IFA-Proficiency Testing Scheme for Water Analysis

Round M148
Metals

Sample Dispatch: 2 September 2019

TULLN

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Round: M 148	Date / Signature:	10.10.2019 Wolfgang Kandler

This report has 101 pages.

This report summarises the results of round M148 (trace metals) within the IFA-Proficiency Testing Scheme for Water Analysis. The samples M148A and M148B were distributed to the participants on Monday, 2 September 2019. Closing date for reporting results to the IFA-Tulln was Friday, 27 September 2019. Each participant received two samples of 275 mL filled into LDPE bottles.

29 laboratories participated in this interlaboratory comparison. 27 participants submitted results.

To make the results of this round anonymous, each laboratory was given a laboratory code on a random basis.

Samples

The samples consisted of artificial ground water spiked with pure standards. For sample preparation, ultrapure water was spiked with concentrated solutions of salts in order to simulate the ionic composition of natural Austrian ground water. Ultrapure HNO_3 (0.5 % v/v) was added to stabilise the sample at a pH below 2, which meets the standard sampling procedure in the Austrian monitoring program. The following ultrapure salts were used: $CaCO_3$, $Mg(NO_3)_2$, NaCl, KCl, besides ultrapure H_2SO_4 for sulphate. By this, the matrix of the samples consisted of about 46.1 mg/L Ca, 19.5 mg/L Mg, 11.2 mg/L Na, 1.23 mg/L K, 22.1 mg/L SO_4^{2-} and 18.8 mg/L Cl^-.

Traces of Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, U and Zn were added, using certified spectroscopy standards. For most of the compounds added to the samples, the target concentrations were higher than the minimum quantifiable values of the Austrian ground and river water monitoring program. The calculation of the target concentrations of the compounds was based on the mass of standard added to the samples.

Homogeneity, accuracy and stability tests at the IFA-Tulln

Some samples of the round M148A and M148B were analysed for all investigated parameters prior to shipment to the participants. The results are listed in the results tables and the parameter oriented part of the report ("IFA result").

Stability tests will be carried out together with the accuracy tests of the following round (M149).

According to our experience, the concentrations of Al, As, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, U and Zn in the samples remain stable up to 18 months when stored at 4-6 °C in the dark. For Hg a concentration decrease of 2 % to 4 % per month can be expected.

Results

Data evaluation was based on target concentrations that were calculated from the weights of the standards used to produce the samples. Their uncertainty intervals correspond to the expanded uncertainty (coverage factor k = 2) as described in the EURACHEM/CITAC Guide "Quantifying Uncertainty in Analytical Measurement, 3rd Edition (2012)".

Recoveries for individual laboratory results and overall mean values are related to the assigned concentrations. The results were tested for outliers by application of the Hampel outlier test (level of significance 99 %). A minimum number of four results was required for the outlier test.

The recoveries of the target concentrations, calculated from outlier-corrected data mean values ranged between 92.2 % (Pb in sample M148A) and 103.1 % (As in sample M148B).

The between laboratory CVs covered the range between 3.0 % (Cd in sample M148B) and 14.4 % (Hg in sample M148B).

All confidence intervals of the outlier-corrected laboratory mean values except that for Cu in sample M148B (93.6 % ± 4.0 %) encompass the corresponding target values with their uncertainties. For all other parameters no difference could be detected between target concentrations and outlier corrected laboratory means statistically.

z-scores

The most common approach is to form the z-score given by

$$z = \frac{x_i - \bar{x}}{\sigma}$$

z	z-score
x_i	result of laboratory
$\bar{x}$	target value or mean value („consensus value“)
σ	standard deviation

Thus, the z-score is the ratio of the estimated bias (difference between result and target value) and a standard deviation. The z-score criteria were determined from relative standard deviations from all interlaboratory comparisons that were organised by the IFA-Tulln in the period from 2008 to 2018. They represent long-term performance data of all former participating laboratories. The z-scores are listed together with the recoveries in the tables of the parameter oriented part.

Additionally, each laboratory obtained for every sample a single sheet that summarises the z-scores of the laboratory in graphical and tabular form.

The following table lists the z-score criteria as relative standard deviation and their limits of applicability. Z-scores were only calculated, if the target values were higher than these limits.

Parameter	z-Score-criteria (%)	Lower limit [µg/L]
Aluminium	8.6	8
Arsenic	8.2	0.5
Cadmium	6.2	0.1
Chromium	6.7	0.5
Copper	9.0	1.2
Iron	7.4	10
Lead	7.3	0.3
Manganese	6.0	2.0
Mercury	11	0.2
Nickel	8.6	1.0
Selenium	12	0.3
Uranium	5.9	0.4
Zinc	9.0	3

Normally, a classification based on z-scores is made this way:

|z-Score|	Classification
<2	satisfactory
2<|z|<3	questionable
>3	unsatisfactory

Please note that this evaluation is made on the background of the average performance of all participants of the IFA-Proficiency Testing Scheme during the period from 2008 to 2018.

Illustration of results

An explanation to the illustration of the results is given on the following page.

The **laboratory oriented part** contains the measurement results and reported uncertainties of each individual laboratory for all parameters together with the achieved recoveries in graphical and tabular form. This part of the report also lists tables with the results originally reported by the laboratories.

In the **parameter oriented part** the reported results and corresponding uncertainties are illustrated together with recoveries of the target values and the z-scores for each parameter and all laboratories. This information is presented in graphical and tabular form. Results, which were identified as outliers by the Hampel test are marked with an asterisk in the column “out”. These values were not considered for the calculation of statistical parameters (mean values, standard deviations and confidence intervals). Moreover, the parameter oriented part contains the uncertainties of the target values. The uncertainty intervals correspond to the expanded uncertainty (coverage factor k = 2) as described in the EURACHEM / CITAC Guide “Quantifying Uncertainty in Analytical Measurement” 3rd Edition (2012) “. The uncertainty interval of the reference concentration is illustrated in the graphs as a grey band around the 100 % recovery line.

Results, for which no recoveries could be calculated, are illustrated by one of the following symbols: **FN** (false negative), **FP** (false positive) or • - symbol.

- “FN”: a result is considered false negative when the “< result” reported is lower than the corresponding target value
- “FP”: False positive results can only be obtained for compounds that were evaluated on the basis of a “< target value”. A result is termed FP if it does not include (strike) the “< target” with its measurement uncertainty.
- “•”: All other results for which no recoveries can be calculated are illustrated by this symbol

Tulln, 9 October 2019

EXPLANATION

Sample M106A

Parameter Copper

Target value ± U (k=2)	4,79 µg/l	±	0,13 µg/l	*Obtained from sample preperation, U=uncertainty*
IFA result ± U (k=2)	4,79 µg/l	±	0,38 µg/l	*Determined at IFA prior to shipment of samples*
Stability test ± U (k=2)	4,69 µg/l	±	0,38 µg/l	*Determined at IFA 3 weeks after sample dispatch*

Lab Code	Result	±	Unit	Recovery	z-Score
A	5,16	0,4128	µg/l	108%	0,90
B	4,22	0,42	µg/l	88%	-1,38
C	4,45	0,13	µg/l	93%	-0,83
D			µg/l		
E			µg/l		
F	4,10	0,08	µg/l	86%	-1,68
G			µg/l		
H			µg/l		
I	4,75	0,74	µg/l	99%	-0,10
J	<5		µg/l	•	
K	4,76		µg/l	99%	-0,07
L	<10		µg/l	•	
M	4,8	0,5	µg/l	100%	0,02
N	3,7	0,4	µg/l	77%	-2,65
O	4,47	0,447	µg/l	93%	-0,78
P	6,0		µg/l	125%	2,94
Q	4,17	0,2	µg/l	87%	-1,51
R	4,6	0,8	µg/l	96%	-0,46
S	4,44	0,67	µg/l	93%	-0,85
T			µg/l		
U	4,675	0,935	µg/l	98%	-0,28
V	5,0	0,50	µg/l	104%	0,51
W	3,54	0,3	µg/l	74%	-3,03
X	7,108 *	0,749	µg/l	148%	5,63
Y	<10		µg/l	•	
Z			µg/l		
AA	<3,0		µg/l	FN	
AB	3,775	0,107	µg/l	79%	-2,46
AC	<10,0		µg/l	•	

Recovery of target value in percent

z-Score of the laboratory

An asterik indicates a result detected as outlier by Hampel test

Interval expected to encompass target value as stated by participant

	All results	Outliers excl.	Unit
Mean ± CI(99%)	4,65 ± 0,57	4,51 ± 0,42	µg/l
Recov. ± CI(99%)	97,1 ± 12,0	94,1 ± 8,8	%
SD between labs	0,84	0,59	µg/l
RSD between labs	18,1	13,2	%
n for calculation	18	17	

Between laboratory standard deviation

Laboratory mean and recovery of target value with corresponding confidence intervals (p=99%)

Number of results used for calculation of statistic parameters

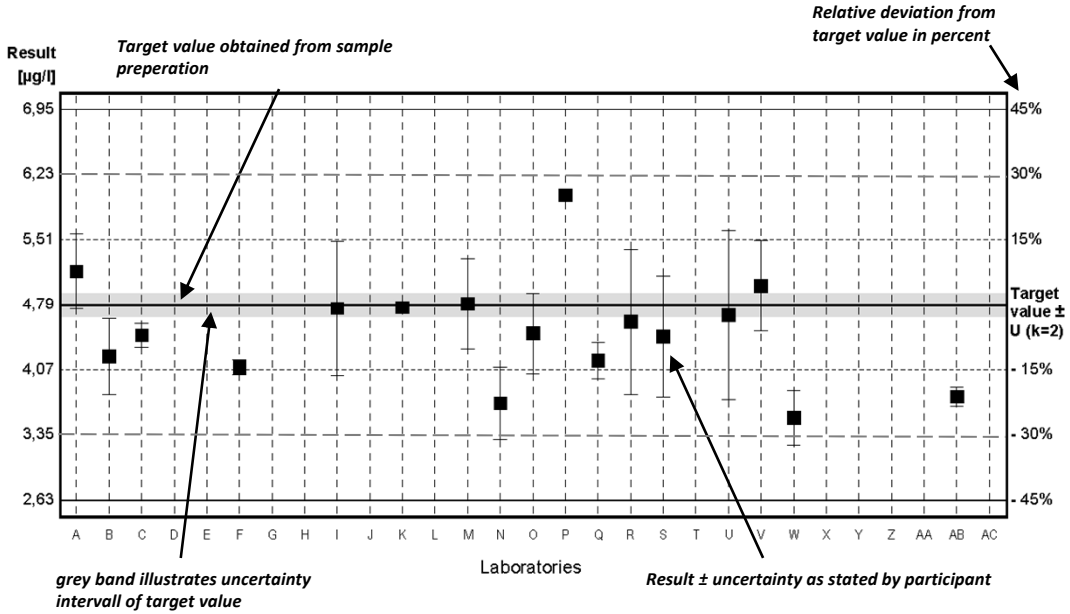


Diagram 1: Measurement results and their uncertainties

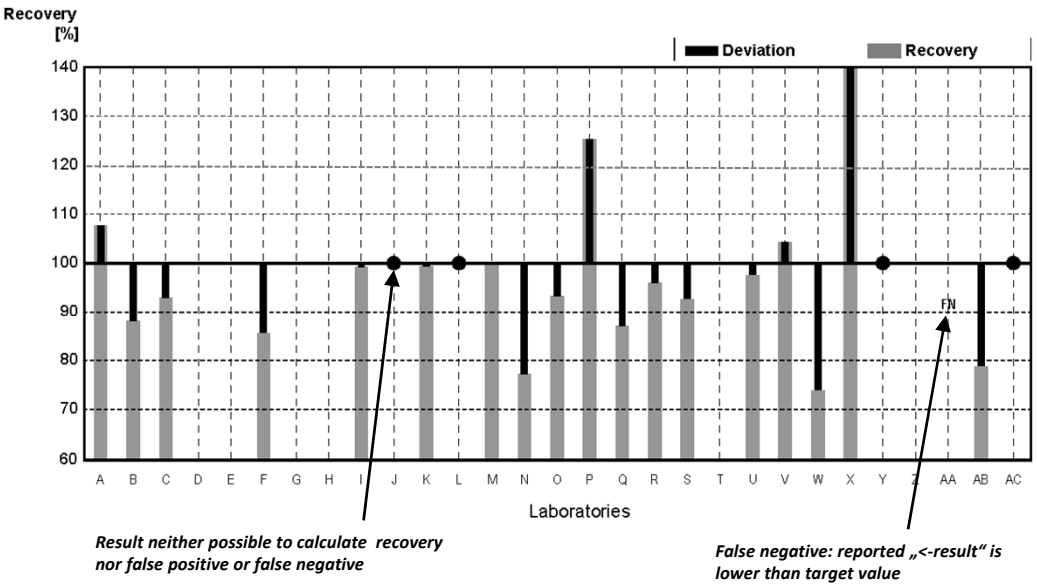


Diagram 2: Recoveries and deviations from target values

Illustration of Results
Tables and Parameter Oriented Part

Round M148
Metals

Sample Dispatch: 2 September 2019

TULLN

Results Sample M148A

	Aluminium	Arsenic	Lead	Cadmium	Chromium	Iron	Copper
Target value	30.0	4.20	0.79	0.249	4.04	71.4	1.70
IFA result	30.5	4.15	0.79	0.264	4.24	73.5	1.72
A	29.30	4.112	<1.0	0.246	3.792	69.07	1.618
B	30.8		<4.0	<0.5	4.18	73.4	<5.0
C	16.12	4.18	0.59	0.23	3.58	62.5	1.54
D	30.99	4.29	0.71	0.24	4.42	68.5	1.55
E	29.5	4.3	0.71	0.25	3.9	72	1.5
F	28					75	<10
G		2.2	<1	0.2	2	73	1
H	30.4	4.5	<2	<1	<5	70.2	<5
I			1.28			89.0	
J							
K							
L						73.5	
M	26.7	5.83	<5	<1	4.28	76.3	4.0
N	32	4.7	0.7	0.2	4	72	1.8
O	28	4.4	<1	<1	4	64	1.5
P	30.1	4.28	0.77	0.25	3.96	70.0	1.61
Q	33.4	4.28	0.70		3.9	69	2.6
R	31.1	4.22	0.756	0.235	3.71	70.3	1.51
S	32.0	4.13	0.795	0.243	4.10	62.6	1.66
T	27	4.52	0.83	0.25	4.02	67	1.7
U	28.4	4.2	0.72	0.26	3.8	70	1.6
V	31.6					67.4	
W	31.0	4.37	<1	0.240	4.15	70.9	1.67
X	26.6	4.43	<1.00	0.252	4.09	69.8	1.67
Y	29.2	5.01	<1	<0.4	<5	77.0	<5
Z	22.7		<4		3.7	65.5	<2
AA	30.0	5.42	<1	0.28	2.95	76.5	1.63
AB							
AC							

All data in µg/L

Measurement Uncertainties Sample M148A

	Aluminium ±	Arsenic ±	Lead ±	Cadmium ±	Chromium ±	Iron ±	Copper ±
Target value	0.3	0.03	0.01	0.003	0.03	0.3	0.02
IFA result	1.5	0.33	0.03	0.018	0.21	7.4	0.15
A	3.25	0.231		0.011	0.535	7.67	0.088
B	5.6				0.63	7.4	
C	1.837	0.117	0.057	0.025	0.133	0.546	0.039
D	0.09	0.06	0.02	0.01	0.05	0.4	0.01
E	3	0.65	0.14	0.05	0.58	7.2	0.22
F							
G							
H	3.04	0.45				7.02	
I			0.08			7.1	
J							
K							
L						4.8	
M	4.6	0.25			0.32	2.50	0.4
N	3.2	0.564	0.056	0.016	0.48	18.72	0.144
O	6	0.9			0.8	13	0.3
P	2.8	0.25	0.07	0.02	0.26	5.5	0.15
Q	6.0	0.96	0.54		1.5	9.6	1.6
R	0.6	0.20	0.017	0.021	0.28	4.7	0.11
S	0.666	0.080	0.020	0.009	0.015	0.115	0.015
T	2.7	0.5	0.1	0.05	0.4	7	0.3
U	2.8	0.63	0.072	0.026	0.38	7.0	0.16
V	7.9					8.1	
W	4.6	0.66		0.036	0.62	10.6	0.25
X	0.52	0.07		0.021	0.09	0.41	0.09
Y	1.69	0.38				1.96	
Z	2.1				0.4	4.0	
AA	4.5	0.81		0.04	0.44	11.5	0.24
AB							
AC							

All data in µg/L

Results Sample M148A

	Manganese	Nickel	Mercury	Selenium	Uranium	Zinc
Target value	38.1	1.30	0.95	1.00	6.05	10.0
IFA result	37.9	1.34	0.99	0.93	5.71	10.9
A	35.88	1.308	0.872	0.958	6.018	9.923
B	39.3	1.31	0.872			10.1
C	35.58	1.31		0.90	5.56	9.30
D	38	1.37	0.92	1.04	5.96	10
E	38.4	1.2	0.93	<2	5.8	10
F	40	<10				11
G	40	<1	1.2			9
H	36.9	<5	0.8	<2	6.3	<15
I			1.08			
J			2.0			
K	40.9		1.03			
L	<50					
M	40.7	1.35	1.08	2.0		9.33
N	40	1.3	0.96	1.1	6.3	10
O	39	1.2	0.92	<2	6.3	9.7
P	36.6	1.45	0.92	1.04	6.01	11.1
Q	37	<10				10.1
R	37.2	1.14	1.01	0.96	5.54	9.57
S	38.4	1.21	0.719	1.02	6.07	10.3
T	35	1.75	0.88	1.02	5.91	9.6
U	38	1.22	0.88	1.08	5.9	9.7
V	35.9					
W	36.7	1.28	1.04	1.05	6.45	10.2
X	35.7	1.36	0.843	<1.00	5.91	10.7
Y	34.9	<1	1.04	1.06	6.69	<10
Z	32.4	<2				<10
AA	41.8	1.25	1.22	1.49	5.03	12.3
AB						
AC						

All data in µg/L

Measurement Uncertainties Sample M148A

	Manganese ±	Nickel ±	Mercury ±	Selenium ±	Uranium ±	Zinc ±
Target value	0.2	0.02	0.01	0.05	0.04	0.8
IFA result	3.4	0.12	0.10	0.13	0.57	2.2
A	1.96	0.100	0.135	0.115	0.638	0.619
B	4.0	0.16	0.18			1.2
C	0.227	0.159		0.122	0.190	2.996
D	0.4	0.03	0.04	0.06	0.2	0.6
E	3.8	0.20	0.19	0.3	0.8	1.5
F						
G						
H	3.69		0.08		0.63	
I			0.07			
J			0.4			
K	0.1		0.09			
L						
M	0.69	0.07	0.06	0.24		1.53
N	4	0.13	0.1152	0.165	0.315	1
O	8	0.2	0.18		1.3	1.9
P	3.0	0.12	0.04	0.16	0.59	1.1
Q	7.2					2.7
R	1.6	0.11	0.07	0.06	0.26	0.56
S	0.100	0.044	0.015	0.010	0.107	0.242
T	3.5	0.2	0.1	0.1	0.5	1
U	3.8	0.12	0.088	0.16	0.59	0.97
V	5.7					
W	5.5	0.19	0.15	0.16	0.97	1.5
X	0.76	0.28	0.032		0.09	0.24
Y	0.26		0.03	0.13	0.23	
Z	2.6					
AA	6.27	0.19	0.18	0.22	0.76	1.84
AB						
AC						

All data in µg/L

Results Sample M148B

	Aluminium	Arsenic	Lead	Cadmium	Chromium	Iron	Copper
Target value	15.0	1.10	1.98	0.800	0.60	18.0	3.20
IFA result	15.9	1.09	1.95	0.825	0.63	18.0	3.17
A	14.68	1.111	1.932	0.7805	<1.0	16.90	2.917
B	15.6		<4.0	0.805	<1.0	18.5	<5.0
C	<5.00	1.09	1.69	0.78	<0.50	16.89	2.94
D	14.52	1.11	1.79	0.78	0.92	17	2.9
E	14	1.1	1.8	0.80	0.58	18	2.8
F	13					20	<10
G		0.6	2	0.7	<1	21	3
H	15.6	<2	2.2	<1	<5	20.2	<5
I			2.09			22.0	
J							
K							
L						<50	
M	16.0	1.68	<5	<1	0.73	19.0	5.1
N	17	1.2	2	0.8	0.6	19	3.5
O	14	1.2	1.9	<1	<1	17	3
P	15.3	1.13	1.94	0.80	0.58	17.7	3.08
Q	19.6	1.05	1.85		<2	<20	4.4
R	15.8	1.12	1.90	0.755	0.566	17.4	2.86
S	17.3	1.13	2.00	0.817	0.520	15.7	3.11
T	11	1.20	1.91	0.79	0.72	16	2.7
U	15	1.1	1.8	0.79	<1.0	17.5	2.94
V	15.1					16.9	
W	15.3	1.15	1.93	0.786	<1	18.0	3.08
X	12.4	1.19	1.95	0.811	<1.00	17.2	3.18
Y	15.6	<1.5	2.07	0.86	<5	18.8	<5
Z	12.9		<4		<2	18.6	3.4
AA	15.3	1.44	1.61	0.91	<1	19.2	3.0
AB							
AC							

All data in µg/L

Measurement Uncertainties Sample M148B

	Aluminium ±	Arsenic ±	Lead ±	Cadmium ±	Chromium ±	Iron ±	Copper ±
Target value	0.3	0.01	0.01	0.007	0.01	0.2	0.03
IFA result	0.8	0.09	0.08	0.058	0.03	1.8	0.29
A	1.63	0.0623	0.205	0.036		1.88	0.159
B	2.8			0.12		1.9	
C		0.039	0.108	0.033		1.143	0.070
D	0.08	0.01	0.01	0.01	0.02	0.2	0.02
E	3	0.2	0.27	0.16	0.12	2	0.42
F							
G							
H	1.56		0.22			2.02	
I			0.14			1.8	
J							
K							
L							
M	0.27	0.35			0.17	0.78	0.5
N	1.7	0.144	0.16	0.064	0.072	4.94	0.28
O	3	0.2	0.4			3	0.6
P	1.4	0.07	0.18	0.07	0.04	1.4	0.29
Q	4.4	0.41	0.74				1.8
R	0.8	0.03	0.02	0.033	0.043	1.2	0.18
S	0.208	0.021	0.015	0.011	0.023	0.153	0.021
T	1.1	0.2	0.2	0.1	0.1	1.6	0.4
U	1.5	0.165	0.18	0.079		1.75	0.29
V	3.8					2.0	
W	2.3	0.17	0.29	0.118		2.7	0.46
X	0.61	0.08	0.09	0.019		0.46	0.09
Y	2.1		0.07	0.04		1.1	
Z	1.2					1.1	0.4
AA	2.3	0.22	0.24	0.14		2.88	0.45
AB							
AC							

All data in µg/L

Results Sample M148B

	Manganese	Nickel	Mercury	Selenium	Uranium	Zinc
Target value	2.12	3.52	0.58	3.55	3.80	28.0
IFA result	2.07	3.72	0.58	3.10	3.46	27.3
A	2.013	3.377	0.477	3.240	3.757	26.68
B	<5.0	3.51	0.516			28.2
C	1.98	3.45		3.50	3.54	26.91
D	2	3.56	0.54	3.52	3.61	28
E	<5	3.2	0.55	3.5	3.6	28
F	<10	<10				30
G	2	3	0.6			27
H	<5	<5	0.5	3.8	4.0	26.3
I			0.65			
J			1.1			
K	2.59		0.587			
L	<50					
M	2.15	3.35	0.65	5.2		29.0
N	2	3.8	0.6	4	4	29
O	2.1	3.5	0.56	3.6	3.9	28
P	2.07	3.67	0.56	3.44	3.72	28.8
Q	2.1	<10				28.7
R	1.98	3.33	0.61	3.47	3.49	27.0
S	2.07	3.52	0.426	3.37	3.83	28.3
T	2.0	3.87	0.42	3.52	3.73	26.6
U	2.1	3.26	0.55	3.72	3.8	27.2
V	<10					
W	<10	3.45	0.645	3.71	4.10	27.4
X	[0.92]	3.59	0.495	3.74	3.69	28.3
Y	<4	3.80	0.54	4.09	4.17	29.4
Z	1.8	3.5				24.6
AA	2.35	3.36	0.76	5.43	3.06	35.0
AB						
AC						

All data in µg/L

Measurement Uncertainties Sample M148B

	Manganese ±	Nickel ±	Mercury ±	Selenium ±	Uranium ±	Zinc ±
Target value	0.03	0.03	0.01	0.06	0.02	0.8
IFA result	0.19	0.33	0.06	0.43	0.35	5.5
A	0.110	0.259	0.074	0.389	0.398	1.66
B		0.42	0.11			3.4
C	0.039	0.098		0.289	0.192	1.574
D	0.1	0.05	0.04	0.01	0.05	0.3
E	0.5	0.32	0.11	0.52	0.54	3
F						
G						
H			0.05	0.38	0.40	2.63
I			0.04			
J			0.2			
K	0.12		0.081			
L						
M	0.06	0.70	0.06	0.12		1.66
N	0.2	0.38	0.072	0.6	0.2	2.9
O	0.4	0.7	0.11	0.7	0.8	6
P	0.17	0.30	0.02	0.52	0.37	2.8
Q	5.1					5.5
R	0.09	0.19	0.05	0.28	0.17	0.8
S	0.038	0.025	0.011	0.201	0.067	0.153
T	0.4	0.4	0.08	0.4	0.4	2.7
U	0.21	0.33	0.055	0.558	0.38	2.7
V	1.6					
W		0.52	0.097	0.56	0.61	4.1
X		0.26	0.034	0.13	0.09	0.25
Y		0.09	0.02	0.11	0.26	0.7
Z	0.1	0.4				2.5
AA	0.35	0.51	0.11	0.82	0.46	5.25
AB						
AC						

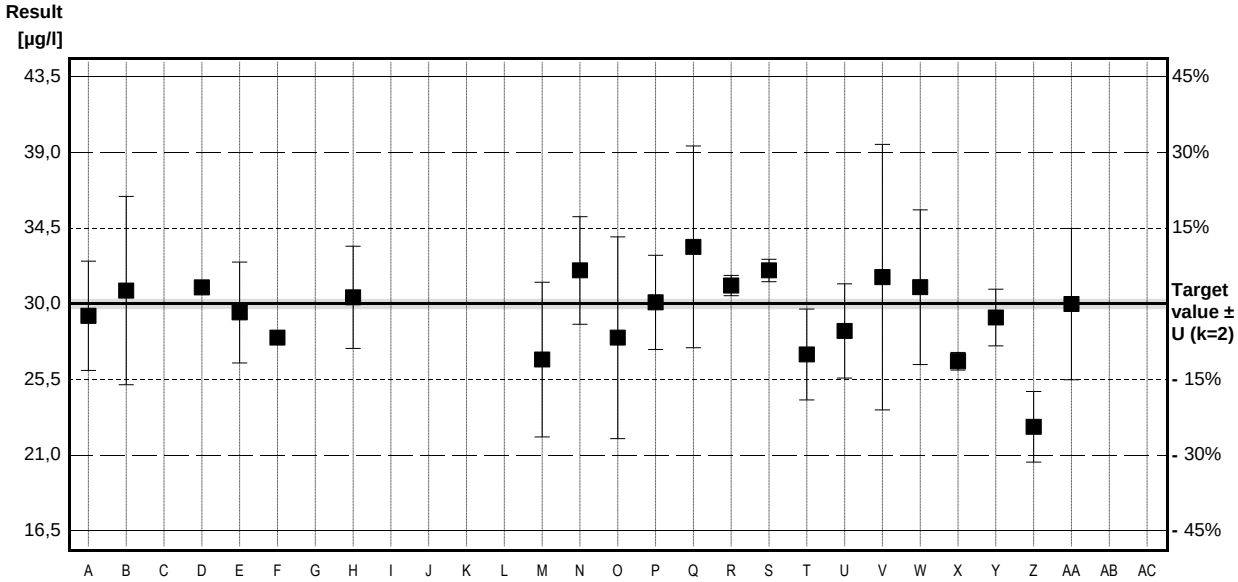
All data in µg/L

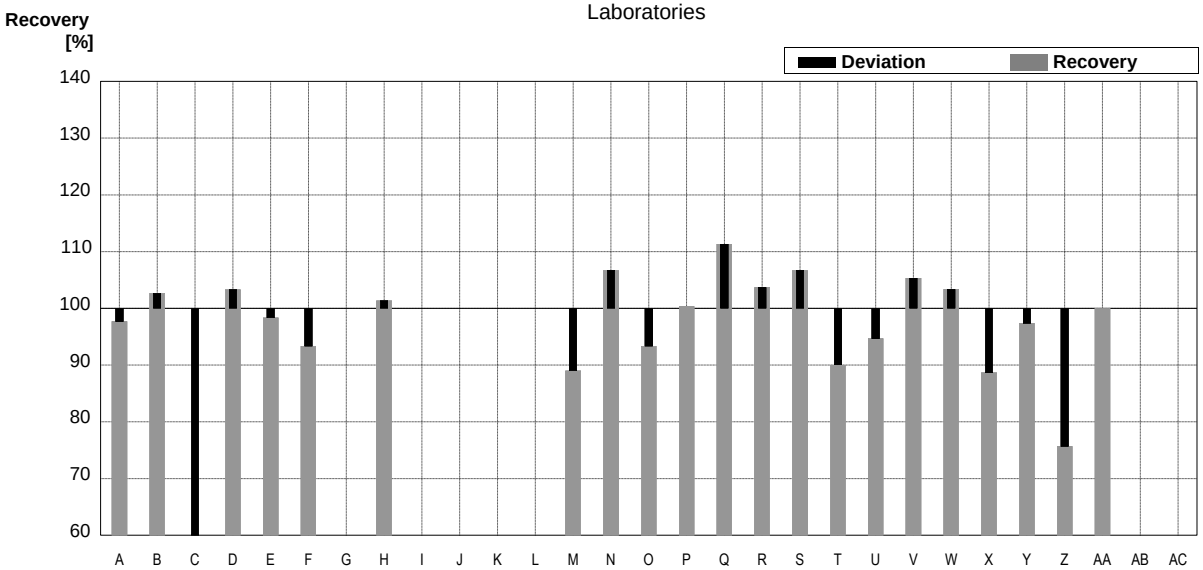
Sample M148A
Parameter Aluminium

Target value ± U (k=2)	30,0 µg/l	±	0,3 µg/l
IFA result ± U (k=2)	30,5 µg/l	±	1,5 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	29,30	3,25	µg/l	98%	-0,27
B	30,8	5,6	µg/l	103%	0,31
C	16,12 *	1,837	µg/l	54%	-5,38
D	30,99	0,09	µg/l	103%	0,38
E	29,5	3	µg/l	98%	-0,19
F	28		µg/l	93%	-0,78
G			µg/l		
H	30,4	3,04	µg/l	101%	0,16
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	26,7	4,6	µg/l	89%	-1,28
N	32	3,2	µg/l	107%	0,78
O	28	6	µg/l	93%	-0,78
P	30,1	2,8	µg/l	100%	0,04
Q	33,4	6,0	µg/l	111%	1,32
R	31,1	0,6	µg/l	104%	0,43
S	32,0	0,666	µg/l	107%	0,78
T	27	2,7	µg/l	90%	-1,16
U	28,4	2,8	µg/l	95%	-0,62
V	31,6	7,9	µg/l	105%	0,62
W	31,0	4,6	µg/l	103%	0,39
X	26,6	0,52	µg/l	89%	-1,32
Y	29,2	1,69	µg/l	97%	-0,31
Z	22,7	2,1	µg/l	76%	-2,83
AA	30,0	4,5	µg/l	100%	0,00
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	28,9 ± 2,2	29,5 ± 1,5	µg/l
Recov. ± CI(99%)	96,2 ± 7,4	98,2 ± 5,0	%
SD between labs	3,7	2,4	µg/l
RSD between labs	12,8	8,2	%
n for calculation	22	21	



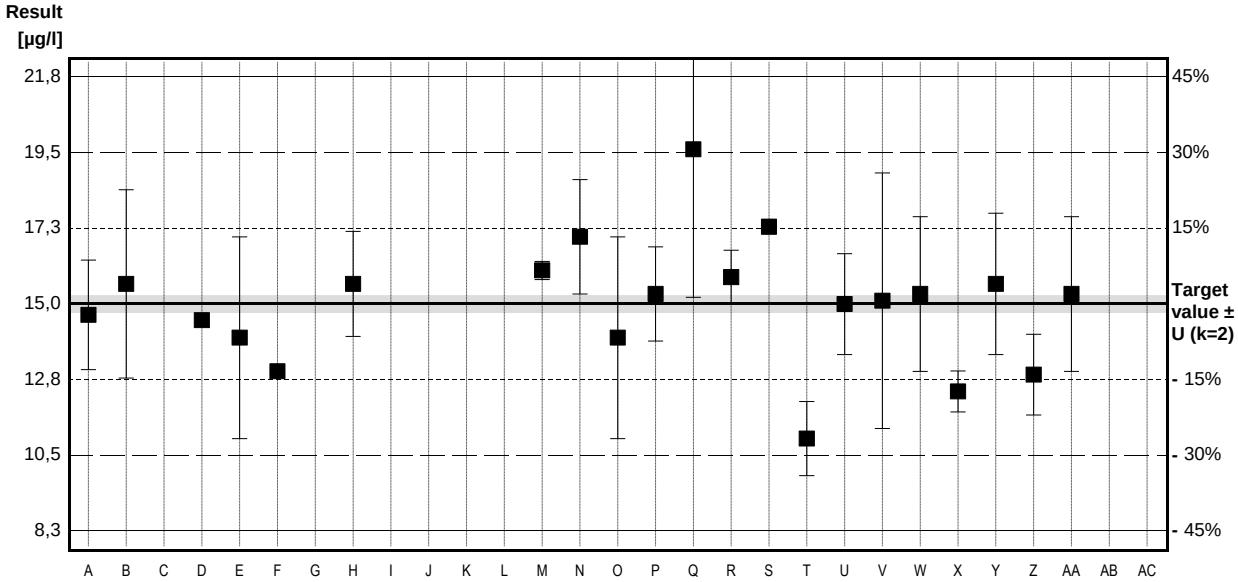


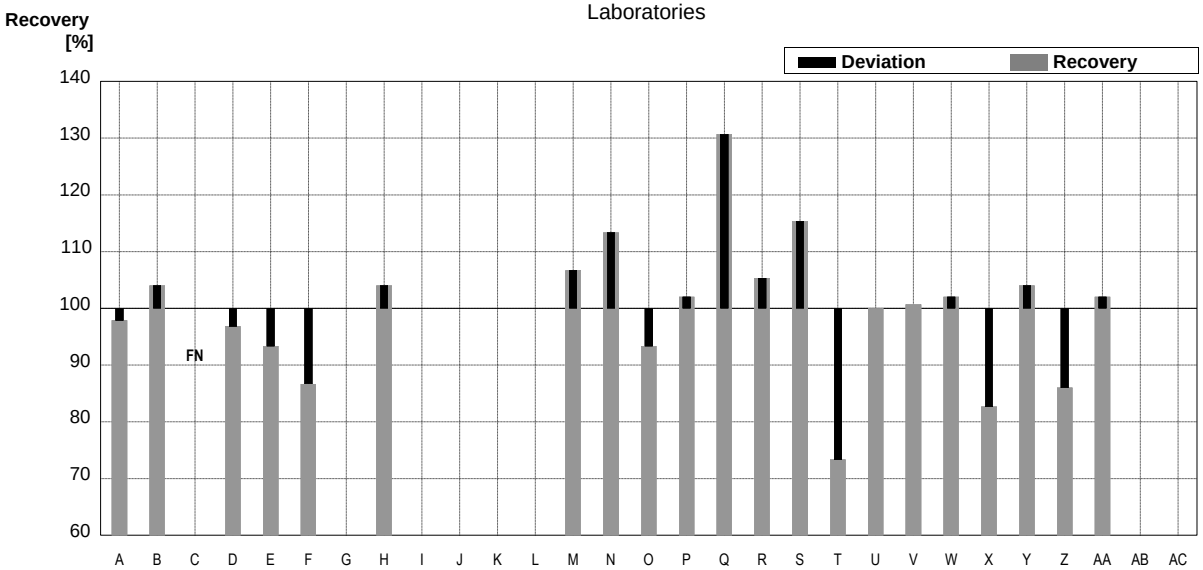
Sample M148B
Parameter Aluminium

Target value ± U (k=2)	15,0 µg/l	±	0,3 µg/l		
IFA result ± U (k=2)	15,9 µg/l	±	0,8 µg/l		
Stability test	µg/l				

Lab Code	Result	±	Unit	Recovery	z-Score
A	14,68	1,63	µg/l	98%	-0,25
B	15,6	2,8	µg/l	104%	0,47
C	<5,00		µg/l	FN	
D	14,52	0,08	µg/l	97%	-0,37
E	14	3	µg/l	93%	-0,78
F	13		µg/l	87%	-1,55
G			µg/l		
H	15,6	1,56	µg/l	104%	0,47
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	16,0	0,27	µg/l	107%	0,78
N	17	1,7	µg/l	113%	1,55
O	14	3	µg/l	93%	-0,78
P	15,3	1,4	µg/l	102%	0,23
Q	19,6 *	4,4	µg/l	131%	3,57
R	15,8	0,8	µg/l	105%	0,62
S	17,3	0,208	µg/l	115%	1,78
T	11 *	1,1	µg/l	73%	-3,10
U	15	1,5	µg/l	100%	0,00
V	15,1	3,8	µg/l	101%	0,08
W	15,3	2,3	µg/l	102%	0,23
X	12,4	0,61	µg/l	83%	-2,02
Y	15,6	2,1	µg/l	104%	0,47
Z	12,9	1,2	µg/l	86%	-1,63
AA	15,3	2,3	µg/l	102%	0,23
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	15,0 ± 1,1	15,0 ± 0,8	µg/l
Recov. ± CI(99%)	100,0 ± 7,6	99,8 ± 5,7	%
SD between labs	1,8	1,3	µg/l
RSD between labs	12,2	8,6	%
n for calculation	21	19	



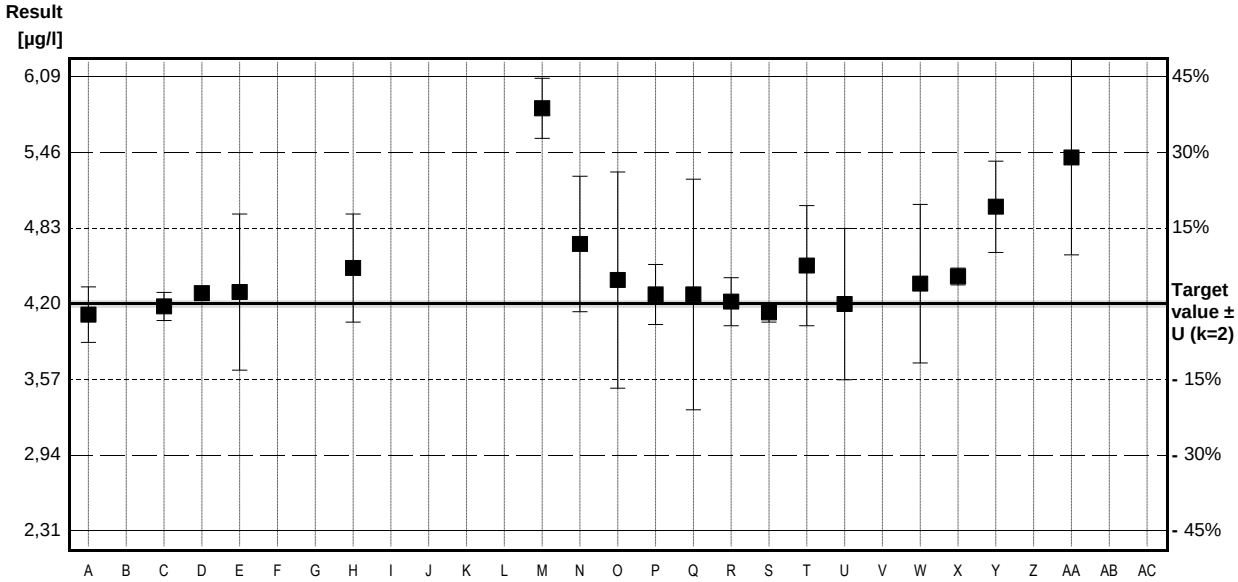


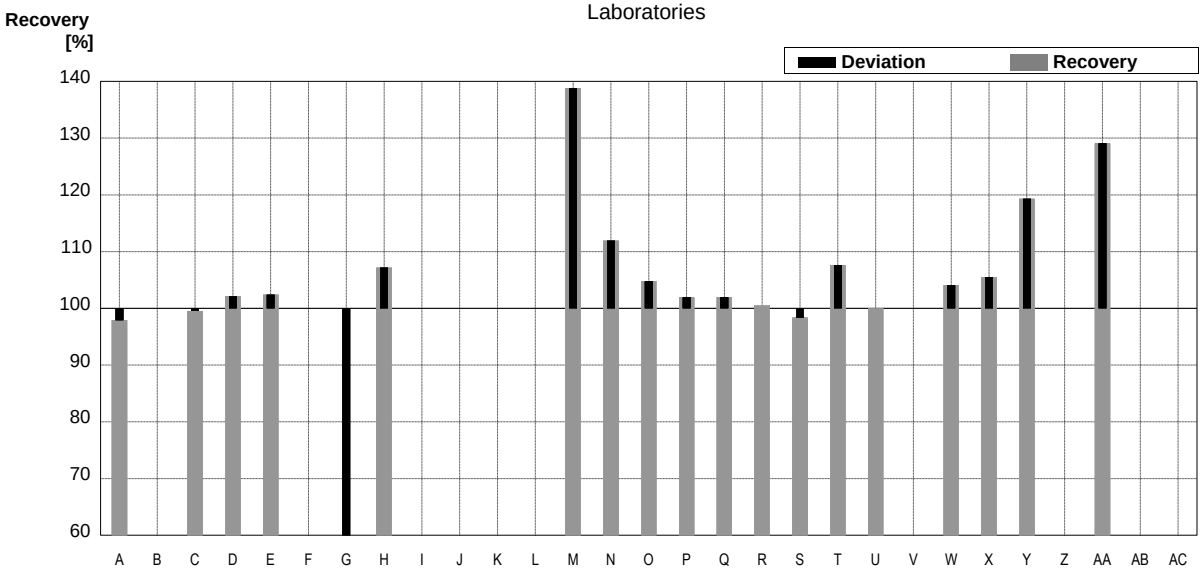
Sample M148A
Parameter Arsenic

Target value ± U (k=2)	4,20	µg/l	±	0,03	µg/l
IFA result ± U (k=2)	4,15	µg/l	±	0,33	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	4,112	0,231	µg/l	98%	-0,26
B			µg/l		
C	4,18	0,117	µg/l	100%	-0,06
D	4,29	0,06	µg/l	102%	0,26
E	4,3	0,65	µg/l	102%	0,29
F			µg/l		
G	2,2 *		µg/l	52%	-5,81
H	4,5	0,45	µg/l	107%	0,87
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	5,83 *	0,25	µg/l	139%	4,73
N	4,7	0,564	µg/l	112%	1,45
O	4,4	0,9	µg/l	105%	0,58
P	4,28	0,25	µg/l	102%	0,23
Q	4,28	0,96	µg/l	102%	0,23
R	4,22	0,20	µg/l	100%	0,06
S	4,13	0,080	µg/l	98%	-0,20
T	4,52	0,5	µg/l	108%	0,93
U	4,2	0,63	µg/l	100%	0,00
V			µg/l		
W	4,37	0,66	µg/l	104%	0,49
X	4,43	0,07	µg/l	105%	0,67
Y	5,01 *	0,38	µg/l	119%	2,35
Z			µg/l		
AA	5,42 *	0,81	µg/l	129%	3,54
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	4,39 ± 0,46	4,33 ± 0,12	µg/l
Recov. ± CI(99%)	104,5 ± 11,0	103,0 ± 3,0	%
SD between labs	0,70	0,16	µg/l
RSD between labs	15,9	3,7	%
n for calculation	19	15	



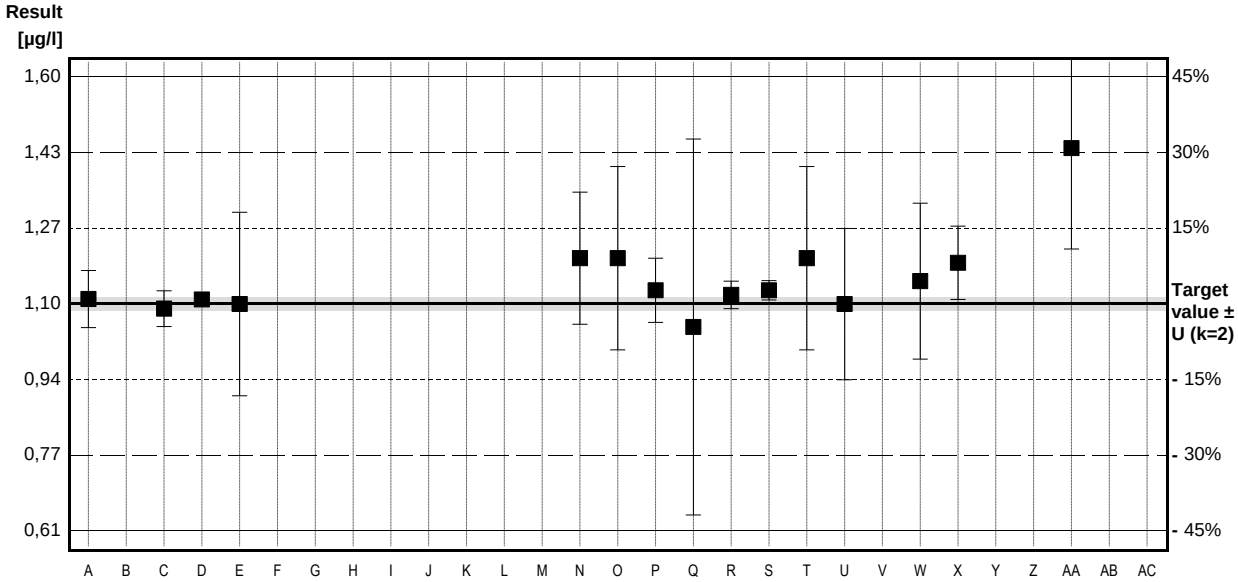


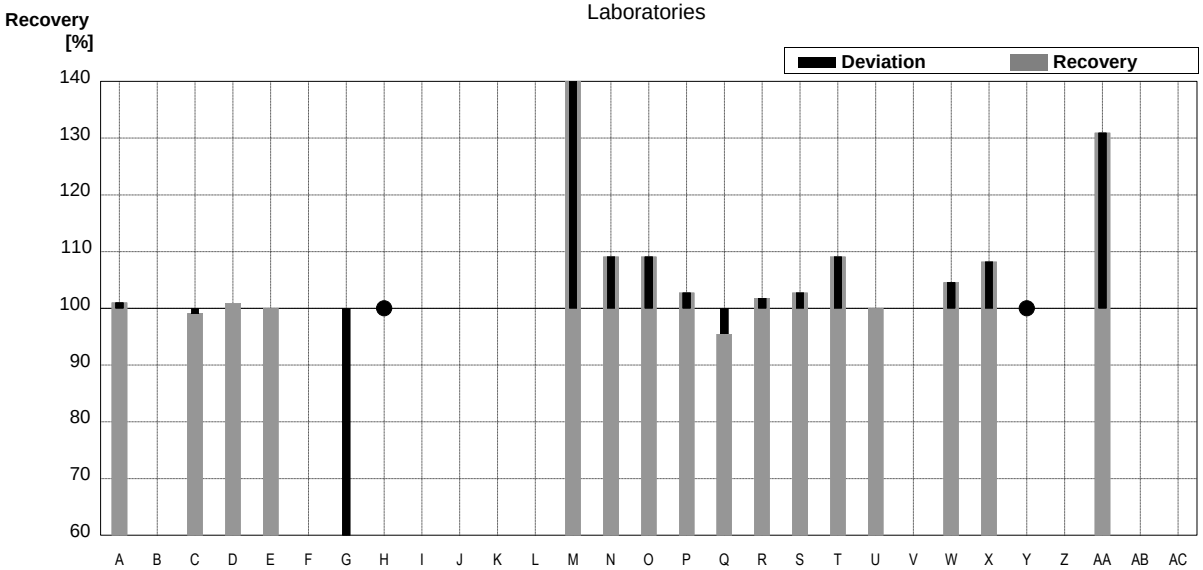
Sample M148B
Parameter Arsenic

Target value ± U (k=2)	1,10 µg/l	±	0,01 µg/l
IFA result ± U (k=2)	1,09 µg/l	±	0,09 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	1,111	0,0623	µg/l	101%	0,12
B			µg/l		
C	1,09	0,039	µg/l	99%	-0,11
D	1,11	0,01	µg/l	101%	0,11
E	1,1	0,2	µg/l	100%	0,00
F			µg/l		
G	0,6 *		µg/l	55%	-5,54
H	<2		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	1,68 *	0,35	µg/l	153%	6,43
N	1,2	0,144	µg/l	109%	1,11
O	1,2	0,2	µg/l	109%	1,11
P	1,13	0,07	µg/l	103%	0,33
Q	1,05	0,41	µg/l	95%	-0,55
R	1,12	0,03	µg/l	102%	0,22
S	1,13	0,021	µg/l	103%	0,33
T	1,20	0,2	µg/l	109%	1,11
U	1,1	0,165	µg/l	100%	0,00
V			µg/l		
W	1,15	0,17	µg/l	105%	0,55
X	1,19	0,08	µg/l	108%	1,00
Y	<1,5		µg/l	•	
Z			µg/l		
AA	1,44 *	0,22	µg/l	131%	3,77
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,15 ± 0,15	1,13 ± 0,04	µg/l
Recov. ± CI(99%)	104,8 ± 13,5	103,1 ± 3,5	%
SD between labs	0,21	0,05	µg/l
RSD between labs	18,1	4,2	%
n for calculation	17	14	





