

IFA-Proficiency Testing Scheme zur Wasseranalytik / for Water Analysis

Endbericht / Final Report
Eignungsprüfungsrunde / Proficiency testing round
M173

Metalle / Metals

Probenversand / Sample dispatch: 02.09.2024

Durchführung gemäß Verfahren / In accordance with the procedure: AVKPS.02 idgF



Anschrift / Address: **Universität für Bodenkultur Wien**
 Department für Agrarbiotechnologie Tulln
 Institut für Bioanalytik und Agro-Metabolomics

**University of Natural Resources
 and Life Sciences, Vienna**
 Department of Agrobiotechnology, IFA-Tulln
 Institute of Bioanalytics and Agro-Metabolomics
 Leiter / Head: Prof. DI Dr. Rudolf Krska
 Konrad-Lorenz-Str. 20
 3430 Tulln
 Österreich / Austria

Website: www.ifatest.at / www.ifatest.eu
www.ifa-tulln.boku.ac.at

Tel: +43(0) 1 47654 – Dw / Ext

IFA-Proficiency Testing Scheme:

Koordination und technische Leitung / Coordinator and technical management:

Dipl.-HTL-Ing. Andrea Koutnik Dw / Ext 97361 andrea.koutnik@boku.ac.at

Verantwortlich für die Durchführung / Responsible for the implementation:

Ing. Uta Kachelmeier Dw / Ext 97361 uta.kachelmeier@boku.ac.at


Unter Mitarbeit von / With the collaboration of:

Ing. Caroline Stadlmann, Ing. Dr. Stephan Freitag, Dr. Wolfgang Kandler

Verantwortlich für die Freigabe des Berichts / Responsible for authorizing the report

Gesamtverantwortliche Leitung / Overall responsible management:

Dipl.-HTL-Ing. Andrea Koutnik Dw / Ext 97361 andrea.koutnik@boku.ac.at

Approved by:	Dr. Stephan Freitag	
Round:	Date / Signature:	15.10.2024, 

Ausgabe / Edition 1: 07.10.2024, Ing. Uta Kachelmeier
 110 Seiten / pages

Allgemeine Informationen

Diese Zusammenfassung beschreibt die 173. Runde der regelmäßigen Eignungsprüfungen zur Parametergruppe „Metalle“. Die Prüfgegenstände M173A und M173B wurden am 2. September 2024 an 21 Teilnehmer versendet. Jedes Labor erhielt zwei Prüfgegenstände zu je 250 ml, abgefüllt in LDPE-Flaschen.

Einsendeschluss für die Ergebnisse war am 27. September 2024. Von 20 Teilnehmern wurden Ergebnisse übermittelt.

Zur Anonymisierung wurde jedem Labor per Zufallsgenerator ein Buchstabencode zugeteilt.

Zusammensetzung des Prüfgegenstands

Die Prüfgegenstände M173A und M173B enthielten Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, U und Zn in einer den natürlichen Bedingungen angepassten Matrix, welche durch Zugabe von hochreinen Salzen (CaCO_3 , $\text{Mg}(\text{NO}_3)_2$, NaCl und KCl), H_2SO_4 , HCl und eines Sr-Standards eingestellt wurde: 45,8 mg/l Ca, 19,5 mg/l Mg, 8,9 mg/l Na, 1,19 mg/l K, 19,5 mg/l SO_4^{2-} , 15,6 mg/l Cl⁻ und 689 µg/l Sr (M173A) bzw. 102 µg/l Sr (M173B). Die Prüfgegenstände wurden mit hochreiner HNO_3 (0,5 % v/v) bei pH < 2 stabilisiert.

Homogenitäts-, Richtigkeits- und Stabilitätsuntersuchung

Die Prüfgegenstände wurden vor dem Versand am IFA auf Homogenität und Richtigkeit untersucht. Die Ergebnisse der Kontrollanalytik finden sich auf den Rohdatenblättern sowie auf den Auswertungen zu jedem Parameter.

Die Stabilitätsuntersuchungen zu allen Parametern werden zusammen mit der Kontrollanalytik zur folgenden Runde (M174) durchgeführt.

Nach unseren Erfahrungen bleiben die Konzentrationen Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Se, U und Zn bei Lagerung bei 4-6 °C im Dunkeln bis 18 Monate stabil. Bei Hg ist eine Konzentrationsabnahme von 2 % bis 4 % pro Monat zu erwarten.

Zugewiesene Werte

Die zugewiesenen Werte ergaben sich aus den Wägewerten der zur Herstellung der Prüfgegenstände verwendeten Standards. Sie lagen bei Al, As, Cd, Cr, Fe, Hg, Cu, Mn, Ni, Pb, Se und Zn in mindestens einem Prüfgegenstand über den Mindestbestimmungsgrenzen der österreichischen Gewässerzustandsüberwachungsverordnung (GZÜV - BGBl. II. 479/2006).

Die Unsicherheiten der zugewiesenen Werte (erweiterte Unsicherheiten, $k = 2$, $\alpha = 0,05$) wurden nach den Vorgaben des EURACHEM / CITAC Guides „Quantifying Uncertainty in Analytical Measurement, 3rd Edition (2012)“ ermittelt.

Auswertung

Mit den bei uns eingegangenen Messwerten wurde ein Ausreißertest nach Hampel durchgeführt. Die von diesem Test als auffällig eingestufteten Werte sind in den Tabellen der parameterorientierten Auswertung mit einem Stern gekennzeichnet.

Die aus den ausreißerbereinigten Daten berechneten, auf die zugewiesenen Werte bezogenen mittleren Wiederfindungen lagen zwischen 90,8 % (Quecksilber in M173A) und 114,4 % (Selen in M173B). Die aus den ausreißerbereinigten Daten berechneten Standardabweichungen bewegten sich im Bereich von 0,7 % (Selen in M173B) bis 10,0 % (Quecksilber in M173A).

Zu den Mittelwerten und mittleren Wiederfindungen wurden auch die Vertrauensbereiche ($P = 99 \%$) angegeben. Diese Vertrauensbereiche der Labormittelwerte enthielten in allen Fällen bis auf Selen ($114 \% \pm 4,9 \%$) die entsprechenden zugewiesenen Werte mit ihren Unsicherheiten.

z-Score-Auswertung

Ein z-Score ist die auf eine Standardabweichung bezogene Abweichung eines Messwertes vom zugewiesenen Wert. Er wird mittels folgender Formel berechnet:

$$z = \frac{x_i - X}{\sigma_{pt}}$$

z	z-Score
x_i	Messwert eines Labors
X	zugewiesener Wert oder ausreißerbereinigter Mittelwert („Konsenswert“)
σ_{pt}	Standardabweichung für die Eignungsbewertung

Es handelt sich also um das Verhältnis der Abweichung des Messwertes eines Labors vom zugewiesenen Wert zu einer vorgegebenen Standardabweichung.

Diese Vorgehensweise wurde deshalb gewählt, weil, unserer Erfahrung nach, die Standardabweichungen der ausreißerbereinigten Messwerte zwischen den einzelnen Eignungsprüfungen variieren. Die Ermittlung der Standardabweichung über die Eignungsprüfungen aus mehreren Jahren bietet jedoch eine gut abgesicherte Basis auf einer breiten Datengrundlage und ist somit meistens besser geeignet, als das bei der direkt aus der Eignungsprüfung berechneten Standardabweichung der Fall wäre. (siehe EN ISO/IEC 17043:2010, B.3.1.3)

Der Vorteil, welcher sich für alle Teilnehmer daraus ergibt, ist, dass dadurch bei unseren Eignungsprüfungen schon vor der Teilnahme vorhersehbar ist, welche z-Scores man mit den eigenen, aus Routineverfahren bekannten, Messabweichungen erwarten kann.

Rechenbeispiel:

Ein Labor bestimmte für den Parameter Aluminium einen Messwert von 73,7 µg/l (Wiederfindung von 101,94 %). Der zugewiesene Wert für Aluminium lag bei 72,3 µg/l (100 %).

In der nachfolgenden Tabelle (und in der Tabelle des Jahresprogrammes www.ifatetest.at) ist die relative Standardabweichung für die Eignungsbewertung beim Parameter Aluminium mit 7,8 % angegeben. Bezogen auf den zugewiesenen Wert 72,3 µg/l Al entsprechen 7,8 % 5,6 µg/l.

$$z = \frac{x_i - X}{\sigma_{pt}} = \frac{73,7 \mu\text{g/l} - 72,3 \mu\text{g/l}}{5,6 \mu\text{g/l}} \approx 0,25 \quad \text{oder} \quad \frac{101,94 \% - 100 \%}{7,8 \%} \approx 0,25$$

z	z-Score	
x_i	73,7 µg/l	entsprechen 101,94 % (Messwert des Labors)
X	72,3 µg/l	entsprechen 100 % (zugewiesener Wert)
σ_{pt}	5,6 µg/l	entsprechen 7,8 % (Standardabweichung für die Eignungsbewertung, siehe Tabelle unten)

Abweichungen in den Nachkommastellen können sich bei Nachberechnung dadurch ergeben, dass im Bericht bei den Wiederfindungen zwecks Übersichtlichkeit gerundete Werte angegeben sind.

Die folgende Tabelle enthält die Standardabweichung für die Eignungsbewertung bezogen auf den zugewiesenen Wert mit ihren Anwendungsbereichen. Die Berechnung von z-Scores erfolgt nur dann, wenn der zugehörige zugewiesene Wert über der in der Tabelle angegebenen Konzentration liegt. **Aus diesem Grund sind in dieser Auswertung bei Selen in M173B keine z-Scores angegeben.**

Parameter	Standardabweichung für die Eignungsbewertung bezogen auf den zugewiesenen Wert	untere Grenze
Aluminium	7,8 %	7,5 µg/l
Arsen	7,1 %	0,5 µg/l
Blei	6,6 %	0,3 µg/l
Cadmium	5,2 %	0,1 µg/l
Chrom	6,2 %	0,5 µg/l
Eisen	6,6 %	10 µg/l
Kupfer	7,5 %	1,0 µg/l
Mangan	5,2 %	2,0 µg/l
Nickel	6,9 %	0,75 µg/l
Quecksilber	11 %	0,2 µg/l
Selen	8,8 %	0,45 µg/l
Uran	5,6 %	0,35 µg/l
Zink	6,9 %	3 µg/l

Zur Interpretation von z-Scores wird meist folgende Klassifikation vorgeschlagen:

z-Score	Klassifikation
≤2	zufriedenstellend
2< z <3	fraglich
≥3	nicht zufriedenstellend

Die z-Scores sind in der parameterorientierten Auswertung in den Tabellen neben den Wiederfindungen angegeben. Jedes Labor erhält zusätzlich zu dieser Auswertung ein Blatt, auf dem die erzielten z-Scores zusammengefasst und grafisch dargestellt sind. Die Standardabweichungen für die Eignungsbewertung sind dort in Konzentrationseinheiten angegeben.

Eine Übersichtstabelle aller z-Scores ist im Anschluss an die Rohdatentabellen im parameterorientierten Teil zu finden.

Zur Darstellung der Ergebnisse in der Auswertung:

Eine Legende zur Darstellung der Ergebnisse finden Sie auf der nächsten Seite. In den Tabellen der Auswertung sind jeweils zugewiesener Wert, Messwert, Unsicherheit und die Wiederfindung dargestellt. In der parameterorientierten Auswertung befindet sich der Sollwert direkt unter der Parameterbezeichnung. Die Unsicherheit des Sollwertes ist immer als erweiterte Unsicherheit ($k = 2$; $\alpha = 0,05$) angegeben. Sie wurde nach den Vorgaben des EURACHEM / CITAC Guides „Quantifying Uncertainty in Analytical Measurement, 3rd Edition (2012)“ ermittelt. Die grafische Darstellung der Ergebnisse enthält die Unsicherheit des zugewiesenen Wertes als grau unterlegtes Band.

In der Spalte „A“ bei der parameterorientierten Auswertung wurden die Messwerte, die nach dem Test nach Hampel als Ausreißer gewertet wurden, mit einem Stern (*) gekennzeichnet. Die Grafik der Messwerte wurde für alle Parameter auf $100\% \pm 45\%$ des zugewiesenen Wertes skaliert. Die kleine Tabelle unten links enthält statistische Parameter, darunter den 99 % - Vertrauensbereich der Labormittelwerte vor und nach Ausreißereliminierung.

Ergebnisse, für die keine Wiederfindung bzw. Abweichung vom zugewiesenen Wert berechnet werden kann (d.h. „Kleiner als“ Ergebnisse oder Zahlenwerte bei nicht zugegebenen Substanzen) werden in den Tabellen und Grafiken entweder als **FN** (falsch negativ), **FP** (falsch positiv) oder als • - Symbol dargestellt.

- Als falsch negativ gelten „< Ergebnisse“ mit einem Betrag des Zahlenwertes unterhalb des zugewiesenen Wertes bzw. Messwert „0“ bei zugegebenen Substanzen.
- Falsch positive Ergebnisse sind für Substanzen möglich, die über „< zugewiesener Wert“ ausgewertet wurden. Mit FP werden alle Messwerte gekennzeichnet, die mit ihren Unsicherheiten das Kriterium „< zugewiesener Wert“ nicht einschließen (tangieren).
- Mit einem • - Symbol werden alle weiteren Ergebnisse illustriert, für die keine Wiederfindung berechnet werden kann

Prüfmethoden

Den Teilnehmenden stand die Wahl der Analysenmethode frei. Die Parameter sollten mit den im jeweiligen Teilnehmerlabor eingesetzten Routineverfahren bestimmt werden. Eine Übersicht der angewendeten Methoden befindet sich am Ende des Berichts.

Ergebnisse mit z-Scores $>|3,5|$, welche zu einer unübersichtlichen Skalierung führen würden, sind in den Graphiken nicht berücksichtigt.

Tulln, 15. Oktober 2024

Probe M106A

Parameter Kupfer

*Sollwert ± U (k=2) 4,79 µg/l ± 0,13 µg/l
 IFA-Kontrolle ± U (k=2) 4,79 µg/l ± 0,38 µg/l
 IFA-Stabilität ± U (k=2) 4,69 µg/l ± 0,38 µg/l

*Sollwert = "zugewiesener Wert"
Sollwert ± Unsicherheit aus Einwaage
Kontrollmessung IFA vor Versand
Messung IFA 3 Wochen nach Versand

Labor-Kennung	Messwert	±	Einheit	Wiederfindung	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	95%	-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	*	

Wiederfindung des zugewiesenen Wertes in Prozent

z-Score des Labors

Ein Stern markiert einen Ausreißer nach dem Hampel-Test

Ergebnisunsicherheit laut Teilnehmer

	alle Ergebnisse	ohne Ausreißer	Einheit
MW ± VB(99%)	4,65 ± 0,57	4,51 ± 0,42	µg/l
WF ± VB(99%)	97,1 ± 12,0	94,1 ± 8,8	%
Standardabw.	0,84	0,59	µg/l
rel. Standardabw.	18,1	13,2	%
n für Berechnung	18	17	

Standardabweichung zwischen den Labors

Mittelwert der Messwerte und Wiederfindung des zugewiesenen Wertes mit zugehörigen Vertrauensbereichen (p=99%)

Anzahl der Messungen zur Berechnung der statistischen Kenngrößen

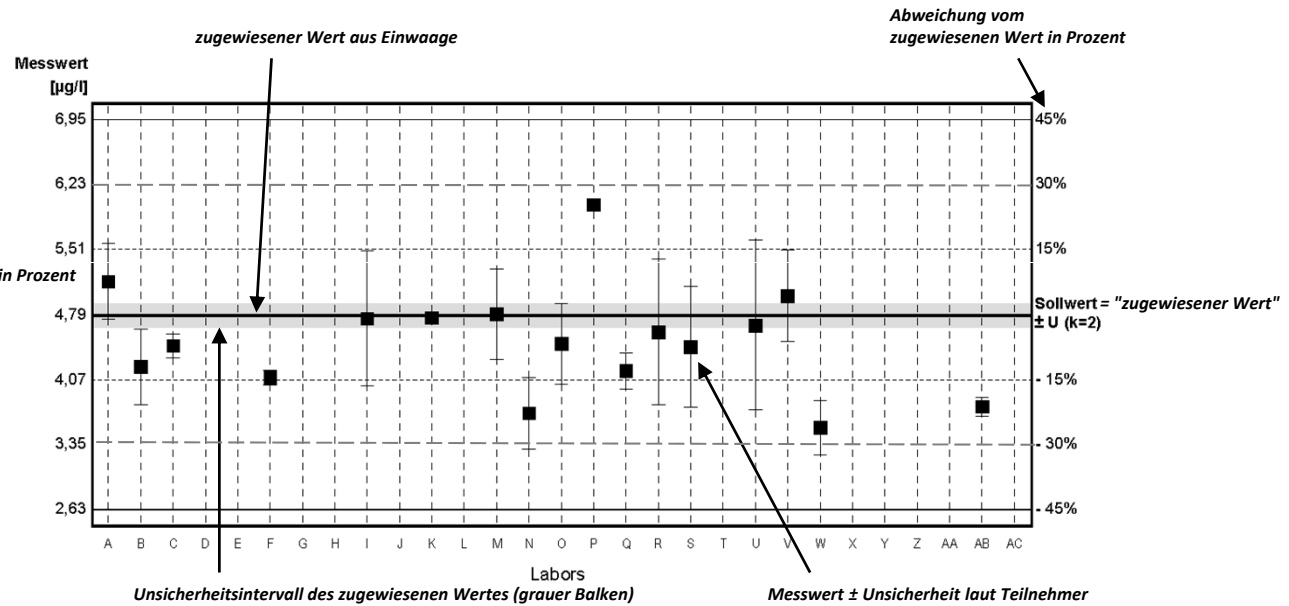
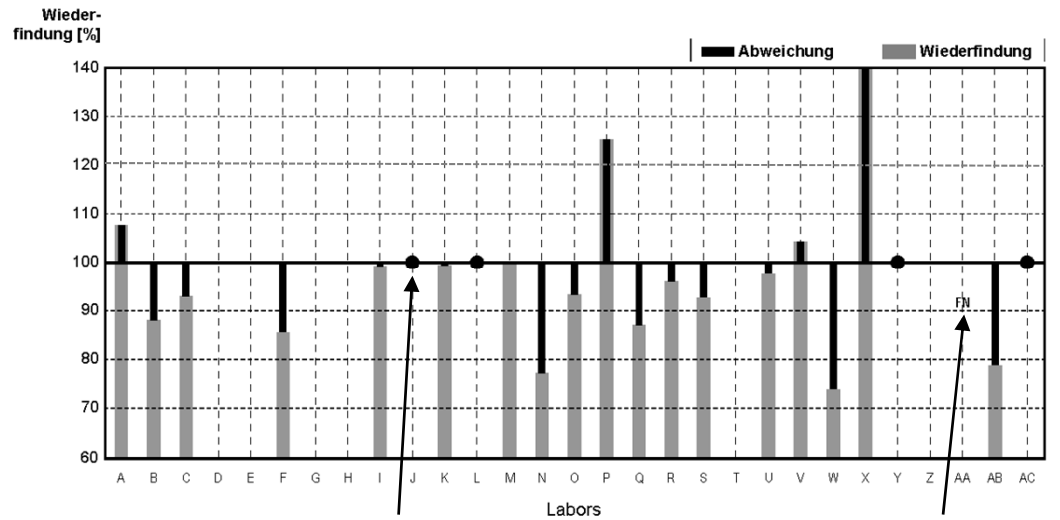


Diagramm 1: Messwerte mit zugehörigen Unsicherheitsintervallen



Ergebnis abgegeben, Berechnung der Wiederfindung oder Zuordnung FN, FP nicht möglich

Falsch negativ „< Ergebnis“ kleiner als der theoretische Sollwert

Diagramm 2: Wiederfindung und Abweichung vom zugewiesenen Wert

LEGENDE

Information

This report summarises the results of the round M173 (trace metals) within the IFA-Proficiency Testing Scheme for Water Analysis. The proficiency testing items M173A and M173B were distributed to 21 participants on Monday, 2 September 2024. Each participant received two proficiency testing items of 250 mL filled into LDPE bottles.

Closing date for reporting results to the IFA-Tulln was Friday, 27 September 2024. 20 participants submitted results. To make the participants anonymous, each laboratory obtained a letter code by random.

Proficiency testing items

The proficiency testing items consisted of artificial ground water spiked with pure standards. For the preparation, ultrapure water was spiked with concentrated solutions of salts in order to simulate the ionic composition of natural Austrian ground water. The following ultrapure salts were used: CaCO_3 , $\text{Mg}(\text{NO}_3)_2$, NaCl, KCl, ultrapure H_2SO_4 , HCl, and in addition, a Sr - standard was added. By this, the matrix of the proficiency testing items consisted of about 45.8 mg/L Ca, 19.5 mg/L Mg, 8.9 mg/L Na, 1.19 mg/L K, 19.5 mg/L SO_4^{2-} , 15.6 mg/L Cl^- and 689 $\mu\text{g/L}$ Sr (M173A) respectively 102 $\mu\text{g/L}$ Sr (M173B). Ultrapure HNO_3 (0.5 % v/v) was added to stabilise the proficiency testing item at a pH below 2, which meets the standard sampling procedure in the Austrian monitoring program.

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

Homogeneity, accuracy and stability tests at the IFA-Tulln

Some proficiency testing items of the round M173A and M173B 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 (M174). According to our experience, the concentrations of Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Se, U and Zn in the proficiency testing items 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 assigned concentrations that were calculated from the weights of the standards used to produce the proficiency testing items. 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 %).

The recoveries of the assigned concentrations, calculated from outlier-corrected data mean values ranged between 90.8 % (Hg in M173A) and 114.4 % (Se in M173B).

The between laboratory CVs covered the ranged between 0.7 % (Se in M173B) and 10.0 % (Hg in M173A).

All confidence intervals of the outlier-corrected laboratory mean values except for selenium in proficiency testing item M173B ($114.4 \% \pm 4.9 \%$) encompass the corresponding assigned values with their uncertainties. For all other parameters, statistically, no difference could be detected between theoretical concentrations and outlier corrected laboratory means.

z-scores

The most common approach to calculate a z-score is given by

$$z = \frac{x_i - X}{\sigma_{pt}}$$

z	z-score
x_i	result of laboratory
X	assigned value or mean value („consensus value“)
σ_{pt}	standard deviation for proficiency assessment

Thus, the z-score is the ratio of the estimated bias (difference between result and assigned value) and a standard deviation. The z-score criteria were, determined from relative standard deviations from all interlaboratory comparisons that have been organised by the IFA-Tulln from 2013 to 2023. They represent average performance data of all former participating laboratories.

This approach was chosen, because standard deviations of the outlier-corrected measurements substantially vary between individual proficiency test rounds. Averaging standard deviations from proficiency testing rounds of several years can provide standard deviations for proficiency assessment on a broad data basis. It is therefore more suitable than a standard deviation taken directly from the interlaboratory comparison (EN ISO/IEC 17043:2010, B.3.1.3). Another advantage of previously determined standard deviations is that the participants can foresee which z-scores can be expected by their routine analysis methods before participation.

Calculation example:

A laboratory found 73.7 µg/L for the parameter Aluminium (recovery of 101.94 %). The assigned value for Aluminium was 72.3 µg/L (100 %). The relative standard deviation for proficiency assessment is given in the table below (as well as in the annual program www.ifatest.eu) by 7.8 %, which is 5.6 µg/L Al, when based on the assigned value.

$$z = \frac{x_i - X}{\sigma_{pt}} = \frac{73.7 \mu\text{g/L} - 72.3 \mu\text{g/L}}{5.6 \mu\text{g/L}} \approx 0.25 \quad \text{or} \quad \frac{101.94 \% - 100 \%}{7.8 \%} \approx 0.25$$

z	z-score	
x_i	73.7 µg/L	equivalent to 101.94 % (result of the laboratory)
X	72.3 µg/L	equivalent to 100 % (assigned value)
σ_{pt}	5.6 µg/L	equivalent to 7.8 % (standard deviation for proficiency assessment see table below)

In the case of recalculation, deviations in the last digits may occur due to the fact that rounded values are given in the report for clarity.

The following table lists the standard deviations for proficiency assessment and their limits of applicability. Z-scores were only calculated, if the assigned values were higher than these limits. **Thus, no z-scores were calculated for Se in M173B.**

Parameter	standard deviation for proficiency assessment based on the assigned value	Lower limit
Aluminium	7.8 %	7.5 µg/L
Arsenic	7.1 %	0.5 µg/L
Cadmium	5.2 %	0.1 µg/L
Chromium	6.2 %	0.5 µg/L
Copper	7.5 %	1.0 µg/L
Iron	6.6 %	10 µg/L
Lead	6.6 %	0.3 µg/L
Manganese	5.2 %	2.0 µg/L
Mercury	11 %	0.2 µg/L
Nickel	6.9 %	0.75 µg/L
Selenium	8.8 %	0.45 µg/L
Uranium	5.6 %	0.35 µg/L
Zinc	6.9 %	3 µg/L

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

z-Score	Classification
≤2	satisfactory
2< z <3	questionable
≥3	unsatisfactory

The z-scores are listed in the parameter-oriented evaluation in the tables next to the recoveries. Additionally, each laboratory receives a sheet on which the obtained z-scores are summarized and graphically presented. The standard deviations for proficiency assessment are given in concentration units there.

An overview table of all z-scores can be found after the result tables in the parameter-oriented part.

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 assigned 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 assigned 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 assigned value, or the measured value was given as "0" when the substance was added.
- "FP": False positive results can only be obtained for compounds that were evaluated on the basis of a "< assigned value". A result is termed FP if it does not include (strike) the "< assigned value" with its measurement uncertainty.
- "•": All other results for which no recoveries can be calculated are illustrated by this symbol

Overview of measurement methods

The participants were free to choose the analytical method. The test methods should be consistent with the methods applied in routine. An overview of the methods used can be found at the end of the report.

Results with z-Scores $>|3.5|$, which would lead to confusing scaling, are not included in the graphics.

Tulln, 15 October 2024

Sample M106A
Parameter Copper

*Target value ± U (k=2) 4,79 µg/l ± 0,13 µg/l
 IFA result ± U (k=2) 4,79 µg/l ± 0,38 µg/l
 Stability test ± U (k=2) 4,69 µg/l ± 0,38 µg/l

**Target value = "assigned value"*
Obtained from sample preparation, U=uncertainty
Determined at IFA prior to shipment of samples
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 assigned 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 assigned value with corresponding confidence intervals (p=99%)

Number of results used for calculation of statistic parameters

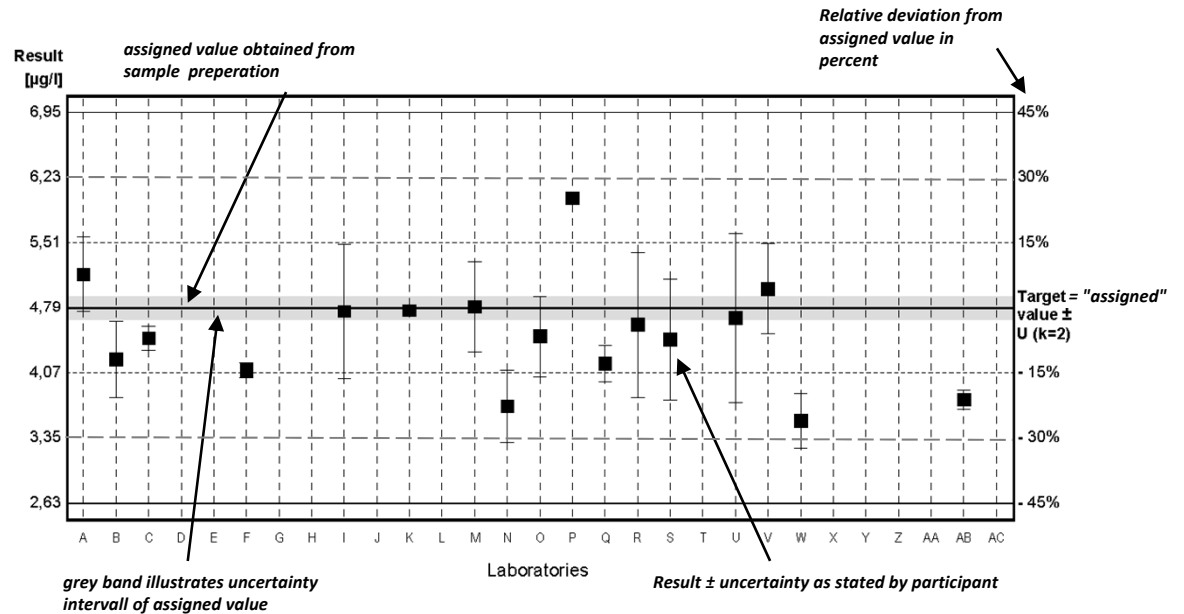
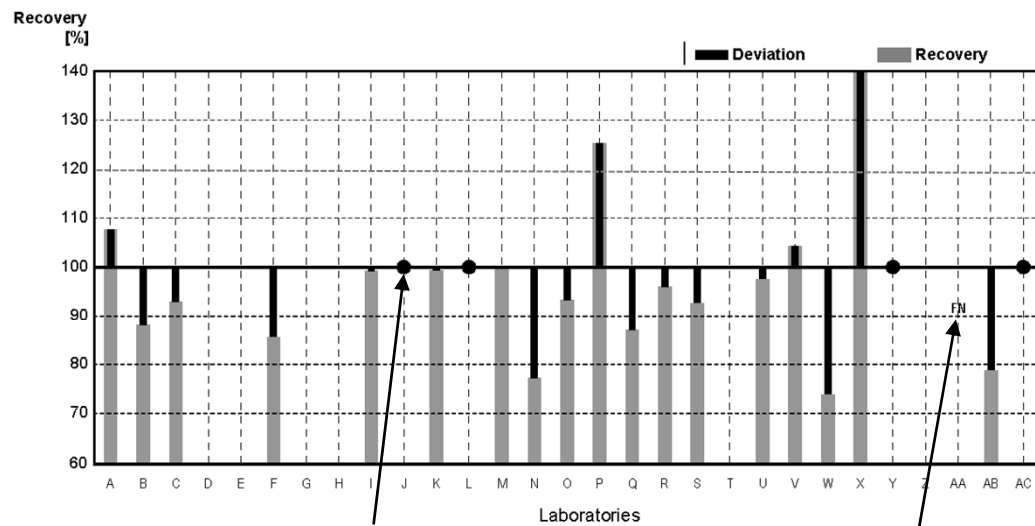


Diagram 1: Measurement results and their uncertainties



Result neither possible to calculate recovery nor false positive or false negative

False negative: reported „<-result“ is lower than target value

Diagram 2: Recoveries and deviations from assigned values

EXPLANATION

Rohdatenblätter und Parameterorientierte Auswertung Tables and Parameter Oriented Part

Eignungsprüfungsrunde / Proficiency testing round
M173

Metalle / Metals

Versand / Dispatch: 02.09.2024

Results M173A

	Aluminium	Arsenic	Lead	Cadmium	Chromium	Iron	Copper
assigned value	58.4	3.33	0.806	1.765	3.79	17.92	3.43
IFA result	56.9	3.38	0.79	1.80	3.82	18.0	3.46
A	58.1	3.24	0.744	1.74	3.50	17.8	3.49
B	64.0						
C	59.6	3.43	<1.00	1.72	3.52	14.7	3.35
D	59.9	3.36	<1.0	1.75	3.80	17.6	3.30
E							
F	52.3	3.25	0.78	1.78	3.69	17.3	3.25
G	52.6	3.31	<1.0	1.77	3.66	16.4	3.33
H							
I	<100						
J	59.4	3.51	<1	1.76	3.86	18.7	3.18
K	66.5	3.57	0.777	1.66	3.70	18.8	3.08
L	52.5					20.0	4.50
M	58.0	3.90	0.80	1.83	3.80	18.0	3.50
N	57.6	3.40	0.80	1.76	3.62	17.5	3.43
O				1.816		18.83	
P						<50	
Q	59.31	3.43	0.71	1.76	3.66	13.87	3.36
R	61.41	3.31	0.82	1.74	3.79	18.16	3.21
S	53.0	<5.00	<5.00	2.00	<5.00	17.5	<5.00
T	58.3	3.33	<3	1.72	3.93	17.5	<5
U	59.3	3.40	<1	1.78	3.83	16.8	3.90

All data in µg/L

Measurement Uncertainties M173A

	Aluminium ±	Arsenic ±	Lead ±	Cadmium ±	Chromium ±	Iron ±	Copper ±
assigned value	0.5	0.02	0.014	0.014	0.03	0.19	0.03
IFA result	1.9	0.31	0.04	0.11	0.13	1.4	0.25
A	4.25	0.182	0.106	0.103	0.607	2.86	0.789
B	12.16						
C	1.21	0.108		0.143	0.193	0.885	0.142
D	0.656	0.064		0.051	0.115	0.153	0.026
E							
F	5.23	0.488	0.078	0.178	0.369	1.73	0.325
G	11	0.50		0.21	0.55	2.5	0.40
H							
I	18						
J	8.91	0.53		0.26	0.58	2.80	0.48
K	16.6	0.89	0.194	0.42	0.93	4.7	0.77
L	4					4	5
M	5.80	0.468	0.064	0.146	0.456	4.68	0.280
N	6.64	0.30		0.11		1.21	
O				0.18		1.51	
P							
Q	10.86	0.75	0.06	0.12	0.80	2.82	0.32
R	0.54	0.08	0.03	0.01	0.04	0.09	0.01
S	5.30	0.500	0.500	0.200	0.500	1.75	0.500
T	8.98	0.50		0.12	0.33	1.47	
U	12	0.68		0.36	0.77	3.4	0.78

All data in µg/L

Results M173A

	Manganese	Nickel	Mercury	Selenium	Uranium	Zinc
assigned value	10.79	5.50	0.421	2.83	5.24	10.5
IFA result	10.9	5.5	0.399	2.77	5.2	11.3
A	10.6	4.99	0.347	3.01	4.73	10.6
B	10.0					10.0
C	<10.0	5.48	0.362	2.73	5.38	11.2
D	10.7	5.44	0.380	2.74	4.80	10.0
E						
F	10.8	5.4	0.431	2.84	5.23	10.5
G	11.6	5.36	0.422	2.85	5.09	11.3
H						10.107
I			0.385			
J	10.5	5.27	0.402	2.84	5.46	10.8
K	10.6	5.13	0.368	2.87	5.04	10.4
L	11.0					12.0
M	11.0	5.60	0.405	3.00	5.44	11.0
N	10.6	5.23	0.390	2.90	5.20	10.7
O						
P	<50					
Q	10.04	5.27	0.370	2.90	4.85	11.16
R	11.17	5.39	0.420	2.99		9.94
S	10.5	5.00	376	<5.00		8.00
T	10.8	5.78		<10		10.3
U	11.0	5.55	0.286	<5	5.40	<10

All data in µg/L

Measurement Uncertainties M173A

	Manganese ±	Nickel ±	Mercury ±	Selenium ±	Uranium ±	Zinc ±
assigned value	0.16	0.04	0.013	0.02	0.04	0.7
IFA result	0.7	0.2	0.065	0.36	0.5	2.2
A	0.964	0.616	0.0424	0.571	0.469	3.31
B	2.50					2.20
C		0.0855	0.0246	0.108	0.0946	0.368
D	0.058	0.059	0.003	0.014	0.078	0.361
E						
F	1.08	0.54	0.0431	0.426	0.523	1.05
G	1.4	0.59	0.093	0.43	0.76	1.7
H						
I			0.077			
J	1.57	0.79	0.060	0.43	0.82	1.61
K	2.7	1.28	0.092	0.72	1.26	2.6
L	2					10
M	1.10	0.560	0.061	0.450	0.272	1.10
N	0.71	0.58	0.1		0.45	2.68
O						
P						
Q	1.84	0.54	0.00	0.85	0.69	0.95
R	0.07	0.11	0.01	0.09		0.01
S	1.05	0.500	18.8	0.500		0.800
T	1.02	0.71				1.44
U	2.2	1.1	0.057		1.1	

All data in µg/L

Results M173B

	Aluminium	Arsenic	Lead	Cadmium	Chromium	Iron	Copper
assigned value	24.4	4.20	3.69	0.705	1.72	57.5	107.8
IFA result	24.1	4.17	3.45	0.73	1.75	56	103
A	23.9	4.13	3.38	0.706	1.50	56.8	112.3
B	29.0						112.0
C	25.4	4.40	3.70	0.700	1.70	51.8	106
D	25.9	4.23	3.74	0.727	1.71	56.2	102
E							
F	23.1	4.40	3.59	0.73	1.66	54.9	96.1
G	25.1	4.20	3.60	0.706	1.67	54.2	100
H							
I	<100						
J	24.1	4.43	3.63	0.73	1.77	57.4	100
K	29.4	4.77	3.57	0.695	1.81	62.7	103
L	22.5					62.5	105.00
M	26.0	4.60	3.90	0.740	1.70	57.0	110
N	27.0	4.34	3.53	0.65	1.73	55.6	103.9
O				0.806		58.71	
P						57	
Q	24.34	4.40	3.43	0.72	1.67	45.71	104.12
R	26.55	4.31	3.72	0.70	1.75	61.37	103.93
S	22.0	<5.00	<5.00	0.700	<5.00	58.0	110
T	24.2	4.37	4.26	0.73	1.70	57.1	106
U	24.5	4.28	3.63	0.700	1.70	56.0	115

All data in µg/L

Measurement Uncertainties M173B

	Aluminium ±	Arsenic ±	Lead ±	Cadmium ±	Chromium ±	Iron ±	Copper ±
assigned value	0.3	0.03	0.03	0.007	0.03	0.3	0.4
IFA result	0.9	0.38	0.17	0.05	0.08	4	7
A	1.75	0.233	0.480	0.0609	0.260	9.15	12.9
B	5.51						24.64
C	1.31	0.105	0.0222	0.0100	0.212	0.769	2.08
D	0.252	0.075	0.036	0.018	0.055	0.416	1.0
E							
F	2.31	0.66	0.359	0.073	0.166	5.49	9.61
G	5.0	0.63	0.43	0.085	0.25	8.1	12
H							
I	18						
J	3.61	0.66	0.55	0.11	0.27	8.61	15
K	7.4	1.19	0.89	0.174	0.45	15.7	26
L	4					4	5
M	2.60	0.552	0.312	0.0592	0.204	14.8	8.78
N	4.3	0.40	0.42	0.07		3.76	12.4
O				0.08		4.70	
P						5	
Q	4.46	0.96	0.28	0.05	0.37	9.31	9.88
R	0.13	0.04	0.02	0.01	0.01	0.33	0.69
S	2.20	0.500	0.500	0.0700	0.500	5.80	11.0
T	3.73	0.66	0.73	0.05	0.14	4.80	38.2
U	4.9	0.86	0.73	0.14	0.34	11	23

