

PROFICIENCY TESTING

Evaluation Report

Scheduled Study

WP19-1

Study Type

WPCHEM_MICRO

Open Date

2019-01-16

Close Date

2019-03-01

Report Generated

2019-03-07

Laboratory

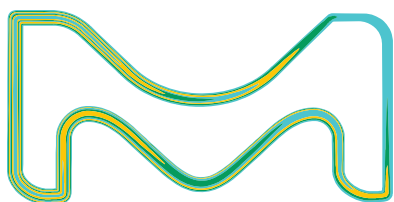
Energy Laboratories-Gillette
Julie Weisz
400 West Boxelder Rd.
Gillette WY 82718 US

Account Number

49978849

US EPA Lab Code

WY00006



Provider of the proficiency test

Sigma-Aldrich RTC, Inc.
2931 Solider Springs Road
Laramie, WY 82070 USA
ptservice@milliporesigma.com

Statistical analysis and reporting

QuoData GmbH Quality & Statistics!



Release of the report

Mark Pooler
(QA manager)

Sign:

A handwritten signature in black ink that reads 'Mark Pooler'.

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Accreditors

Evaluations of this study will be sent to the accreditor(s) listed below. If any of the information listed below is not correct, please contact Sigma-Aldrich RTC immediately.

Accrediting Agency

EPA Region 10

Katie Adams
7411 Beach Drive East
Port Orchard WA 98366 US

Accrediting Agency

Montana DEQ

Lisa Tucker
1520 East 6th Avenue
PO Box 200901
Helena MT 59620-0901 US

Accrediting Agency

EPA Region 8

Marcie Tidd
1595 Wynkoop Street
Denver CO 80202-1129 US

Accrediting Agency

Wyoming DEQ

Steve Vien
208 South College Drive
Cheyenne WY 82002 US

**Summary Results for WP19-1
PE1269-20ML Acidity - WP
LRAB5747**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SM 2310 B-2011 (2011) 20044615				
Miscellaneous Analytes				
Acidity, as CaCO ₃ ^{1,2} 1500	1280 mg/L	1350 mg/L	1220 - 1490 mg/L	-1.6 Acceptable
Analyst: BB Analysis Date: 2019-01-29	Evaluation Criteria – 1* Parameters*: a:1, b:0, c:.03333334, d:0			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

* Study mean from the latest scheduled study within this scheme. If no study mean is available, this is indicated by "---".

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**Summary Results for WP19-1
PE1060-20ML Anions - WP
LRAB8878**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
EPA 300.0 2.1 (1993) 10053200				
Minerals				
Bromide ^{1,2} 1540 Analyst: BB Analysis Date: 2019-01-22	3.49 mg/L	3.23 mg/L	2.56 - 3.89 mg/L	1.2 Acceptable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:1.0098, b:-0.0533, c:0.0400, d:0.0912</i>				
Chloride ^{1,2} 1575 Analyst: BB Analysis Date: 2019-01-22	127 mg/L	119 mg/L	105 - 134 mg/L	1.6 Acceptable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:1.005, b:0.0490, c:0.0376, d:0.3716</i>				
Fluoride ^{1,2} 1730 Analyst: BB Analysis Date: 2019-01-22	0.67 mg/L	0.698 mg/L	0.513 - 0.883 mg/L	-0.5 Acceptable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:0.9748, b:0.0156, c:0.0487, d:0.0277</i>				
Sulfate ^{1,2} 2000 Analyst: BB Analysis Date: 2019-01-22	58.6 mg/L	53.3 mg/L	44.7 - 62.0 mg/L	1.8 Acceptable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:0.9880, b:-0.2130, c:0.0473, d:0.3309</i>				
Group Analysis Summary	Acceptable: 4/4		Score: 100% - Acceptable	
Nutrients				
Nitrate as N ^{1,2} 1810 Analyst: BB Analysis Date: 2019-01-22	7.67 mg/L	6.84 mg/L	5.61 - 8.08 mg/L	2.0 Acceptable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:0.9975, b:-0.0005, c:0.0506, d:0.0642</i>				
Nitrite as N ^{1,2} 1840 Analyst: BB Analysis Date: 2019-01-22	1.31 mg/L	1.14 mg/L	0.935 - 1.34 mg/L	2.5 Questionable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:1.0017, b:-0.0030, c:0.0377, d:0.0250</i>				
Group Analysis Summary	Acceptable: 2/2		Score: 100% - Acceptable	

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**Summary Results for WP19-1
PE1130-20ML Demand - WP
LRAB8995**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
HACH 8000 (1979) 60003001				
Demands				
Chemical oxygen demand (COD) ^{1,2} 1565	143 mg/L	156 mg/L	127 - 186 mg/L	-1.3 Acceptable
Analyst: BB Analysis Date: 2019-02-07	Evaluation Criteria – 1* Parameters*: a:0.9843, b:-0.3171, c:0.0432, d:3.0191			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	
SM 5210 B-2011 (2011) 20135266				
Demands				
5-day BOD ^{1,2} 1530	138 mg/L	98.0 mg/L	52.6 - 143 mg/L	2.6 Questionable
Analyst: BB Analysis Date: 2019-02-06	Evaluation Criteria – 1* Parameters*: a:0.6237, b:0.7022, c:0.0928, d:0.6636			
Carbonaceous BOD (CBOD) ^{1,2} 1555	112 mg/L	88.8 mg/L	41.1 - 136 mg/L	1.5 Acceptable
Analyst: BB Analysis Date: 2019-02-06	Evaluation Criteria – 1* Parameters*: a:0.5648, b:0.6665, c:0.0965, d:0.8253			
Group Analysis Summary	Acceptable: 2/2		Score: 100% - Acceptable	

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**Summary Results for WP19-1
MIC003-2EA E. coli in Water - Quantitative WP
LRAB9048**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
Colilert®-18 (Fecal Coliforms) (2010) 60002688				
Microbiology				
Fecal coliform, MPN ^{1,2} 2530	144 MPN/100 mL	140 MPN/100 mL	15.5 - 1260 MPN/100 mL	0.0 Acceptable
Analyst: BB Analysis Date: 2019-01-28		<i>Evaluation Criteria – 6*</i> <i>Parameters*: span:3</i>		
Group Analysis Summary	Acceptable: 1/1			Score: 100% - Acceptable
SM 9223 B (Colilert Quanti-Tray)-2004 20211614				
Microbiology				
Escherichia coli, MPN ^{1,2} 2525	345 MPN/100 mL	197 MPN/100 mL	29.0 - 1340 MPN/100 mL	0.9 Acceptable
Analyst: BB Analysis Date: 2019-01-28		<i>Evaluation Criteria – 6*</i> <i>Parameters*: span:3</i>		
Group Analysis Summary	Acceptable: 1/1			Score: 100% - Acceptable

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**Summary Results for WP19-1
PE1041-1KT Minerals - WP
LRAC0662**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SM 2320 B-2011 (2011) 20045618				
Minerals				
Alkalinity as CaCO ₃ ^{1,2} 1505 Analyst: BB Analysis Date: 2019-01-17	187 mg/L	182 mg/L	155 - 209 mg/L	0.5 Acceptable
		<i>Evaluation Criteria – 4*</i> <i>Parameters*: break:40, highPercentage:0.15, lowPercentage:0.20</i>		
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	
SM 2510 B-2011 (2011) 20048617				
Minerals				
Specific conductance, Conductivity (25°C) ^{1,2} 1610 Analyst: BB Analysis Date: 2019-01-17	771 µmhos/cm	775 µmhos/cm	698 - 852 µmhos/cm	-0.2 Acceptable
		<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:1, b:0, c:0.0333, d:0</i>		
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

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**Summary Results for WP19-1
PE1083-2ML Oil & Grease - WP
LRAB6038**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
EPA 1664A (1999) 10127807				
Miscellaneous Analytes				
Silica Gel Treated n-Hexane Extractable Material (Non-polar Material) ² 6142 Analyst: BB Analysis Date: 2019-01-21	35 mg/L	37.7 mg/L	14.7 - 60.6 mg/L	-0.3 Acceptable
		<i>Evaluation Criteria – 5*</i> <i>Parameters*: deviations:3</i>		
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	
Petroleum Hydrocarbons				
n-Hexane Extractable Material (O&G) ^{1,2} 1803 Analyst: BB Analysis Date: 2019-01-21	74 mg/L	75.1 mg/L	55.7 - 94.4 mg/L	-0.2 Acceptable
		<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:0.9400, b:-0.4166, c:0.0545, d:2.0789</i>		
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

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Summary Results for WP19-1
PE1210-100ML pH - WP - 100ML
LRAB8869

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SM 4500-H+ B-2011 (2011) 20105220				
Miscellaneous Analytes				
pH ^{1,2} 1900 Analyst: BB Analysis Date: 2019-01-17	7.33 Units	7.30 Units	7.10 - 7.50 Units	0.4 Acceptable
			<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:1, b:0, c:0, d:0.06667</i>	
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

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**Summary Results for WP19-1
PE3050-500ML Residue - WP
LRAB9079**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SM 2540 C-2011 (2011) 20050413				
Minerals				
Total Dissolved Solids at 180°C (TDS) ^{1,2} 1955	545 mg/L	552 mg/L	507 - 597 mg/L	-0.5 Acceptable
Analyst: BB Analysis Date: 2019-01-20	<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:1, b:0, c:0, d:15.0</i>			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	
SM 2540 D-2011 (2011) 20051212				
Miscellaneous Analytes				
Total Suspended Solids, Non-Filterable Residue (TSS) ^{1,2} 1960	65.7 mg/L	70.4 mg/L	59.1 - 81.7 mg/L	-1.2 Acceptable
Analyst: BB Analysis Date: 2019-01-20	<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:0.9728, b:-0.6338, c:0.0300, d:1.5793</i>			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

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Summary Results for WP19-1
PE1070-2ML Total Organic Halides (TOX) - WP
LRAC1455

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
EPA 9020B (1994) 10194408				
Miscellaneous Analytes				
Total organic halides (TOX) ² 2045	749 ug/L	838 ug/L	335 - 1340 ug/L	-0.5 Acceptable
Analyst: DB	Evaluation Criteria – 1*			
Analysis Date: 2019-01-16	Parameters*: a:1, b:0, c:0.2, d:0			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

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**Summary Results for WP19-1
PE1065-2ML Total Residual Chlorine - WP
LRAB4400**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SM 4500-Cl G-2011 (2011) 20081623				
Miscellaneous Analytes				
Total residual chlorine ^{1,2} 1940 Analyst: BB Analysis Date: 2019-01-28	1.78 mg/L	1.59 mg/L	1.23 - 1.95 mg/L	1.6 Acceptable
<i>Evaluation Criteria – 1*</i> <i>Parameters*: a:0.9345, b:0.0392, c:0.0688, d:0.0073</i>				
Residual free chlorine ² 1945 Analyst: BB Analysis Date: 2019-01-28	1.7 mg/L	1.61 mg/L	1.45 - 1.77 mg/L	1.7 Acceptable
<i>Evaluation Criteria – 5*</i> <i>Parameters*: deviations:3</i>				
Group Analysis Summary	Acceptable: 2/2		Score: 100% - Acceptable	

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**Summary Results for WP19-1
PE1081-20ML Turbidity - WP
LRAC0922**

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SM 2130 B-2011 (2011) 20048220				
Miscellaneous Analytes				
Turbidity ^{1,2} 2055	5.99 NTU	5.64 NTU	4.36 - 6.91 NTU	0.8 Acceptable
Analyst: BB Analysis Date: 2019-01-28	<i>Evaluation Criteria - 1*</i> <i>Parameters*: a:1.0040, b:-0.0368, c:0.0475, d:0.1575</i>			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

* Study mean from the latest scheduled study within this scheme. If no study mean is available, this is indicated by "---".

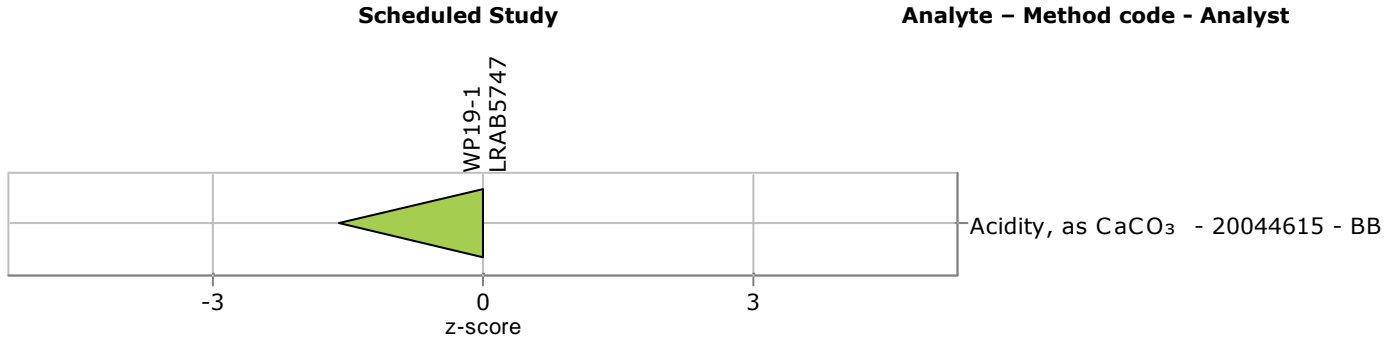
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**Graphical z-score Overview for WP19-1
PE1269-20ML Acidity - WP**

