9%)

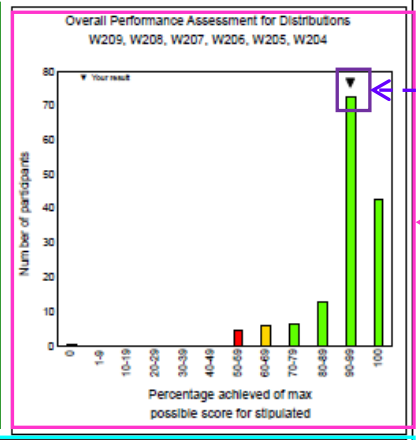
Performance Assessment Comment:

Participants are reminded that to take advantage of the performance assessment overtime tool provided in the reports they need to take part in more than one distribution a year.

Performance assessments are designed to alert participants to on-going problems with their examinations and are provided after every distribution. Scores are allocated to results reported for every parameter, for every sample to help assess performance.

Cummulative scores are calculated for the current and previous **five** distributions for the Drinking Water Scheme. Participants' cummulative scores for each of the examinations are compared with the maximum possible scores after every distribution.

Your overall performance with the enumerations of low levels of indicator organisms in drinking water proficiency testing samples for the current and last five distributions is collated in the chart to the right.



Your overall performance

Overall performance graph for the last six distributions for all laboratories

Performance Assessment Comment:

Laboratories that achieve less than 70% of the maximum possible score are likely to be experiencing significant problems with their examinations and are advised to:

a) refer to the relevant distribution reports for sample-specific comments

b) refer to the website guidance documents:
https://www.gov.uk/government/collections/external-quality-assessment-eqa-and-proficiency-testing-pt-for-food-water-and-environmental-microbiology

Sample specific comment

General comments

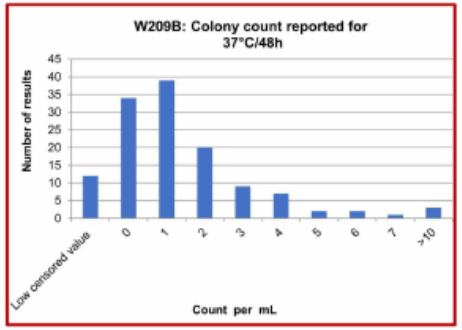
Sample specific comments:

W209A: Enterococci
This sample contained an *Enterococcus casseliflavus* at levels of approximately 31 colony forming units per 100mL. 14/127 (11%) of the laboratories reported a false negative result. In the FEPTU laboratory this organism grew as <1mm round pink colonies on Slanetz and Bartley (S+B) agar following incubation at 37°C for 48 hours. However, nine laboratories used an Enterolert method, of which eight reported a false negative result, suggesting that this strain of *E. casseliflavus* grows poorly in this system to generate a positive reaction. These laboratories have been awarded a correct score due to the characteristics behaviour of this strain with this method.

W209A: Colony count 37°C/48 and 22°C/72 h
The number of outlying counts reported, and the wide standard deviation of results was higher than usual. The sample contained a *Micrococcus luteus* which on analysing the results reported this organism showed variable growth pattern at 22°C when incubated for 72 hours. A Kolmogorov-Smirnov test showed that for both these examinations the data was not normally distributed. Therefore, laboratories reporting an outlying count have been awarded a correct score. To note, laboratories using the z-score to analyse their performance, should do so with caution.

W209B: Colony count 37°C/48 and 22°C/72 h
The number of outlying counts reported, and the wide standard deviation of results was higher than usual. A Kolmogorov-Smirnov test showed that for both these examinations the data was not normally distributed. Therefore, laboratories reporting an outlying count have been awarded a correct score. To note, laboratories using the z-score to analyse their performance, should do so with caution.

W209B: Colony count 37°C/48 h
Below is a graph of the colony counts reported at 37°C/48h by the participants, which is not shown in the main scheme report.



General comments:

Method based presentation of results:
Participants are advised if less than 10 laboratories report a result for a method, no data is shown for the Median, Robust *S** and the Range Reported in the 'Method based presentation' tables.

Numbers shown in the 'Excluded Results' column are laboratories that reported a censored value.

Trend analysis:
Plotting your PT results over a period can help to identify potential problems. If you need the latest file, please email us on foodeqa@ukhsa.gov.uk.

If you do not return a result for a distribution, you will not be able to view all the participants' results data in your individualised report. Please contact us if you require this information on foodeqa@ukhsa.gov.uk.

End of report