All data in µg/L

Results M173B

	Manganese	Nickel	Mercury	Selenium	Uranium	Zinc
assigned value	44.6	1.92	1.588	0.404	2.64	20.1
IFA result	44.3	1.91	1.67	<0.50	2.48	22.6
A	43.6	1.64	1.44	0.579	2.36	20.5
B	43.0					19.0
C	44.6	2.01	1.49	<1.00	2.68	20.0
D	43.8	1.82	1.50	<1.0	2.46	19.4
E						
F	43.7	1.79	1.59	<1.0	2.62	20.0
G	46.3	1.83	1.58	<1.0	2.54	20.8
H						18.645
I			1.517			
J	43.3	1.84	1.59	<1	2.73	19.9
K	47.7	1.93	1.59	0.466	2.51	20.8
L	46.0					25.0
M	44.0	1.90	1.736	<0.50	2.78	21.0
N	43.2	1.78	1.49	0.410	2.65	20.3
O						
P	<50					
Q	41.52	1.86	1.50	0.460	2.46	20.98
R	46.15	1.85	1.63	0.460		19.27
S	43.0	<5.00	1560	<5.00		18.0
T	44.9	<5		<10		20.0
U	44.8	1.93	1.26	<5	2.70	19.0

All data in µg/L

Measurement Uncertainties M173B

	Manganese ±	Nickel ±	Mercury ±	Selenium ±	Uranium ±	Zinc ±
assigned value	0.2	0.03	0.017	0.017	0.02	0.7
IFA result	2.9	0.10	0.27		0.24	3.4
A	3.89	0.203	0.192	0.110	0.234	6.37
B	10.75					4.18
C	0.761	0.0938	0.230		0.102	0.342
D	0.231	0.035	0.015		0.040	0.659
E						
F	4.37	0.179	0.159		0.26	2.0
G	5.6	0.20	0.35		0.38	3.1
H						
I			0.303			
J	6.49	0.28	0.24		0.41	2.99
K	11.9	0.48	0.40	0.117	0.63	5.2
L	2					10
M	4.40	0.190	0.260		0.139	2.10
N	2.73	0.16	0.26		0.18	3.11
O						
P						
Q	7.63	0.19	0.00	0.13	0.35	1.79
R	0.44	0.01	0.03	0.03		0.12
S	4.30	0.500	78.0	0.500		1.80
T	4.22					2.79
U	9.0	0.39	0.25		0.54	3.8

All data in µg/L

z-Scores M173A

	Aluminium	Arsenic	Lead	Cadmium	Chromium	Iron	Copper
A	-0.07	-0.38	-1.17	-0.27	-1.23	-0.10	0.23
B	1.23						
C	0.26	0.42		-0.49	-1.15	-2.72	-0.31
D	0.33	0.13		-0.16	0.04	-0.27	-0.51
E							
F	-1.34	-0.34	-0.49	0.16	-0.43	-0.52	-0.70
G	-1.27	-0.08		0.05	-0.55	-1.29	-0.39
H							
I							
J	0.22	0.76		-0.05	0.30	0.66	-0.97
K	1.78	1.02	-0.55	-1.14	-0.38	0.74	-1.36
L	-1.30					1.76	4.16
M	-0.09	2.41	-0.11	0.71	0.04	0.07	0.27
N	-0.18	0.30	-0.11	-0.05	-0.72	-0.36	0.00
O				0.56		0.77	
P							
Q	0.20	0.42	-1.80	-0.05	-0.55	-3.42	-0.27
R	0.66	-0.08	0.26	-0.27	0.00	0.20	-0.86
S	-1.19			2.56		-0.36	
T	-0.02	0.00		-0.49	0.60	-0.36	
U	0.20	0.30		0.16	0.17	-0.95	1.83

z-Scores M173A

	Manganese	Nickel	Mercury	Selenium	Uranium	Zinc
A	-0.34	-1.34	-1.60	0.72	-1.74	0.14
B	-1.41					-0.69
C		-0.05	-1.27	-0.40	0.48	0.97
D	-0.16	-0.16	-0.89	-0.36	-1.50	-0.69
E						
F	0.02	-0.26	0.22	0.04	-0.03	0.00
G	1.44	-0.37	0.02	0.08	-0.51	1.10
H						-0.54
I			-0.78			
J	-0.52	-0.61	-0.41	0.04	0.75	0.41
K	-0.34	-0.97	-1.14	0.16	-0.68	-0.14
L	0.37					2.07
M	0.37	0.26	-0.35	0.68	0.68	0.69
N	-0.34	-0.71	-0.67	0.28	-0.14	0.28
O						
P						
Q	-1.34	-0.61	-1.10	0.28	-1.33	0.91
R	0.68	-0.29	-0.02	0.64		-0.77
S	-0.52	-1.32	8110.11			-3.45
T	0.02	0.74				-0.28
U	0.37	0.13	-2.92		0.55	

z-Scores M173B

	Aluminium	Arsenic	Lead	Cadmium	Chromium	Iron	Copper
A	-0.26	-0.23	-1.27	0.03	-2.06	-0.18	0.56
B	2.42						0.52
C	0.53	0.67	0.04	-0.14	-0.19	-1.50	-0.22
D	0.79	0.10	0.21	0.60	-0.09	-0.34	-0.72
E							
F	-0.68	0.67	-0.41	0.68	-0.56	-0.69	-1.45
G	0.37	0.00	-0.37	0.03	-0.47	-0.87	-0.96
H							
I							
J	-0.16	0.77	-0.25	0.68	0.47	-0.03	-0.96
K	2.63	1.91	-0.49	-0.27	0.84	1.37	-0.59
L	-1.00					1.32	-0.35
M	0.84	1.34	0.86	0.95	-0.19	-0.13	0.27
N	1.37	0.47	-0.66	-1.50	0.09	-0.50	-0.48
O				2.76		0.32	
P						-0.13	
Q	-0.03	0.67	-1.07	0.41	-0.47	-3.11	-0.46
R	1.13	0.37	0.12	-0.14	0.28	1.02	-0.48
S	-1.26			-0.14		0.13	0.27
T	-0.11	0.57	2.34	0.68	-0.19	-0.11	-0.22
U	0.05	0.27	-0.25	-0.14	-0.19	-0.40	0.89

z-Scores M173B

	Manganese	Nickel	Mercury	Selenium	Uranium	Zinc
A	-0.43	-2.11	-0.85		-1.89	0.29
B	-0.69					-0.79
C	0.00	0.68	-0.56		0.27	-0.07
D	-0.34	-0.75	-0.50		-1.22	-0.50
E						
F	-0.39	-0.98	0.01		-0.14	-0.07
G	0.73	-0.68	-0.05		-0.68	0.50
H						-1.05
I			-0.41			
J	-0.56	-0.60	0.01		0.61	-0.14
K	1.34	0.08	0.01		-0.88	0.50
L	0.60					3.53
M	-0.26	-0.15	0.85		0.95	0.65
N	-0.60	-1.06	-0.56		0.07	0.14
O						
P						
Q	-1.33	-0.45	-0.50		-1.22	0.63
R	0.67	-0.53	0.24			-0.60
S	-0.69		8921.53			-1.51
T	0.13					-0.07
U	0.09	0.08	-1.88		0.41	-0.79

Sample M173A

Parameter Aluminium

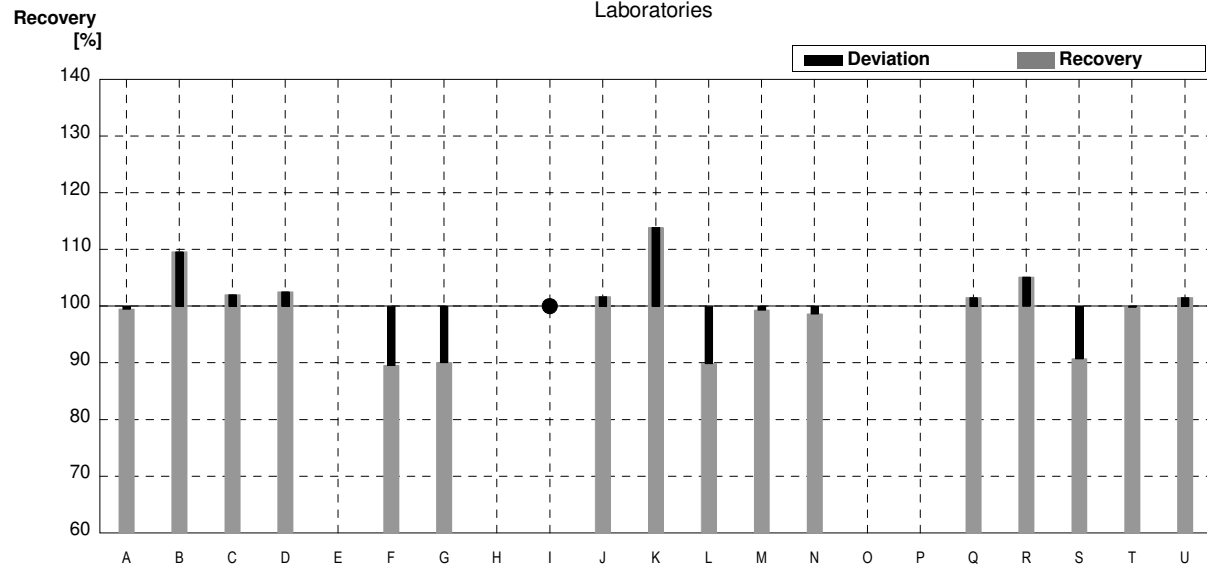
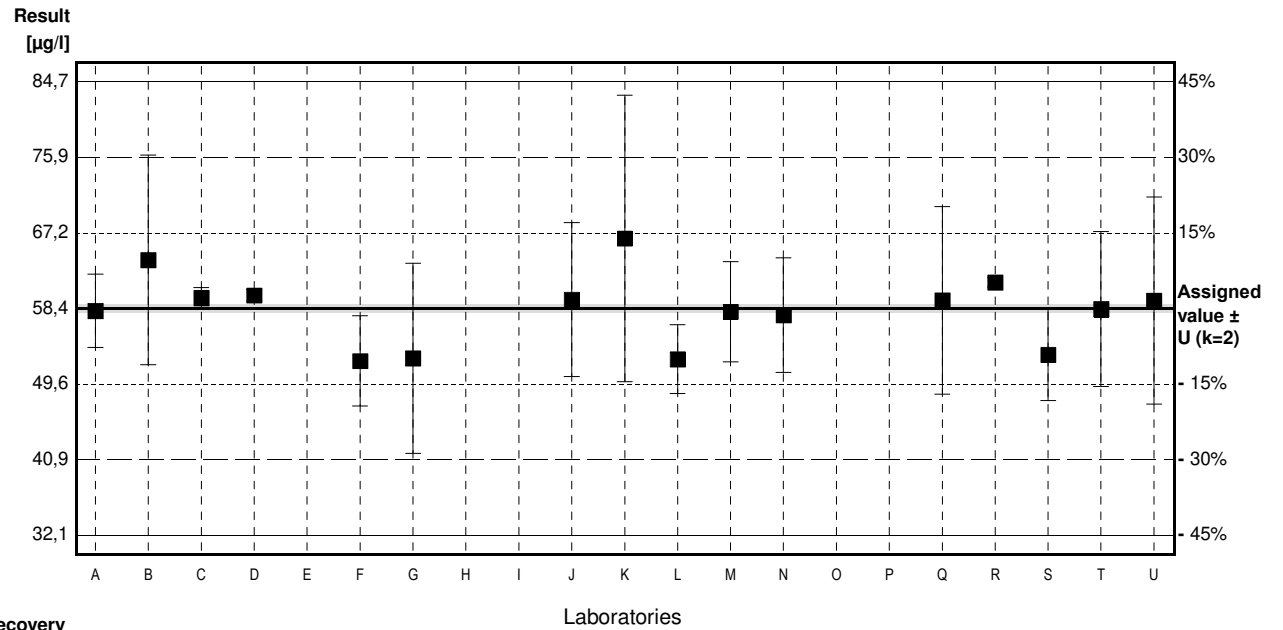
Assigned value ± U (k=2) 58,4 µg/l ± 0,5 µg/l

IFA result ± U (k=2) 56,9 µg/l ± 1,9 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	58,1	4,25	µg/l	99%	-0,07
B	64,0	12,16	µg/l	110%	1,23
C	59,6	1,21	µg/l	102%	0,26
D	59,9	0,656	µg/l	103%	0,33
E			µg/l		
F	52,3 *	5,23	µg/l	90%	-1,34
G	52,6 *	11	µg/l	90%	-1,27
H			µg/l		
I	<100	18	µg/l	*	
J	59,4	8,91	µg/l	102%	0,22
K	66,5 *	16,6	µg/l	114%	1,78
L	52,5 *	4	µg/l	90%	-1,30
M	58,0	5,80	µg/l	99%	-0,09
N	57,6	6,64	µg/l	99%	-0,18
O			µg/l		
P			µg/l		
Q	59,31	10,86	µg/l	102%	0,20
R	61,41	0,54	µg/l	105%	0,66
S	53,0 *	5,30	µg/l	91%	-1,19
T	58,3	8,98	µg/l	100%	-0,02
U	59,3	12	µg/l	102%	0,20

	All results	Outliers excl.	Unit
Mean ± CI(99%)	58,2 ± 3,0	59,5 ± 1,7	µg/l
Recov. ± CI(99%)	99,7 ± 5,1	101,9 ± 3,0	%
SD between labs	4,1	1,8	µg/l
RSD between labs	7,0	3,1	%
n for calculation	16	11	



Sample M173B

Parameter Aluminium

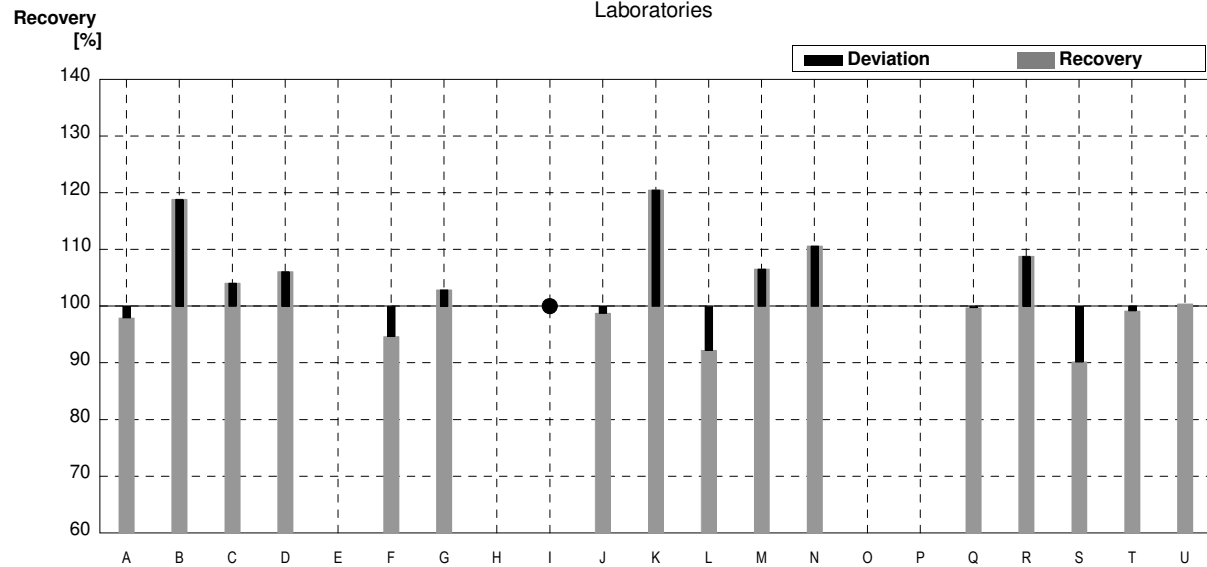
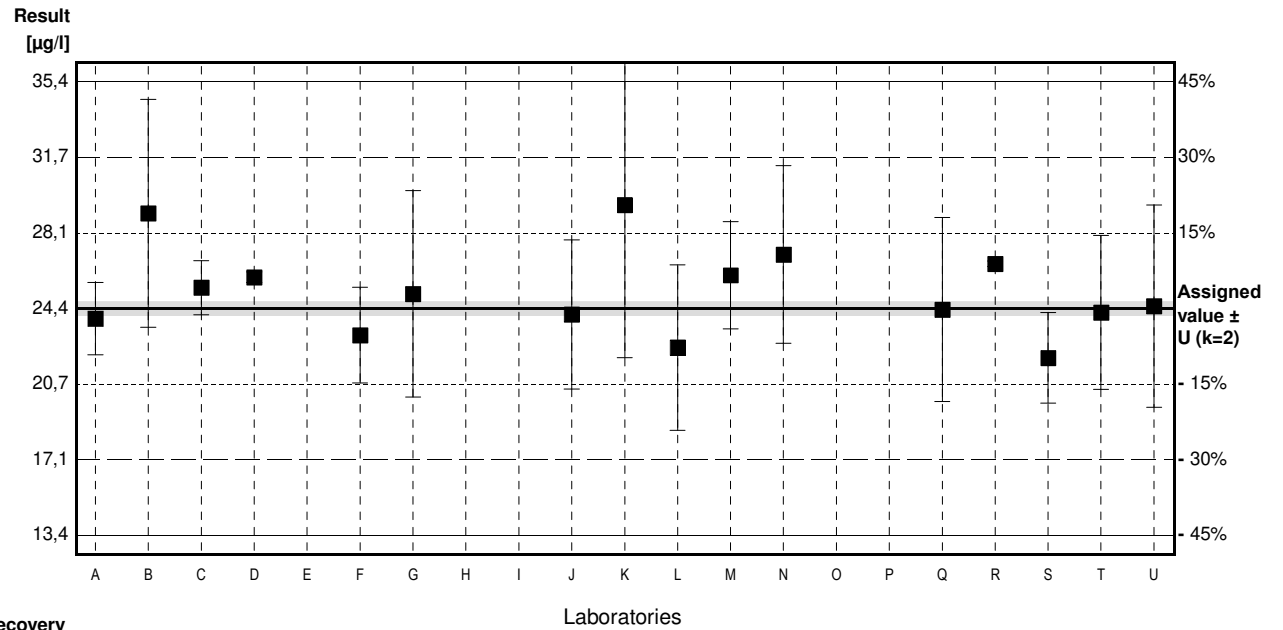
Assigned value ± U (k=2) 24,4 µg/l ± 0,3 µg/l

IFA result ± U (k=2) 24,1 µg/l ± 0,9 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	23,9	1,75	µg/l	98%	-0,26
B	29,0	5,51	µg/l	119%	2,42
C	25,4	1,31	µg/l	104%	0,53
D	25,9	0,252	µg/l	106%	0,79
E			µg/l		
F	23,1	2,31	µg/l	95%	-0,68
G	25,1	5,0	µg/l	103%	0,37
H			µg/l		
I	<100	18	µg/l	-	
J	24,1	3,61	µg/l	99%	-0,16
K	29,4	7,4	µg/l	120%	2,63
L	22,5	4	µg/l	92%	-1,00
M	26,0	2,60	µg/l	107%	0,84
N	27,0	4,3	µg/l	111%	1,37
O			µg/l		
P			µg/l		
Q	24,34	4,46	µg/l	100%	-0,03
R	26,55	0,13	µg/l	109%	1,13
S	22,0	2,20	µg/l	90%	-1,26
T	24,2	3,73	µg/l	99%	-0,11
U	24,5	4,9	µg/l	100%	0,05

	All results	Outliers excl.	Unit
Mean ± CI(99%)	25,2 ± 1,5	25,2 ± 1,5	µg/l
Recov. ± CI(99%)	103,2 ± 6,3	103,2 ± 6,3	%
SD between labs	2,1	2,1	µg/l
RSD between labs	8,3	8,3	%
n for calculation	16	16	



Sample M173A

Parameter Arsenic

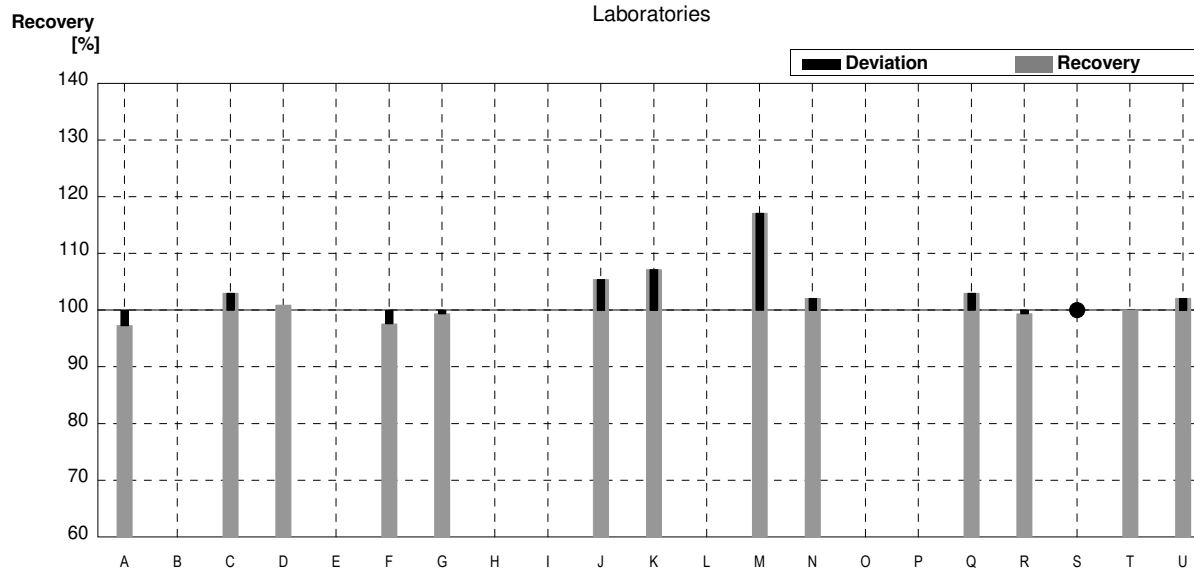
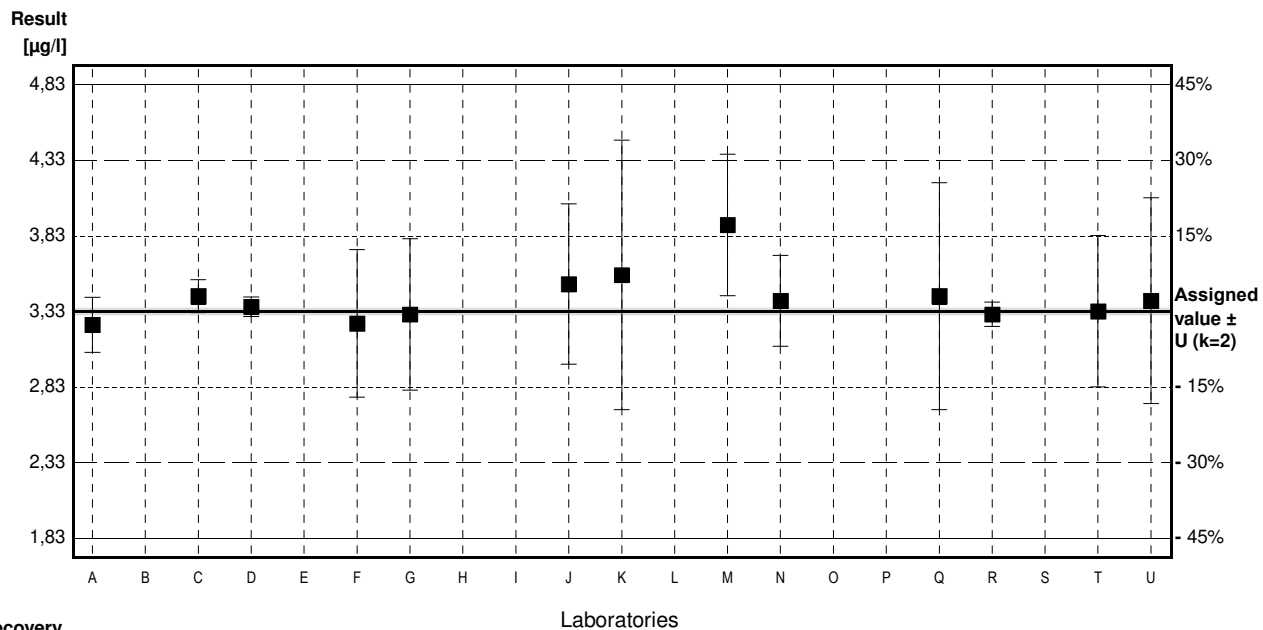
Assigned value ± U (k=2) 3,33 µg/l ± 0,02 µg/l

IFA result ± U (k=2) 3,38 µg/l ± 0,31 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,24	0,182	µg/l	97%	-0,38
B			µg/l		
C	3,43	0,108	µg/l	103%	0,42
D	3,36	0,064	µg/l	101%	0,13
E			µg/l		
F	3,25	0,488	µg/l	98%	-0,34
G	3,31	0,50	µg/l	99%	-0,08
H			µg/l		
I			µg/l		
J	3,51	0,53	µg/l	105%	0,76
K	3,57	0,89	µg/l	107%	1,02
L			µg/l		
M	3,90 *	0,468	µg/l	117%	2,41
N	3,40	0,30	µg/l	102%	0,30
O			µg/l		
P			µg/l		
Q	3,43	0,75	µg/l	103%	0,42
R	3,31	0,08	µg/l	99%	-0,08
S	<5,00	0,500	µg/l	*	
T	3,33	0,50	µg/l	100%	0,00
U	3,40	0,68	µg/l	102%	0,30

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,42 ± 0,15	3,38 ± 0,09	µg/l
Recov. ± CI(99%)	102,7 ± 4,4	101,5 ± 2,7	%
SD between labs	0,17	0,10	µg/l
RSD between labs	5,1	2,9	%
n for calculation	13	12	



Sample M173B

Parameter Arsenic

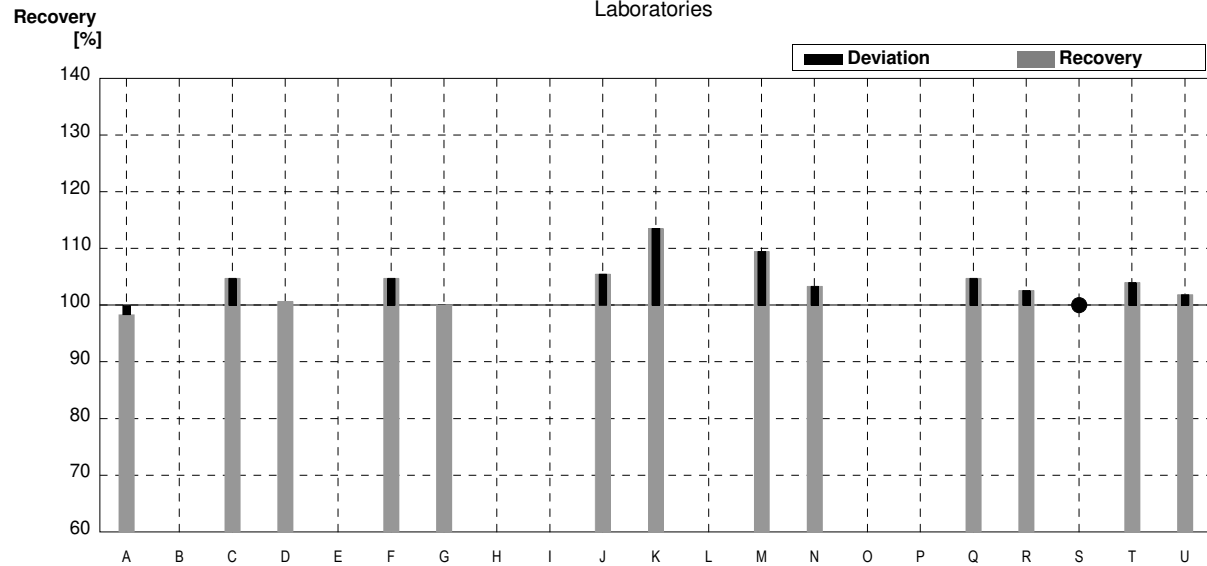
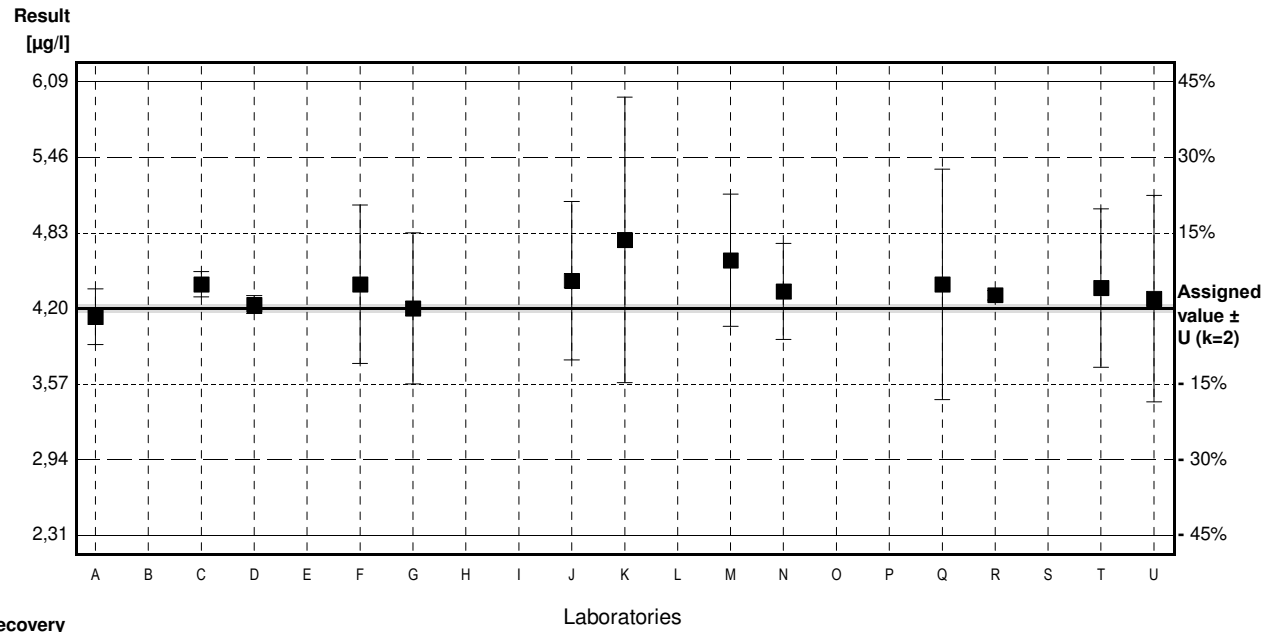
Assigned value ± U (k=2) 4,20 µg/l ± 0,03 µg/l

IFA result ± U (k=2) 4,17 µg/l ± 0,38 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	4,13	0,233	µg/l	98%	-0,23
B			µg/l		
C	4,40	0,105	µg/l	105%	0,67
D	4,23	0,075	µg/l	101%	0,10
E			µg/l		
F	4,40	0,66	µg/l	105%	0,67
G	4,20	0,63	µg/l	100%	0,00
H			µg/l		
I			µg/l		
J	4,43	0,66	µg/l	105%	0,77
K	4,77 *	1,19	µg/l	114%	1,91
L			µg/l		
M	4,60	0,552	µg/l	110%	1,34
N	4,34	0,40	µg/l	103%	0,47
O			µg/l		
P			µg/l		
Q	4,40	0,96	µg/l	105%	0,67
R	4,31	0,04	µg/l	103%	0,37
S	<5,00	0,500	µg/l	*	
T	4,37	0,66	µg/l	104%	0,57
U	4,28	0,86	µg/l	102%	0,27

	All results	Outliers excl.	Unit
Mean ± CI(99%)	4,37 ± 0,14	4,34 ± 0,11	µg/l
Recov. ± CI(99%)	104,1 ± 3,4	103,4 ± 2,6	%
SD between labs	0,17	0,12	µg/l
RSD between labs	3,8	2,8	%
n for calculation	13	12	



Sample M173A

Parameter Lead

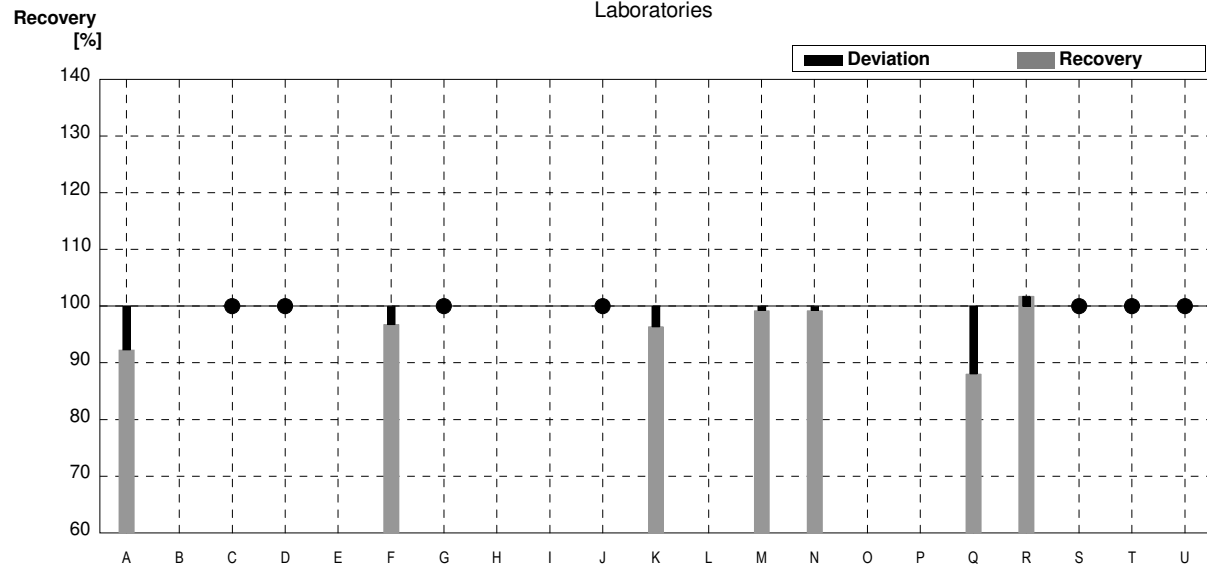
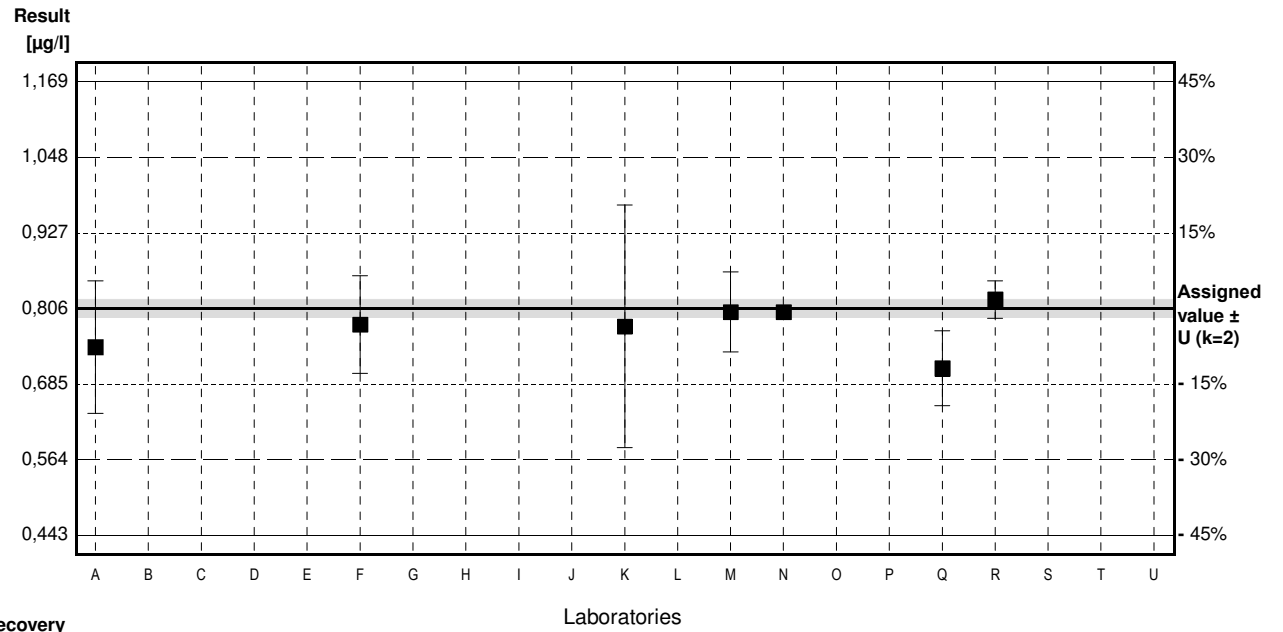
Assigned value ± U (k=2) 0,806 µg/l ± 0,014 µg/l

IFA result ± U (k=2) 0,79 µg/l ± 0,04 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,744	0,106	µg/l	92%	-1,17
B			µg/l		
C	<1,00		µg/l	•	
D	<1,0		µg/l	•	
E			µg/l		
F	0,78	0,078	µg/l	97%	-0,49
G	<1,0		µg/l	•	
H			µg/l		
I			µg/l		
J	<1		µg/l	•	
K	0,777	0,194	µg/l	96%	-0,55
L			µg/l		
M	0,80	0,064	µg/l	99%	-0,11
N	0,80		µg/l	99%	-0,11
O			µg/l		
P			µg/l		
Q	0,71	0,06	µg/l	88%	-1,80
R	0,82	0,03	µg/l	102%	0,26
S	<5,00	0,500	µg/l	•	
T	<3		µg/l	•	
U	<1		µg/l	•	

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,776 ± 0,053	0,776 ± 0,053	µg/l
Recov. ± CI(99%)	96,3 ± 6,5	96,3 ± 6,5	%
SD between labs	0,038	0,038	µg/l
RSD between labs	4,8	4,8	%
n for calculation	7	7	