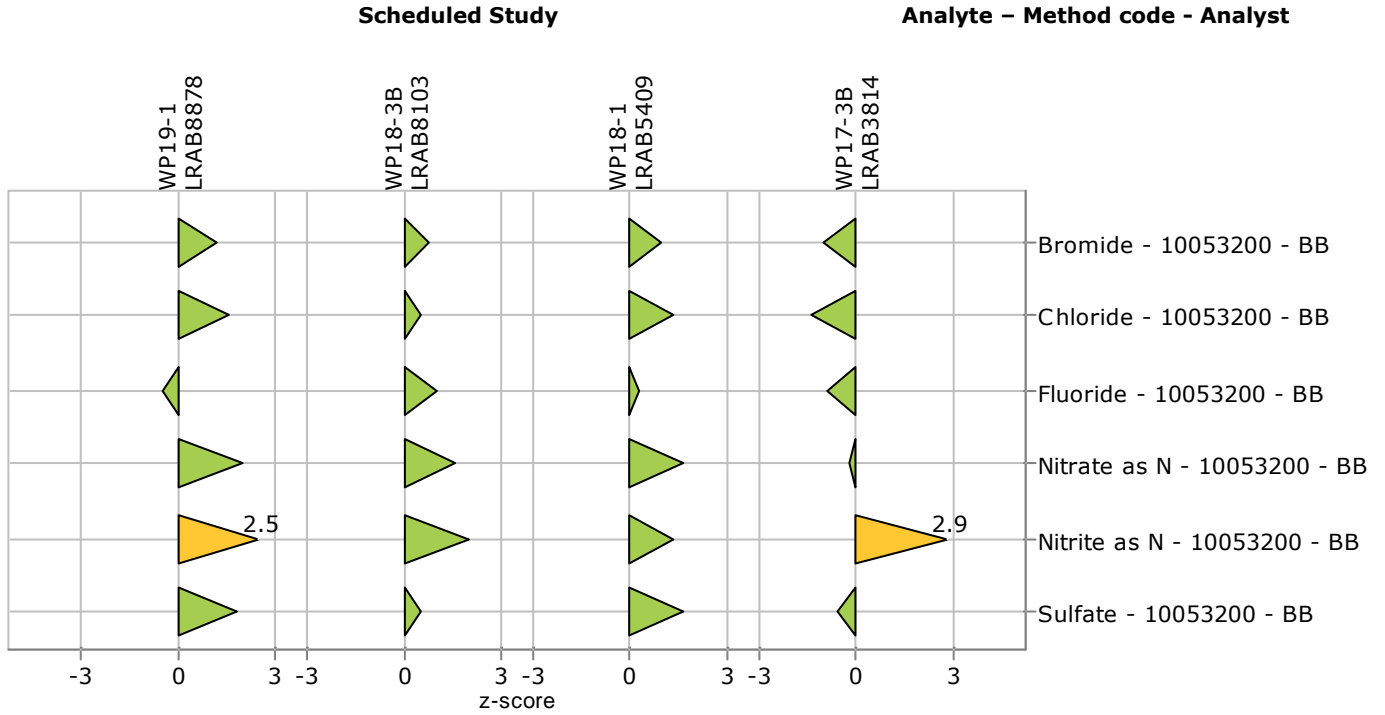
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



* Evaluation parameters used for the statistical analysis; explanation at the end of report

**Graphical z-score Overview for WP19-1
PE1060-20ML Anions - WP**

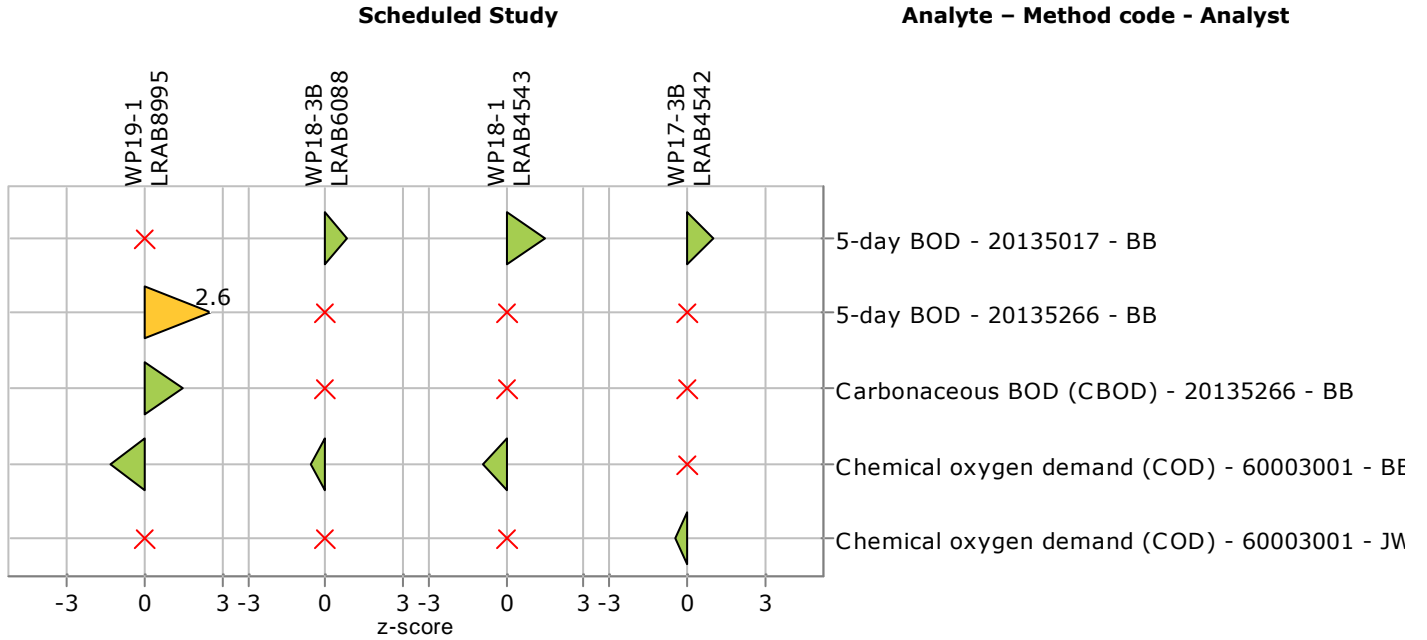
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE1130-20ML Demand - WP**

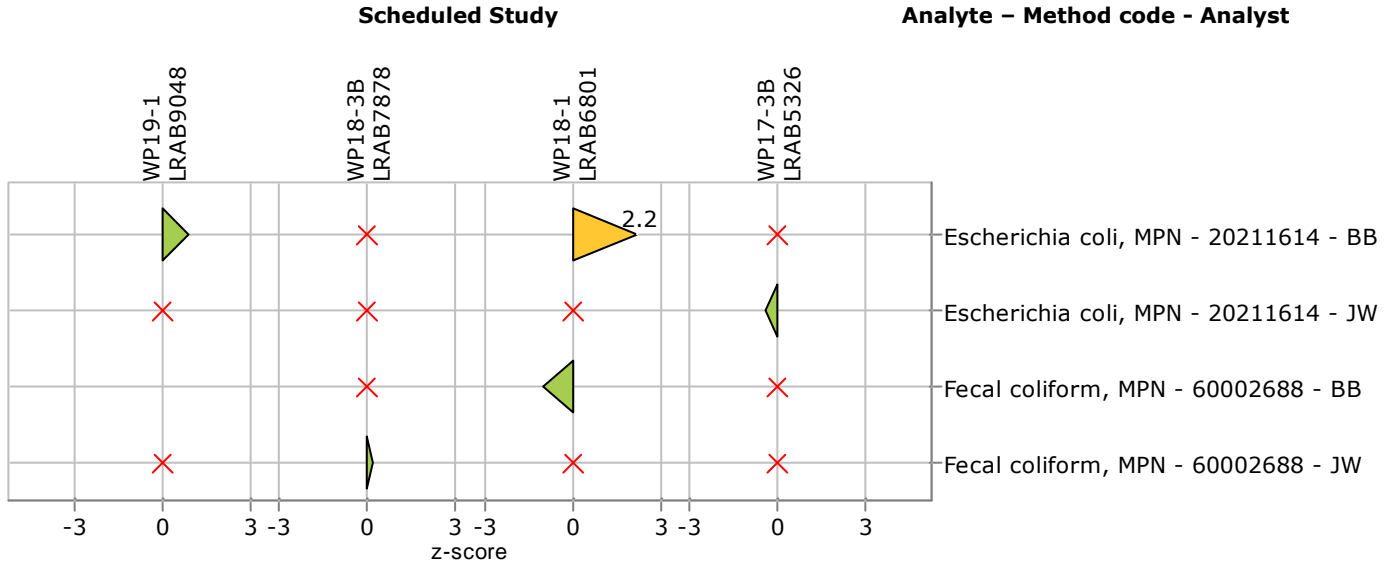
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
MIC003-2EA E. coli in Water - Quantitative WP**

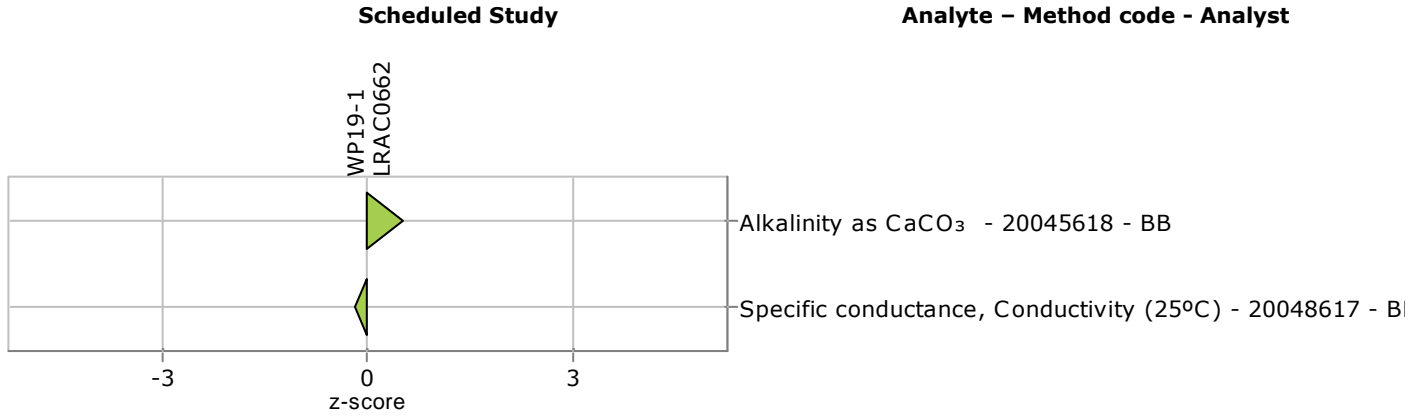
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE1041-1KT Minerals - WP**

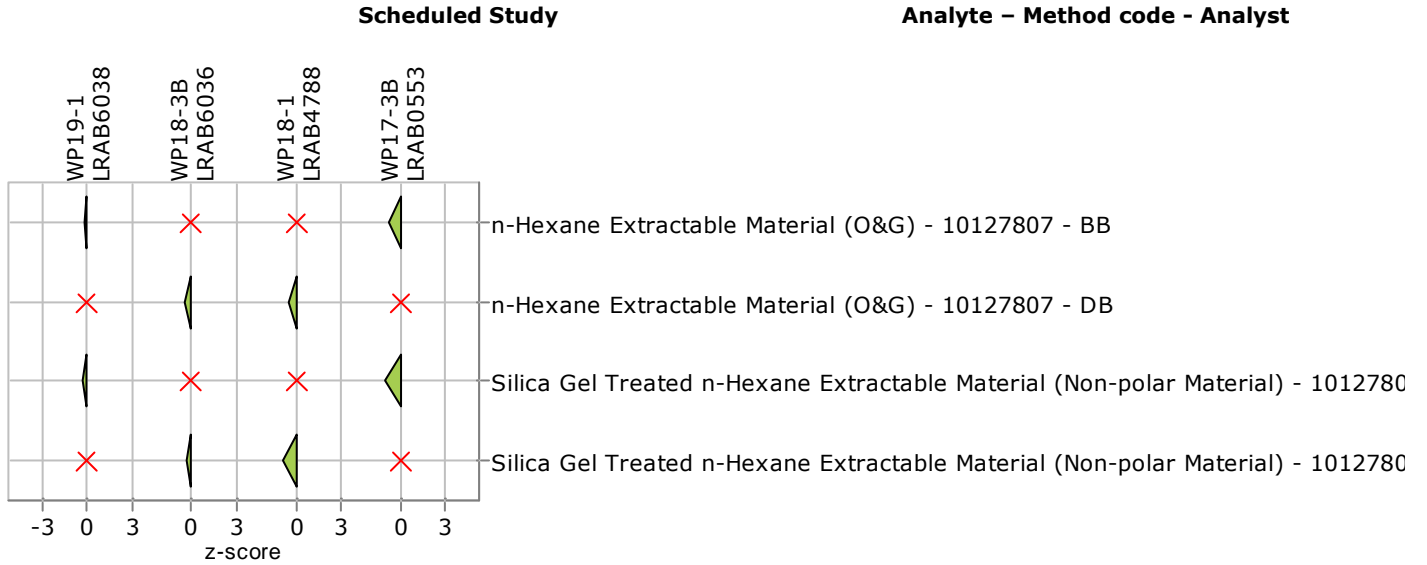
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE1083-2ML Oil & Grease - WP**

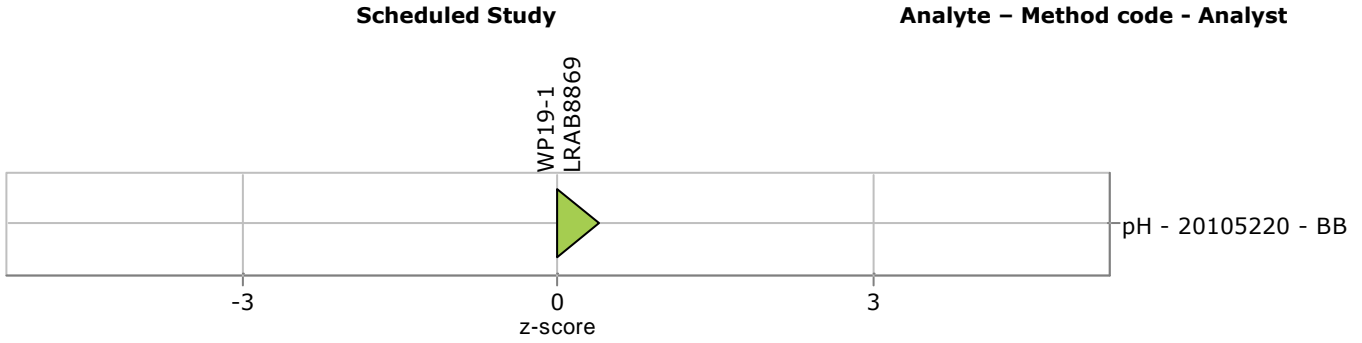
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE1210-100ML pH - WP - 100ML**