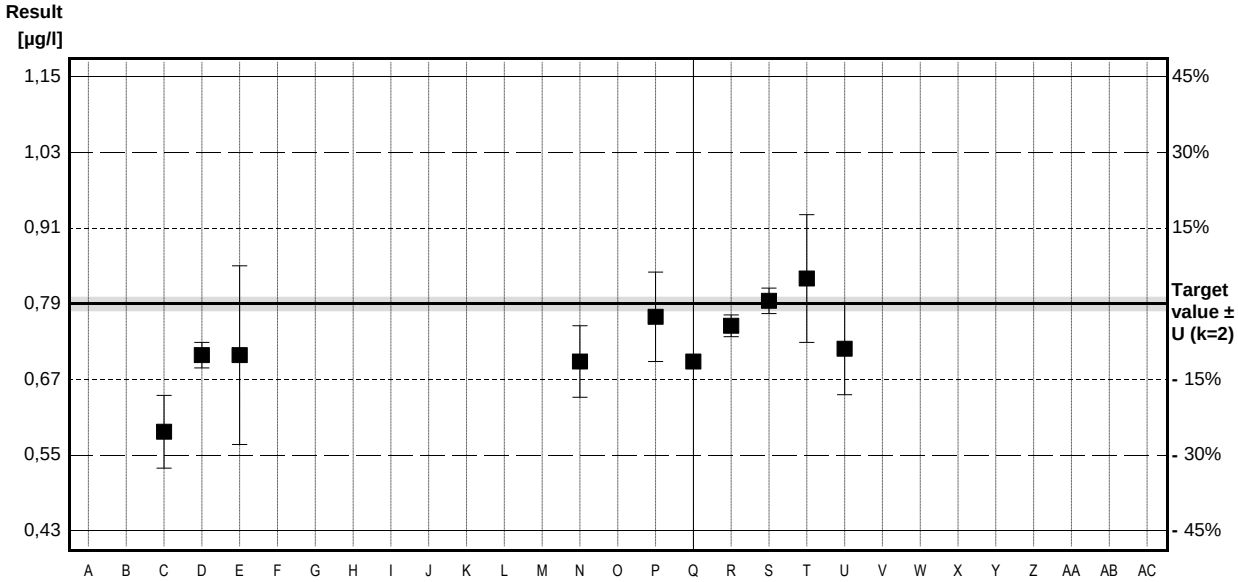
Sample M148A

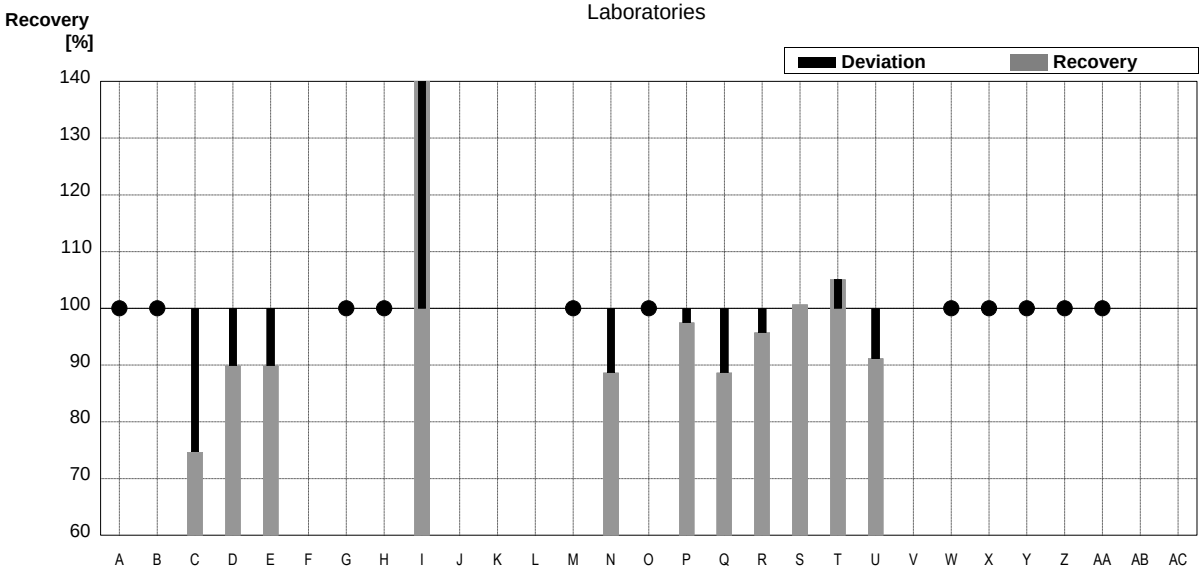
Parameter Lead

Target value ± U (k=2)	0,79 µg/l	±	0,01 µg/l
IFA result ± U (k=2)	0,79 µg/l	±	0,03 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	<1,0		µg/l	•	
B	<4,0		µg/l	•	
C	0,59	0,057	µg/l	75%	-3,47
D	0,71	0,02	µg/l	90%	-1,39
E	0,71	0,14	µg/l	90%	-1,39
F			µg/l		
G	<1		µg/l	•	
H	<2		µg/l	•	
I	1,28 *	0,08	µg/l	162%	8,50
J			µg/l		
K			µg/l		
L			µg/l		
M	<5		µg/l	•	
N	0,7	0,056	µg/l	89%	-1,56
O	<1		µg/l	•	
P	0,77	0,07	µg/l	97%	-0,35
Q	0,70	0,54	µg/l	89%	-1,56
R	0,756	0,017	µg/l	96%	-0,59
S	0,795	0,020	µg/l	101%	0,09
T	0,83	0,1	µg/l	105%	0,69
U	0,72	0,072	µg/l	91%	-1,21
V			µg/l		
W	<1		µg/l	•	
X	<1,00		µg/l	•	
Y	<1		µg/l	•	
Z	<4		µg/l	•	
AA	<1		µg/l	•	
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,78 ± 0,17	0,73 ± 0,07	µg/l
Recov. ± CI(99%)	98,5 ± 21,5	92,2 ± 8,6	%
SD between labs	0,18	0,07	µg/l
RSD between labs	22,8	9,0	%
n for calculation	11	10	





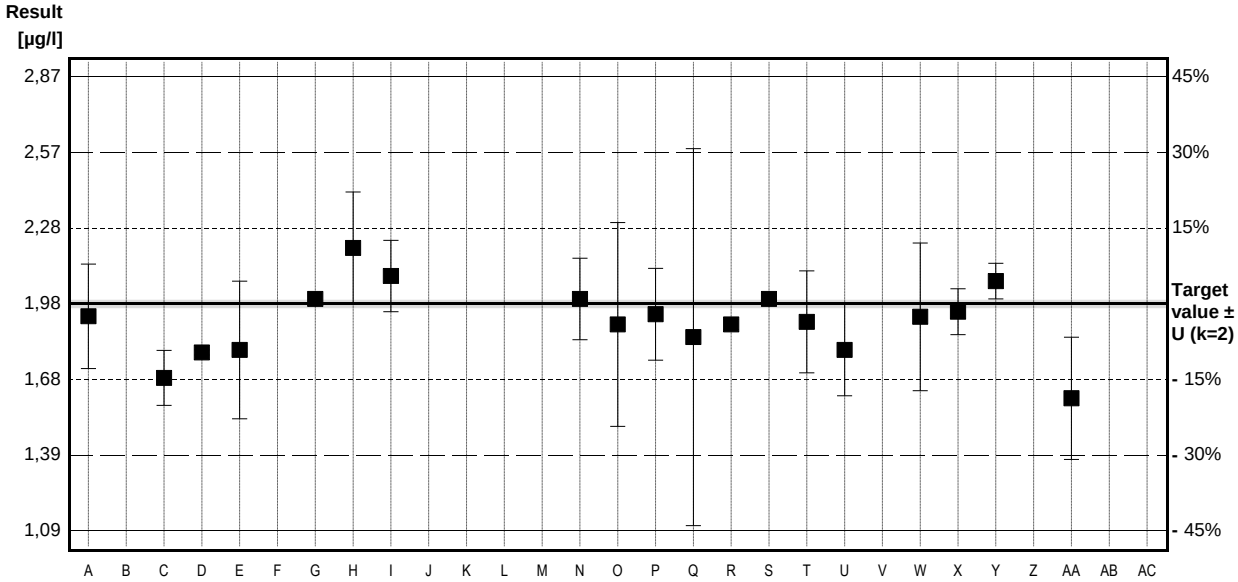
Sample M148B

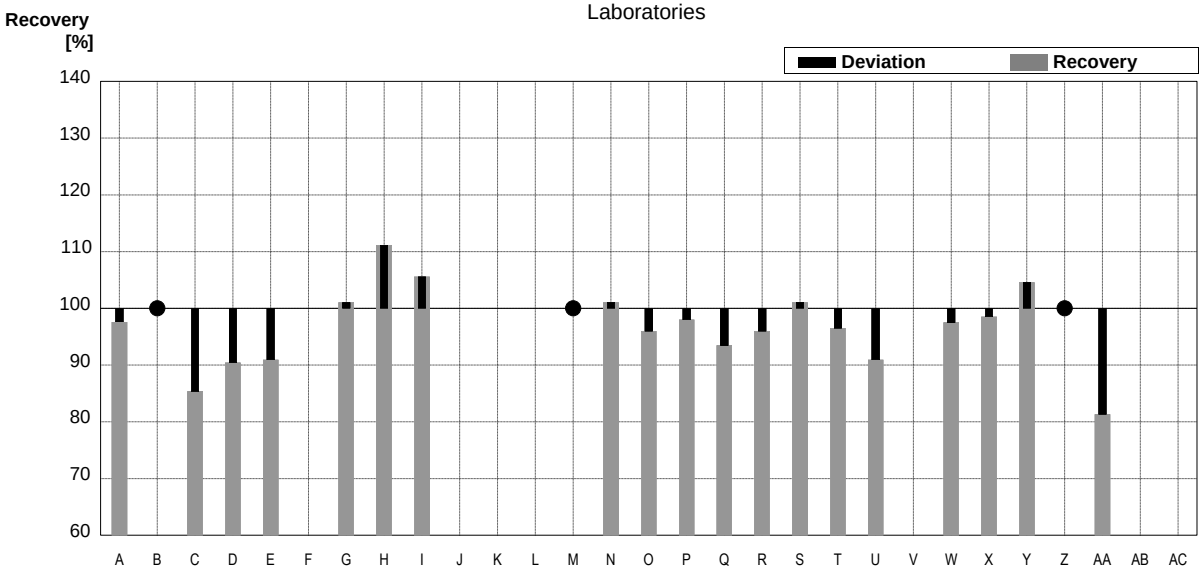
Parameter Lead

Target value ± U (k=2)	1,98	µg/l	±	0,01	µg/l
IFA result ± U (k=2)	1,95	µg/l	±	0,08	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	1,932	0,205	µg/l	98%	-0,33
B	<4,0		µg/l	•	
C	1,69	0,108	µg/l	85%	-2,01
D	1,79	0,01	µg/l	90%	-1,31
E	1,8	0,27	µg/l	91%	-1,25
F			µg/l		
G	2		µg/l	101%	0,14
H	2,2	0,22	µg/l	111%	1,52
I	2,09	0,14	µg/l	106%	0,76
J			µg/l		
K			µg/l		
L			µg/l		
M	<5		µg/l	•	
N	2	0,16	µg/l	101%	0,14
O	1,9	0,4	µg/l	96%	-0,55
P	1,94	0,18	µg/l	98%	-0,28
Q	1,85	0,74	µg/l	93%	-0,90
R	1,90	0,02	µg/l	96%	-0,55
S	2,00	0,015	µg/l	101%	0,14
T	1,91	0,2	µg/l	96%	-0,48
U	1,8	0,18	µg/l	91%	-1,25
V			µg/l		
W	1,93	0,29	µg/l	97%	-0,35
X	1,95	0,09	µg/l	98%	-0,21
Y	2,07	0,07	µg/l	105%	0,62
Z	<4		µg/l	•	
AA	1,61	0,24	µg/l	81%	-2,56
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,91 ± 0,09	1,91 ± 0,09	µg/l
Recov. ± CI(99%)	96,7 ± 4,7	96,7 ± 4,7	%
SD between labs	0,14	0,14	µg/l
RSD between labs	7,3	7,3	%
n for calculation	19	19	



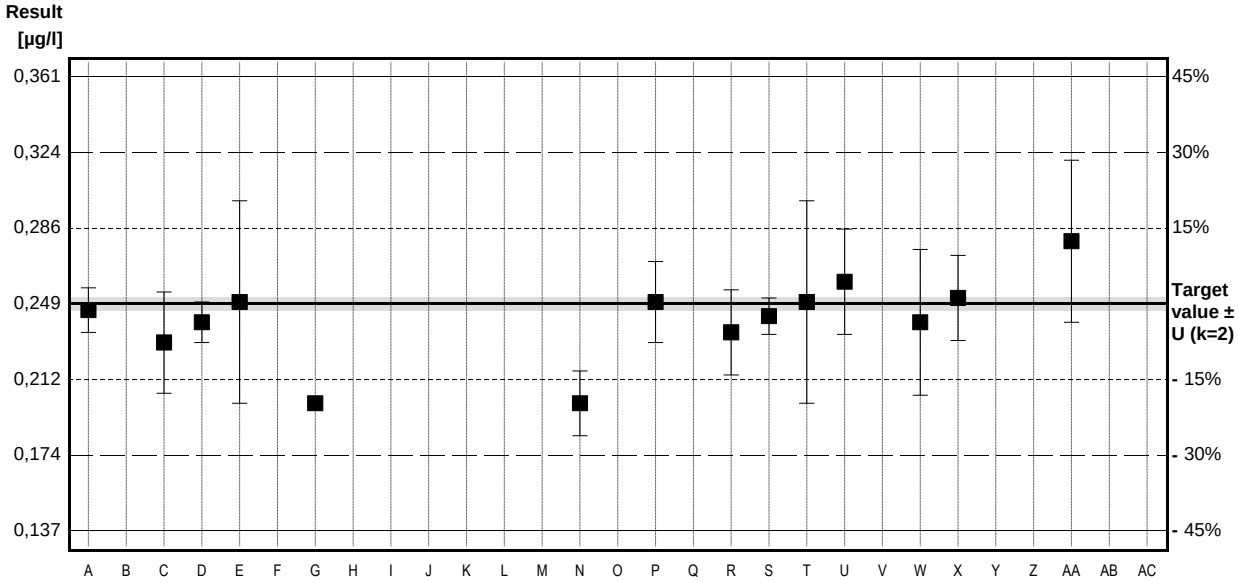


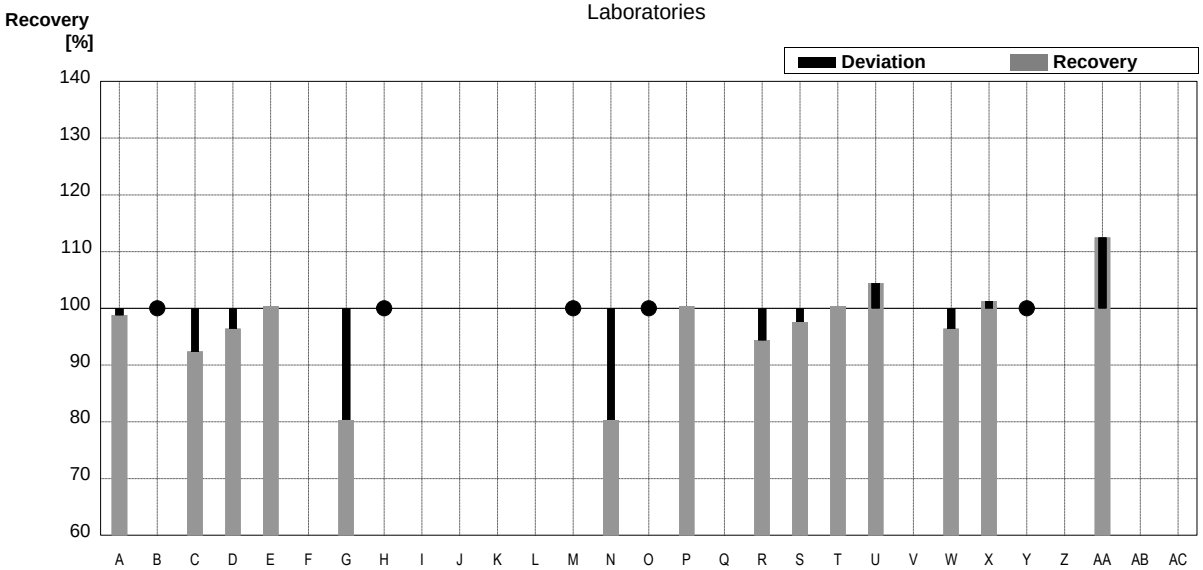
Sample M148A
Parameter Cadmium

Target value ± U (k=2)	0,249	µg/l	±	0,003	µg/l
IFA result ± U (k=2)	0,264	µg/l	±	0,018	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,246	0,011	µg/l	99%	-0,19
B	<0,5		µg/l	•	
C	0,23	0,025	µg/l	92%	-1,23
D	0,24	0,01	µg/l	96%	-0,58
E	0,25	0,05	µg/l	100%	0,06
F			µg/l		
G	0,2 *		µg/l	80%	-3,17
H	<1		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	<1		µg/l	•	
N	0,2 *	0,016	µg/l	80%	-3,17
O	<1		µg/l	•	
P	0,25	0,02	µg/l	100%	0,06
Q			µg/l		
R	0,235	0,021	µg/l	94%	-0,91
S	0,243	0,009	µg/l	98%	-0,39
T	0,25	0,05	µg/l	100%	0,06
U	0,26	0,026	µg/l	104%	0,71
V			µg/l		
W	0,240	0,036	µg/l	96%	-0,58
X	0,252	0,021	µg/l	101%	0,19
Y	<0,4		µg/l	•	
Z			µg/l		
AA	0,28 *	0,04	µg/l	112%	2,01
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,241 ± 0,017	0,245 ± 0,008	µg/l
Recov. ± CI(99%)	96,8 ± 6,8	98,4 ± 3,3	%
SD between labs	0,021	0,009	µg/l
RSD between labs	8,8	3,5	%
n for calculation	14	11	



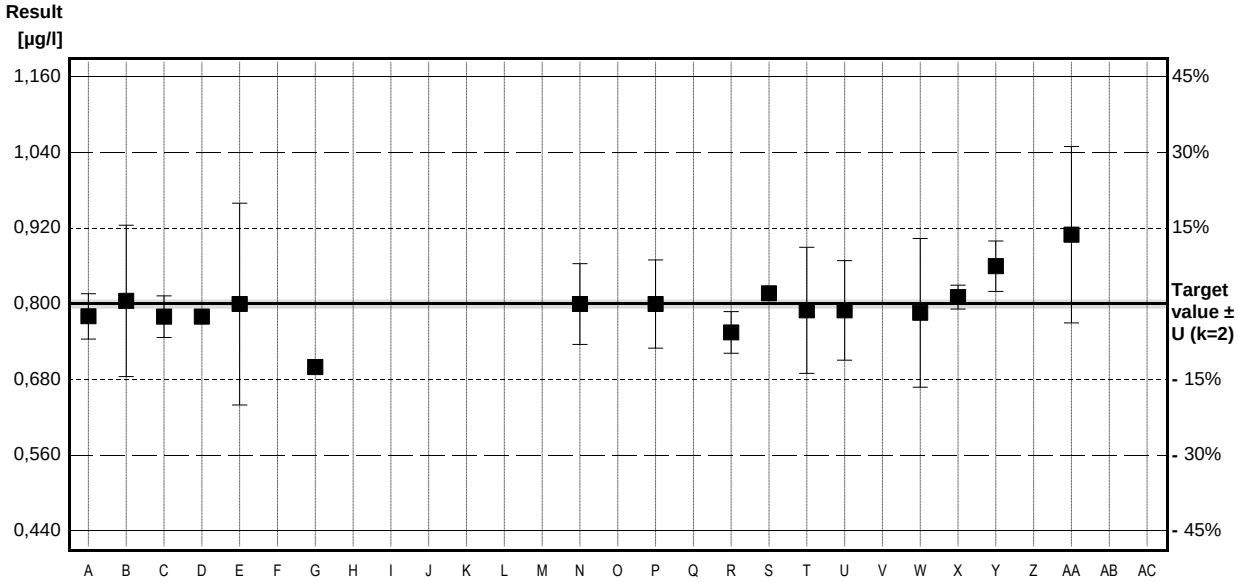


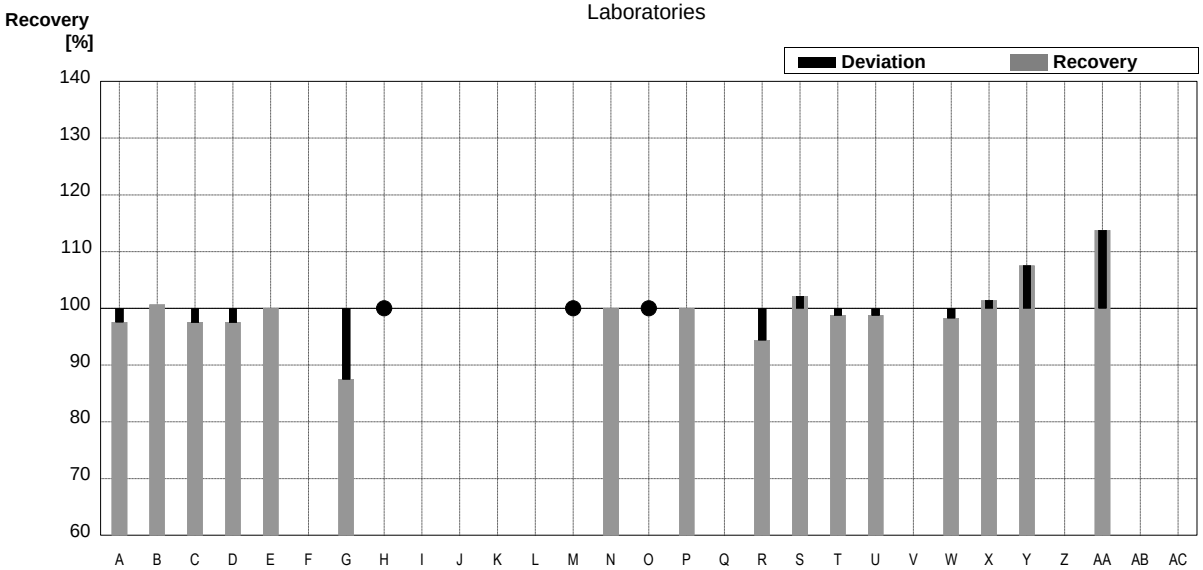
Sample M148B
Parameter Cadmium

Target value ± U (k=2) 0,800 µg/l ± 0,007 µg/l
IFA result ± U (k=2) 0,825 µg/l ± 0,058 µg/l
Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,7805	0,036	µg/l	98%	-0,39
B	0,805	0,12	µg/l	101%	0,10
C	0,78	0,033	µg/l	98%	-0,40
D	0,78	0,01	µg/l	98%	-0,40
E	0,80	0,16	µg/l	100%	0,00
F			µg/l		
G	0,7 *		µg/l	88%	-2,02
H	<1		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	<1		µg/l	•	
N	0,8	0,064	µg/l	100%	0,00
O	<1		µg/l	•	
P	0,80	0,07	µg/l	100%	0,00
Q			µg/l		
R	0,755	0,033	µg/l	94%	-0,91
S	0,817	0,011	µg/l	102%	0,34
T	0,79	0,1	µg/l	99%	-0,20
U	0,79	0,079	µg/l	99%	-0,20
V			µg/l		
W	0,786	0,118	µg/l	98%	-0,28
X	0,811	0,019	µg/l	101%	0,22
Y	0,86	0,04	µg/l	108%	1,21
Z			µg/l		
AA	0,91 *	0,14	µg/l	114%	2,22
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,798 ± 0,033	0,797 ± 0,019	µg/l
Recov. ± CI(99%)	99,7 ± 4,1	99,6 ± 2,4	%
SD between labs	0,044	0,024	µg/l
RSD between labs	5,6	3,0	%
n for calculation	16	14	



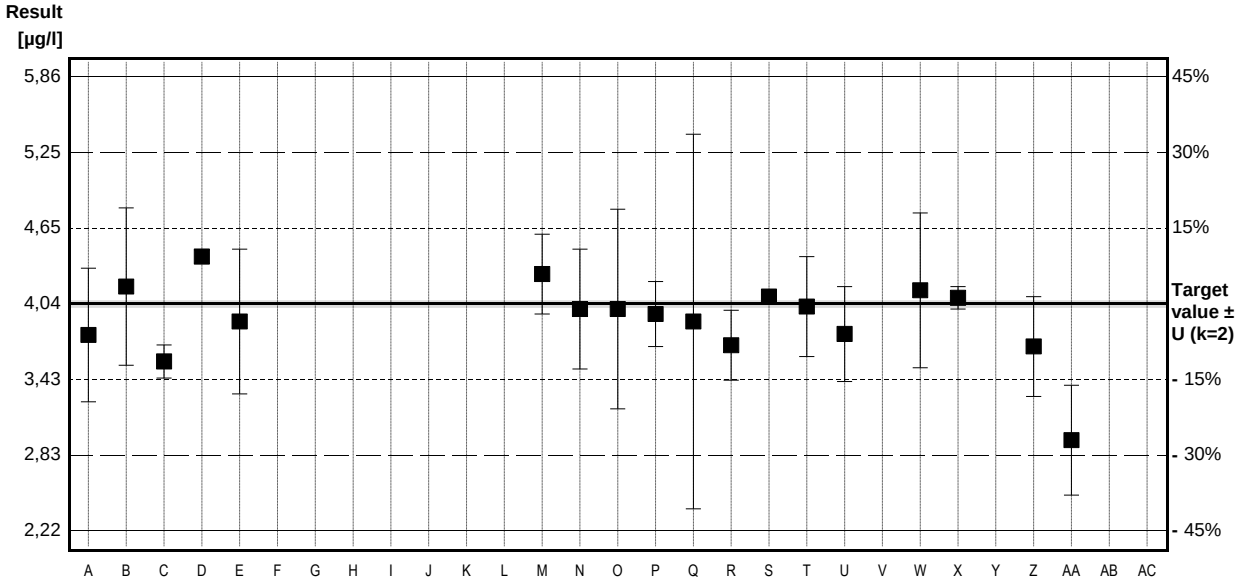


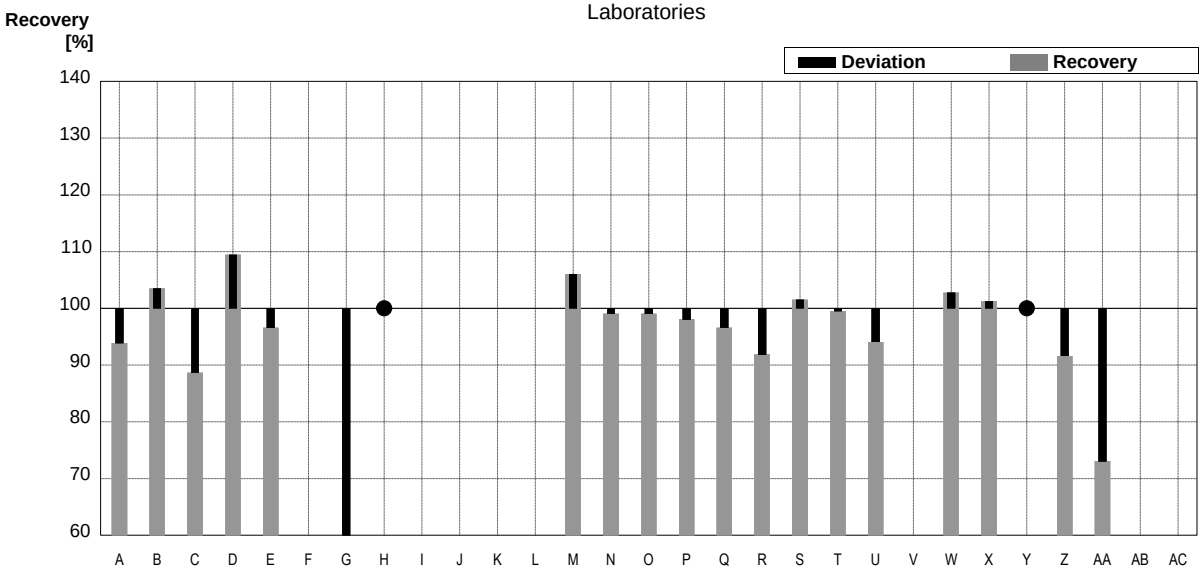
Sample M148A
Parameter Chromium

Target value ± U (k=2)	4,04 µg/l	±	0,03 µg/l		
IFA result ± U (k=2)	4,24 µg/l	±	0,21 µg/l		
Stability test	µg/l				

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,792	0,535	µg/l	94%	-0,92
B	4,18	0,63	µg/l	103%	0,52
C	3,58	0,133	µg/l	89%	-1,70
D	4,42	0,05	µg/l	109%	1,40
E	3,9	0,58	µg/l	97%	-0,52
F			µg/l		
G	2 *		µg/l	50%	-7,54
H	<5		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	4,28	0,32	µg/l	106%	0,89
N	4	0,48	µg/l	99%	-0,15
O	4	0,8	µg/l	99%	-0,15
P	3,96	0,26	µg/l	98%	-0,30
Q	3,9	1,5	µg/l	97%	-0,52
R	3,71	0,28	µg/l	92%	-1,22
S	4,10	0,015	µg/l	101%	0,22
T	4,02	0,4	µg/l	100%	-0,07
U	3,8	0,38	µg/l	94%	-0,89
V			µg/l		
W	4,15	0,62	µg/l	103%	0,41
X	4,09	0,09	µg/l	101%	0,18
Y	<5		µg/l	•	
Z	3,7	0,4	µg/l	92%	-1,26
AA	2,95 *	0,44	µg/l	73%	-4,03
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,82 ± 0,36	3,98 ± 0,16	µg/l
Recov. ± CI(99%)	94,5 ± 8,8	98,4 ± 3,9	%
SD between labs	0,54	0,22	µg/l
RSD between labs	14,2	5,5	%
n for calculation	19	17	



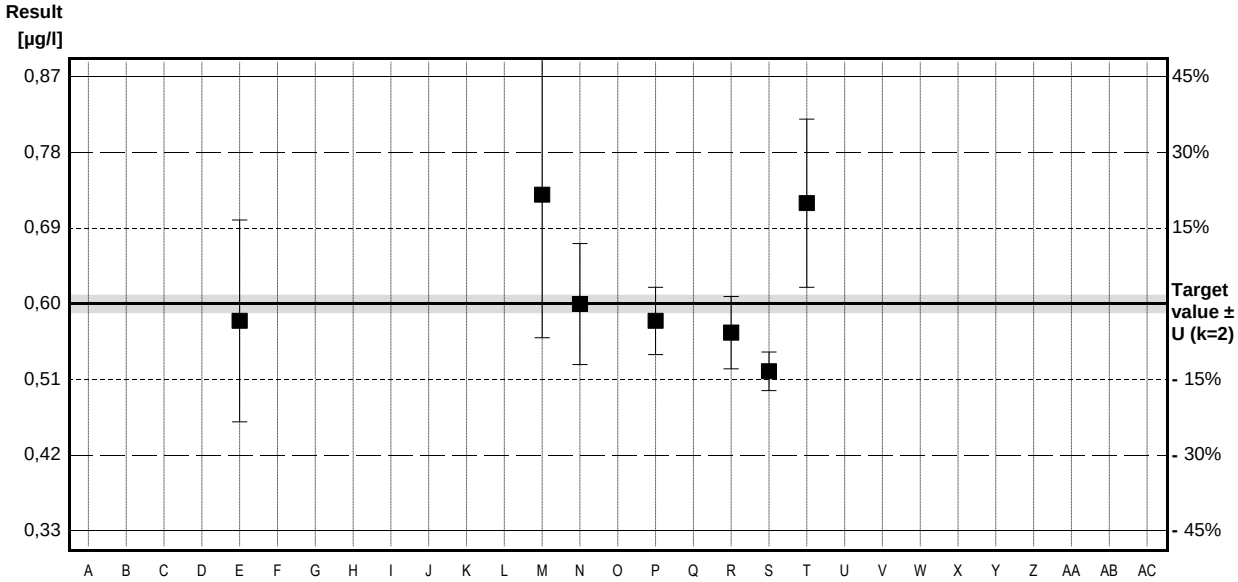


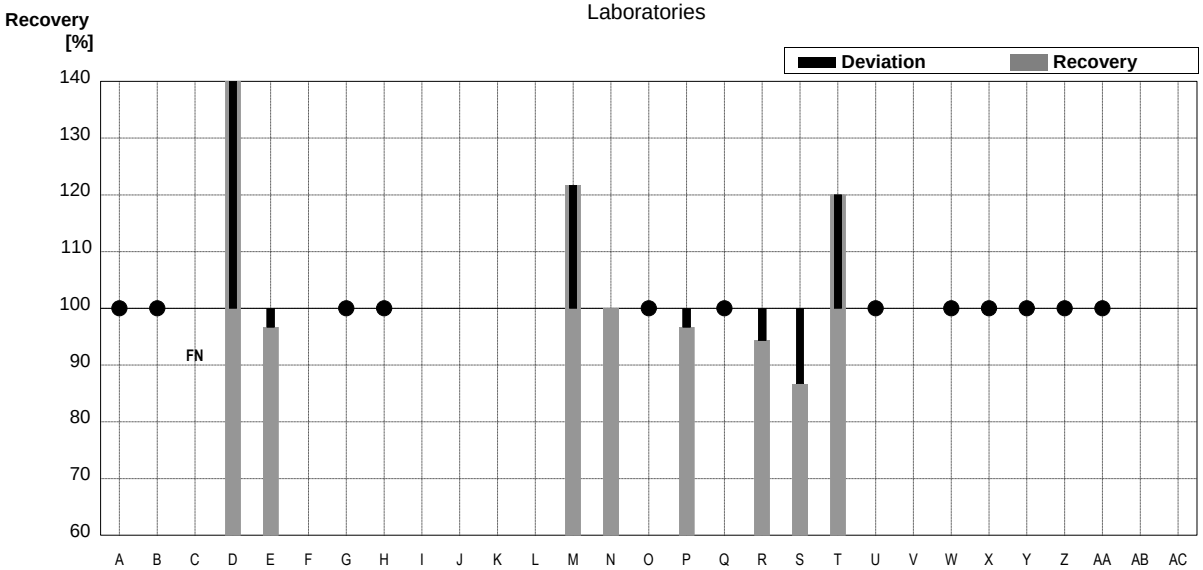
Sample M148B
Parameter Chromium

Target value ± U (k=2)	0,60 µg/l	±	0,01 µg/l
IFA result ± U (k=2)	0,63 µg/l	±	0,03 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	<1,0		µg/l	•	
B	<1,0		µg/l	•	
C	<0,50		µg/l	FN	
D	0,92 *	0,02	µg/l	153%	7,96
E	0,58	0,12	µg/l	97%	-0,50
F			µg/l		
G	<1		µg/l	•	
H	<5		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	0,73	0,17	µg/l	122%	3,23
N	0,6	0,072	µg/l	100%	0,00
O	<1		µg/l	•	
P	0,58	0,04	µg/l	97%	-0,50
Q	<2		µg/l	•	
R	0,566	0,043	µg/l	94%	-0,85
S	0,520	0,023	µg/l	87%	-1,99
T	0,72	0,1	µg/l	120%	2,99
U	<1,0		µg/l	•	
V			µg/l		
W	<1		µg/l	•	
X	<1,00		µg/l	•	
Y	<5		µg/l	•	
Z	<2		µg/l	•	
AA	<1		µg/l	•	
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,65 ± 0,16	0,61 ± 0,11	µg/l
Recov. ± CI(99%)	108,7 ± 27,1	102,3 ± 18,7	%
SD between labs	0,13	0,08	µg/l
RSD between labs	20,1	13,0	%
n for calculation	8	7	





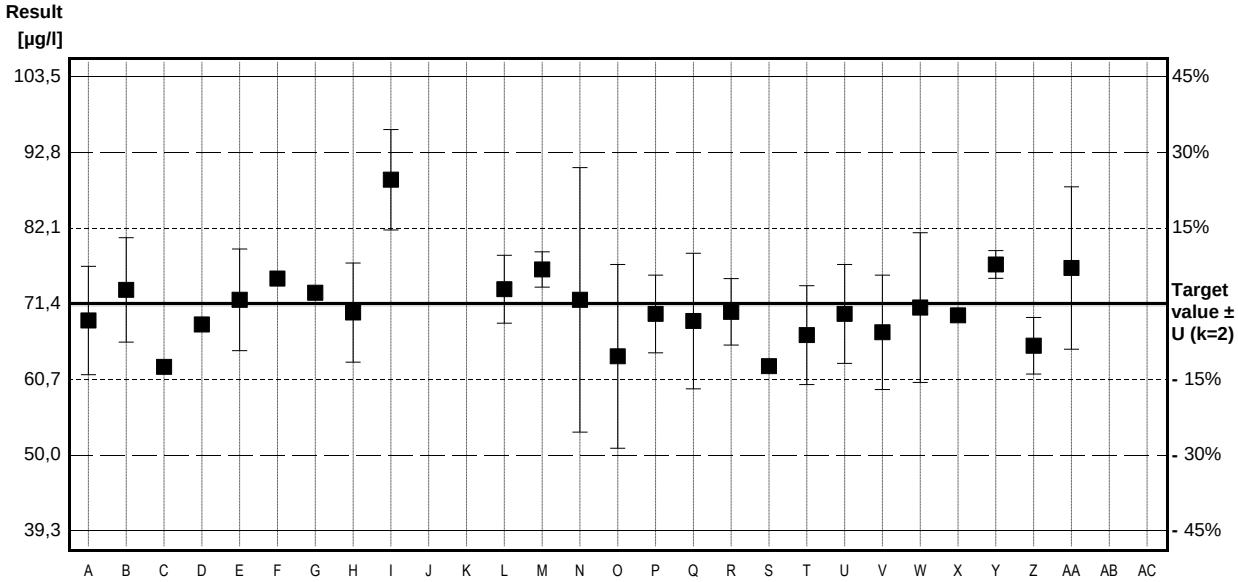
Sample M148A

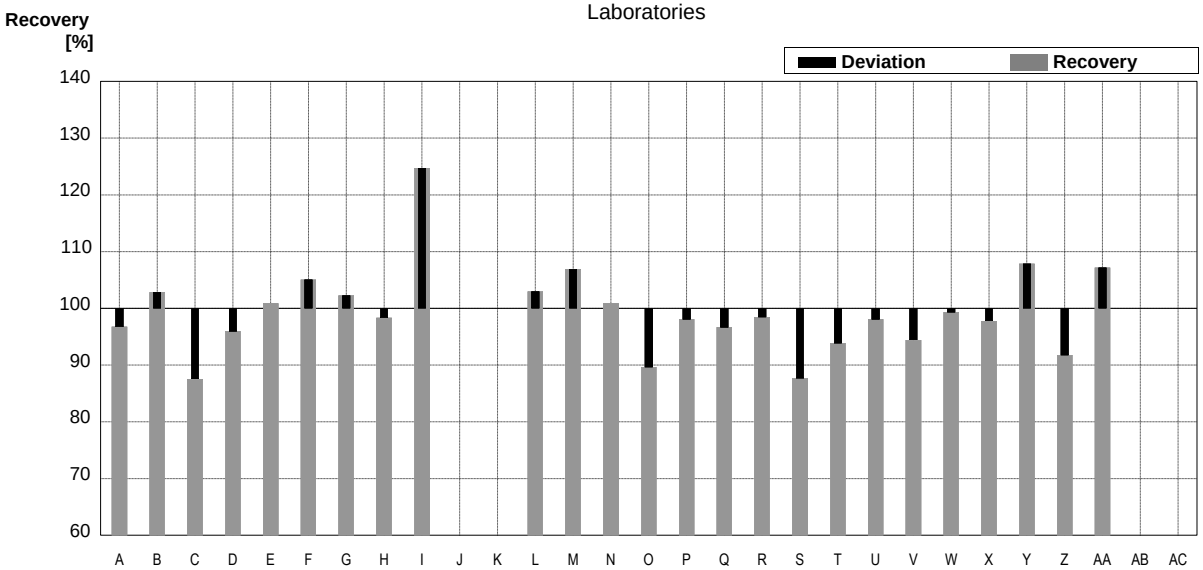
Parameter Iron

Target value ± U (k=2)	71,4	µg/l	±	0,3	µg/l
IFA result ± U (k=2)	73,5	µg/l	±	7,4	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	69,07	7,67	µg/l	97%	-0,44
B	73,4	7,4	µg/l	103%	0,38
C	62,5	0,546	µg/l	88%	-1,68
D	68,5	0,4	µg/l	96%	-0,55
E	72	7,2	µg/l	101%	0,11
F	75		µg/l	105%	0,68
G	73		µg/l	102%	0,30
H	70,2	7,02	µg/l	98%	-0,23
I	89,0 *	7,1	µg/l	125%	3,33
J			µg/l		
K			µg/l		
L	73,5	4,8	µg/l	103%	0,40
M	76,3	2,50	µg/l	107%	0,93
N	72	18,72	µg/l	101%	0,11
O	64	13	µg/l	90%	-1,40
P	70,0	5,5	µg/l	98%	-0,26
Q	69	9,6	µg/l	97%	-0,45
R	70,3	4,7	µg/l	98%	-0,21
S	62,6	0,115	µg/l	88%	-1,67
T	67	7	µg/l	94%	-0,83
U	70	7,0	µg/l	98%	-0,26
V	67,4	8,1	µg/l	94%	-0,76
W	70,9	10,6	µg/l	99%	-0,09
X	69,8	0,41	µg/l	98%	-0,30
Y	77,0	1,96	µg/l	108%	1,06
Z	65,5	4,0	µg/l	92%	-1,12
AA	76,5	11,5	µg/l	107%	0,97
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	71,0 ± 3,1	70,2 ± 2,3	µg/l
Recov. ± CI(99%)	99,4 ± 4,3	98,4 ± 3,3	%
SD between labs	5,5	4,1	µg/l
RSD between labs	7,7	5,8	%
n for calculation	25	24	





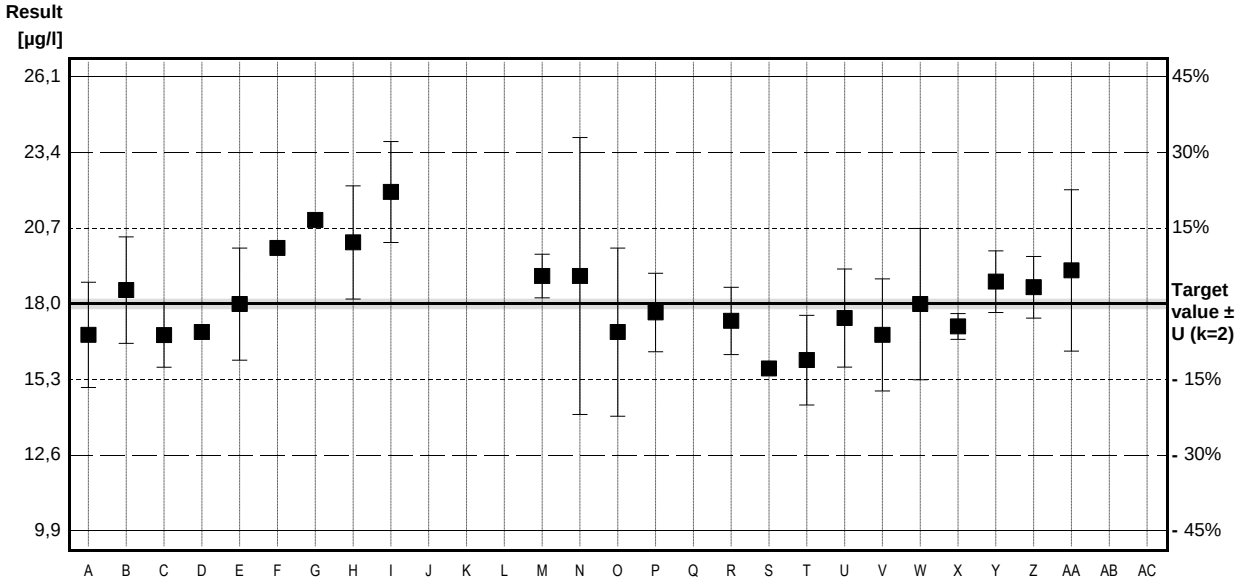
Sample M148B

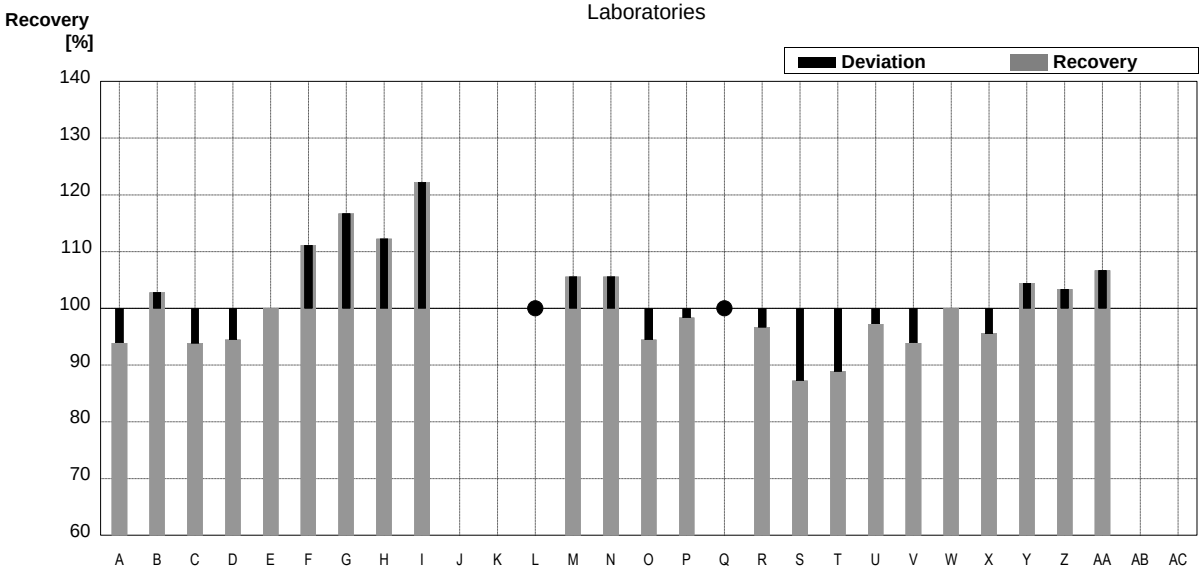
Parameter Iron

Target value ± U (k=2)	18,0	µg/l	±	0,2	µg/l
IFA result ± U (k=2)	18,0	µg/l	±	1,8	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	16,90	1,88	µg/l	94%	-0,83
B	18,5	1,9	µg/l	103%	0,38
C	16,89	1,143	µg/l	94%	-0,83
D	17	0,2	µg/l	94%	-0,75
E	18	2	µg/l	100%	0,00
F	20		µg/l	111%	1,50
G	21		µg/l	117%	2,25
H	20,2	2,02	µg/l	112%	1,65
I	22,0	1,8	µg/l	122%	3,00
J			µg/l		
K			µg/l		
L	<50		µg/l	•	
M	19,0	0,78	µg/l	106%	0,75
N	19	4,94	µg/l	106%	0,75
O	17	3	µg/l	94%	-0,75
P	17,7	1,4	µg/l	98%	-0,23
Q	<20		µg/l	•	
R	17,4	1,2	µg/l	97%	-0,45
S	15,7	0,153	µg/l	87%	-1,73
T	16	1,6	µg/l	89%	-1,50
U	17,5	1,75	µg/l	97%	-0,38
V	16,9	2,0	µg/l	94%	-0,83
W	18,0	2,7	µg/l	100%	0,00
X	17,2	0,46	µg/l	96%	-0,60
Y	18,8	1,1	µg/l	104%	0,60
Z	18,6	1,1	µg/l	103%	0,45
AA	19,2	2,88	µg/l	107%	0,90
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	18,2 ± 0,9	18,2 ± 0,9	µg/l
Recov. ± CI(99%)	101,1 ± 5,1	101,1 ± 5,1	%
SD between labs	1,6	1,6	µg/l
RSD between labs	8,6	8,6	%
n for calculation	23	23	



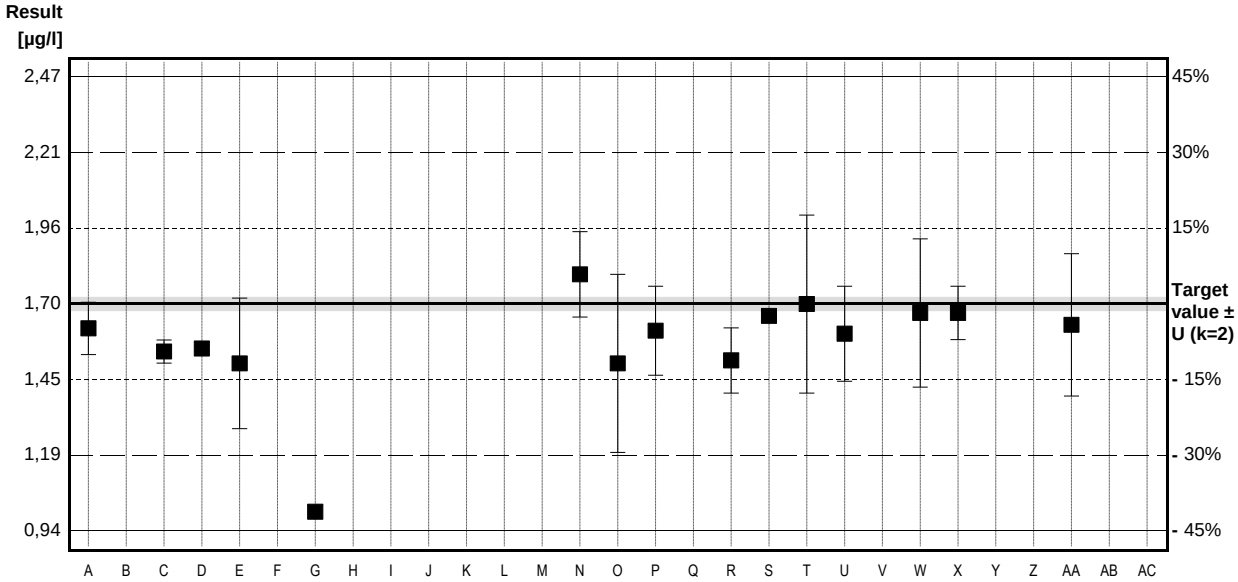


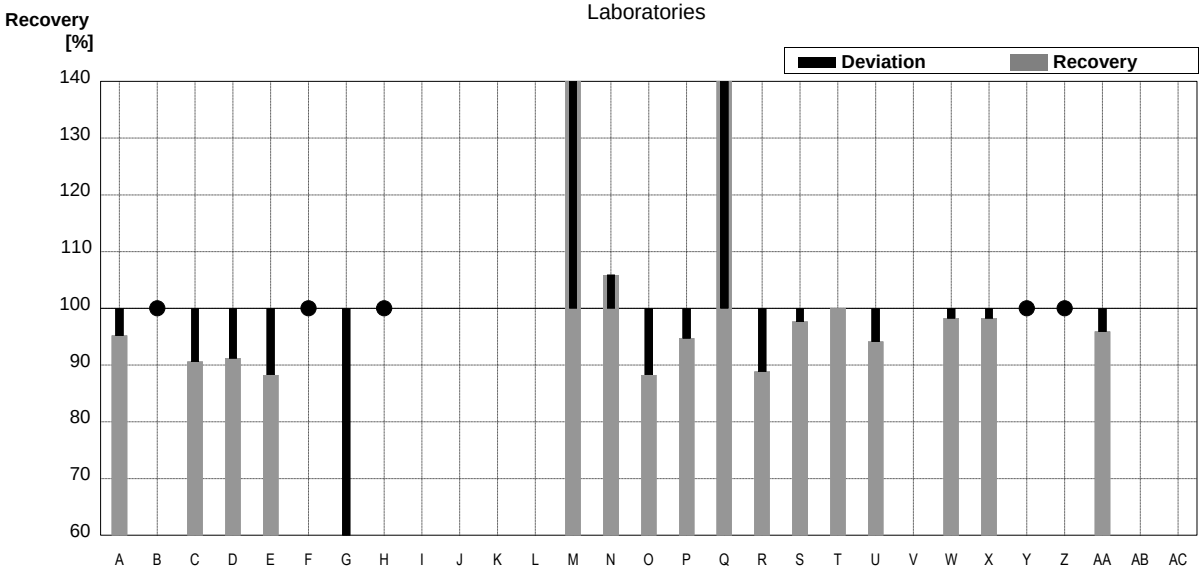
Sample M148A
Parameter Copper

Target value ± U (k=2)	1,70	µg/l	±	0,02	µg/l
IFA result ± U (k=2)	1,72	µg/l	±	0,15	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	1,618	0,088	µg/l	95%	-0,54
B	<5,0		µg/l	•	
C	1,54	0,039	µg/l	91%	-1,05
D	1,55	0,01	µg/l	91%	-0,98
E	1,5	0,22	µg/l	88%	-1,31
F	<10		µg/l	•	
G	1 *		µg/l	59%	-4,58
H	<5		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	4,0 *	0,4	µg/l	235%	15,03
N	1,8	0,144	µg/l	106%	0,65
O	1,5	0,3	µg/l	88%	-1,31
P	1,61	0,15	µg/l	95%	-0,59
Q	2,6 *	1,6	µg/l	153%	5,88
R	1,51	0,11	µg/l	89%	-1,24
S	1,66	0,015	µg/l	98%	-0,26
T	1,7	0,3	µg/l	100%	0,00
U	1,6	0,16	µg/l	94%	-0,65
V			µg/l		
W	1,67	0,25	µg/l	98%	-0,20
X	1,67	0,09	µg/l	98%	-0,20
Y	<5		µg/l	•	
Z	<2		µg/l	•	
AA	1,63	0,24	µg/l	96%	-0,46
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,77 ± 0,46	1,61 ± 0,07	µg/l
Recov. ± CI(99%)	104,4 ± 27,0	94,8 ± 4,1	%
SD between labs	0,65	0,09	µg/l
RSD between labs	36,5	5,4	%
n for calculation	17	14	