Sample M173B

Parameter Lead

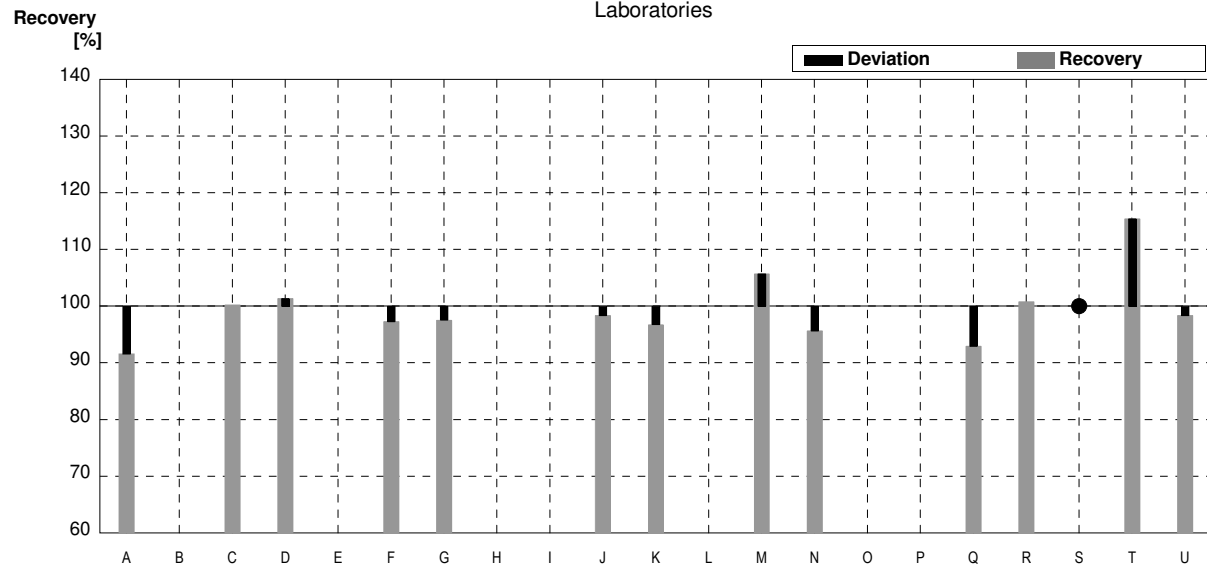
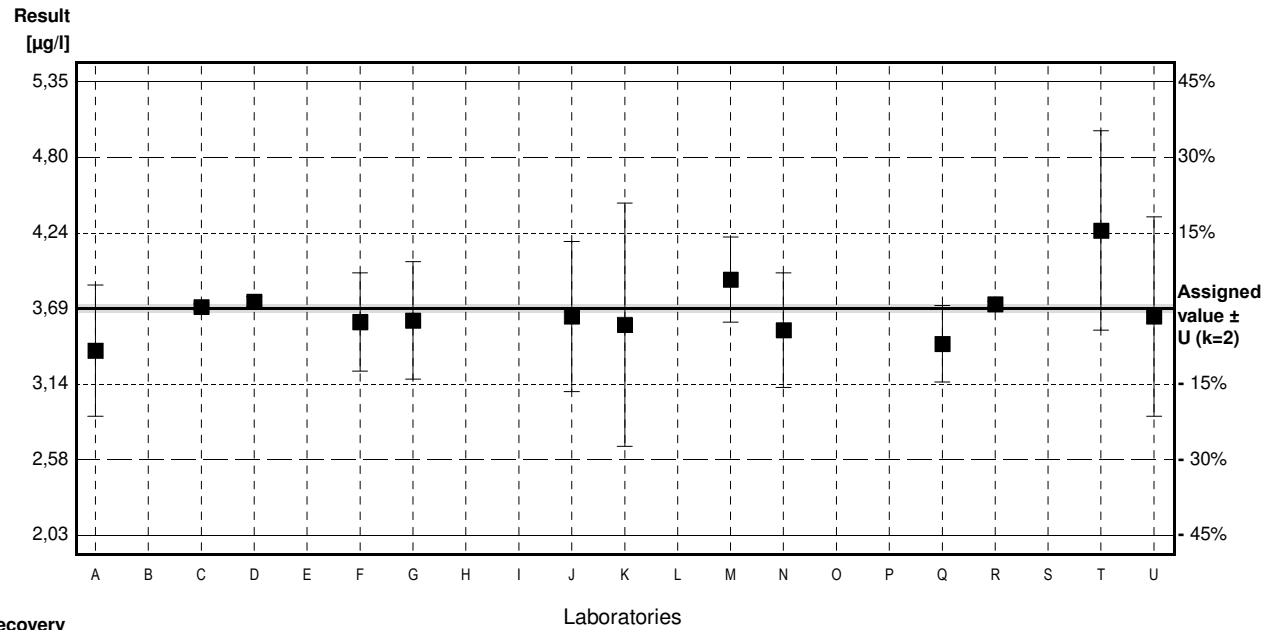
Assigned value ± U (k=2) 3,69 µg/l ± 0,03 µg/l

IFA result ± U (k=2) 3,45 µg/l ± 0,17 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,38	0,480	µg/l	92%	-1,27
B			µg/l		
C	3,70	0,0222	µg/l	100%	0,04
D	3,74	0,036	µg/l	101%	0,21
E			µg/l		
F	3,59	0,359	µg/l	97%	-0,41
G	3,60	0,43	µg/l	98%	-0,37
H			µg/l		
I			µg/l		
J	3,63	0,55	µg/l	98%	-0,25
K	3,57	0,89	µg/l	97%	-0,49
L			µg/l		
M	3,90	0,312	µg/l	106%	0,86
N	3,53	0,42	µg/l	96%	-0,66
O			µg/l		
P			µg/l		
Q	3,43	0,28	µg/l	93%	-1,07
R	3,72	0,02	µg/l	101%	0,12
S	<5,00	0,500	µg/l	*	
T	4,26	0,73	µg/l	115%	2,34
U	3,63	0,73	µg/l	98%	-0,25

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,67 ± 0,19	3,62 ± 0,13	µg/l
Recov. ± CI(99%)	99,4 ± 5,1	98,1 ± 3,4	%
SD between labs	0,22	0,14	µg/l
RSD between labs	6,1	3,9	%
n for calculation	13	12	



Sample M173A

Parameter Cadmium

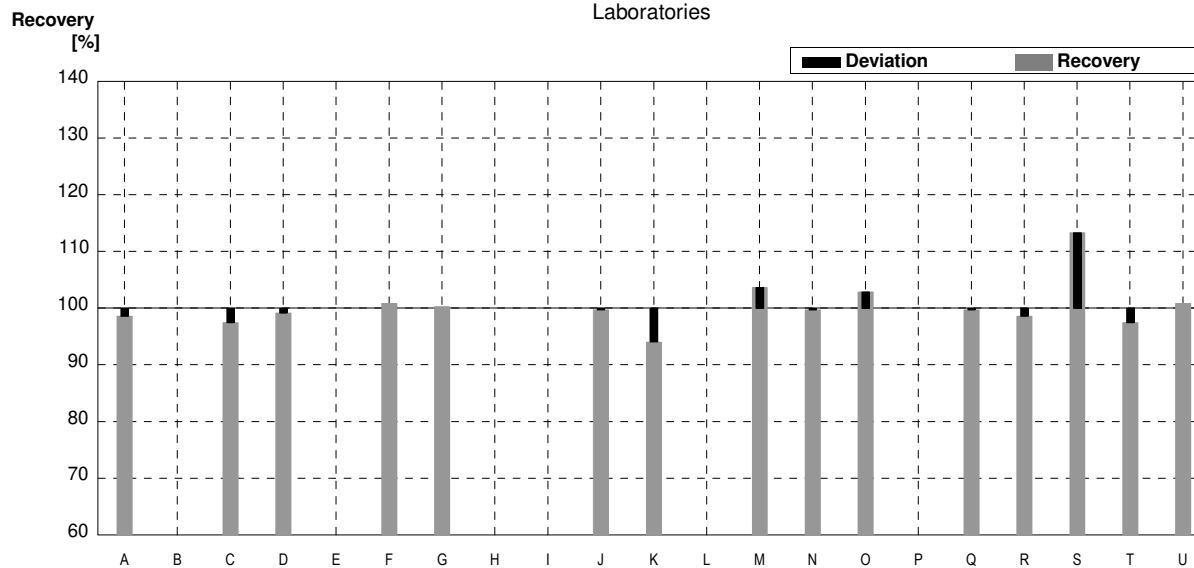
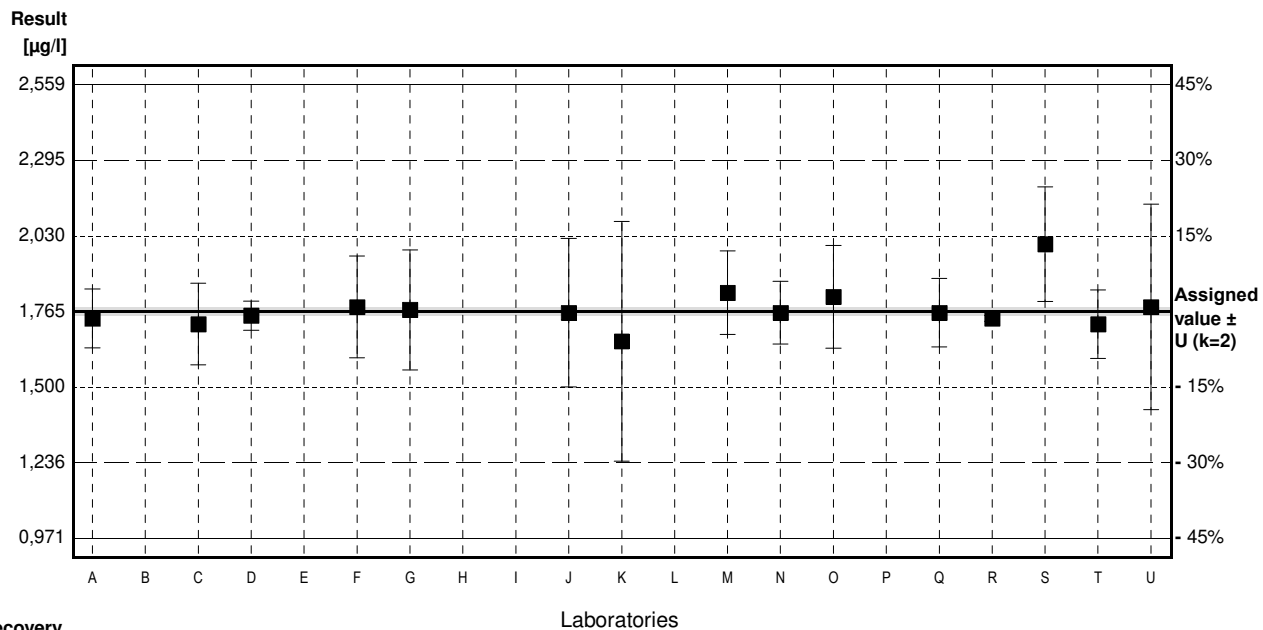
Assigned value ± U (k=2) 1,765 µg/l ± 0,014 µg/l

IFA result ± U (k=2) 1,80 µg/l ± 0,11 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	1,74	0,103	µg/l	99%	-0,27
B			µg/l		
C	1,72	0,143	µg/l	97%	-0,49
D	1,75	0,051	µg/l	99%	-0,16
E			µg/l		
F	1,78	0,178	µg/l	101%	0,16
G	1,77	0,21	µg/l	100%	0,05
H			µg/l		
I			µg/l		
J	1,76	0,26	µg/l	100%	-0,05
K	1,66 *	0,42	µg/l	94%	-1,14
L			µg/l		
M	1,83	0,146	µg/l	104%	0,71
N	1,76	0,11	µg/l	100%	-0,05
O	1,816	0,18	µg/l	103%	0,56
P			µg/l		
Q	1,76	0,12	µg/l	100%	-0,05
R	1,74	0,01	µg/l	99%	-0,27
S	2,00 *	0,200	µg/l	113%	2,56
T	1,72	0,12	µg/l	97%	-0,49
U	1,78	0,36	µg/l	101%	0,16

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,772 ± 0,058	1,764 ± 0,028	µg/l
Recov. ± CI(99%)	100,4 ± 3,3	99,9 ± 1,6	%
SD between labs	0,075	0,033	µg/l
RSD between labs	4,2	1,9	%
n for calculation	15	13	



Sample M173B

Parameter Cadmium

Assigned value ± U (k=2) 0,705 µg/l ± 0,007 µg/l

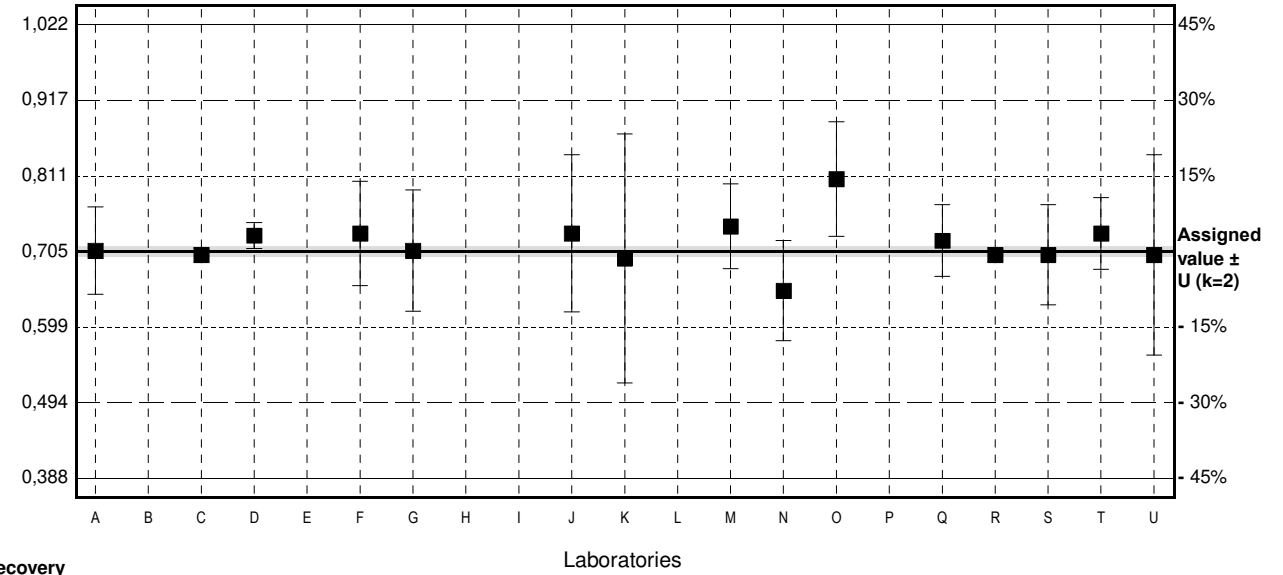
IFA result ± U (k=2) 0,73 µg/l ± 0,05 µg/l

Stability test µg/l

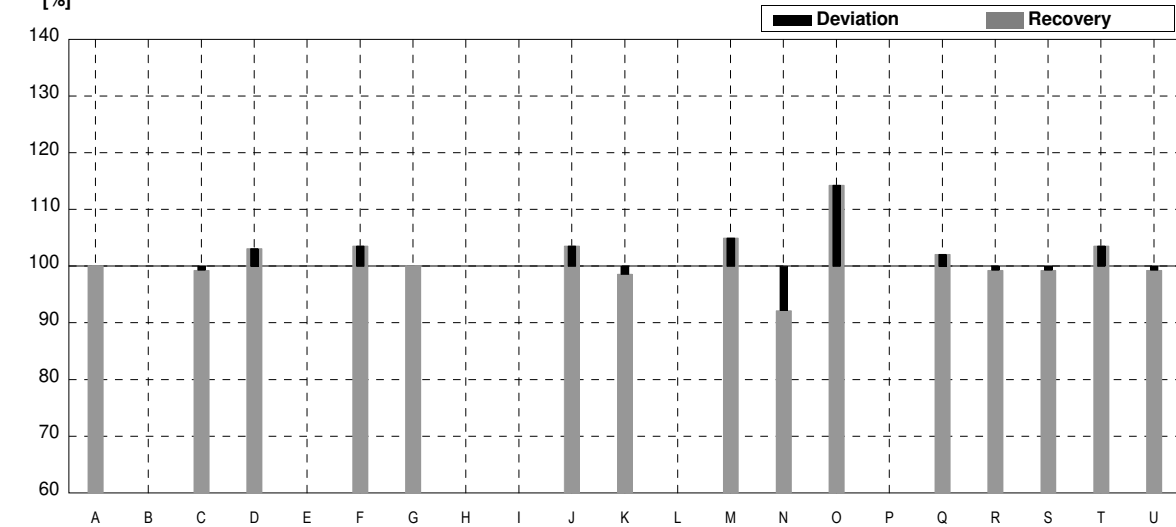
Lab Code	Result	±	Unit	Recovery	z-Score
A	0,706	0,0609	µg/l	100%	0,03
B			µg/l		
C	0,700	0,0100	µg/l	99%	-0,14
D	0,727	0,018	µg/l	103%	0,60
E			µg/l		
F	0,73	0,073	µg/l	104%	0,68
G	0,706	0,085	µg/l	100%	0,03
H			µg/l		
I			µg/l		
J	0,73	0,11	µg/l	104%	0,68
K	0,695	0,174	µg/l	99%	-0,27
L			µg/l		
M	0,740	0,0592	µg/l	105%	0,95
N	0,65	0,07	µg/l	92%	-1,50
O	0,806	0,08	µg/l	114%	2,76
P			µg/l		
Q	0,72	0,05	µg/l	102%	0,41
R	0,70	0,01	µg/l	99%	-0,14
S	0,700	0,0700	µg/l	99%	-0,14
T	0,73	0,05	µg/l	104%	0,68
U	0,700	0,14	µg/l	99%	-0,14

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,716 ± 0,026	0,710 ± 0,018	µg/l
Recov. ± CI(99%)	101,6 ± 3,6	100,6 ± 2,6	%
SD between labs	0,033	0,023	µg/l
RSD between labs	4,6	3,2	%
n for calculation	15	14	

Result
[µg/l]



Recovery
[%]



Sample M173A

Parameter Chromium

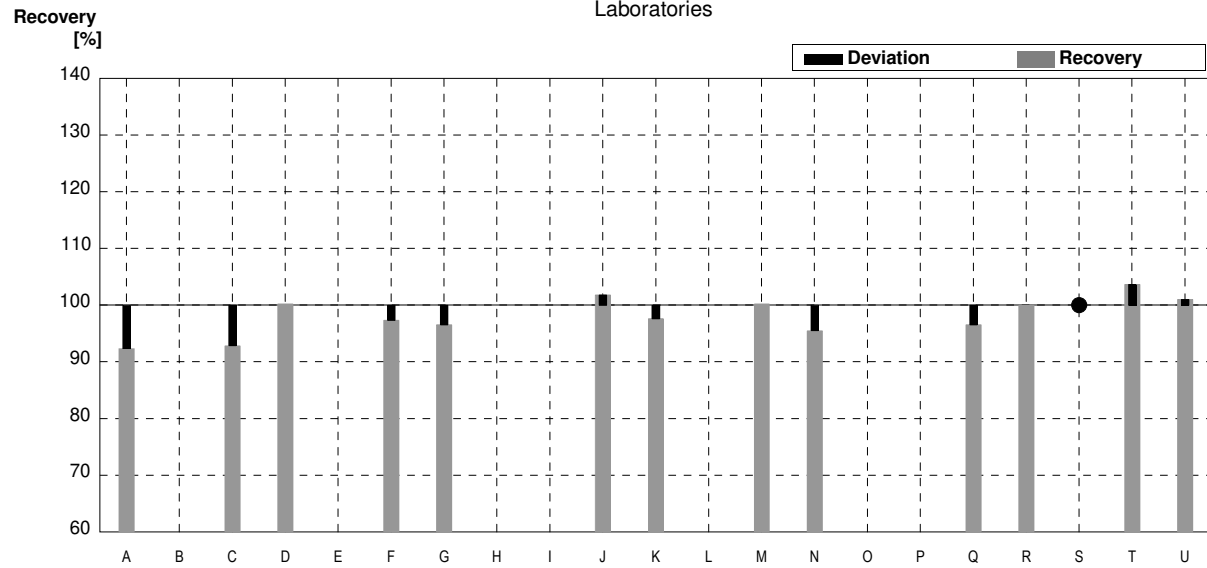
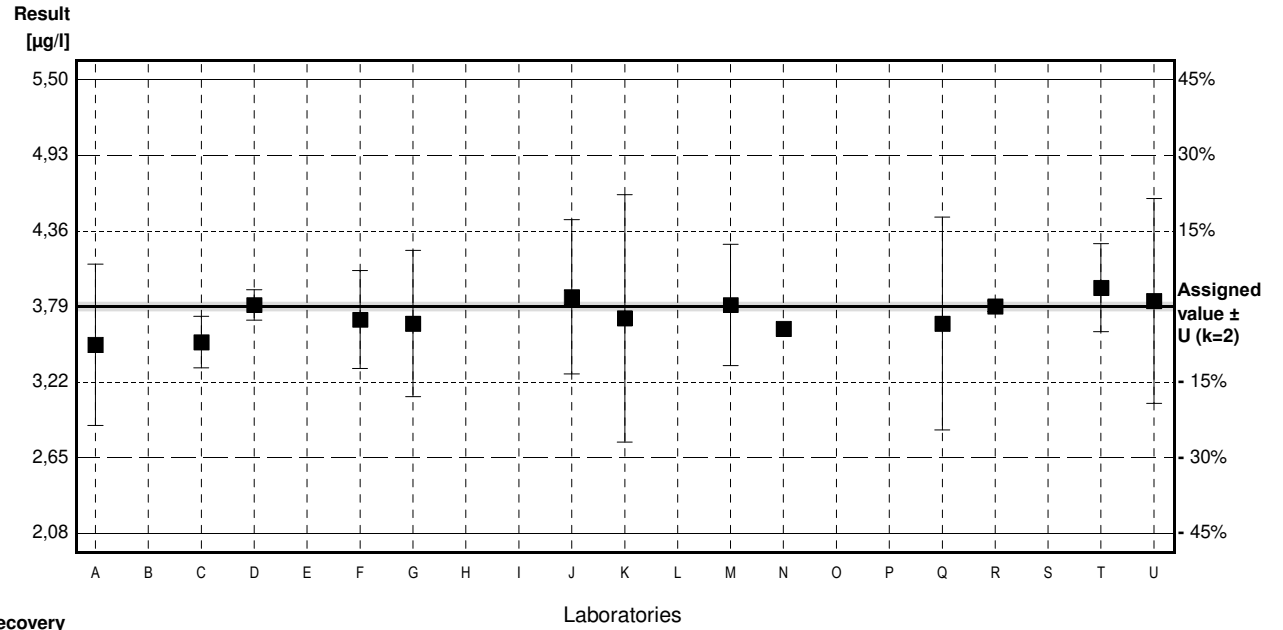
Assigned value ± U (k=2) 3,79 µg/l ± 0,03 µg/l

IFA result ± U (k=2) 3,82 µg/l ± 0,13 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,50	0,607	µg/l	92%	-1,23
B			µg/l		
C	3,52	0,193	µg/l	93%	-1,15
D	3,80	0,115	µg/l	100%	0,04
E			µg/l		
F	3,69	0,369	µg/l	97%	-0,43
G	3,66	0,55	µg/l	97%	-0,55
H			µg/l		
I			µg/l		
J	3,86	0,58	µg/l	102%	0,30
K	3,70	0,93	µg/l	98%	-0,38
L			µg/l		
M	3,80	0,456	µg/l	100%	0,04
N	3,62		µg/l	96%	-0,72
O			µg/l		
P			µg/l		
Q	3,66	0,80	µg/l	97%	-0,55
R	3,79	0,04	µg/l	100%	0,00
S	<5,00	0,500	µg/l	*	
T	3,93	0,33	µg/l	104%	0,60
U	3,83	0,77	µg/l	101%	0,17

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,72 ± 0,11	3,72 ± 0,11	µg/l
Recov. ± CI(99%)	98,2 ± 2,9	98,2 ± 2,9	%
SD between labs	0,13	0,13	µg/l
RSD between labs	3,5	3,5	%
n for calculation	13	13	



Sample M173B

Parameter Chromium

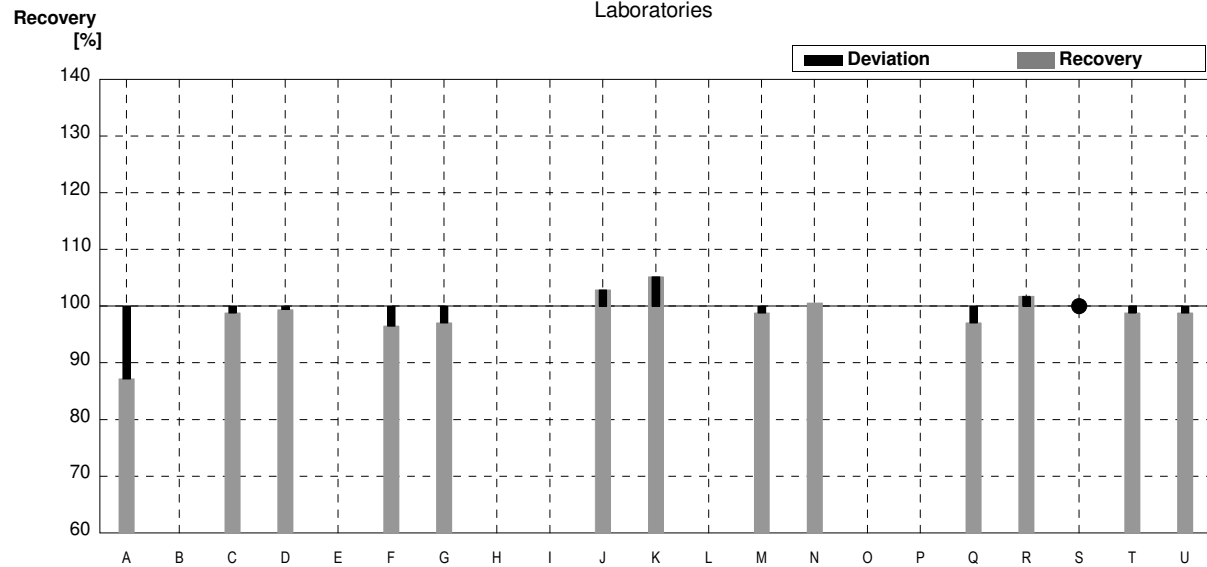
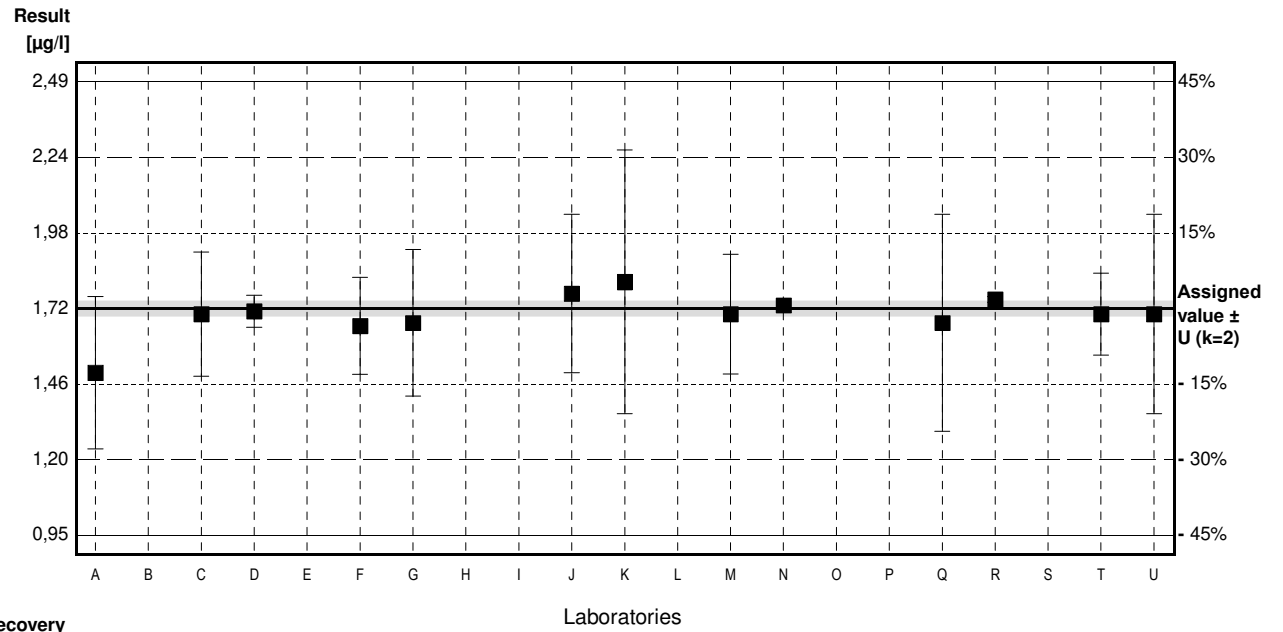
Assigned value ± U (k=2) 1,72 µg/l ± 0,03 µg/l

IFA result ± U (k=2) 1,75 µg/l ± 0,08 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	1,50 *	0,260	µg/l	87%	-2,06
B			µg/l		
C	1,70	0,212	µg/l	99%	-0,19
D	1,71	0,055	µg/l	99%	-0,09
E			µg/l		
F	1,66	0,166	µg/l	97%	-0,56
G	1,67	0,25	µg/l	97%	-0,47
H			µg/l		
I			µg/l		
J	1,77	0,27	µg/l	103%	0,47
K	1,81	0,45	µg/l	105%	0,84
L			µg/l		
M	1,70	0,204	µg/l	99%	-0,19
N	1,73		µg/l	101%	0,09
O			µg/l		
P			µg/l		
Q	1,67	0,37	µg/l	97%	-0,47
R	1,75	0,01	µg/l	102%	0,28
S	<5,00	0,500	µg/l	*	
T	1,70	0,14	µg/l	99%	-0,19
U	1,70	0,34	µg/l	99%	-0,19

	All results	Outliers excl.	Unit
Mean ± CI(99%)	1,70 ± 0,06	1,71 ± 0,04	µg/l
Recov. ± CI(99%)	98,7 ± 3,6	99,7 ± 2,3	%
SD between labs	0,07	0,04	µg/l
RSD between labs	4,3	2,6	%
n for calculation	13	12	



Sample M173A

Parameter Iron

Assigned value ± U (k=2) 17,92 µg/l ± 0,19 µg/l

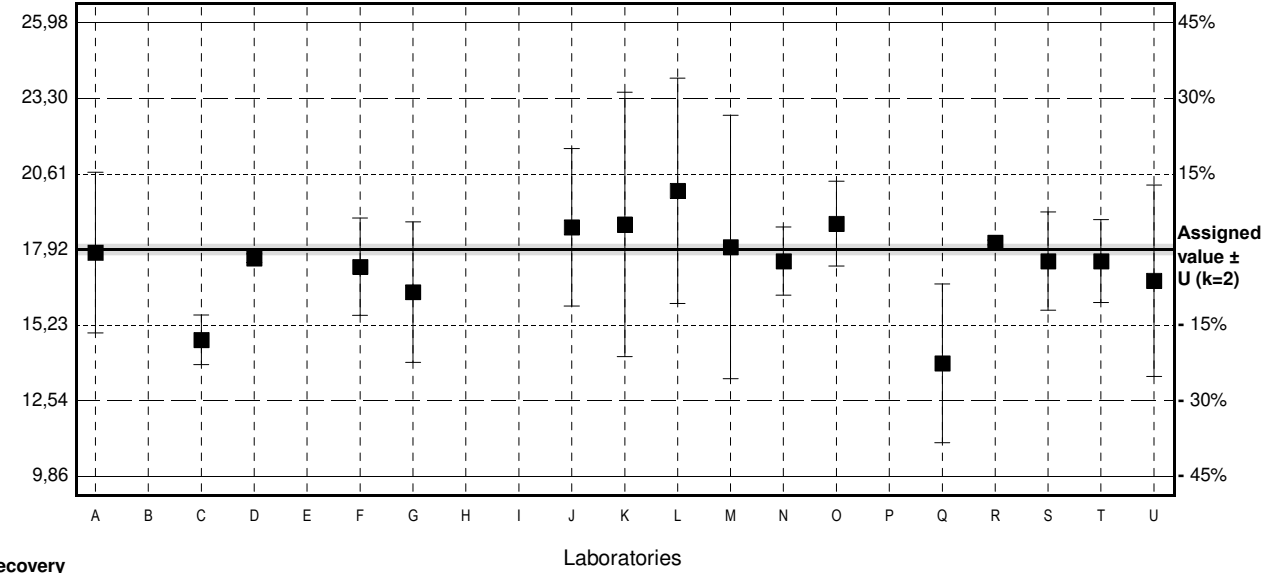
IFA result ± U (k=2) 18,0 µg/l ± 1,4 µg/l

Stability test µg/l

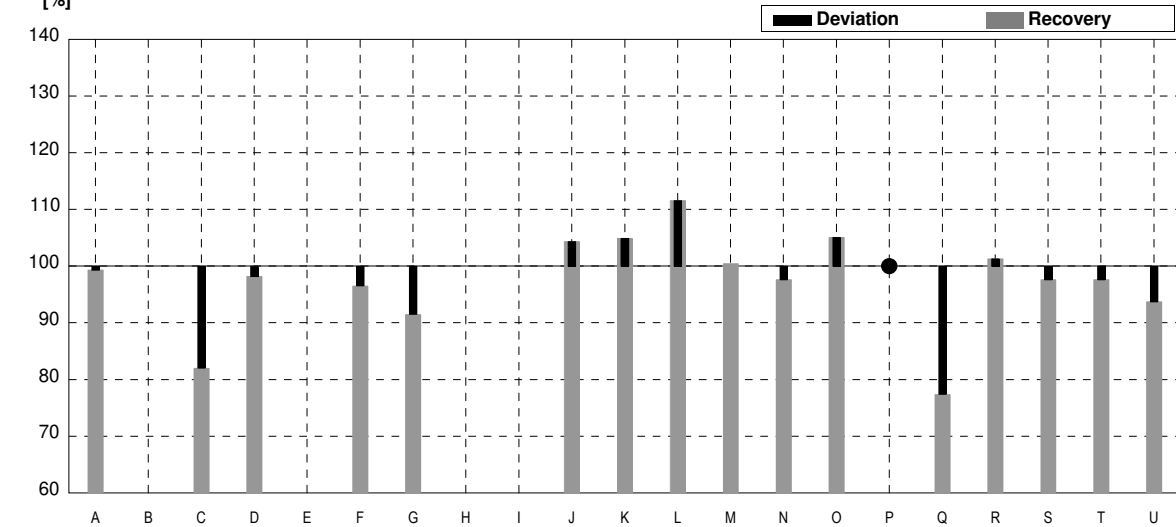
Lab Code	Result	±	Unit	Recovery	z-Score
A	17,8	2,86	µg/l	99%	-0,10
B			µg/l		
C	14,7	0,885	µg/l	82%	-2,72
D	17,6	0,153	µg/l	98%	-0,27
E			µg/l		
F	17,3	1,73	µg/l	97%	-0,52
G	16,4	2,5	µg/l	92%	-1,29
H			µg/l		
I			µg/l		
J	18,7	2,80	µg/l	104%	0,66
K	18,8	4,7	µg/l	105%	0,74
L	20,0	4	µg/l	112%	1,76
M	18,0	4,68	µg/l	100%	0,07
N	17,5	1,21	µg/l	98%	-0,36
O	18,83	1,51	µg/l	105%	0,77
P	<50		µg/l	*	
Q	13,87 *	2,82	µg/l	77%	-3,42
R	18,16	0,09	µg/l	101%	0,20
S	17,5	1,75	µg/l	98%	-0,36
T	17,5	1,47	µg/l	98%	-0,36
U	16,8	3,4	µg/l	94%	-0,95

	All results	Outliers excl.	Unit
Mean ± CI(99%)	17,47 ± 1,12	17,71 ± 0,94	µg/l
Recov. ± CI(99%)	97,5 ± 6,3	98,8 ± 5,2	%
SD between labs	1,52	1,22	µg/l
RSD between labs	8,7	6,9	%
n for calculation	16	15	

Result
[µg/l]



Recovery
[%]



Sample M173B

Parameter Iron

Assigned value ± U (k=2) 57,5 µg/l ± 0,3 µg/l

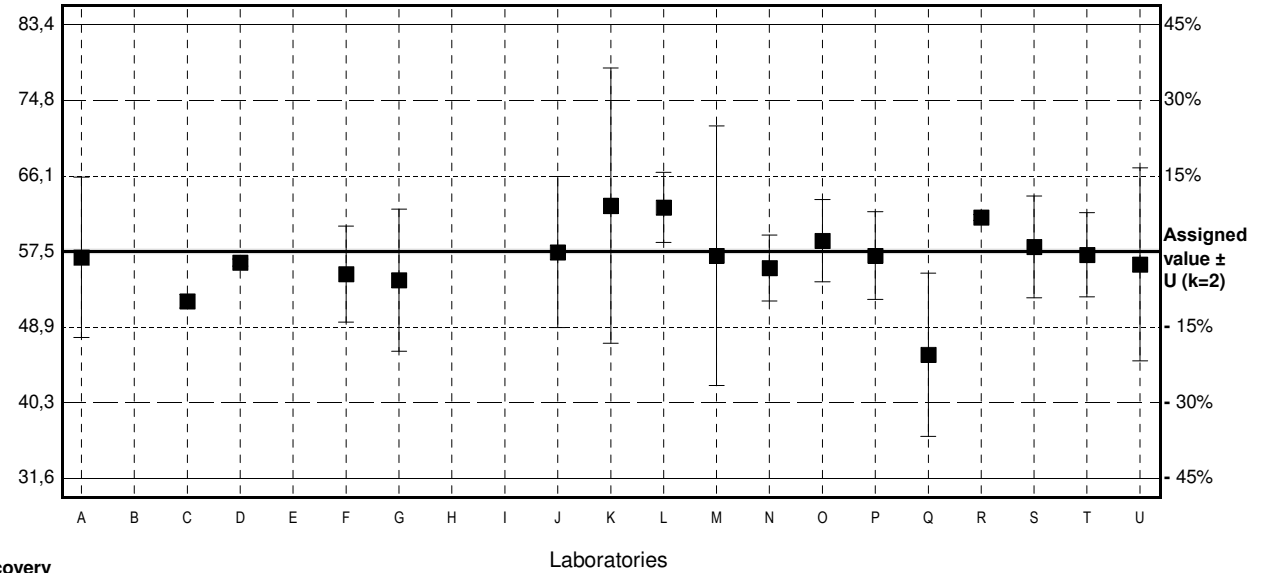
IFA result ± U (k=2) 56 µg/l ± 4 µg/l

Stability test µg/l

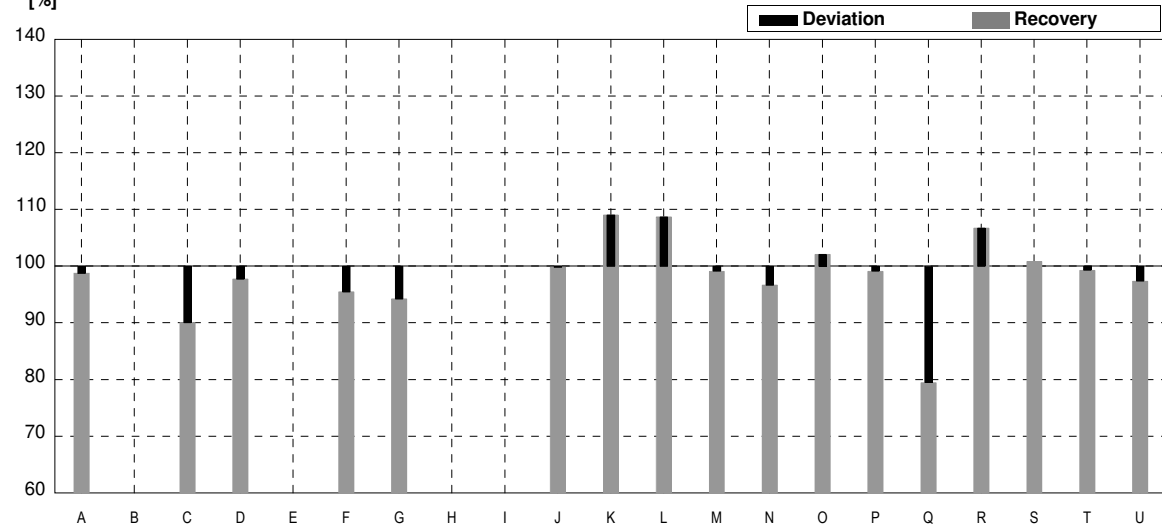
Lab Code	Result	±	Unit	Recovery	z-Score
A	56,8	9,15	µg/l	99%	-0,18
B			µg/l		
C	51,8	0,769	µg/l	90%	-1,50
D	56,2	0,416	µg/l	98%	-0,34
E			µg/l		
F	54,9	5,49	µg/l	95%	-0,69
G	54,2	8,1	µg/l	94%	-0,87
H			µg/l		
I			µg/l		
J	57,4	8,61	µg/l	100%	-0,03
K	62,7	15,7	µg/l	109%	1,37
L	62,5	4	µg/l	109%	1,32
M	57,0	14,8	µg/l	99%	-0,13
N	55,6	3,76	µg/l	97%	-0,50
O	58,71	4,70	µg/l	102%	0,32
P	57	5	µg/l	99%	-0,13
Q	45,71 *	9,31	µg/l	79%	-3,11
R	61,37	0,33	µg/l	107%	1,02
S	58,0	5,80	µg/l	101%	0,13
T	57,1	4,80	µg/l	99%	-0,11
U	56,0	11	µg/l	97%	-0,40