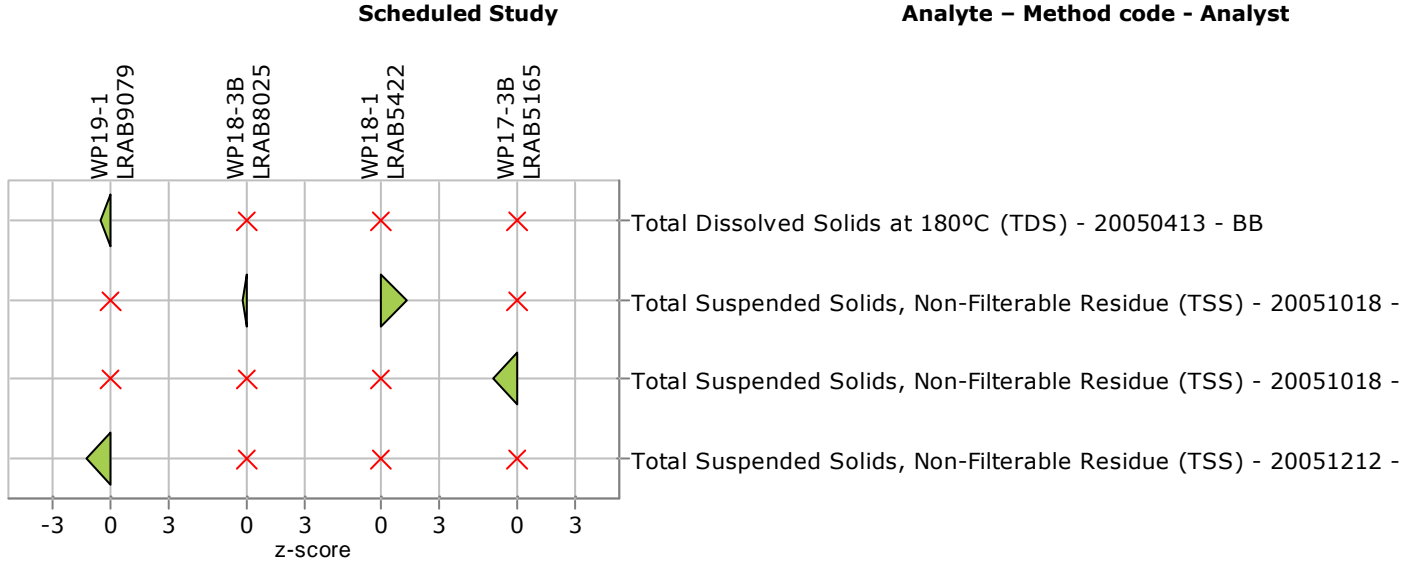
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE3050-500ML Residue - WP**

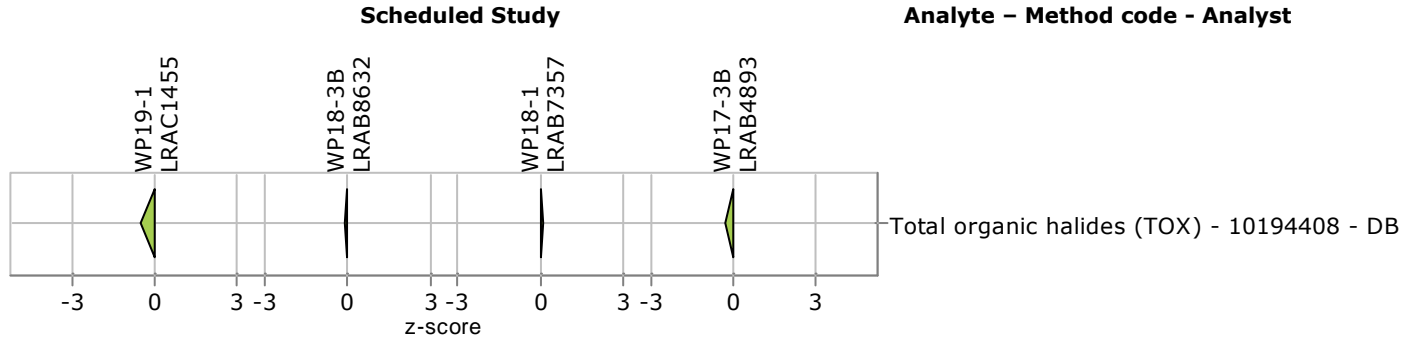
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE1070-2ML Total Organic Halides (TOX) - WP**

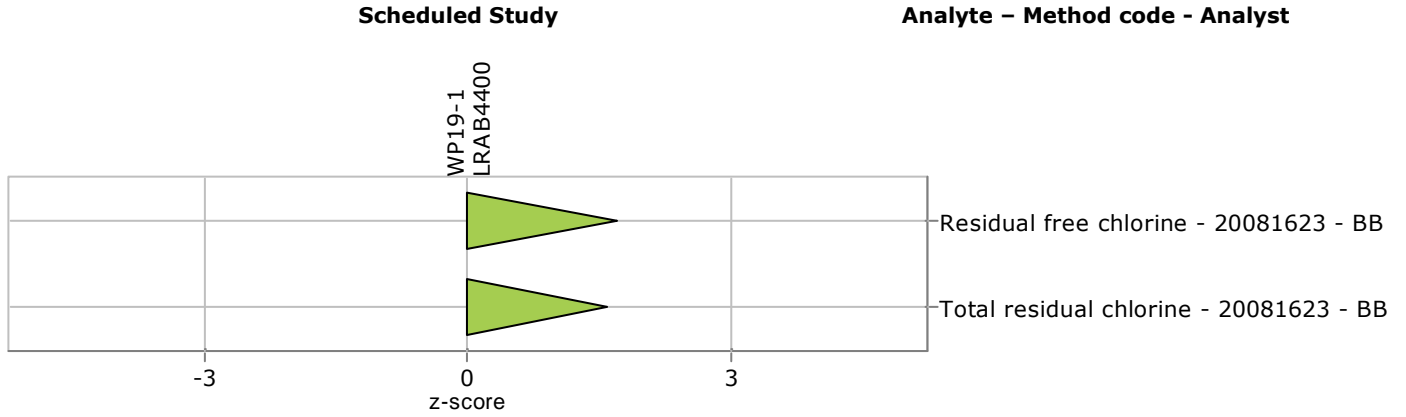
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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**Graphical z-score Overview for WP19-1
PE1065-2ML Total Residual Chlorine - WP**

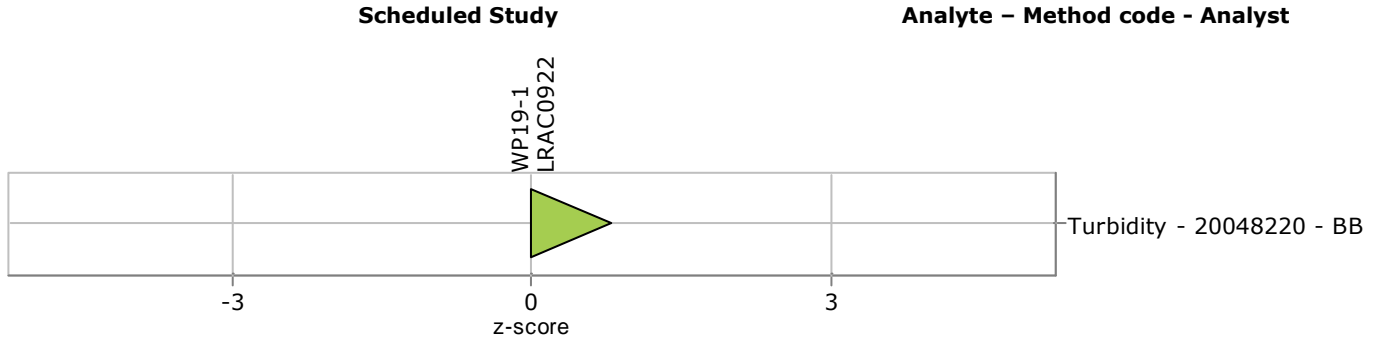
z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



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Graphical z-score Overview for WP19-1 PE1081-20ML Turbidity - WP

z-score Overview* for WP19-1 and the previous three Scheduled Studies of this Study type



* Evaluation parameters used for the statistical analysis; explanation at the end of report

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1 Aim of the Proficiency Test

This interlaboratory study is a proficiency test for the assessment of laboratory performance. It was conducted in the framework of external quality assurance and the report provides an external appraisal of the participant laboratories' competence in the particular testing field.

2 Sample Information

PE1269-20ML Acidity - WP LRAB5747

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Acidity, as CaCO ₃ 1500	mg/L	1350 ± 13.1	585	1240	76.0

PE1060-20ML Anions - WP LRAB8878

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Bromide 1540	mg/L	3.25 ± 0.0200	0.560	3.33	0.182
Chloride 1575	mg/L	119 ± 0.600	29.0	123	4.40
Fluoride 1730	mg/L	0.700 ± 0.00357	0.130	0.670	0.109
Nitrate as N 1810	mg/L	6.86 ± 0.0400	0.190	7.36	0.422
Nitrite as N 1840	mg/L	1.14 ± 0.0100	0.280	1.19	0.119
Sulfate 2000	mg/L	54.2 ± 0.300	2.80	55.8	2.45

PE1130-20ML Demand - WP LRAB8995

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
5-day BOD 1530	mg/L	156 ± 0.800	4.50	95.2	16.4
Carbonaceous BOD (CBOD) 1555	mg/L	156 ± 0.800	3.70	92.8	18.6
Chemical oxygen demand (COD) 1565	mg/L	159 ± 0.800	17.0	155	12.6

MIC003-2EA E. coli in Water - Quantitative WP LRAB9048

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Escherichia coli, MPN 2525	MPN/100 mL	619 ± 59.2	2.00	197	126

* If there are not enough data available to provide Study mean and Study Std. Dev, this is indicated by "---".

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Fecal coliform, MPN 2530	MPN/100 mL	619 ± 59.2	2.00	140	102

PE1041-1KT Minerals - WP LRAC0662

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Alkalinity as CaCO ₃ 1505	mg/L	182 ± 0.928	20.0	181	7.61
Specific conductance, Conductivity (25°C) 1610	µmhos/cm	775 ± 3.95	180	765	25.0

PE1083-2ML Oil & Grease - WP LRAB6038

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
n-Hexane Extractable Material (O&G) 1803	mg/L	80.3 ± 0.409	8.80	76.6	6.77
Silica Gel Treated n-Hexane Extractable Material (Non-polar Material) 6142	mg/L	40.1 ± 0.205	---	37.7	7.64

PE1210-100ML pH - WP - 100ML LRAB8869

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
pH 1900	Units	7.30 ± 0.0372	---	7.35	0.0592

PE3050-500ML Residue - WP LRAB9079

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Total Dissolved Solids at 180°C (TDS) 1955	mg/L	552 ± 9.00	98.0	540	20.9
Total Suspended Solids, Non- Filterable Residue (TSS) 1960	mg/L	73.0 ± 1.20	14.0	64.9	5.08

* If there are not enough data available to provide Study mean and Study Std. Dev, this is indicated by "---".

**PE1070-2ML Total Organic Halides (TOX) - WP
LRAC1455**

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Total organic halides (TOX) 2045	ug/L	838 ± 4.27	---	---	---

**PE1065-2ML Total Residual Chlorine - WP
LRAB4400**

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Total residual chlorine 1940	mg/L	1.66 ± 0.0104	0.360	1.67	0.113
Residual free chlorine 1945	mg/L	1.66 ± 0.0104	---	1.61	0.0541

**PE1081-20ML Turbidity - WP
LRAC0922**

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Turbidity 2055	NTU	5.65 ± 0.0300	1.20	5.43	0.490

* If there are not enough data available to provide Study mean and Study Std. Dev, this is indicated by "---".

3 Data Availability

PE1269-20ML Acidity - WP LRAB5747

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Acidity, as CaCO ₃ 1500	5	5	6	6

PE1060-20ML Anions - WP LRAB8878

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Bromide 1540	8	8	12	12
Chloride 1575	25	25	32	32
Fluoride 1730	19	19	29	29
Nitrate as N 1810	20	20	26	26
Nitrite as N 1840	16	16	21	21
Sulfate 2000	22	22	29	29

PE1130-20ML Demand - WP LRAB8995

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
5-day BOD 1530	44	44	45	45
Carbonaceous BOD (CBOD) 1555	33	33	33	33
Chemical oxygen demand (COD) 1565	30	30	32	32

* Only quantitative values are taken into account in the calculation of study mean and study std.dev. (i.e. without missing results, without less-than results, without larger-than results).

**MIC003-2EA E. coli in Water - Quantitative WP
LRAB9048**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Escherichia coli, MPN 2525	26	25	30	29
Fecal coliform, MPN 2530	27	27	34	34

**PE1041-1KT Minerals - WP
LRAC0662**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Alkalinity as CaCO ₃ 1505	44	44	45	45
Specific conductance, Conductivity (25°C) 1610	49	49	53	53

**PE1083-2ML Oil & Grease - WP
LRAB6038**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
n-Hexane Extractable Material (O&G) 1803	34	34	35	35
Silica Gel Treated n-Hexane Extractable Material (Non-polar Material) 6142	17	17	17	17

**PE1210-100ML pH - WP - 100ML
LRAB8869**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
pH 1900	39	39	43	43

* Only quantitative values are taken into account in the calculation of study mean and study std.dev. (i.e. without missing results, without less-than results, without larger-than results).