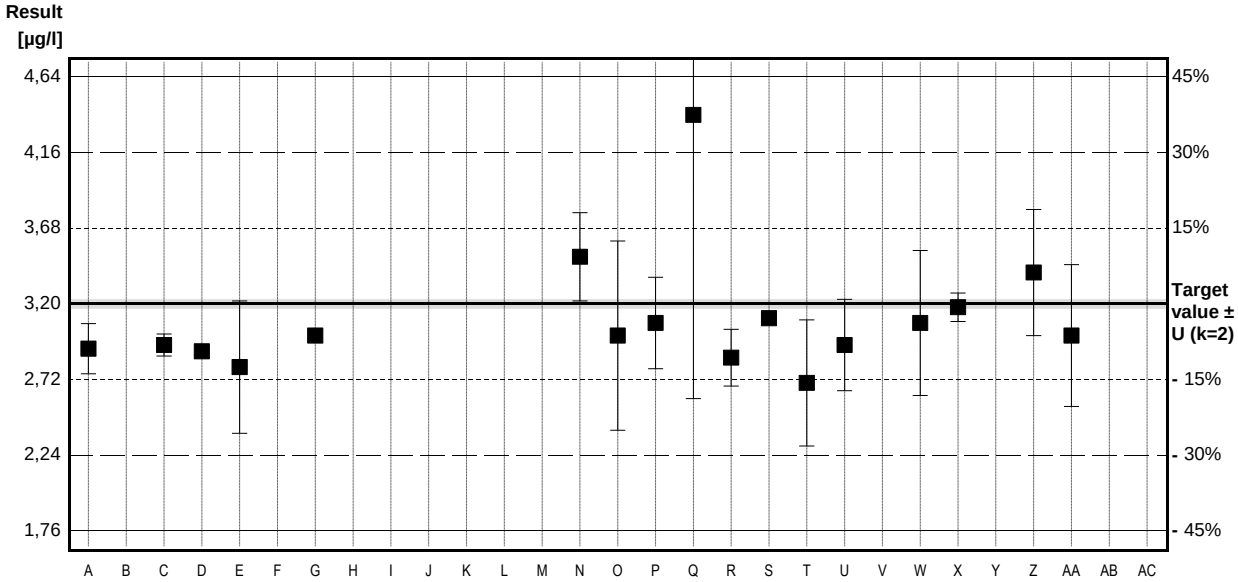


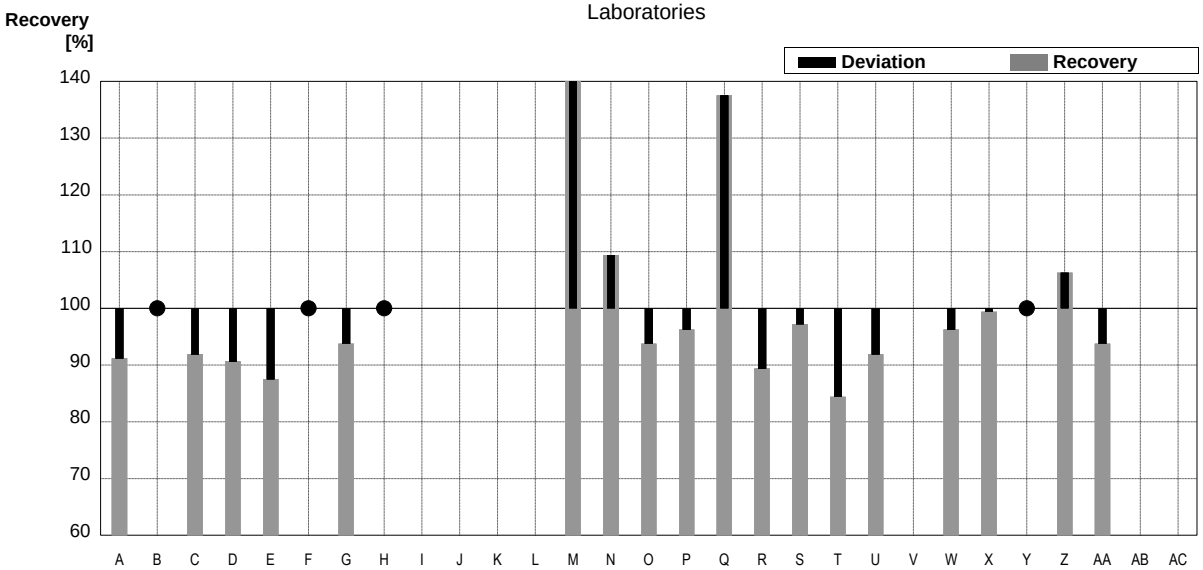
Sample M148B
Parameter Copper

Target value ± U (k=2)	3,20	µg/l	±	0,03	µg/l
IFA result ± U (k=2)	3,17	µg/l	±	0,29	µg/l
Stability test		µg/l			

Lab Code	Result		±	Unit	Recovery	z-Score
A	2,917		0,159	µg/l	91%	-0,98
B	<5,0			µg/l	•	
C	2,94		0,070	µg/l	92%	-0,90
D	2,9		0,02	µg/l	91%	-1,04
E	2,8		0,42	µg/l	88%	-1,39
F	<10			µg/l	•	
G	3			µg/l	94%	-0,69
H	<5			µg/l	•	
I				µg/l		
J				µg/l		
K				µg/l		
L				µg/l		
M	5,1	*	0,5	µg/l	159%	6,60
N	3,5	*	0,28	µg/l	109%	1,04
O	3		0,6	µg/l	94%	-0,69
P	3,08		0,29	µg/l	96%	-0,42
Q	4,4	*	1,8	µg/l	138%	4,17
R	2,86		0,18	µg/l	89%	-1,18
S	3,11		0,021	µg/l	97%	-0,31
T	2,7		0,4	µg/l	84%	-1,74
U	2,94		0,29	µg/l	92%	-0,90
V				µg/l		
W	3,08		0,46	µg/l	96%	-0,42
X	3,18		0,09	µg/l	99%	-0,07
Y	<5			µg/l	•	
Z	3,4		0,4	µg/l	106%	0,69
AA	3,0		0,45	µg/l	94%	-0,69
AB				µg/l		
AC				µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,22 ± 0,41	2,99 ± 0,13	µg/l
Recov. ± CI(99%)	100,5 ± 12,9	93,6 ± 4,0	%
SD between labs	0,60	0,17	µg/l
RSD between labs	18,7	5,6	%
n for calculation	18	15	



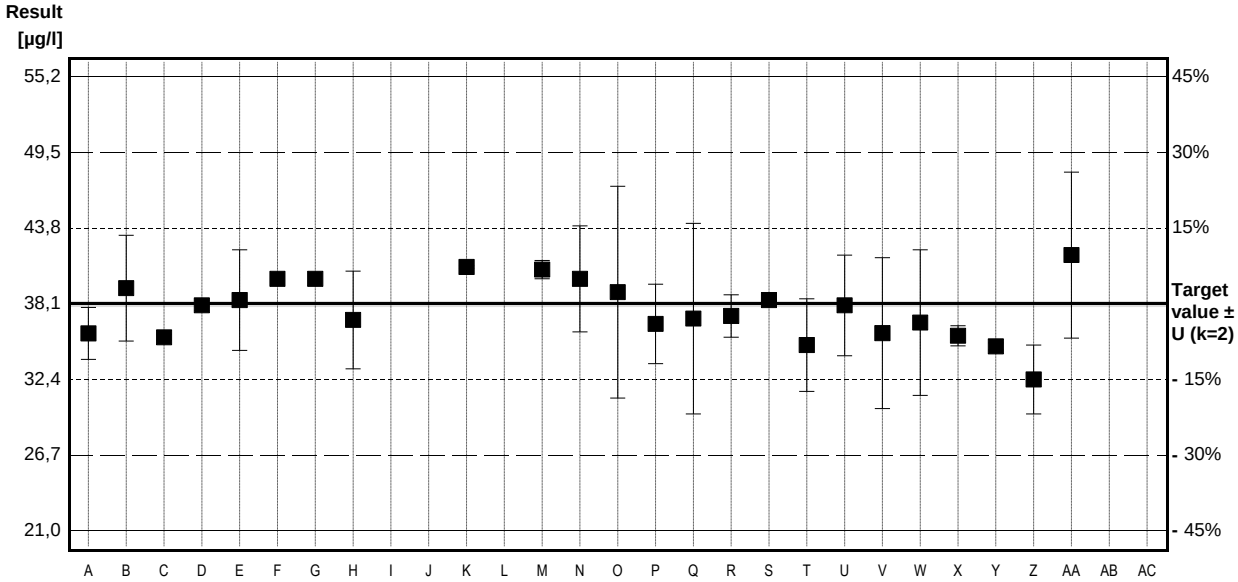


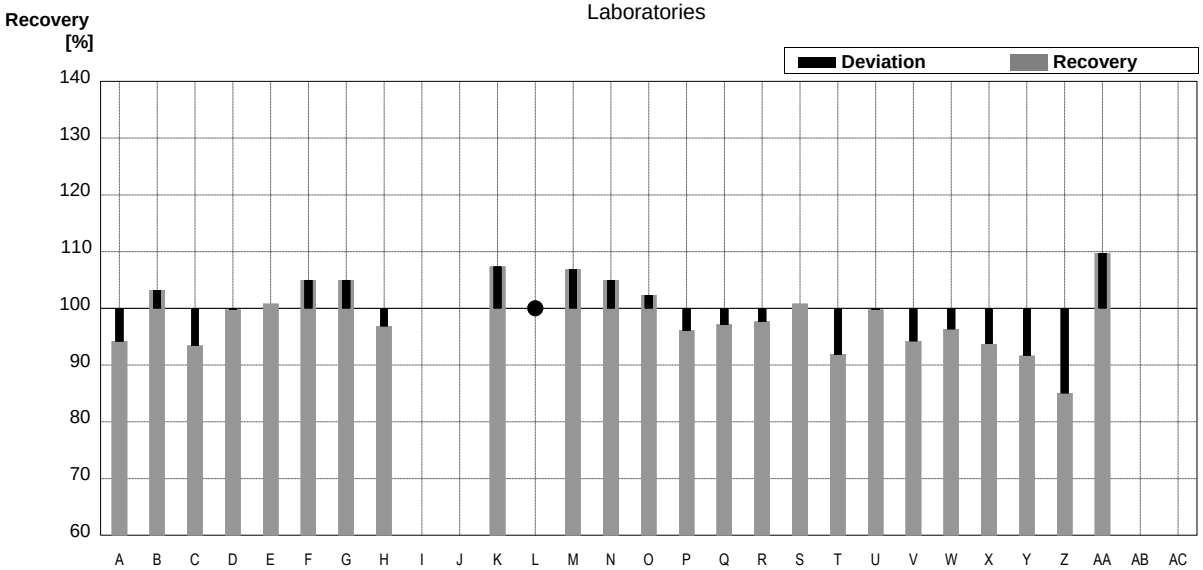
Sample M148A
Parameter Manganese

Target value ± U (k=2)	38,1 µg/l	±	0,2 µg/l
IFA result ± U (k=2)	37,9 µg/l	±	3,4 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	35,88	1,96	µg/l	94%	-0,97
B	39,3	4,0	µg/l	103%	0,52
C	35,58	0,227	µg/l	93%	-1,10
D	38	0,4	µg/l	100%	-0,04
E	38,4	3,8	µg/l	101%	0,13
F	40		µg/l	105%	0,83
G	40		µg/l	105%	0,83
H	36,9	3,69	µg/l	97%	-0,52
I			µg/l		
J			µg/l		
K	40,9	0,1	µg/l	107%	1,22
L	<50		µg/l	•	
M	40,7	0,69	µg/l	107%	1,14
N	40	4	µg/l	105%	0,83
O	39	8	µg/l	102%	0,39
P	36,6	3,0	µg/l	96%	-0,66
Q	37	7,2	µg/l	97%	-0,48
R	37,2	1,6	µg/l	98%	-0,39
S	38,4	0,100	µg/l	101%	0,13
T	35	3,5	µg/l	92%	-1,36
U	38	3,8	µg/l	100%	-0,04
V	35,9	5,7	µg/l	94%	-0,96
W	36,7	5,5	µg/l	96%	-0,61
X	35,7	0,76	µg/l	94%	-1,05
Y	34,9	0,26	µg/l	92%	-1,40
Z	32,4	2,6	µg/l	85%	-2,49
AA	41,8	6,27	µg/l	110%	1,62
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	37,7 ± 1,3	37,7 ± 1,3	µg/l
Recov. ± CI(99%)	98,9 ± 3,4	98,9 ± 3,4	%
SD between labs	2,3	2,3	µg/l
RSD between labs	6,0	6,0	%
n for calculation	24	24	





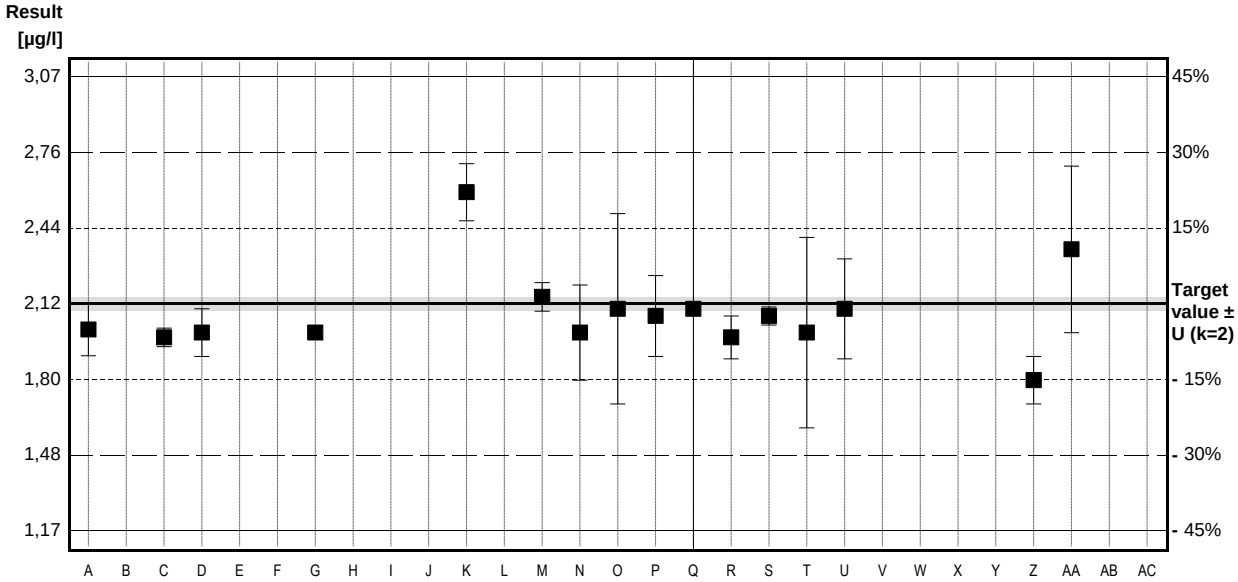
Sample M148B

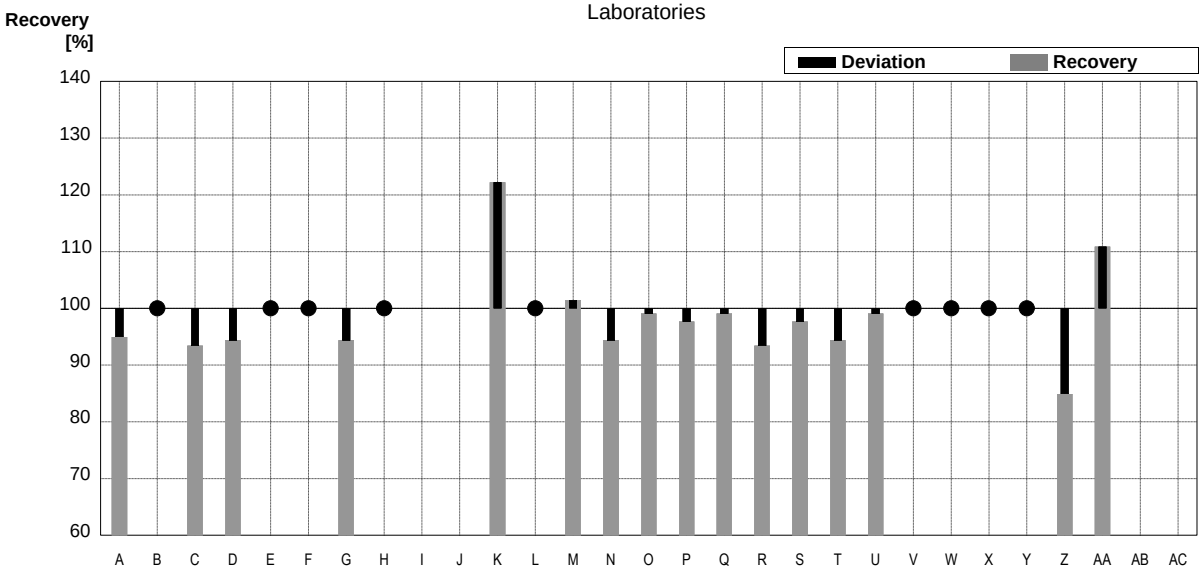
Parameter Manganese

Target value ± U (k=2)	2,12	µg/l	±	0,03	µg/l
IFA result ± U (k=2)	2,07	µg/l	±	0,19	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	2,013	0,110	µg/l	95%	-0,84
B	<5,0		µg/l	•	
C	1,98	0,039	µg/l	93%	-1,10
D	2	0,1	µg/l	94%	-0,94
E	<5	0,5	µg/l	•	
F	<10		µg/l	•	
G	2		µg/l	94%	-0,94
H	<5		µg/l	•	
I			µg/l		
J			µg/l		
K	2,59 *	0,12	µg/l	122%	3,69
L	<50		µg/l	•	
M	2,15	0,06	µg/l	101%	0,24
N	2	0,2	µg/l	94%	-0,94
O	2,1	0,4	µg/l	99%	-0,16
P	2,07	0,17	µg/l	98%	-0,39
Q	2,1	5,1	µg/l	99%	-0,16
R	1,98	0,09	µg/l	93%	-1,10
S	2,07	0,038	µg/l	98%	-0,39
T	2,0	0,4	µg/l	94%	-0,94
U	2,1	0,21	µg/l	99%	-0,16
V	<10	1,6	µg/l	•	
W	<10		µg/l	•	
X	[0,92]		µg/l		
Y	<4		µg/l	•	
Z	1,8	0,1	µg/l	85%	-2,52
AA	2,35 *	0,35	µg/l	111%	1,81
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	2,08 ± 0,13	2,03 ± 0,07	µg/l
Recov. ± CI(99%)	98,2 ± 6,1	95,6 ± 3,2	%
SD between labs	0,18	0,08	µg/l
RSD between labs	8,5	4,2	%
n for calculation	16	14	



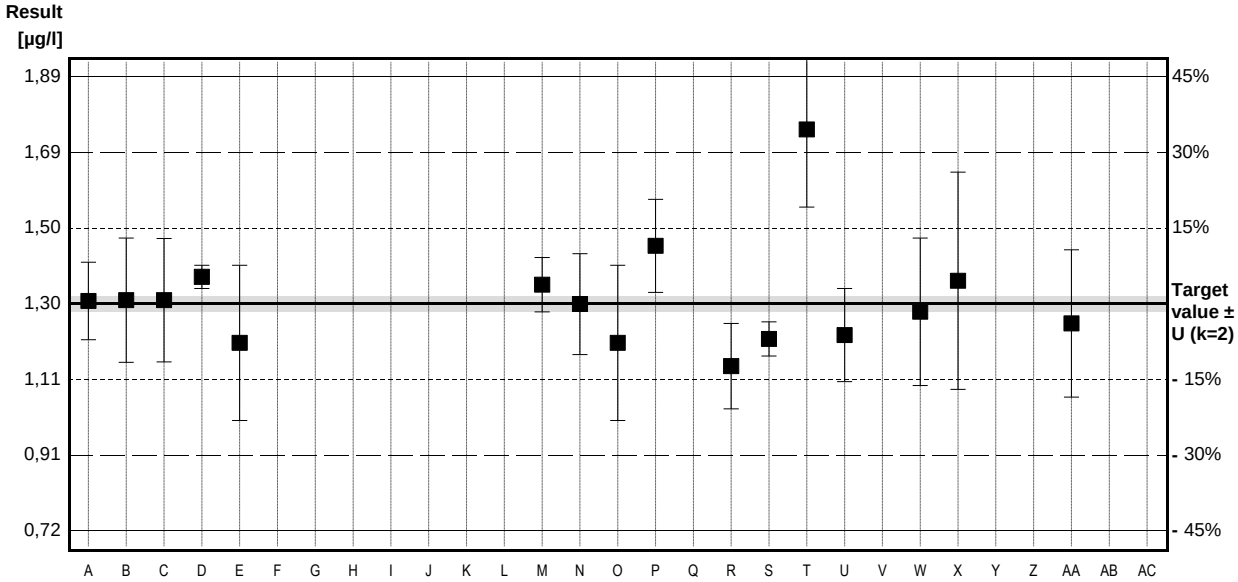


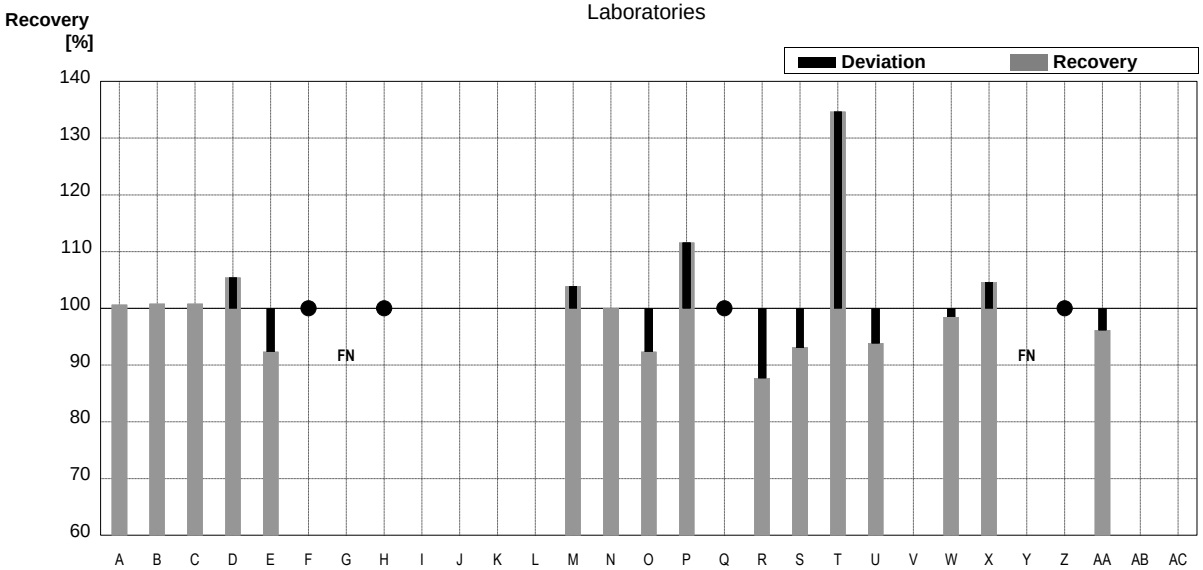
Sample M148A
Parameter Nickel

Target value ± U (k=2)	1,30	µg/l	±	0,02	µg/l
IFA result ± U (k=2)	1,34	µg/l	±	0,12	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	1,308	0,100	µg/l	101%	0,07
B	1,31	0,16	µg/l	101%	0,09
C	1,31	0,159	µg/l	101%	0,09
D	1,37	0,03	µg/l	105%	0,63
E	1,2	0,20	µg/l	92%	-0,89
F	<10		µg/l	•	
G	<1		µg/l	FN	
H	<5		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	1,35	0,07	µg/l	104%	0,45
N	1,3	0,13	µg/l	100%	0,00
O	1,2	0,2	µg/l	92%	-0,89
P	1,45	0,12	µg/l	112%	1,34
Q	<10		µg/l	•	
R	1,14	0,11	µg/l	88%	-1,43
S	1,21	0,044	µg/l	93%	-0,81
T	1,75 *	0,2	µg/l	135%	4,03
U	1,22	0,12	µg/l	94%	-0,72
V			µg/l		
W	1,28	0,19	µg/l	98%	-0,18
X	1,36	0,28	µg/l	105%	0,54
Y	<1		µg/l	FN	
Z	<2		µg/l	•	
AA	1,25	0,19	µg/l	96%	-0,45
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,31 ± 0,10	1,28 ± 0,06	µg/l
Recov. ± CI(99%)	101,0 ± 8,0	98,8 ± 4,8	%
SD between labs	0,14	0,08	µg/l
RSD between labs	10,7	6,3	%
n for calculation	16	15	



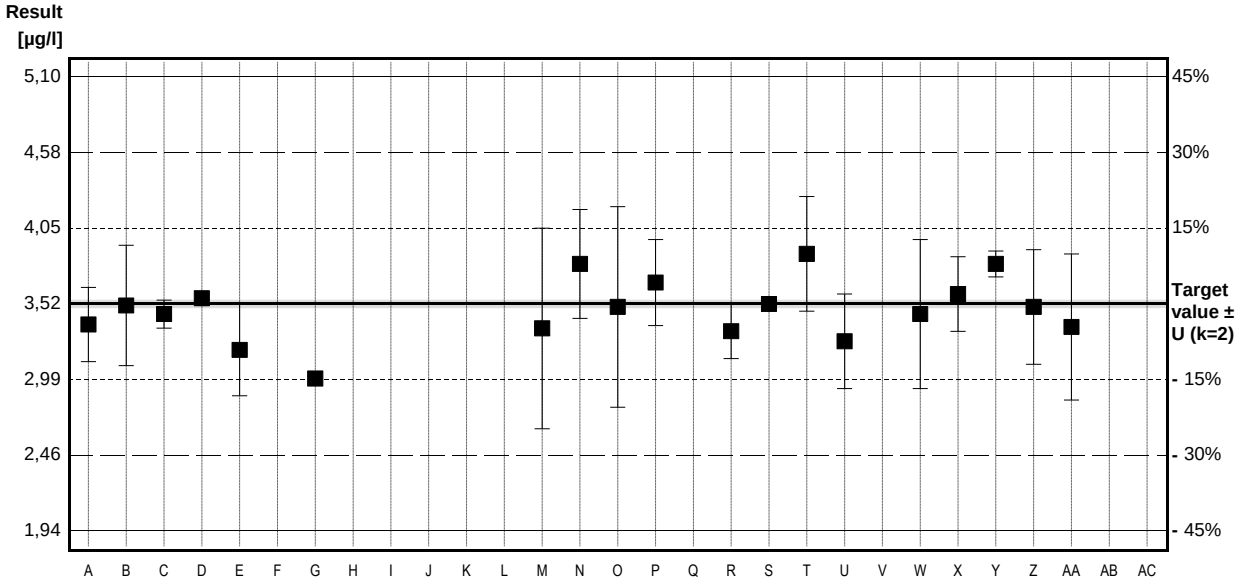


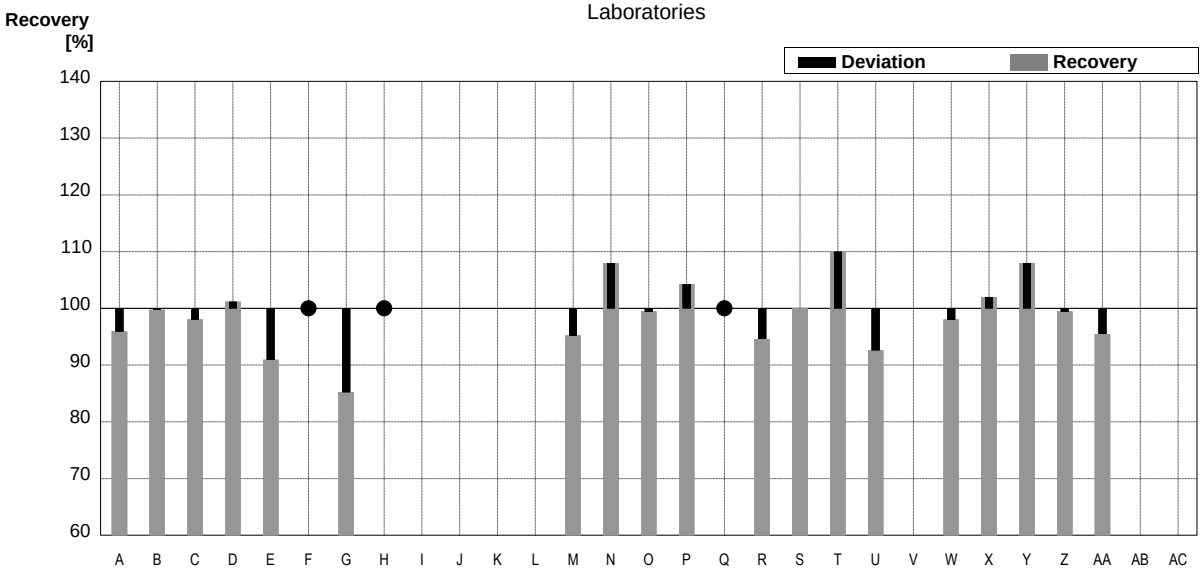
Sample M148B
Parameter Nickel

Target value ± U (k=2)	3,52	µg/l	±	0,03	µg/l
IFA result ± U (k=2)	3,72	µg/l	±	0,33	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,377	0,259	µg/l	96%	-0,47
B	3,51	0,42	µg/l	100%	-0,03
C	3,45	0,098	µg/l	98%	-0,23
D	3,56	0,05	µg/l	101%	0,13
E	3,2	0,32	µg/l	91%	-1,06
F	<10		µg/l	•	
G	3		µg/l	85%	-1,72
H	<5		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	3,35	0,70	µg/l	95%	-0,56
N	3,8	0,38	µg/l	108%	0,92
O	3,5	0,7	µg/l	99%	-0,07
P	3,67	0,30	µg/l	104%	0,50
Q	<10		µg/l	•	
R	3,33	0,19	µg/l	95%	-0,63
S	3,52	0,025	µg/l	100%	0,00
T	3,87	0,4	µg/l	110%	1,16
U	3,26	0,33	µg/l	93%	-0,86
V			µg/l		
W	3,45	0,52	µg/l	98%	-0,23
X	3,59	0,26	µg/l	102%	0,23
Y	3,80	0,09	µg/l	108%	0,92
Z	3,5	0,4	µg/l	99%	-0,07
AA	3,36	0,51	µg/l	95%	-0,53
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,48 ± 0,14	3,48 ± 0,14	µg/l
Recov. ± CI(99%)	98,8 ± 4,1	98,8 ± 4,1	%
SD between labs	0,22	0,22	µg/l
RSD between labs	6,2	6,2	%
n for calculation	19	19	



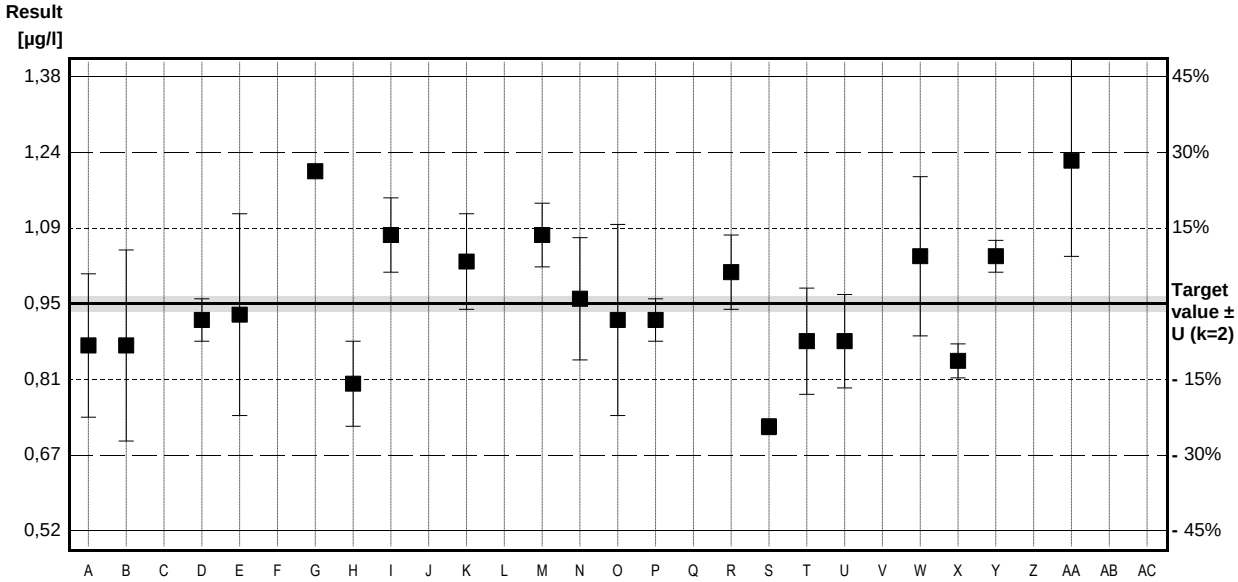


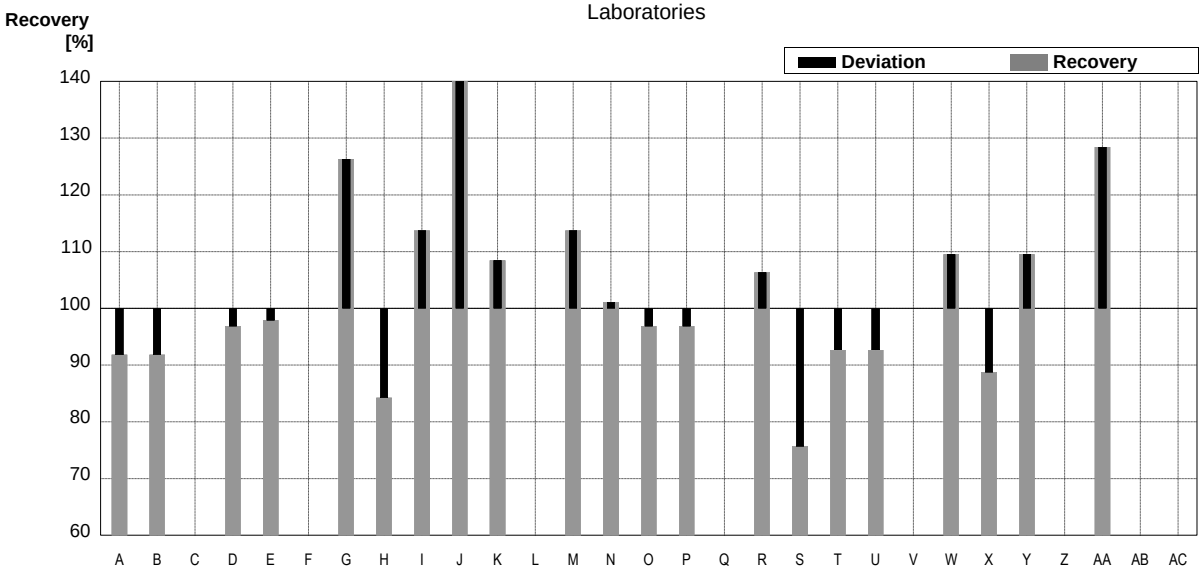
Sample M148A
Parameter Mercury

Target value ± U (k=2)	0,95 µg/l	±	0,01 µg/l
IFA result ± U (k=2)	0,99 µg/l	±	0,10 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,872	0,135	µg/l	92%	-0,75
B	0,872	0,18	µg/l	92%	-0,75
C			µg/l		
D	0,92	0,04	µg/l	97%	-0,29
E	0,93	0,19	µg/l	98%	-0,19
F			µg/l		
G	1,2		µg/l	126%	2,39
H	0,8	0,08	µg/l	84%	-1,44
I	1,08	0,07	µg/l	114%	1,24
J	2,0 *	0,4	µg/l	211%	10,05
K	1,03	0,09	µg/l	108%	0,77
L			µg/l		
M	1,08	0,06	µg/l	114%	1,24
N	0,96	0,1152	µg/l	101%	0,10
O	0,92	0,18	µg/l	97%	-0,29
P	0,92	0,04	µg/l	97%	-0,29
Q			µg/l		
R	1,01	0,07	µg/l	106%	0,57
S	0,719	0,015	µg/l	76%	-2,21
T	0,88	0,1	µg/l	93%	-0,67
U	0,88	0,088	µg/l	93%	-0,67
V			µg/l		
W	1,04	0,15	µg/l	109%	0,86
X	0,843	0,032	µg/l	89%	-1,02
Y	1,04	0,03	µg/l	109%	0,86
Z			µg/l		
AA	1,22	0,18	µg/l	128%	2,58
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,01 ± 0,16	0,96 ± 0,08	µg/l
Recov. ± CI(99%)	106,3 ± 16,9	101,1 ± 8,5	%
SD between labs	0,26	0,13	µg/l
RSD between labs	25,6	13,2	%
n for calculation	21	20	



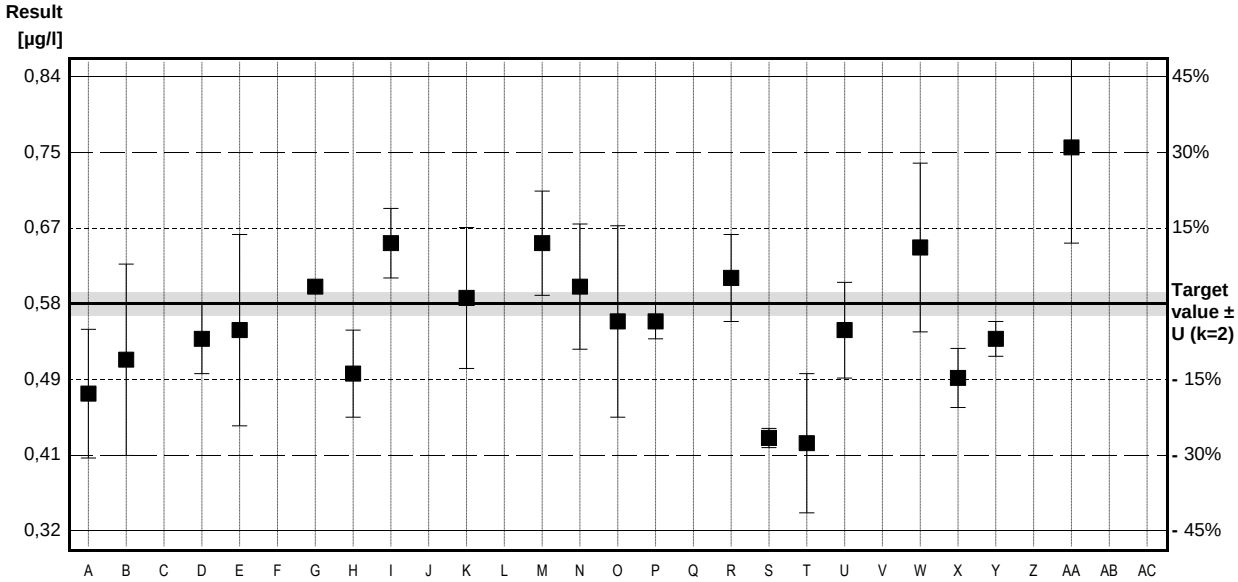


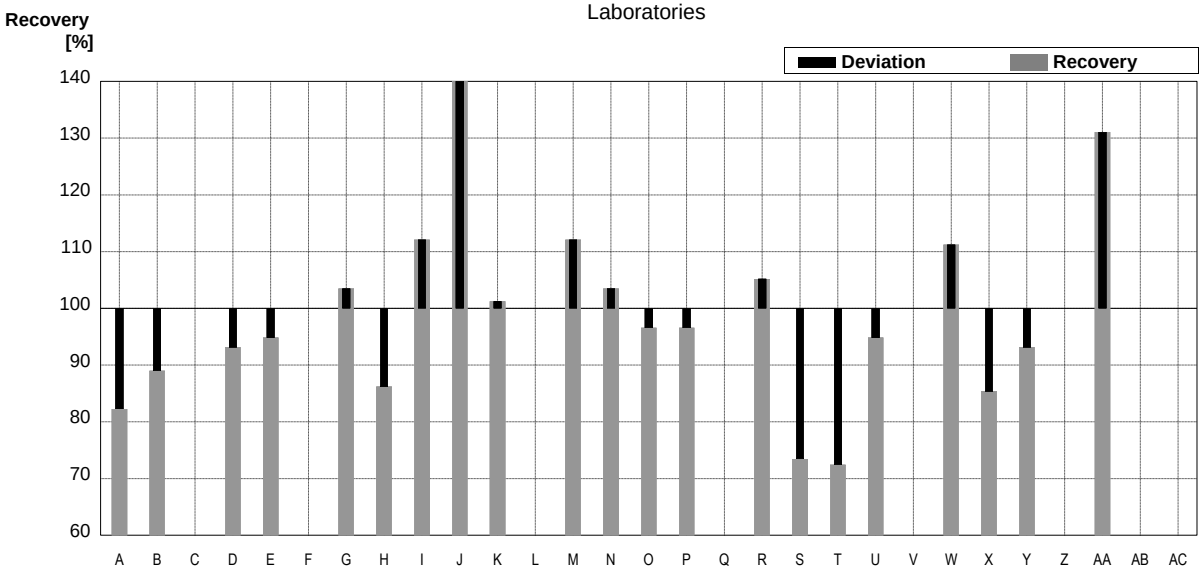
Sample M148B
Parameter Mercury

Target value	± U (k=2)	0,58 µg/l	±	0,01 µg/l	
IFA result	± U (k=2)	0,58 µg/l	±	0,06 µg/l	
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,477	0,074	µg/l	82%	-1,61
B	0,516	0,11	µg/l	89%	-1,00
C			µg/l		
D	0,54	0,04	µg/l	93%	-0,63
E	0,55	0,11	µg/l	95%	-0,47
F			µg/l		
G	0,6		µg/l	103%	0,31
H	0,5	0,05	µg/l	86%	-1,25
I	0,65	0,04	µg/l	112%	1,10
J	1,1 *	0,2	µg/l	190%	8,15
K	0,587	0,081	µg/l	101%	0,11
L			µg/l		
M	0,65	0,06	µg/l	112%	1,10
N	0,6	0,072	µg/l	103%	0,31
O	0,56	0,11	µg/l	97%	-0,31
P	0,56	0,02	µg/l	97%	-0,31
Q			µg/l		
R	0,61	0,05	µg/l	105%	0,47
S	0,426	0,011	µg/l	73%	-2,41
T	0,42	0,08	µg/l	72%	-2,51
U	0,55	0,055	µg/l	95%	-0,47
V			µg/l		
W	0,645	0,097	µg/l	111%	1,02
X	0,495	0,034	µg/l	85%	-1,33
Y	0,54	0,02	µg/l	93%	-0,63
Z			µg/l		
AA	0,76	0,11	µg/l	131%	2,82
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,59 ± 0,09	0,56 ± 0,05	µg/l
Recov. ± CI(99%)	101,3 ± 15,2	96,9 ± 8,9	%
SD between labs	0,14	0,08	µg/l
RSD between labs	24,1	14,4	%
n for calculation	21	20	



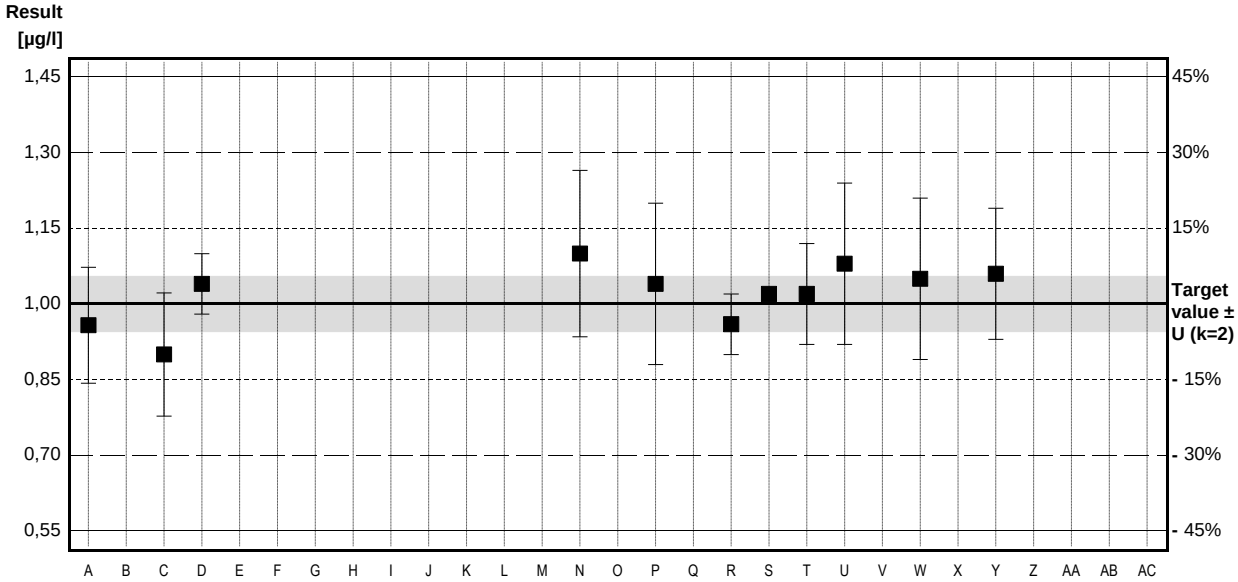


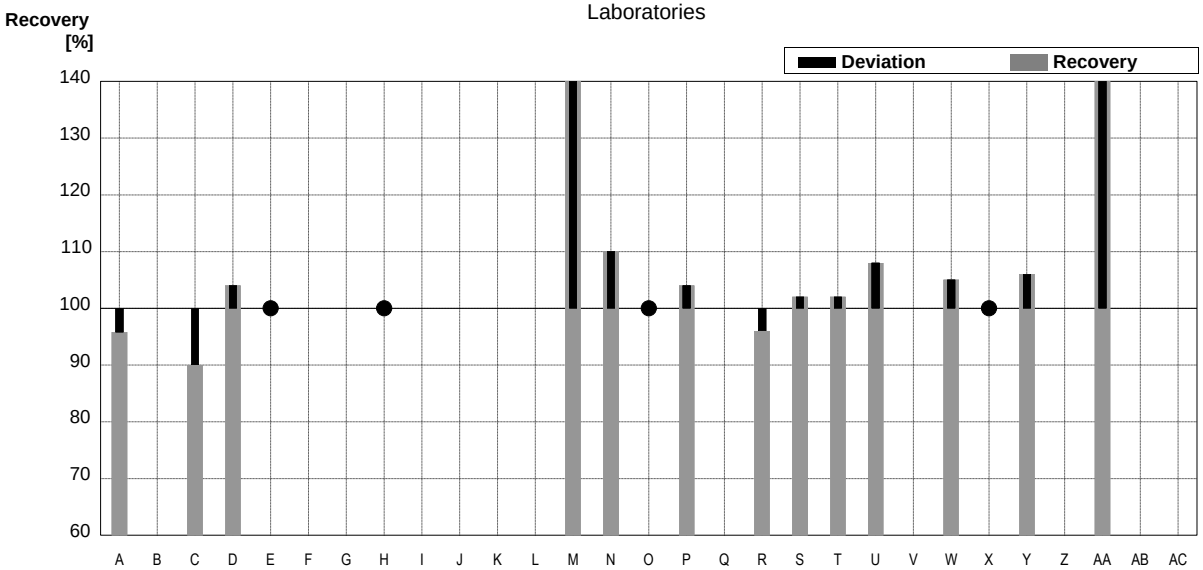
Sample M148A
Parameter Selenium

Target value ± U (k=2)	1,00 µg/l	±	0,05 µg/l
IFA result ± U (k=2)	0,93 µg/l	±	0,13 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,958	0,115	µg/l	96%	-0,35
B			µg/l		
C	0,90	0,122	µg/l	90%	-0,83
D	1,04	0,06	µg/l	104%	0,33
E	<2	0,3	µg/l	•	
F			µg/l		
G			µg/l		
H	<2		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	2,0 *	0,24	µg/l	200%	8,33
N	1,1	0,165	µg/l	110%	0,83
O	<2		µg/l	•	
P	1,04	0,16	µg/l	104%	0,33
Q			µg/l		
R	0,96	0,06	µg/l	96%	-0,33
S	1,02	0,010	µg/l	102%	0,17
T	1,02	0,1	µg/l	102%	0,17
U	1,08	0,16	µg/l	108%	0,67
V			µg/l		
W	1,05	0,16	µg/l	105%	0,42
X	<1,00		µg/l	•	
Y	1,06	0,13	µg/l	106%	0,50
Z			µg/l		
AA	1,49 *	0,22	µg/l	149%	4,08
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,13 ± 0,25	1,02 ± 0,06	µg/l
Recov. ± CI(99%)	113,2 ± 25,1	102,1 ± 5,7	%
SD between labs	0,30	0,06	µg/l
RSD between labs	26,2	5,8	%
n for calculation	13	11	