	All results	Outliers excl.	Unit
Mean ± CI(99%)	56,6 ± 2,8	57,3 ± 2,1	µg/l
Recov. ± CI(99%)	98,5 ± 4,9	99,7 ± 3,7	%
SD between labs	4,0	2,9	µg/l
RSD between labs	7,0	5,1	%
n for calculation	17	16	

Result
[µg/l]



Recovery
[%]



Sample M173A
Parameter Copper

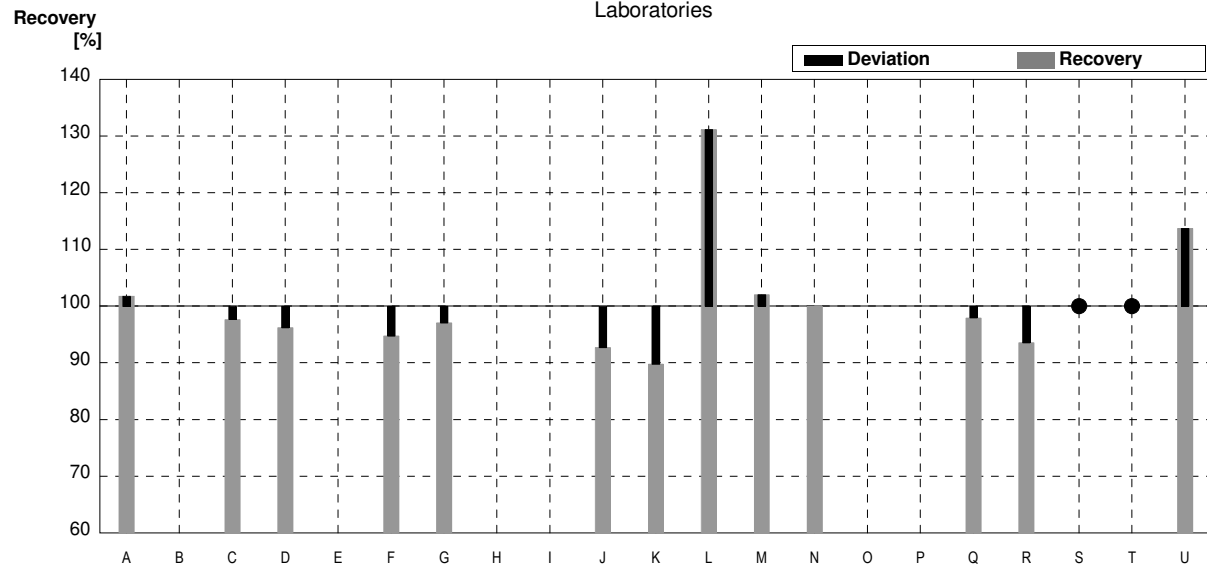
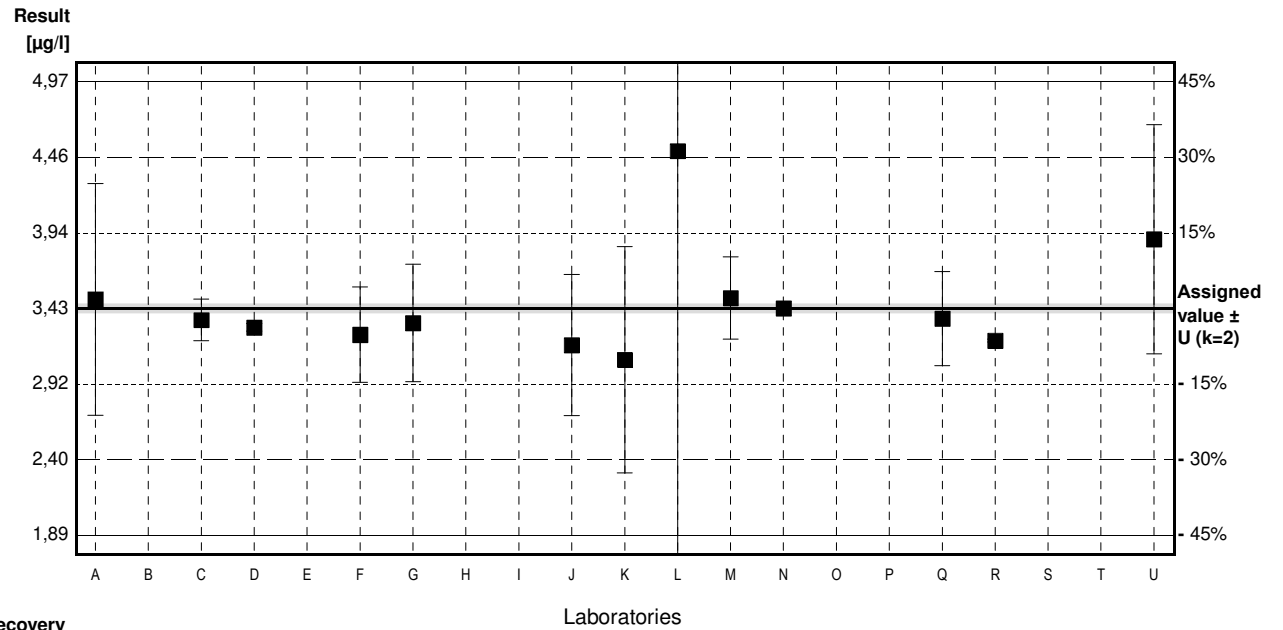
Assigned value ± U (k=2) 3,43 µg/l ± 0,03 µg/l

IFA result ± U (k=2) 3,46 µg/l ± 0,25 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,49	0,789	µg/l	102%	0,23
B			µg/l		
C	3,35	0,142	µg/l	98%	-0,31
D	3,30	0,026	µg/l	96%	-0,51
E			µg/l		
F	3,25	0,325	µg/l	95%	-0,70
G	3,33	0,40	µg/l	97%	-0,39
H			µg/l		
I			µg/l		
J	3,18	0,48	µg/l	93%	-0,97
K	3,08	0,77	µg/l	90%	-1,36
L	4,50 *	5	µg/l	131%	4,16
M	3,50	0,280	µg/l	102%	0,27
N	3,43		µg/l	100%	0,00
O			µg/l		
P			µg/l		
Q	3,36	0,32	µg/l	98%	-0,27
R	3,21	0,01	µg/l	94%	-0,86
S	<5,00	0,500	µg/l	*	
T	<5		µg/l	*	
U	3,90	0,78	µg/l	114%	1,83

	All results	Outliers excl.	Unit
Mean ± CI(99%)	3,45 ± 0,32	3,37 ± 0,19	µg/l
Recov. ± CI(99%)	100,7 ± 9,2	98,1 ± 5,5	%
SD between labs	0,37	0,21	µg/l
RSD between labs	10,8	6,2	%
n for calculation	13	12	



Sample M173B

Parameter Copper

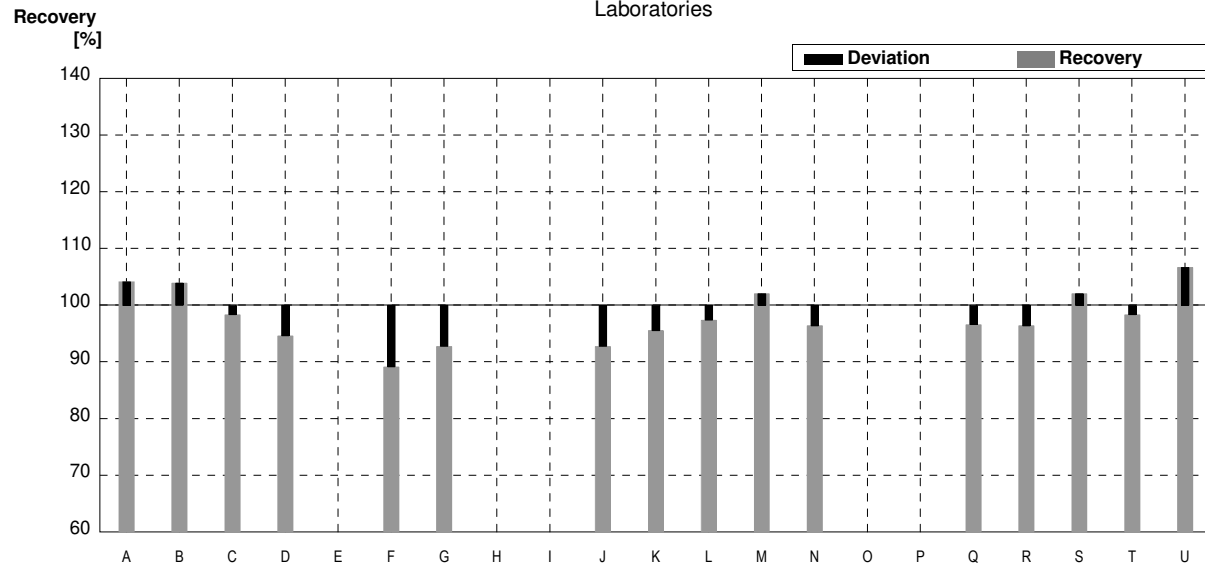
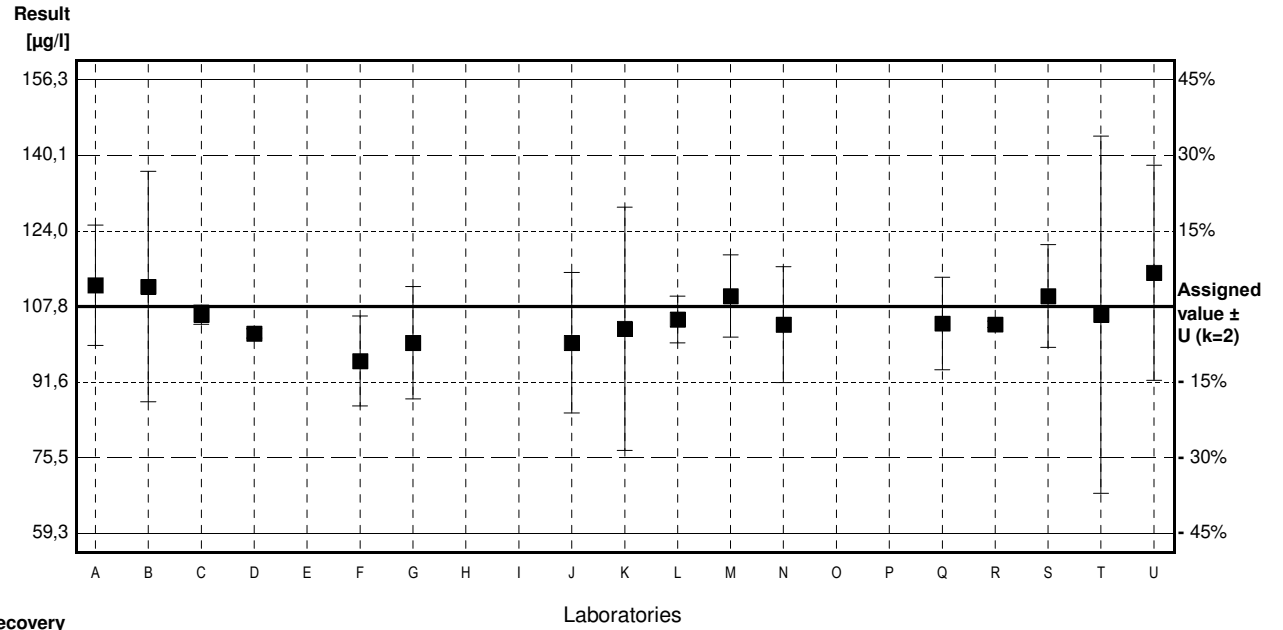
Assigned value ± U (k=2) 107,8 µg/l ± 0,4 µg/l

IFA result ± U (k=2) 103 µg/l ± 7 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	112,3	12,9	µg/l	104%	0,56
B	112,0	24,64	µg/l	104%	0,52
C	106	2,08	µg/l	98%	-0,22
D	102	1,0	µg/l	95%	-0,72
E			µg/l		
F	96,1	9,61	µg/l	89%	-1,45
G	100	12	µg/l	93%	-0,96
H			µg/l		
I			µg/l		
J	100	15	µg/l	93%	-0,96
K	103	26	µg/l	96%	-0,59
L	105,00	5	µg/l	97%	-0,35
M	110	8,78	µg/l	102%	0,27
N	103,9	12,4	µg/l	96%	-0,48
O			µg/l		
P			µg/l		
Q	104,12	9,88	µg/l	97%	-0,46
R	103,93	0,69	µg/l	96%	-0,48
S	110	11,0	µg/l	102%	0,27
T	106	38,2	µg/l	98%	-0,22
U	115	23	µg/l	107%	0,89

	All results	Outliers excl.	Unit
Mean ± CI(99%)	105,6 ± 3,8	105,6 ± 3,8	µg/l
Recov. ± CI(99%)	97,9 ± 3,5	97,9 ± 3,5	%
SD between labs	5,1	5,1	µg/l
RSD between labs	4,9	4,9	%
n for calculation	16	16	



Sample M173A

Parameter Manganese

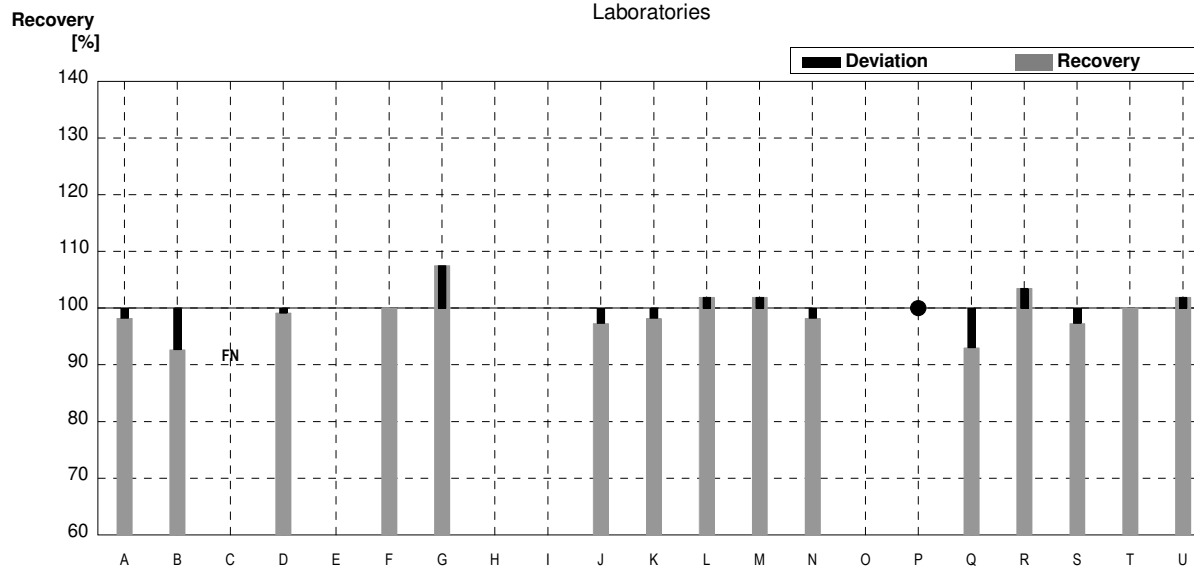
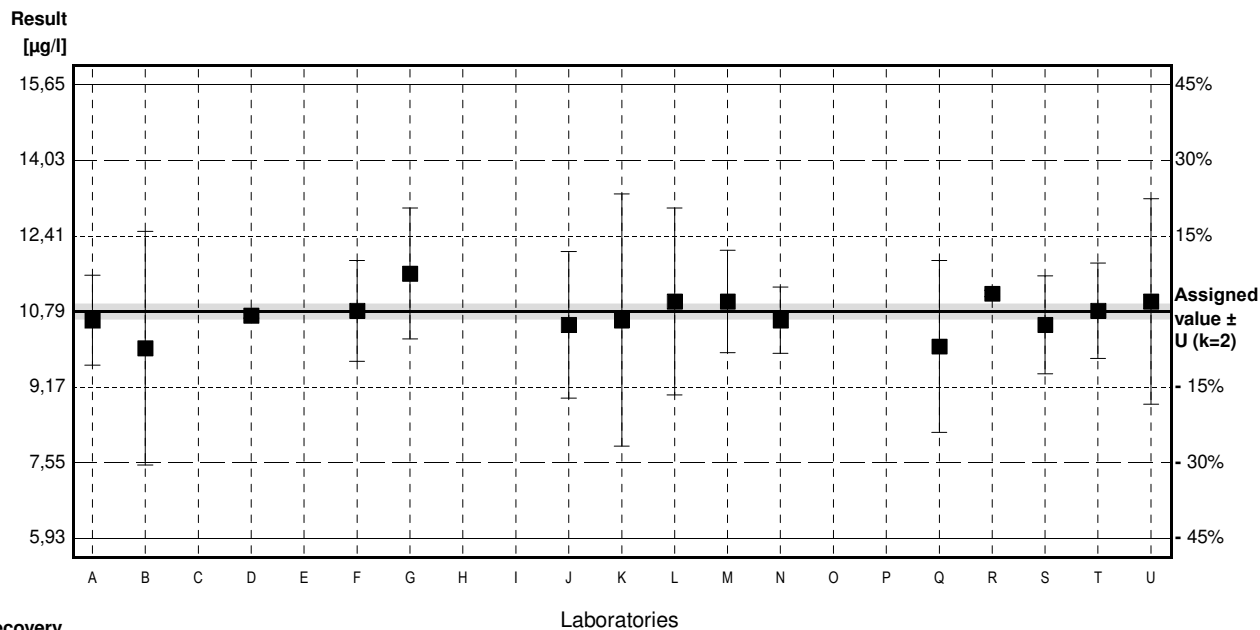
Assigned value ± U (k=2) 10,79 µg/l ± 0,16 µg/l

IFA result ± U (k=2) 10,9 µg/l ± 0,7 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	10,6	0,964	µg/l	98%	-0,34
B	10,0	2,50	µg/l	93%	-1,41
C	<10,0		µg/l	FN	
D	10,7	0,058	µg/l	99%	-0,16
E			µg/l		
F	10,8	1,08	µg/l	100%	0,02
G	11,6	1,4	µg/l	108%	1,44
H			µg/l		
I			µg/l		
J	10,5	1,57	µg/l	97%	-0,52
K	10,6	2,7	µg/l	98%	-0,34
L	11,0	2	µg/l	102%	0,37
M	11,0	1,10	µg/l	102%	0,37
N	10,6	0,71	µg/l	98%	-0,34
O			µg/l		
P	<50		µg/l	*	
Q	10,04	1,84	µg/l	93%	-1,34
R	11,17	0,07	µg/l	104%	0,68
S	10,5	1,05	µg/l	97%	-0,52
T	10,8	1,02	µg/l	100%	0,02
U	11,0	2,2	µg/l	102%	0,37

	All results	Outliers excl.	Unit
Mean ± CI(99%)	10,73 ± 0,31	10,73 ± 0,31	µg/l
Recov. ± CI(99%)	99,4 ± 2,9	99,4 ± 2,9	%
SD between labs	0,41	0,41	µg/l
RSD between labs	3,8	3,8	%
n for calculation	15	15	



Sample M173B

Parameter Manganese

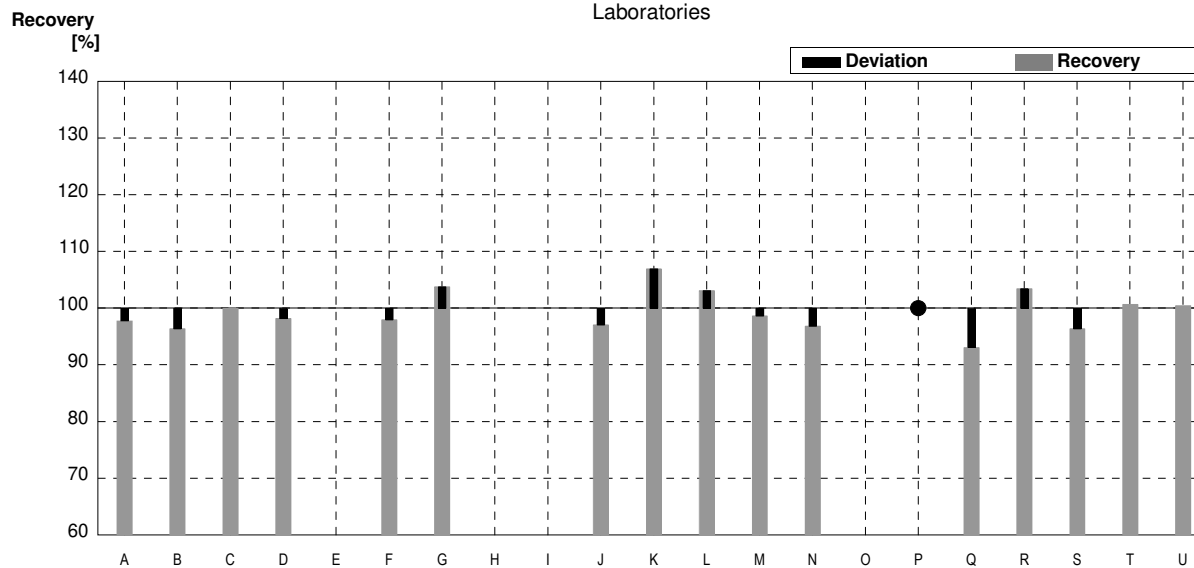
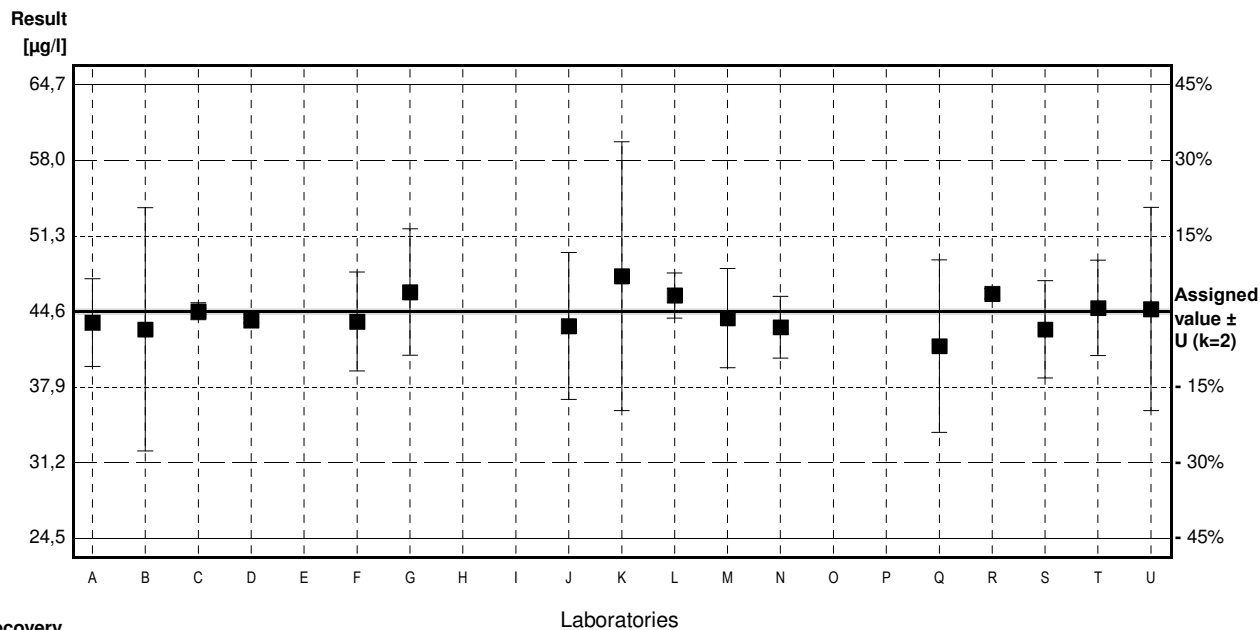
Assigned value ± U (k=2) 44,6 µg/l ± 0,2 µg/l

IFA result ± U (k=2) 44,3 µg/l ± 2,9 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	43,6	3,89	µg/l	98%	-0,43
B	43,0	10,75	µg/l	96%	-0,69
C	44,6	0,761	µg/l	100%	0,00
D	43,8	0,231	µg/l	98%	-0,34
E			µg/l		
F	43,7	4,37	µg/l	98%	-0,39
G	46,3	5,6	µg/l	104%	0,73
H			µg/l		
I			µg/l		
J	43,3	6,49	µg/l	97%	-0,56
K	47,7	11,9	µg/l	107%	1,34
L	46,0	2	µg/l	103%	0,60
M	44,0	4,40	µg/l	99%	-0,26
N	43,2	2,73	µg/l	97%	-0,60
O			µg/l		
P	<50		µg/l	*	
Q	41,52	7,63	µg/l	93%	-1,33
R	46,15	0,44	µg/l	103%	0,67
S	43,0	4,30	µg/l	96%	-0,69
T	44,9	4,22	µg/l	101%	0,13
U	44,8	9,0	µg/l	100%	0,09

	All results	Outliers excl.	Unit
Mean ± CI(99%)	44,3 ± 1,2	44,3 ± 1,2	µg/l
Recov. ± CI(99%)	99,4 ± 2,6	99,4 ± 2,6	%
SD between labs	1,6	1,6	µg/l
RSD between labs	3,5	3,5	%
n for calculation	16	16	



Sample M173A

Parameter Nickel

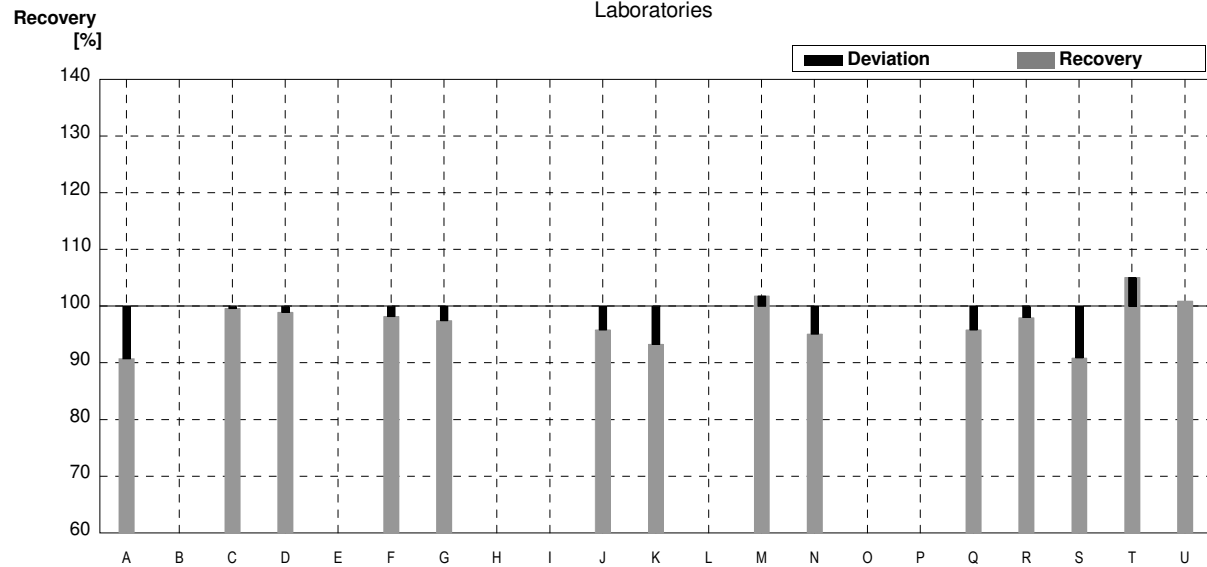
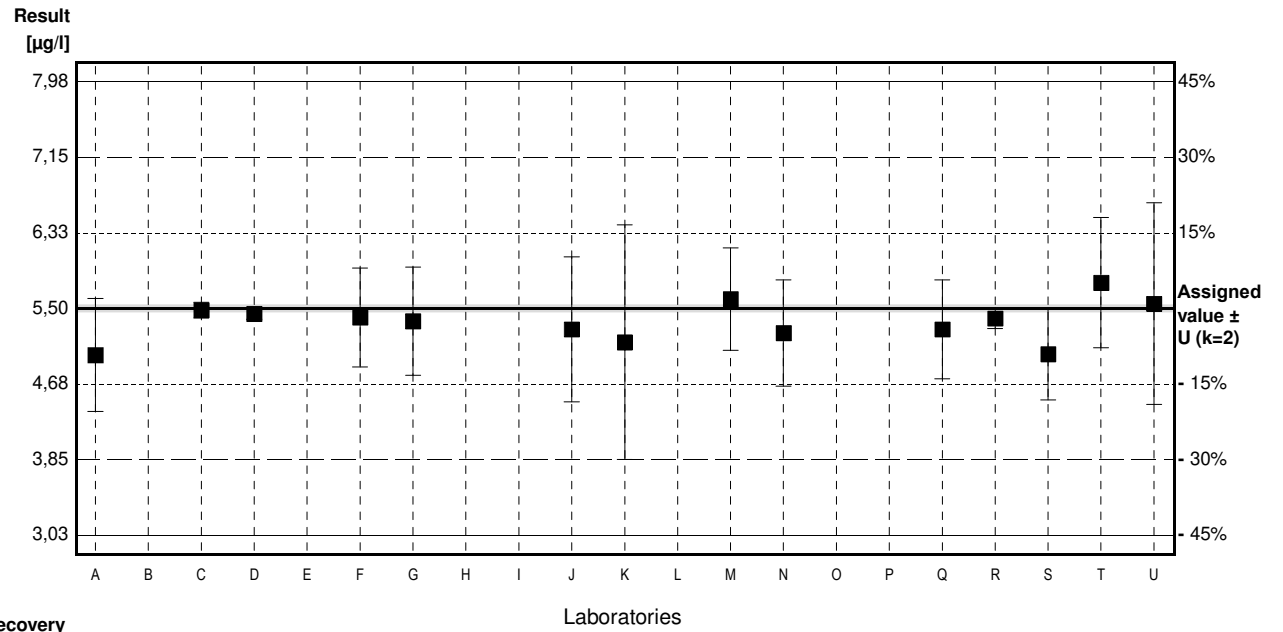
Assigned value ± U (k=2) 5,50 µg/l ± 0,04 µg/l

IFA result ± U (k=2) 5,5 µg/l ± 0,2 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	4,99	0,616	µg/l	91%	-1,34
B			µg/l		
C	5,48	0,0855	µg/l	100%	-0,05
D	5,44	0,059	µg/l	99%	-0,16
E			µg/l		
F	5,4	0,54	µg/l	98%	-0,26
G	5,36	0,59	µg/l	97%	-0,37
H			µg/l		
I			µg/l		
J	5,27	0,79	µg/l	96%	-0,61
K	5,13	1,28	µg/l	93%	-0,97
L			µg/l		
M	5,60	0,560	µg/l	102%	0,26
N	5,23	0,58	µg/l	95%	-0,71
O			µg/l		
P			µg/l		
Q	5,27	0,54	µg/l	96%	-0,61
R	5,39	0,11	µg/l	98%	-0,29
S	5,00	0,500	µg/l	91%	-1,32
T	5,78	0,71	µg/l	105%	0,74
U	5,55	1,1	µg/l	101%	0,13

	All results	Outliers excl.	Unit
Mean ± CI(99%)	5,35 ± 0,18	5,35 ± 0,18	µg/l
Recov. ± CI(99%)	97,3 ± 3,3	97,3 ± 3,3	%
SD between labs	0,22	0,22	µg/l
RSD between labs	4,2	4,2	%
n for calculation	14	14	



Sample M173B

Parameter Nickel

Assigned value \pm U (k=2) 1,92 $\mu\text{g/l}$ \pm 0,03 $\mu\text{g/l}$

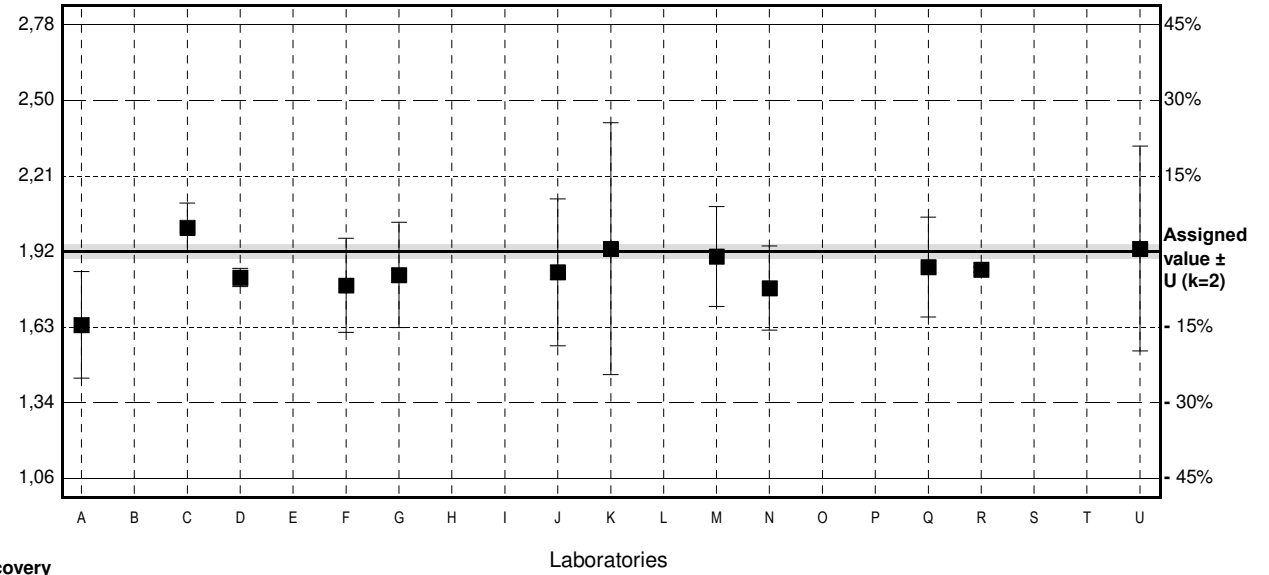
IFA result \pm U (k=2) 1,91 $\mu\text{g/l}$ \pm 0,10 $\mu\text{g/l}$

Stability test $\mu\text{g/l}$

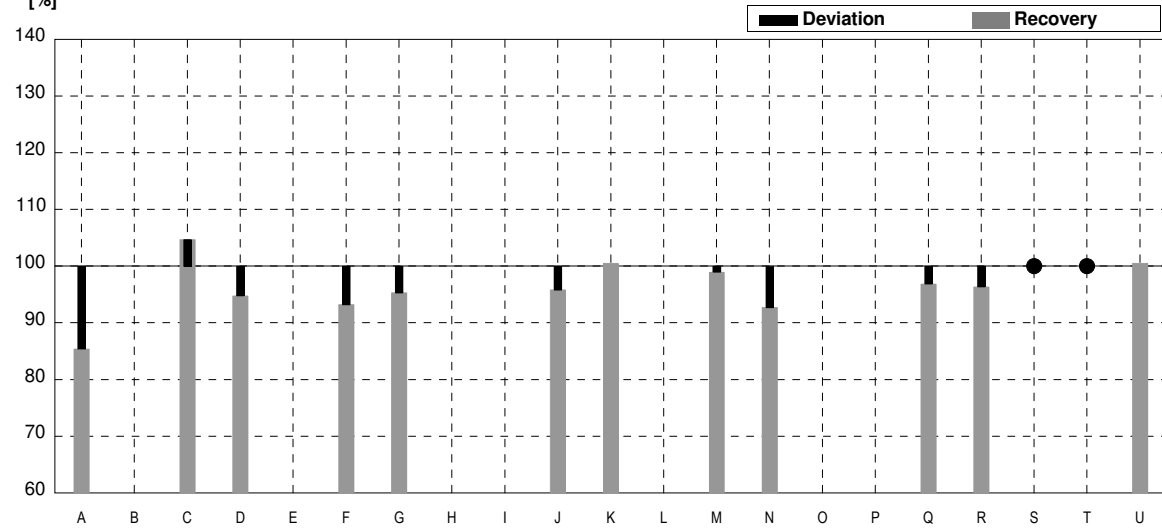
Lab Code	Result	\pm	Unit	Recovery	z-Score
A	1,64	0,203	$\mu\text{g/l}$	85%	-2,11
B			$\mu\text{g/l}$		
C	2,01	0,0938	$\mu\text{g/l}$	105%	0,68
D	1,82	0,035	$\mu\text{g/l}$	95%	-0,75
E			$\mu\text{g/l}$		
F	1,79	0,179	$\mu\text{g/l}$	93%	-0,98
G	1,83	0,20	$\mu\text{g/l}$	95%	-0,68
H			$\mu\text{g/l}$		
I			$\mu\text{g/l}$		
J	1,84	0,28	$\mu\text{g/l}$	96%	-0,60
K	1,93	0,48	$\mu\text{g/l}$	101%	0,08
L			$\mu\text{g/l}$		
M	1,90	0,190	$\mu\text{g/l}$	99%	-0,15
N	1,78	0,16	$\mu\text{g/l}$	93%	-1,06
O			$\mu\text{g/l}$		
P			$\mu\text{g/l}$		
Q	1,86	0,19	$\mu\text{g/l}$	97%	-0,45
R	1,85	0,01	$\mu\text{g/l}$	96%	-0,53
S	<5,00	0,500	$\mu\text{g/l}$	•	
T	<5		$\mu\text{g/l}$	•	
U	1,93	0,39	$\mu\text{g/l}$	101%	0,08