**PE3050-500ML Residue - WP
LRAB9079**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Total Dissolved Solids at 180°C (TDS) 1955	38	38	41	41
Total Suspended Solids, Non-Filterable Residue (TSS) 1960	52	52	54	54

**PE1070-2ML Total Organic Halides (TOX) - WP
LRAC1455**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Total organic halides (TOX) 2045	1	1	1	1

**PE1065-2ML Total Residual Chlorine - WP
LRAB4400**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Total residual chlorine 1940	102	102	103	103
Residual free chlorine 1945	13	13	14	14

**PE1081-20ML Turbidity - WP
LRAC0922**

Analyte	Number of participating laboratories		Number of data points	
	in total	with quantitative data points only*	in total	quantitative only*
Turbidity 2055	28	28	30	30

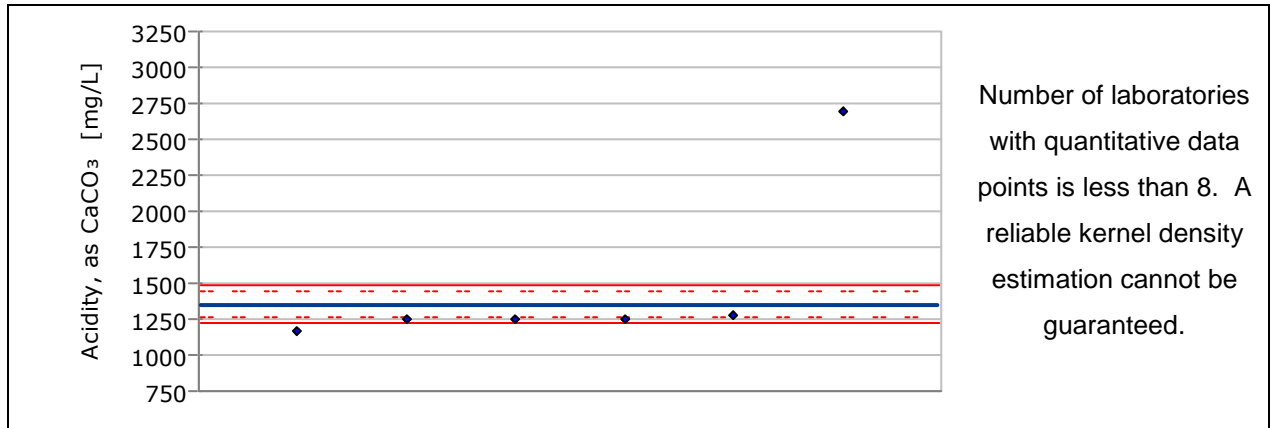
* Only quantitative values are taken into account in the calculation of study mean and study std.dev. (i.e. without missing results, without less-than results, without larger-than results).

4 Results

4.1 PE1269-20ML Acidity - WP / LRAB5747

4.1.1 Acidity, as CaCO₃

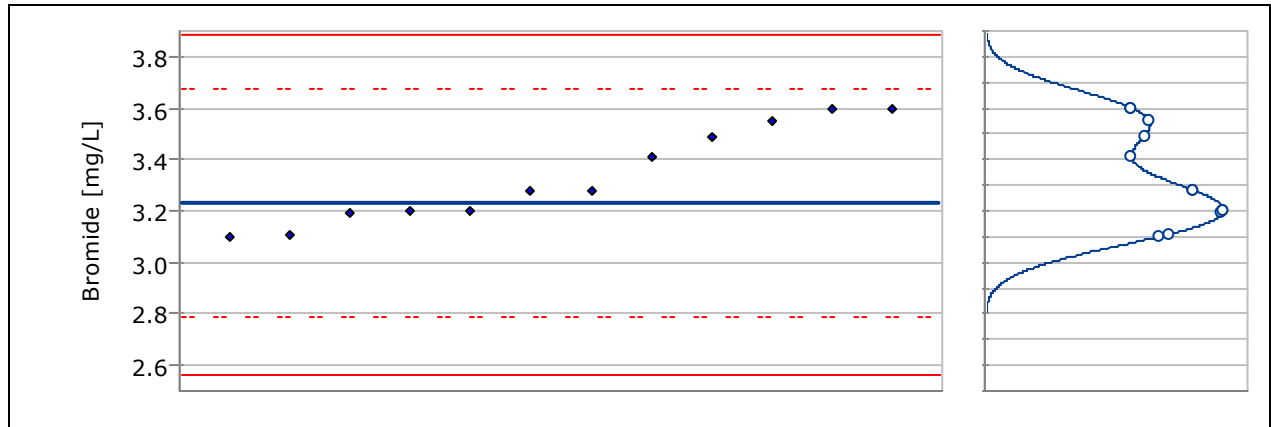
No. of participating laboratories (in total / with quant. data points only)	5 / 5
No. of data points (in total / quantitative)	6 / 6
Assigned value	1350 mg/L
Proficiency std. dev.	45.0 mg/L
Acceptance window	1220 - 1490 mg/L



4.2 PE1060-20ML Anions - WP / LRAB8878

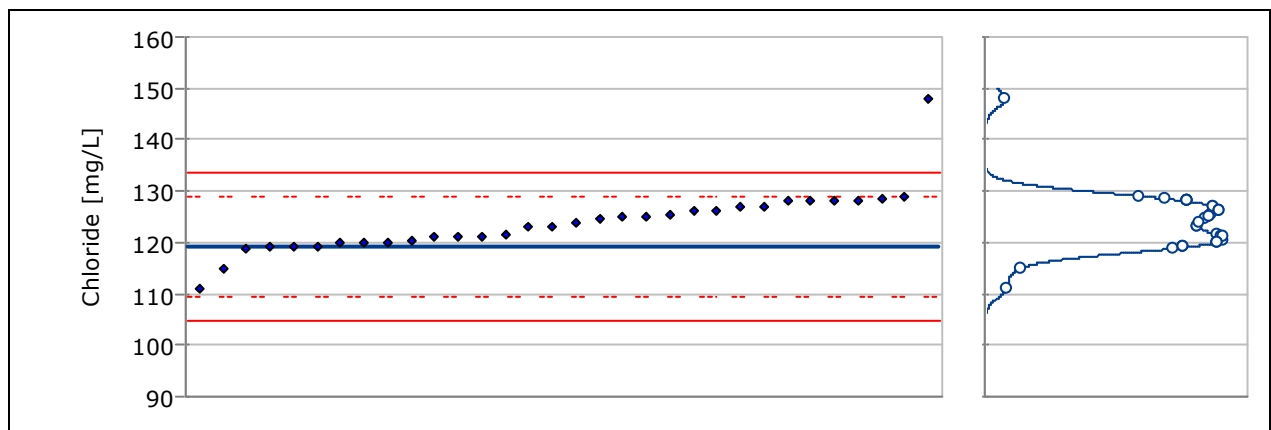
4.2.1 Bromide

No. of participating laboratories (in total / with quant. data points only)	8 / 8
No. of data points (in total / quantitative)	12 / 12
Assigned value	3.23 mg/L
Proficiency std. dev.	0.221 mg/L
Acceptance window	2.56 - 3.89 mg/L



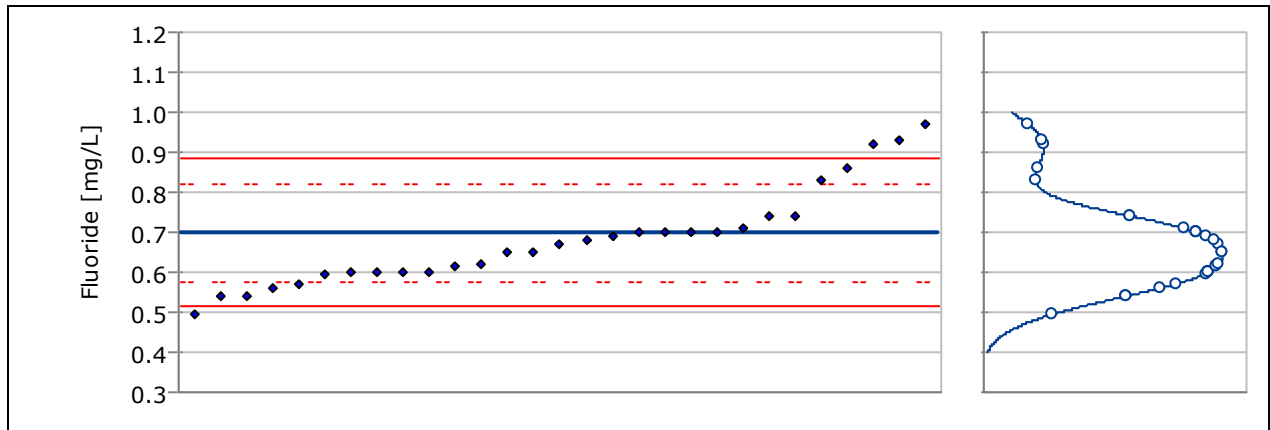
4.2.2 Chloride

No. of participating laboratories (in total / with quant. data points only)	25 / 25
No. of data points (in total / quantitative)	32 / 32
Assigned value	119 mg/L
Proficiency std. dev.	4.83 mg/L
Acceptance window	105 - 134 mg/L



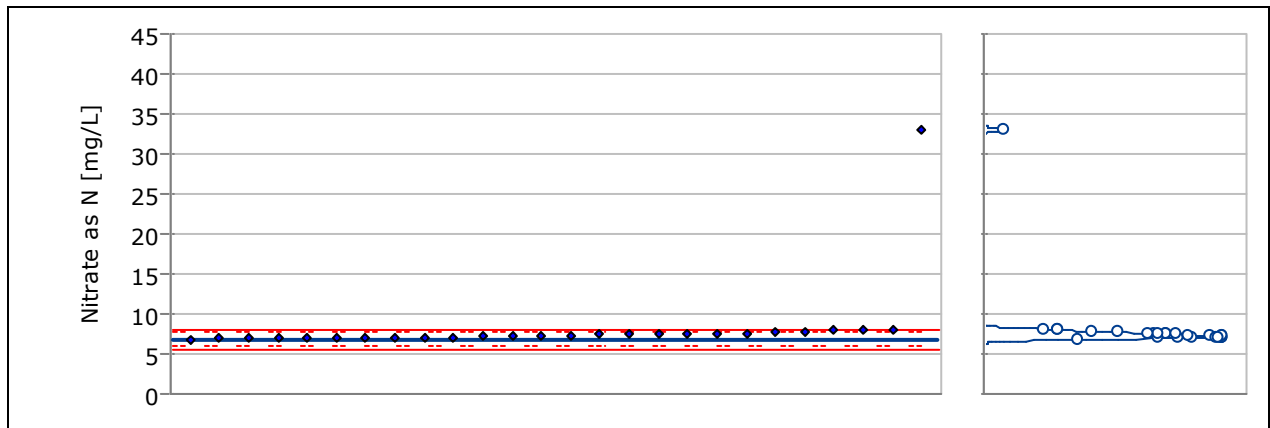
4.2.3 Fluoride

No. of participating laboratories (in total / with quant. data points only)	19 / 19
No. of data points (in total / quantitative)	29 / 29
Assigned value	0.698 mg/L
Proficiency std. dev.	0.0618 mg/L
Acceptance window	0.513 - 0.883 mg/L



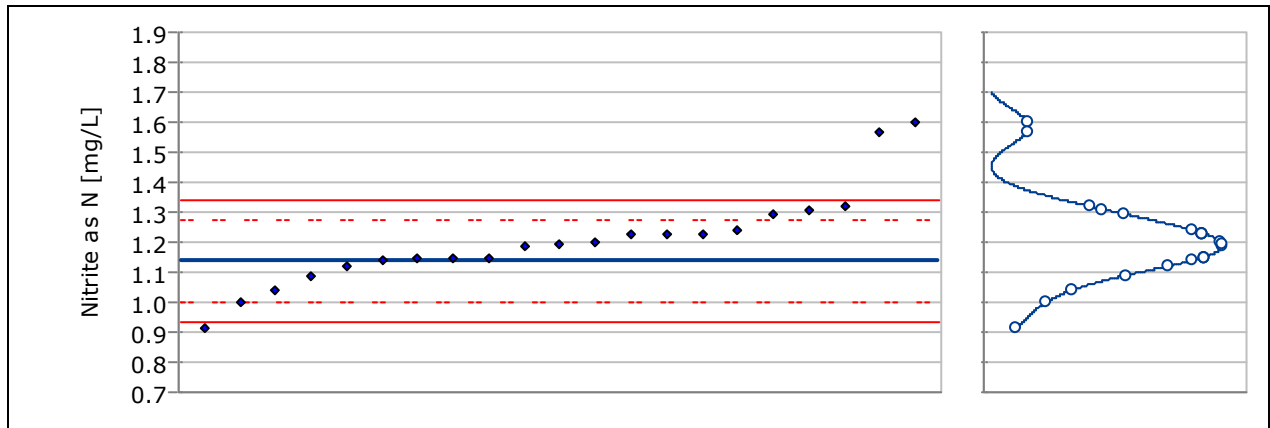
4.2.4 Nitrate as N

No. of participating laboratories (in total / with quant. data points only)	20 / 20
No. of data points (in total / quantitative)	26 / 26
Assigned value	6.84 mg/L
Proficiency std. dev.	0.411 mg/L
Acceptance window	5.61 - 8.08 mg/L