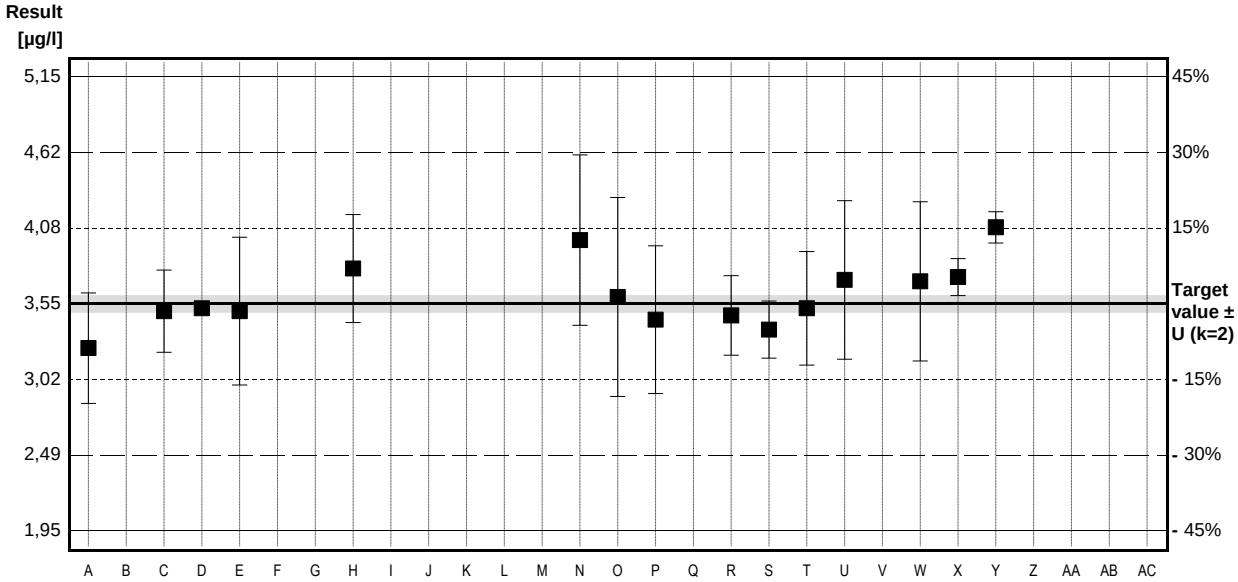


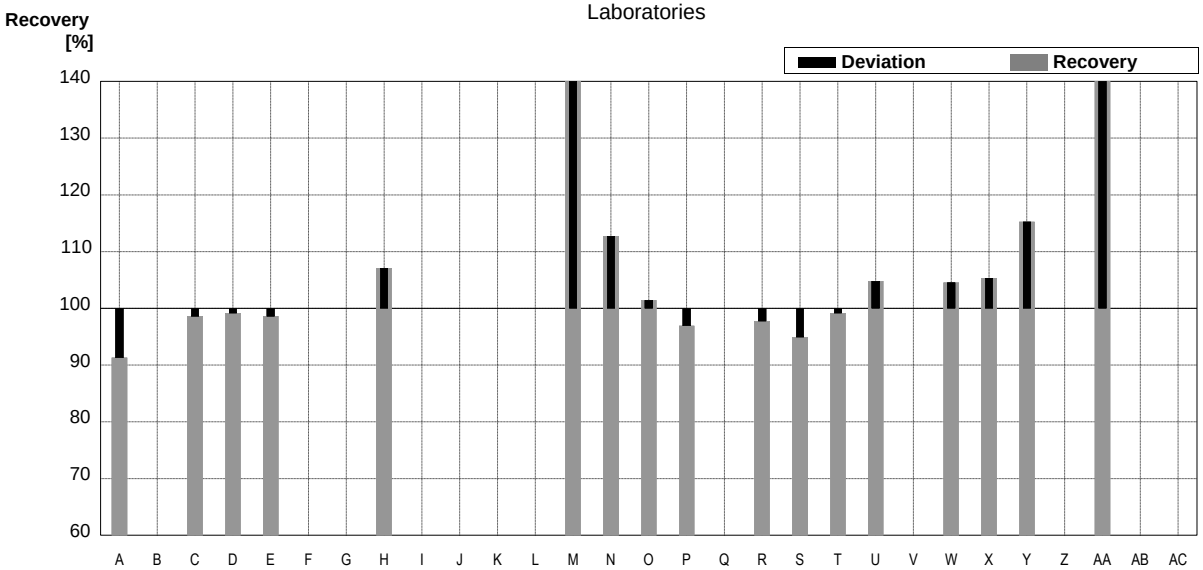
Sample M148B
Parameter Selenium

Target value ± U (k=2)	3,55	µg/l	±	0,06	µg/l
IFA result ± U (k=2)	3,10	µg/l	±	0,43	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,240	0,389	µg/l	91%	-0,73
B			µg/l		
C	3,50	0,289	µg/l	99%	-0,12
D	3,52	0,01	µg/l	99%	-0,07
E	3,5	0,52	µg/l	99%	-0,12
F			µg/l		
G			µg/l		
H	3,8	0,38	µg/l	107%	0,59
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	5,2 *	0,12	µg/l	146%	3,87
N	4	0,6	µg/l	113%	1,06
O	3,6	0,7	µg/l	101%	0,12
P	3,44	0,52	µg/l	97%	-0,26
Q			µg/l		
R	3,47	0,28	µg/l	98%	-0,19
S	3,37	0,201	µg/l	95%	-0,42
T	3,52	0,4	µg/l	99%	-0,07
U	3,72	0,558	µg/l	105%	0,40
V			µg/l		
W	3,71	0,56	µg/l	105%	0,38
X	3,74	0,13	µg/l	105%	0,45
Y	4,09	0,11	µg/l	115%	1,27
Z			µg/l		
AA	5,43 *	0,82	µg/l	153%	4,41
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,81 ± 0,43	3,61 ± 0,18	µg/l
Recov. ± CI(99%)	107,5 ± 12,1	101,8 ± 5,0	%
SD between labs	0,61	0,23	µg/l
RSD between labs	15,9	6,4	%
n for calculation	17	15	



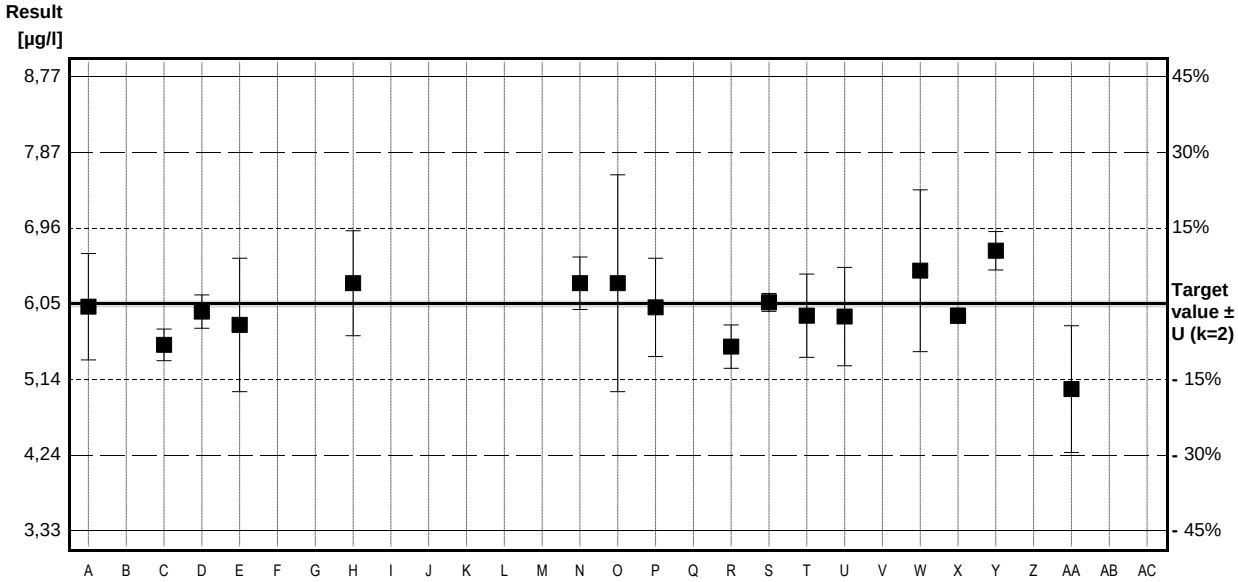


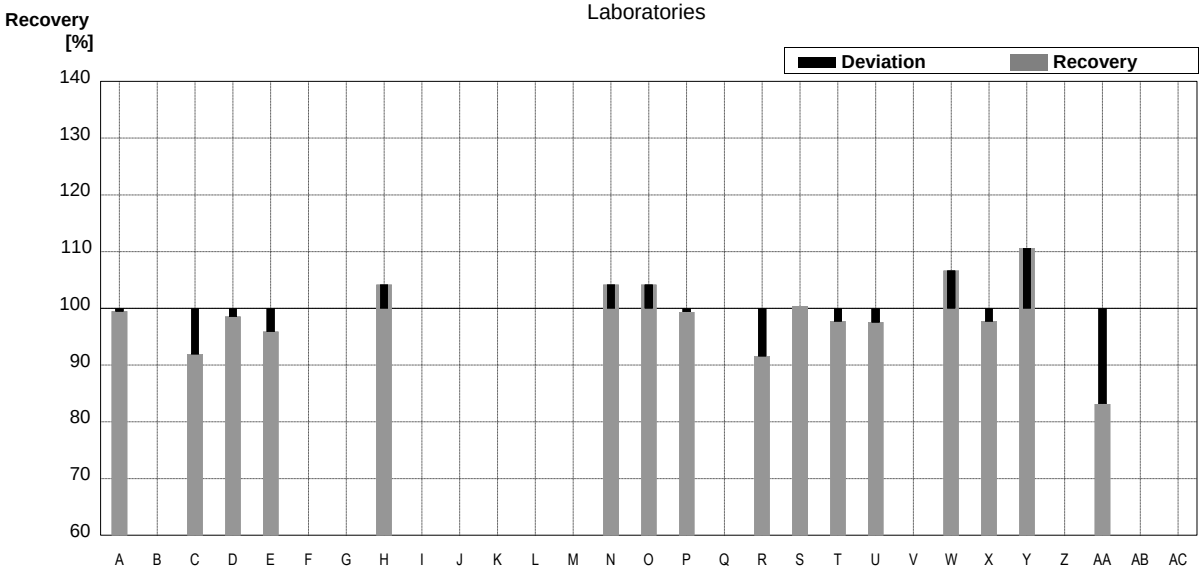
Sample M148A
Parameter Uranium

Target value ± U (k=2)	6,05	µg/l	±	0,04	µg/l
IFA result ± U (k=2)	5,71	µg/l	±	0,57	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	6,018	0,638	µg/l	99%	-0,09
B			µg/l		
C	5,56	0,190	µg/l	92%	-1,37
D	5,96	0,2	µg/l	99%	-0,25
E	5,8	0,8	µg/l	96%	-0,70
F			µg/l		
G			µg/l		
H	6,3	0,63	µg/l	104%	0,70
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M			µg/l		
N	6,3	0,315	µg/l	104%	0,70
O	6,3	1,3	µg/l	104%	0,70
P	6,01	0,59	µg/l	99%	-0,11
Q			µg/l		
R	5,54	0,26	µg/l	92%	-1,43
S	6,07	0,107	µg/l	100%	0,06
T	5,91	0,5	µg/l	98%	-0,39
U	5,9	0,59	µg/l	98%	-0,42
V			µg/l		
W	6,45	0,97	µg/l	107%	1,12
X	5,91	0,09	µg/l	98%	-0,39
Y	6,69	0,23	µg/l	111%	1,79
Z			µg/l		
AA	5,03	0,76	µg/l	83%	-2,86
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	5,98 ± 0,29	5,98 ± 0,29	µg/l
Recov. ± CI(99%)	98,9 ± 4,8	98,9 ± 4,8	%
SD between labs	0,40	0,40	µg/l
RSD between labs	6,6	6,6	%
n for calculation	16	16	



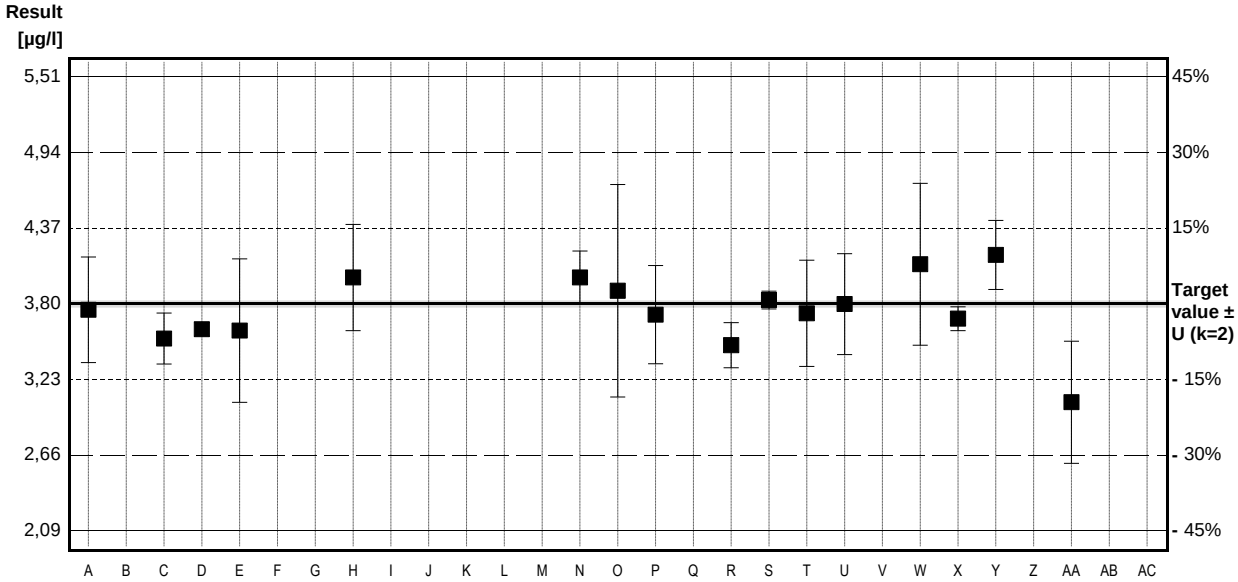


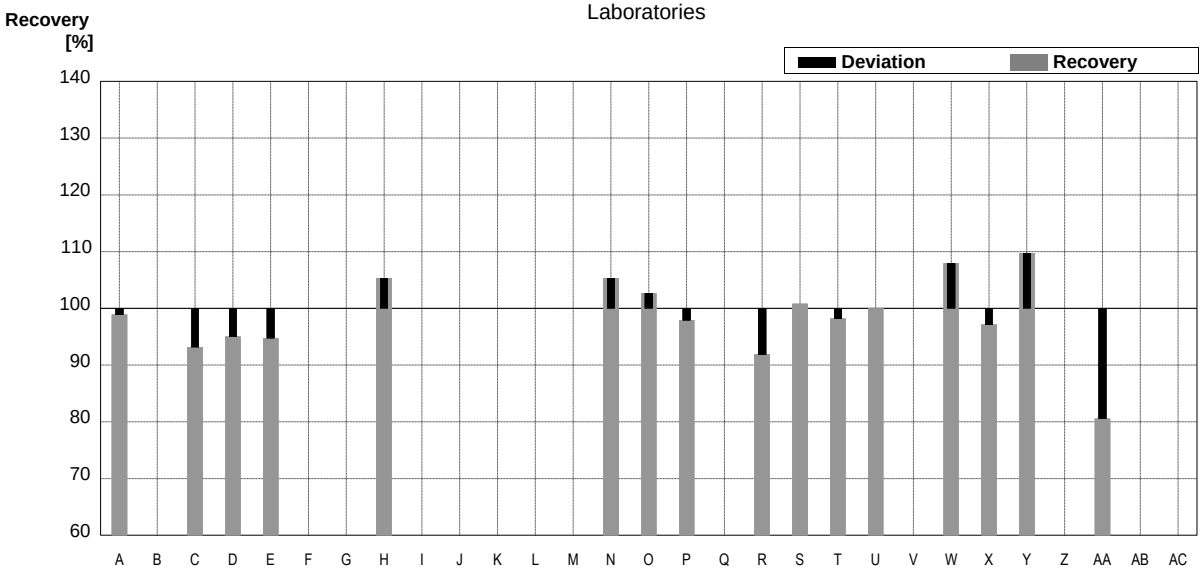
Sample M148B
Parameter Uranium

Target value ± U (k=2)	3,80	µg/l	±	0,02	µg/l
IFA result ± U (k=2)	3,46	µg/l	±	0,35	µg/l
Stability test		µg/l			

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,757	0,398	µg/l	99%	-0,19
B			µg/l		
C	3,54	0,192	µg/l	93%	-1,16
D	3,61	0,05	µg/l	95%	-0,85
E	3,6	0,54	µg/l	95%	-0,89
F			µg/l		
G			µg/l		
H	4,0	0,40	µg/l	105%	0,89
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M			µg/l		
N	4	0,2	µg/l	105%	0,89
O	3,9	0,8	µg/l	103%	0,45
P	3,72	0,37	µg/l	98%	-0,36
Q			µg/l		
R	3,49	0,17	µg/l	92%	-1,38
S	3,83	0,067	µg/l	101%	0,13
T	3,73	0,4	µg/l	98%	-0,31
U	3,8	0,38	µg/l	100%	0,00
V			µg/l		
W	4,10	0,61	µg/l	108%	1,34
X	3,69	0,09	µg/l	97%	-0,49
Y	4,17	0,26	µg/l	110%	1,65
Z			µg/l		
AA	3,06	0,46	µg/l	81%	-3,30
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,75 ± 0,20	3,75 ± 0,20	µg/l
Recov. ± CI(99%)	98,7 ± 5,2	98,7 ± 5,2	%
SD between labs	0,27	0,27	µg/l
RSD between labs	7,2	7,2	%
n for calculation	16	16	





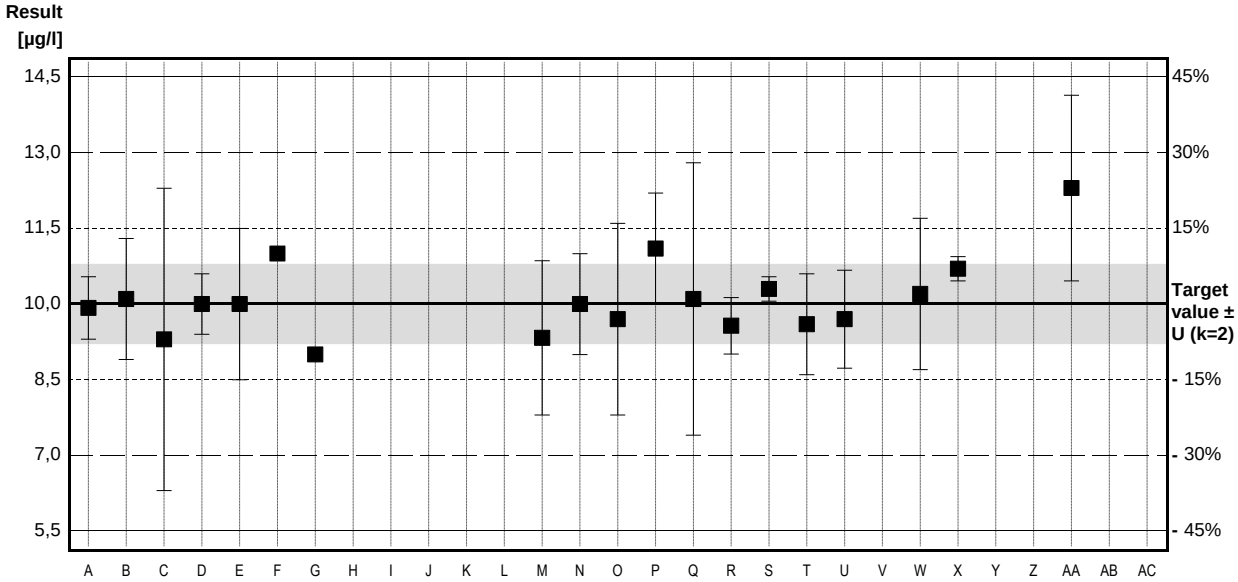
Sample M148A

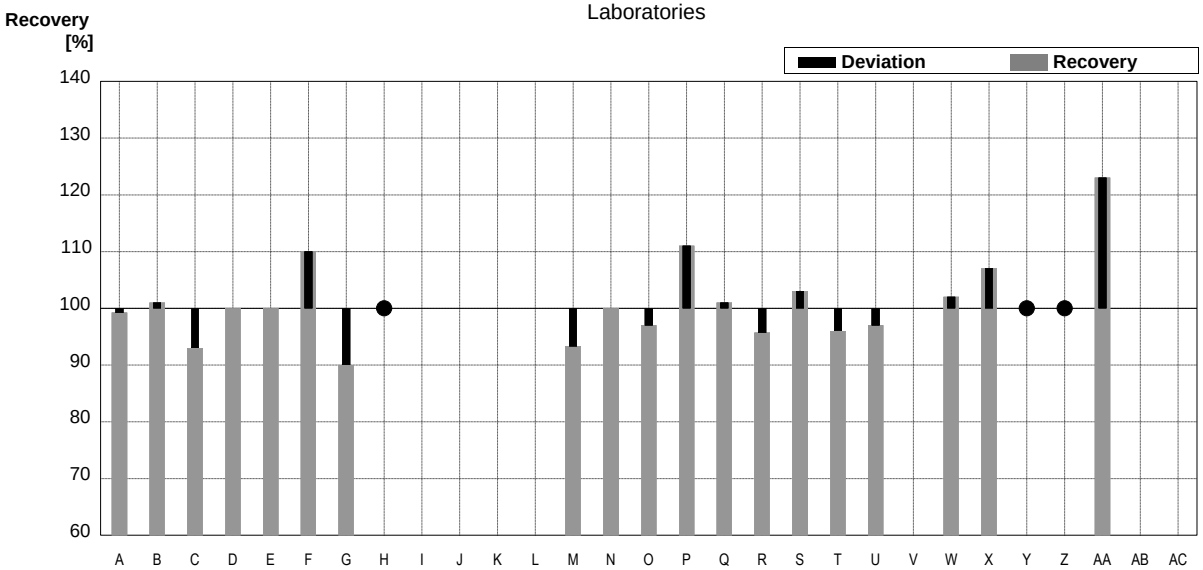
Parameter Zinc

Target value ± U (k=2)	10,0 µg/l	±	0,8 µg/l
IFA result ± U (k=2)	10,9 µg/l	±	2,2 µg/l
Stability test	µg/l		

Lab Code	Result	±	Unit	Recovery	z-Score
A	9,923	0,619	µg/l	99%	-0,09
B	10,1	1,2	µg/l	101%	0,11
C	9,30	2,996	µg/l	93%	-0,78
D	10	0,6	µg/l	100%	0,00
E	10	1,5	µg/l	100%	0,00
F	11		µg/l	110%	1,11
G	9		µg/l	90%	-1,11
H	<15		µg/l	•	
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	9,33	1,53	µg/l	93%	-0,74
N	10	1	µg/l	100%	0,00
O	9,7	1,9	µg/l	97%	-0,33
P	11,1	1,1	µg/l	111%	1,22
Q	10,1	2,7	µg/l	101%	0,11
R	9,57	0,56	µg/l	96%	-0,48
S	10,3	0,242	µg/l	103%	0,33
T	9,6	1	µg/l	96%	-0,44
U	9,7	0,97	µg/l	97%	-0,33
V			µg/l		
W	10,2	1,5	µg/l	102%	0,22
X	10,7	0,24	µg/l	107%	0,78
Y	<10		µg/l	•	
Z	<10		µg/l	•	
AA	12,3 *	1,84	µg/l	123%	2,56
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	10,1 ± 0,5	10,0 ± 0,4	µg/l
Recov. ± CI(99%)	101,0 ± 5,0	99,8 ± 3,8	%
SD between labs	0,8	0,6	µg/l
RSD between labs	7,5	5,6	%
n for calculation	19	18	



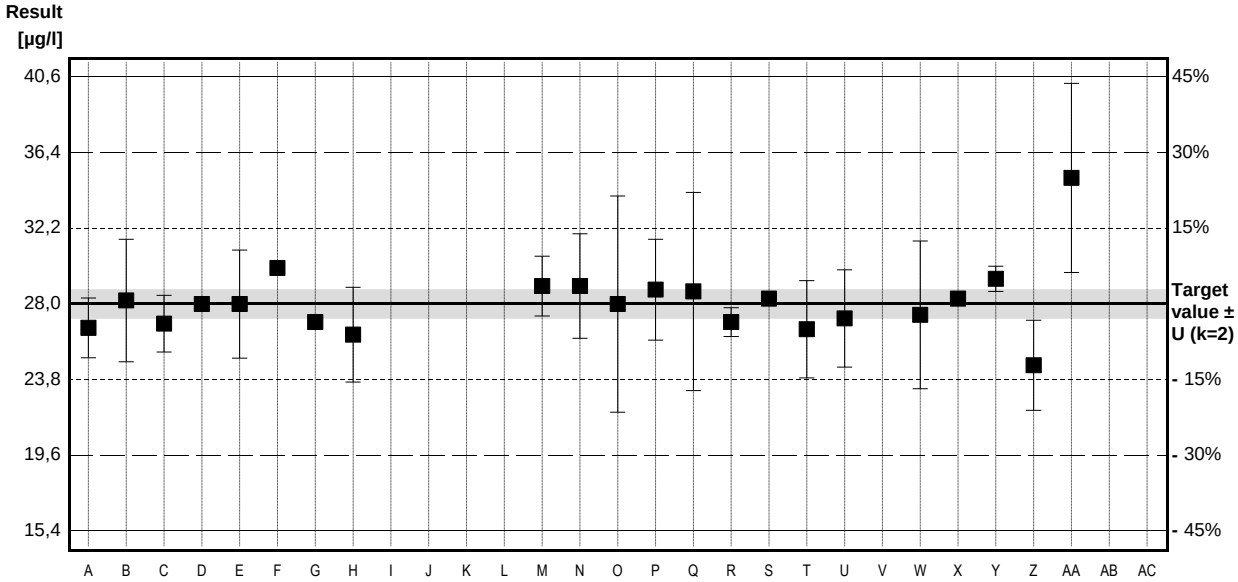


Sample M148B
Parameter Zinc

Target value ± U (k=2)	28,0 µg/l	±	0,8 µg/l		
IFA result ± U (k=2)	27,3 µg/l	±	5,5 µg/l		
Stability test	µg/l				

Lab Code	Result	±	Unit	Recovery	z-Score
A	26,68	1,66	µg/l	95%	-0,52
B	28,2	3,4	µg/l	101%	0,08
C	26,91	1,574	µg/l	96%	-0,43
D	28	0,3	µg/l	100%	0,00
E	28	3	µg/l	100%	0,00
F	30		µg/l	107%	0,79
G	27		µg/l	96%	-0,40
H	26,3	2,63	µg/l	94%	-0,67
I			µg/l		
J			µg/l		
K			µg/l		
L			µg/l		
M	29,0	1,66	µg/l	104%	0,40
N	29	2,9	µg/l	104%	0,40
O	28	6	µg/l	100%	0,00
P	28,8	2,8	µg/l	103%	0,32
Q	28,7	5,5	µg/l	103%	0,28
R	27,0	0,8	µg/l	96%	-0,40
S	28,3	0,153	µg/l	101%	0,12
T	26,6	2,7	µg/l	95%	-0,56
U	27,2	2,7	µg/l	97%	-0,32
V			µg/l		
W	27,4	4,1	µg/l	98%	-0,24
X	28,3	0,25	µg/l	101%	0,12
Y	29,4	0,7	µg/l	105%	0,56
Z	24,6	2,5	µg/l	88%	-1,35
AA	35,0 *	5,25	µg/l	125%	2,78
AB			µg/l		
AC			µg/l		

	All results	Outliers excl.	Unit
Mean ± CI(99%)	28,1 ± 1,2	27,8 ± 0,8	µg/l
Recov. ± CI(99%)	100,4 ± 4,2	99,2 ± 2,7	%
SD between labs	2,0	1,2	µg/l
RSD between labs	7,0	4,5	%
n for calculation	22	21	



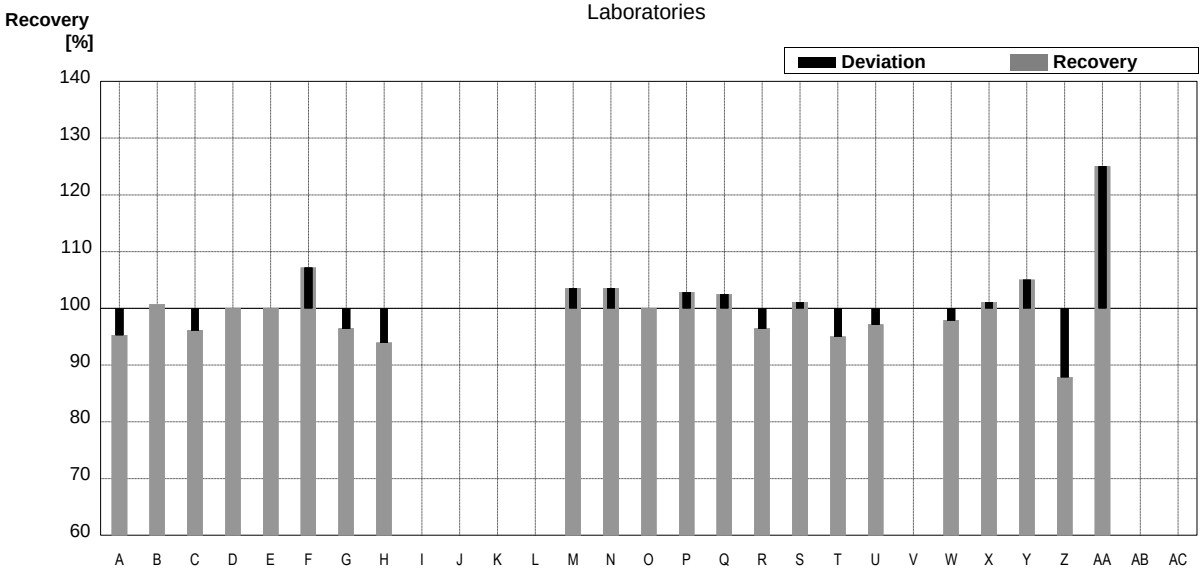


Illustration of Results
Laboratory Oriented Part

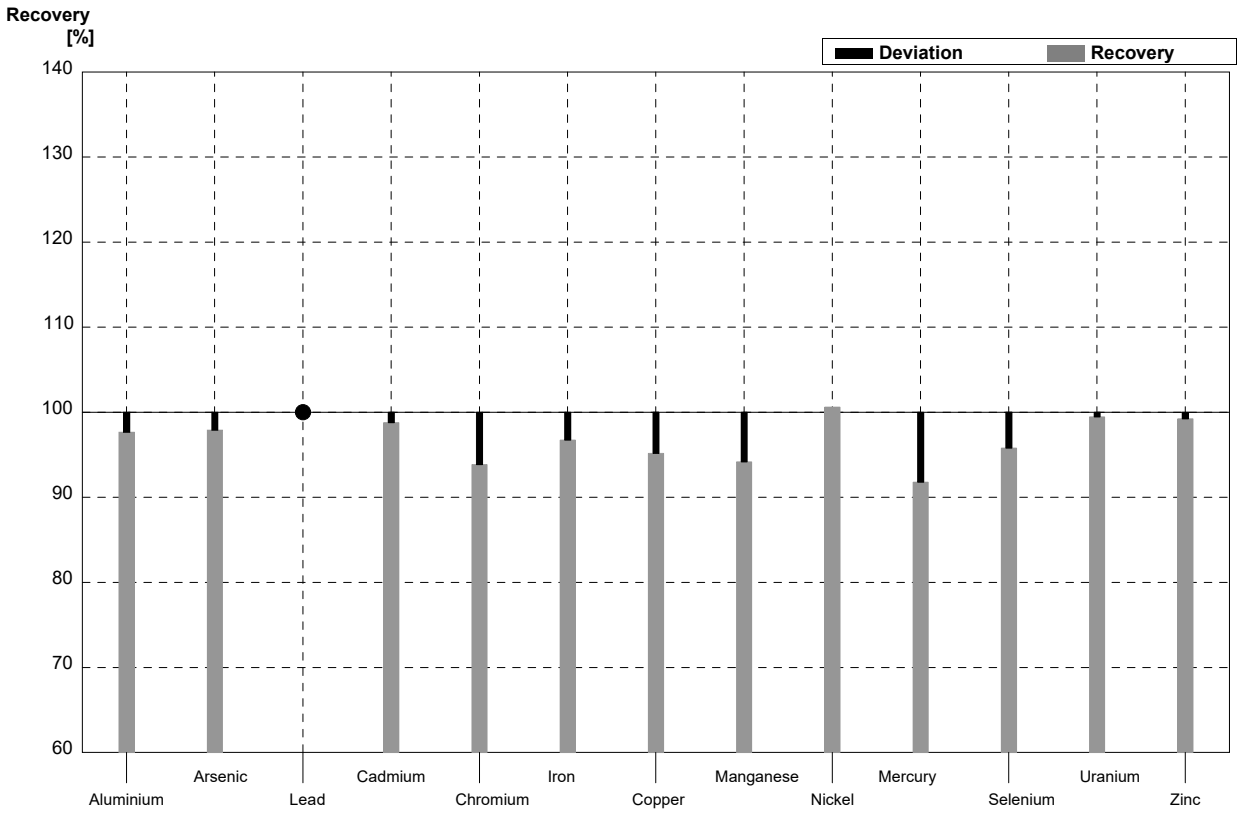
Round M148
Metals

Sample Dispatch: 2 September 2019

TULLN

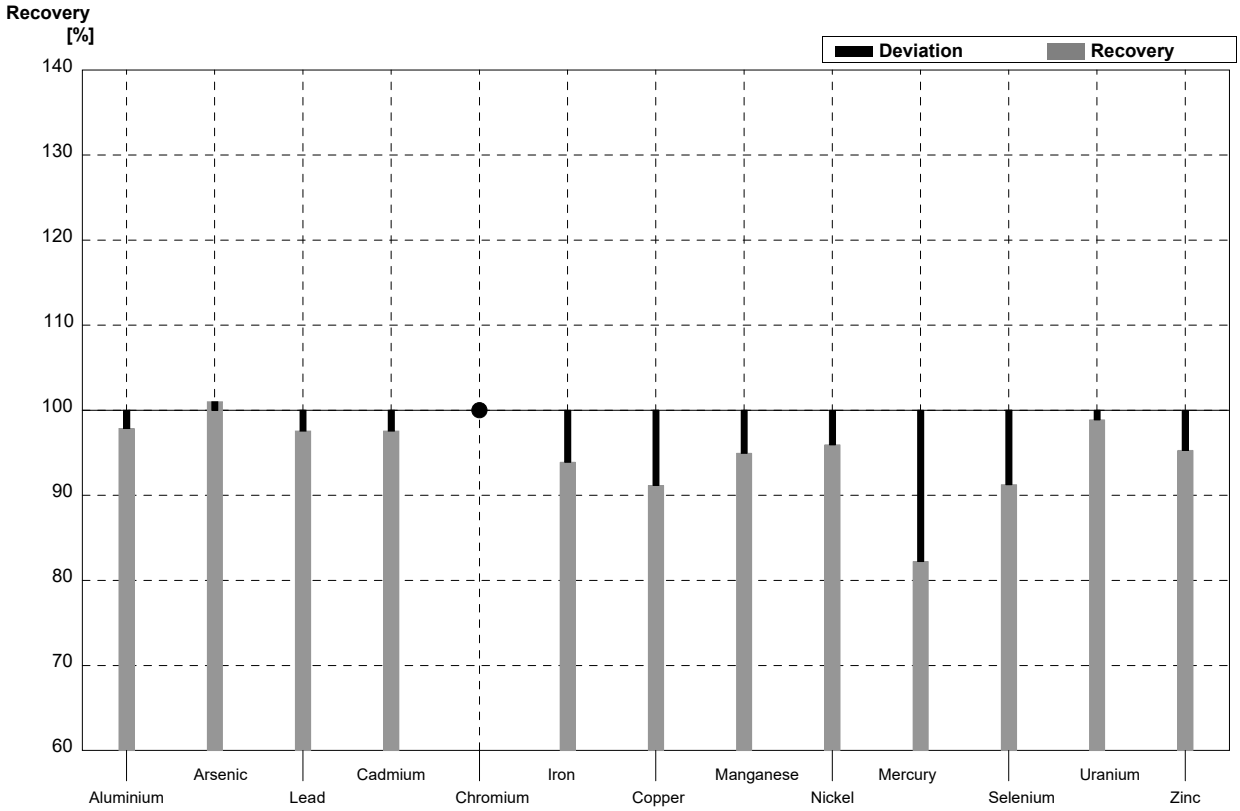
Sample M148A
Laboratory A

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	29,30	3,25	µg/l	98%
Arsenic	4,20	0,03	4,112	0,231	µg/l	98%
Lead	0,79	0,01	<1,0		µg/l	•
Cadmium	0,249	0,003	0,246	0,011	µg/l	99%
Chromium	4,04	0,03	3,792	0,535	µg/l	94%
Iron	71,4	0,3	69,07	7,67	µg/l	97%
Copper	1,70	0,02	1,618	0,088	µg/l	95%
Manganese	38,1	0,2	35,88	1,96	µg/l	94%
Nickel	1,30	0,02	1,308	0,100	µg/l	101%
Mercury	0,95	0,01	0,872	0,135	µg/l	92%
Selenium	1,00	0,05	0,958	0,115	µg/l	96%
Uranium	6,05	0,04	6,018	0,638	µg/l	99%
Zinc	10,0	0,8	9,923	0,619	µg/l	99%



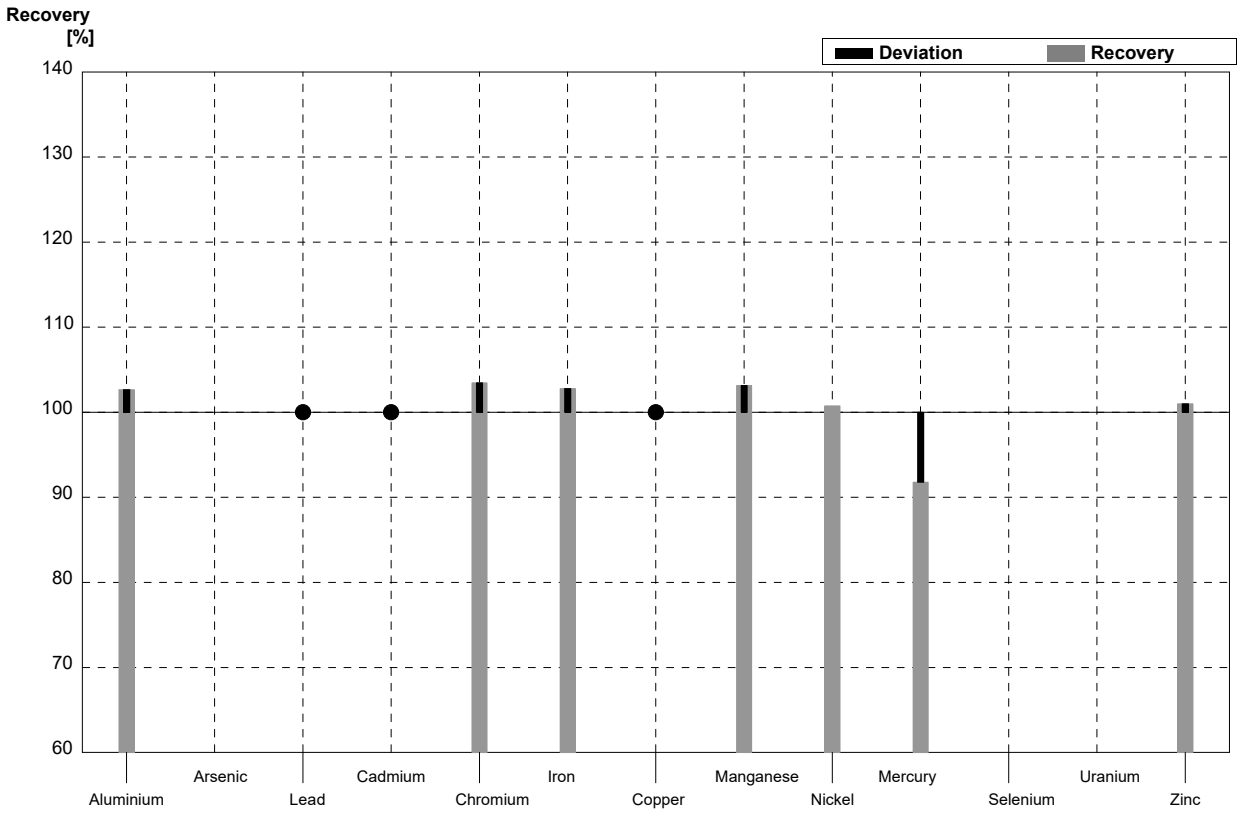
Sample M148B
Laboratory A

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	14,68	1,63	µg/l	98%
Arsenic	1,10	0,01	1,111	0,0623	µg/l	101%
Lead	1,98	0,01	1,932	0,205	µg/l	98%
Cadmium	0,800	0,007	0,7805	0,036	µg/l	98%
Chromium	0,60	0,01	<1,0		µg/l	•
Iron	18,0	0,2	16,90	1,88	µg/l	94%
Copper	3,20	0,03	2,917	0,159	µg/l	91%
Manganese	2,12	0,03	2,013	0,110	µg/l	95%
Nickel	3,52	0,03	3,377	0,259	µg/l	96%
Mercury	0,58	0,01	0,477	0,074	µg/l	82%
Selenium	3,55	0,06	3,240	0,389	µg/l	91%
Uranium	3,80	0,02	3,757	0,398	µg/l	99%
Zinc	28,0	0,8	26,68	1,66	µg/l	95%



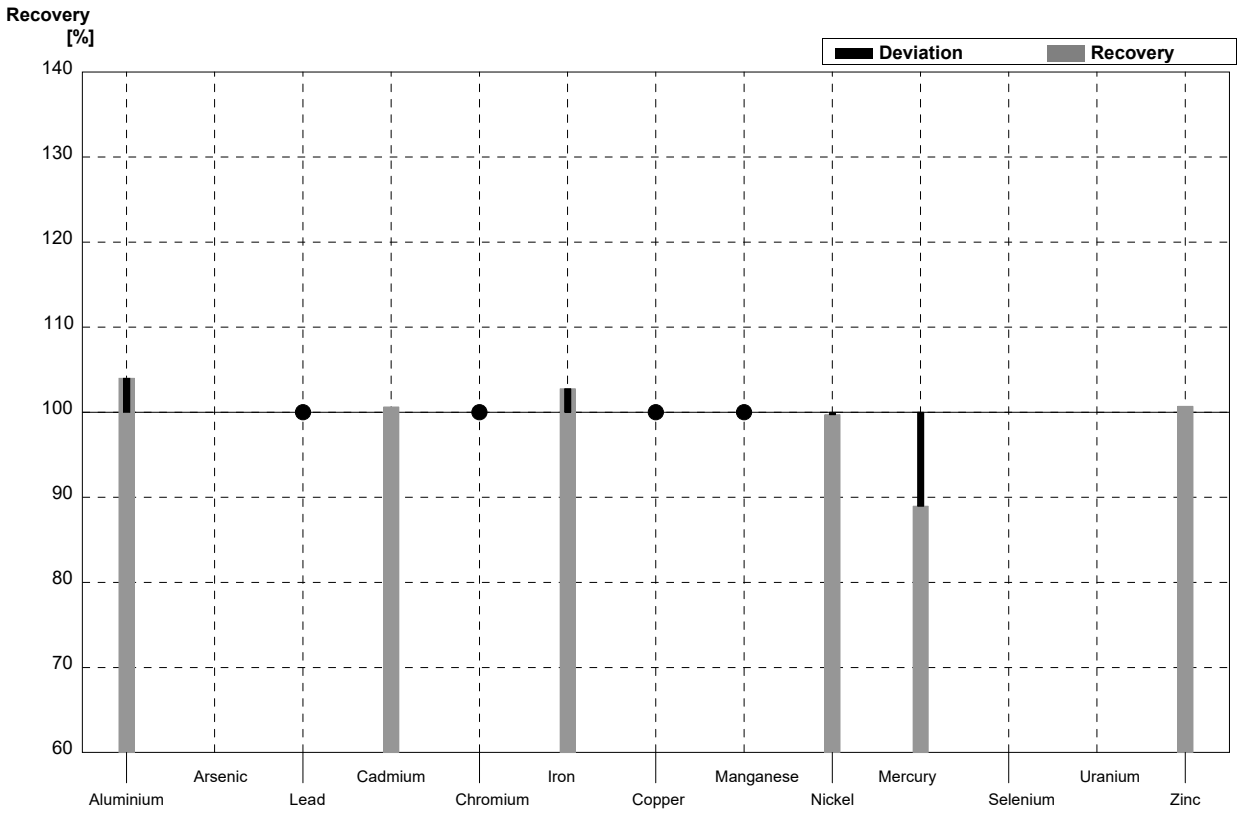
Sample M148A
Laboratory B

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	30,8	5,6	µg/l	103%
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01	<4,0		µg/l	•
Cadmium	0,249	0,003	<0,5		µg/l	•
Chromium	4,04	0,03	4,18	0,63	µg/l	103%
Iron	71,4	0,3	73,4	7,4	µg/l	103%
Copper	1,70	0,02	<5,0		µg/l	•
Manganese	38,1	0,2	39,3	4,0	µg/l	103%
Nickel	1,30	0,02	1,31	0,16	µg/l	101%
Mercury	0,95	0,01	0,872	0,18	µg/l	92%
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8	10,1	1,2	µg/l	101%



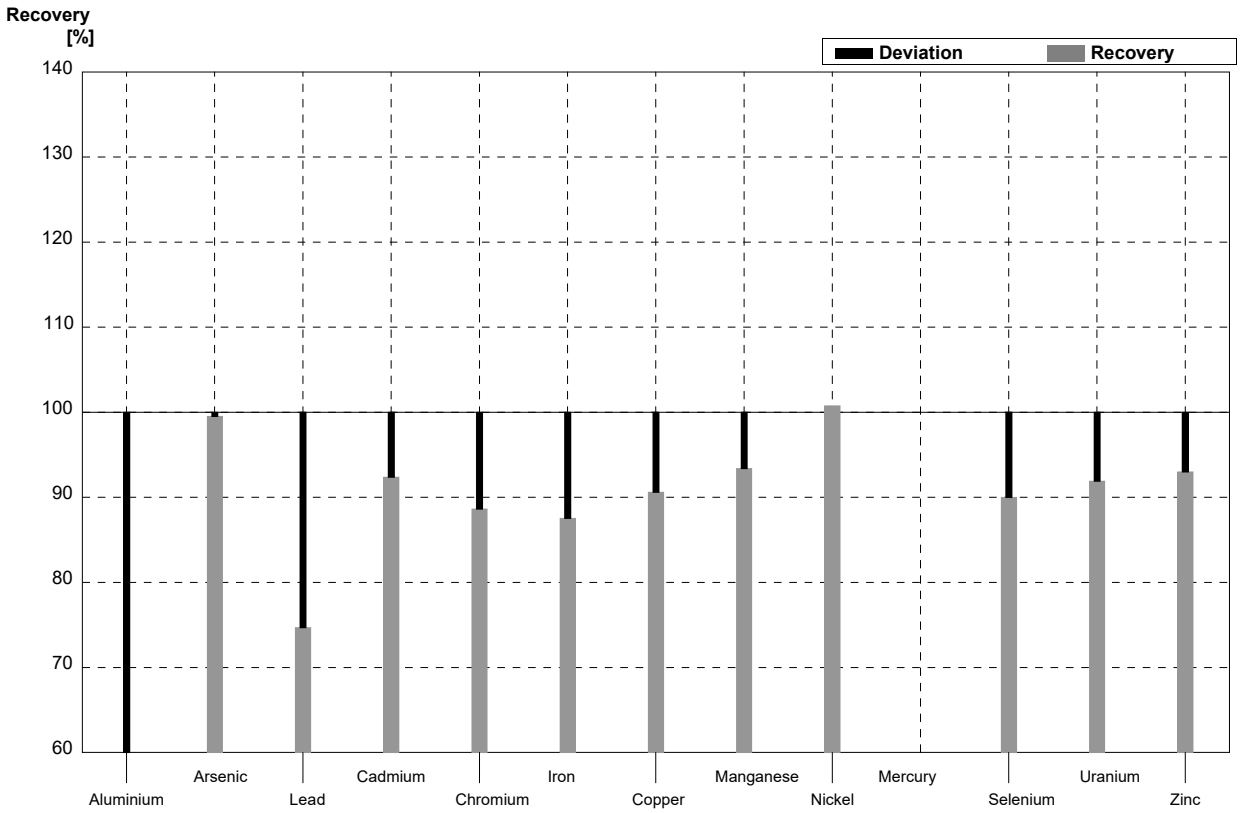
Sample M148B
Laboratory B

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,6	2,8	µg/l	104%
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01	<4,0		µg/l	•
Cadmium	0,800	0,007	0,805	0,12	µg/l	101%
Chromium	0,60	0,01	<1,0		µg/l	•
Iron	18,0	0,2	18,5	1,9	µg/l	103%
Copper	3,20	0,03	<5,0		µg/l	•
Manganese	2,12	0,03	<5,0		µg/l	•
Nickel	3,52	0,03	3,51	0,42	µg/l	100%
Mercury	0,58	0,01	0,516	0,11	µg/l	89%
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8	28,2	3,4	µg/l	101%