	All results	Outliers excl.	Unit
Mean \pm CI(99%)	1,85 \pm 0,08	1,85 \pm 0,08	$\mu\text{g/l}$
Recov. \pm CI(99%)	96,3 \pm 4,3	96,3 \pm 4,3	%
SD between labs	0,09	0,09	$\mu\text{g/l}$
RSD between labs	5,0	5,0	%
n for calculation	12	12	

Result
[$\mu\text{g/l}$]



Recovery
[%]



Sample M173A

Parameter Mercury

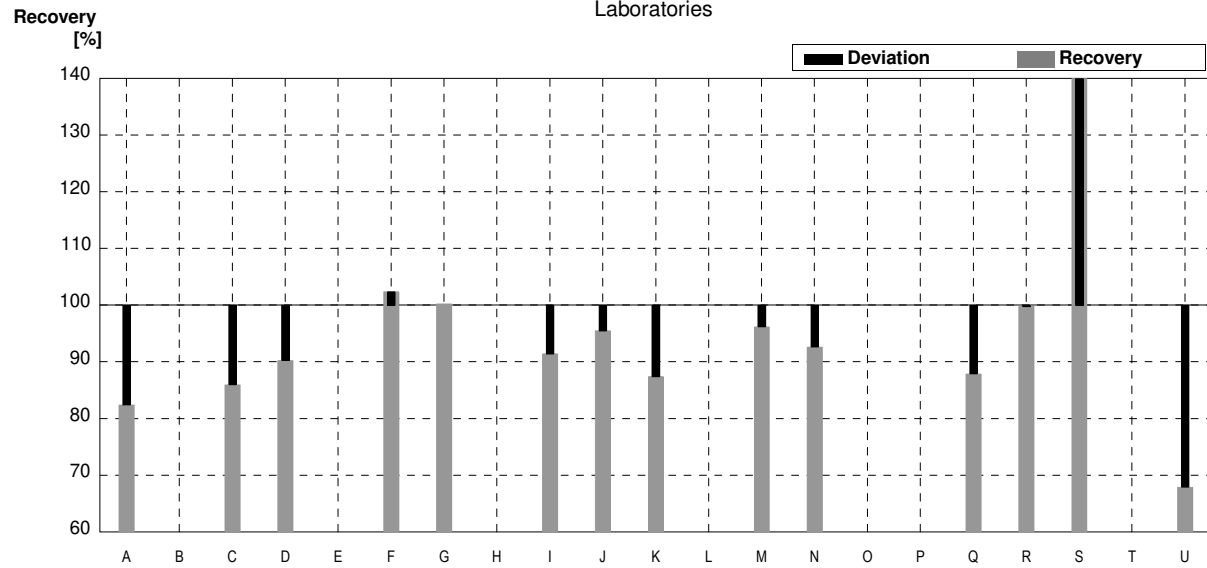
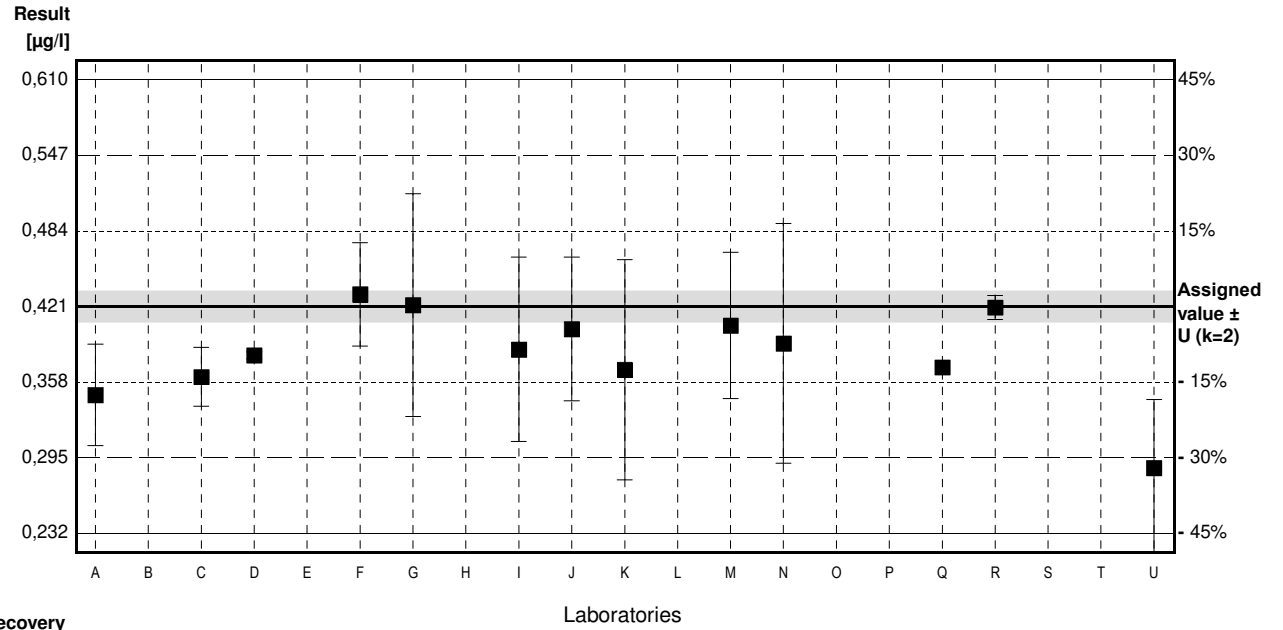
Assigned value ± U (k=2) 0,421 µg/l ± 0,013 µg/l

IFA result ± U (k=2) 0,399 µg/l ± 0,065 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,347	0,0424	µg/l	82%	-1,60
B			µg/l		
C	0,362	0,0246	µg/l	86%	-1,27
D	0,380	0,003	µg/l	90%	-0,89
E			µg/l		
F	0,431	0,0431	µg/l	102%	0,22
G	0,422	0,093	µg/l	100%	0,02
H			µg/l		
I	0,385	0,077	µg/l	91%	-0,78
J	0,402	0,060	µg/l	95%	-0,41
K	0,368	0,092	µg/l	87%	-1,14
L			µg/l		
M	0,405	0,061	µg/l	96%	-0,35
N	0,390	0,1	µg/l	93%	-0,67
O			µg/l		
P			µg/l		
Q	0,370	0,00	µg/l	88%	-1,10
R	0,420	0,01	µg/l	100%	-0,02
S	376 *	18,8	µg/l	89311%	8110,11
T			µg/l		
U	0,286	0,057	µg/l	68%	-2,92

	All results	Outliers excl.	Unit
Mean ± CI(99%)	27,212 ± 80,758	0,382 ± 0,032	µg/l
Recov. ± CI(99%)	6463,7 ± 19182,	90,8 ± 7,7	%
SD between labs	100,388	0,038	µg/l
RSD between labs	368,9	10,0	%
n for calculation	14	13	



Sample M173B

Parameter Mercury

Assigned value ± U (k=2) 1,588 µg/l ± 0,017 µg/l

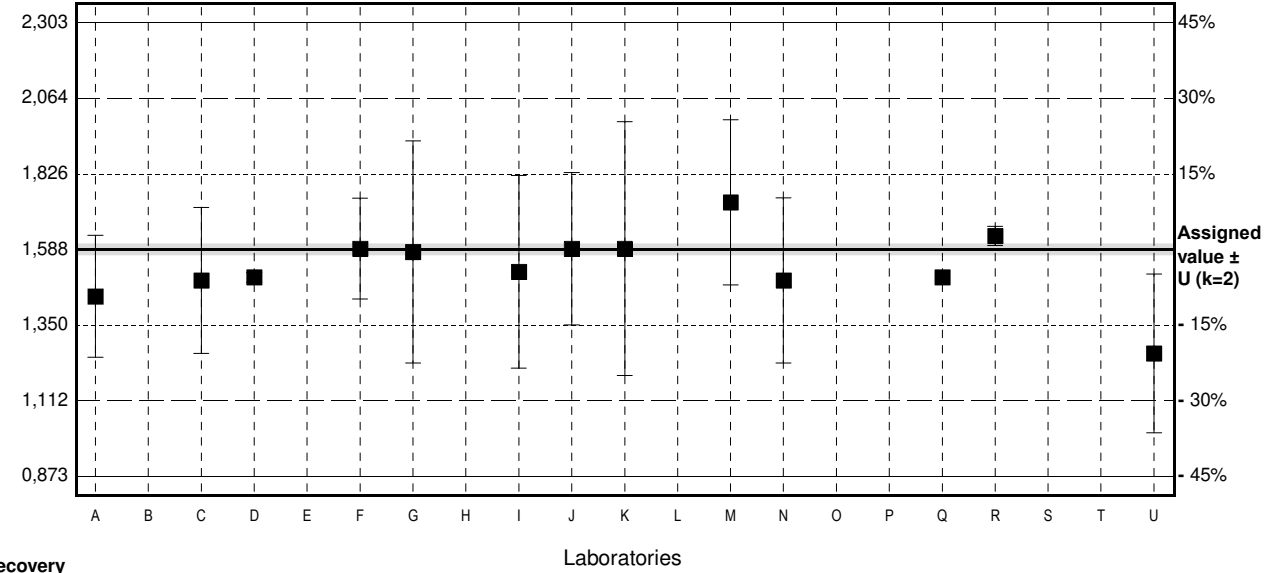
IFA result ± U (k=2) 1,67 µg/l ± 0,27 µg/l

Stability test µg/l

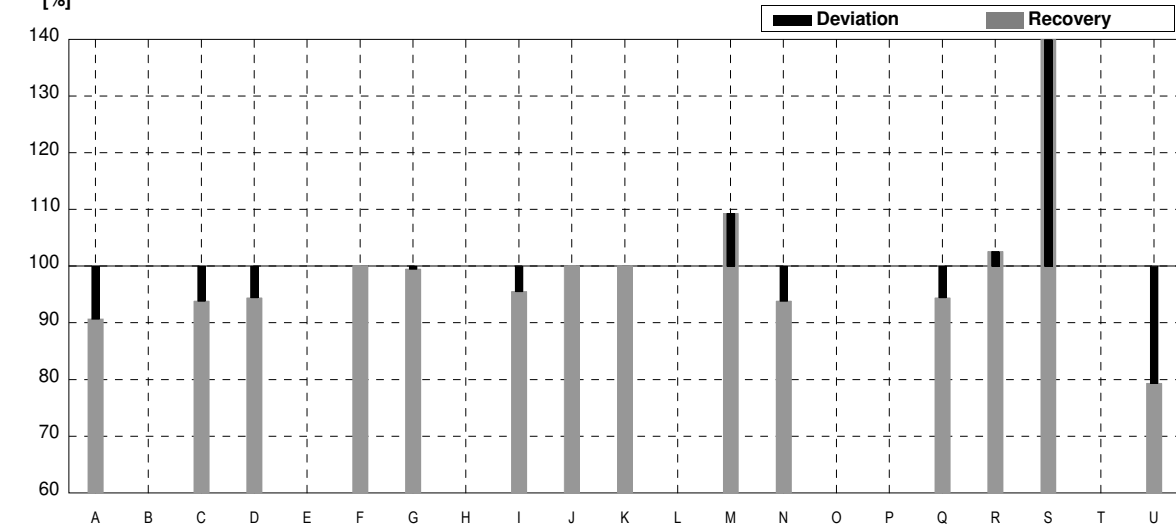
Lab Code	Result	±	Unit	Recovery	z-Score
A	1,44	0,192	µg/l	91%	-0,85
B			µg/l		
C	1,49	0,230	µg/l	94%	-0,56
D	1,50	0,015	µg/l	94%	-0,50
E			µg/l		
F	1,59	0,159	µg/l	100%	0,01
G	1,58	0,35	µg/l	99%	-0,05
H			µg/l		
I	1,517	0,303	µg/l	96%	-0,41
J	1,59	0,24	µg/l	100%	0,01
K	1,59	0,40	µg/l	100%	0,01
L			µg/l		
M	1,736	0,260	µg/l	109%	0,85
N	1,49	0,26	µg/l	94%	-0,56
O			µg/l		
P			µg/l		
Q	1,50	0,00	µg/l	94%	-0,50
R	1,63	0,03	µg/l	103%	0,24
S	1560 *	78,0	µg/l	98237%	8921,53
T			µg/l		
U	1,26 *	0,25	µg/l	79%	-1,88

	All results	Outliers excl.	Unit
Mean ± CI(99%)	112,851 ± 335,07	1,554 ± 0,073	µg/l
Recov. ± CI(99%)	7106,5 ± 21100,	97,9 ± 4,6	%
SD between labs	416,518	0,081	µg/l
RSD between labs	369,1	5,2	%
n for calculation	14	12	

Result
[µg/l]



Recovery
[%]



Sample M173A

Parameter Selenium

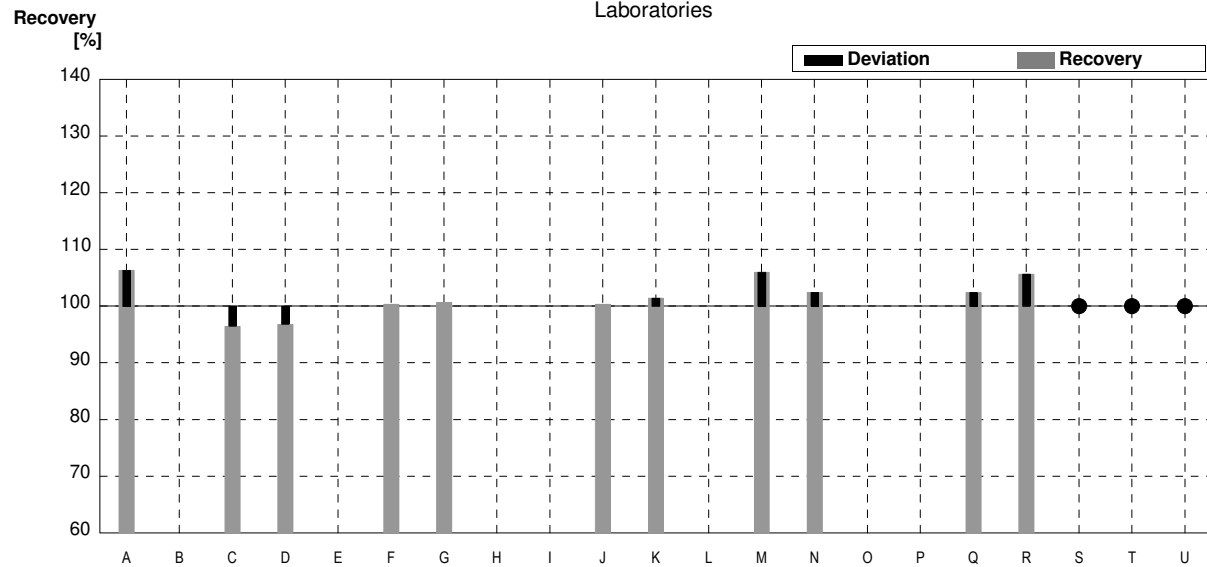
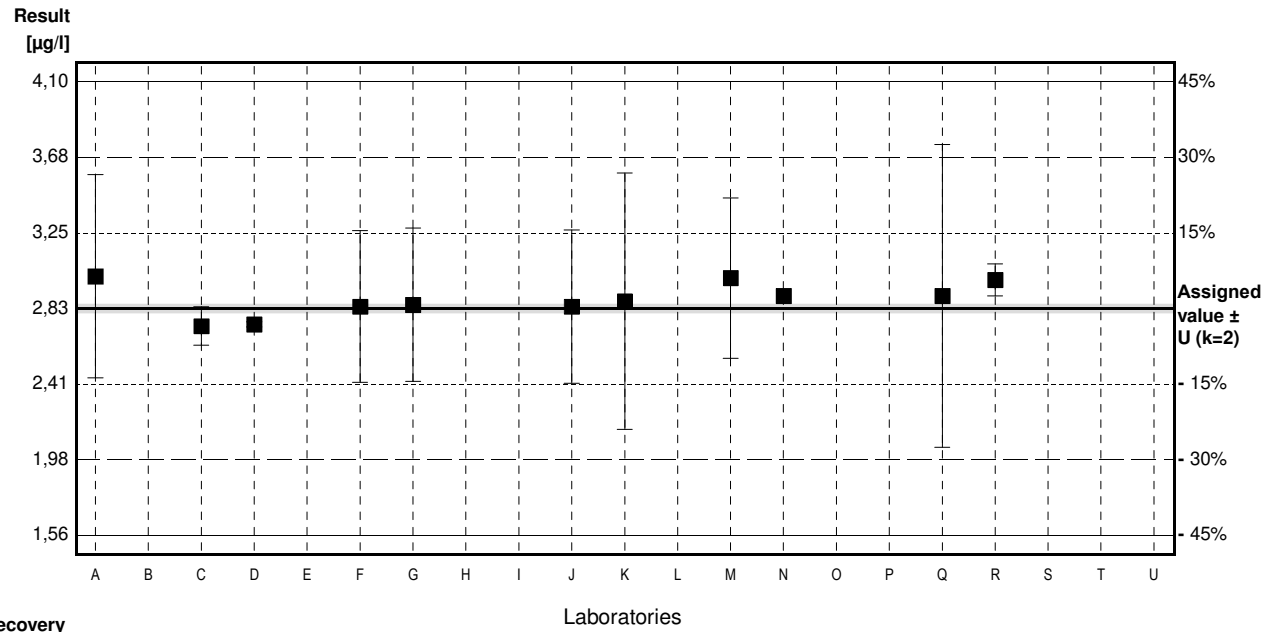
Assigned value ± U (k=2) 2,83 µg/l ± 0,02 µg/l

IFA result ± U (k=2) 2,77 µg/l ± 0,36 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	3,01	0,571	µg/l	106%	0,72
B			µg/l		
C	2,73	0,108	µg/l	96%	-0,40
D	2,74	0,014	µg/l	97%	-0,36
E			µg/l		
F	2,84	0,426	µg/l	100%	0,04
G	2,85	0,43	µg/l	101%	0,08
H			µg/l		
I			µg/l		
J	2,84	0,43	µg/l	100%	0,04
K	2,87	0,72	µg/l	101%	0,16
L			µg/l		
M	3,00	0,450	µg/l	106%	0,68
N	2,90		µg/l	102%	0,28
O			µg/l		
P			µg/l		
Q	2,90	0,85	µg/l	102%	0,28
R	2,99	0,09	µg/l	106%	0,64
S	<5,00	0,500	µg/l	•	
T	<10		µg/l	•	
U	<5		µg/l	•	

	All results	Outliers excl.	Unit
Mean ± CI(99%)	2,88 ± 0,09	2,88 ± 0,09	µg/l
Recov. ± CI(99%)	101,7 ± 3,2	101,7 ± 3,2	%
SD between labs	0,10	0,10	µg/l
RSD between labs	3,3	3,3	%
n for calculation	11	11	



Sample M173B

Parameter Selenium

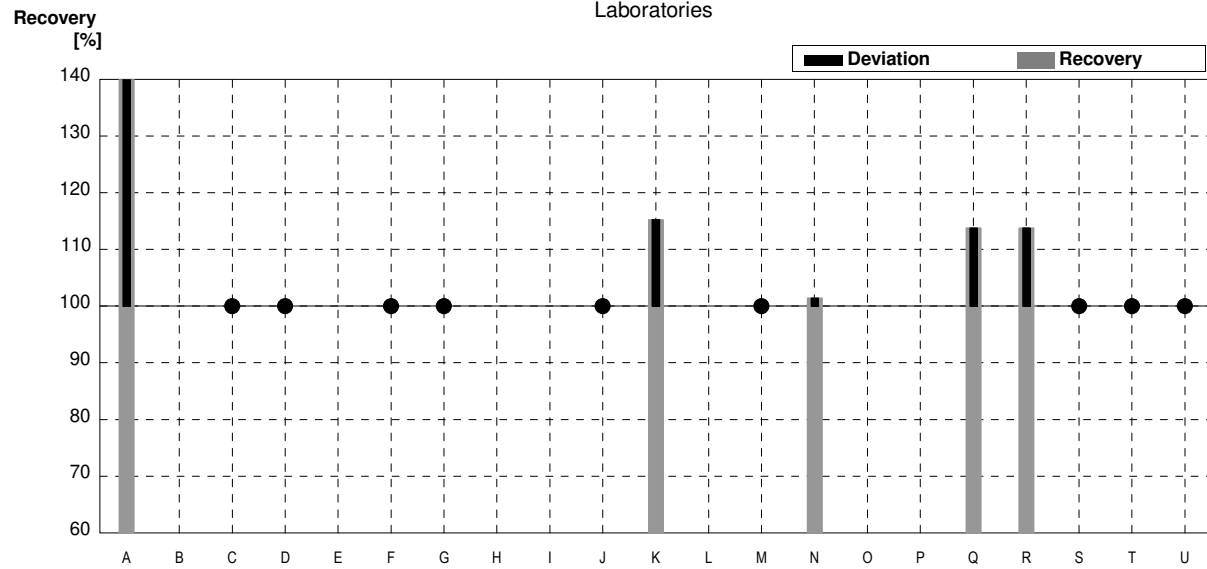
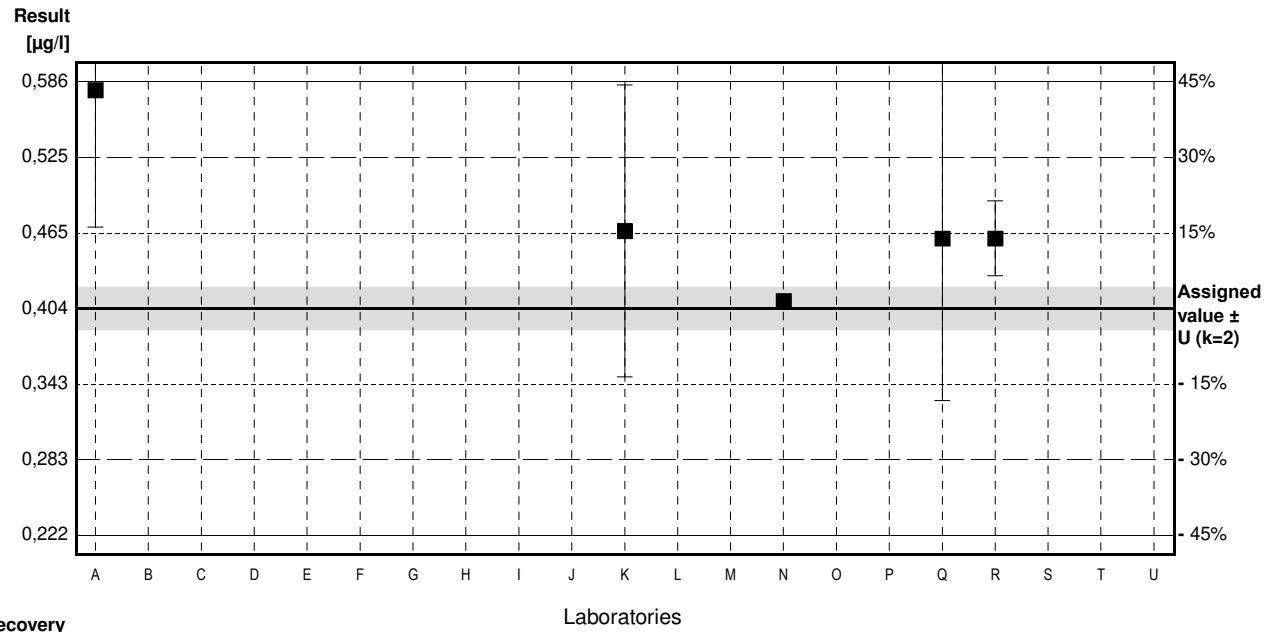
Assigned value ± U (k=2) 0,404 µg/l ± 0,017 µg/l

IFA result ± U (k=2) <0,50 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	0,579 *	0,110	µg/l	143%	
B			µg/l		
C	<1,00		µg/l	•	
D	<1,0		µg/l	•	
E			µg/l		
F	<1,0		µg/l	•	
G	<1,0		µg/l	•	
H			µg/l		
I			µg/l		
J	<1		µg/l	•	
K	0,466	0,117	µg/l	115%	
L			µg/l		
M	<0,50		µg/l	•	
N	0,410 *		µg/l	101%	
O			µg/l		
P			µg/l		
Q	0,460	0,13	µg/l	114%	
R	0,460	0,03	µg/l	114%	
S	<5,00	0,500	µg/l	•	
T	<10		µg/l	•	
U	<5		µg/l	•	

	All results	Outliers excl.	Unit
Mean ± CI(99%)	0,475 ± 0,128	0,462 ± 0,020	µg/l
Recov. ± CI(99%)	117,6 ± 31,8	114,4 ± 4,9	%
SD between labs	0,062	0,003	µg/l
RSD between labs	13,1	0,7	%
n for calculation	5	3	



Sample M173A

Parameter Uranium

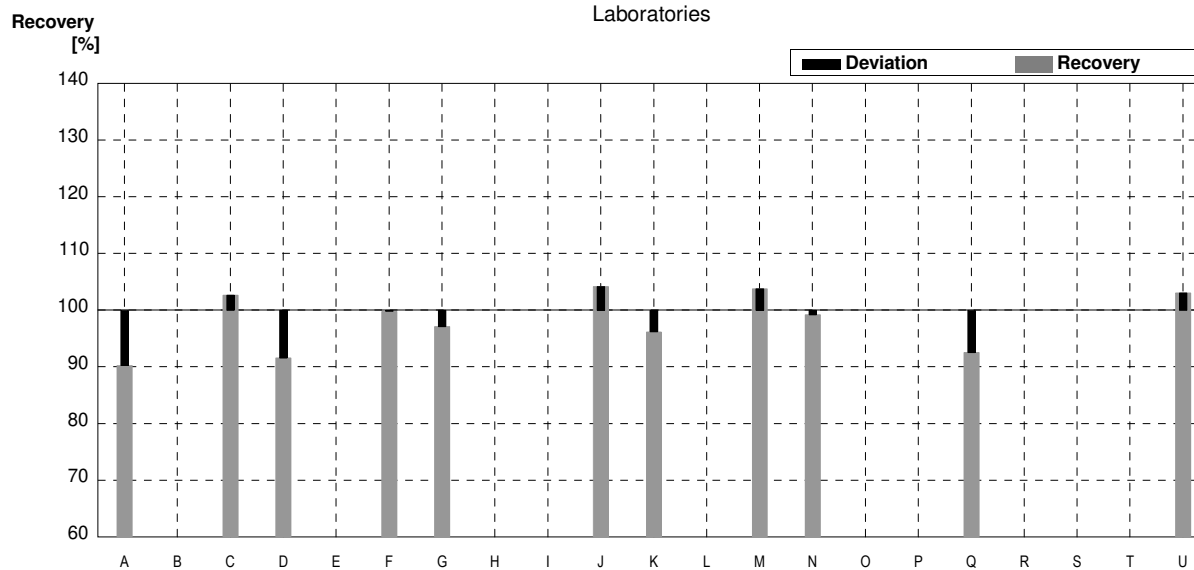
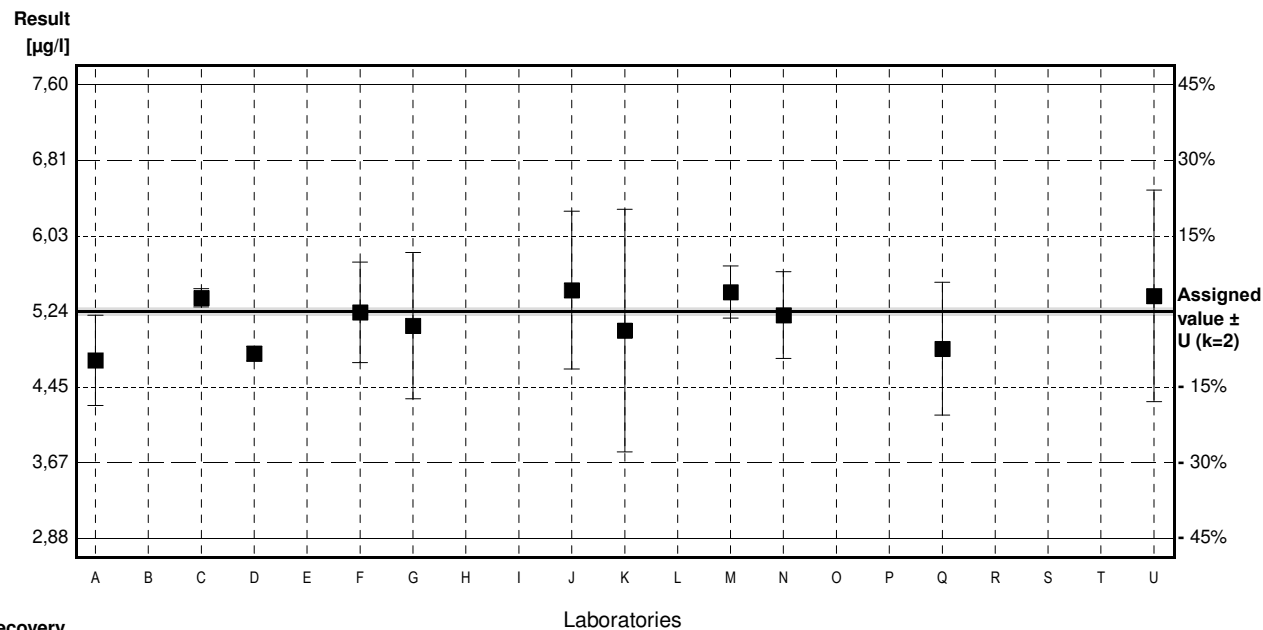
Assigned value $\pm U$ (k=2) 5,24 $\mu\text{g/l}$ \pm 0,04 $\mu\text{g/l}$

IFA result $\pm U$ (k=2) 5,2 $\mu\text{g/l}$ \pm 0,5 $\mu\text{g/l}$

Stability test $\mu\text{g/l}$

Lab Code	Result	\pm	Unit	Recovery	z-Score
A	4,73	0,469	$\mu\text{g/l}$	90%	-1,74
B			$\mu\text{g/l}$		
C	5,38	0,0946	$\mu\text{g/l}$	103%	0,48
D	4,80	0,078	$\mu\text{g/l}$	92%	-1,50
E			$\mu\text{g/l}$		
F	5,23	0,523	$\mu\text{g/l}$	100%	-0,03
G	5,09	0,76	$\mu\text{g/l}$	97%	-0,51
H			$\mu\text{g/l}$		
I			$\mu\text{g/l}$		
J	5,46	0,82	$\mu\text{g/l}$	104%	0,75
K	5,04	1,26	$\mu\text{g/l}$	96%	-0,68
L			$\mu\text{g/l}$		
M	5,44	0,272	$\mu\text{g/l}$	104%	0,68
N	5,20	0,45	$\mu\text{g/l}$	99%	-0,14
O			$\mu\text{g/l}$		
P			$\mu\text{g/l}$		
Q	4,85	0,69	$\mu\text{g/l}$	93%	-1,33
R			$\mu\text{g/l}$		
S			$\mu\text{g/l}$		
T			$\mu\text{g/l}$		
U	5,40	1,1	$\mu\text{g/l}$	103%	0,55

	All results	Outliers excl.	Unit
Mean \pm CI(99%)	5,15 \pm 0,25	5,15 \pm 0,25	$\mu\text{g/l}$
Recov. \pm CI(99%)	98,2 \pm 4,9	98,2 \pm 4,9	%
SD between labs	0,27	0,27	$\mu\text{g/l}$
RSD between labs	5,2	5,2	%
n for calculation	11	11	



Sample M173B

Parameter Uranium

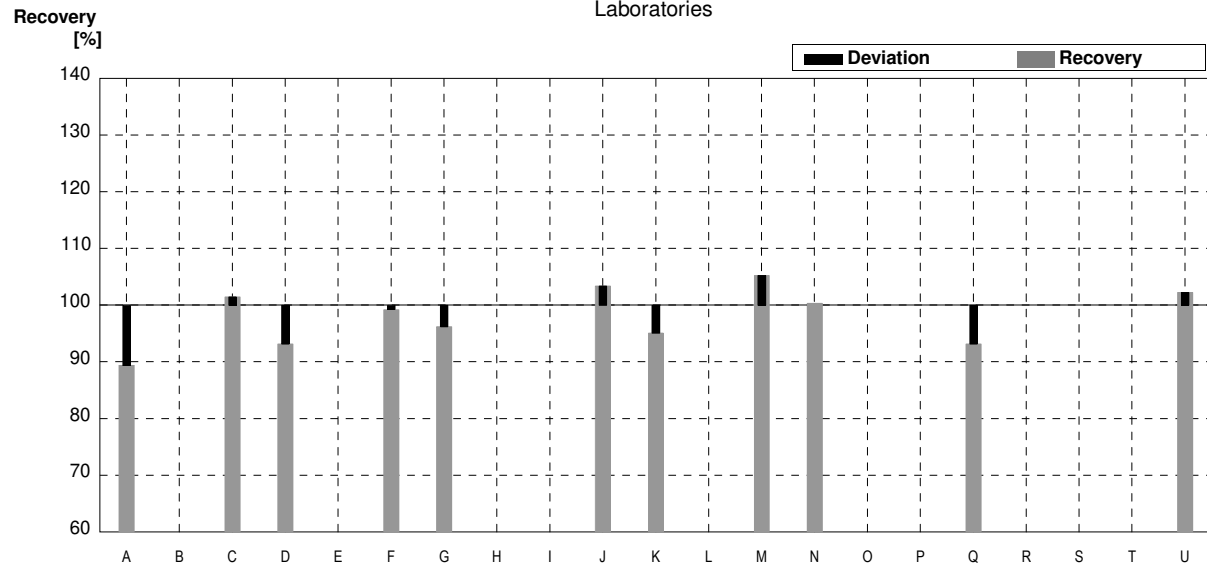
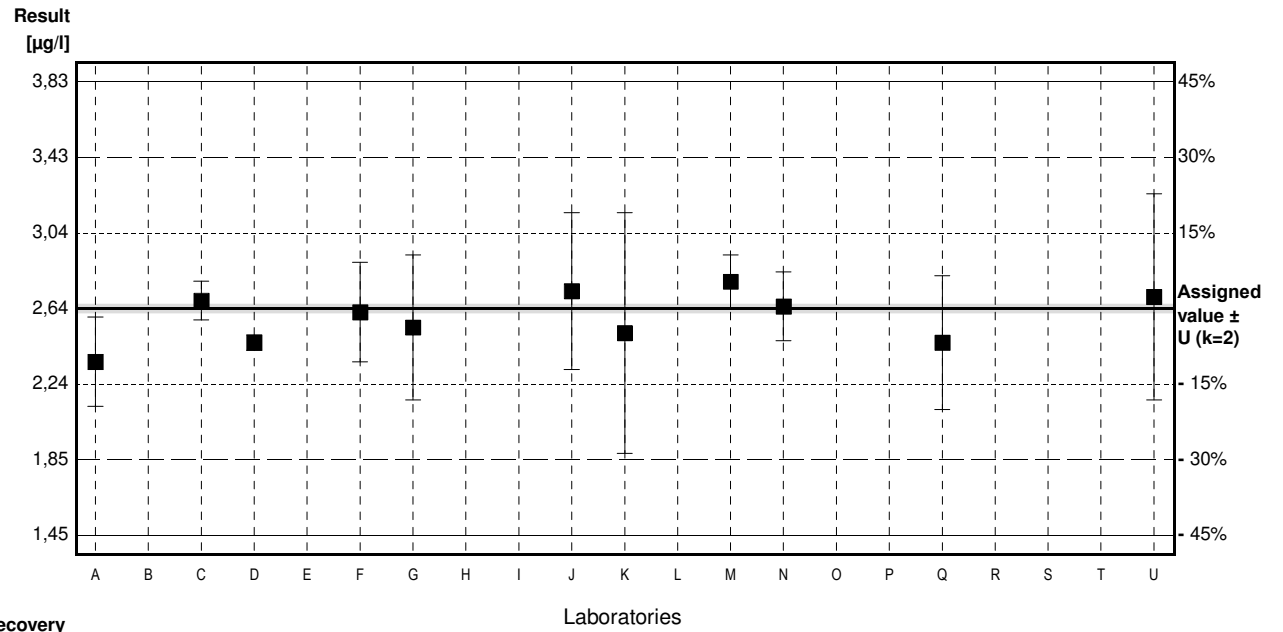
Assigned value ± U (k=2) 2,64 µg/l ± 0,02 µg/l

IFA result ± U (k=2) 2,48 µg/l ± 0,24 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	2,36	0,234	µg/l	89%	-1,89
B			µg/l		
C	2,68	0,102	µg/l	102%	0,27
D	2,46	0,040	µg/l	93%	-1,22
E			µg/l		
F	2,62	0,26	µg/l	99%	-0,14
G	2,54	0,38	µg/l	96%	-0,68
H			µg/l		
I			µg/l		
J	2,73	0,41	µg/l	103%	0,61
K	2,51	0,63	µg/l	95%	-0,88
L			µg/l		
M	2,78	0,139	µg/l	105%	0,95
N	2,65	0,18	µg/l	100%	0,07
O			µg/l		
P			µg/l		
Q	2,46	0,35	µg/l	93%	-1,22
R			µg/l		
S			µg/l		
T			µg/l		
U	2,70	0,54	µg/l	102%	0,41

	All results	Outliers excl.	Unit
Mean ± CI(99%)	2,59 ± 0,13	2,59 ± 0,13	µg/l
Recov. ± CI(99%)	98,1 ± 4,8	98,1 ± 4,8	%
SD between labs	0,13	0,13	µg/l
RSD between labs	5,1	5,1	%
n for calculation	11	11	