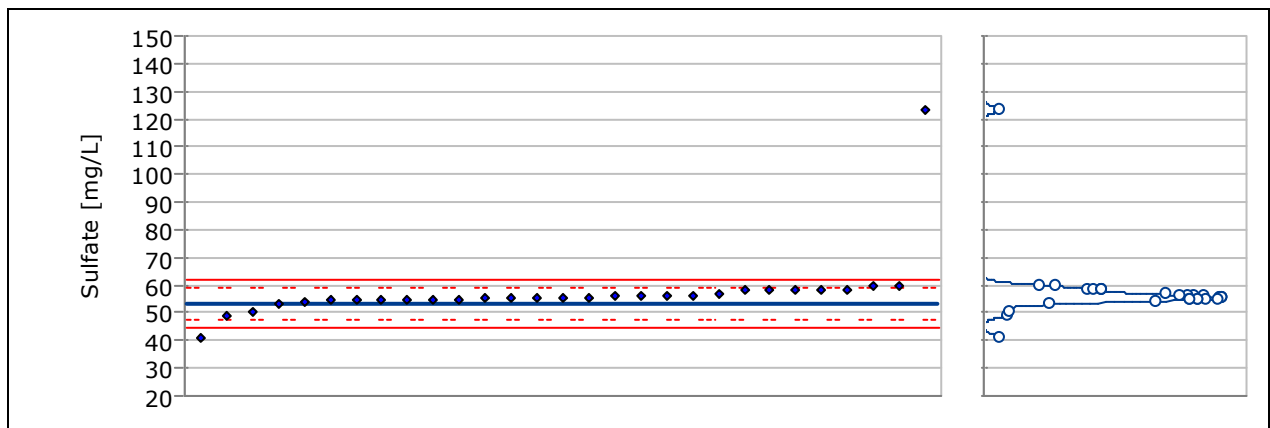
4.2.5 Nitrite as N

No. of participating laboratories (in total / with quant. data points only)	16 / 16
No. of data points (in total / quantitative)	21 / 21
Assigned value	1.14 mg/L
Proficiency std. dev.	0.0680 mg/L
Acceptance window	0.935 - 1.34 mg/L



4.2.6 Sulfate

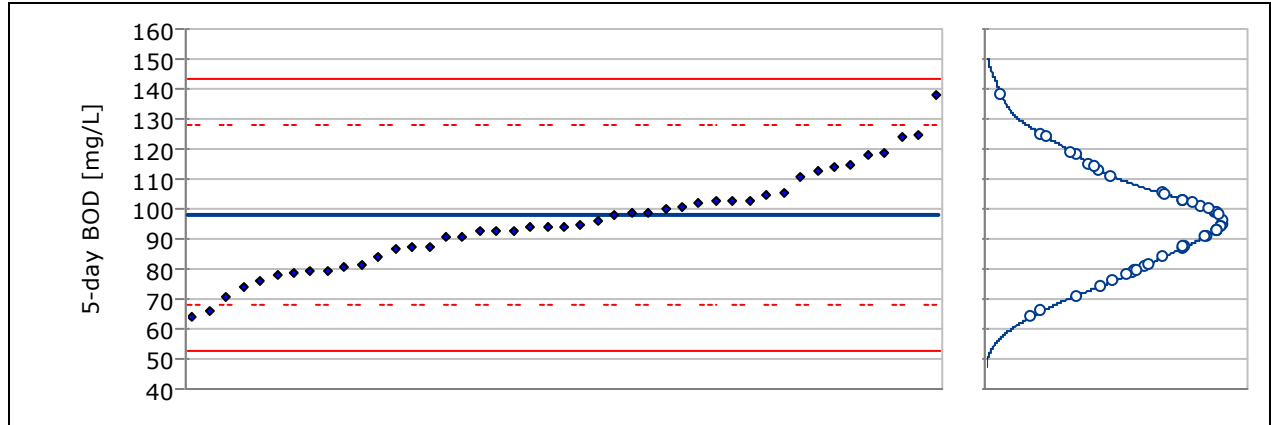
No. of participating laboratories (in total / with quant. data points only)	22 / 22
No. of data points (in total / quantitative)	29 / 29
Assigned value	53.3 mg/L
Proficiency std. dev.	2.89 mg/L
Acceptance window	44.7 - 62.0 mg/L



4.3 PE1130-20ML Demand - WP / LRAB8995

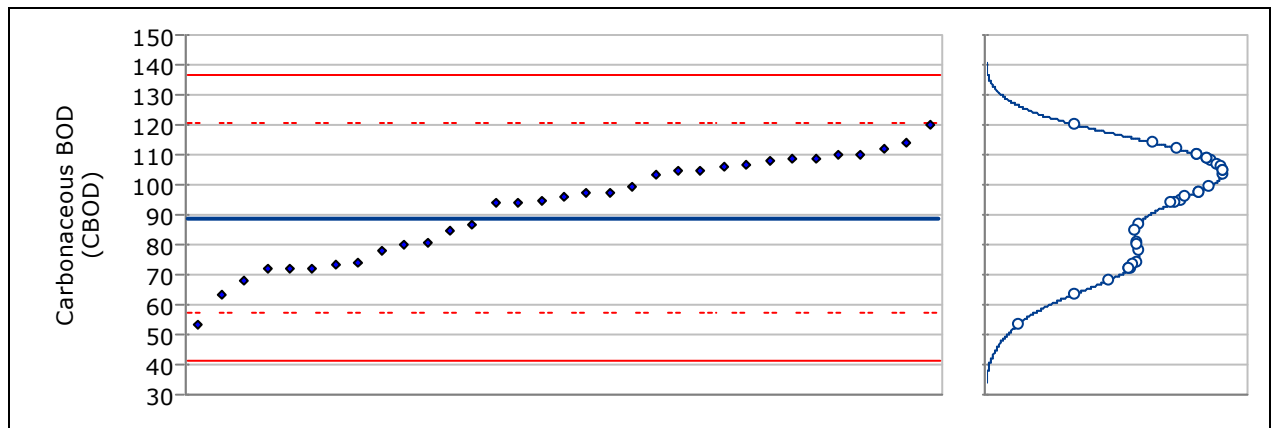
4.3.1 5-day BOD

No. of participating laboratories (in total / with quant. data points only)	44 / 44
No. of data points (in total / quantitative)	45 / 45
Assigned value	98.0 mg/L
Proficiency std. dev.	15.1 mg/L
Acceptance window	52.6 - 143 mg/L



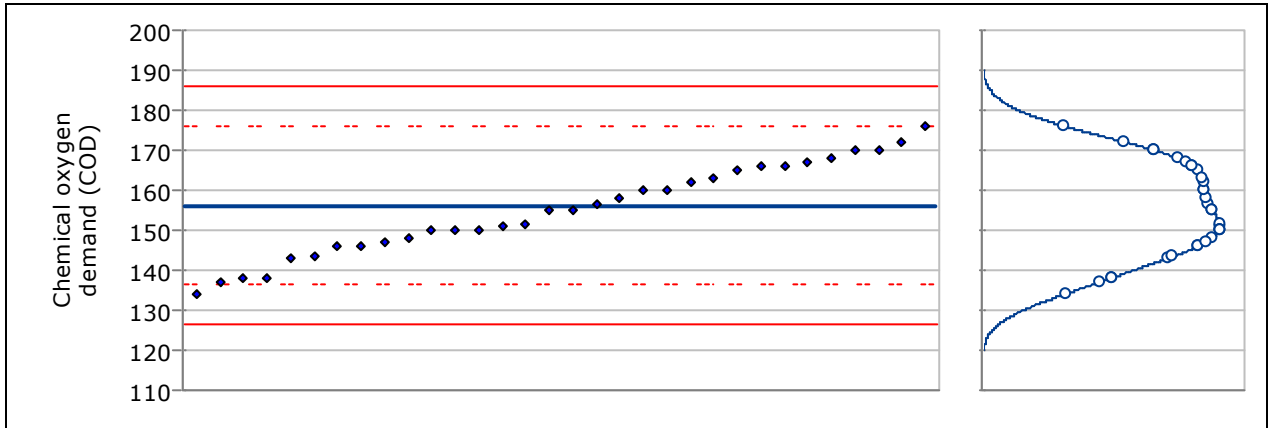
4.3.2 Carbonaceous BOD (CBOD)

No. of participating laboratories (in total / with quant. data points only)	33 / 33
No. of data points (in total / quantitative)	33 / 33
Assigned value	88.8 mg/L
Proficiency std. dev.	15.9 mg/L
Acceptance window	41.1 - 136 mg/L



4.3.3 Chemical oxygen demand (COD)

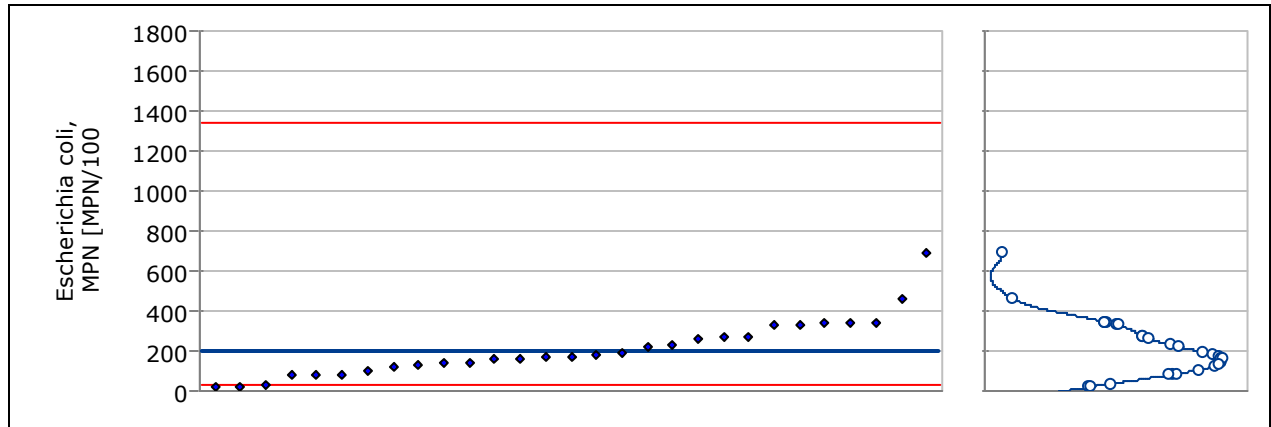
No. of participating laboratories (in total / with quant. data points only)	30 / 30
No. of data points (in total / quantitative)	32 / 32
Assigned value	156 mg/L
Proficiency std. dev.	9.89 mg/L
Acceptance window	127 - 186 mg/L



4.4 MIC003-2EA E. coli in Water - Quantitative WP / LRAB9048

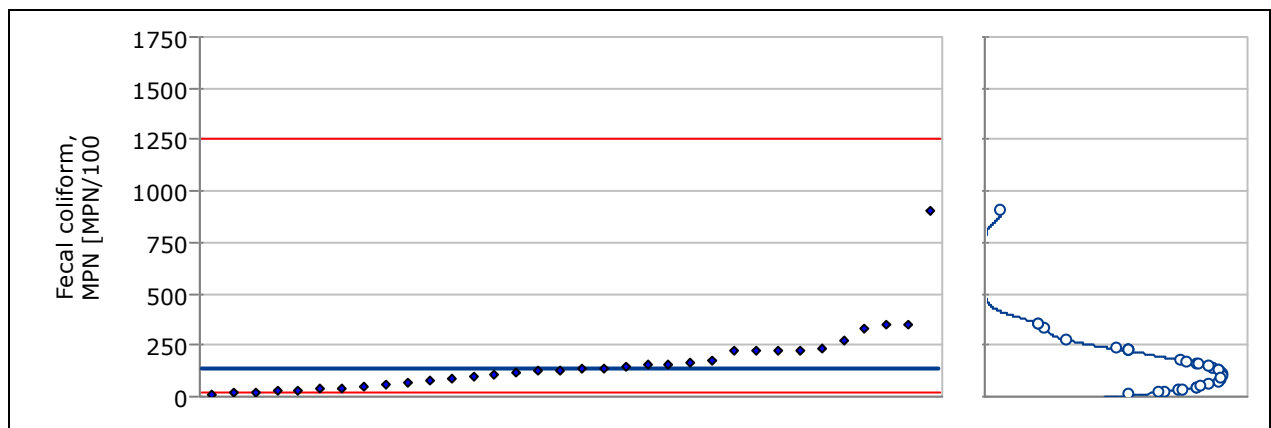
4.4.1 Escherichia coli, MPN

No. of participating laboratories (in total / with quant. data points only)	26 / 25
No. of data points (in total / quantitative)	30 / 29
Assigned value	197 MPN/100 mL
Proficiency std. dev.	126 MPN/100 mL
Acceptance window	29.0 - 1340 MPN/100 mL



4.4.2 Fecal coliform, MPN

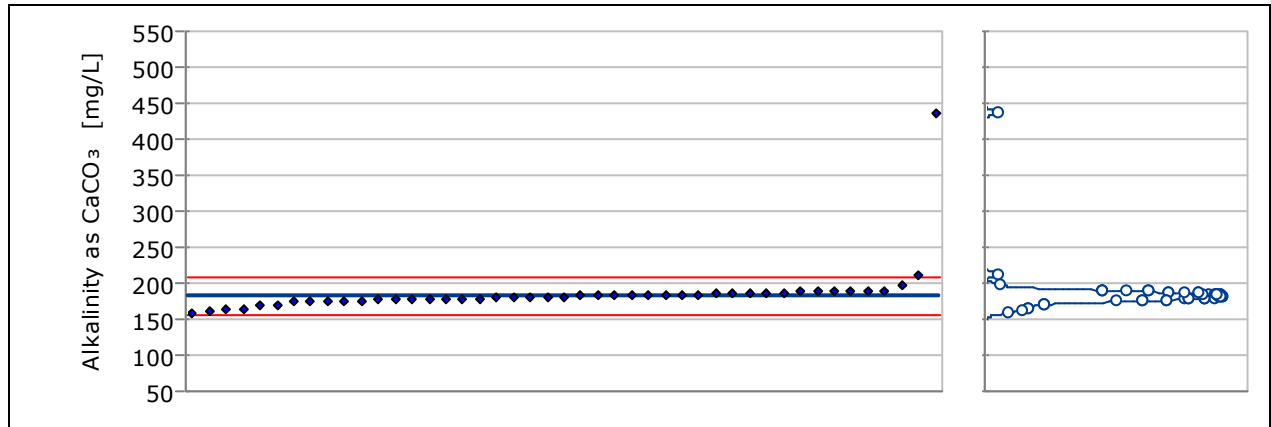
No. of participating laboratories (in total / with quant. data points only)	27 / 27
No. of data points (in total / quantitative)	34 / 34
Assigned value	140 MPN/100 mL
Proficiency std. dev.	102 MPN/100 mL
Acceptance window	15.5 - 1260 MPN/100 mL