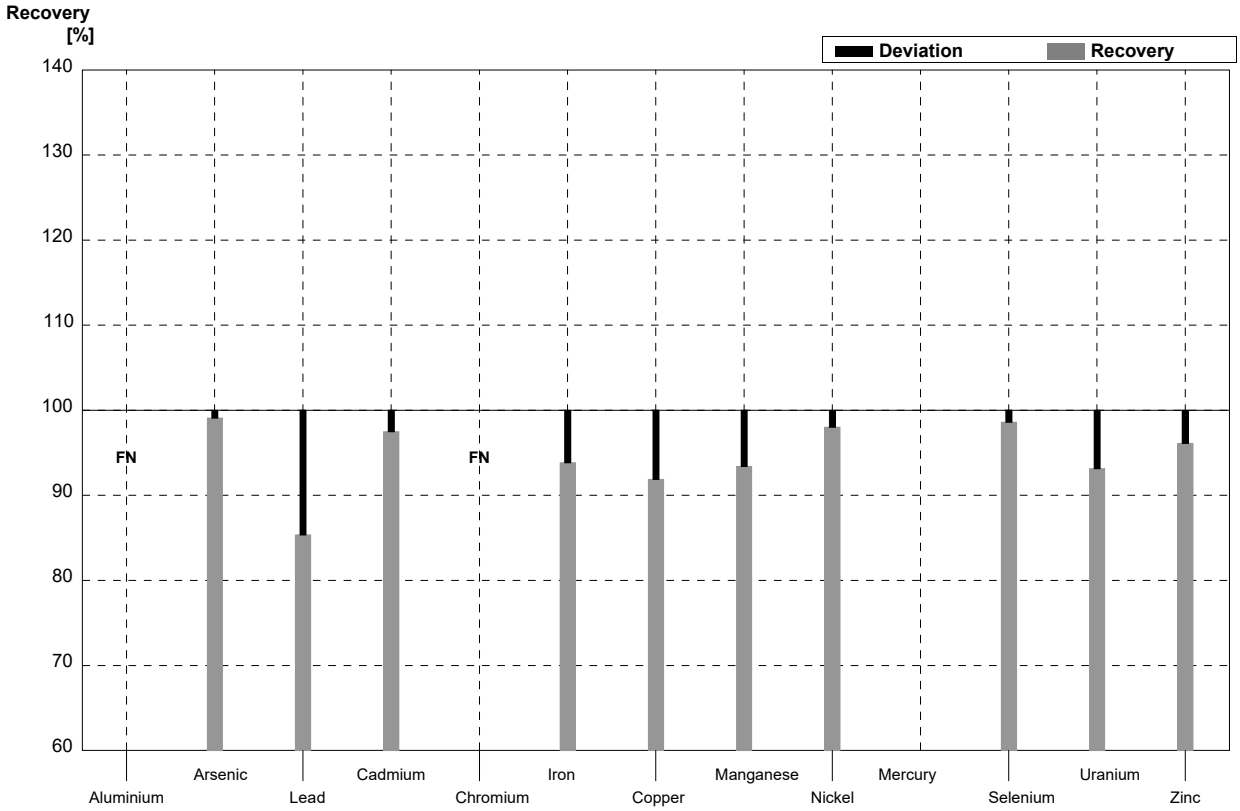
Sample M148A
Laboratory C

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	16,12	1,837	µg/l	54%
Arsenic	4,20	0,03	4,18	0,117	µg/l	100%
Lead	0,79	0,01	0,59	0,057	µg/l	75%
Cadmium	0,249	0,003	0,23	0,025	µg/l	92%
Chromium	4,04	0,03	3,58	0,133	µg/l	89%
Iron	71,4	0,3	62,5	0,546	µg/l	88%
Copper	1,70	0,02	1,54	0,039	µg/l	91%
Manganese	38,1	0,2	35,58	0,227	µg/l	93%
Nickel	1,30	0,02	1,31	0,159	µg/l	101%
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05	0,90	0,122	µg/l	90%
Uranium	6,05	0,04	5,56	0,190	µg/l	92%
Zinc	10,0	0,8	9,30	2,996	µg/l	93%



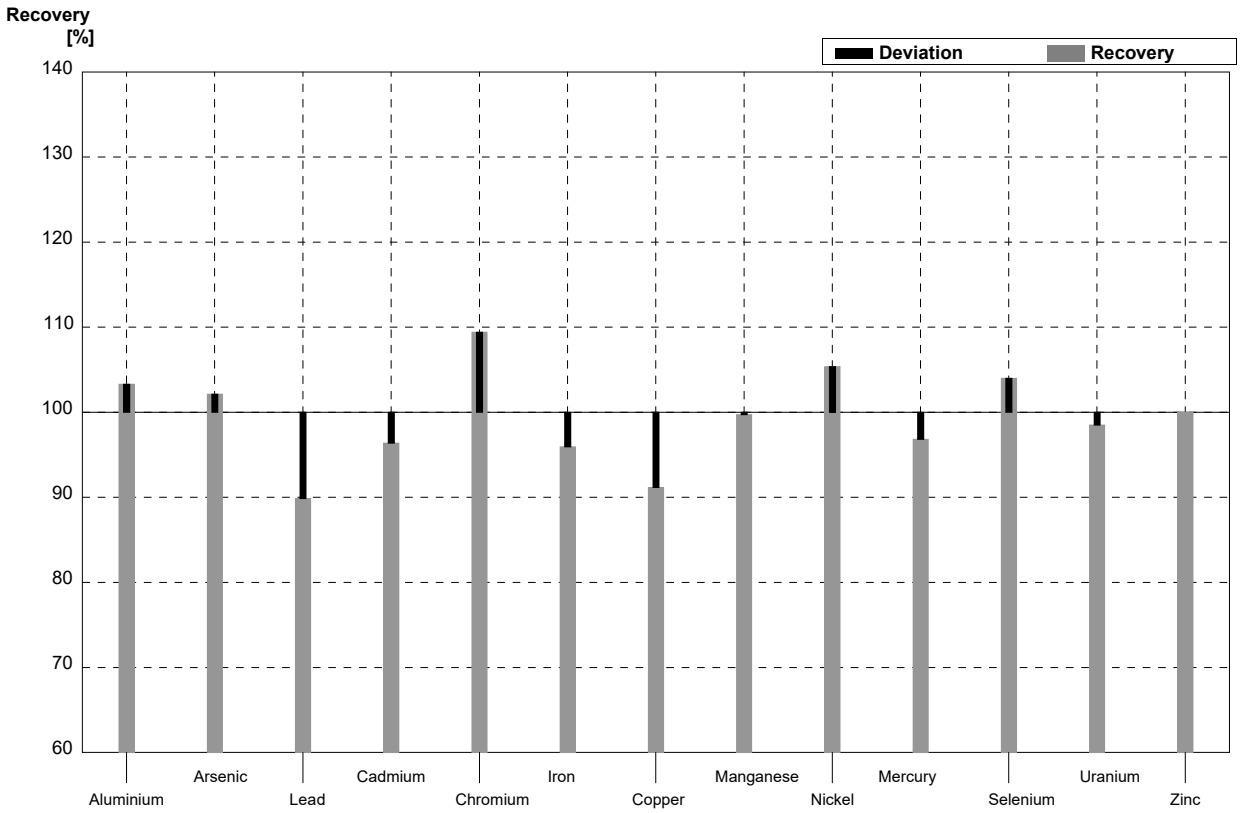
Sample M148B
Laboratory C

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	<5,00		µg/l	FN
Arsenic	1,10	0,01	1,09	0,039	µg/l	99%
Lead	1,98	0,01	1,69	0,108	µg/l	85%
Cadmium	0,800	0,007	0,78	0,033	µg/l	98%
Chromium	0,60	0,01	<0,50		µg/l	FN
Iron	18,0	0,2	16,89	1,143	µg/l	94%
Copper	3,20	0,03	2,94	0,070	µg/l	92%
Manganese	2,12	0,03	1,98	0,039	µg/l	93%
Nickel	3,52	0,03	3,45	0,098	µg/l	98%
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06	3,50	0,289	µg/l	99%
Uranium	3,80	0,02	3,54	0,192	µg/l	93%
Zinc	28,0	0,8	26,91	1,574	µg/l	96%



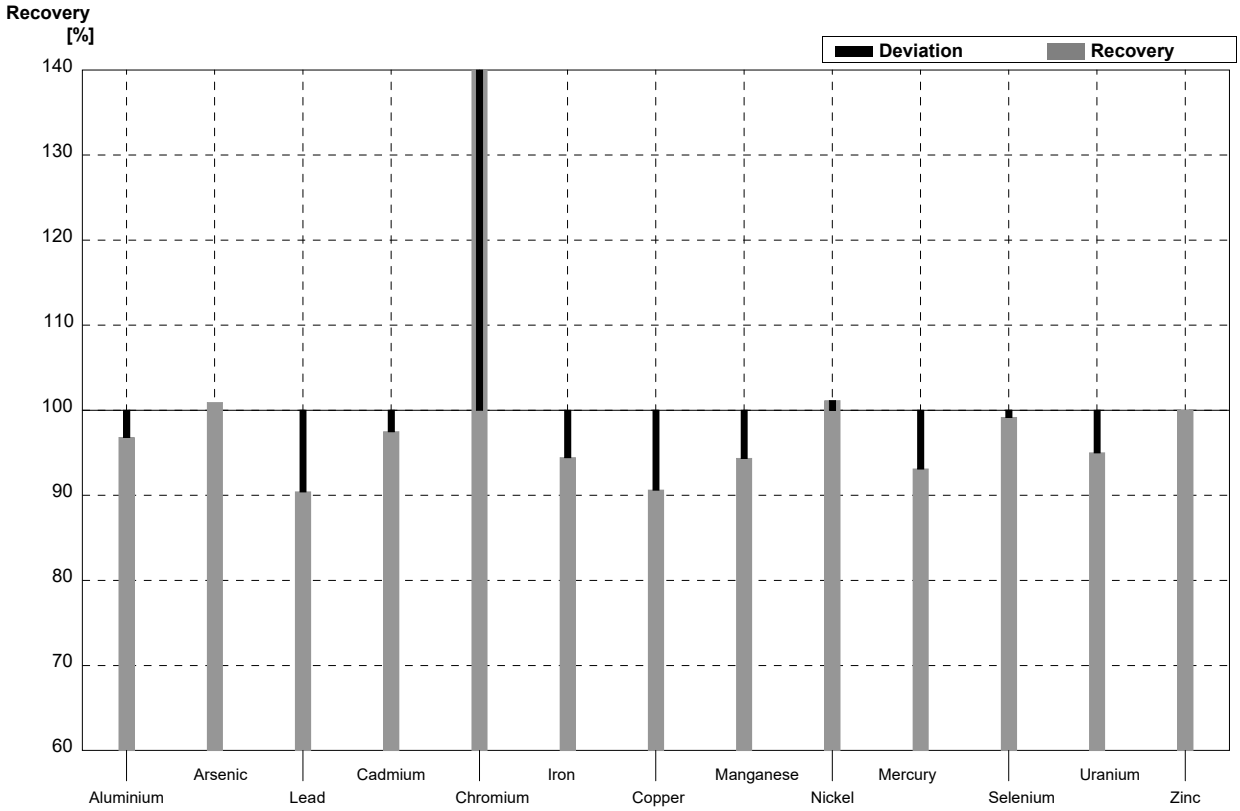
Sample M148A
Laboratory D

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	30,99	0,09	µg/l	103%
Arsenic	4,20	0,03	4,29	0,06	µg/l	102%
Lead	0,79	0,01	0,71	0,02	µg/l	90%
Cadmium	0,249	0,003	0,24	0,01	µg/l	96%
Chromium	4,04	0,03	4,42	0,05	µg/l	109%
Iron	71,4	0,3	68,5	0,4	µg/l	96%
Copper	1,70	0,02	1,55	0,01	µg/l	91%
Manganese	38,1	0,2	38	0,4	µg/l	100%
Nickel	1,30	0,02	1,37	0,03	µg/l	105%
Mercury	0,95	0,01	0,92	0,04	µg/l	97%
Selenium	1,00	0,05	1,04	0,06	µg/l	104%
Uranium	6,05	0,04	5,96	0,2	µg/l	99%
Zinc	10,0	0,8	10	0,6	µg/l	100%



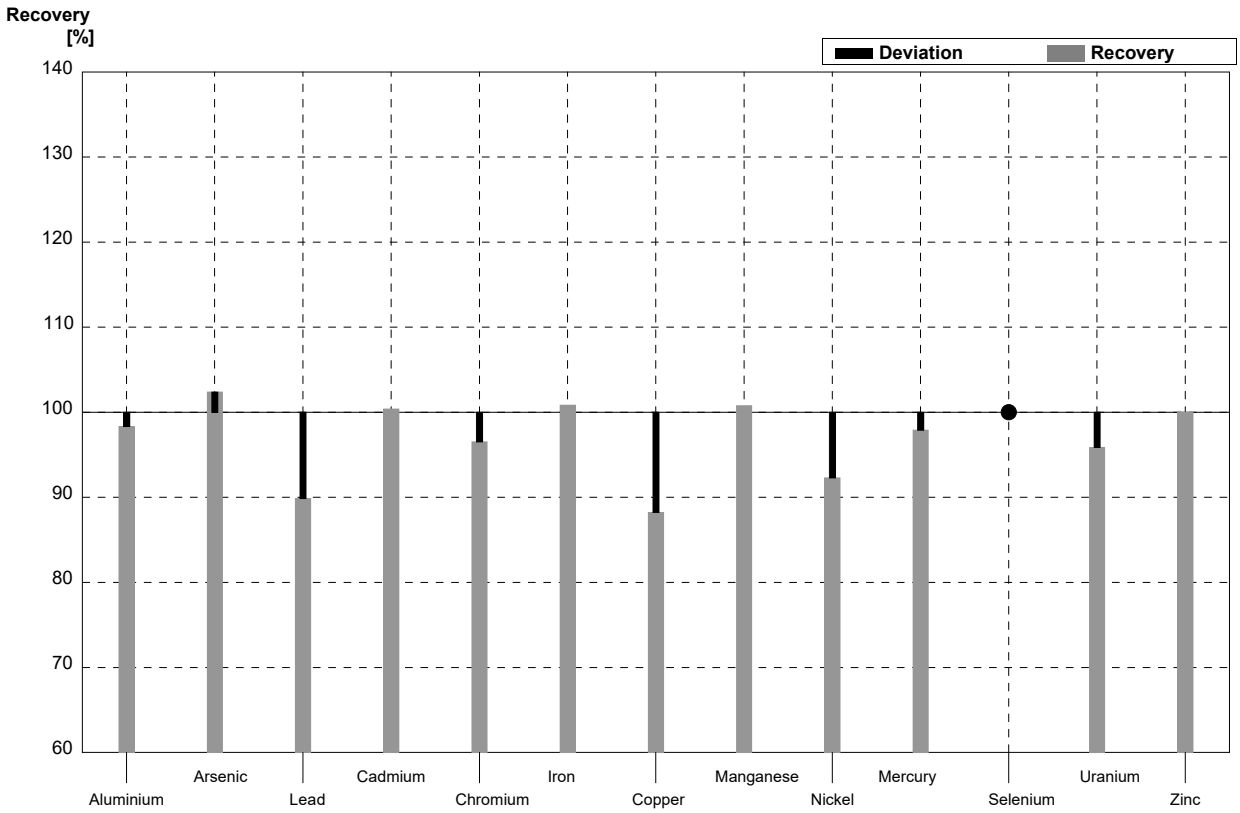
Sample M148B
Laboratory D

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	14,52	0,08	µg/l	97%
Arsenic	1,10	0,01	1,11	0,01	µg/l	101%
Lead	1,98	0,01	1,79	0,01	µg/l	90%
Cadmium	0,800	0,007	0,78	0,01	µg/l	98%
Chromium	0,60	0,01	0,92	0,02	µg/l	153%
Iron	18,0	0,2	17	0,2	µg/l	94%
Copper	3,20	0,03	2,9	0,02	µg/l	91%
Manganese	2,12	0,03	2	0,1	µg/l	94%
Nickel	3,52	0,03	3,56	0,05	µg/l	101%
Mercury	0,58	0,01	0,54	0,04	µg/l	93%
Selenium	3,55	0,06	3,52	0,01	µg/l	99%
Uranium	3,80	0,02	3,61	0,05	µg/l	95%
Zinc	28,0	0,8	28	0,3	µg/l	100%



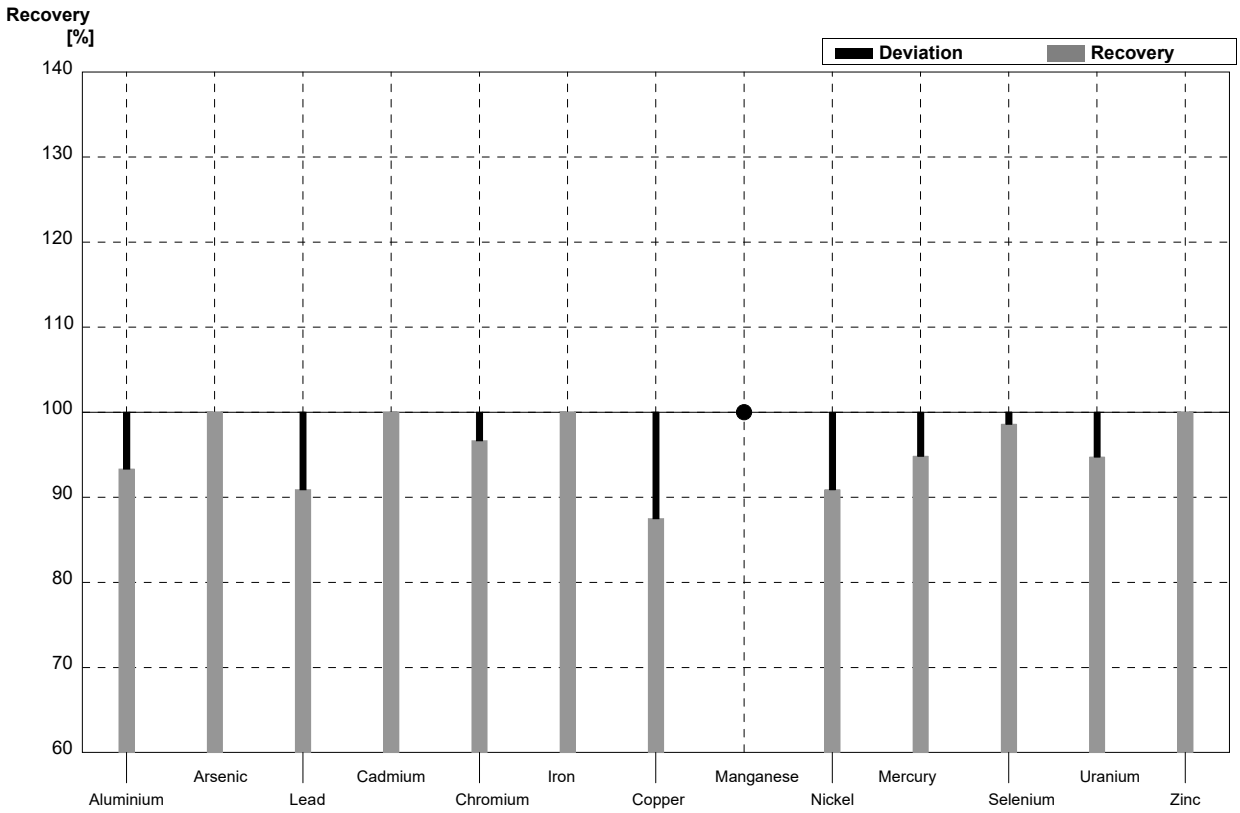
Sample M148A
Laboratory E

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	29,5	3	µg/l	98%
Arsenic	4,20	0,03	4,3	0,65	µg/l	102%
Lead	0,79	0,01	0,71	0,14	µg/l	90%
Cadmium	0,249	0,003	0,25	0,05	µg/l	100%
Chromium	4,04	0,03	3,9	0,58	µg/l	97%
Iron	71,4	0,3	72	7,2	µg/l	101%
Copper	1,70	0,02	1,5	0,22	µg/l	88%
Manganese	38,1	0,2	38,4	3,8	µg/l	101%
Nickel	1,30	0,02	1,2	0,20	µg/l	92%
Mercury	0,95	0,01	0,93	0,19	µg/l	98%
Selenium	1,00	0,05	<2	0,3	µg/l	•
Uranium	6,05	0,04	5,8	0,8	µg/l	96%
Zinc	10,0	0,8	10	1,5	µg/l	100%



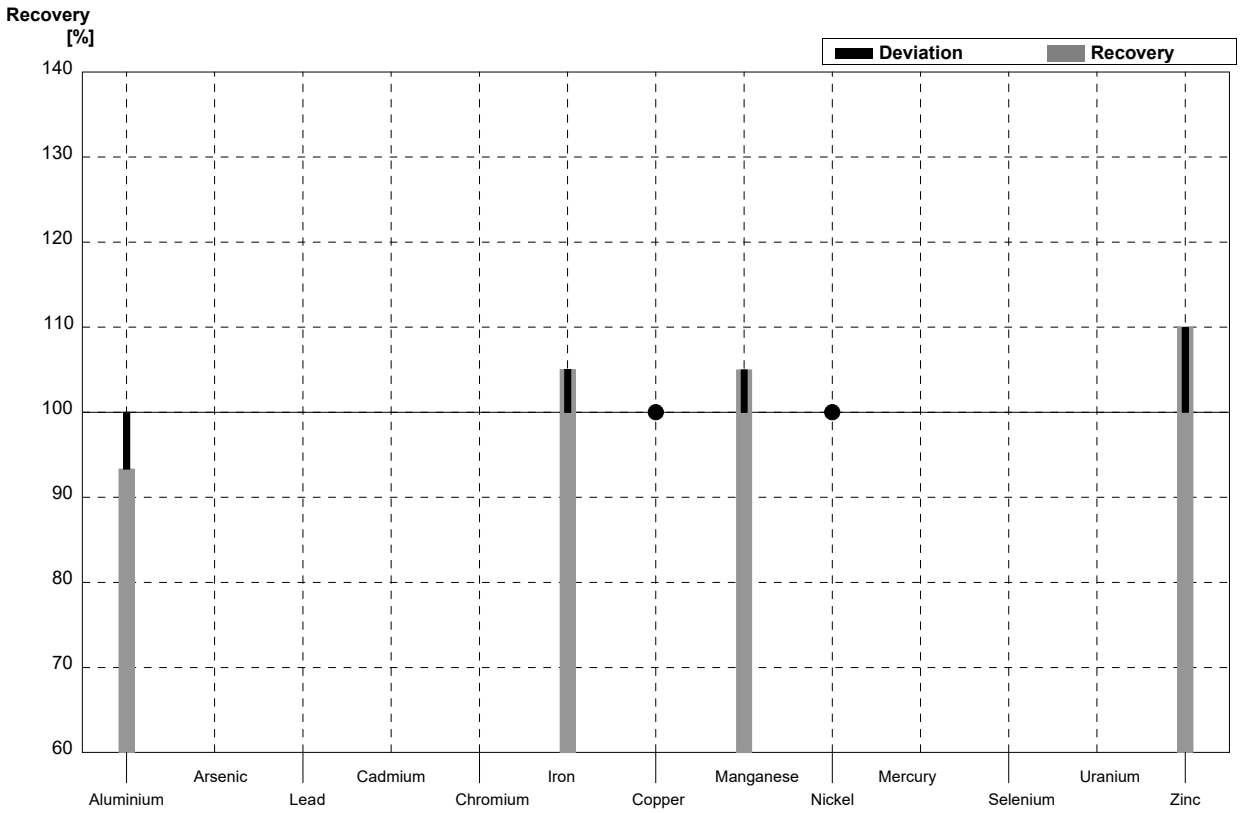
Sample M148B
Laboratory E

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	14	3	µg/l	93%
Arsenic	1,10	0,01	1,1	0,2	µg/l	100%
Lead	1,98	0,01	1,8	0,27	µg/l	91%
Cadmium	0,800	0,007	0,80	0,16	µg/l	100%
Chromium	0,60	0,01	0,58	0,12	µg/l	97%
Iron	18,0	0,2	18	2	µg/l	100%
Copper	3,20	0,03	2,8	0,42	µg/l	88%
Manganese	2,12	0,03	<5	0,5	µg/l	•
Nickel	3,52	0,03	3,2	0,32	µg/l	91%
Mercury	0,58	0,01	0,55	0,11	µg/l	95%
Selenium	3,55	0,06	3,5	0,52	µg/l	99%
Uranium	3,80	0,02	3,6	0,54	µg/l	95%
Zinc	28,0	0,8	28	3	µg/l	100%



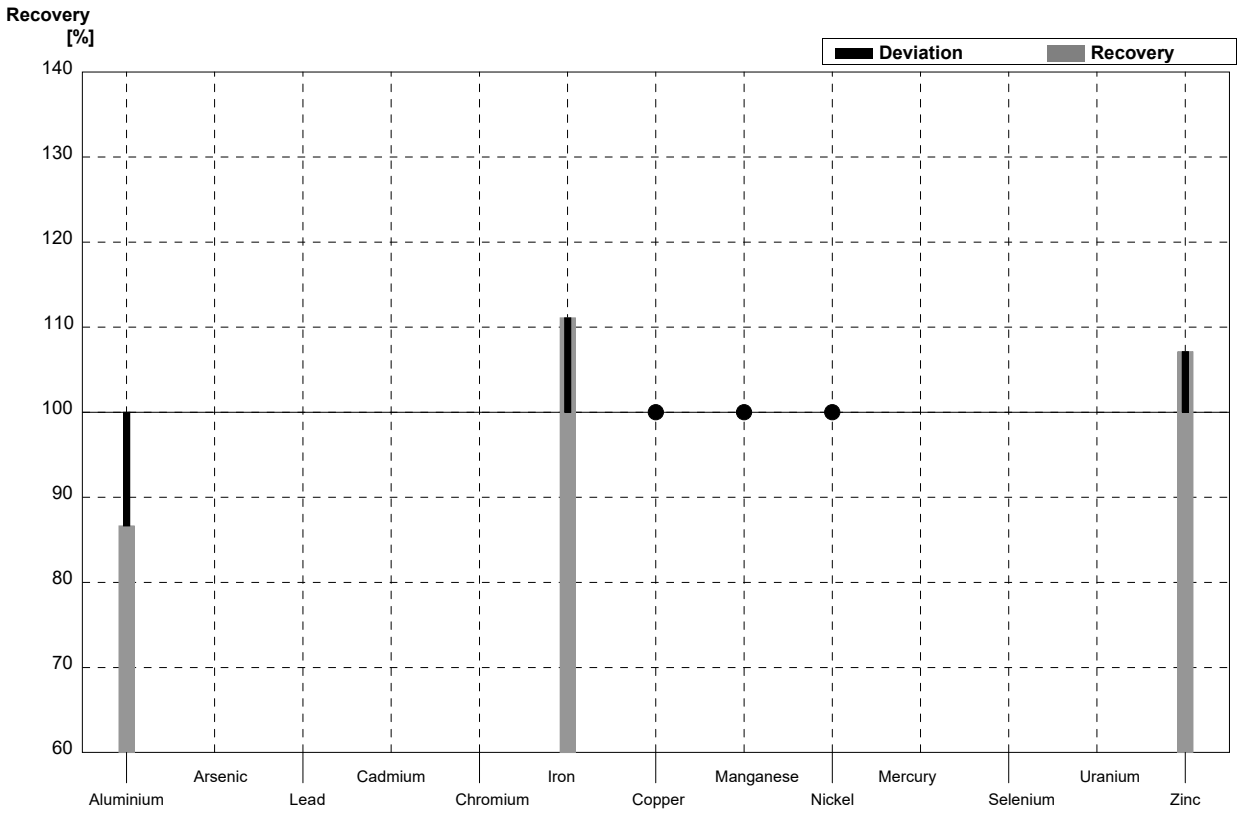
Sample M148A
Laboratory F

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	28		µg/l	93%
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3	75		µg/l	105%
Copper	1,70	0,02	<10		µg/l	•
Manganese	38,1	0,2	40		µg/l	105%
Nickel	1,30	0,02	<10		µg/l	•
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8	11		µg/l	110%



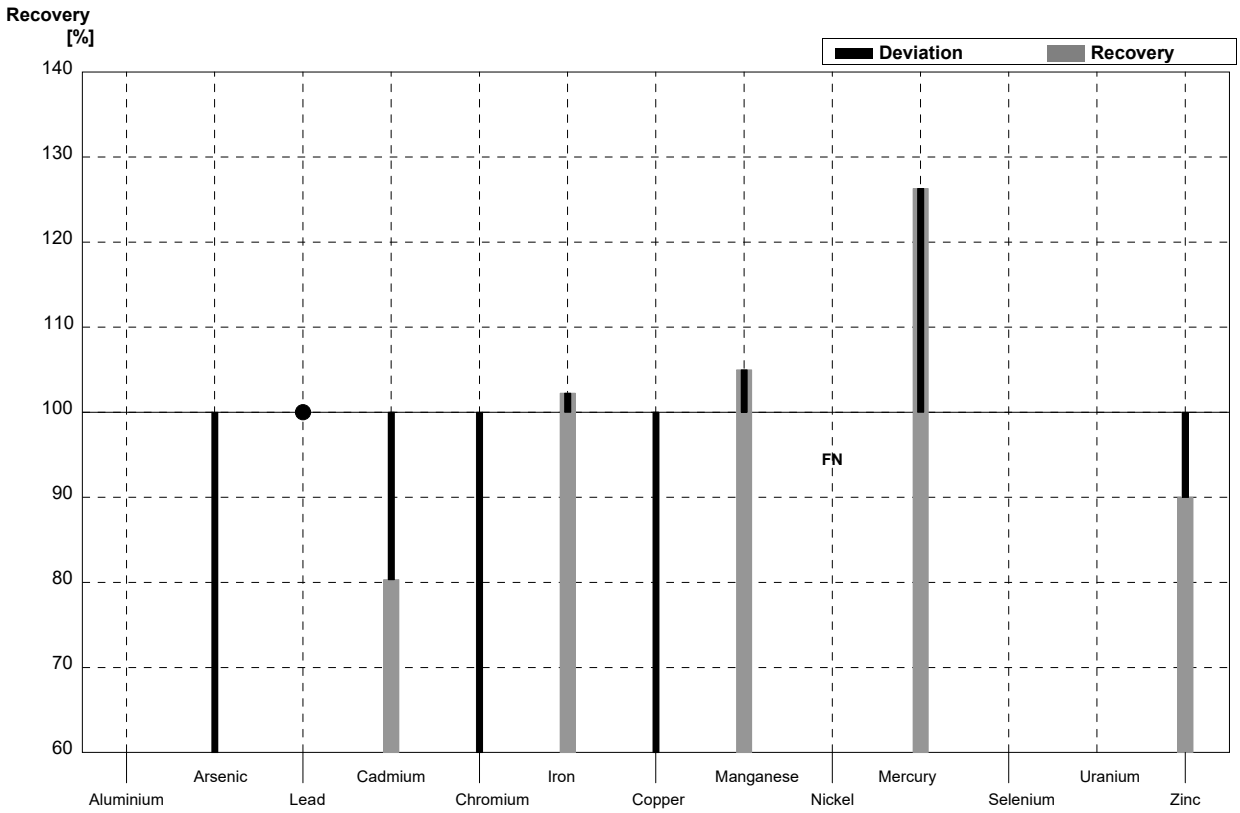
Sample M148B
Laboratory F

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	13		µg/l	87%
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2	20		µg/l	111%
Copper	3,20	0,03	<10		µg/l	•
Manganese	2,12	0,03	<10		µg/l	•
Nickel	3,52	0,03	<10		µg/l	•
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8	30		µg/l	107%



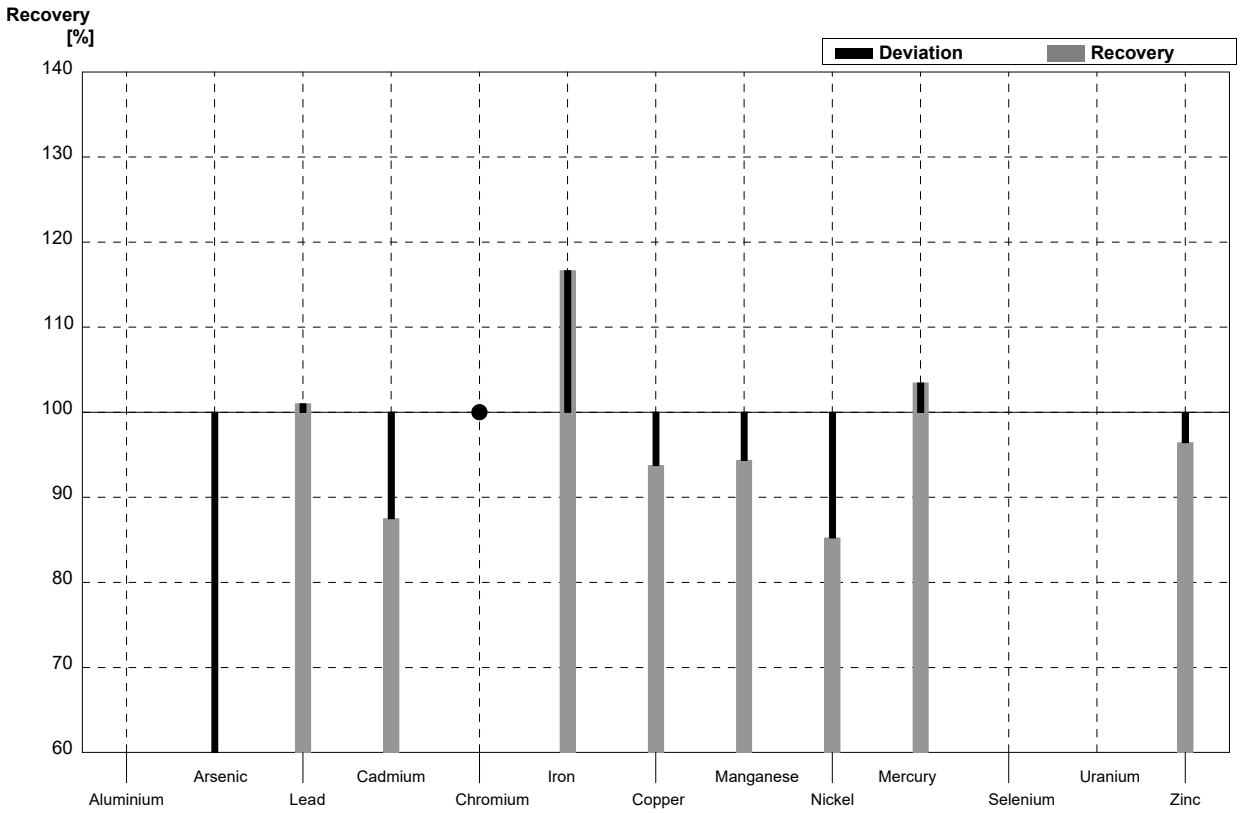
Sample **M148A**
Laboratory **G**

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03	2,2		µg/l	52%
Lead	0,79	0,01	<1		µg/l	•
Cadmium	0,249	0,003	0,2		µg/l	80%
Chromium	4,04	0,03	2		µg/l	50%
Iron	71,4	0,3	73		µg/l	102%
Copper	1,70	0,02	1		µg/l	59%
Manganese	38,1	0,2	40		µg/l	105%
Nickel	1,30	0,02	<1		µg/l	FN
Mercury	0,95	0,01	1,2		µg/l	126%
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8	9		µg/l	90%



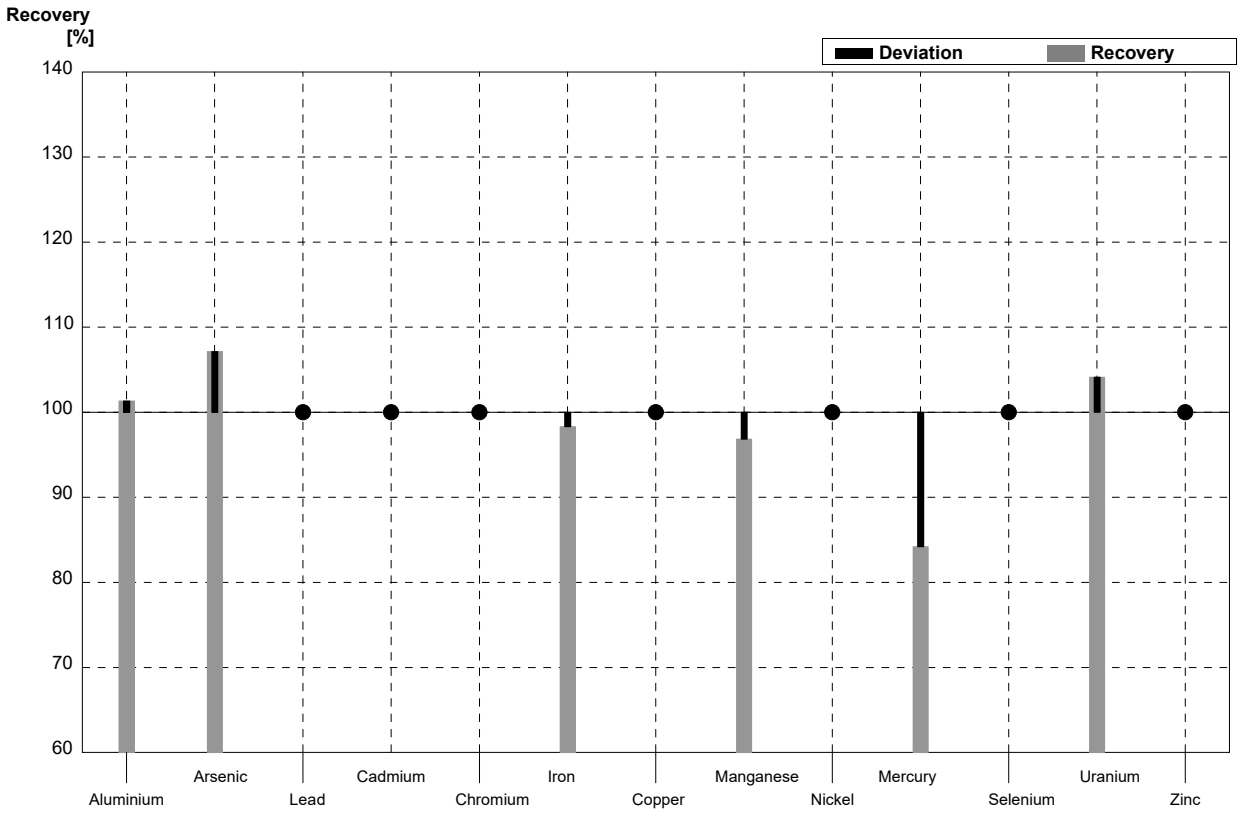
Sample M148B
Laboratory G

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01	0,6		µg/l	55%
Lead	1,98	0,01	2		µg/l	101%
Cadmium	0,800	0,007	0,7		µg/l	88%
Chromium	0,60	0,01	<1		µg/l	•
Iron	18,0	0,2	21		µg/l	117%
Copper	3,20	0,03	3		µg/l	94%
Manganese	2,12	0,03	2		µg/l	94%
Nickel	3,52	0,03	3		µg/l	85%
Mercury	0,58	0,01	0,6		µg/l	103%
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8	27		µg/l	96%



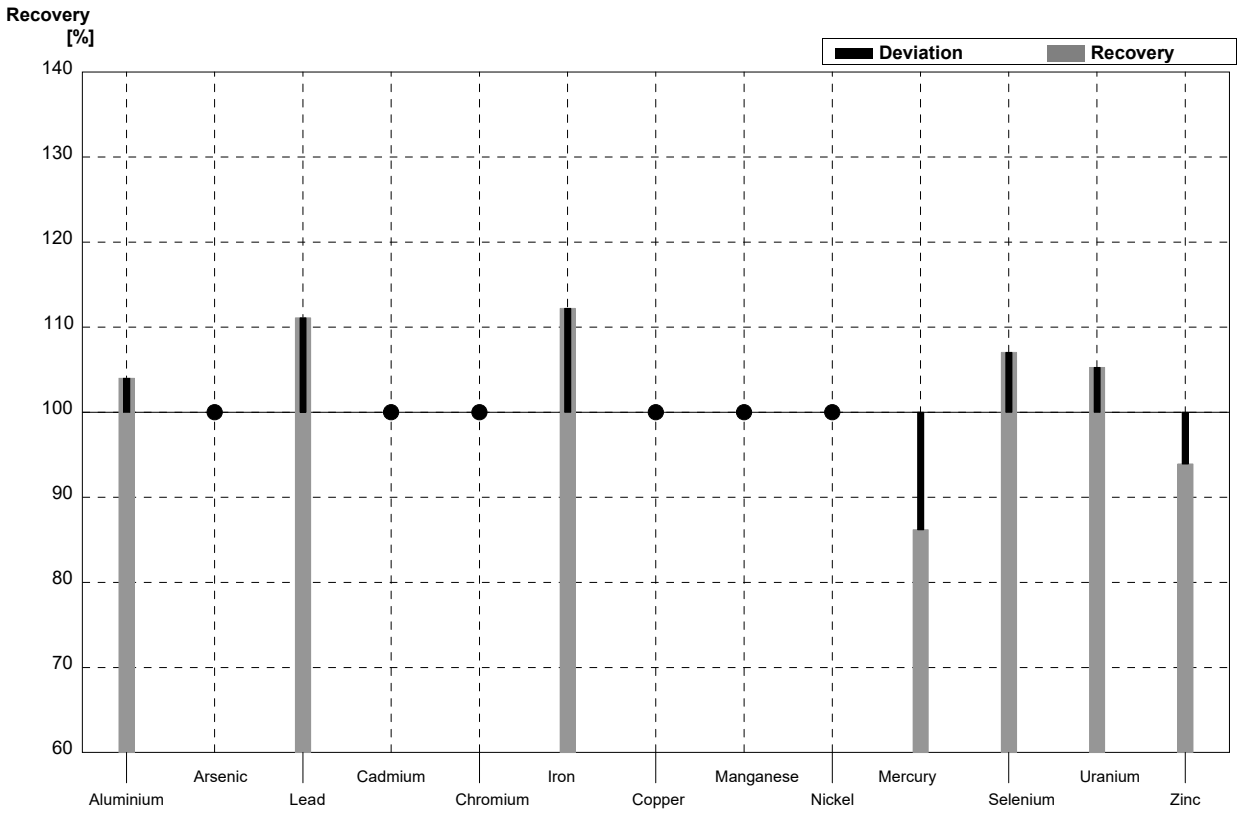
Sample M148A
Laboratory H

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	30,4	3,04	µg/l	101%
Arsenic	4,20	0,03	4,5	0,45	µg/l	107%
Lead	0,79	0,01	<2		µg/l	•
Cadmium	0,249	0,003	<1		µg/l	•
Chromium	4,04	0,03	<5		µg/l	•
Iron	71,4	0,3	70,2	7,02	µg/l	98%
Copper	1,70	0,02	<5		µg/l	•
Manganese	38,1	0,2	36,9	3,69	µg/l	97%
Nickel	1,30	0,02	<5		µg/l	•
Mercury	0,95	0,01	0,8	0,08	µg/l	84%
Selenium	1,00	0,05	<2		µg/l	•
Uranium	6,05	0,04	6,3	0,63	µg/l	104%
Zinc	10,0	0,8	<15		µg/l	•



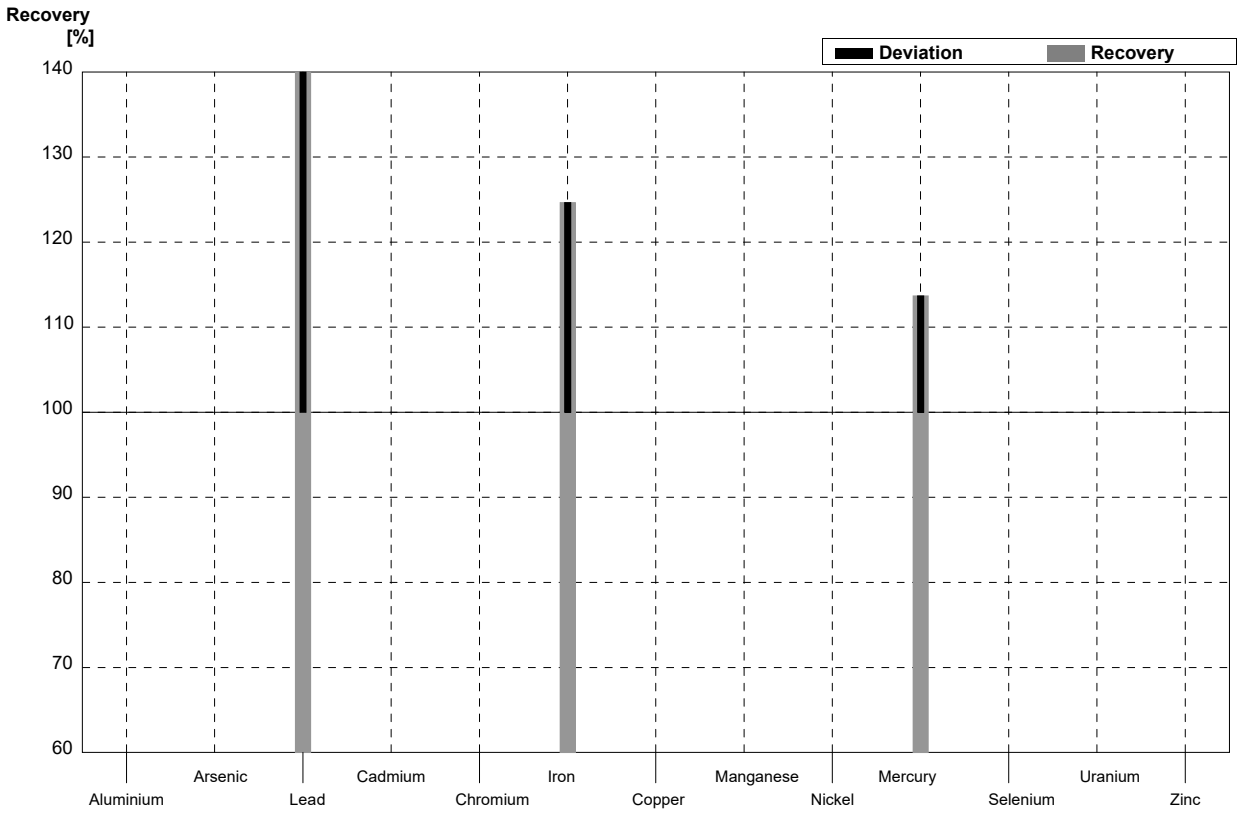
Sample M148B
Laboratory H

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,6	1,56	µg/l	104%
Arsenic	1,10	0,01	<2		µg/l	•
Lead	1,98	0,01	2,2	0,22	µg/l	111%
Cadmium	0,800	0,007	<1		µg/l	•
Chromium	0,60	0,01	<5		µg/l	•
Iron	18,0	0,2	20,2	2,02	µg/l	112%
Copper	3,20	0,03	<5		µg/l	•
Manganese	2,12	0,03	<5		µg/l	•
Nickel	3,52	0,03	<5		µg/l	•
Mercury	0,58	0,01	0,5	0,05	µg/l	86%
Selenium	3,55	0,06	3,8	0,38	µg/l	107%
Uranium	3,80	0,02	4,0	0,40	µg/l	105%
Zinc	28,0	0,8	26,3	2,63	µg/l	94%



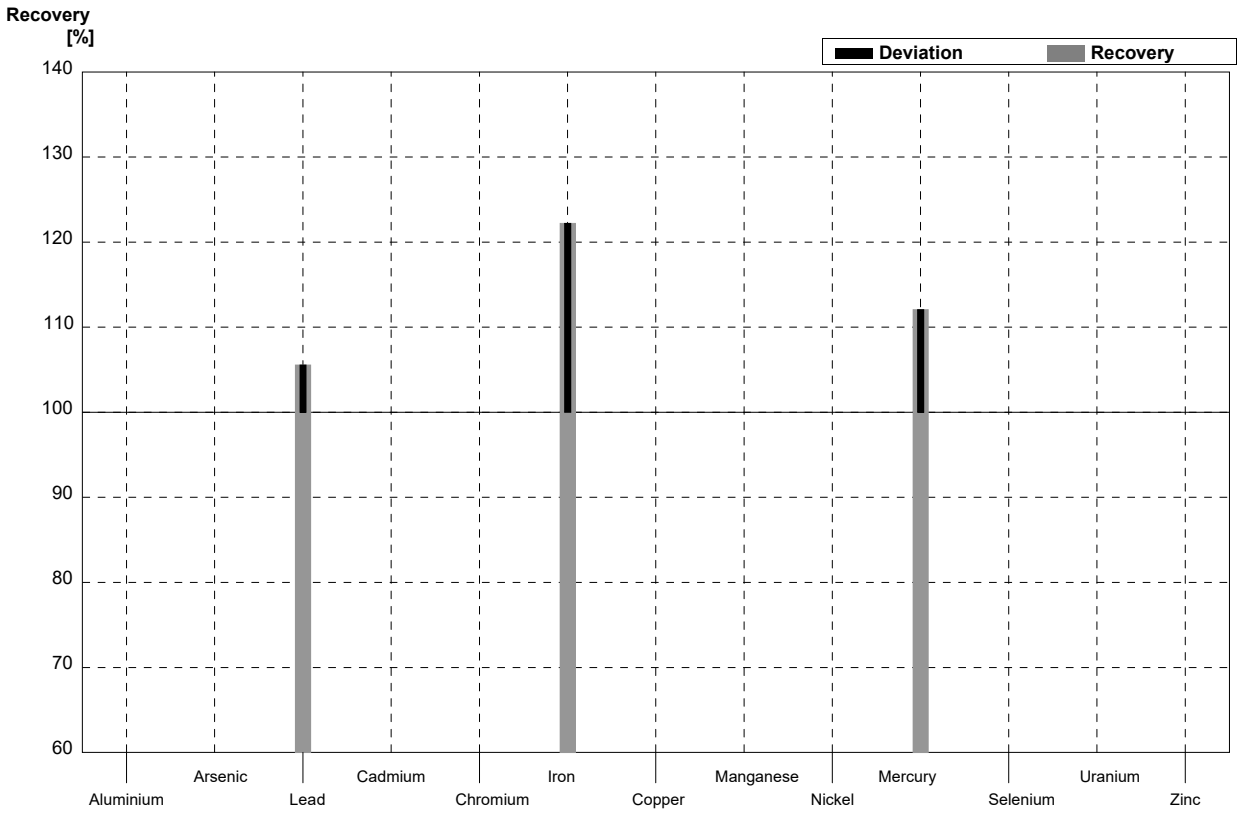
Sample M148A
Laboratory I

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01	1,28	0,08	µg/l	162%
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3	89,0	7,1	µg/l	125%
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2			µg/l	
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01	1,08	0,07	µg/l	114%
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