Sample M173A

Parameter Zinc

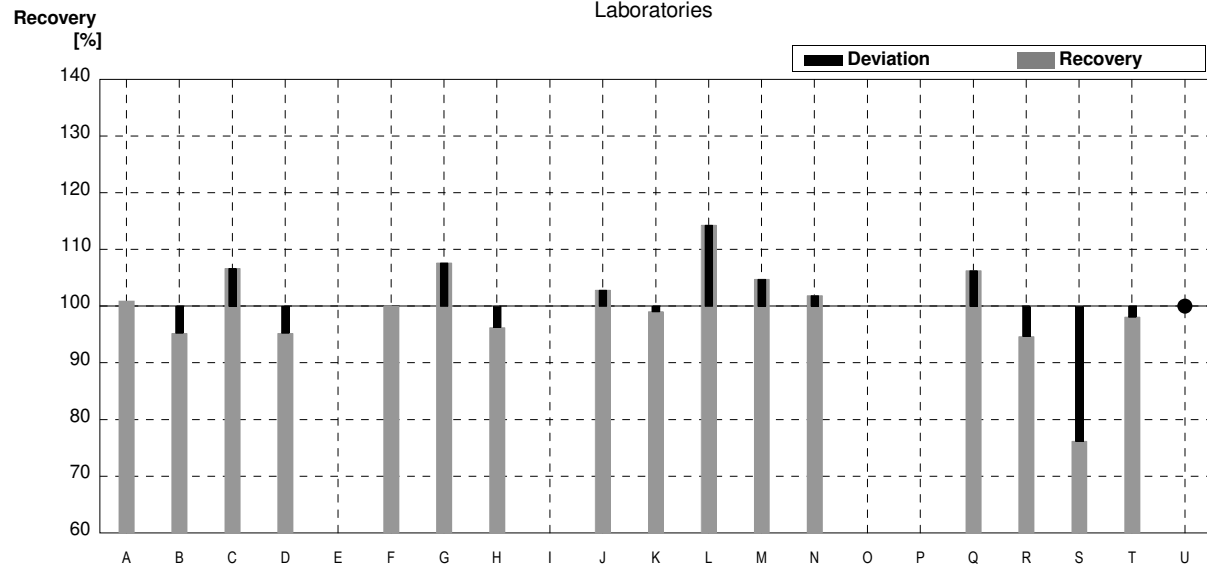
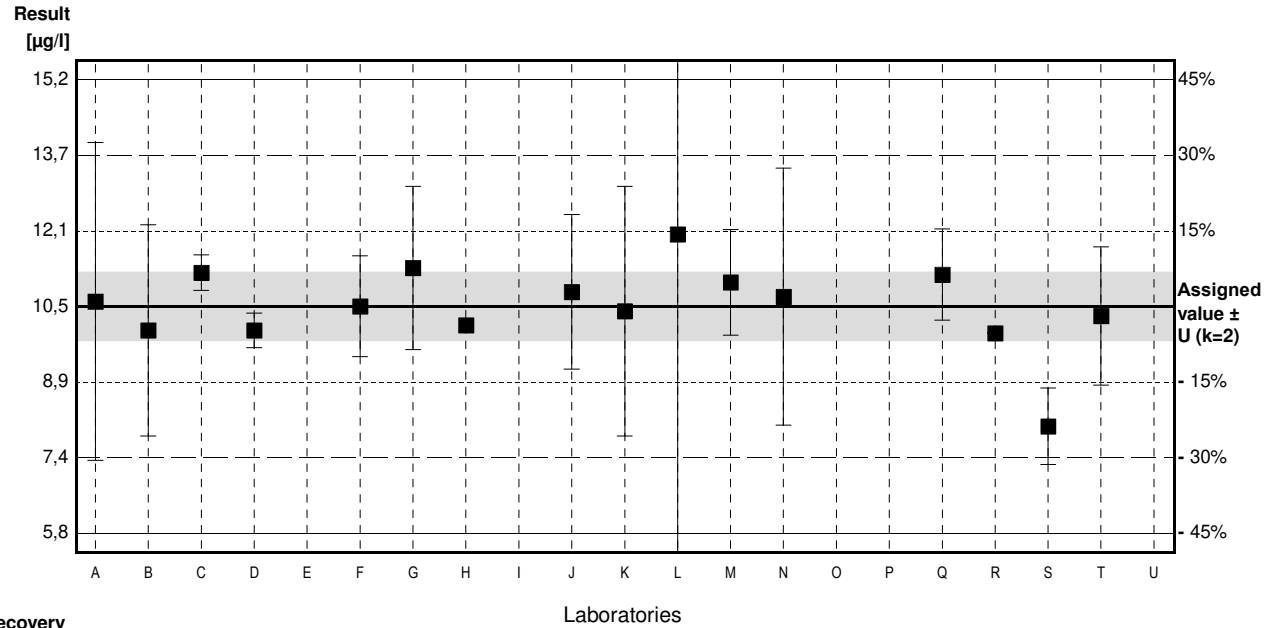
Assigned value ± U (k=2) 10,5 µg/l ± 0,7 µg/l

IFA result ± U (k=2) 11,3 µg/l ± 2,2 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	10,6	3,31	µg/l	101%	0,14
B	10,0	2,20	µg/l	95%	-0,69
C	11,2	0,368	µg/l	107%	0,97
D	10,0	0,361	µg/l	95%	-0,69
E			µg/l		
F	10,5	1,05	µg/l	100%	0,00
G	11,3	1,7	µg/l	108%	1,10
H	10,107		µg/l	96%	-0,54
I			µg/l		
J	10,8	1,61	µg/l	103%	0,41
K	10,4	2,6	µg/l	99%	-0,14
L	12,0	10	µg/l	114%	2,07
M	11,0	1,10	µg/l	105%	0,69
N	10,7	2,68	µg/l	102%	0,28
O			µg/l		
P			µg/l		
Q	11,16	0,95	µg/l	106%	0,91
R	9,94	0,01	µg/l	95%	-0,77
S	8,00 *	0,800	µg/l	76%	-3,45
T	10,3	1,44	µg/l	98%	-0,28
U	<10		µg/l	*	

	All results	Outliers excl.	Unit
Mean ± CI(99%)	10,5 ± 0,6	10,7 ± 0,5	µg/l
Recov. ± CI(99%)	100,0 ± 6,1	101,6 ± 4,3	%
SD between labs	0,9	0,6	µg/l
RSD between labs	8,3	5,5	%
n for calculation	16	15	



Sample M173B

Parameter Zinc

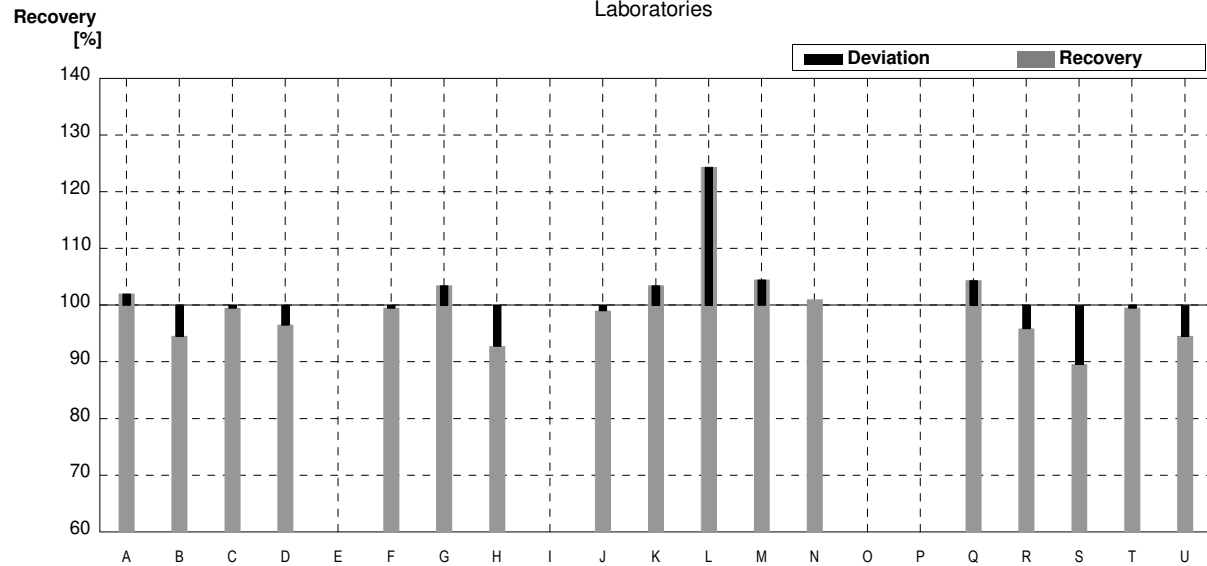
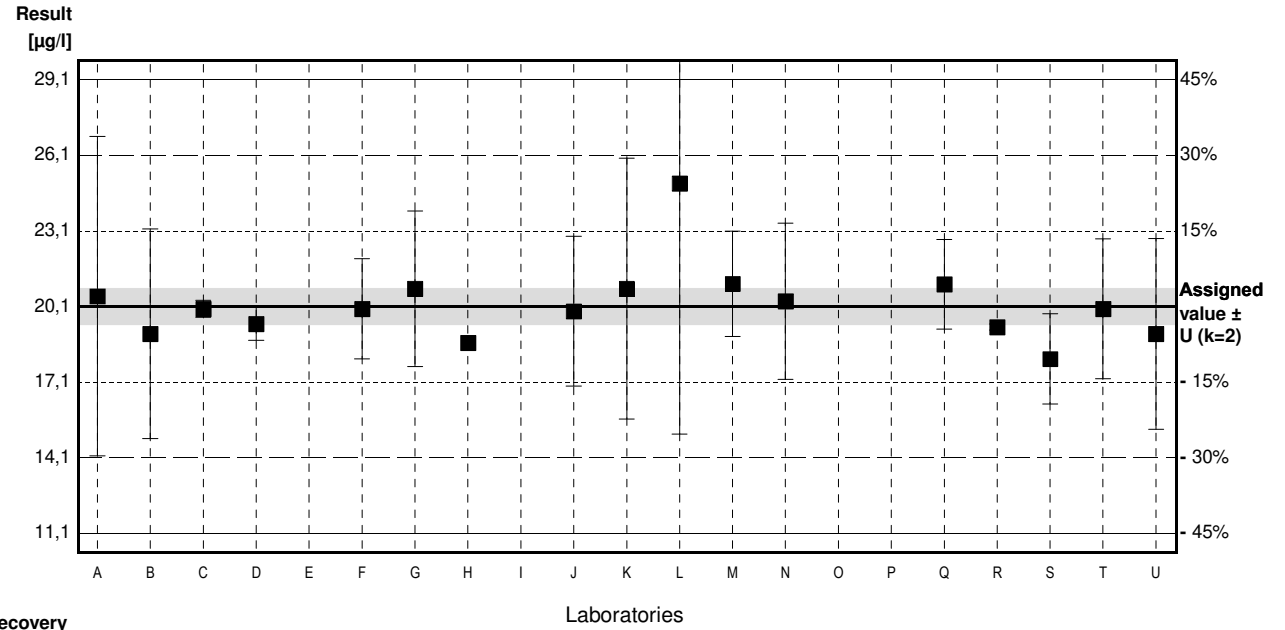
Assigned value ± U (k=2) 20,1 µg/l ± 0,7 µg/l

IFA result ± U (k=2) 22,6 µg/l ± 3,4 µg/l

Stability test µg/l

Lab Code	Result	±	Unit	Recovery	z-Score
A	20,5	6,37	µg/l	102%	0,29
B	19,0	4,18	µg/l	95%	-0,79
C	20,0	0,342	µg/l	100%	-0,07
D	19,4	0,659	µg/l	97%	-0,50
E			µg/l		
F	20,0	2,0	µg/l	100%	-0,07
G	20,8	3,1	µg/l	103%	0,50
H	18,645		µg/l	93%	-1,05
I			µg/l		
J	19,9	2,99	µg/l	99%	-0,14
K	20,8	5,2	µg/l	103%	0,50
L	25,0 *	10	µg/l	124%	3,53
M	21,0	2,10	µg/l	104%	0,65
N	20,3	3,11	µg/l	101%	0,14
O			µg/l		
P			µg/l		
Q	20,98	1,79	µg/l	104%	0,63
R	19,27	0,12	µg/l	96%	-0,60
S	18,0	1,80	µg/l	90%	-1,51
T	20,0	2,79	µg/l	100%	-0,07
U	19,0	3,8	µg/l	95%	-0,79

	All results	Outliers excl.	Unit
Mean ± CI(99%)	20,2 ± 1,1	19,8 ± 0,7	µg/l
Recov. ± CI(99%)	100,3 ± 5,4	98,8 ± 3,3	%
SD between labs	1,5	0,9	µg/l
RSD between labs	7,5	4,5	%
n for calculation	17	16	



Labororientierte Auswertung

Laboratory Oriented Part

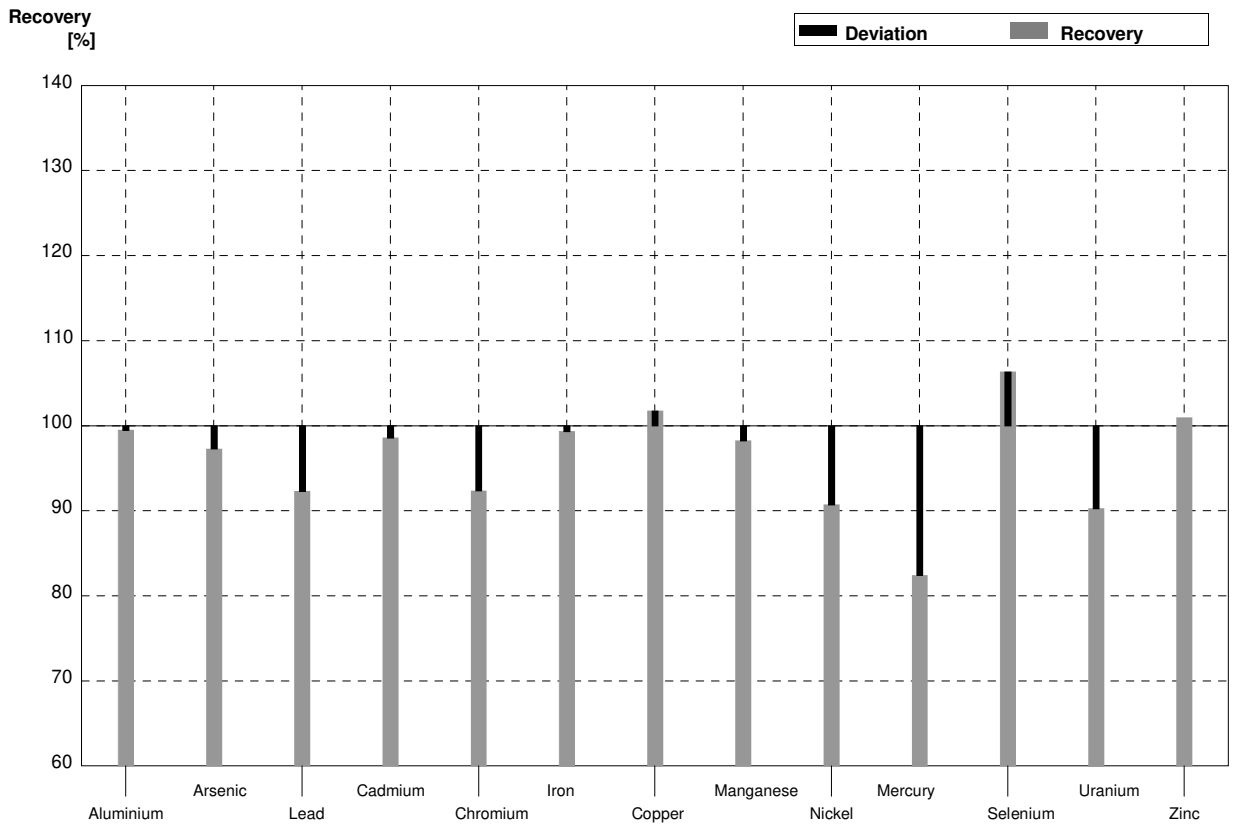
Eignungsprüfungsrunde / Proficiency testing round
M173

Metalle / Metals

Versand / Dispatch: 02.09.2024

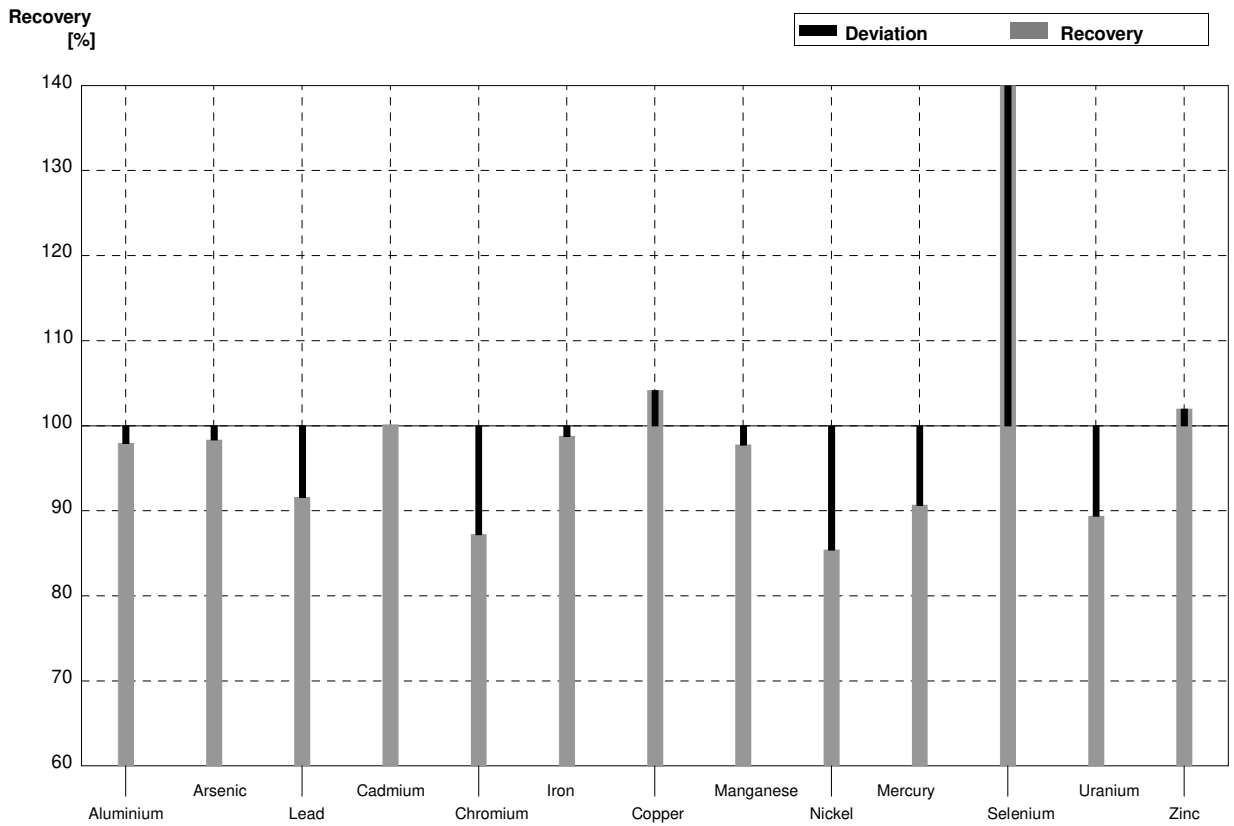
Sample M173A
Laboratory A

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	58,1	4,25	$\mu\text{g/l}$	99%
Arsenic	3,33	0,02	3,24	0,182	$\mu\text{g/l}$	97%
Lead	0,806	0,014	0,744	0,106	$\mu\text{g/l}$	92%
Cadmium	1,765	0,014	1,74	0,103	$\mu\text{g/l}$	99%
Chromium	3,79	0,03	3,50	0,607	$\mu\text{g/l}$	92%
Iron	17,92	0,19	17,8	2,86	$\mu\text{g/l}$	99%
Copper	3,43	0,03	3,49	0,789	$\mu\text{g/l}$	102%
Manganese	10,79	0,16	10,6	0,964	$\mu\text{g/l}$	98%
Nickel	5,50	0,04	4,99	0,616	$\mu\text{g/l}$	91%
Mercury	0,421	0,013	0,347	0,0424	$\mu\text{g/l}$	82%
Selenium	2,83	0,02	3,01	0,571	$\mu\text{g/l}$	106%
Uranium	5,24	0,04	4,73	0,469	$\mu\text{g/l}$	90%
Zinc	10,5	0,7	10,6	3,31	$\mu\text{g/l}$	101%



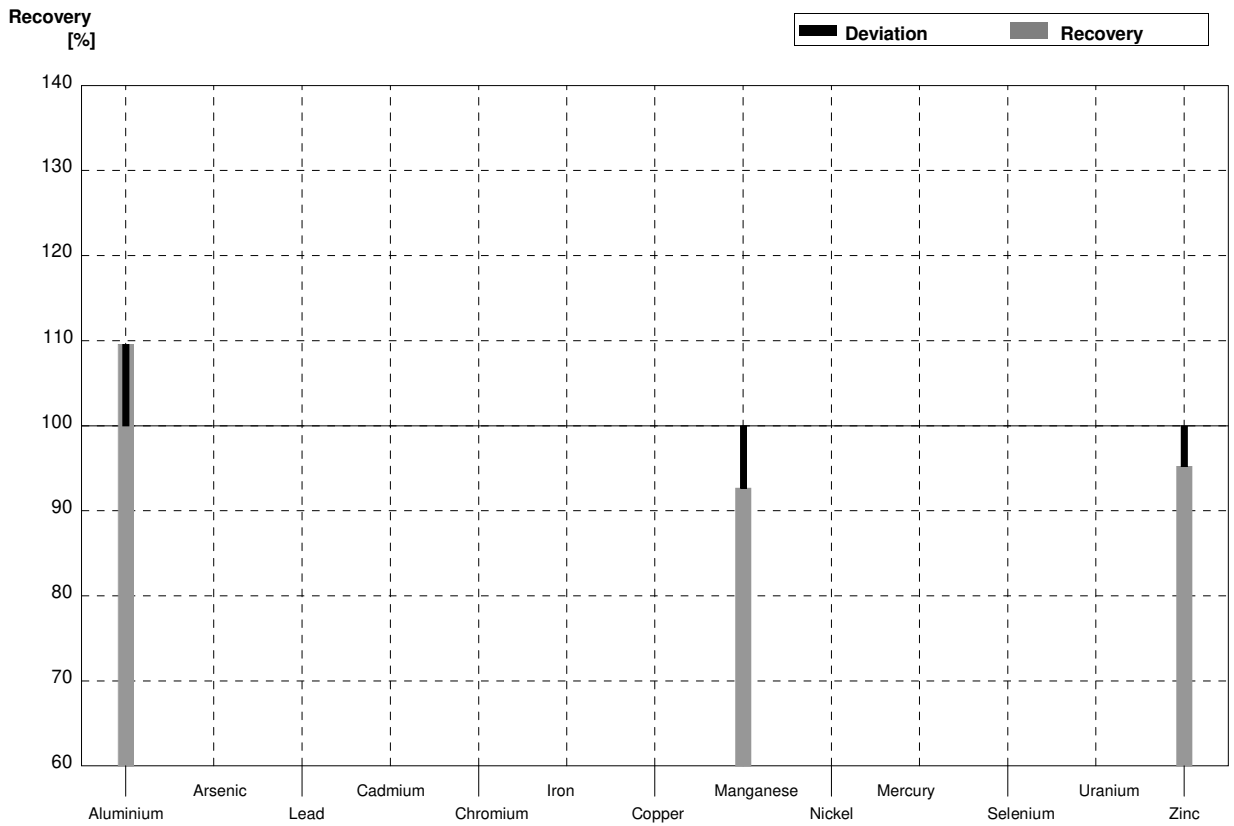
Sample M173B
Laboratory A

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	23,9	1,75	$\mu\text{g/l}$	98%
Arsenic	4,20	0,03	4,13	0,233	$\mu\text{g/l}$	98%
Lead	3,69	0,03	3,38	0,480	$\mu\text{g/l}$	92%
Cadmium	0,705	0,007	0,706	0,0609	$\mu\text{g/l}$	100%
Chromium	1,72	0,03	1,50	0,260	$\mu\text{g/l}$	87%
Iron	57,5	0,3	56,8	9,15	$\mu\text{g/l}$	99%
Copper	107,8	0,4	112,3	12,9	$\mu\text{g/l}$	104%
Manganese	44,6	0,2	43,6	3,89	$\mu\text{g/l}$	98%
Nickel	1,92	0,03	1,64	0,203	$\mu\text{g/l}$	85%
Mercury	1,588	0,017	1,44	0,192	$\mu\text{g/l}$	91%
Selenium	0,404	0,017	0,579	0,110	$\mu\text{g/l}$	143%
Uranium	2,64	0,02	2,36	0,234	$\mu\text{g/l}$	89%
Zinc	20,1	0,7	20,5	6,37	$\mu\text{g/l}$	102%



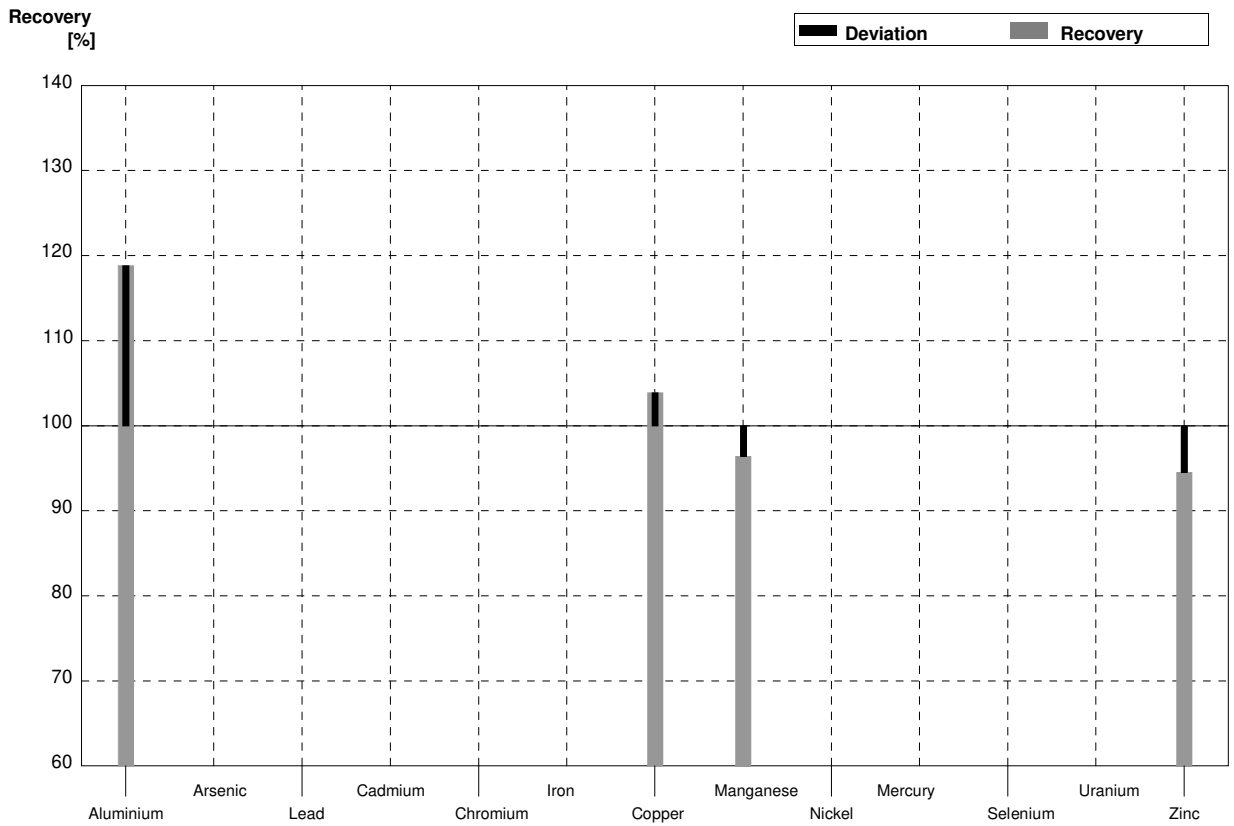
Sample M173A
Laboratory B

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	64,0	12,16	$\mu\text{g/l}$	110%
Arsenic	3,33	0,02			$\mu\text{g/l}$	
Lead	0,806	0,014			$\mu\text{g/l}$	
Cadmium	1,765	0,014			$\mu\text{g/l}$	
Chromium	3,79	0,03			$\mu\text{g/l}$	
Iron	17,92	0,19			$\mu\text{g/l}$	
Copper	3,43	0,03			$\mu\text{g/l}$	
Manganese	10,79	0,16	10,0	2,50	$\mu\text{g/l}$	93%
Nickel	5,50	0,04			$\mu\text{g/l}$	
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02			$\mu\text{g/l}$	
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7	10,0	2,20	$\mu\text{g/l}$	95%



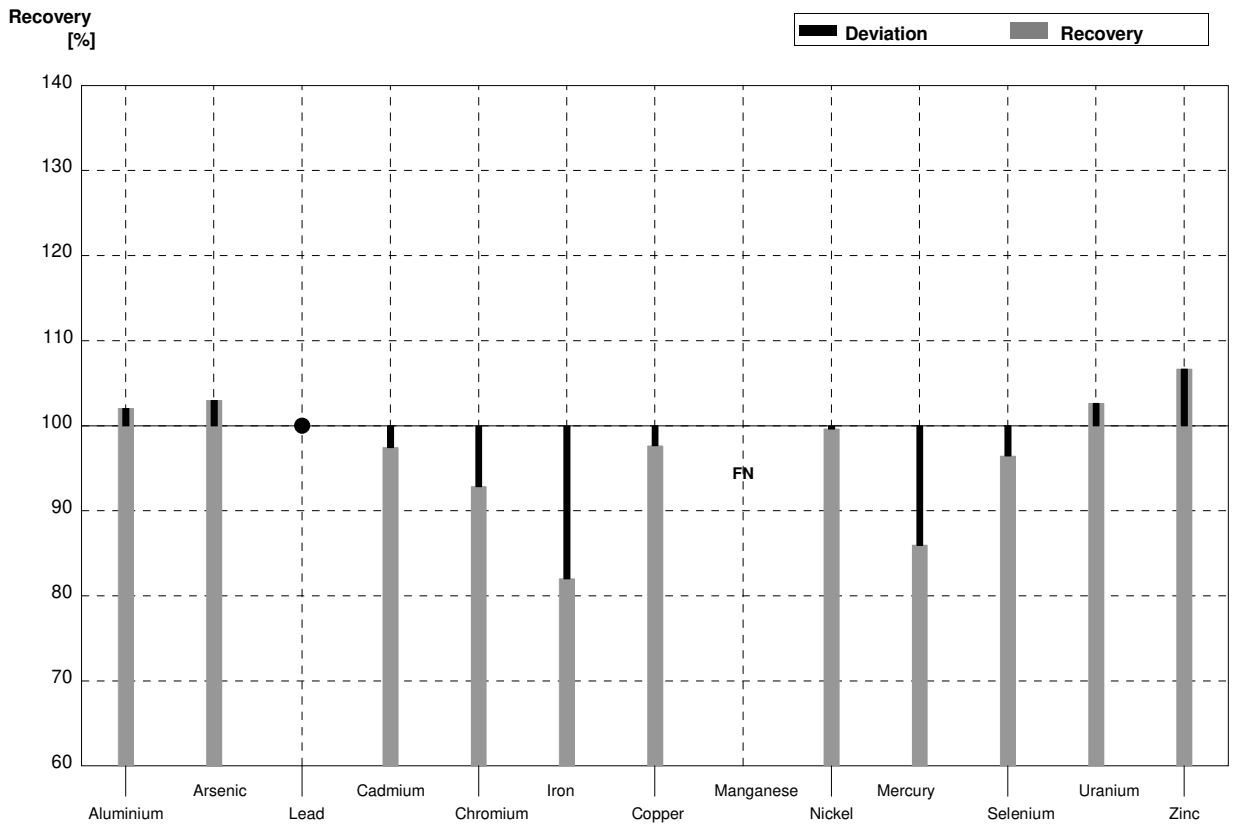
Sample M173B
Laboratory B

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	29,0	5,51	$\mu\text{g/l}$	119%
Arsenic	4,20	0,03			$\mu\text{g/l}$	
Lead	3,69	0,03			$\mu\text{g/l}$	
Cadmium	0,705	0,007			$\mu\text{g/l}$	
Chromium	1,72	0,03			$\mu\text{g/l}$	
Iron	57,5	0,3			$\mu\text{g/l}$	
Copper	107,8	0,4	112,0	24,64	$\mu\text{g/l}$	104%
Manganese	44,6	0,2	43,0	10,75	$\mu\text{g/l}$	96%
Nickel	1,92	0,03			$\mu\text{g/l}$	
Mercury	1,588	0,017			$\mu\text{g/l}$	
Selenium	0,404	0,017			$\mu\text{g/l}$	
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7	19,0	4,18	$\mu\text{g/l}$	95%



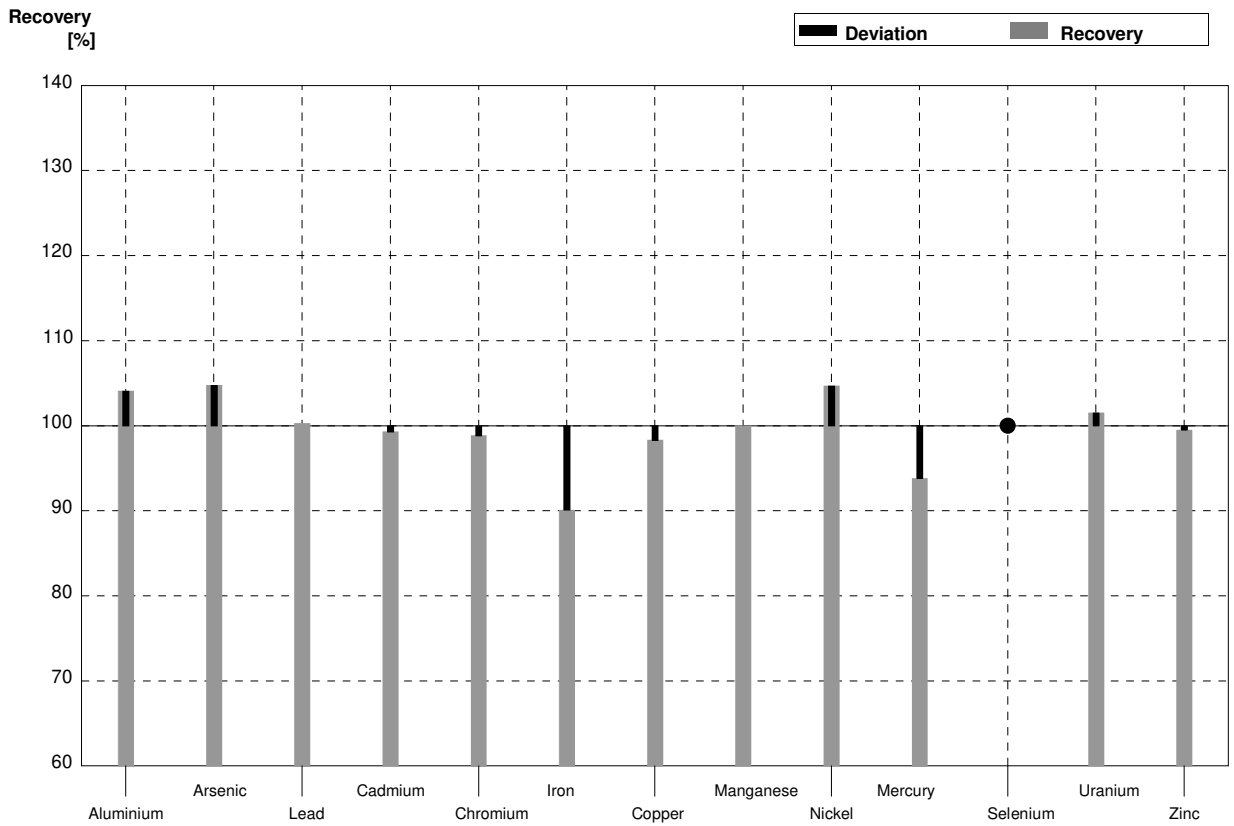
Sample M173A
Laboratory C

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	59,6	1,21	$\mu\text{g/l}$	102%
Arsenic	3,33	0,02	3,43	0,108	$\mu\text{g/l}$	103%
Lead	0,806	0,014	<1,00		$\mu\text{g/l}$	•
Cadmium	1,765	0,014	1,72	0,143	$\mu\text{g/l}$	97%
Chromium	3,79	0,03	3,52	0,193	$\mu\text{g/l}$	93%
Iron	17,92	0,19	14,7	0,885	$\mu\text{g/l}$	82%
Copper	3,43	0,03	3,35	0,142	$\mu\text{g/l}$	98%
Manganese	10,79	0,16	<10,0		$\mu\text{g/l}$	FN
Nickel	5,50	0,04	5,48	0,0855	$\mu\text{g/l}$	100%
Mercury	0,421	0,013	0,362	0,0246	$\mu\text{g/l}$	86%
Selenium	2,83	0,02	2,73	0,108	$\mu\text{g/l}$	96%
Uranium	5,24	0,04	5,38	0,0946	$\mu\text{g/l}$	103%
Zinc	10,5	0,7	11,2	0,368	$\mu\text{g/l}$	107%