4.5 PE1041-1KT Minerals - WP / LRAC0662

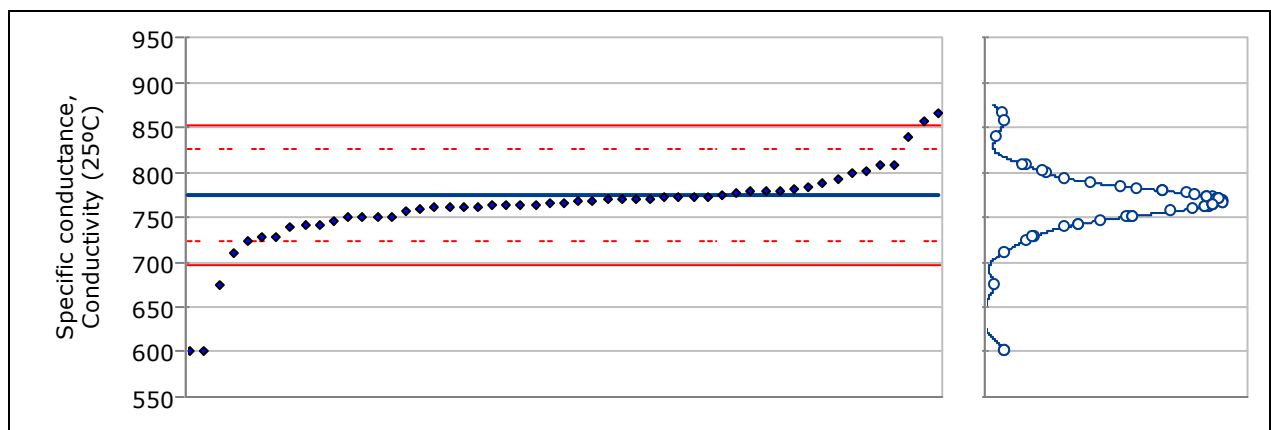
4.5.1 Alkalinity as CaCO₃

No. of participating laboratories (in total / with quant. data points only)	44 / 44
No. of data points (in total / quantitative)	45 / 45
Assigned value	182 mg/L
Proficiency std. dev.	9.10 mg/L
Acceptance window	155 - 209 mg/L



4.5.2 Specific conductance, Conductivity (25°C)

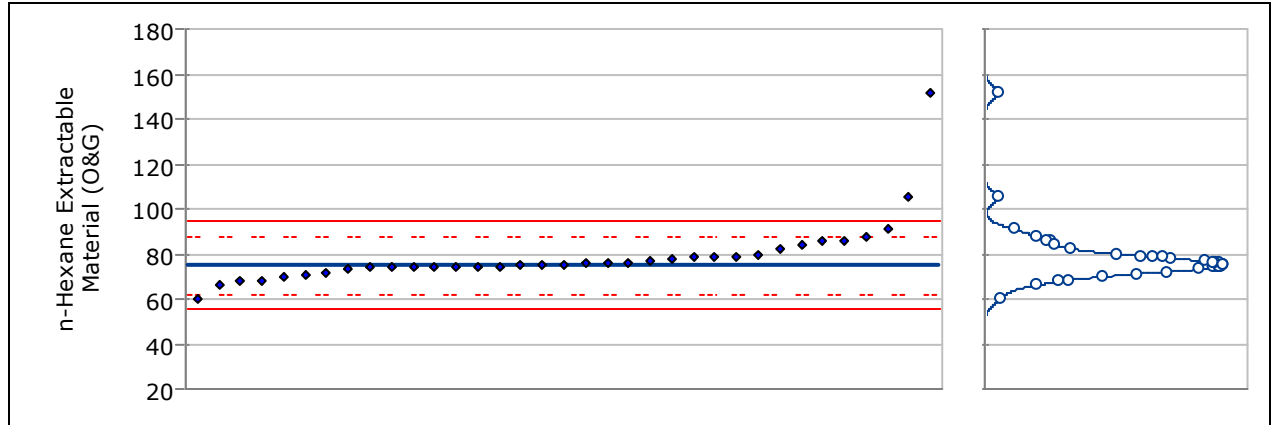
No. of participating laboratories (in total / with quant. data points only)	49 / 49
No. of data points (in total / quantitative)	53 / 53
Assigned value	775 µmhos/cm
Proficiency std. dev.	25.8 µmhos/cm
Acceptance window	698 - 852 µmhos/cm



4.6 PE1083-2ML Oil & Grease - WP / LRAB6038

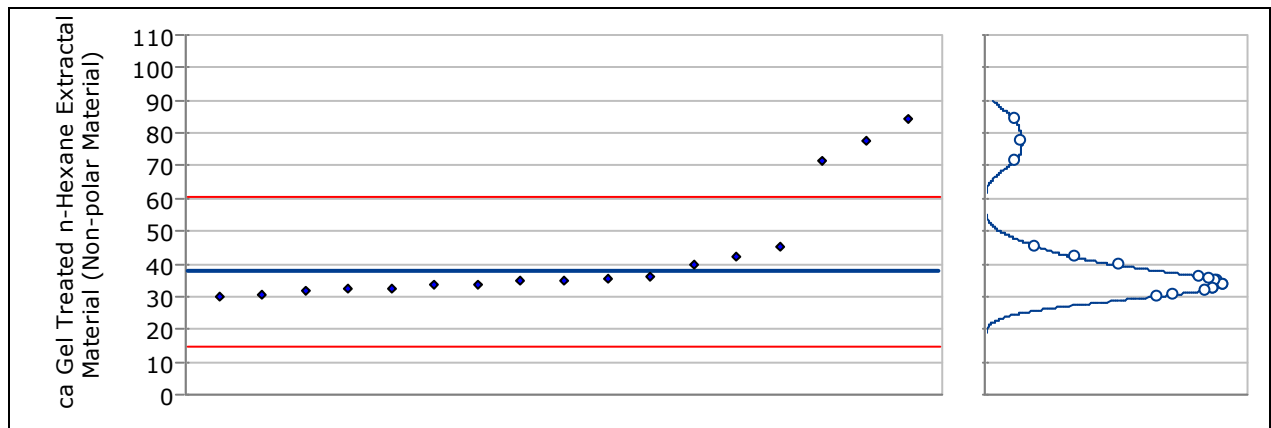
4.6.1 n-Hexane Extractable Material (O&G)

No. of participating laboratories (in total / with quant. data points only)	34 / 34
No. of data points (in total / quantitative)	35 / 35
Assigned value	75.1 mg/L
Proficiency std. dev.	6.46 mg/L
Acceptance window	55.7 - 94.4 mg/L



4.6.2 Silica Gel Treated n-Hexane Extractable Material (Non-polar Material)

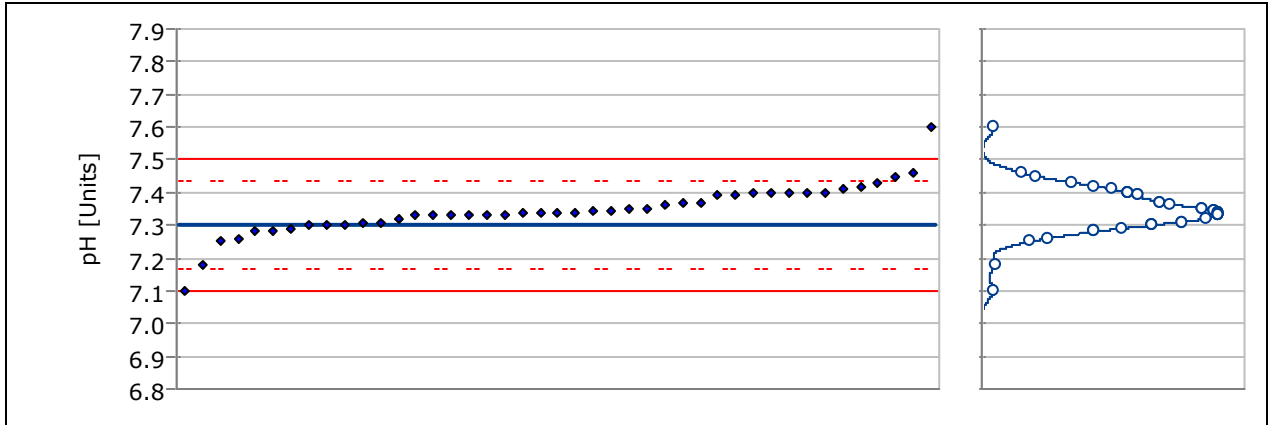
No. of participating laboratories (in total / with quant. data points only)	17 / 17
No. of data points (in total / quantitative)	17 / 17
Assigned value	37.7 mg/L
Proficiency std. dev.	7.64 mg/L
Acceptance window	14.7 - 60.6 mg/L



4.7 PE1210-100ML pH - WP - 100ML / LRAB8869

4.7.1 pH

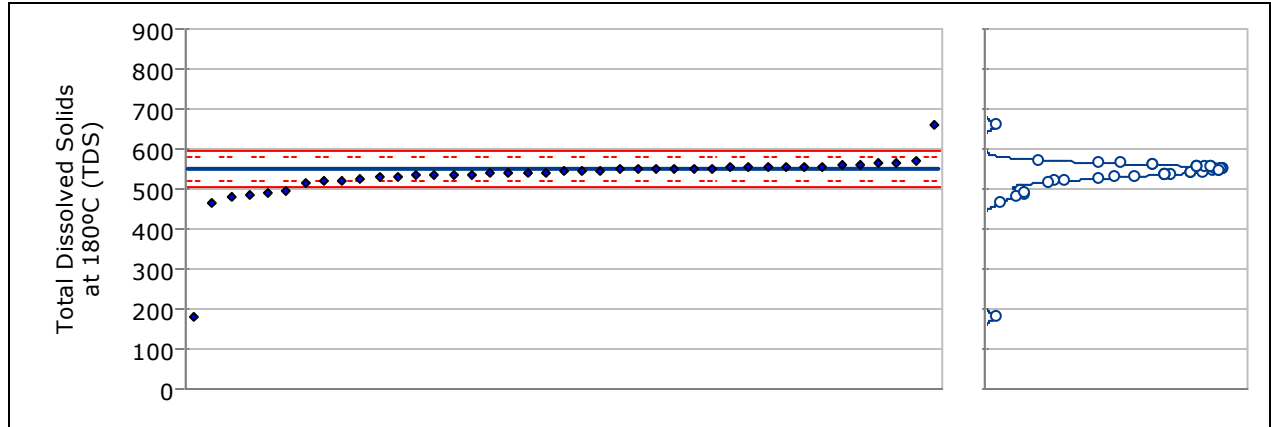
No. of participating laboratories (in total / with quant. data points only)	39 / 39
No. of data points (in total / quantitative)	43 / 43
Assigned value	7.30 Units
Proficiency std. dev.	0.0667 Units
Acceptance window	7.10 - 7.50 Units



4.8 PE3050-500ML Residue - WP / LRAB9079

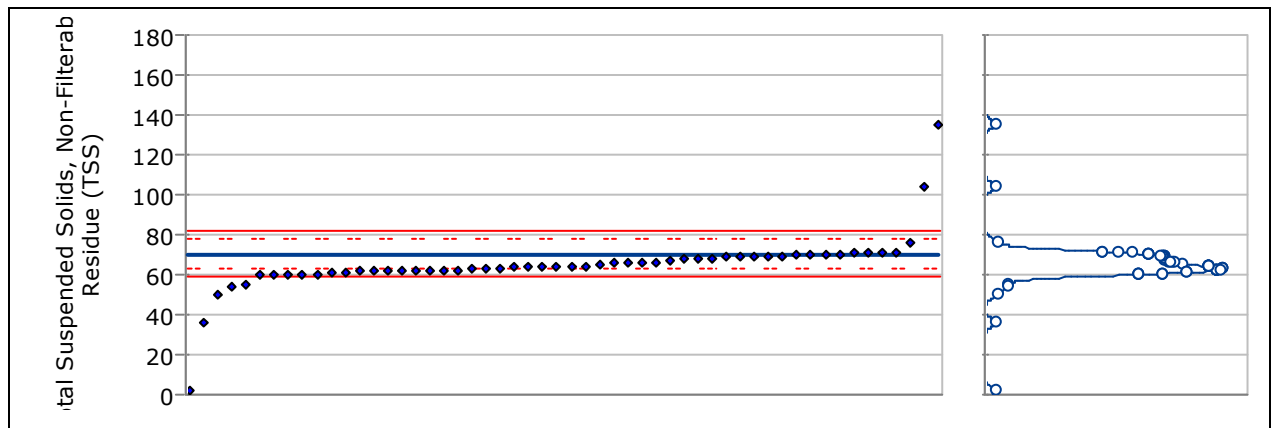
4.8.1 Total Dissolved Solids at 180°C (TDS)

No. of participating laboratories (in total / with quant. data points only)	38 / 38
No. of data points (in total / quantitative)	41 / 41
Assigned value	552 mg/L
Proficiency std. dev.	15.0 mg/L
Acceptance window	507 - 597 mg/L