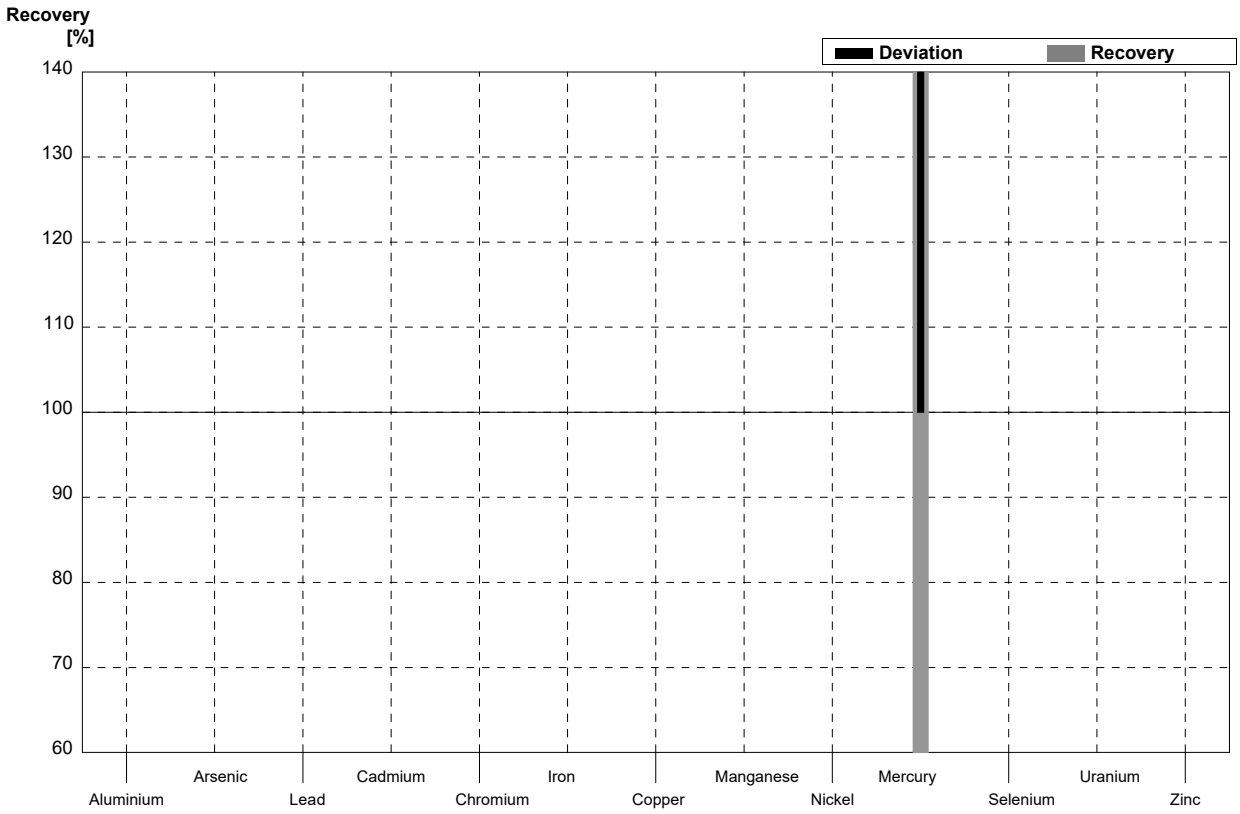
Sample M148B
Laboratory I

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01	2,09	0,14	µg/l	106%
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2	22,0	1,8	µg/l	122%
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03			µg/l	
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01	0,65	0,04	µg/l	112%
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l	



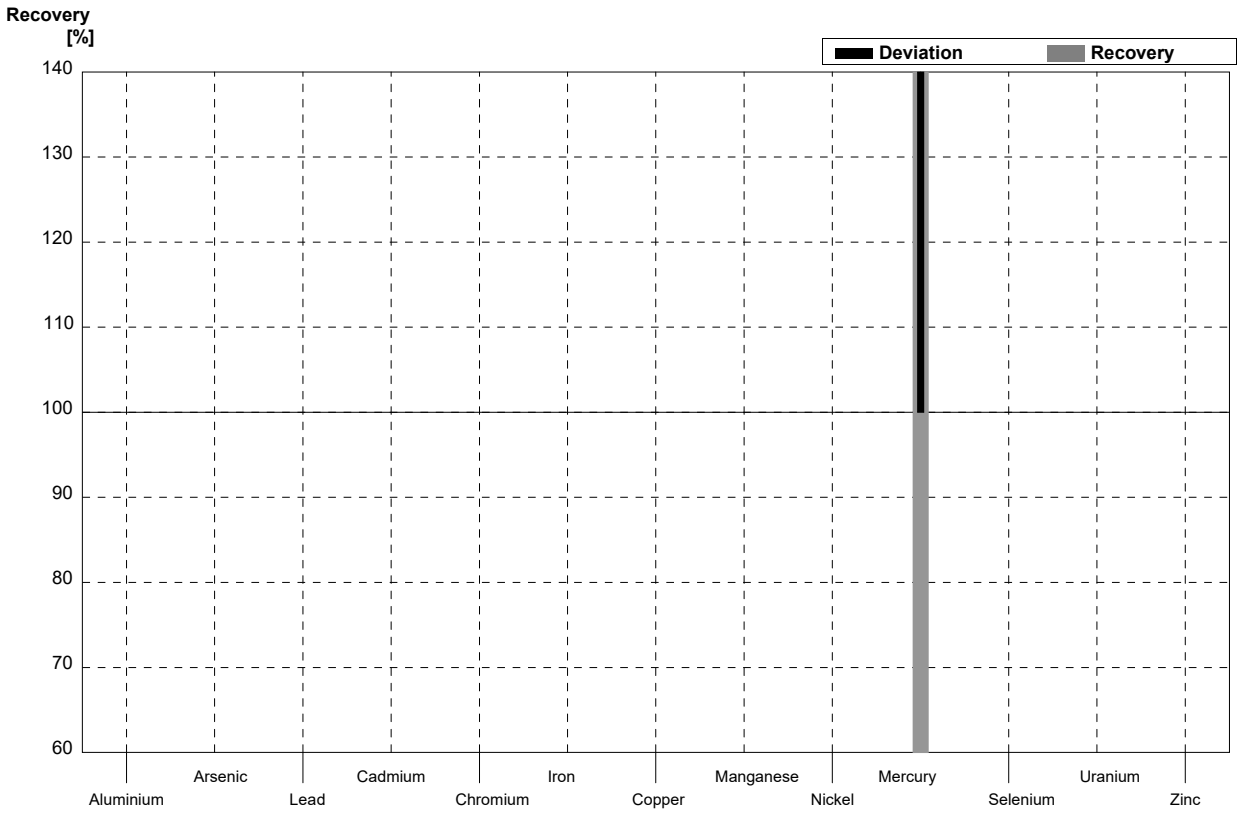
Sample M148A
Laboratory J

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3			µg/l	
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2			µg/l	
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01	2,0	0,4	µg/l	211%
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



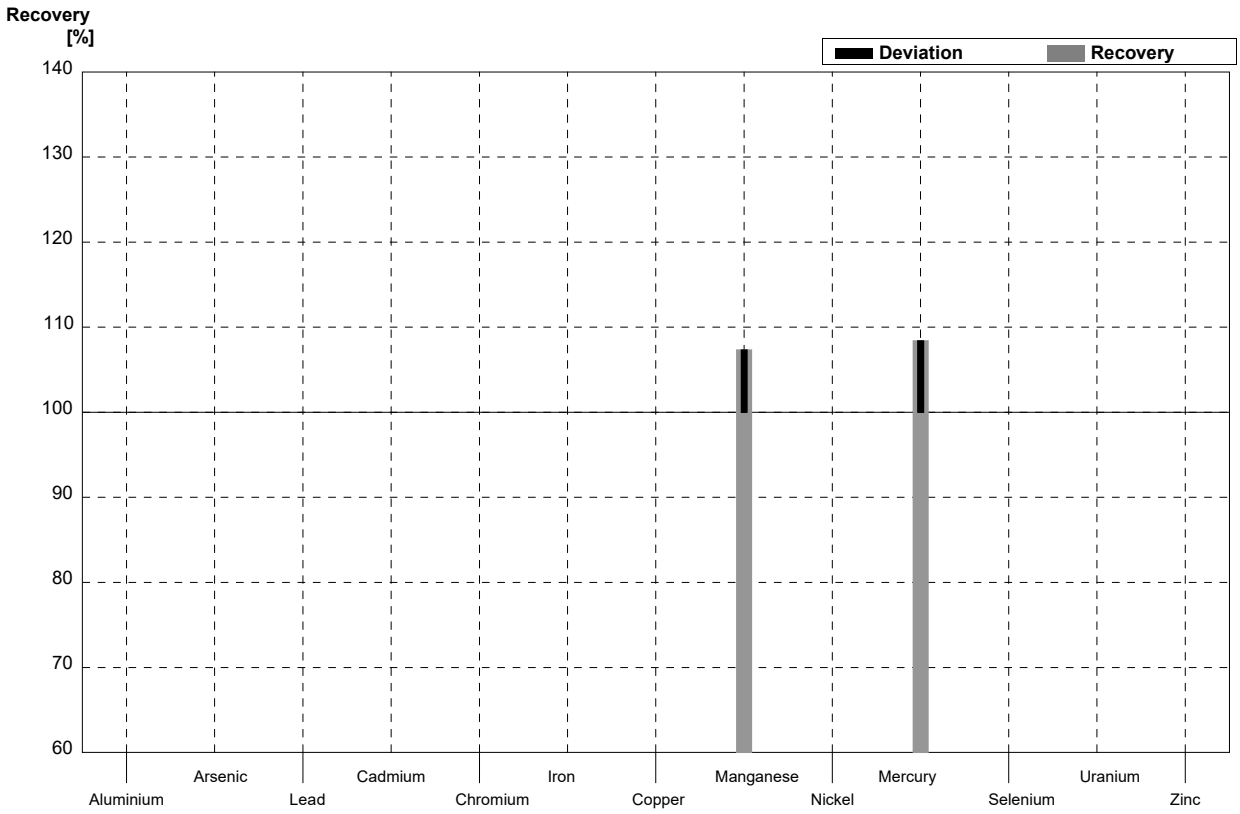
Sample M148B
Laboratory J

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2			µg/l	
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03			µg/l	
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01	1,1	0,2	µg/l	190%
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l	



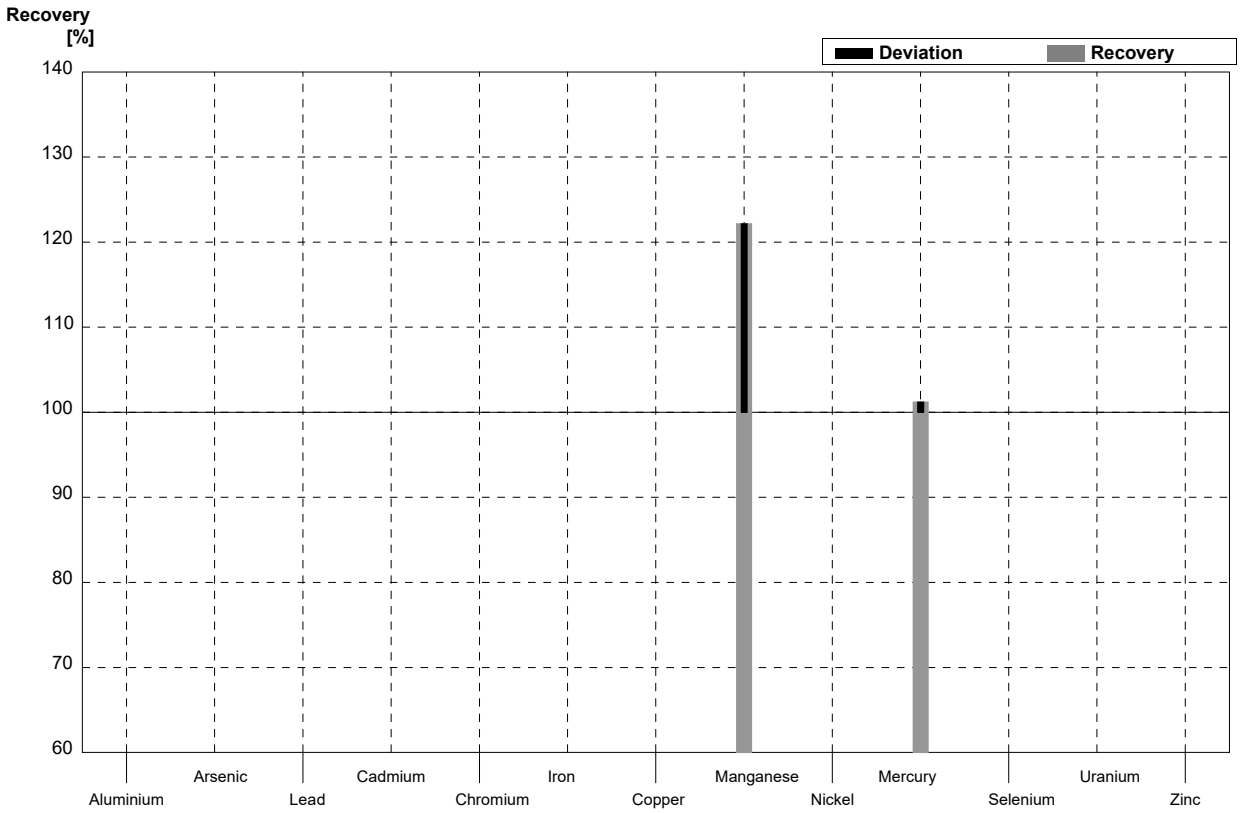
Sample M148A
Laboratory K

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3			µg/l	
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2	40,9	0,1	µg/l	107%
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01	1,03	0,09	µg/l	108%
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



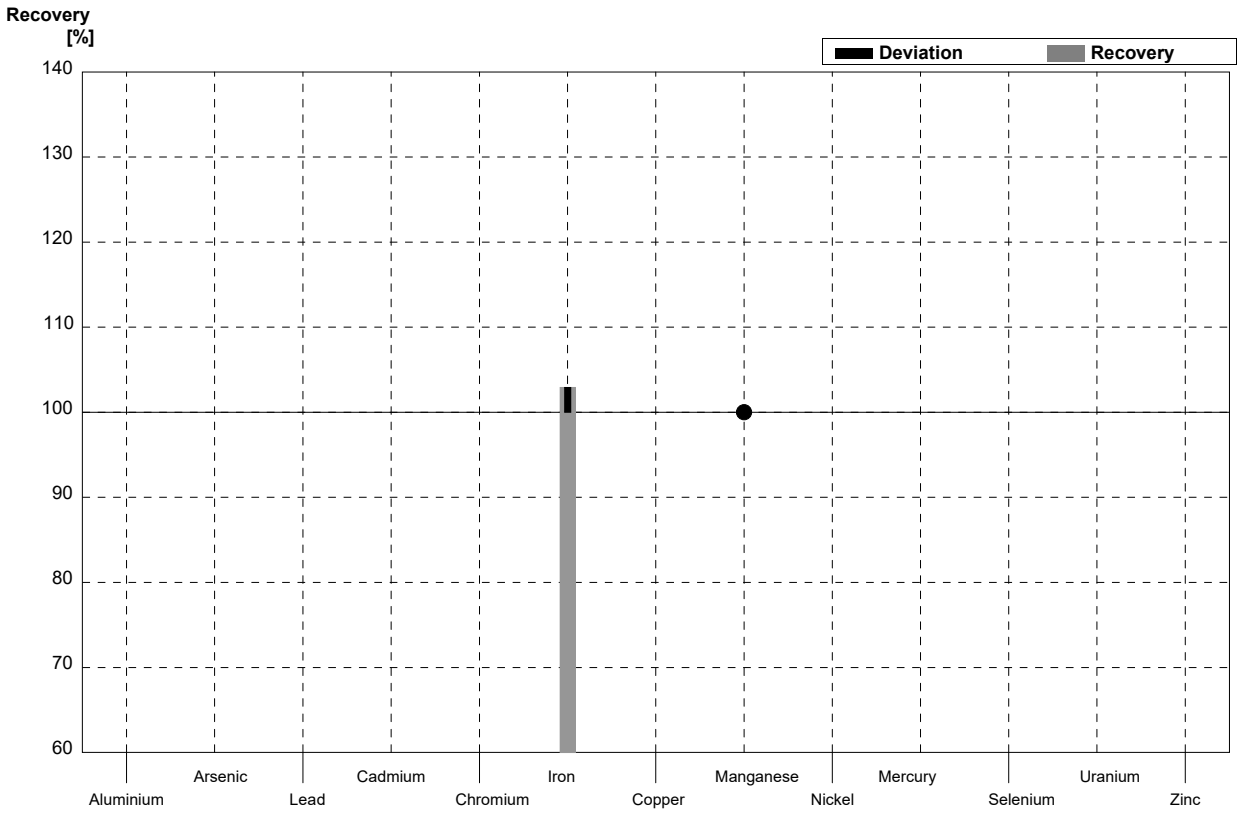
Sample **M148B**
Laboratory **K**

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2			µg/l	
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03	2,59	0,12	µg/l	122%
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01	0,587	0,081	µg/l	101%
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l	



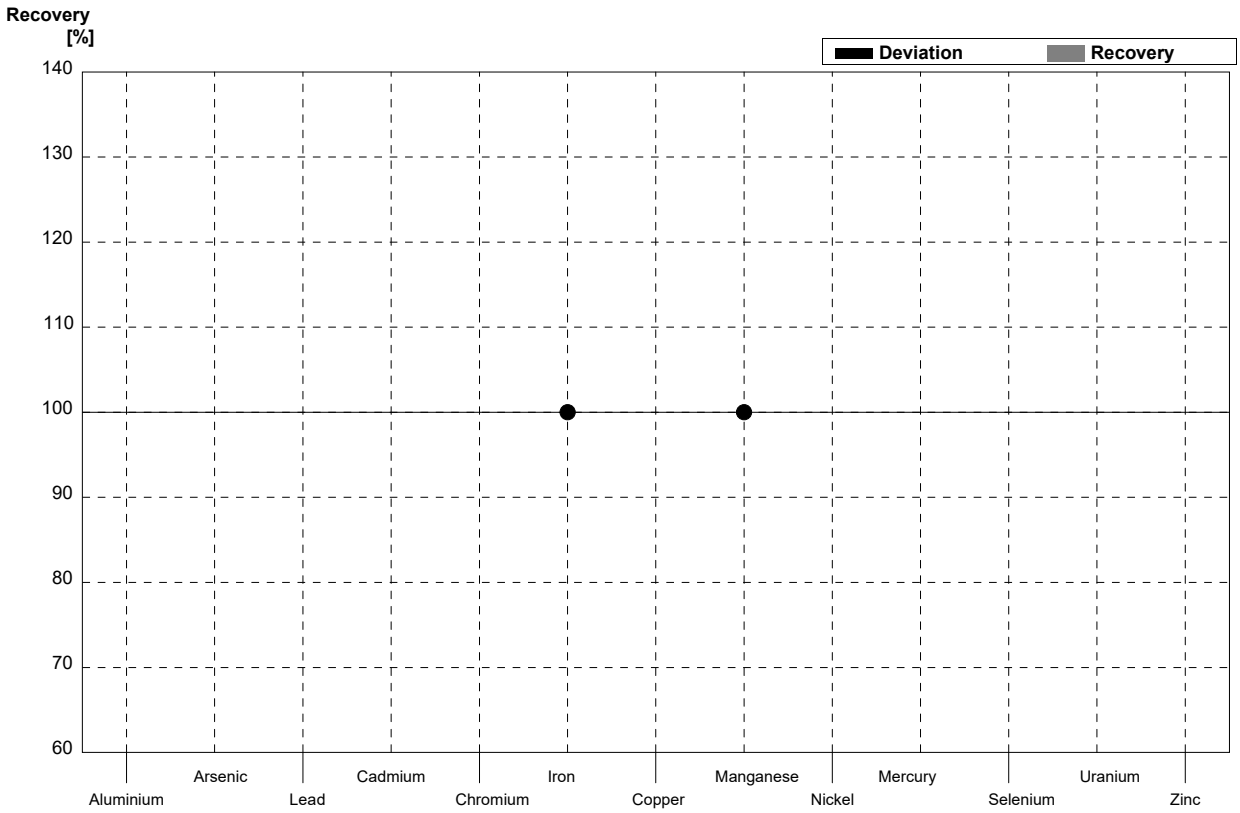
Sample M148A
Laboratory L

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3	73,5	4,8	µg/l	103%
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2	<50		µg/l	•
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



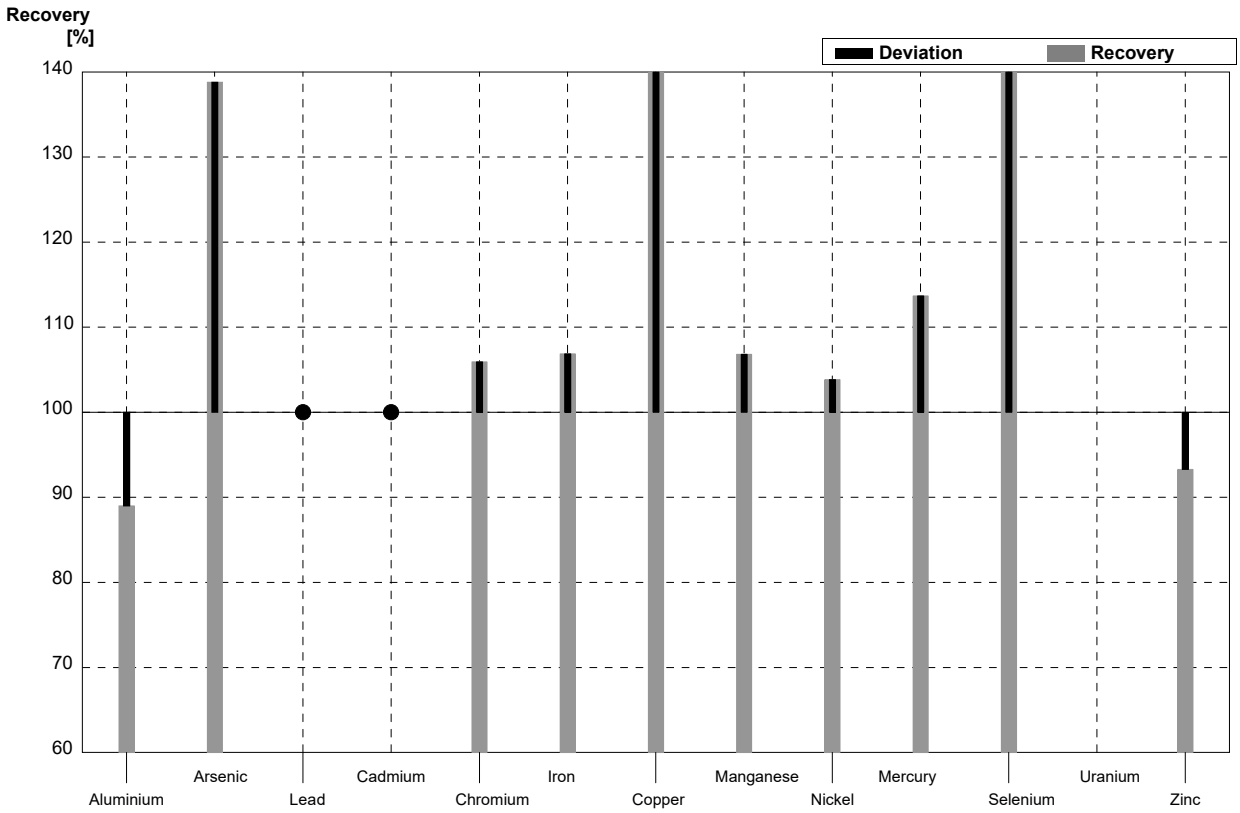
Sample M148B
Laboratory L

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2	<50		µg/l	•
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03	<50		µg/l	•
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l	



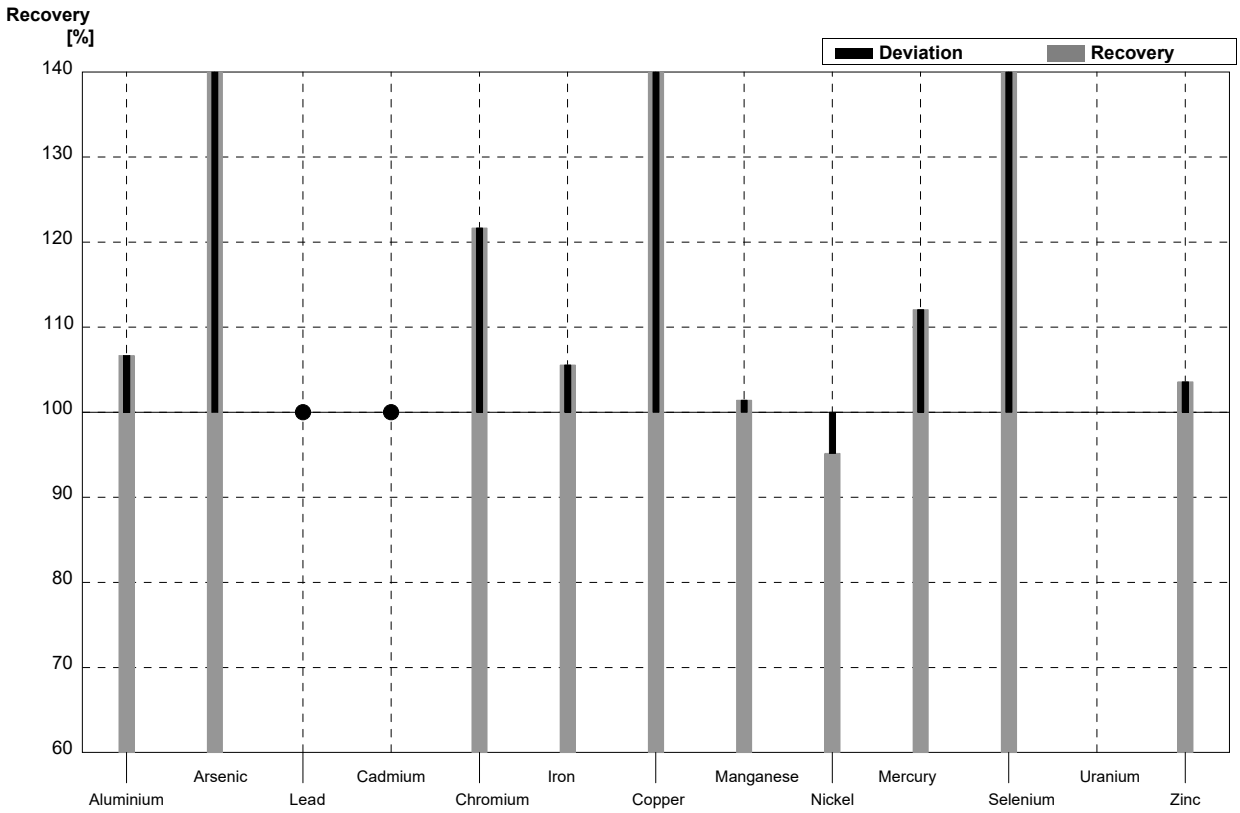
Sample M148A
Laboratory M

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	26,7	4,6	µg/l	89%
Arsenic	4,20	0,03	5,83	0,25	µg/l	139%
Lead	0,79	0,01	<5		µg/l	•
Cadmium	0,249	0,003	<1		µg/l	•
Chromium	4,04	0,03	4,28	0,32	µg/l	106%
Iron	71,4	0,3	76,3	2,50	µg/l	107%
Copper	1,70	0,02	4,0	0,4	µg/l	235%
Manganese	38,1	0,2	40,7	0,69	µg/l	107%
Nickel	1,30	0,02	1,35	0,07	µg/l	104%
Mercury	0,95	0,01	1,08	0,06	µg/l	114%
Selenium	1,00	0,05	2,0	0,24	µg/l	200%
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8	9,33	1,53	µg/l	93%



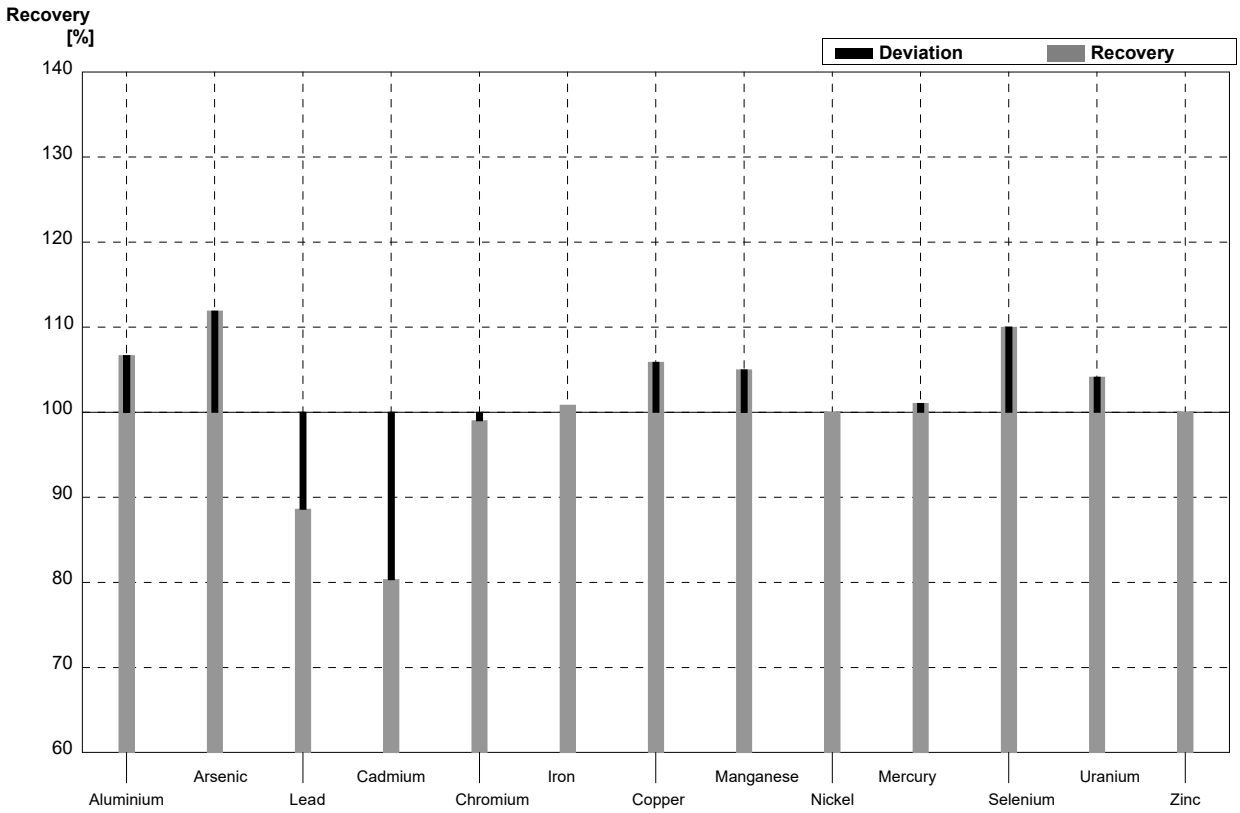
Sample M148B
Laboratory M

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	16,0	0,27	µg/l	107%
Arsenic	1,10	0,01	1,68	0,35	µg/l	153%
Lead	1,98	0,01	<5		µg/l	•
Cadmium	0,800	0,007	<1		µg/l	•
Chromium	0,60	0,01	0,73	0,17	µg/l	122%
Iron	18,0	0,2	19,0	0,78	µg/l	106%
Copper	3,20	0,03	5,1	0,5	µg/l	159%
Manganese	2,12	0,03	2,15	0,06	µg/l	101%
Nickel	3,52	0,03	3,35	0,70	µg/l	95%
Mercury	0,58	0,01	0,65	0,06	µg/l	112%
Selenium	3,55	0,06	5,2	0,12	µg/l	146%
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8	29,0	1,66	µg/l	104%



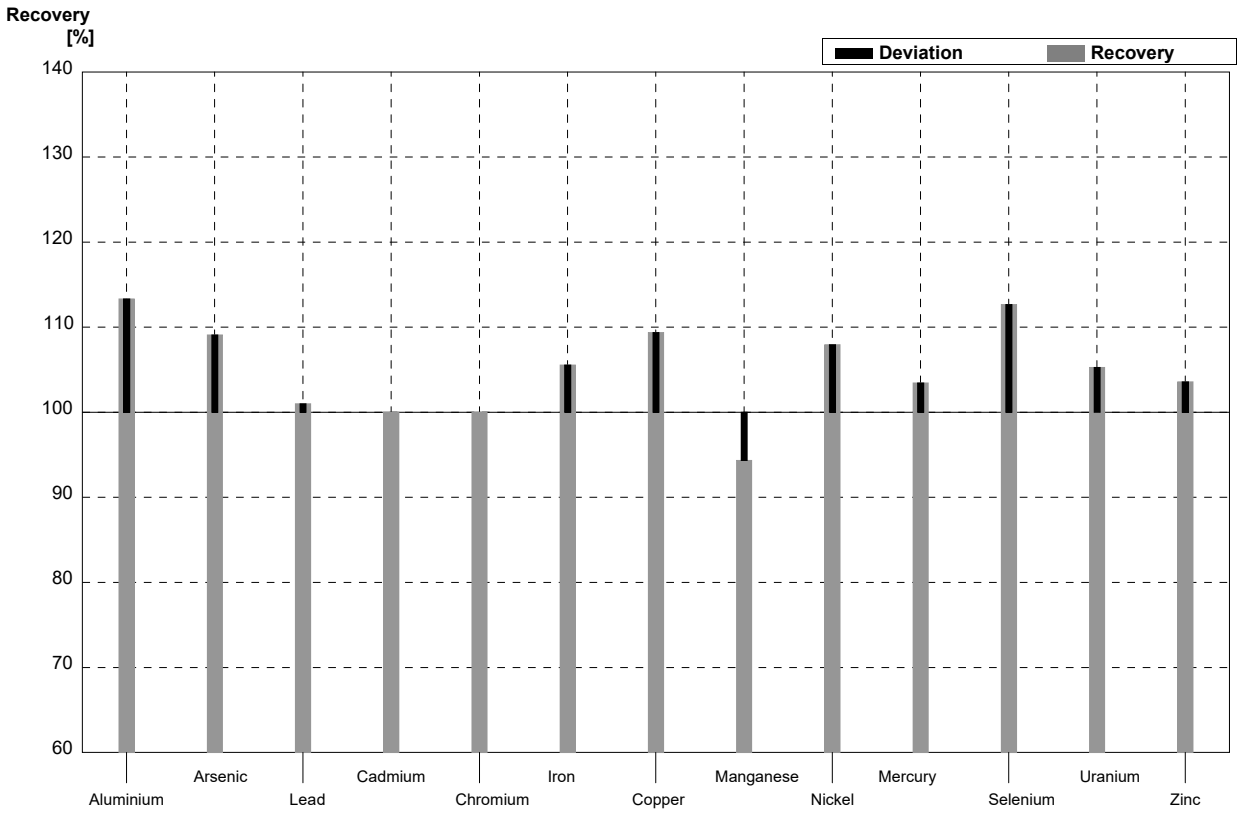
Sample M148A
Laboratory N

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	32	3,2	µg/l	107%
Arsenic	4,20	0,03	4,7	0,564	µg/l	112%
Lead	0,79	0,01	0,7	0,056	µg/l	89%
Cadmium	0,249	0,003	0,2	0,016	µg/l	80%
Chromium	4,04	0,03	4	0,48	µg/l	99%
Iron	71,4	0,3	72	18,72	µg/l	101%
Copper	1,70	0,02	1,8	0,144	µg/l	106%
Manganese	38,1	0,2	40	4	µg/l	105%
Nickel	1,30	0,02	1,3	0,13	µg/l	100%
Mercury	0,95	0,01	0,96	0,1152	µg/l	101%
Selenium	1,00	0,05	1,1	0,165	µg/l	110%
Uranium	6,05	0,04	6,3	0,315	µg/l	104%
Zinc	10,0	0,8	10	1	µg/l	100%



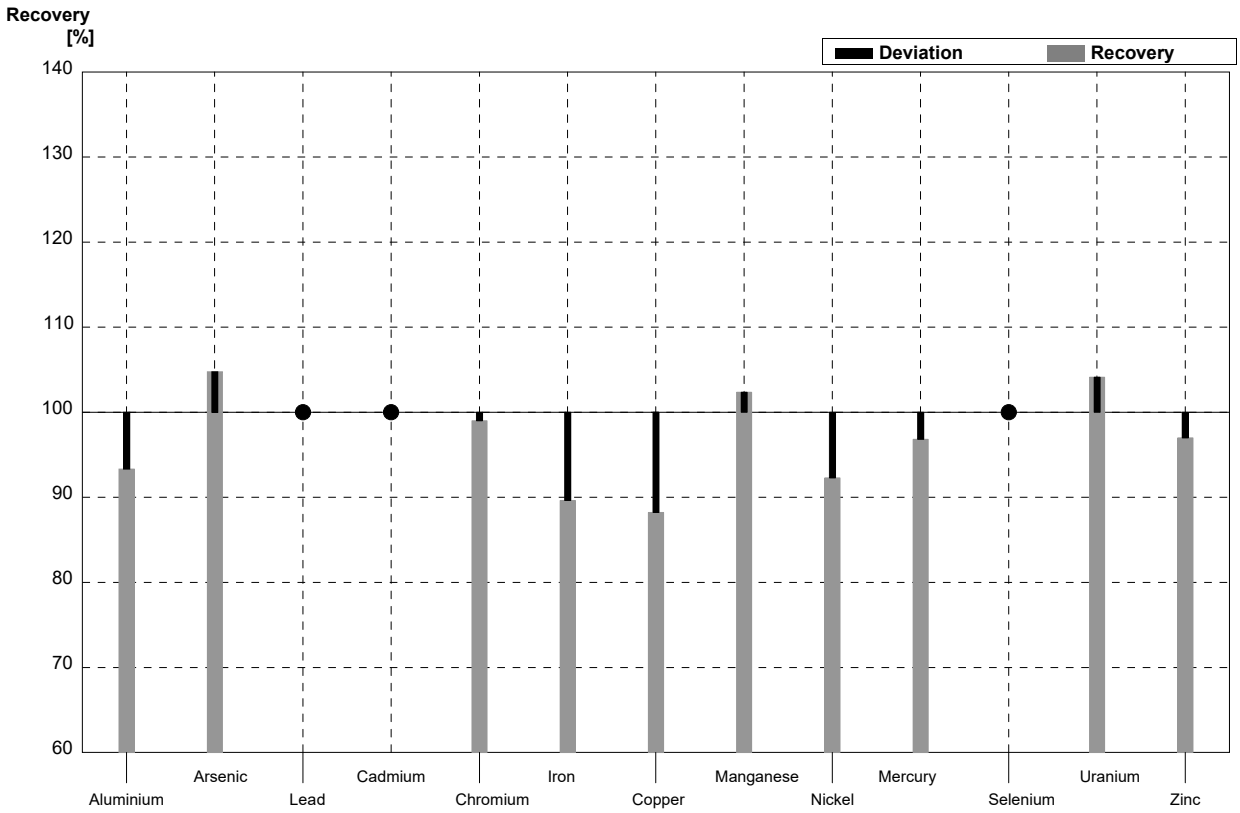
Sample M148B
Laboratory N

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	17	1,7	µg/l	113%
Arsenic	1,10	0,01	1,2	0,144	µg/l	109%
Lead	1,98	0,01	2	0,16	µg/l	101%
Cadmium	0,800	0,007	0,8	0,064	µg/l	100%
Chromium	0,60	0,01	0,6	0,072	µg/l	100%
Iron	18,0	0,2	19	4,94	µg/l	106%
Copper	3,20	0,03	3,5	0,28	µg/l	109%
Manganese	2,12	0,03	2	0,2	µg/l	94%
Nickel	3,52	0,03	3,8	0,38	µg/l	108%
Mercury	0,58	0,01	0,6	0,072	µg/l	103%
Selenium	3,55	0,06	4	0,6	µg/l	113%
Uranium	3,80	0,02	4	0,2	µg/l	105%
Zinc	28,0	0,8	29	2,9	µg/l	104%



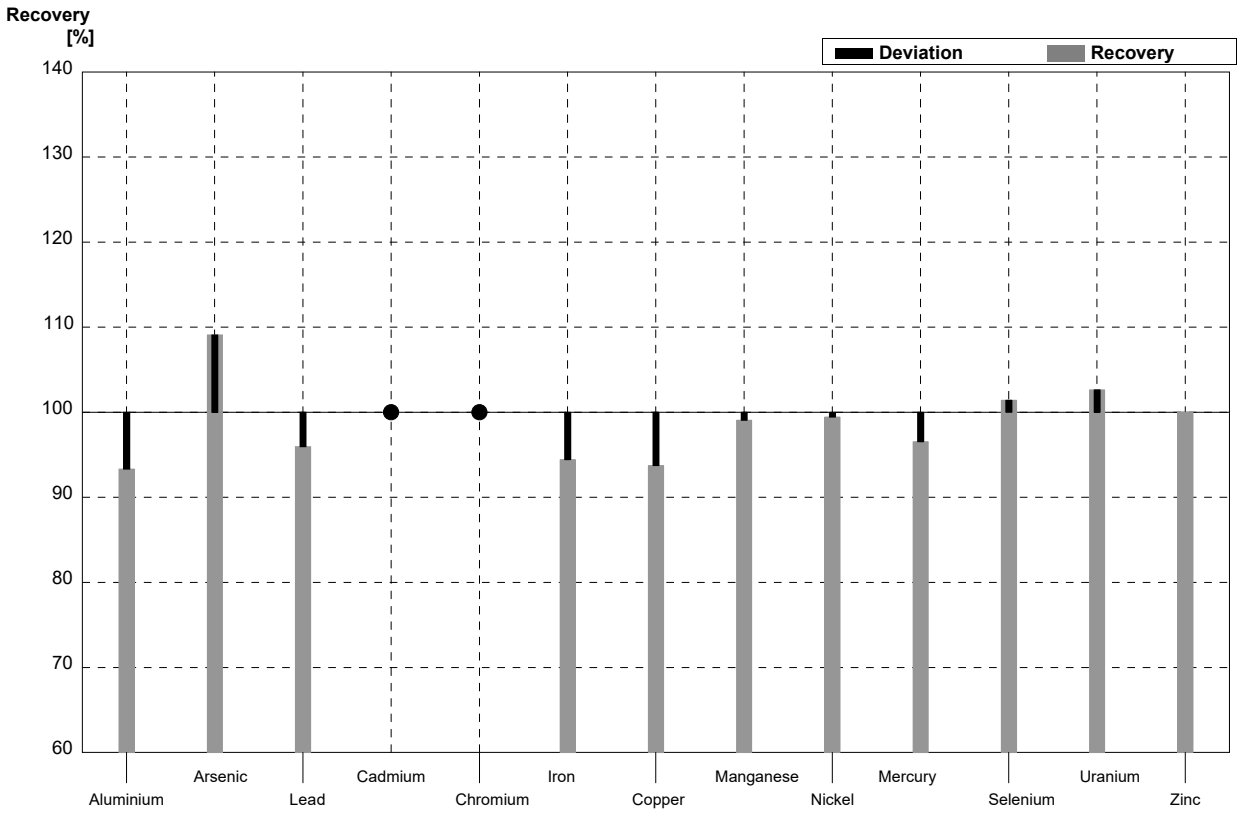
Sample M148A
Laboratory O

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	28	6	µg/l	93%
Arsenic	4,20	0,03	4,4	0,9	µg/l	105%
Lead	0,79	0,01	<1		µg/l	•
Cadmium	0,249	0,003	<1		µg/l	•
Chromium	4,04	0,03	4	0,8	µg/l	99%
Iron	71,4	0,3	64	13	µg/l	90%
Copper	1,70	0,02	1,5	0,3	µg/l	88%
Manganese	38,1	0,2	39	8	µg/l	102%
Nickel	1,30	0,02	1,2	0,2	µg/l	92%
Mercury	0,95	0,01	0,92	0,18	µg/l	97%
Selenium	1,00	0,05	<2		µg/l	•
Uranium	6,05	0,04	6,3	1,3	µg/l	104%
Zinc	10,0	0,8	9,7	1,9	µg/l	97%



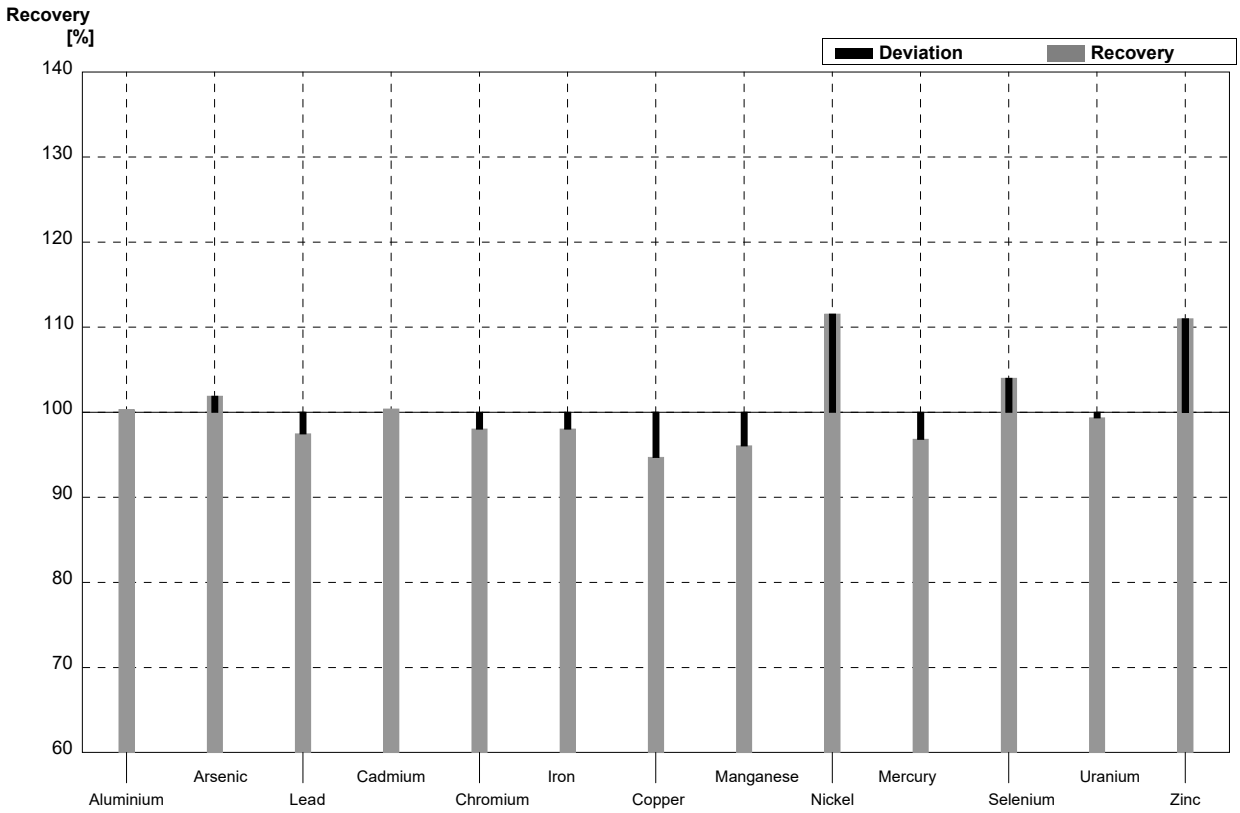
Sample M148B
Laboratory O

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	14	3	µg/l	93%
Arsenic	1,10	0,01	1,2	0,2	µg/l	109%
Lead	1,98	0,01	1,9	0,4	µg/l	96%
Cadmium	0,800	0,007	<1		µg/l	•
Chromium	0,60	0,01	<1		µg/l	•
Iron	18,0	0,2	17	3	µg/l	94%
Copper	3,20	0,03	3	0,6	µg/l	94%
Manganese	2,12	0,03	2,1	0,4	µg/l	99%
Nickel	3,52	0,03	3,5	0,7	µg/l	99%
Mercury	0,58	0,01	0,56	0,11	µg/l	97%
Selenium	3,55	0,06	3,6	0,7	µg/l	101%
Uranium	3,80	0,02	3,9	0,8	µg/l	103%
Zinc	28,0	0,8	28	6	µg/l	100%



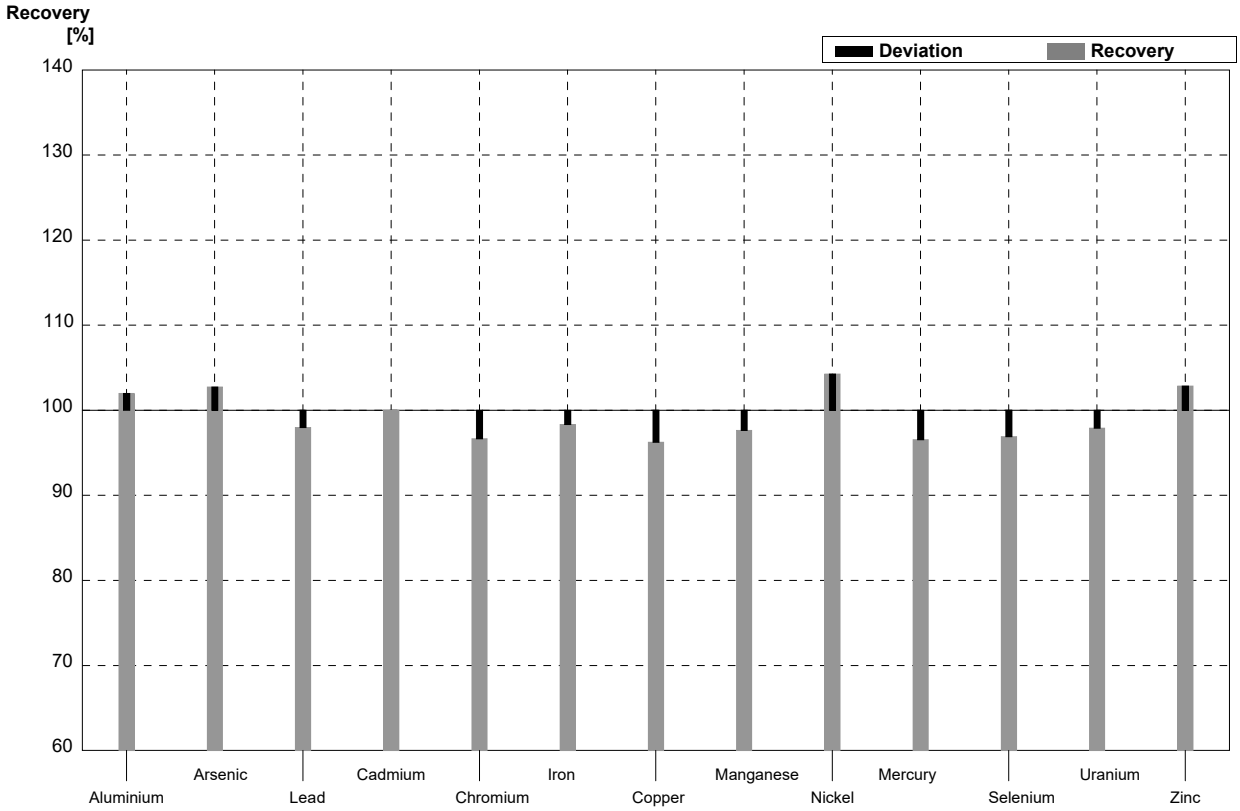
Sample M148A
Laboratory P

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	30,1	2,8	µg/l	100%
Arsenic	4,20	0,03	4,28	0,25	µg/l	102%
Lead	0,79	0,01	0,77	0,07	µg/l	97%
Cadmium	0,249	0,003	0,25	0,02	µg/l	100%
Chromium	4,04	0,03	3,96	0,26	µg/l	98%
Iron	71,4	0,3	70,0	5,5	µg/l	98%
Copper	1,70	0,02	1,61	0,15	µg/l	95%
Manganese	38,1	0,2	36,6	3,0	µg/l	96%
Nickel	1,30	0,02	1,45	0,12	µg/l	112%
Mercury	0,95	0,01	0,92	0,04	µg/l	97%
Selenium	1,00	0,05	1,04	0,16	µg/l	104%
Uranium	6,05	0,04	6,01	0,59	µg/l	99%
Zinc	10,0	0,8	11,1	1,1	µg/l	111%