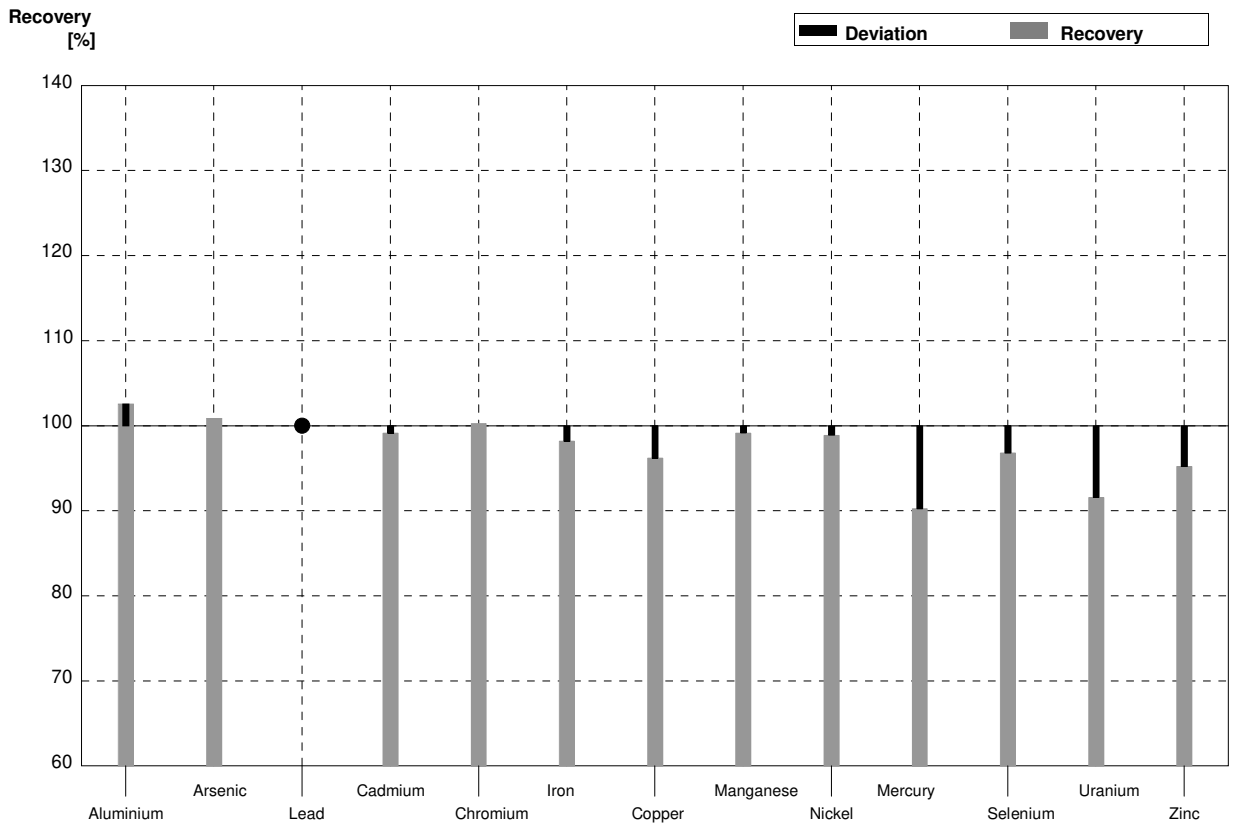
Sample M173B
Laboratory C

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	25,4	1,31	$\mu\text{g/l}$	104%
Arsenic	4,20	0,03	4,40	0,105	$\mu\text{g/l}$	105%
Lead	3,69	0,03	3,70	0,0222	$\mu\text{g/l}$	100%
Cadmium	0,705	0,007	0,700	0,0100	$\mu\text{g/l}$	99%
Chromium	1,72	0,03	1,70	0,212	$\mu\text{g/l}$	99%
Iron	57,5	0,3	51,8	0,769	$\mu\text{g/l}$	90%
Copper	107,8	0,4	106	2,08	$\mu\text{g/l}$	98%
Manganese	44,6	0,2	44,6	0,761	$\mu\text{g/l}$	100%
Nickel	1,92	0,03	2,01	0,0938	$\mu\text{g/l}$	105%
Mercury	1,588	0,017	1,49	0,230	$\mu\text{g/l}$	94%
Selenium	0,404	0,017	<1,00		$\mu\text{g/l}$	•
Uranium	2,64	0,02	2,68	0,102	$\mu\text{g/l}$	102%
Zinc	20,1	0,7	20,0	0,342	$\mu\text{g/l}$	100%



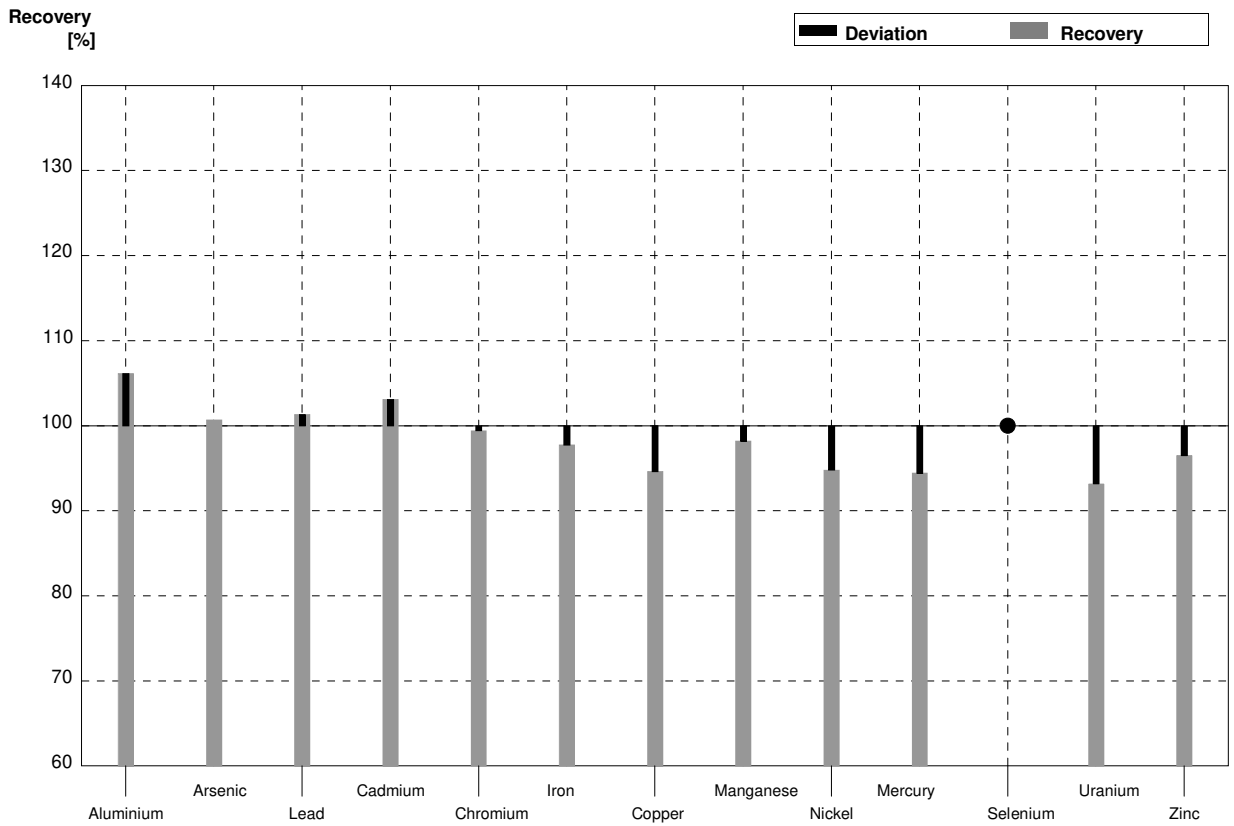
Sample M173A
Laboratory D

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	59,9	0,656	$\mu\text{g/l}$	103%
Arsenic	3,33	0,02	3,36	0,064	$\mu\text{g/l}$	101%
Lead	0,806	0,014	<1,0		$\mu\text{g/l}$	•
Cadmium	1,765	0,014	1,75	0,051	$\mu\text{g/l}$	99%
Chromium	3,79	0,03	3,80	0,115	$\mu\text{g/l}$	100%
Iron	17,92	0,19	17,6	0,153	$\mu\text{g/l}$	98%
Copper	3,43	0,03	3,30	0,026	$\mu\text{g/l}$	96%
Manganese	10,79	0,16	10,7	0,058	$\mu\text{g/l}$	99%
Nickel	5,50	0,04	5,44	0,059	$\mu\text{g/l}$	99%
Mercury	0,421	0,013	0,380	0,003	$\mu\text{g/l}$	90%
Selenium	2,83	0,02	2,74	0,014	$\mu\text{g/l}$	97%
Uranium	5,24	0,04	4,80	0,078	$\mu\text{g/l}$	92%
Zinc	10,5	0,7	10,0	0,361	$\mu\text{g/l}$	95%



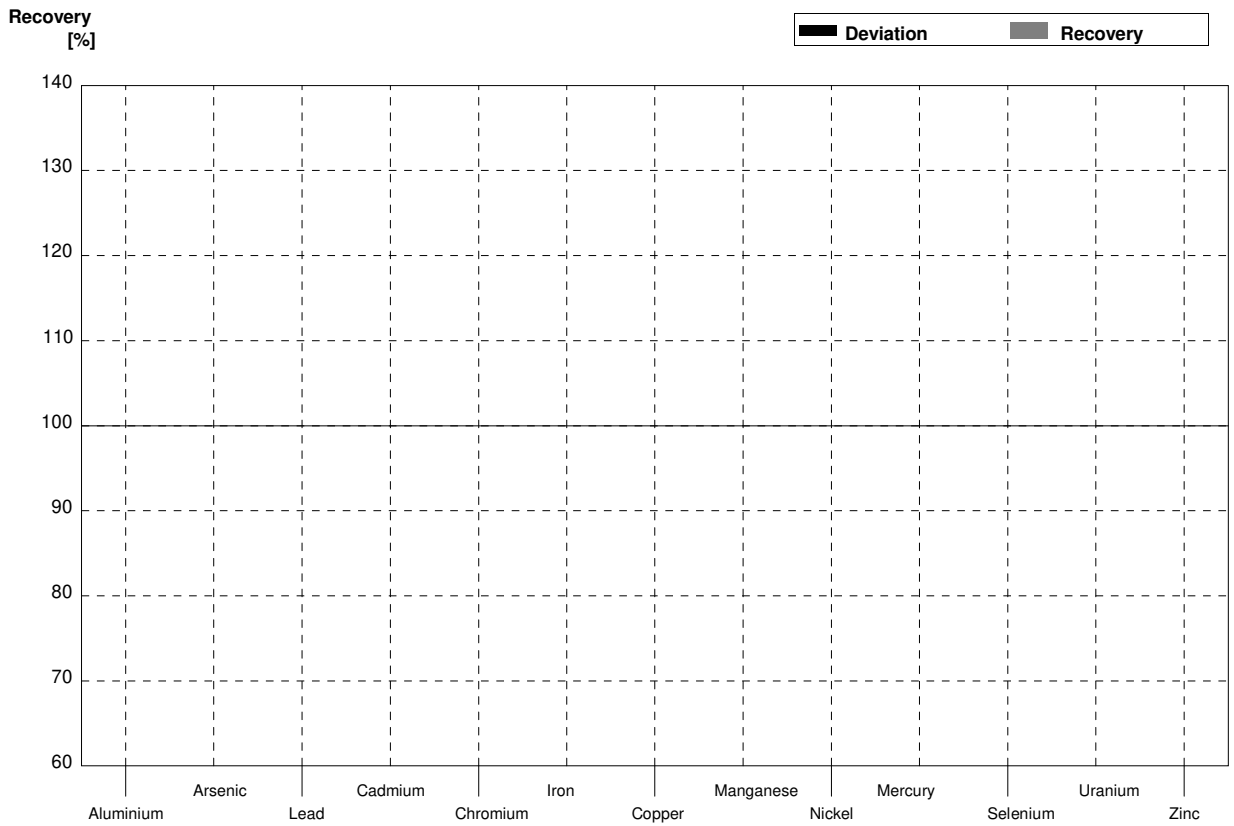
Sample M173B
Laboratory D

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	24,4	0,3	25,9	0,252	µg/l	106%
Arsenic	4,20	0,03	4,23	0,075	µg/l	101%
Lead	3,69	0,03	3,74	0,036	µg/l	101%
Cadmium	0,705	0,007	0,727	0,018	µg/l	103%
Chromium	1,72	0,03	1,71	0,055	µg/l	99%
Iron	57,5	0,3	56,2	0,416	µg/l	98%
Copper	107,8	0,4	102	1,0	µg/l	95%
Manganese	44,6	0,2	43,8	0,231	µg/l	98%
Nickel	1,92	0,03	1,82	0,035	µg/l	95%
Mercury	1,588	0,017	1,50	0,015	µg/l	94%
Selenium	0,404	0,017	<1,0		µg/l	•
Uranium	2,64	0,02	2,46	0,040	µg/l	93%
Zinc	20,1	0,7	19,4	0,659	µg/l	97%



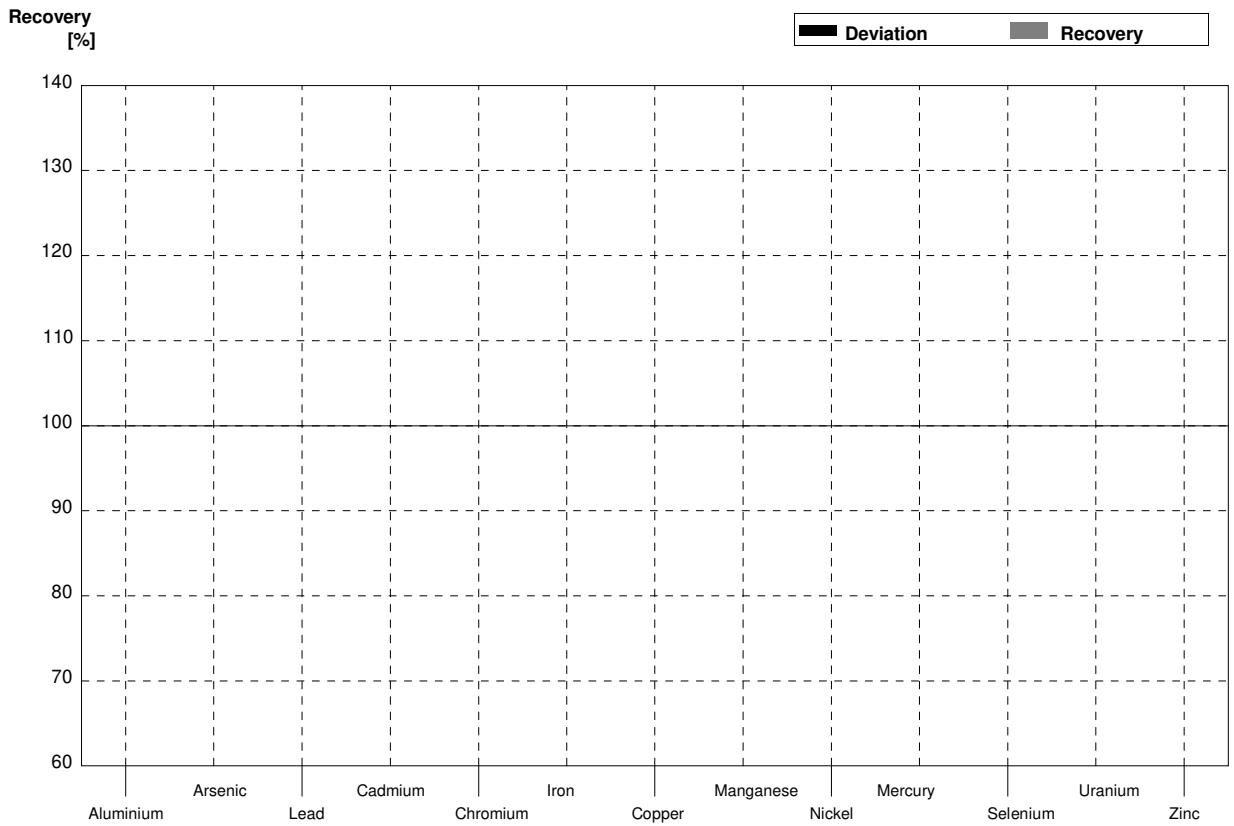
Sample M173A
Laboratory E

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5			$\mu\text{g/l}$	
Arsenic	3,33	0,02			$\mu\text{g/l}$	
Lead	0,806	0,014			$\mu\text{g/l}$	
Cadmium	1,765	0,014			$\mu\text{g/l}$	
Chromium	3,79	0,03			$\mu\text{g/l}$	
Iron	17,92	0,19			$\mu\text{g/l}$	
Copper	3,43	0,03			$\mu\text{g/l}$	
Manganese	10,79	0,16			$\mu\text{g/l}$	
Nickel	5,50	0,04			$\mu\text{g/l}$	
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02			$\mu\text{g/l}$	
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7			$\mu\text{g/l}$	



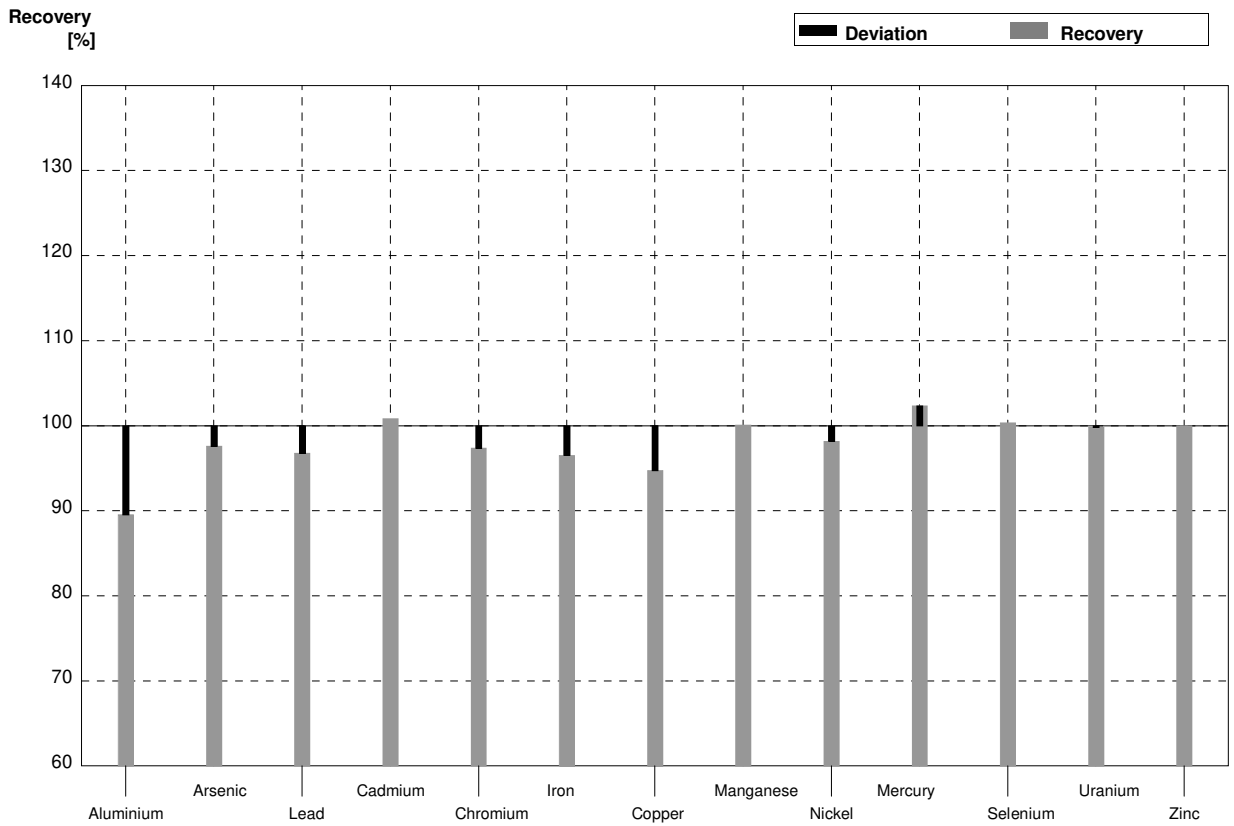
Sample M173B
Laboratory E

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3			$\mu\text{g/l}$	
Arsenic	4,20	0,03			$\mu\text{g/l}$	
Lead	3,69	0,03			$\mu\text{g/l}$	
Cadmium	0,705	0,007			$\mu\text{g/l}$	
Chromium	1,72	0,03			$\mu\text{g/l}$	
Iron	57,5	0,3			$\mu\text{g/l}$	
Copper	107,8	0,4			$\mu\text{g/l}$	
Manganese	44,6	0,2			$\mu\text{g/l}$	
Nickel	1,92	0,03			$\mu\text{g/l}$	
Mercury	1,588	0,017			$\mu\text{g/l}$	
Selenium	0,404	0,017			$\mu\text{g/l}$	
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7			$\mu\text{g/l}$	



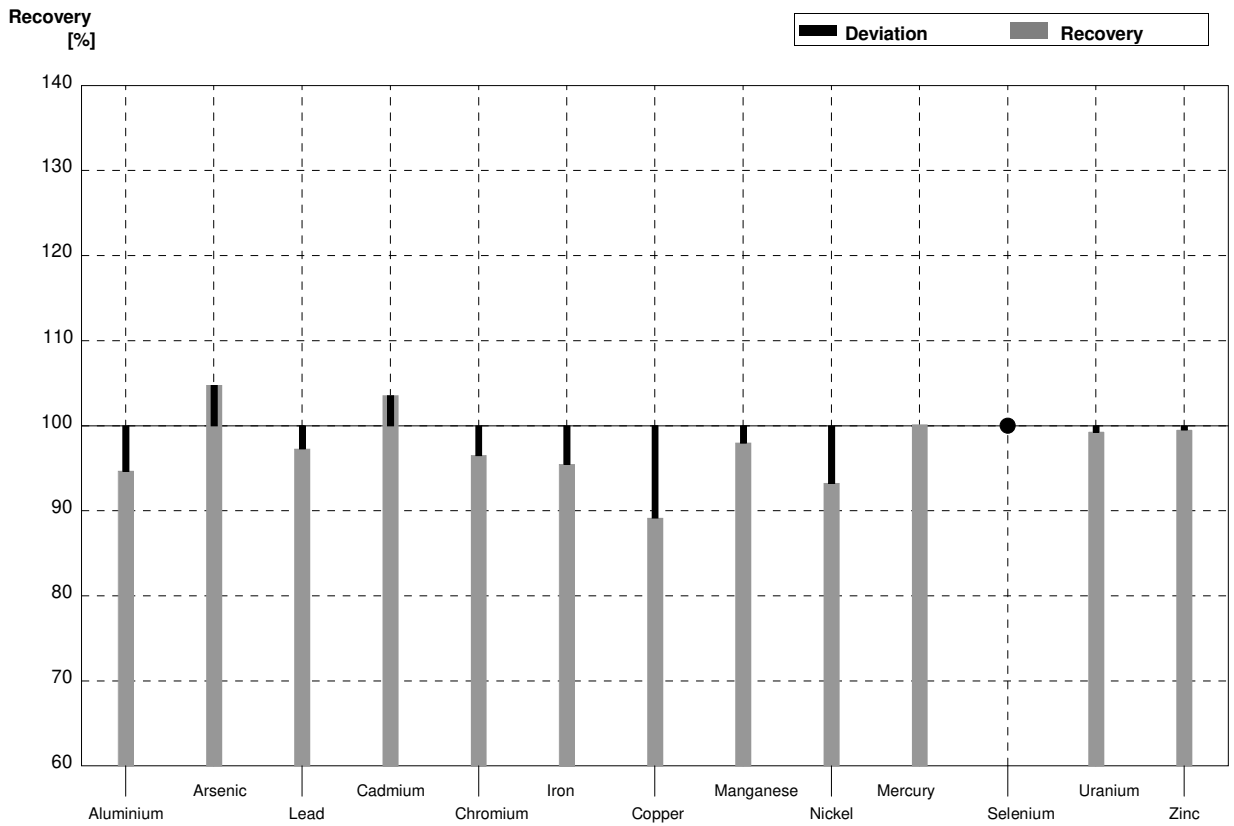
Sample M173A
Laboratory F

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	52,3	5,23	$\mu\text{g/l}$	90%
Arsenic	3,33	0,02	3,25	0,488	$\mu\text{g/l}$	98%
Lead	0,806	0,014	0,78	0,078	$\mu\text{g/l}$	97%
Cadmium	1,765	0,014	1,78	0,178	$\mu\text{g/l}$	101%
Chromium	3,79	0,03	3,69	0,369	$\mu\text{g/l}$	97%
Iron	17,92	0,19	17,3	1,73	$\mu\text{g/l}$	97%
Copper	3,43	0,03	3,25	0,325	$\mu\text{g/l}$	95%
Manganese	10,79	0,16	10,8	1,08	$\mu\text{g/l}$	100%
Nickel	5,50	0,04	5,4	0,54	$\mu\text{g/l}$	98%
Mercury	0,421	0,013	0,431	0,0431	$\mu\text{g/l}$	102%
Selenium	2,83	0,02	2,84	0,426	$\mu\text{g/l}$	100%
Uranium	5,24	0,04	5,23	0,523	$\mu\text{g/l}$	100%
Zinc	10,5	0,7	10,5	1,05	$\mu\text{g/l}$	100%



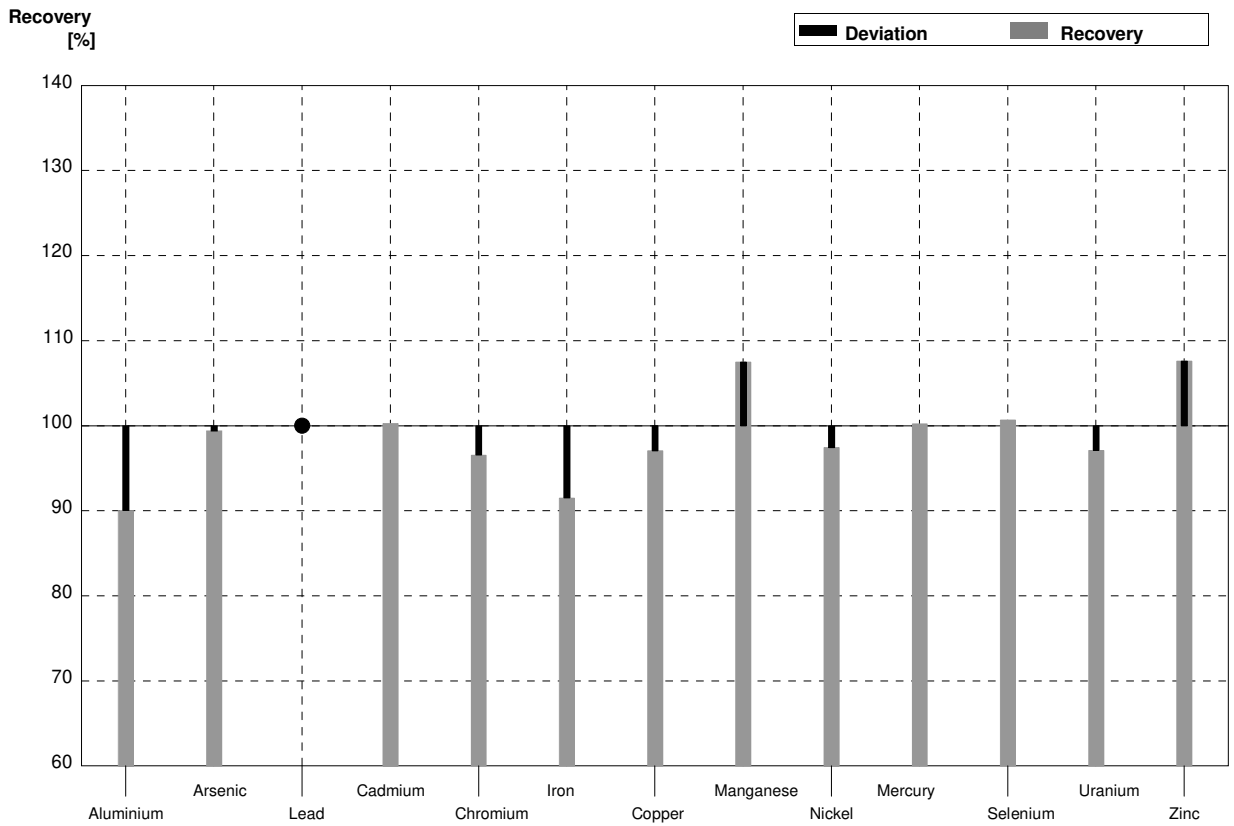
Sample M173B
Laboratory F

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	24,4	0,3	23,1	2,31	µg/l	95%
Arsenic	4,20	0,03	4,40	0,66	µg/l	105%
Lead	3,69	0,03	3,59	0,359	µg/l	97%
Cadmium	0,705	0,007	0,73	0,073	µg/l	104%
Chromium	1,72	0,03	1,66	0,166	µg/l	97%
Iron	57,5	0,3	54,9	5,49	µg/l	95%
Copper	107,8	0,4	96,1	9,61	µg/l	89%
Manganese	44,6	0,2	43,7	4,37	µg/l	98%
Nickel	1,92	0,03	1,79	0,179	µg/l	93%
Mercury	1,588	0,017	1,59	0,159	µg/l	100%
Selenium	0,404	0,017	<1,0		µg/l	•
Uranium	2,64	0,02	2,62	0,26	µg/l	99%
Zinc	20,1	0,7	20,0	2,0	µg/l	100%



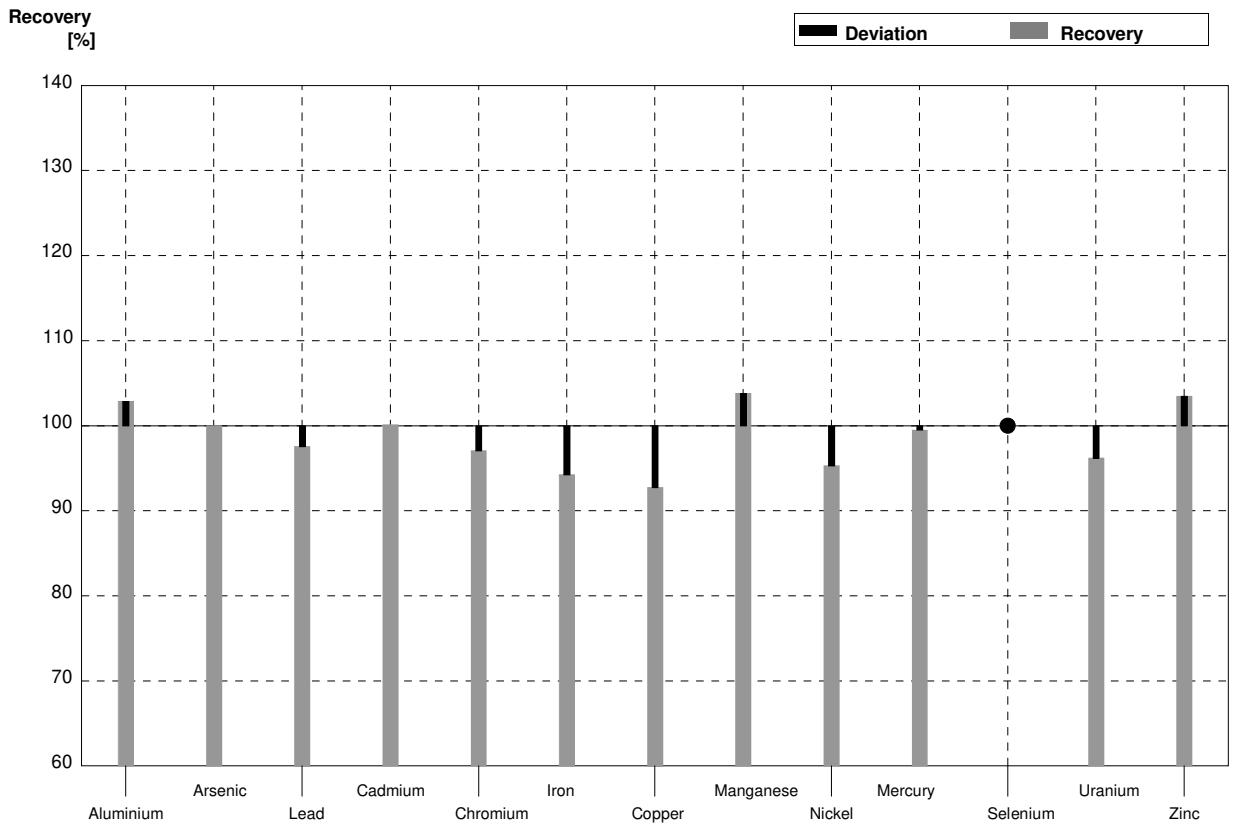
Sample M173A
Laboratory G

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	52,6	11	$\mu\text{g/l}$	90%
Arsenic	3,33	0,02	3,31	0,50	$\mu\text{g/l}$	99%
Lead	0,806	0,014	<1,0		$\mu\text{g/l}$	•
Cadmium	1,765	0,014	1,77	0,21	$\mu\text{g/l}$	100%
Chromium	3,79	0,03	3,66	0,55	$\mu\text{g/l}$	97%
Iron	17,92	0,19	16,4	2,5	$\mu\text{g/l}$	92%
Copper	3,43	0,03	3,33	0,40	$\mu\text{g/l}$	97%
Manganese	10,79	0,16	11,6	1,4	$\mu\text{g/l}$	108%
Nickel	5,50	0,04	5,36	0,59	$\mu\text{g/l}$	97%
Mercury	0,421	0,013	0,422	0,093	$\mu\text{g/l}$	100%
Selenium	2,83	0,02	2,85	0,43	$\mu\text{g/l}$	101%
Uranium	5,24	0,04	5,09	0,76	$\mu\text{g/l}$	97%
Zinc	10,5	0,7	11,3	1,7	$\mu\text{g/l}$	108%



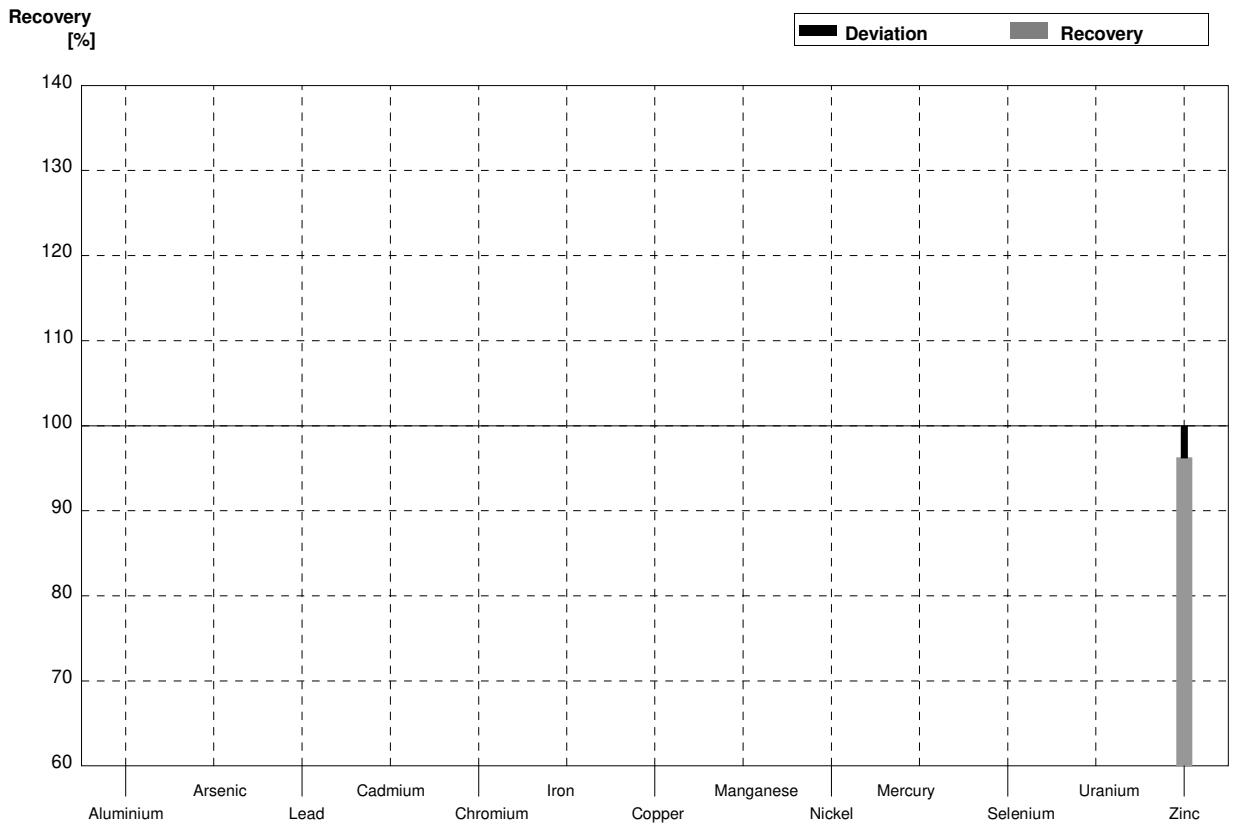
Sample M173B
Laboratory G

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	25,1	5,0	$\mu\text{g/l}$	103%
Arsenic	4,20	0,03	4,20	0,63	$\mu\text{g/l}$	100%
Lead	3,69	0,03	3,60	0,43	$\mu\text{g/l}$	98%
Cadmium	0,705	0,007	0,706	0,085	$\mu\text{g/l}$	100%
Chromium	1,72	0,03	1,67	0,25	$\mu\text{g/l}$	97%
Iron	57,5	0,3	54,2	8,1	$\mu\text{g/l}$	94%
Copper	107,8	0,4	100	12	$\mu\text{g/l}$	93%
Manganese	44,6	0,2	46,3	5,6	$\mu\text{g/l}$	104%
Nickel	1,92	0,03	1,83	0,20	$\mu\text{g/l}$	95%
Mercury	1,588	0,017	1,58	0,35	$\mu\text{g/l}$	99%
Selenium	0,404	0,017	<1,0		$\mu\text{g/l}$	•
Uranium	2,64	0,02	2,54	0,38	$\mu\text{g/l}$	96%
Zinc	20,1	0,7	20,8	3,1	$\mu\text{g/l}$	103%



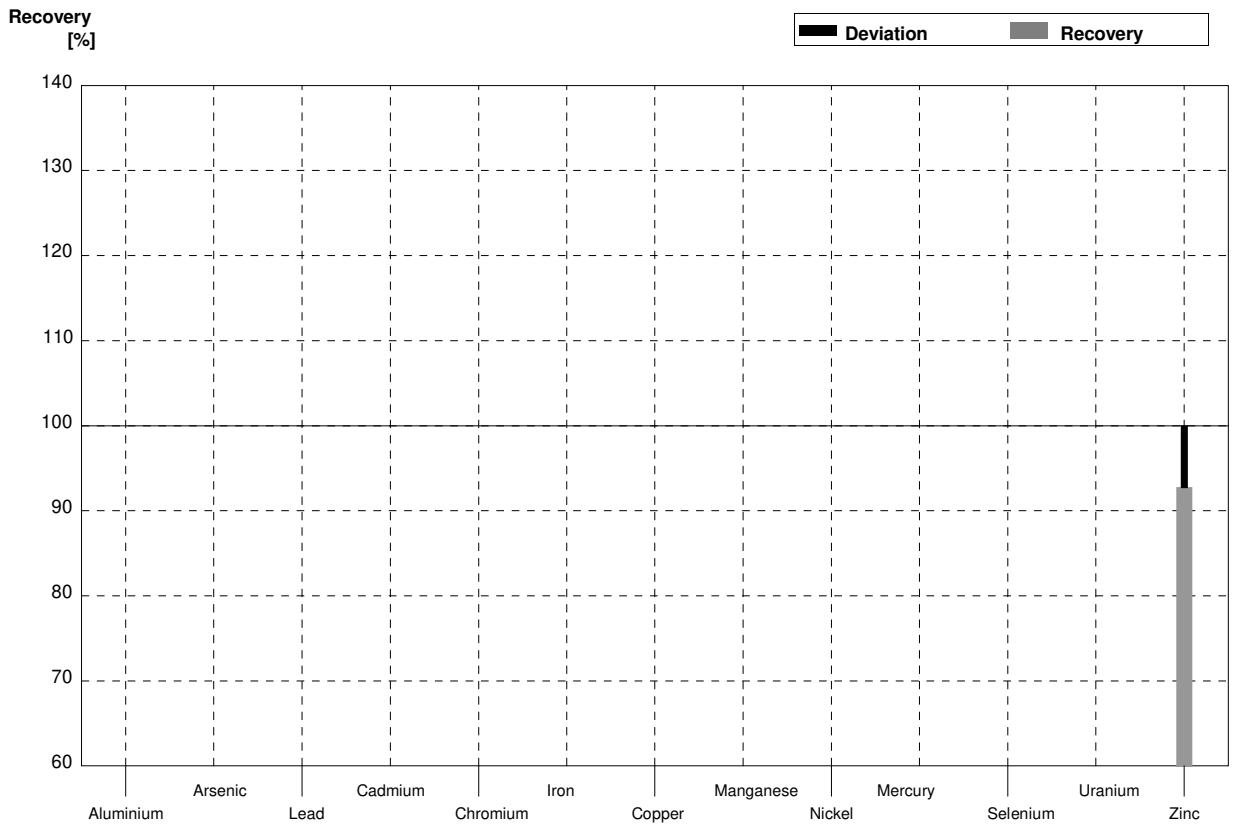
Sample M173A
Laboratory H

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5			$\mu\text{g/l}$	
Arsenic	3,33	0,02			$\mu\text{g/l}$	
Lead	0,806	0,014			$\mu\text{g/l}$	
Cadmium	1,765	0,014			$\mu\text{g/l}$	
Chromium	3,79	0,03			$\mu\text{g/l}$	
Iron	17,92	0,19			$\mu\text{g/l}$	
Copper	3,43	0,03			$\mu\text{g/l}$	
Manganese	10,79	0,16			$\mu\text{g/l}$	
Nickel	5,50	0,04			$\mu\text{g/l}$	
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02			$\mu\text{g/l}$	
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7	10,107		$\mu\text{g/l}$	96%