4.8.2 Total Suspended Solids, Non-Filterable Residue (TSS)

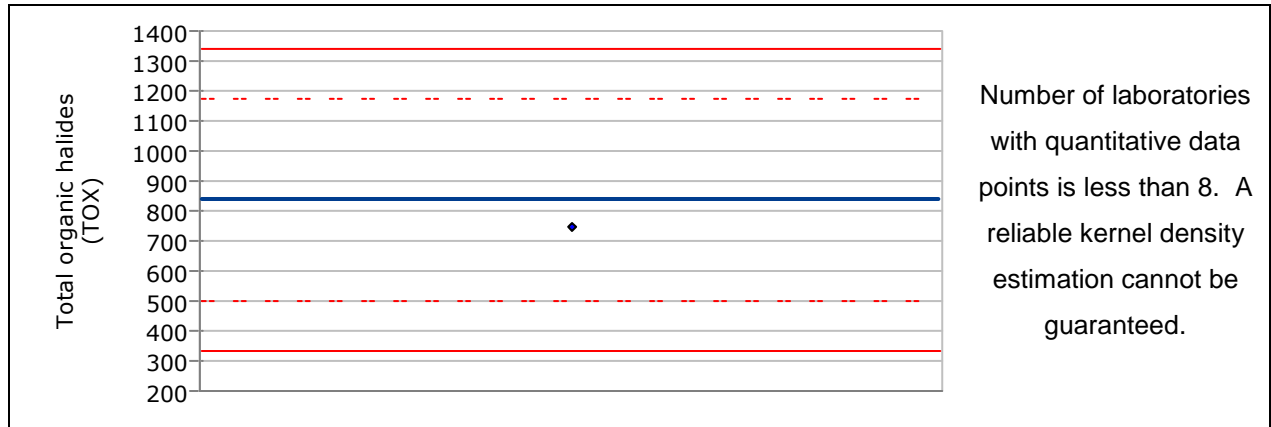
No. of participating laboratories (in total / with quant. data points only)	52 / 52
No. of data points (in total / quantitative)	54 / 54
Assigned value	70.4 mg/L
Proficiency std. dev.	3.77 mg/L
Acceptance window	59.1 - 81.7 mg/L



4.9 PE1070-2ML Total Organic Halides (TOX) - WP / LRAC1455

4.9.1 Total organic halides (TOX)

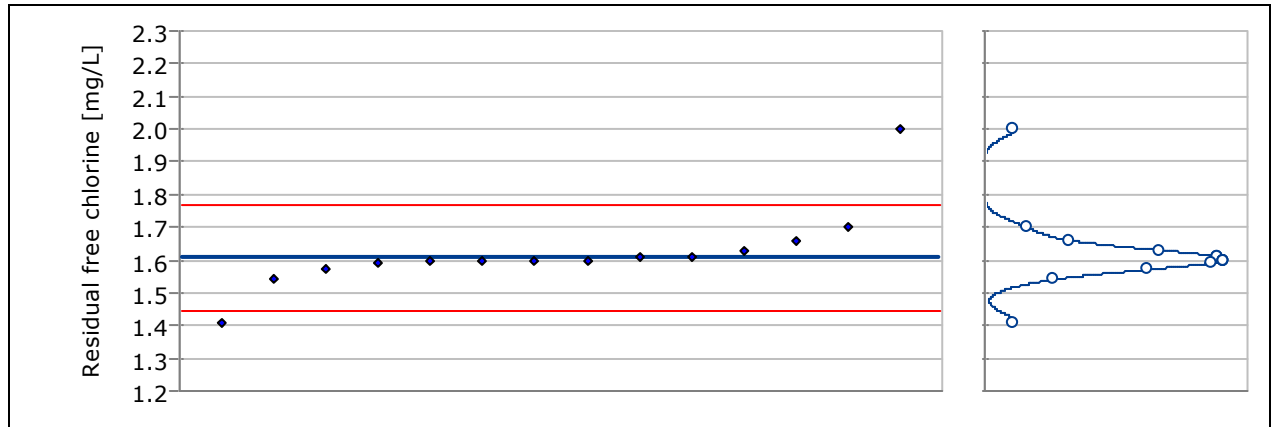
No. of participating laboratories (in total / with quant. data points only)	1 / 1
No. of data points (in total / quantitative)	1 / 1
Assigned value	838 ug/L
Proficiency std. dev.	168 ug/L
Acceptance window	335 - 1340 ug/L



4.10 PE1065-2ML Total Residual Chlorine - WP / LRAB4400

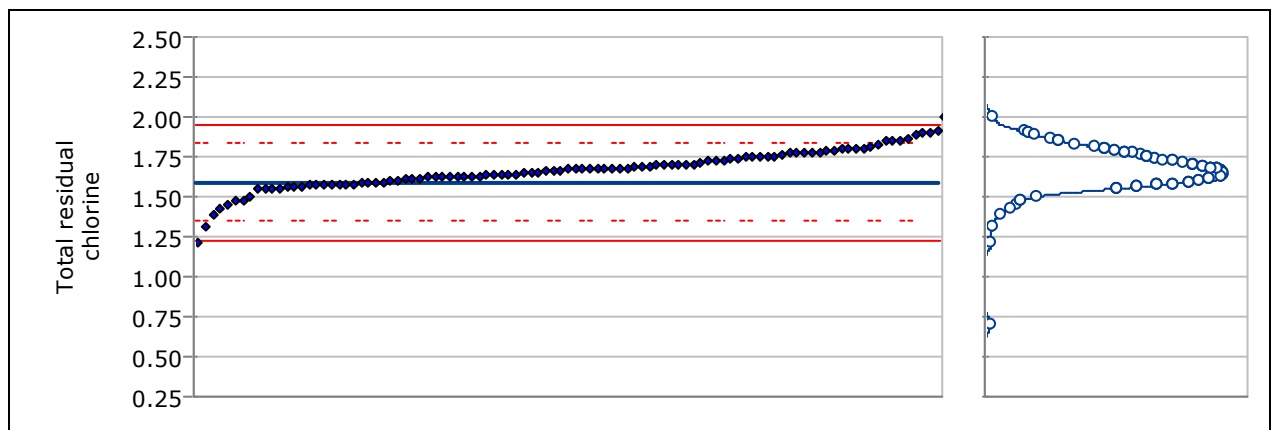
4.10.1 Residual free chlorine

No. of participating laboratories (in total / with quant. data points only)	13 / 13
No. of data points (in total / quantitative)	14 / 14
Assigned value	1.61 mg/L
Proficiency std. dev.	0.0541 mg/L
Acceptance window	1.45 - 1.77 mg/L



4.10.2 Total residual chlorine

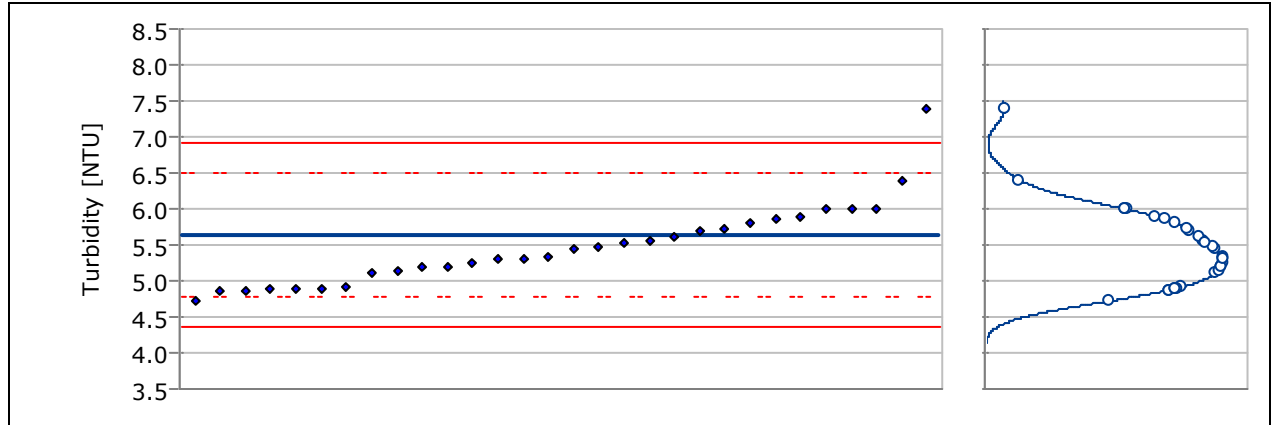
No. of participating laboratories (in total / with quant. data points only)	102 / 102
No. of data points (in total / quantitative)	103 / 103
Assigned value	1.59 mg/L
Proficiency std. dev.	0.122 mg/L
Acceptance window	1.23 - 1.95 mg/L



4.11 PE1081-20ML Turbidity - WP / LRAC0922

4.11.1 Turbidity

No. of participating laboratories (in total / with quant. data points only)	28 / 28
No. of data points (in total / quantitative)	30 / 30
Assigned value	5.64 NTU
Proficiency std. dev.	0.426 NTU
Acceptance window	4.36 - 6.91 NTU



5 Statistical Analysis

5.1 Definitions and Interpretation

Reported Value

The participant's result.

Assigned Value

Value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose. See ISO/IEC 17043 for additional information. In general, the assigned value is the value used to assess proficiency and may or may not be the made to value (gravimetric value).

Acceptance Window

The range of values that constitute acceptable performance for a laboratory participating in this PT study.

z-score

A z-score shows how a single data point compares to normal data. A z-score says not only whether a point was above or below average, but how unusual the measurement is. Generally, a method result with a z-score less than |2| is considered to be in control, a z-score between |2| and |3| is considered 'Questionable', but still within control and a z-score greater than |3| is considered not acceptable and the method is out of control. For WS studies, a z-score greater than |2| is not acceptable.

Calculated as $z = (\text{Reported Value} - \text{Assigned Value}) / \text{Proficiency Std. Dev.}$

A z-score cannot be provided

- (1) for presence/absence data,
- (2) for identification data and other categorical data,
- (3) where the analyte is not present in the sample,
- (4) for "less than" and "greater than" values,
- (5) NOEC analytes (in the framework of WETT analysis).

In cases (1) to (3) the participant's result is only evaluated by "acceptable" if it matches with the assigned value. Otherwise the result is indicated as "not acceptable". In case the analyte is not present in the sample and a PTRL is available, the participant's result is indicated as "acceptable" as long the result is less than the PTRL.

In case (4) the following evaluation rules will be applied:

- “less than” values:
 - PTRL available:
 - When the “less than” value is greater than the PTRL, then the result is indicated as “not acceptable”, otherwise as “acceptable”.
 - PTRL not available:
 - When the analyte is not present in the sample the result is always “acceptable”.
 - When the analyte is truly present in the sample, the result is only “acceptable” if the “less than” value is greater than the lower limit of the acceptance window.
- “greater than” values:
 - When the analyte is not present in the sample the result is always “not acceptable”.
 - When the analyte is truly present in the sample, the result is only “acceptable” if the “greater than” value is less than the upper limit of the acceptance window.

In case (5) the result is indicated as “acceptable” if it lies within the acceptance window, otherwise the result is indicated as “not acceptable”.

Proficiency Std. Dev.

Standard deviation calculated based on Evaluation Criteria.

PTRL

Proficiency Testing Reporting Limit

Study Mean

Statistical study mean calculated using a robust statistical model. Robust statistical techniques are used to minimize the influence extreme results can have on estimates of the mean and standard deviation. NOTE - These techniques assign less weight to extreme results, rather than eliminate them from a data set.

Choice of statistical technique: In case of quantitative data points from at least 8 laboratories, Algorithm A (ISO 13528, Section C.3.1), and in case of quantitative data points of 4 to 7 laboratories, the Hampel estimator (ISO 13528, Section C.5.3) is applied. A study mean cannot be calculated in case there are quantitative data points from less than 4 laboratories available.

Study Std. Dev.

Standard deviation calculated from study data using robust statistics.

In case of quantitative data points from at least 8 laboratories, Algorithm A (ISO 13528, Section C.3.1), and in case of quantitative data points of 4 to 7 laboratories, the Q method (ISO 13528, Section C.5.2) is applied. A study standard deviation cannot be calculated in case there are quantitative data points from less than 4 laboratories available.

Gravimetric Value

The 'prepared to' value, determined by gravimetric means. The uncertainty associated with this value is the standard uncertainty and based on Sigma-Aldrich RTC's gravimetric tolerances.

Analytical Value

The measured value, determined after preparation. The uncertainty associated to this value is the standard uncertainty and based on the measurement process.

5.2 Evaluation Criteria

1 - Regression Equation

Acceptance windows based on TNI adopted equation of proficiency value ± 3 proficiency standard deviations and check limits of proficiency value ± 2 proficiency standard deviations. Proficiency value and proficiency standard deviation are calculated from gravimetric variables a, b, c & d as proficiency value = $a * \text{gravimetric} + b$ and proficiency standard deviation = $c * \text{gravimetric} + d$.

2 - Study Robust Mean and c, d regression

Acceptance windows based on TNI adopted equation of proficiency value ± 3 proficiency standard deviations and check limits of proficiency value ± 2 proficiency standard deviations. Proficiency value and proficiency standard deviation calculated from robust study mean and variables c & d as proficiency value = robust mean and proficiency standard deviation = $c * \text{proficiency value} + d$.

3 - Fixed Limits

Acceptance windows based on span of gravimetric percentage from gravimetric as $\text{gravimetric} \pm \text{gravimetric} * \text{percentage}$.

4 - Adjustable Fixed Limits

Acceptance windows based on a span of gravimetric percentage from gravimetric as $\text{gravimetric} \pm \text{gravimetric} * \text{lowPercentage}$ where $\text{gravimetric} < \text{break}$ and $\text{gravimetric} \pm \text{gravimetric} * \text{highPercentage}$ where $\text{gravimetric} \geq \text{break}$.

5 - Study Statistics

Acceptance windows based on a number of standard deviations span from the study mean as $\text{study mean} \pm (\text{deviations} * \text{standard deviation})$.

6 - Log Transform Statistics

Acceptance windows based on lognormal distributed data. Acceptance windows = $\text{mean}(\text{lognormal}) \pm \text{span} * \text{standard deviation}(\text{lognormal})$.