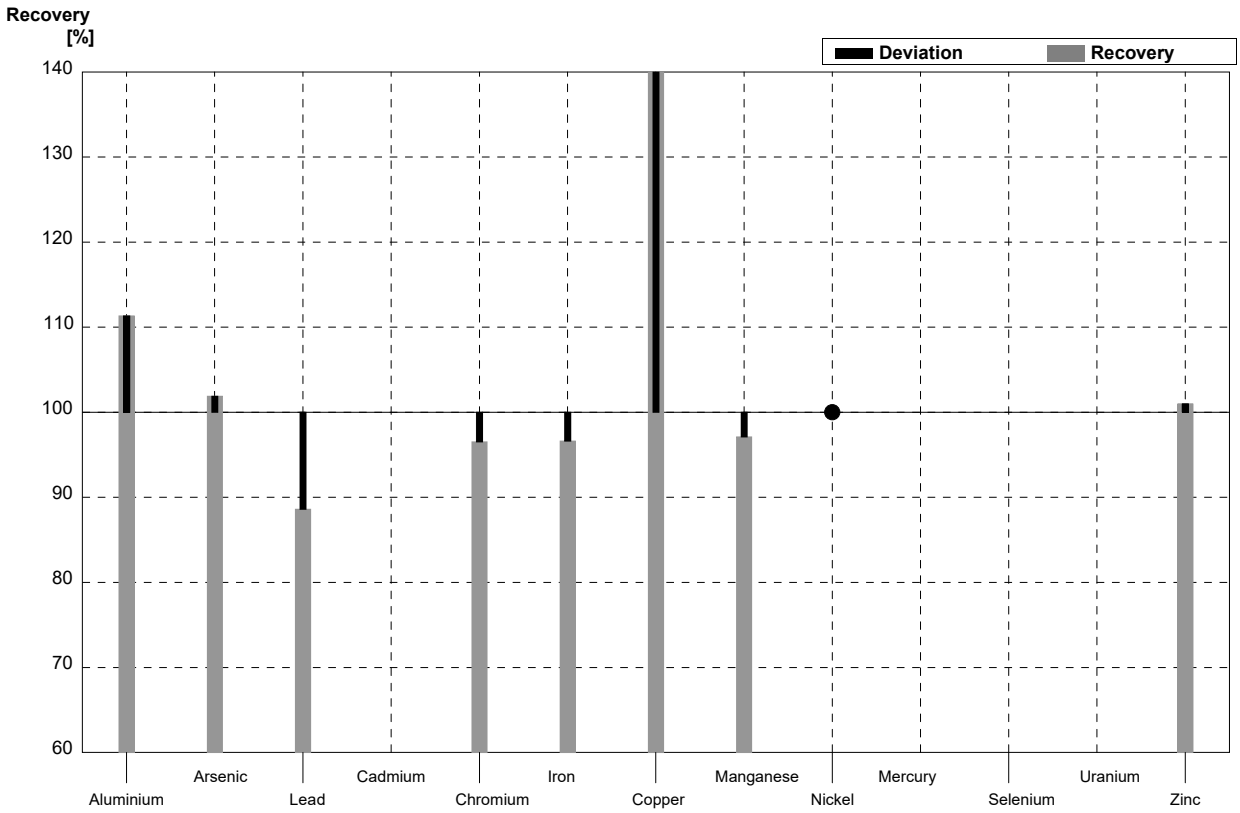
Sample M148B
Laboratory P

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,3	1,4	µg/l	102%
Arsenic	1,10	0,01	1,13	0,07	µg/l	103%
Lead	1,98	0,01	1,94	0,18	µg/l	98%
Cadmium	0,800	0,007	0,80	0,07	µg/l	100%
Chromium	0,60	0,01	0,58	0,04	µg/l	97%
Iron	18,0	0,2	17,7	1,4	µg/l	98%
Copper	3,20	0,03	3,08	0,29	µg/l	96%
Manganese	2,12	0,03	2,07	0,17	µg/l	98%
Nickel	3,52	0,03	3,67	0,30	µg/l	104%
Mercury	0,58	0,01	0,56	0,02	µg/l	97%
Selenium	3,55	0,06	3,44	0,52	µg/l	97%
Uranium	3,80	0,02	3,72	0,37	µg/l	98%
Zinc	28,0	0,8	28,8	2,8	µg/l	103%



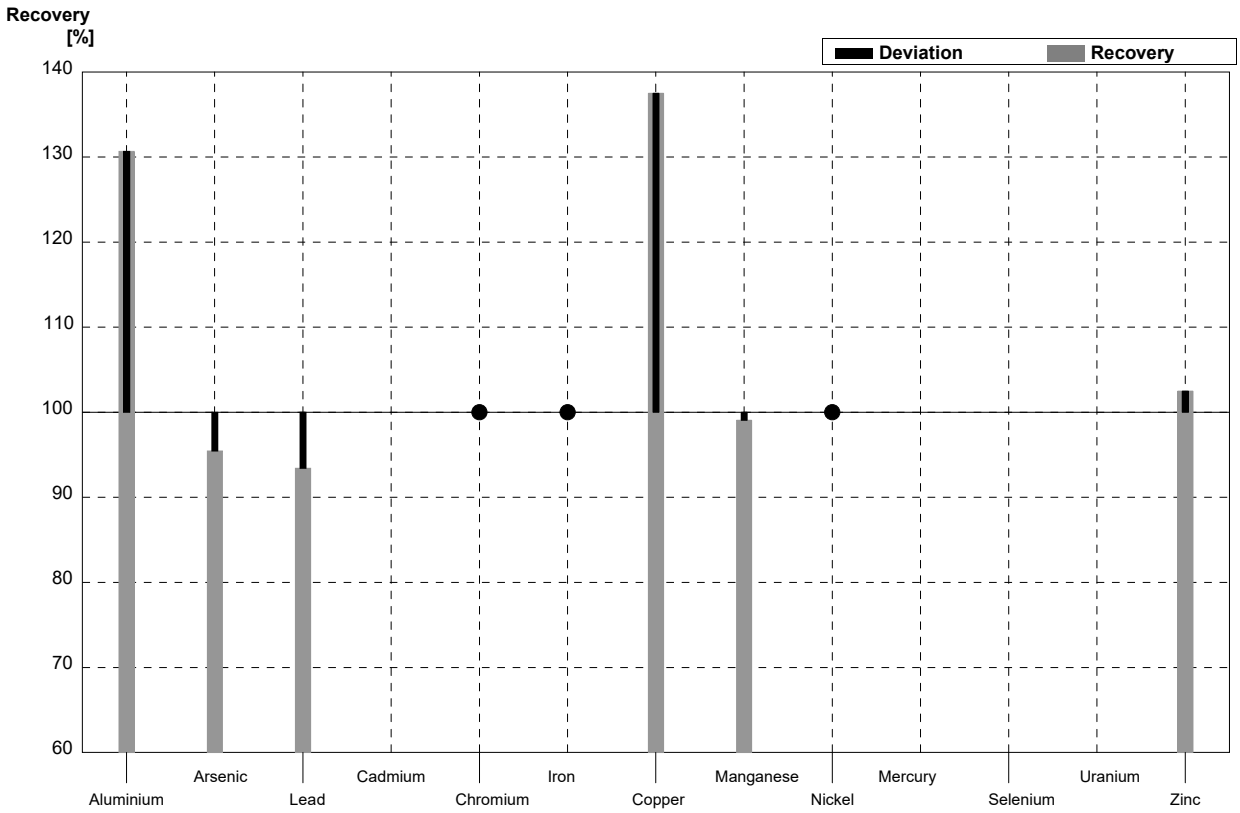
Sample M148A
Laboratory Q

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	33,4	6,0	µg/l	111%
Arsenic	4,20	0,03	4,28	0,96	µg/l	102%
Lead	0,79	0,01	0,70	0,54	µg/l	89%
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03	3,9	1,5	µg/l	97%
Iron	71,4	0,3	69	9,6	µg/l	97%
Copper	1,70	0,02	2,6	1,6	µg/l	153%
Manganese	38,1	0,2	37	7,2	µg/l	97%
Nickel	1,30	0,02	<10		µg/l	•
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8	10,1	2,7	µg/l	101%



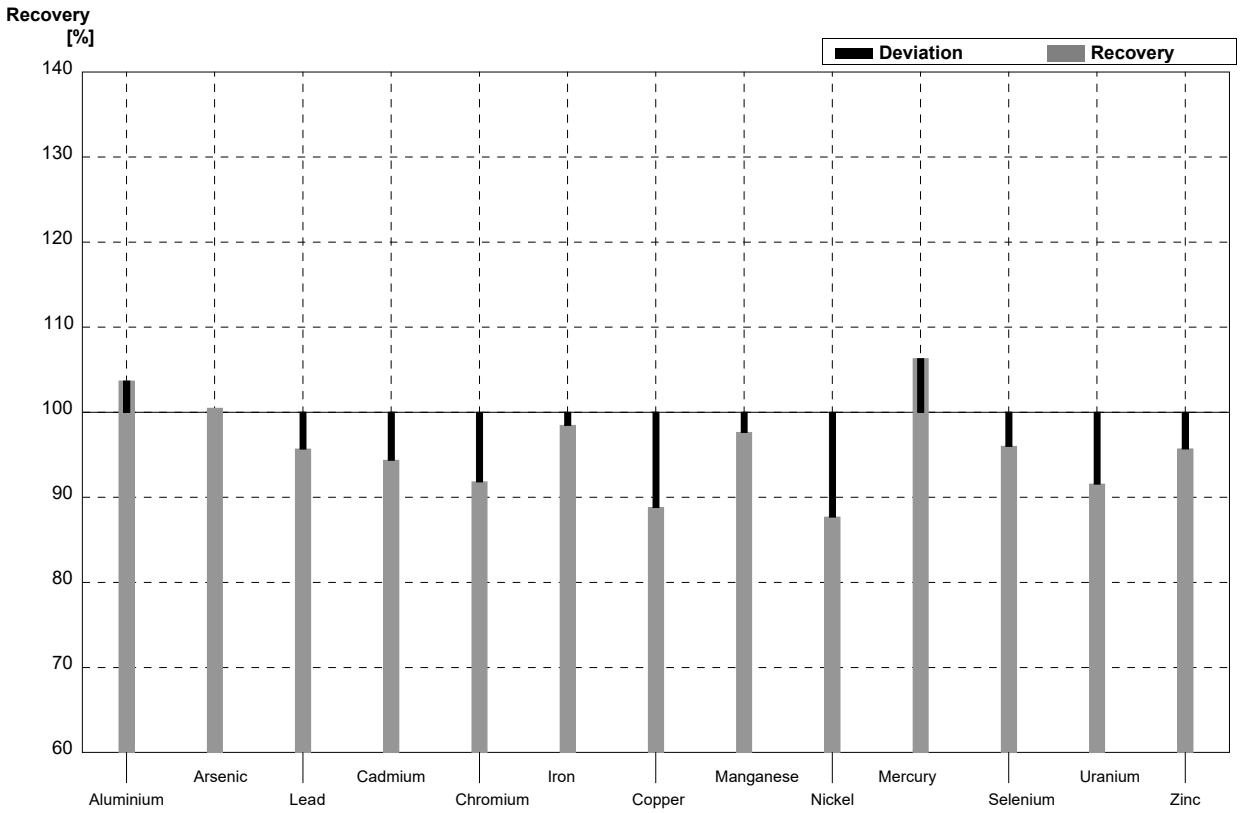
Sample M148B
Laboratory Q

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	19,6	4,4	µg/l	131%
Arsenic	1,10	0,01	1,05	0,41	µg/l	95%
Lead	1,98	0,01	1,85	0,74	µg/l	93%
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01	<2		µg/l	•
Iron	18,0	0,2	<20		µg/l	•
Copper	3,20	0,03	4,4	1,8	µg/l	138%
Manganese	2,12	0,03	2,1	5,1	µg/l	99%
Nickel	3,52	0,03	<10		µg/l	•
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8	28,7	5,5	µg/l	103%



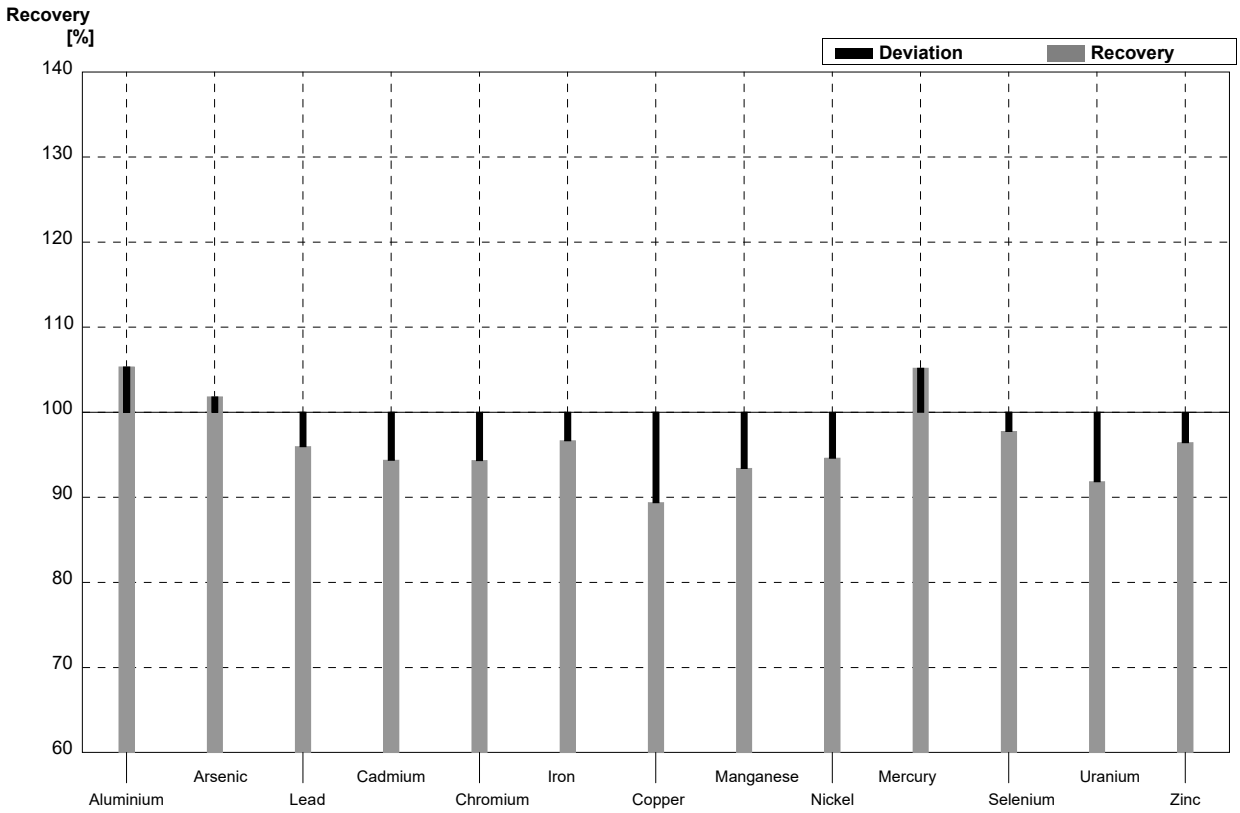
Sample M148A
Laboratory R

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	31,1	0,6	µg/l	104%
Arsenic	4,20	0,03	4,22	0,20	µg/l	100%
Lead	0,79	0,01	0,756	0,017	µg/l	96%
Cadmium	0,249	0,003	0,235	0,021	µg/l	94%
Chromium	4,04	0,03	3,71	0,28	µg/l	92%
Iron	71,4	0,3	70,3	4,7	µg/l	98%
Copper	1,70	0,02	1,51	0,11	µg/l	89%
Manganese	38,1	0,2	37,2	1,6	µg/l	98%
Nickel	1,30	0,02	1,14	0,11	µg/l	88%
Mercury	0,95	0,01	1,01	0,07	µg/l	106%
Selenium	1,00	0,05	0,96	0,06	µg/l	96%
Uranium	6,05	0,04	5,54	0,26	µg/l	92%
Zinc	10,0	0,8	9,57	0,56	µg/l	96%



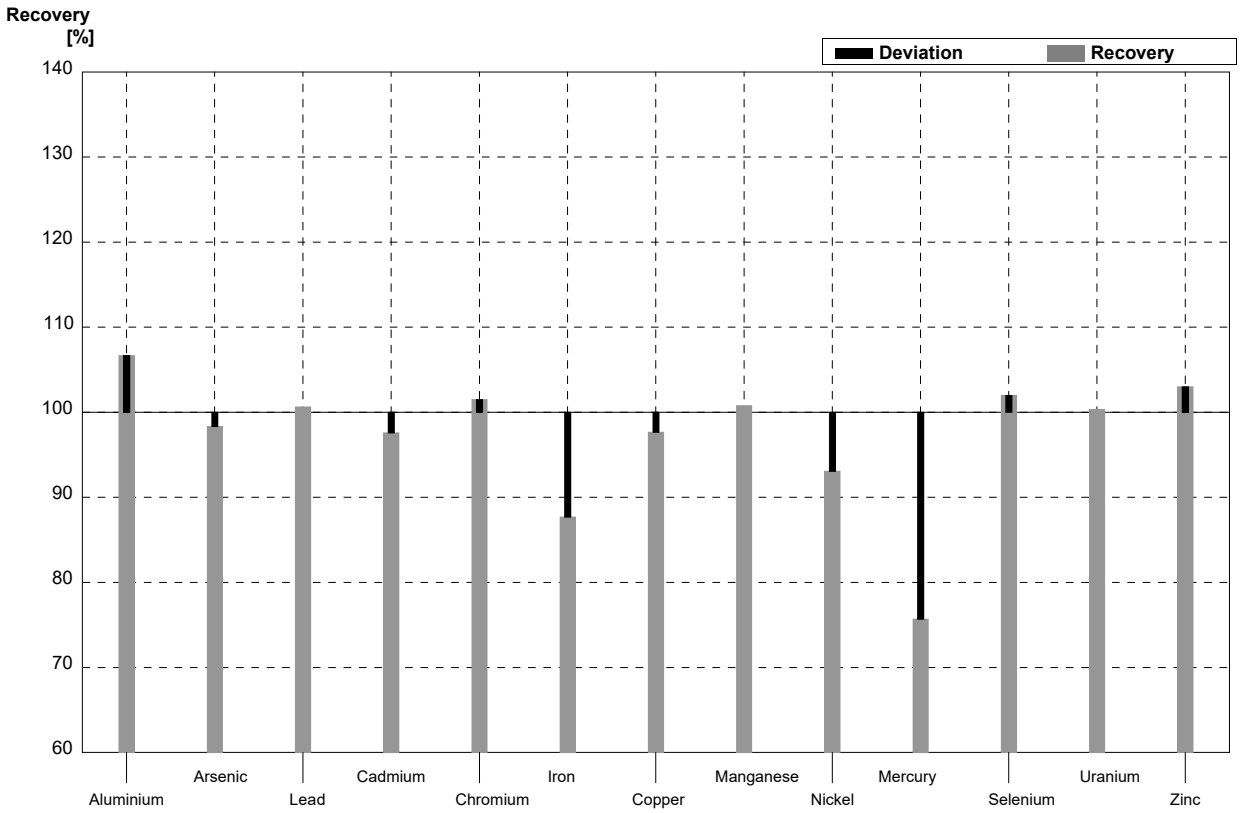
Sample M148B
Laboratory R

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,8	0,8	µg/l	105%
Arsenic	1,10	0,01	1,12	0,03	µg/l	102%
Lead	1,98	0,01	1,90	0,02	µg/l	96%
Cadmium	0,800	0,007	0,755	0,033	µg/l	94%
Chromium	0,60	0,01	0,566	0,043	µg/l	94%
Iron	18,0	0,2	17,4	1,2	µg/l	97%
Copper	3,20	0,03	2,86	0,18	µg/l	89%
Manganese	2,12	0,03	1,98	0,09	µg/l	93%
Nickel	3,52	0,03	3,33	0,19	µg/l	95%
Mercury	0,58	0,01	0,61	0,05	µg/l	105%
Selenium	3,55	0,06	3,47	0,28	µg/l	98%
Uranium	3,80	0,02	3,49	0,17	µg/l	92%
Zinc	28,0	0,8	27,0	0,8	µg/l	96%



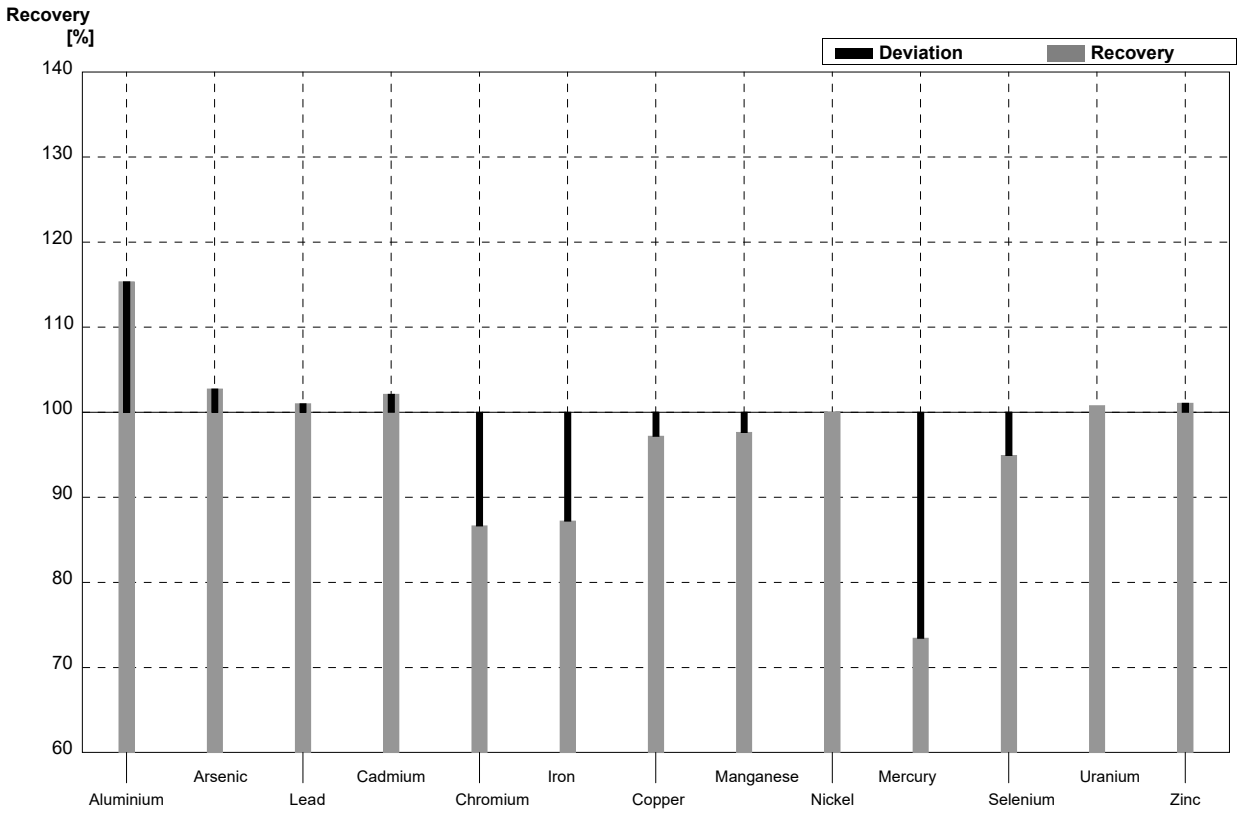
Sample M148A
Laboratory S

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	32,0	0,666	µg/l	107%
Arsenic	4,20	0,03	4,13	0,080	µg/l	98%
Lead	0,79	0,01	0,795	0,020	µg/l	101%
Cadmium	0,249	0,003	0,243	0,009	µg/l	98%
Chromium	4,04	0,03	4,10	0,015	µg/l	101%
Iron	71,4	0,3	62,6	0,115	µg/l	88%
Copper	1,70	0,02	1,66	0,015	µg/l	98%
Manganese	38,1	0,2	38,4	0,100	µg/l	101%
Nickel	1,30	0,02	1,21	0,044	µg/l	93%
Mercury	0,95	0,01	0,719	0,015	µg/l	76%
Selenium	1,00	0,05	1,02	0,010	µg/l	102%
Uranium	6,05	0,04	6,07	0,107	µg/l	100%
Zinc	10,0	0,8	10,3	0,242	µg/l	103%



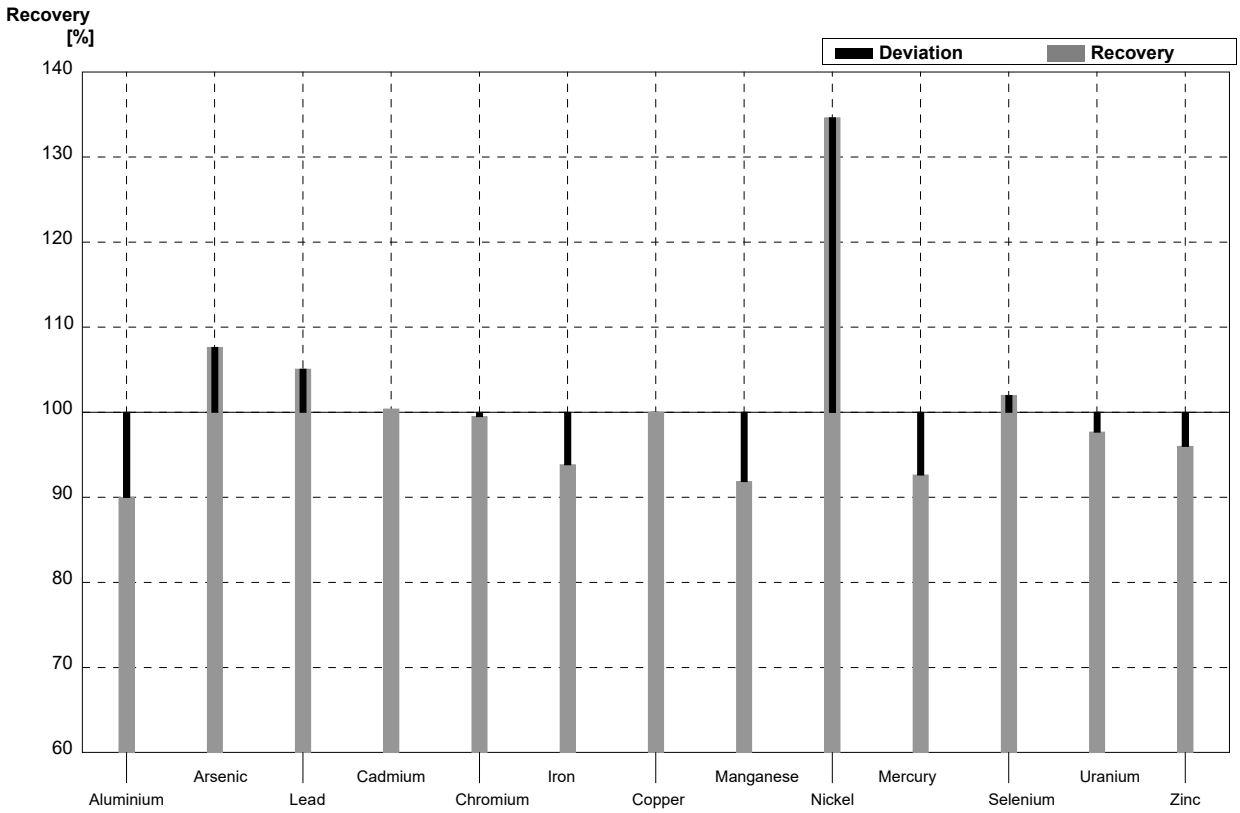
Sample M148B
Laboratory S

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	17,3	0,208	µg/l	115%
Arsenic	1,10	0,01	1,13	0,021	µg/l	103%
Lead	1,98	0,01	2,00	0,015	µg/l	101%
Cadmium	0,800	0,007	0,817	0,011	µg/l	102%
Chromium	0,60	0,01	0,520	0,023	µg/l	87%
Iron	18,0	0,2	15,7	0,153	µg/l	87%
Copper	3,20	0,03	3,11	0,021	µg/l	97%
Manganese	2,12	0,03	2,07	0,038	µg/l	98%
Nickel	3,52	0,03	3,52	0,025	µg/l	100%
Mercury	0,58	0,01	0,426	0,011	µg/l	73%
Selenium	3,55	0,06	3,37	0,201	µg/l	95%
Uranium	3,80	0,02	3,83	0,067	µg/l	101%
Zinc	28,0	0,8	28,3	0,153	µg/l	101%



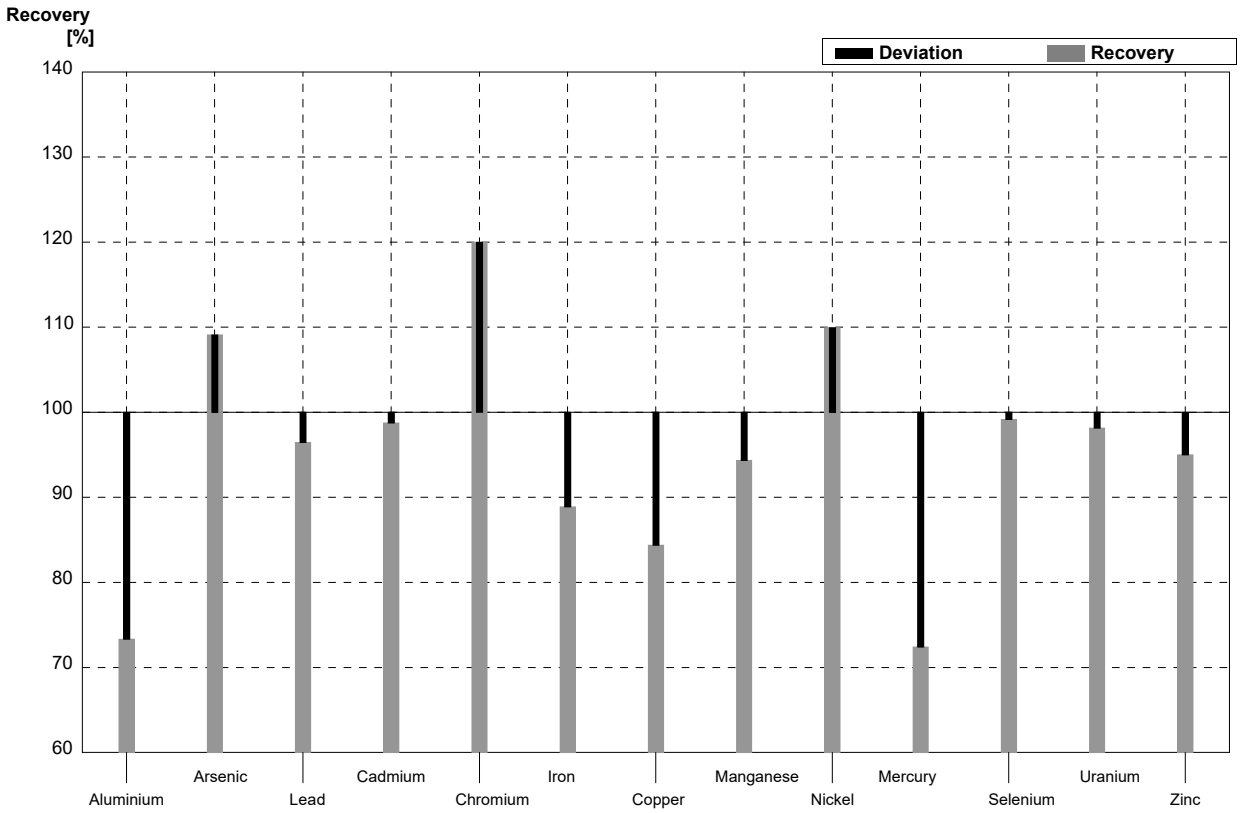
Sample M148A
Laboratory T

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	27	2,7	µg/l	90%
Arsenic	4,20	0,03	4,52	0,5	µg/l	108%
Lead	0,79	0,01	0,83	0,1	µg/l	105%
Cadmium	0,249	0,003	0,25	0,05	µg/l	100%
Chromium	4,04	0,03	4,02	0,4	µg/l	100%
Iron	71,4	0,3	67	7	µg/l	94%
Copper	1,70	0,02	1,7	0,3	µg/l	100%
Manganese	38,1	0,2	35	3,5	µg/l	92%
Nickel	1,30	0,02	1,75	0,2	µg/l	135%
Mercury	0,95	0,01	0,88	0,1	µg/l	93%
Selenium	1,00	0,05	1,02	0,1	µg/l	102%
Uranium	6,05	0,04	5,91	0,5	µg/l	98%
Zinc	10,0	0,8	9,6	1	µg/l	96%



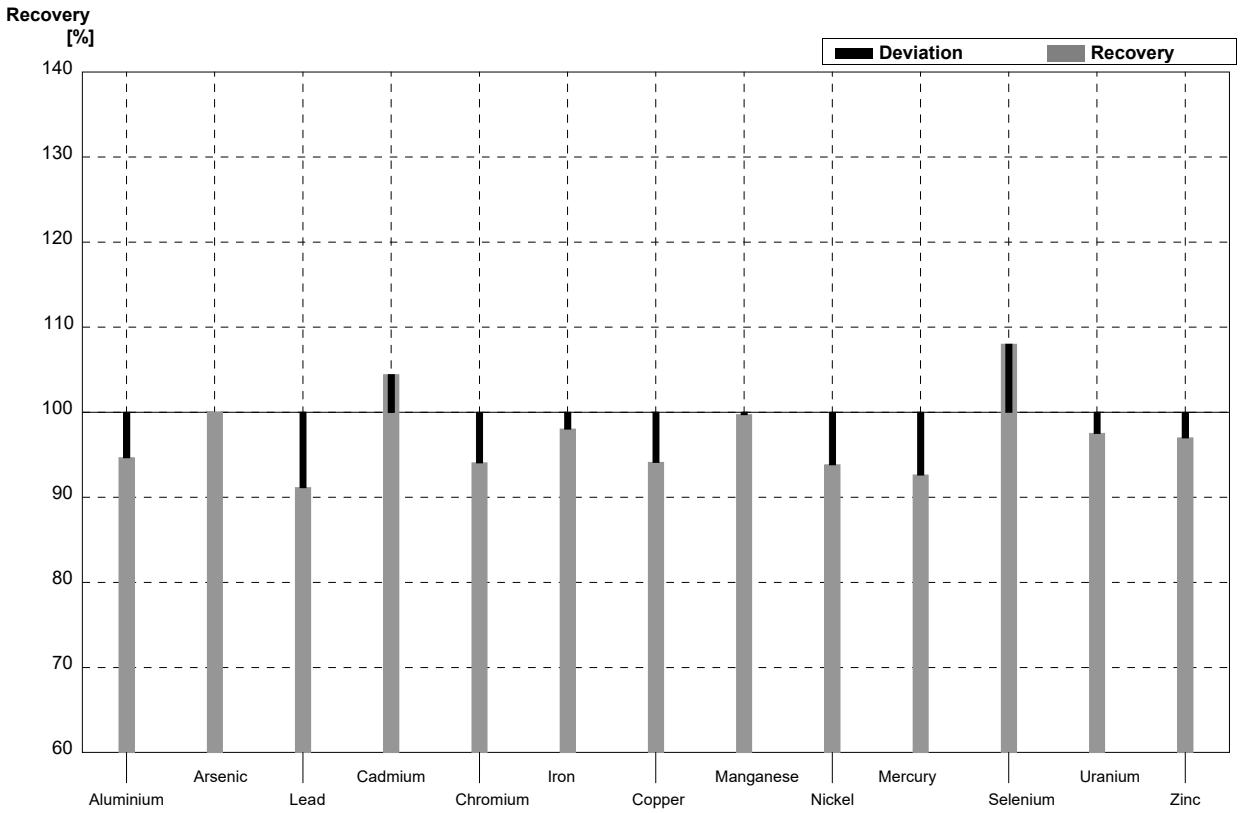
Sample M148B
Laboratory T

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	11	1,1	µg/l	73%
Arsenic	1,10	0,01	1,20	0,2	µg/l	109%
Lead	1,98	0,01	1,91	0,2	µg/l	96%
Cadmium	0,800	0,007	0,79	0,1	µg/l	99%
Chromium	0,60	0,01	0,72	0,1	µg/l	120%
Iron	18,0	0,2	16	1,6	µg/l	89%
Copper	3,20	0,03	2,7	0,4	µg/l	84%
Manganese	2,12	0,03	2,0	0,4	µg/l	94%
Nickel	3,52	0,03	3,87	0,4	µg/l	110%
Mercury	0,58	0,01	0,42	0,08	µg/l	72%
Selenium	3,55	0,06	3,52	0,4	µg/l	99%
Uranium	3,80	0,02	3,73	0,4	µg/l	98%
Zinc	28,0	0,8	26,6	2,7	µg/l	95%



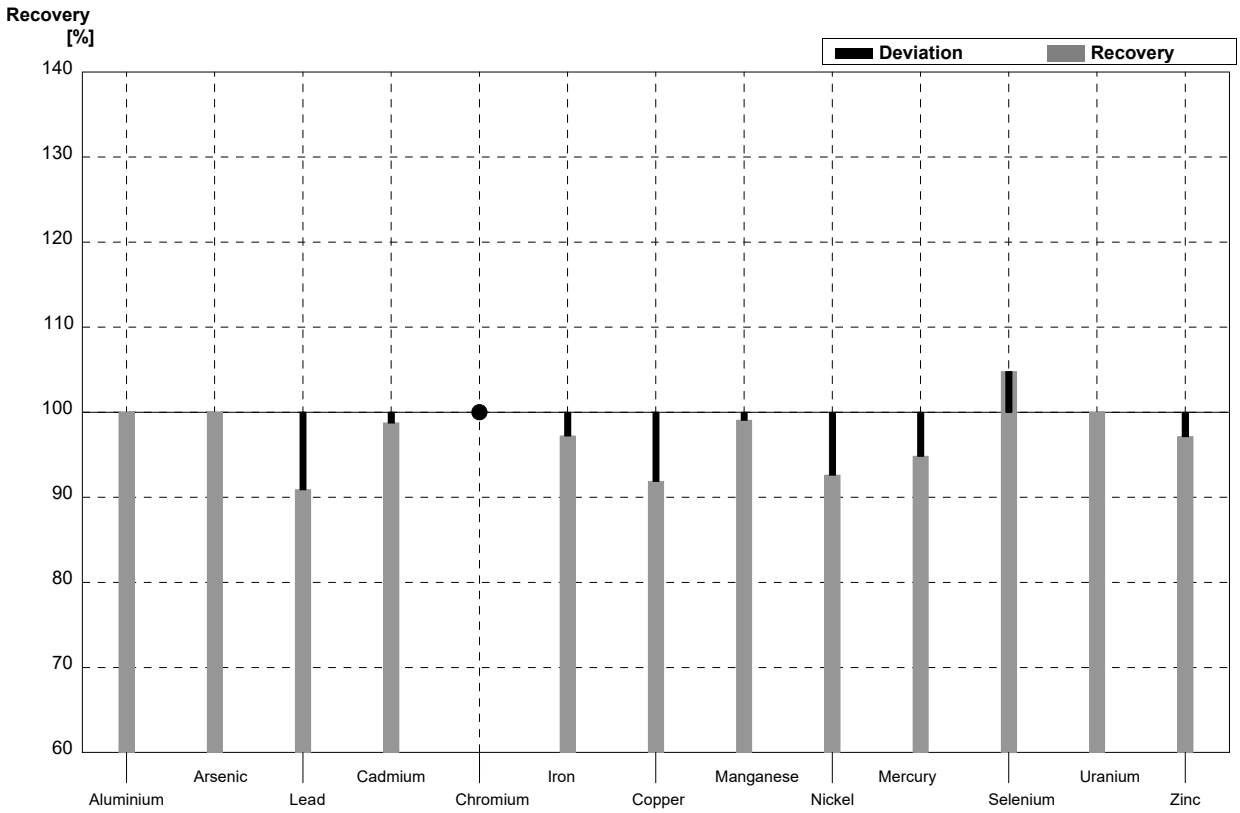
Sample M148A
Laboratory U

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	28,4	2,8	µg/l	95%
Arsenic	4,20	0,03	4,2	0,63	µg/l	100%
Lead	0,79	0,01	0,72	0,072	µg/l	91%
Cadmium	0,249	0,003	0,26	0,026	µg/l	104%
Chromium	4,04	0,03	3,8	0,38	µg/l	94%
Iron	71,4	0,3	70	7,0	µg/l	98%
Copper	1,70	0,02	1,6	0,16	µg/l	94%
Manganese	38,1	0,2	38	3,8	µg/l	100%
Nickel	1,30	0,02	1,22	0,12	µg/l	94%
Mercury	0,95	0,01	0,88	0,088	µg/l	93%
Selenium	1,00	0,05	1,08	0,16	µg/l	108%
Uranium	6,05	0,04	5,9	0,59	µg/l	98%
Zinc	10,0	0,8	9,7	0,97	µg/l	97%



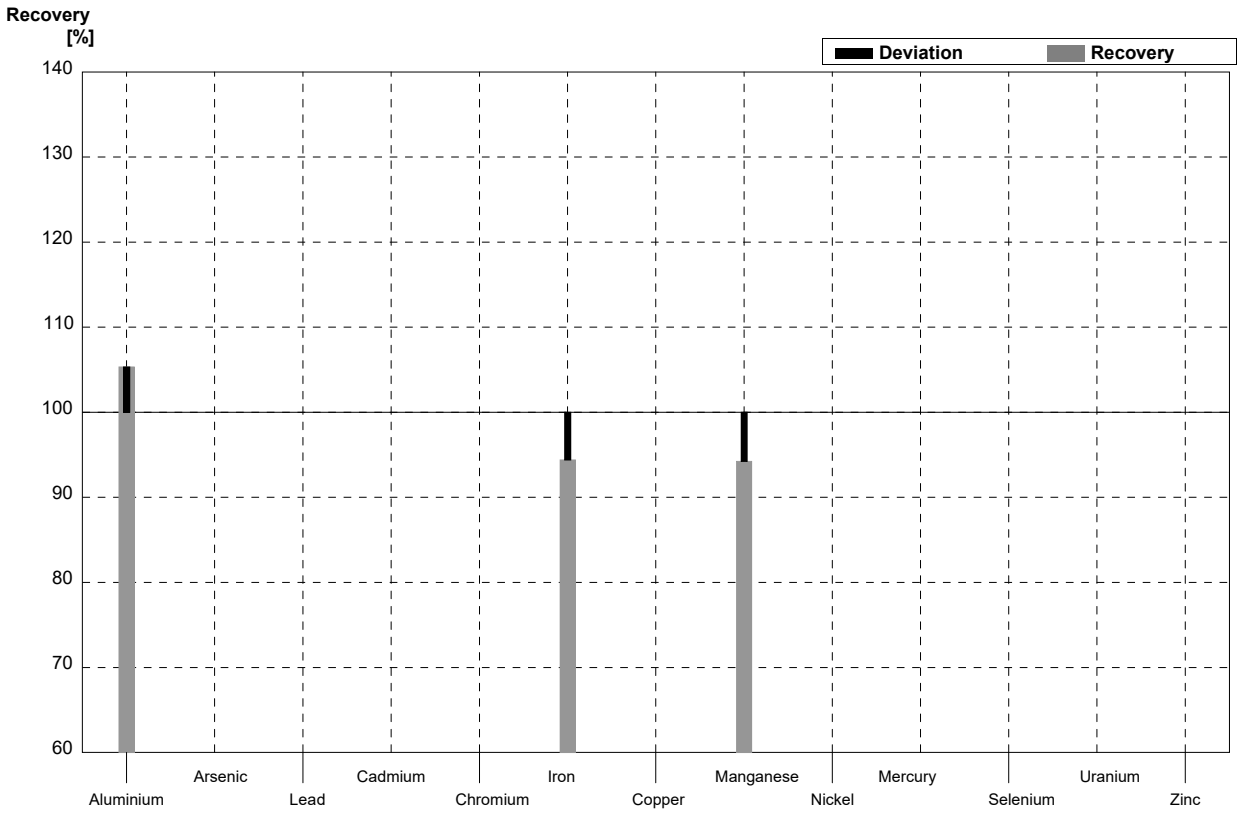
Sample M148B
Laboratory U

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15	1,5	µg/l	100%
Arsenic	1,10	0,01	1,1	0,165	µg/l	100%
Lead	1,98	0,01	1,8	0,18	µg/l	91%
Cadmium	0,800	0,007	0,79	0,079	µg/l	99%
Chromium	0,60	0,01	<1,0		µg/l	•
Iron	18,0	0,2	17,5	1,75	µg/l	97%
Copper	3,20	0,03	2,94	0,29	µg/l	92%
Manganese	2,12	0,03	2,1	0,21	µg/l	99%
Nickel	3,52	0,03	3,26	0,33	µg/l	93%
Mercury	0,58	0,01	0,55	0,055	µg/l	95%
Selenium	3,55	0,06	3,72	0,558	µg/l	105%
Uranium	3,80	0,02	3,8	0,38	µg/l	100%
Zinc	28,0	0,8	27,2	2,7	µg/l	97%



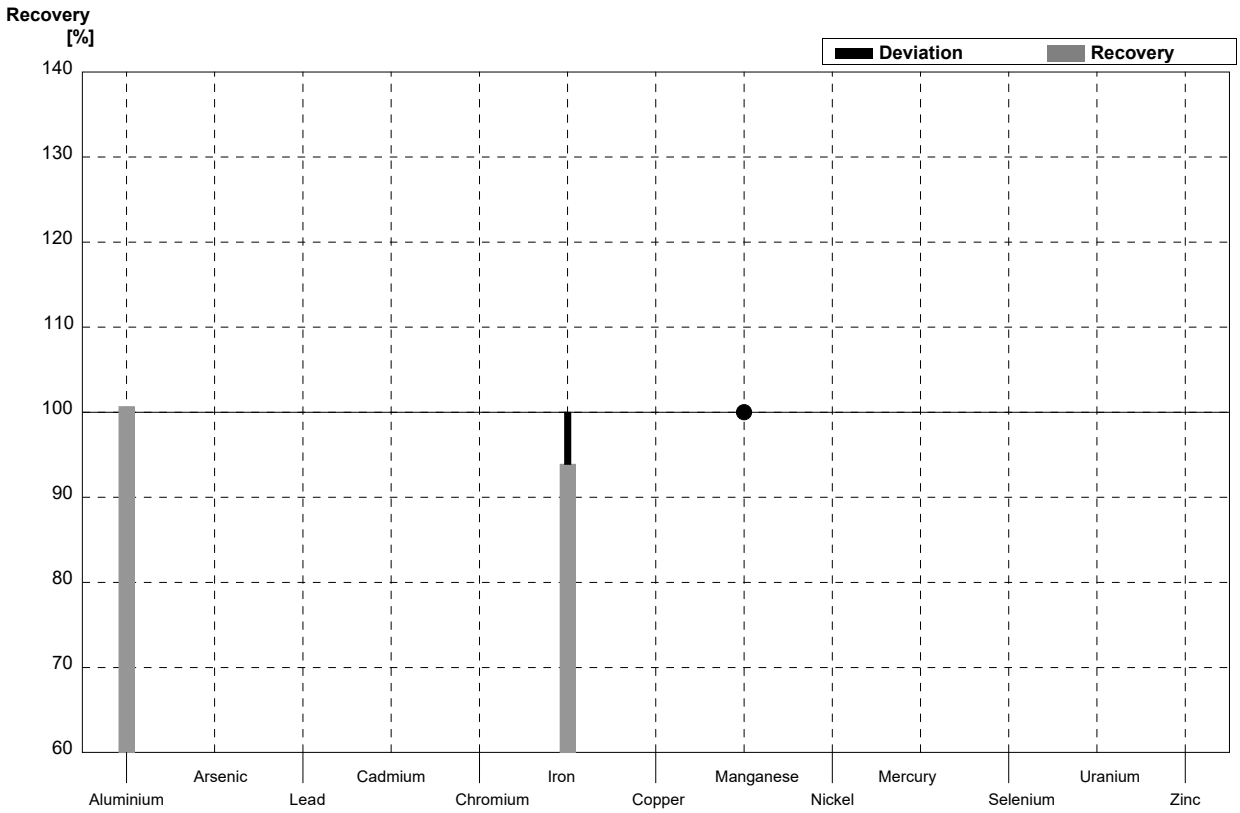
Sample M148A
Laboratory V

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	31,6	7,9	µg/l	105%
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3	67,4	8,1	µg/l	94%
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2	35,9	5,7	µg/l	94%
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



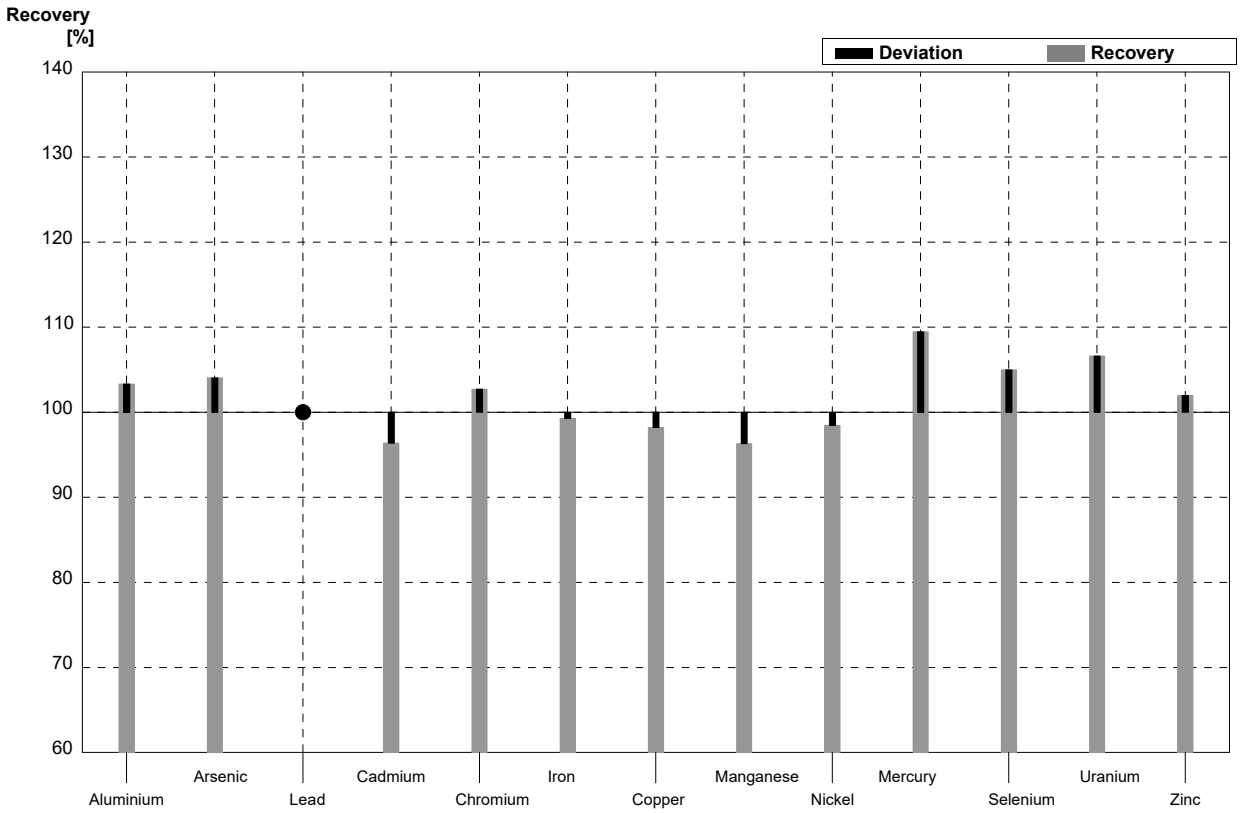
Sample M148B
Laboratory V

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,1	3,8	µg/l	101%
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2	16,9	2,0	µg/l	94%
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03	<10	1,6	µg/l	•
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l	



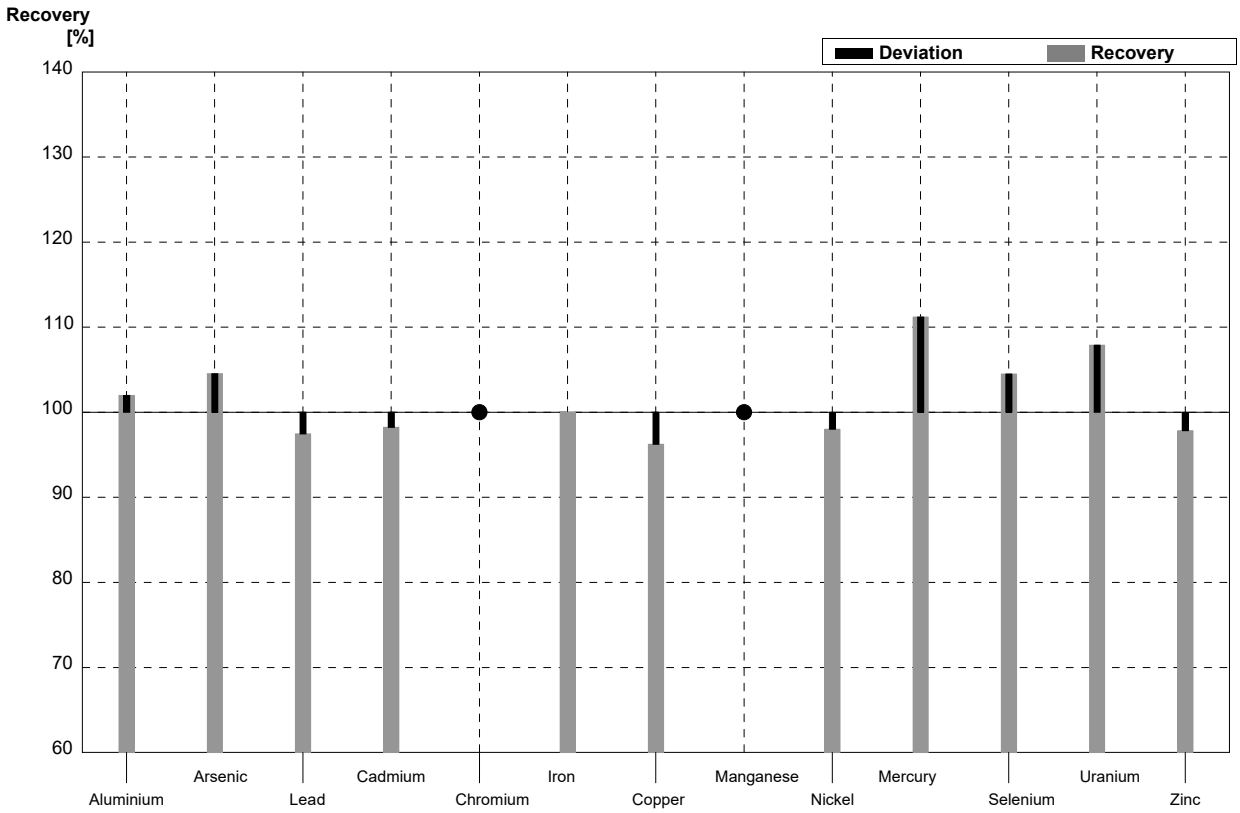
Sample M148A
Laboratory W

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	31,0	4,6	µg/l	103%
Arsenic	4,20	0,03	4,37	0,66	µg/l	104%
Lead	0,79	0,01	<1		µg/l	•
Cadmium	0,249	0,003	0,240	0,036	µg/l	96%
Chromium	4,04	0,03	4,15	0,62	µg/l	103%
Iron	71,4	0,3	70,9	10,6	µg/l	99%
Copper	1,70	0,02	1,67	0,25	µg/l	98%
Manganese	38,1	0,2	36,7	5,5	µg/l	96%
Nickel	1,30	0,02	1,28	0,19	µg/l	98%
Mercury	0,95	0,01	1,04	0,15	µg/l	109%
Selenium	1,00	0,05	1,05	0,16	µg/l	105%
Uranium	6,05	0,04	6,45	0,97	µg/l	107%
Zinc	10,0	0,8	10,2	1,5	µg/l	102%



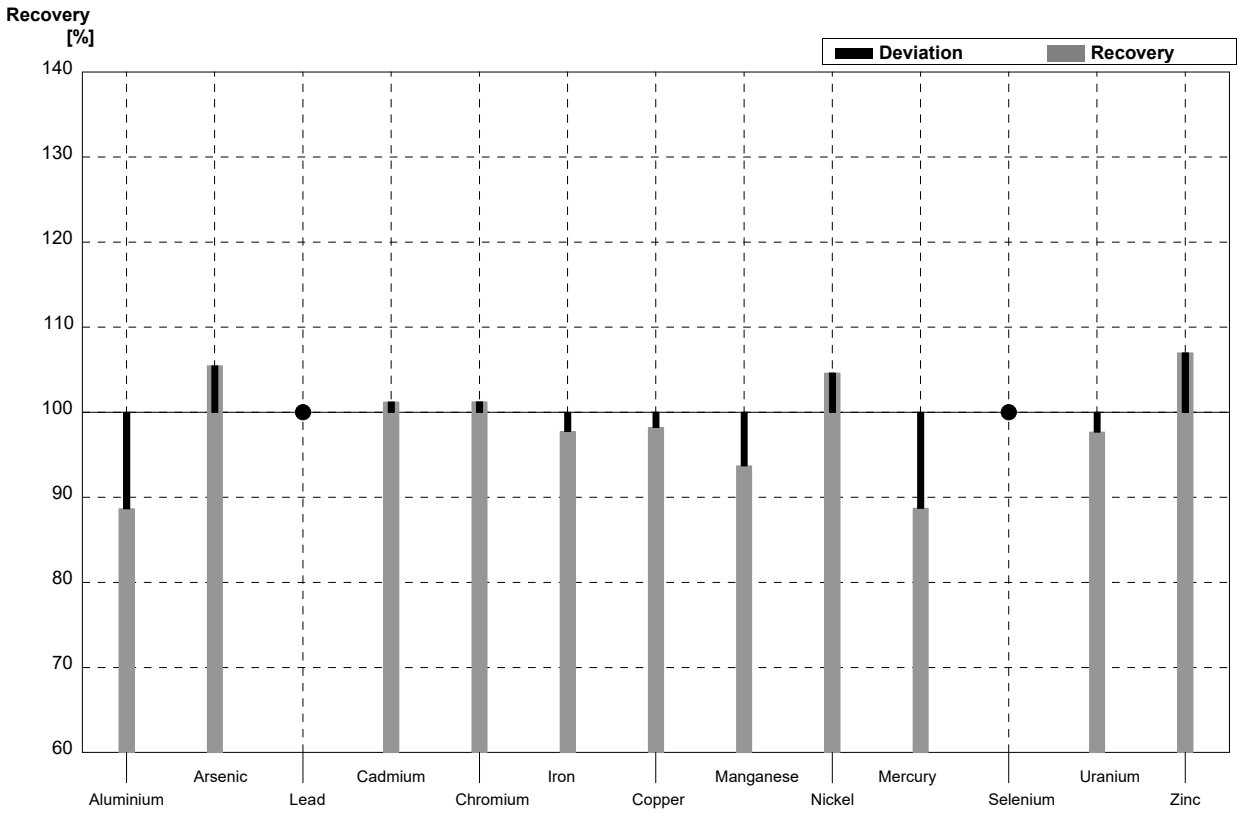
Sample M148B
Laboratory W

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,3	2,3	µg/l	102%
Arsenic	1,10	0,01	1,15	0,17	µg/l	105%
Lead	1,98	0,01	1,93	0,29	µg/l	97%
Cadmium	0,800	0,007	0,786	0,118	µg/l	98%
Chromium	0,60	0,01	<1		µg/l	•
Iron	18,0	0,2	18,0	2,7	µg/l	100%
Copper	3,20	0,03	3,08	0,46	µg/l	96%
Manganese	2,12	0,03	<10		µg/l	•
Nickel	3,52	0,03	3,45	0,52	µg/l	98%
Mercury	0,58	0,01	0,645	0,097	µg/l	111%
Selenium	3,55	0,06	3,71	0,56	µg/l	105%
Uranium	3,80	0,02	4,10	0,61	µg/l	108%
Zinc	28,0	0,8	27,4	4,1	µg/l	98%



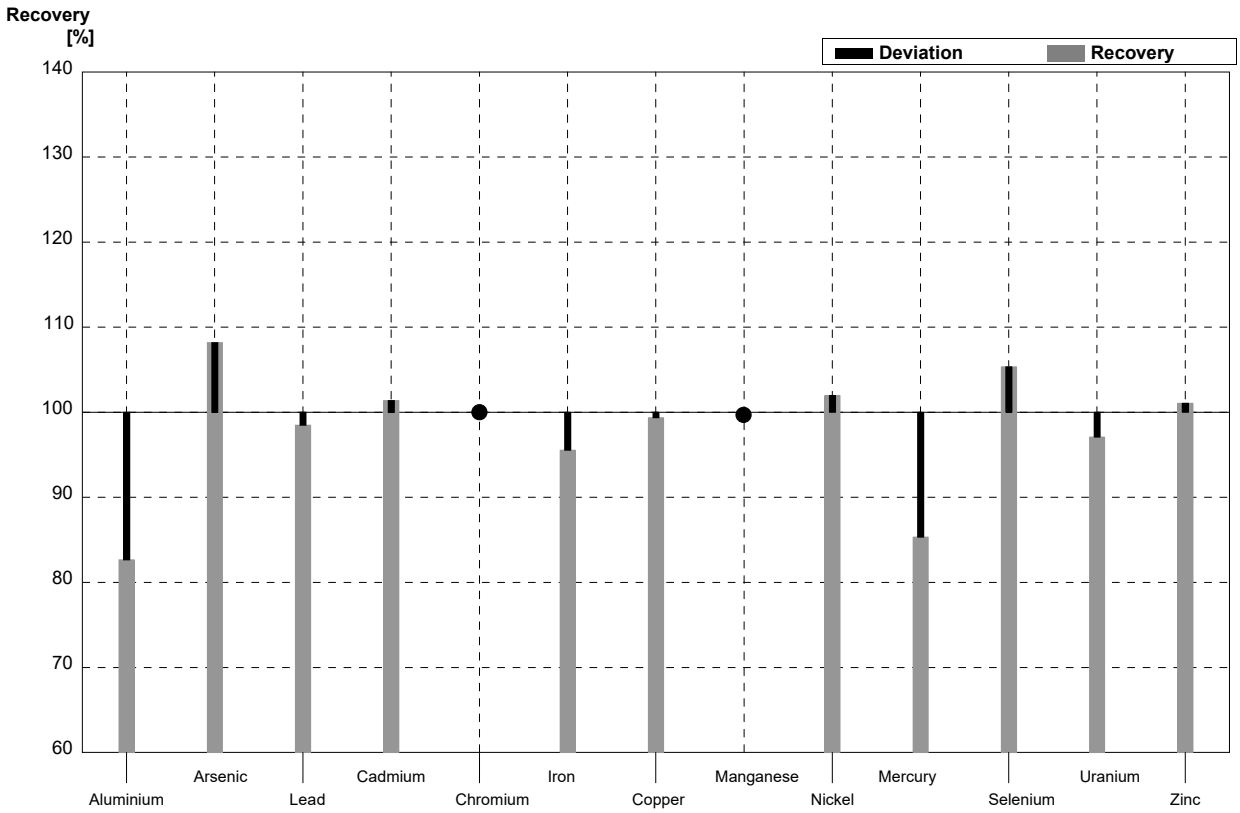
Sample M148A
Laboratory X

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	26,6	0,52	µg/l	89%
Arsenic	4,20	0,03	4,43	0,07	µg/l	105%
Lead	0,79	0,01	<1,00		µg/l	•
Cadmium	0,249	0,003	0,252	0,021	µg/l	101%
Chromium	4,04	0,03	4,09	0,09	µg/l	101%
Iron	71,4	0,3	69,8	0,41	µg/l	98%
Copper	1,70	0,02	1,67	0,09	µg/l	98%
Manganese	38,1	0,2	35,7	0,76	µg/l	94%
Nickel	1,30	0,02	1,36	0,28	µg/l	105%
Mercury	0,95	0,01	0,843	0,032	µg/l	89%
Selenium	1,00	0,05	<1,00		µg/l	•
Uranium	6,05	0,04	5,91	0,09	µg/l	98%
Zinc	10,0	0,8	10,7	0,24	µg/l	107%



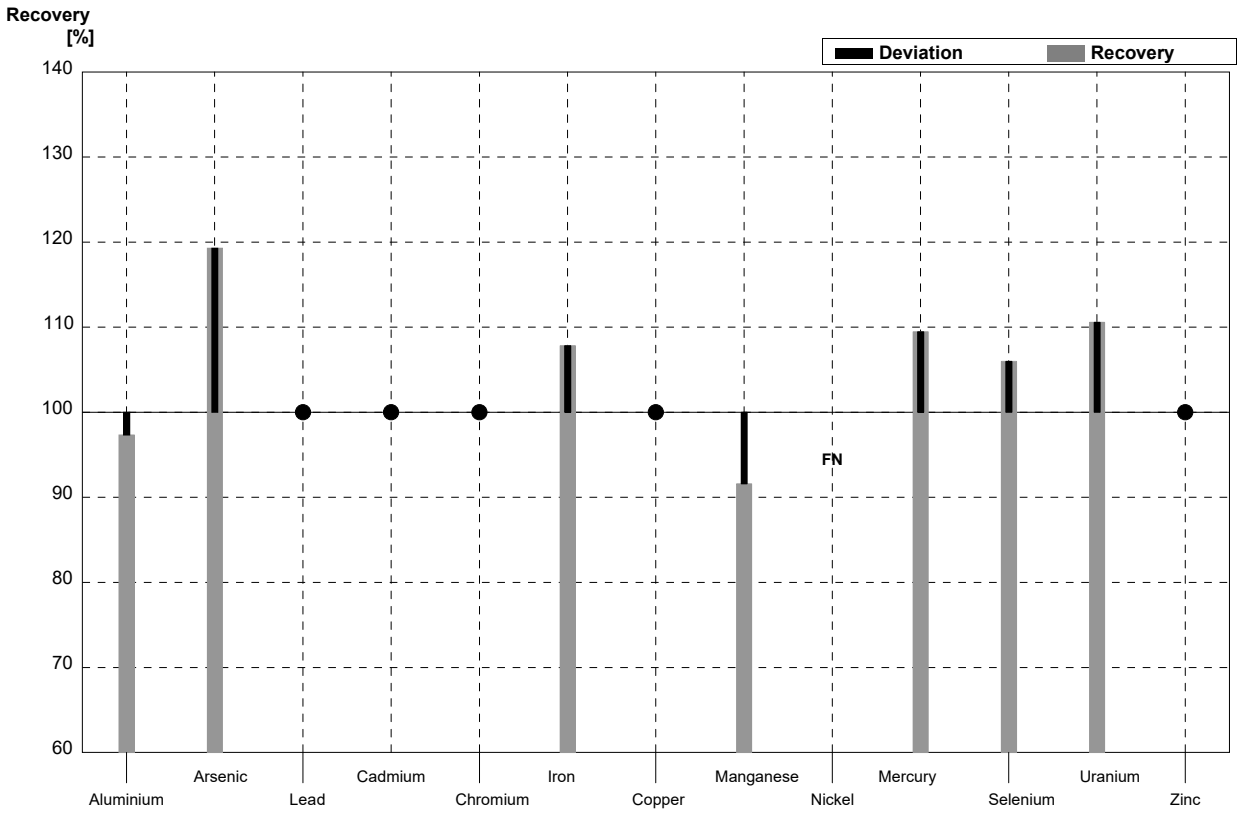
Sample M148B
Laboratory X

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	12,4	0,61	µg/l	83%
Arsenic	1,10	0,01	1,19	0,08	µg/l	108%
Lead	1,98	0,01	1,95	0,09	µg/l	98%
Cadmium	0,800	0,007	0,811	0,019	µg/l	101%
Chromium	0,60	0,01	<1,00		µg/l	•
Iron	18,0	0,2	17,2	0,46	µg/l	96%
Copper	3,20	0,03	3,18	0,09	µg/l	99%
Manganese	2,12	0,03	[0,92]		µg/l	•
Nickel	3,52	0,03	3,59	0,26	µg/l	102%
Mercury	0,58	0,01	0,495	0,034	µg/l	85%
Selenium	3,55	0,06	3,74	0,13	µg/l	105%
Uranium	3,80	0,02	3,69	0,09	µg/l	97%
Zinc	28,0	0,8	28,3	0,25	µg/l	101%



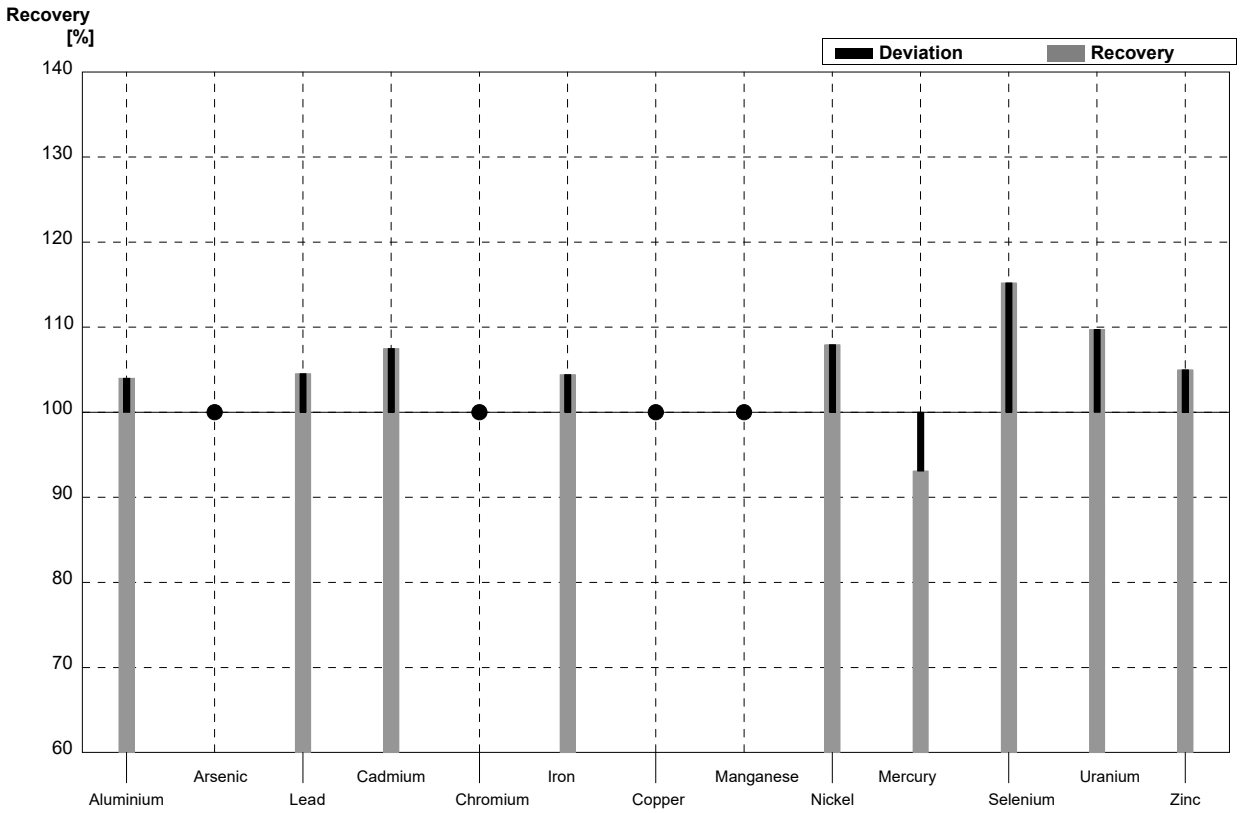
Sample M148A
Laboratory Y

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	29,2	1,69	µg/l	97%
Arsenic	4,20	0,03	5,01	0,38	µg/l	119%
Lead	0,79	0,01	<1		µg/l	•
Cadmium	0,249	0,003	<0,4		µg/l	•
Chromium	4,04	0,03	<5		µg/l	•
Iron	71,4	0,3	77,0	1,96	µg/l	108%
Copper	1,70	0,02	<5		µg/l	•
Manganese	38,1	0,2	34,9	0,26	µg/l	92%
Nickel	1,30	0,02	<1		µg/l	FN
Mercury	0,95	0,01	1,04	0,03	µg/l	109%
Selenium	1,00	0,05	1,06	0,13	µg/l	106%
Uranium	6,05	0,04	6,69	0,23	µg/l	111%
Zinc	10,0	0,8	<10		µg/l	•



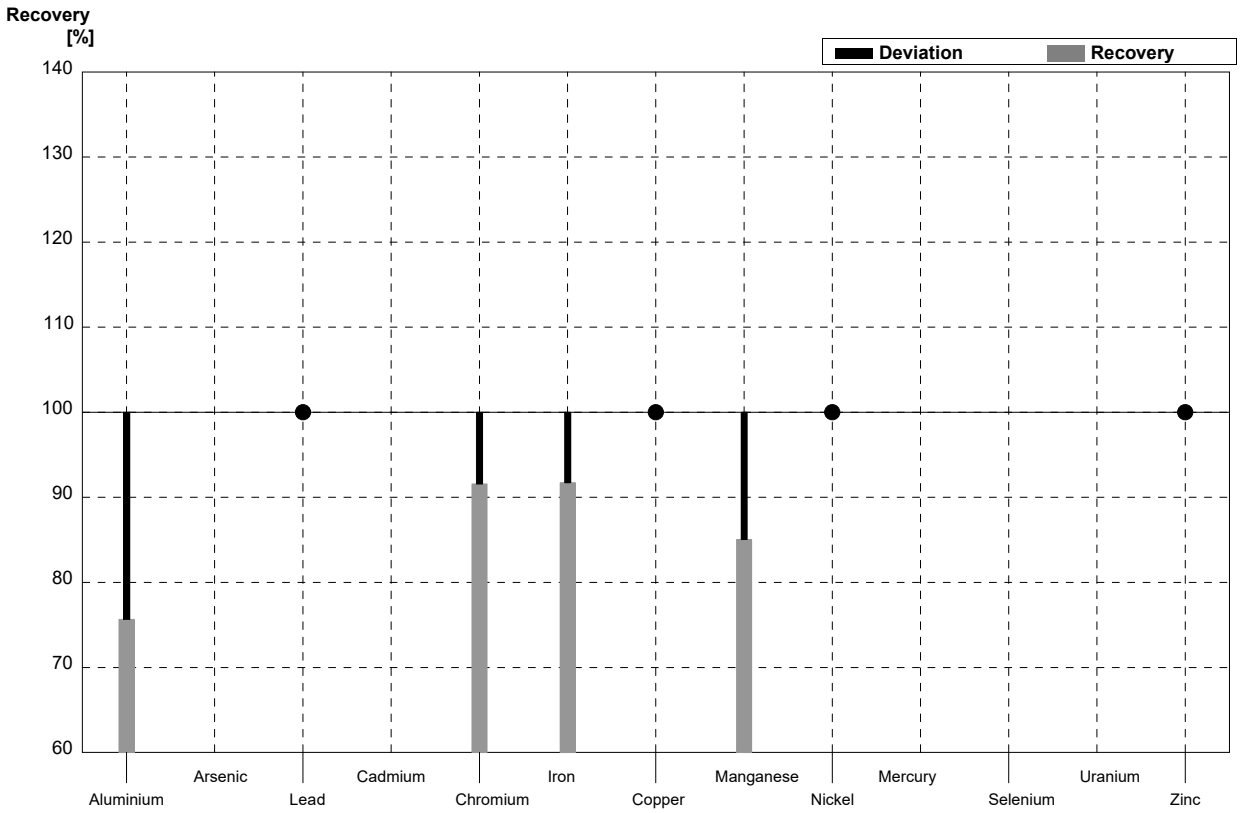
Sample M148B
Laboratory Y

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,6	2,1	µg/l	104%
Arsenic	1,10	0,01	<1,5		µg/l	•
Lead	1,98	0,01	2,07	0,07	µg/l	105%
Cadmium	0,800	0,007	0,86	0,04	µg/l	108%
Chromium	0,60	0,01	<5		µg/l	•
Iron	18,0	0,2	18,8	1,1	µg/l	104%
Copper	3,20	0,03	<5		µg/l	•
Manganese	2,12	0,03	<4		µg/l	•
Nickel	3,52	0,03	3,80	0,09	µg/l	108%
Mercury	0,58	0,01	0,54	0,02	µg/l	93%
Selenium	3,55	0,06	4,09	0,11	µg/l	115%
Uranium	3,80	0,02	4,17	0,26	µg/l	110%
Zinc	28,0	0,8	29,4	0,7	µg/l	105%



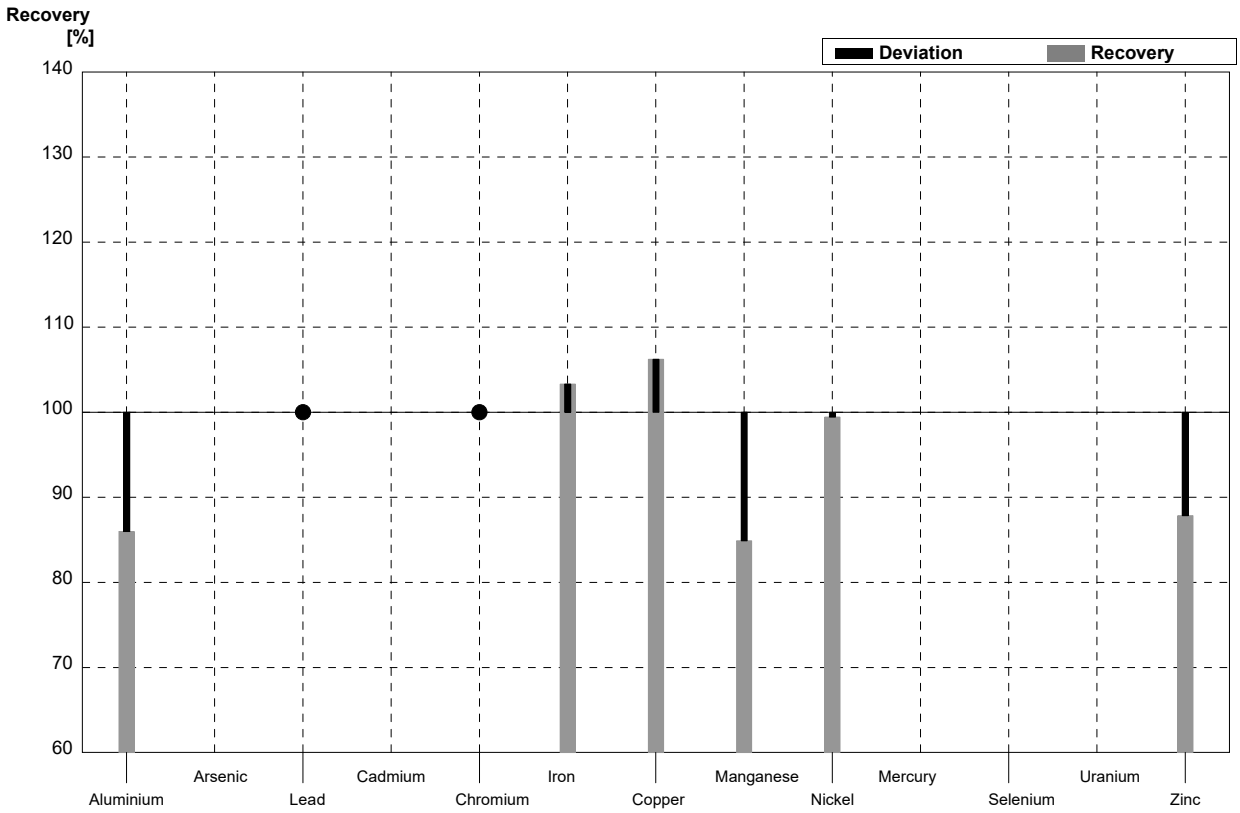
Sample M148A
Laboratory Z

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	22,7	2,1	µg/l	76%
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01	<4		µg/l	•
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03	3,7	0,4	µg/l	92%
Iron	71,4	0,3	65,5	4,0	µg/l	92%
Copper	1,70	0,02	<2		µg/l	•
Manganese	38,1	0,2	32,4	2,6	µg/l	85%
Nickel	1,30	0,02	<2		µg/l	•
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8	<10		µg/l	•



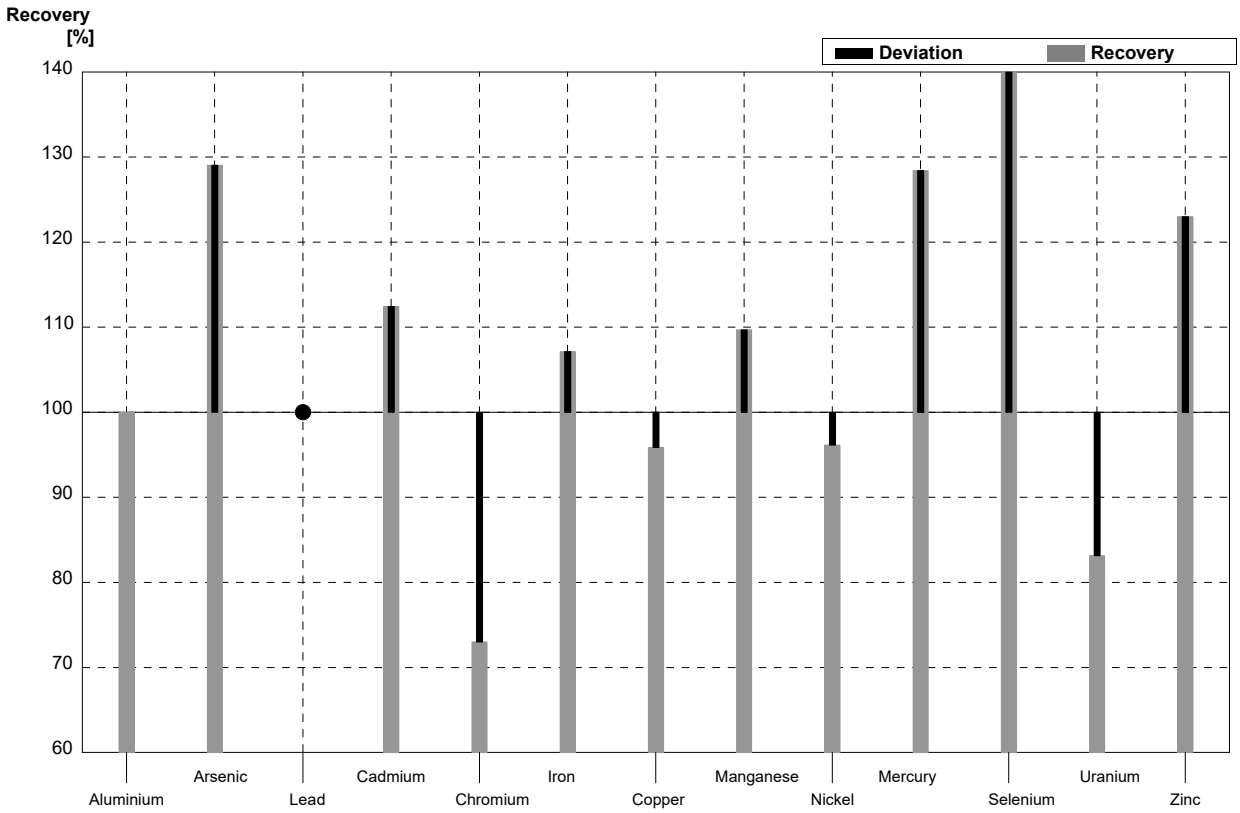
Sample M148B
Laboratory Z

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	12,9	1,2	µg/l	86%
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01	<4		µg/l	•
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01	<2		µg/l	•
Iron	18,0	0,2	18,6	1,1	µg/l	103%
Copper	3,20	0,03	3,4	0,4	µg/l	106%
Manganese	2,12	0,03	1,8	0,1	µg/l	85%
Nickel	3,52	0,03	3,5	0,4	µg/l	99%
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8	24,6	2,5	µg/l	88%



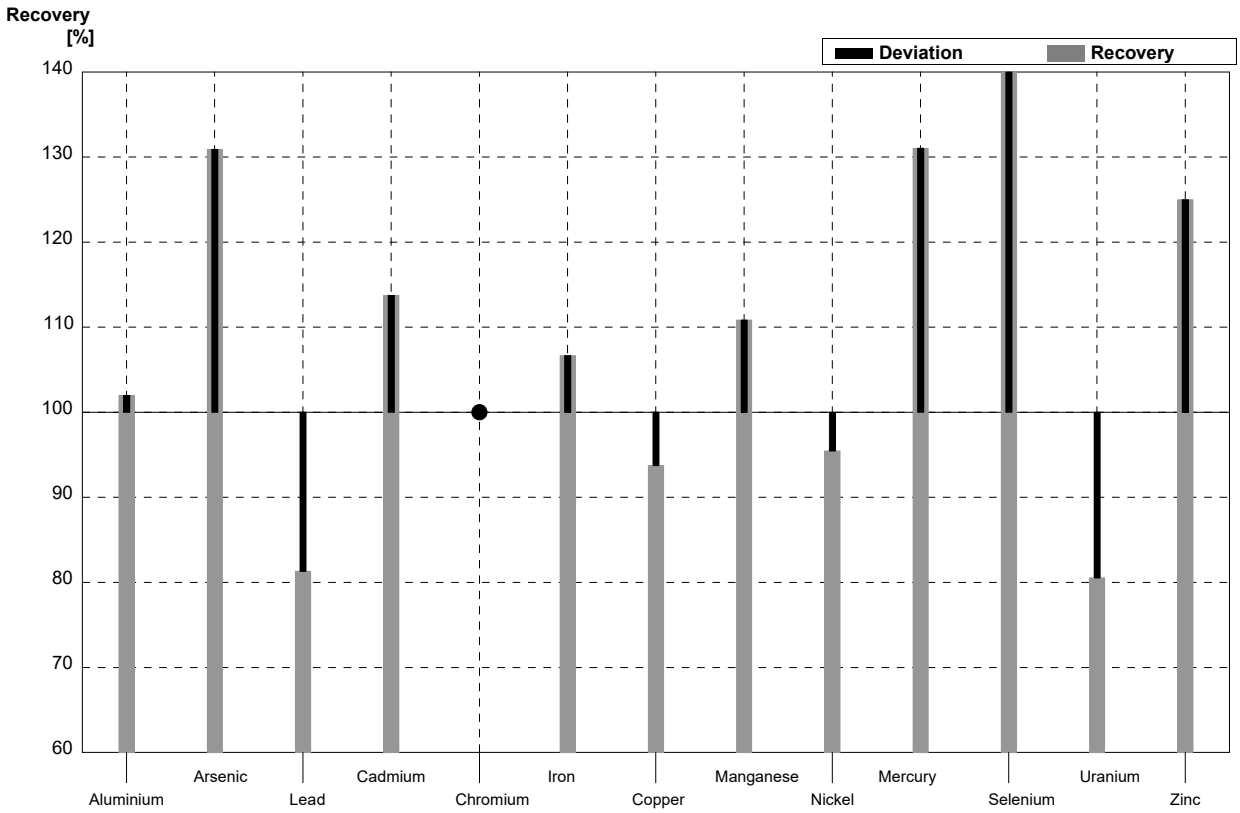
Sample M148A
Laboratory AA

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3	30,0	4,5	µg/l	100%
Arsenic	4,20	0,03	5,42	0,81	µg/l	129%
Lead	0,79	0,01	<1		µg/l	•
Cadmium	0,249	0,003	0,28	0,04	µg/l	112%
Chromium	4,04	0,03	2,95	0,44	µg/l	73%
Iron	71,4	0,3	76,5	11,5	µg/l	107%
Copper	1,70	0,02	1,63	0,24	µg/l	96%
Manganese	38,1	0,2	41,8	6,27	µg/l	110%
Nickel	1,30	0,02	1,25	0,19	µg/l	96%
Mercury	0,95	0,01	1,22	0,18	µg/l	128%
Selenium	1,00	0,05	1,49	0,22	µg/l	149%
Uranium	6,05	0,04	5,03	0,76	µg/l	83%
Zinc	10,0	0,8	12,3	1,84	µg/l	123%



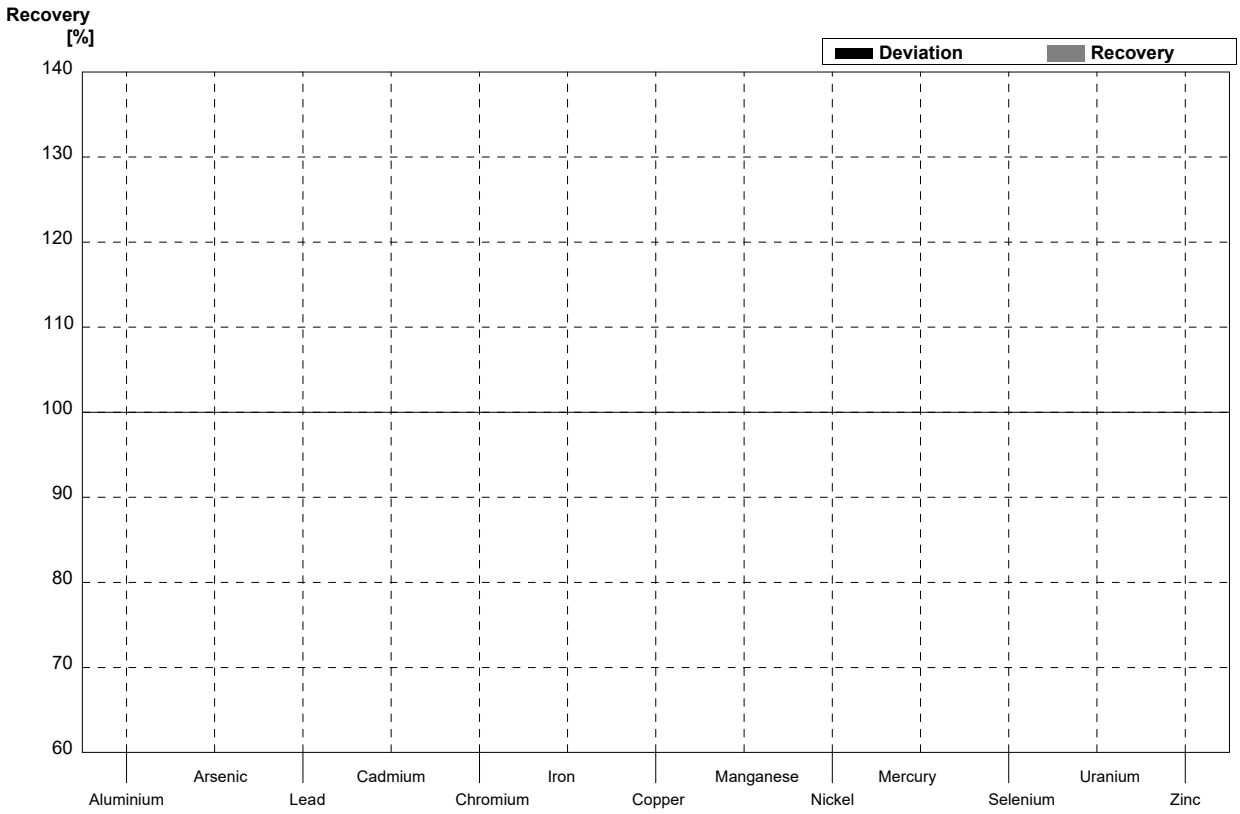
Sample M148B
Laboratory AA

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3	15,3	2,3	µg/l	102%
Arsenic	1,10	0,01	1,44	0,22	µg/l	131%
Lead	1,98	0,01	1,61	0,24	µg/l	81%
Cadmium	0,800	0,007	0,91	0,14	µg/l	114%
Chromium	0,60	0,01	<1		µg/l	•
Iron	18,0	0,2	19,2	2,88	µg/l	107%
Copper	3,20	0,03	3,0	0,45	µg/l	94%
Manganese	2,12	0,03	2,35	0,35	µg/l	111%
Nickel	3,52	0,03	3,36	0,51	µg/l	95%
Mercury	0,58	0,01	0,76	0,11	µg/l	131%
Selenium	3,55	0,06	5,43	0,82	µg/l	153%
Uranium	3,80	0,02	3,06	0,46	µg/l	81%
Zinc	28,0	0,8	35,0	5,25	µg/l	125%



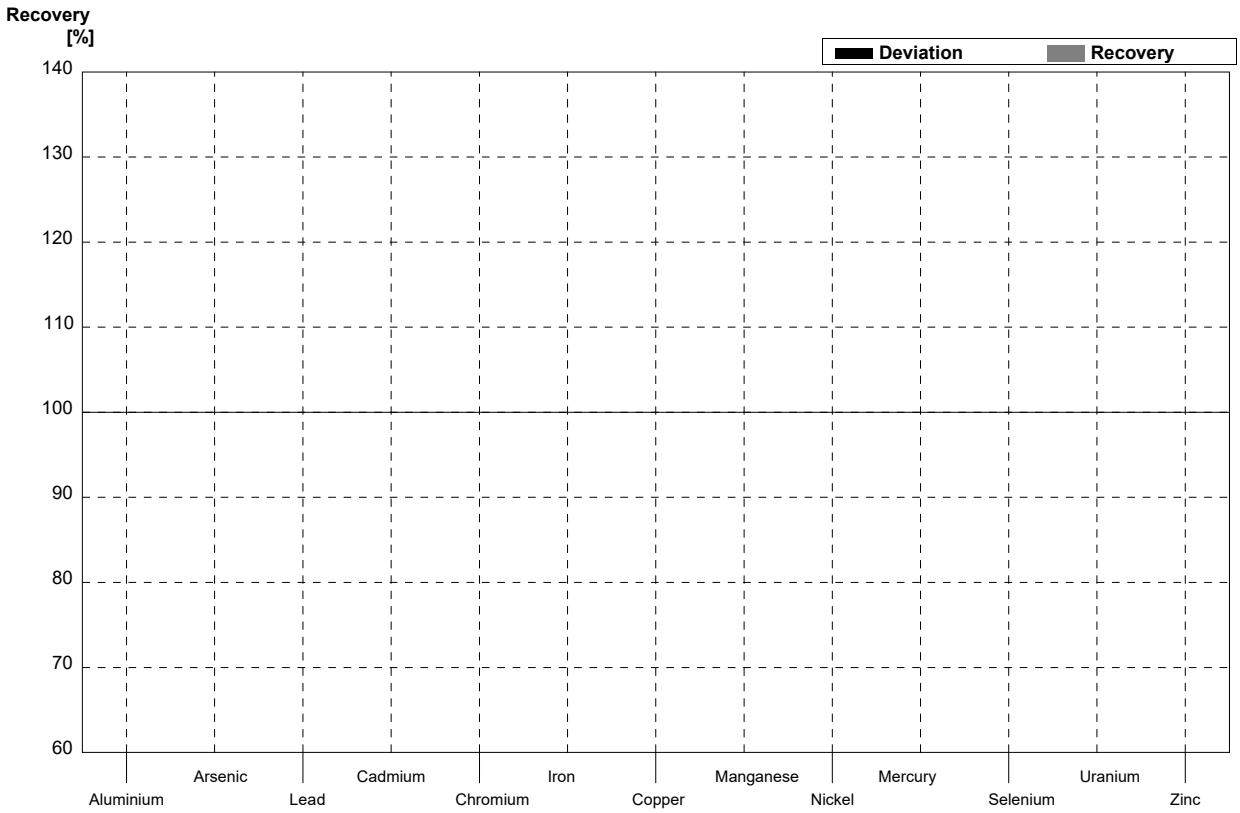
Sample M148A
Laboratory AB

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3			µg/l	
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2			µg/l	
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



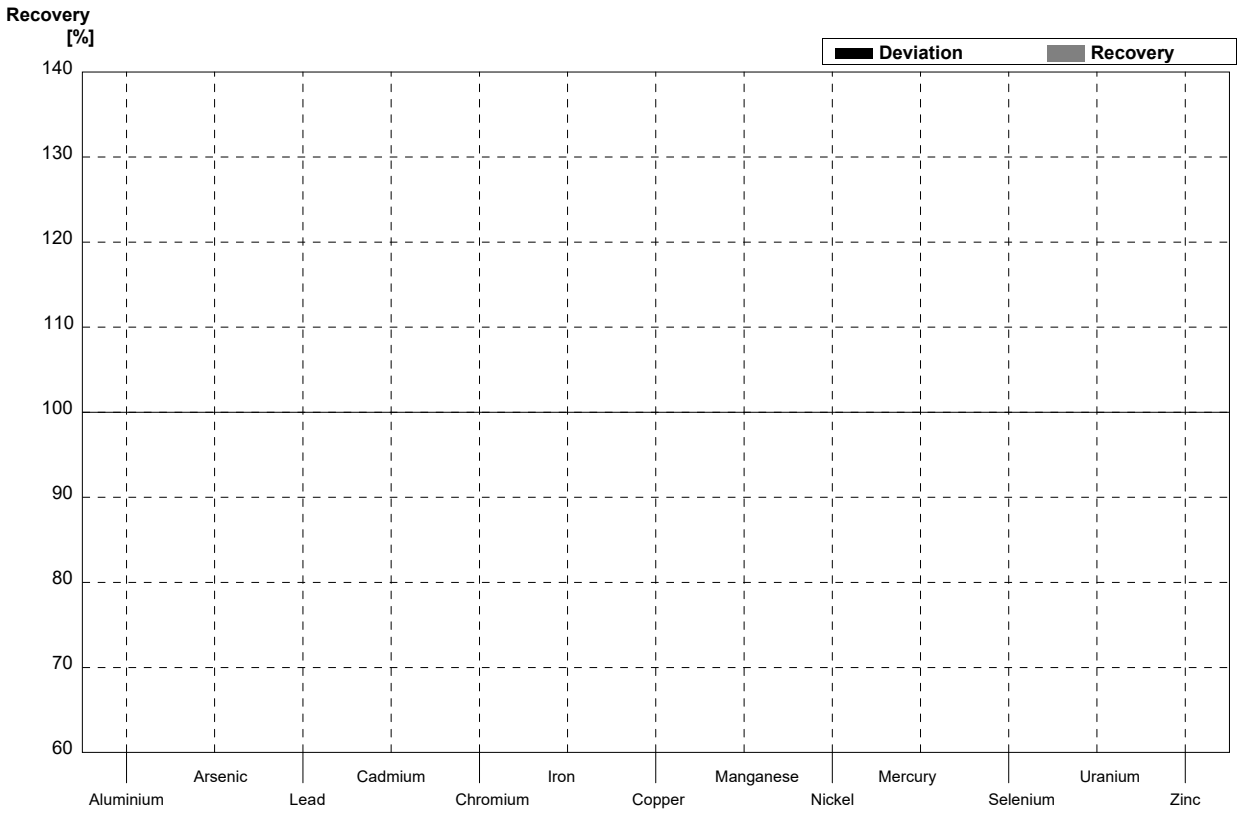
Sample M148B
Laboratory AB

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2			µg/l	
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03			µg/l	
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l	



Sample M148A
Laboratory AC

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	30,0	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	0,79	0,01			µg/l	
Cadmium	0,249	0,003			µg/l	
Chromium	4,04	0,03			µg/l	
Iron	71,4	0,3			µg/l	
Copper	1,70	0,02			µg/l	
Manganese	38,1	0,2			µg/l	
Nickel	1,30	0,02			µg/l	
Mercury	0,95	0,01			µg/l	
Selenium	1,00	0,05			µg/l	
Uranium	6,05	0,04			µg/l	
Zinc	10,0	0,8			µg/l	



Sample M148B
Laboratory AC

Parameter	Target value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	15,0	0,3			µg/l	
Arsenic	1,10	0,01			µg/l	
Lead	1,98	0,01			µg/l	
Cadmium	0,800	0,007			µg/l	
Chromium	0,60	0,01			µg/l	
Iron	18,0	0,2			µg/l	
Copper	3,20	0,03			µg/l	
Manganese	2,12	0,03			µg/l	
Nickel	3,52	0,03			µg/l	
Mercury	0,58	0,01			µg/l	
Selenium	3,55	0,06			µg/l	
Uranium	3,80	0,02			µg/l	
Zinc	28,0	0,8			µg/l