7 - Regression Equation 2SD

Acceptance windows based on EPA equation of proficiency value ± 2 proficiency standard deviations. Proficiency value and proficiency standard deviation are calculated from gravimetric variables a, b, c & d as proficiency value = $a * \text{gravimetric} + b$ and proficiency standard deviation = $c * \text{gravimetric} + d$. Generally reserved for drinking water studies.

8 - Study Median and Dilution Levels

Acceptance windows based on study median ± 1 dilution. If the median falls between two test dilutions, then the assigned value is set at the higher value, and the lower acceptance limit is the second test dilution below the median, and the upper acceptance limit is the second test dilution above the median. Generally reserved for NOEC analytes (in the framework of WETT analysis).

9 - Fixed Limits based on Analytical Value

Acceptance windows based on span of analytical value from measurements.

6 Notes on the Interpretation of the Results

z score Overview

The z-scores are presented as colored triangles. For each item, the z-scores of all analytes of the current and the previous (up to three) scheduled studies of this study type. The z-scores depend on the lot, analytical method used, and analyst (if given). A red cross is shown if no z-score is available.

For the assessment of participants by means of z-scores according to ISO/IEC 17043:2010 [2], the triangles were colored as follows:

$ z \leq 2$	green
$2 < z < 3$	yellow (WS studies, WETT samples: red)
$ z \geq 3$	red.

For $|z| \geq 3$, the corresponding triangles are displayed as -3 or 3. For $|z| > 2$, the value of the z score is displayed next to the triangle (yellow or red). A z-score = 0 is shown as a light blue vertical bar.

Interpretation of the z-scores' overview:

A z-score < 0 , i.e. the triangle points to the left, means that the measurement result is lower than the assigned value.

A z-score > 0 , i.e. the triangle points to the right, means that the measurement result is higher than the assigned value.

A z-score = 0, i.e. a light blue vertical bar is shown, means that the measurement result coincides with the assigned value.

Figures per Combination of Item, Lot and Analyte

The *diagram on the left* shows the participant results by means of blue diamonds.

The horizontal blue line indicates the assigned value.

Both the acceptance and the check limits for the participant results are calculated based on z-scores.

The acceptance limits are displayed as solid lines and correspond to z-scores of ± 3 . For WS studies and non-NOEC analytes (in the framework of WETT analysis), the acceptance limits correspond to a z-score ± 2 . For NOEC analytes (in the framework of WETT analysis), the acceptance limits correspond to ± 1 dilution.

The check limits are displayed as dashed lines and correspond to z-scores of ± 2 . They are only calculated if a rule is given by the evaluation criterion.

In case there are at least 8 laboratories with quantitative data points are available: The *diagram on the right* is a kernel density estimation of the distribution of the participant results. The measurement values are indicated as small circles. The kernel width is determined by the ISO 13528 formula from section 10.3.2 i) a).

7 Proficiency Test Item Preparation, Homogeneity and Stability Assessment

Sigma-Aldrich RTC uses proprietary and published methods for the manufacture, homogeneity and stability testing of proficiency test items. Sigma-Aldrich RTC's proficiency test materials meet the requirements of ISO Guide 34. For more information contact Sigma-Aldrich RTC. Additionally, Sigma-Aldrich RTC complies with the TNI Volume 3 'General Requirements for Environmental Proficiency Test Providers', EL-V3-2009, 2009 for all TNI Fields of Proficiency Testing analytes.

8 Metrological Traceability

All preparations are made using balances calibrated annually traceable to NIST standards. Where appropriate analytical measurements are traceable through an unbroken chain to NIST standards, or a Certified Reference Material manufactured under ISO Guide 34 in conjunction with ISO/IEC 17025.

9 Additional Information

Go to merck-pt.com for additional information on summary statistics for specific methods, advice on the interpretation of the statistical analysis and additional comments/recommendations. Sigma-Aldrich RTC recommends that you contact your accreditation body for specific instruction.

10 References

- [1] ISO 13528: Statistical methods for use in proficiency testing by interlaboratory comparison, August 2015
- [2] ISO/IEC 17025:2017: General requirements for the competence of testing and calibration laboratories
- [3] ISO/IEC 17043:2010: Conformity assessment - General requirements for proficiency testing, May 2010
- [4] S. Uhlig und P. Henschel (1997): Limits of tolerance and z-scores in ring tests. Fresenius' J. Anal. Chem., Vol. 358, pp. 761-766.

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06/2018

PROFICIENCY TESTING

Evaluation Report

Quick Turn

QT-0024477

Study Type

WPCHEM_MICRO

Open Date

2019-04-08

Close Date

2019-04-17

Report Generated

2019-04-19

Laboratory

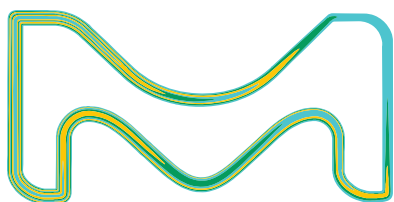
Energy Laboratories-Gillette
Julie Weisz
400 West Boxelder Rd.
Gillette WY 82718 US

Account Number

49978849

US EPA Lab Code

WY00006



Provider of the proficiency test

Sigma-Aldrich RTC, Inc.
2931 Solider Springs Road
Laramie, WY 82070 USA
ptservice@milliporesigma.com

Statistical analysis and reporting

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Release of the report

Mark Pooler
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Accreditors

Evaluations of this study will be sent to the accreditor(s) listed below. If any of the information listed below is not correct, please contact Sigma-Aldrich RTC immediately.

1 Laboratory Performance Evaluation Summary

Summary Results for QT-0024477

MIC003-2EA E. coli in Water - Quantitative WP LRAC1818

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
Colilert®-18 (Fecal Coliforms) (2010) 60002688				
Microbiology				
Fecal coliform, MPN ^{1,2} 2530	126.7 MPN/100 mL	239 MPN/100 mL	27.4 - 2080 MPN/100 mL	-0.7 Acceptable
Analyst: TA Analysis Date: 2019-04-15		Evaluation Criteria – 6* Parameters*: span:3		
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	
SM 9223 B (Colilert-18 Quanti-Tray)-2004 20213610				
Microbiology				
Escherichia coli, MPN ^{1,2} 2525	235.9 MPN/100 mL	359 MPN/100 mL	0 - 825 MPN/100 mL	-0.8 Acceptable
Analyst: TA Analysis Date: 2019-04-15		Evaluation Criteria – 5* Parameters*: deviations:3		
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

* Evaluation parameters used for the statistical analysis: explanation at the end of report; A questionable result is acceptable but to be checked.

¹ NELAC Compliant, covered by Sigma-Aldrich RTC's ANAB Proficiency Testing Provider accreditation, Cert. AP-1469

² ISO 17043 Accredited, covered by Sigma-Aldrich RTC's ANAB Proficiency Testing Provider accreditation, Cert AP-1469

Summary Results for QT-0024477
MIC012-2EA Standard Plate Count - WP
LRAC1822

Analyte	Reported Value	Assigned Value	Acceptance Window	z-score*
SimPlate® (2000) 60032602				
Microbiology				
Heterotrophic Plate Count, MPN ² 2555	108.5 MPN	154 MPN	0 - 332 MPN	-0.8 Acceptable
Analyst: TA Analysis Date: 2019-04-15	<i>Evaluation Criteria - 1*</i> <i>Parameters*: a:1, b:0, c:0, d:59.4</i>			
Group Analysis Summary	Acceptable: 1/1		Score: 100% - Acceptable	

* Evaluation parameters used for the statistical analysis: explanation at the end of report; A questionable result is acceptable but to be checked.

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² ISO 17043 Accredited, covered by Sigma-Aldrich RTC's ANAB Proficiency Testing Provider accreditation, Cert AP-1469

2 Sample Information

MIC003-2EA E. coli in Water - Quantitative WP LRAC1818

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Escherichia coli, MPN 2525	MPN/100 mL	619 ± 59.2	2.00	359	155
Fecal coliform, MPN 2530	MPN/100 mL	619 ± 59.2	2.00	239	172

MIC012-2EA Standard Plate Count - WP LRAC1822

Analyte	Unit	Gravimetric Value	PTRL	Study Mean*	Study Std. Dev.*
Heterotrophic Plate Count, MPN 2555	MPN	154 ± 19.8	---	---	---

* Study mean and Study Std. Dev. from the latest scheduled study within this scheme. If not available, this is indicated by "---".

3 Statistical Analysis

3.1 Definitions and Interpretation

Reported Value

The participant's result.

Assigned Value

Value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose. See ISO/IEC 17043 for additional information. In general, the assigned value is the value used to assess proficiency and may or may not be the made to value (gravimetric value).

Acceptance Window

The range of values that constitute acceptable performance for a laboratory participating in this PT study.

z-score

A z-score shows how a single data point compares to normal data. A z-score says not only whether a point was above or below average, but how unusual the measurement is. Generally, a method result with a z-score less than |2| is considered to be in control, a z-score between |2| and |3| is considered 'Questionable', but still within control and a z-score greater than |3| is considered not acceptable and the method is out of control. For WS studies, a z-score greater than |2| is not acceptable.

Calculated as $z = (\text{Reported Value} - \text{Assigned Value}) / \text{Proficiency Std. Dev.}$

A z-score cannot be provided

- (1) for presence/absence data,
- (2) for identification data and other categorical data,
- (3) where the analyte is not present in the sample,
- (4) for "less than" and "greater than" values,
- (5) NOEC analytes (in the framework of WETT analysis).

In cases (1) to (3) the participant's result is only evaluated by "acceptable" if it matches with the assigned value. Otherwise the result is indicated as "not acceptable". In case the analyte is not present in the sample and a PTRL is available, the participant's result is indicated as "acceptable" as long the result is less than the PTRL.

In case (4) the following evaluation rules will be applied:

- “less than” values:
 - When the analyte is not present in the sample the result is always “acceptable”.
 - When the analyte is truly present in the sample, the result is only “acceptable” if the “less than” value is greater than the lower limit of the acceptance window.
- “greater than” values:
 - When the analyte is not present in the sample the result is always “not acceptable”.
 - When the analyte is truly present in the sample, the result is only “acceptable” if the “greater than” value is less than the upper limit of the acceptance window.

In case (5) the result is indicated as “acceptable” if it lies within the acceptance window, otherwise the result is indicated as “not acceptable”.

Proficiency Std. Dev.

Standard deviation calculated based on Evaluation Criteria.

PTRL

Proficiency Testing Reporting Limit

Study Mean

Statistical study mean calculated using a robust statistical model. Robust statistical techniques are used to minimize the influence extreme results can have on estimates of the mean and standard deviation. NOTE - These techniques assign less weight to extreme results, rather than eliminate them from a data set.

Choice of statistical technique: In case of quantitative data points from at least 8 laboratories, Algorithm A (ISO 13528, Section C.3.1), and in case of quantitative data points of 4 to 7 laboratories, the Hampel estimator (ISO 13528, Section C.5.3) is applied. A study mean cannot be calculated in case there are quantitative data points from less than 4 laboratories available.

Study Std. Dev.

Standard deviation calculated from study data using robust statistics.

In case of quantitative data points from at least 8 laboratories, Algorithm A (ISO 13528, Section C.3.1), and in case of quantitative data points of 4 to 7 laboratories, the Q method (ISO 13528, Section C.5.2) is applied. A study standard deviation cannot be calculated in case there are quantitative data points from less than 4 laboratories available.

Gravimetric Value

The 'prepared to' value, determined by gravimetric means. The uncertainty associated with this value is the standard uncertainty and based on Sigma-Aldrich RTC's gravimetric tolerances.

3.2 Evaluation Criteria

1 - Regression Equation

Acceptance windows based on TNI adopted equation of proficiency value ± 3 proficiency standard deviations and check limits of proficiency value ± 2 proficiency standard deviations. Proficiency value and proficiency standard deviation are calculated from gravimetric variables a, b, c & d as proficiency value = $a * \text{gravimetric} + b$ and proficiency standard deviation = $c * \text{gravimetric} + d$.

2 - Study Robust Mean and c, d regression

Acceptance windows based on TNI adopted equation of proficiency value ± 3 proficiency standard deviations and check limits of proficiency value ± 2 proficiency standard deviations. Proficiency value and proficiency standard deviation calculated from robust study mean and variables c & d as proficiency value = robust mean and proficiency standard deviation = $c * \text{proficiency value} + d$.

3 - Fixed Limits

Acceptance windows based on span of gravimetric percentage from gravimetric as $\text{gravimetric} \pm \text{gravimetric} * \text{percentage}$.

4 - Adjustable Fixed Limits

Acceptance windows based on a span of gravimetric percentage from gravimetric as $\text{gravimetric} \pm \text{gravimetric} * \text{lowPercentage}$ where $\text{gravimetric} < \text{break}$ and $\text{gravimetric} \pm \text{gravimetric} * \text{highPercentage}$ where $\text{gravimetric} \geq \text{break}$.

5 - Study Statistics

Acceptance windows based on a number of standard deviations span from the study mean as $\text{study mean} \pm (\text{deviations} * \text{standard deviation})$.

6 - Log Transform Statistics

Acceptance windows based on lognormal distributed data. Acceptance windows = $\text{mean}(\text{lognormal}) \pm \text{span} * \text{standard deviation}(\text{lognormal})$.

7 - Regression Equation 2SD

Acceptance windows based on EPA equation of proficiency value ± 2 proficiency standard deviations. Proficiency value and proficiency standard deviation are calculated from gravimetric variables a, b, c & d as proficiency value = $a * \text{gravimetric} + b$ and proficiency standard deviation = $c * \text{gravimetric} + d$. Generally reserved for drinking water studies.

8 - Study Median and Dilution Levels

Acceptance windows based on study median ± 1 dilution. If the median falls between two test dilutions, then the assigned value is set at the higher value, and the lower acceptance limit is the second test dilution below the median, and the upper acceptance limit is the second test dilution above the median. Generally reserved for NOEC analytes (in the framework of WETT analysis).

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Acceptance windows based on span of analytical value from measurements.

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