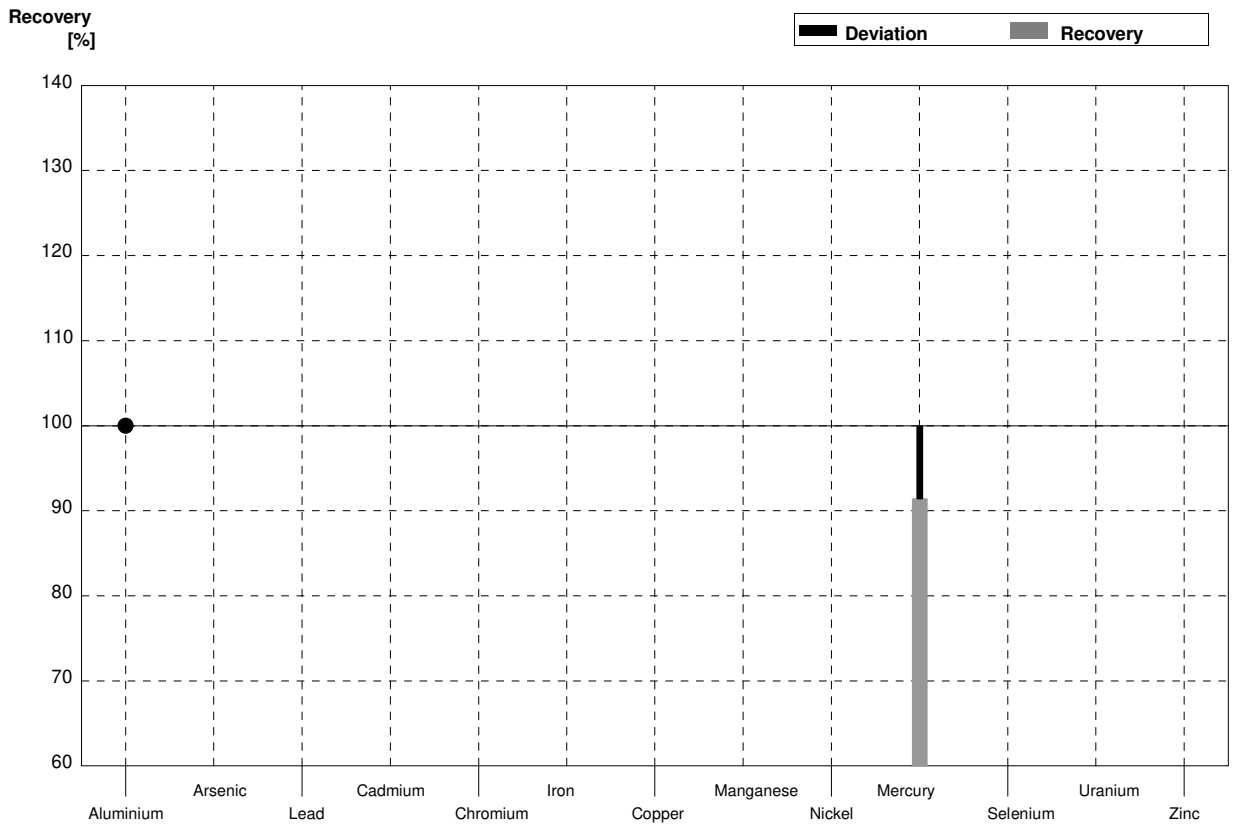
Sample M173B
Laboratory H

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3			$\mu\text{g/l}$	
Arsenic	4,20	0,03			$\mu\text{g/l}$	
Lead	3,69	0,03			$\mu\text{g/l}$	
Cadmium	0,705	0,007			$\mu\text{g/l}$	
Chromium	1,72	0,03			$\mu\text{g/l}$	
Iron	57,5	0,3			$\mu\text{g/l}$	
Copper	107,8	0,4			$\mu\text{g/l}$	
Manganese	44,6	0,2			$\mu\text{g/l}$	
Nickel	1,92	0,03			$\mu\text{g/l}$	
Mercury	1,588	0,017			$\mu\text{g/l}$	
Selenium	0,404	0,017			$\mu\text{g/l}$	
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7	18,645		$\mu\text{g/l}$	93%



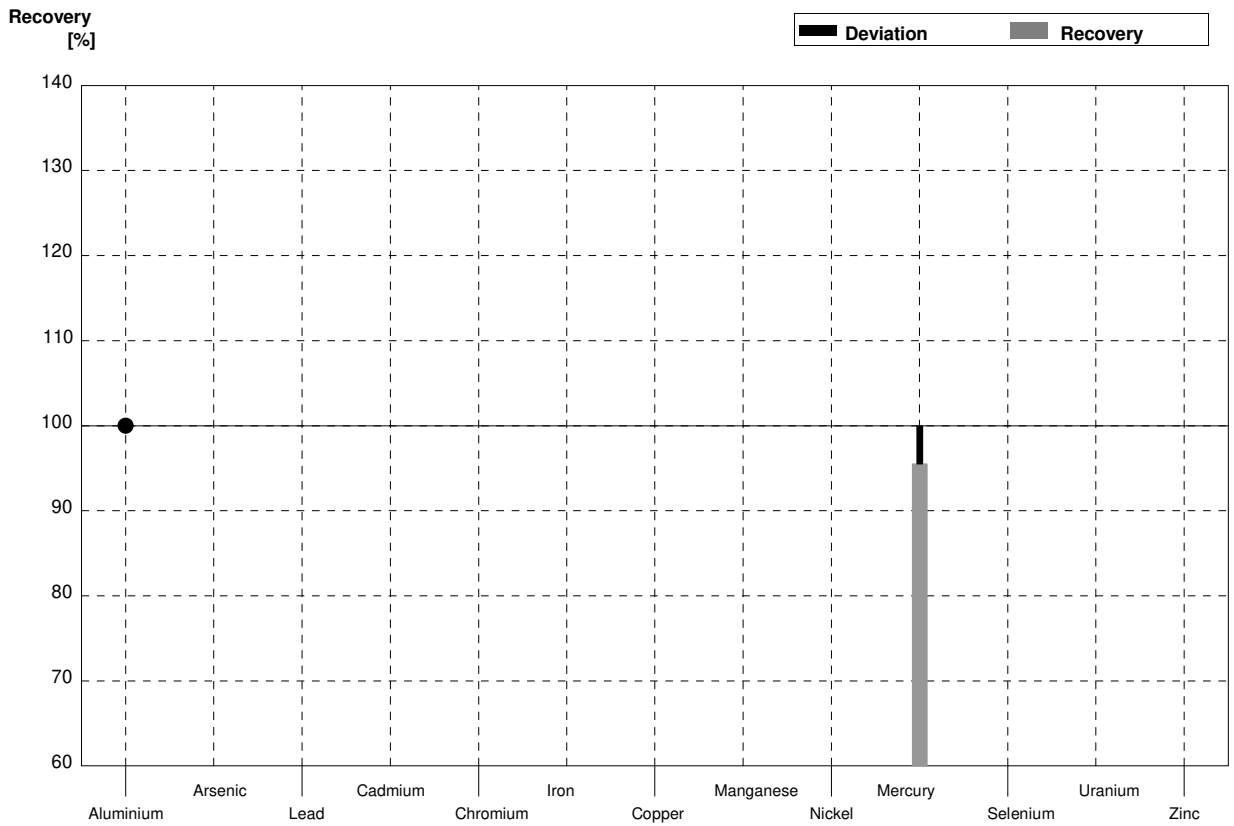
Sample M173A
Laboratory I

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	58,4	0,5	<100	18	µg/l	•
Arsenic	3,33	0,02			µg/l	
Lead	0,806	0,014			µg/l	
Cadmium	1,765	0,014			µg/l	
Chromium	3,79	0,03			µg/l	
Iron	17,92	0,19			µg/l	
Copper	3,43	0,03			µg/l	
Manganese	10,79	0,16			µg/l	
Nickel	5,50	0,04			µg/l	
Mercury	0,421	0,013	0,385	0,077	µg/l	91%
Selenium	2,83	0,02			µg/l	
Uranium	5,24	0,04			µg/l	
Zinc	10,5	0,7			µg/l	



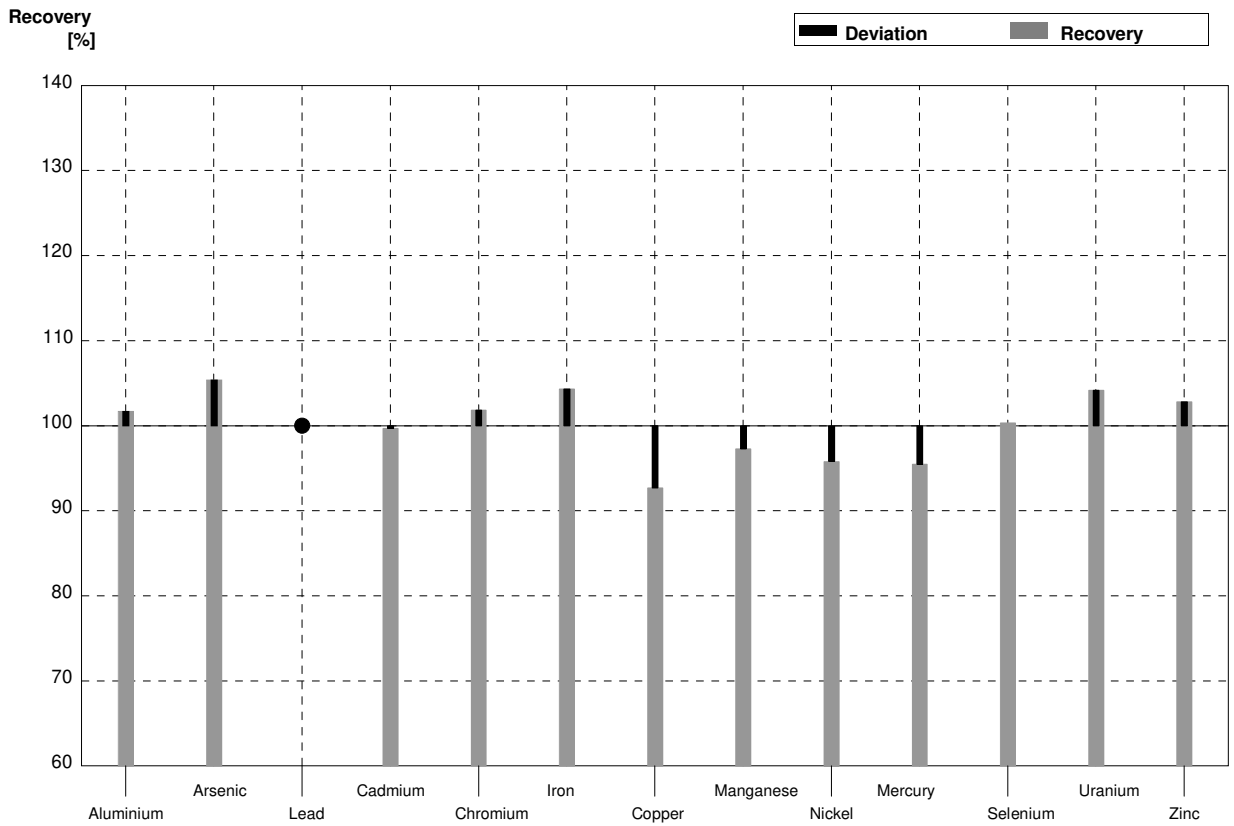
Sample M173B
Laboratory I

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	24,4	0,3	<100	18	µg/l	•
Arsenic	4,20	0,03			µg/l	
Lead	3,69	0,03			µg/l	
Cadmium	0,705	0,007			µg/l	
Chromium	1,72	0,03			µg/l	
Iron	57,5	0,3			µg/l	
Copper	107,8	0,4			µg/l	
Manganese	44,6	0,2			µg/l	
Nickel	1,92	0,03			µg/l	
Mercury	1,588	0,017	1,517	0,303	µg/l	96%
Selenium	0,404	0,017			µg/l	
Uranium	2,64	0,02			µg/l	
Zinc	20,1	0,7			µg/l	



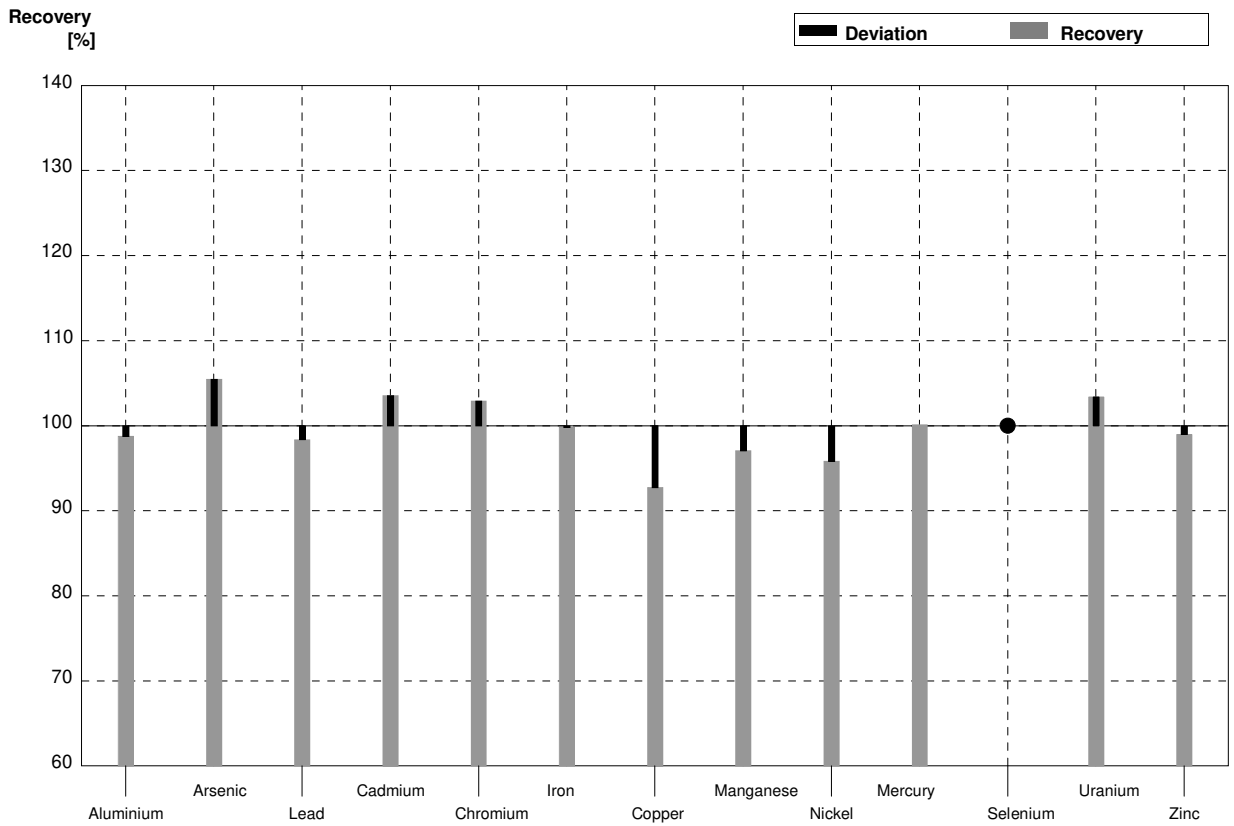
Sample M173A
Laboratory J

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	59,4	8,91	$\mu\text{g/l}$	102%
Arsenic	3,33	0,02	3,51	0,53	$\mu\text{g/l}$	105%
Lead	0,806	0,014	<1		$\mu\text{g/l}$	•
Cadmium	1,765	0,014	1,76	0,26	$\mu\text{g/l}$	100%
Chromium	3,79	0,03	3,86	0,58	$\mu\text{g/l}$	102%
Iron	17,92	0,19	18,7	2,80	$\mu\text{g/l}$	104%
Copper	3,43	0,03	3,18	0,48	$\mu\text{g/l}$	93%
Manganese	10,79	0,16	10,5	1,57	$\mu\text{g/l}$	97%
Nickel	5,50	0,04	5,27	0,79	$\mu\text{g/l}$	96%
Mercury	0,421	0,013	0,402	0,060	$\mu\text{g/l}$	95%
Selenium	2,83	0,02	2,84	0,43	$\mu\text{g/l}$	100%
Uranium	5,24	0,04	5,46	0,82	$\mu\text{g/l}$	104%
Zinc	10,5	0,7	10,8	1,61	$\mu\text{g/l}$	103%



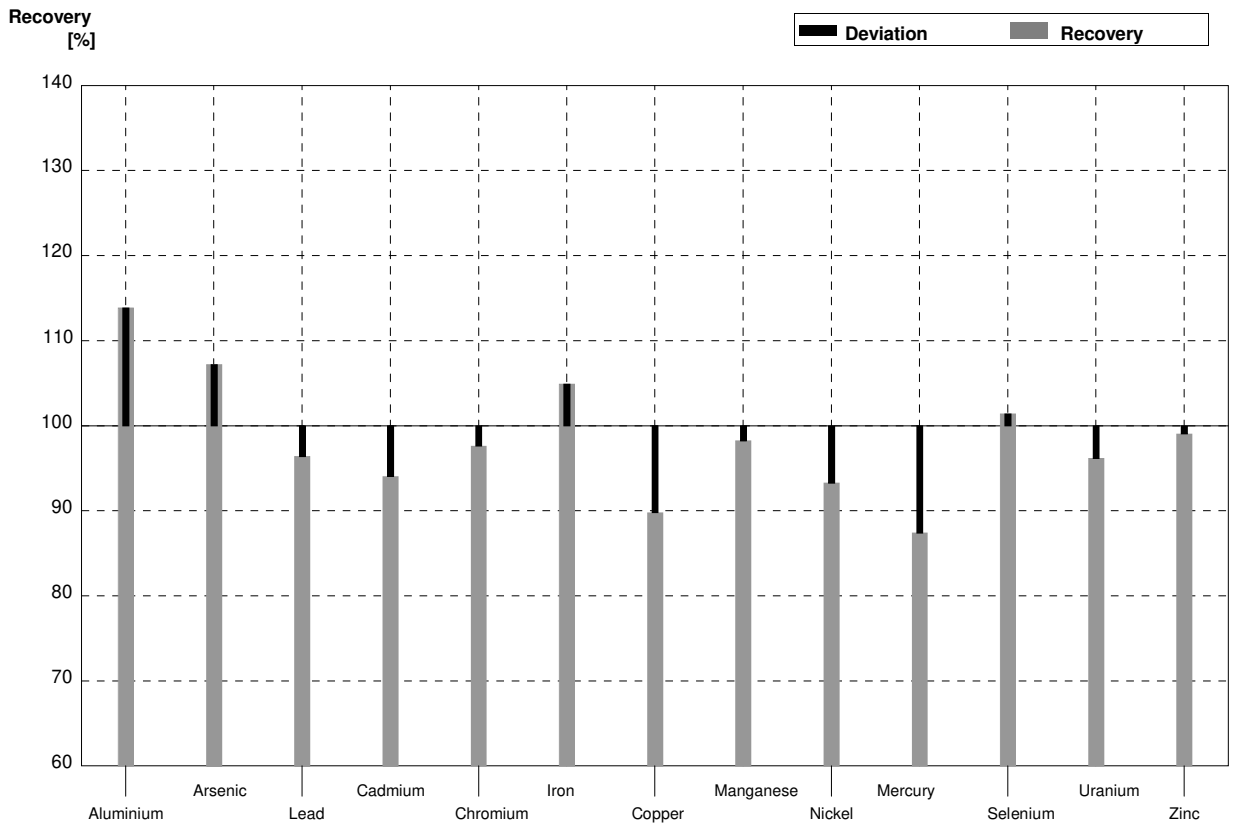
Sample M173B
Laboratory J

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	24,1	3,61	$\mu\text{g/l}$	99%
Arsenic	4,20	0,03	4,43	0,66	$\mu\text{g/l}$	105%
Lead	3,69	0,03	3,63	0,55	$\mu\text{g/l}$	98%
Cadmium	0,705	0,007	0,73	0,11	$\mu\text{g/l}$	104%
Chromium	1,72	0,03	1,77	0,27	$\mu\text{g/l}$	103%
Iron	57,5	0,3	57,4	8,61	$\mu\text{g/l}$	100%
Copper	107,8	0,4	100	15	$\mu\text{g/l}$	93%
Manganese	44,6	0,2	43,3	6,49	$\mu\text{g/l}$	97%
Nickel	1,92	0,03	1,84	0,28	$\mu\text{g/l}$	96%
Mercury	1,588	0,017	1,59	0,24	$\mu\text{g/l}$	100%
Selenium	0,404	0,017	<1		$\mu\text{g/l}$	•
Uranium	2,64	0,02	2,73	0,41	$\mu\text{g/l}$	103%
Zinc	20,1	0,7	19,9	2,99	$\mu\text{g/l}$	99%



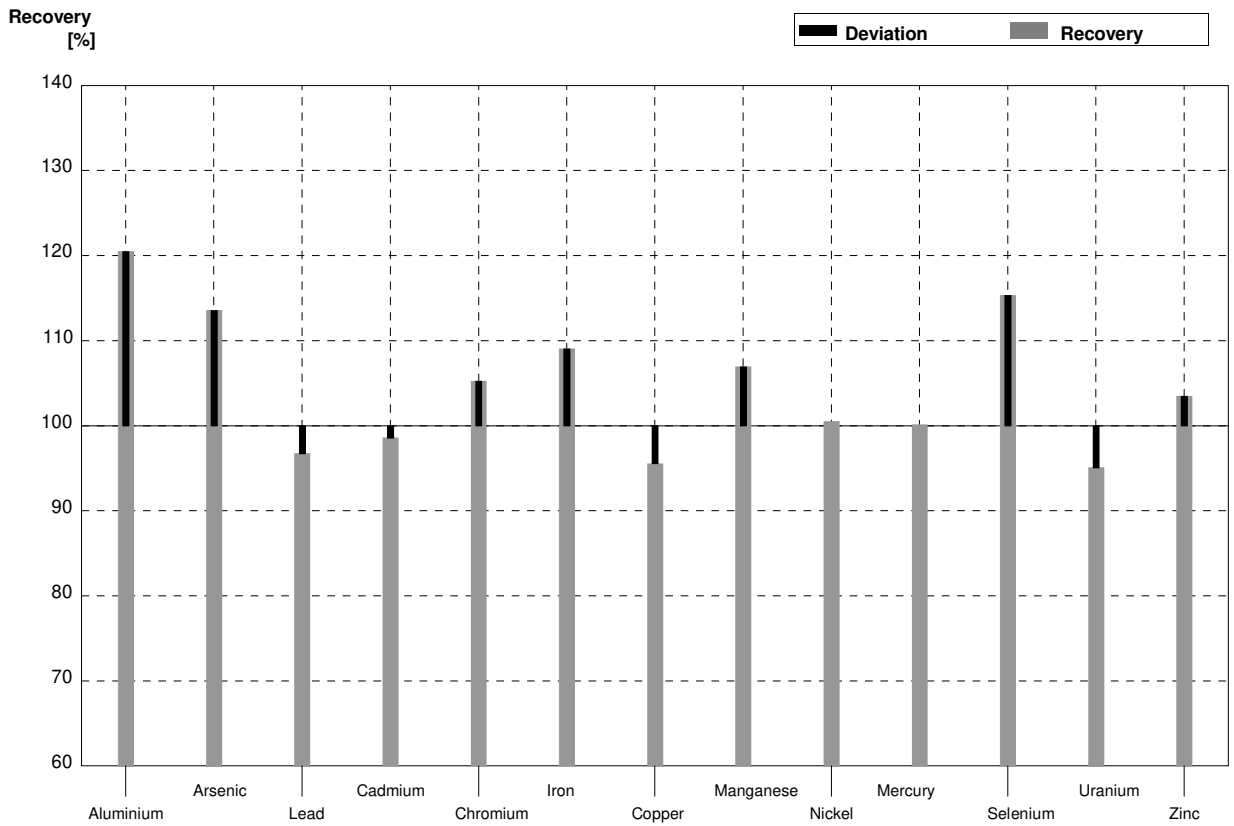
Sample M173A
Laboratory K

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	58,4	0,5	66,5	16,6	µg/l	114%
Arsenic	3,33	0,02	3,57	0,89	µg/l	107%
Lead	0,806	0,014	0,777	0,194	µg/l	96%
Cadmium	1,765	0,014	1,66	0,42	µg/l	94%
Chromium	3,79	0,03	3,70	0,93	µg/l	98%
Iron	17,92	0,19	18,8	4,7	µg/l	105%
Copper	3,43	0,03	3,08	0,77	µg/l	90%
Manganese	10,79	0,16	10,6	2,7	µg/l	98%
Nickel	5,50	0,04	5,13	1,28	µg/l	93%
Mercury	0,421	0,013	0,368	0,092	µg/l	87%
Selenium	2,83	0,02	2,87	0,72	µg/l	101%
Uranium	5,24	0,04	5,04	1,26	µg/l	96%
Zinc	10,5	0,7	10,4	2,6	µg/l	99%



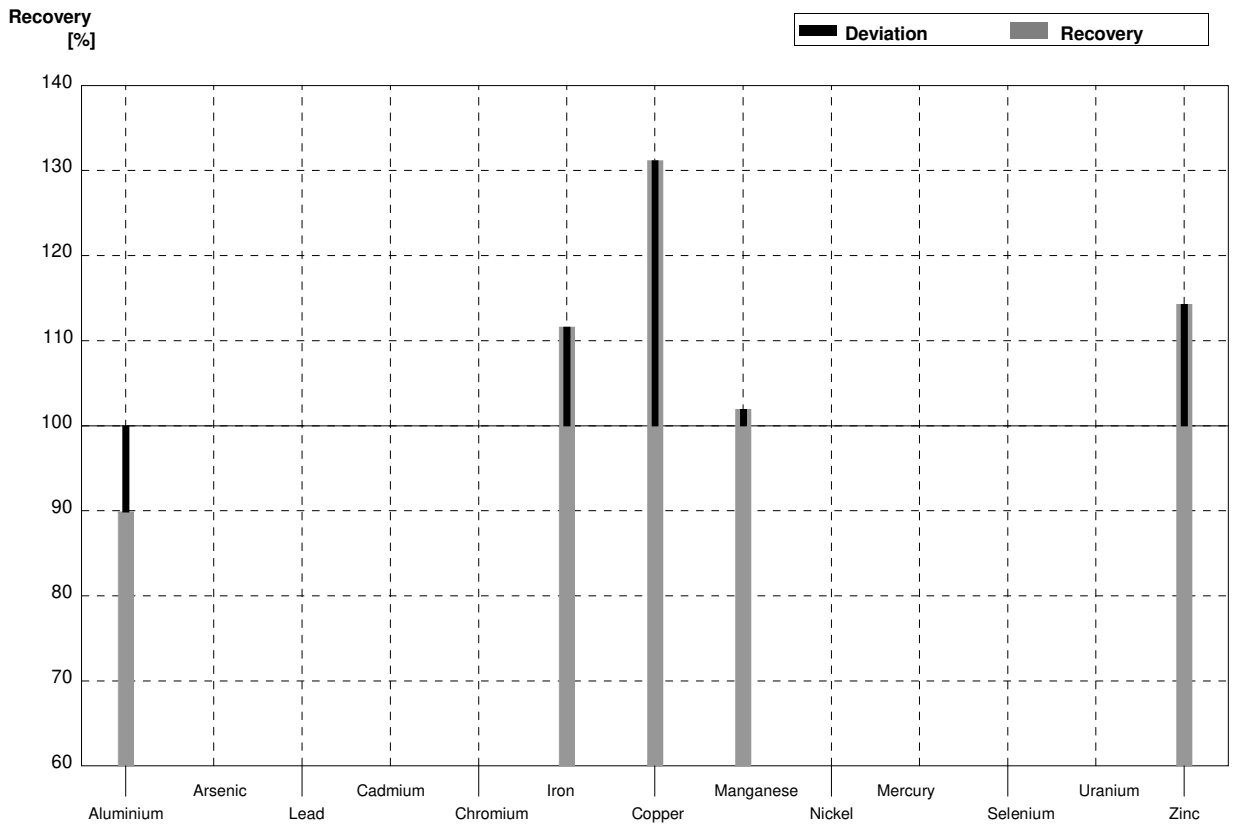
Sample M173B
Laboratory K

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	29,4	7,4	$\mu\text{g/l}$	120%
Arsenic	4,20	0,03	4,77	1,19	$\mu\text{g/l}$	114%
Lead	3,69	0,03	3,57	0,89	$\mu\text{g/l}$	97%
Cadmium	0,705	0,007	0,695	0,174	$\mu\text{g/l}$	99%
Chromium	1,72	0,03	1,81	0,45	$\mu\text{g/l}$	105%
Iron	57,5	0,3	62,7	15,7	$\mu\text{g/l}$	109%
Copper	107,8	0,4	103	26	$\mu\text{g/l}$	96%
Manganese	44,6	0,2	47,7	11,9	$\mu\text{g/l}$	107%
Nickel	1,92	0,03	1,93	0,48	$\mu\text{g/l}$	101%
Mercury	1,588	0,017	1,59	0,40	$\mu\text{g/l}$	100%
Selenium	0,404	0,017	0,466	0,117	$\mu\text{g/l}$	115%
Uranium	2,64	0,02	2,51	0,63	$\mu\text{g/l}$	95%
Zinc	20,1	0,7	20,8	5,2	$\mu\text{g/l}$	103%



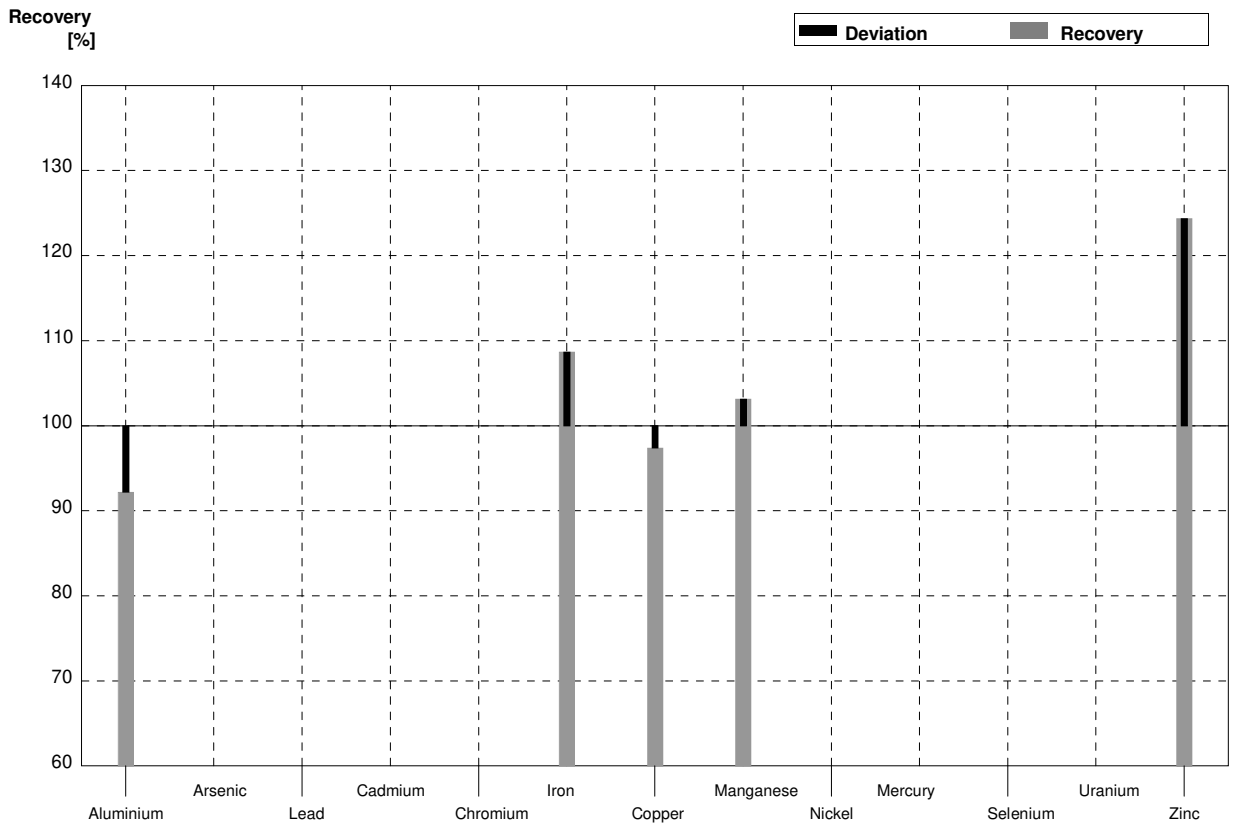
Sample M173A
Laboratory L

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	52,5	4	$\mu\text{g/l}$	90%
Arsenic	3,33	0,02			$\mu\text{g/l}$	
Lead	0,806	0,014			$\mu\text{g/l}$	
Cadmium	1,765	0,014			$\mu\text{g/l}$	
Chromium	3,79	0,03			$\mu\text{g/l}$	
Iron	17,92	0,19	20,0	4	$\mu\text{g/l}$	112%
Copper	3,43	0,03	4,50	5	$\mu\text{g/l}$	131%
Manganese	10,79	0,16	11,0	2	$\mu\text{g/l}$	102%
Nickel	5,50	0,04			$\mu\text{g/l}$	
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02			$\mu\text{g/l}$	
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7	12,0	10	$\mu\text{g/l}$	114%



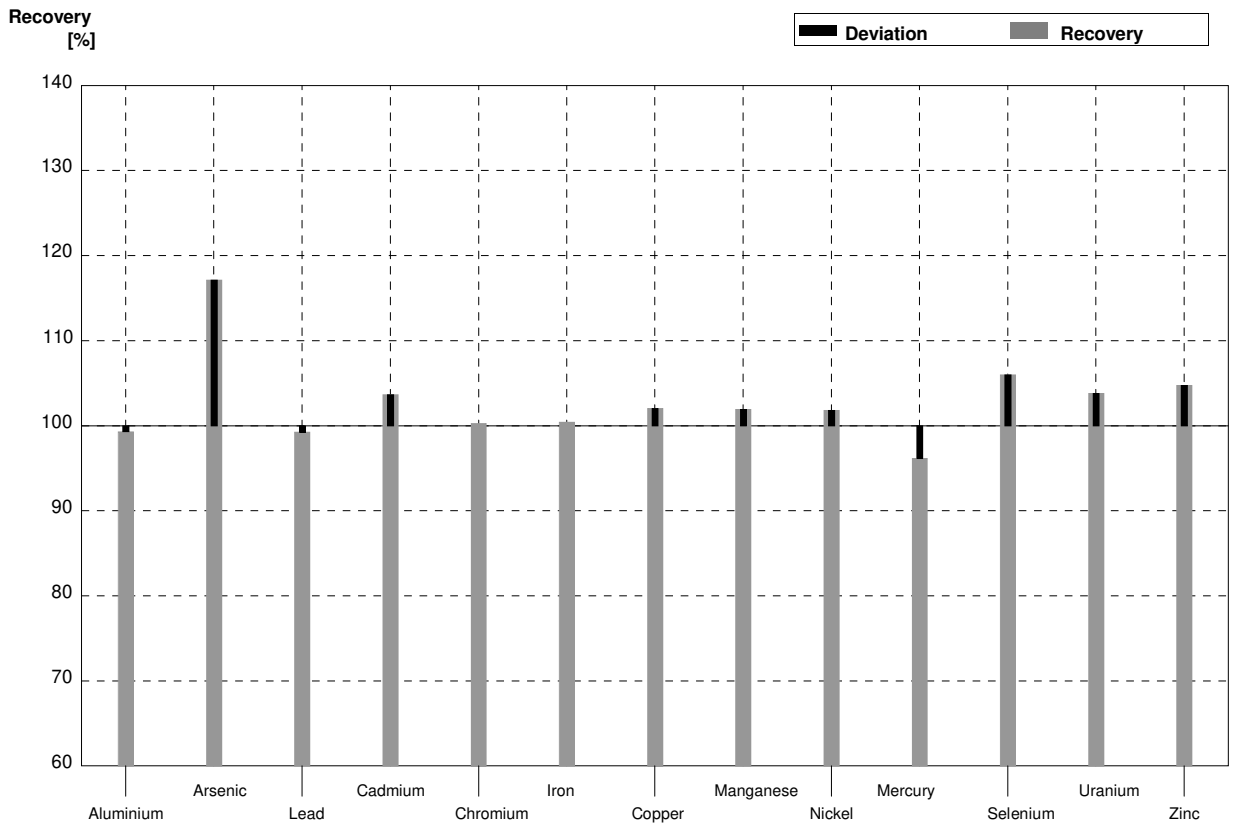
Sample M173B
Laboratory L

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	22,5	4	$\mu\text{g/l}$	92%
Arsenic	4,20	0,03			$\mu\text{g/l}$	
Lead	3,69	0,03			$\mu\text{g/l}$	
Cadmium	0,705	0,007			$\mu\text{g/l}$	
Chromium	1,72	0,03			$\mu\text{g/l}$	
Iron	57,5	0,3	62,5	4	$\mu\text{g/l}$	109%
Copper	107,8	0,4	105,00	5	$\mu\text{g/l}$	97%
Manganese	44,6	0,2	46,0	2	$\mu\text{g/l}$	103%
Nickel	1,92	0,03			$\mu\text{g/l}$	
Mercury	1,588	0,017			$\mu\text{g/l}$	
Selenium	0,404	0,017			$\mu\text{g/l}$	
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7	25,0	10	$\mu\text{g/l}$	124%



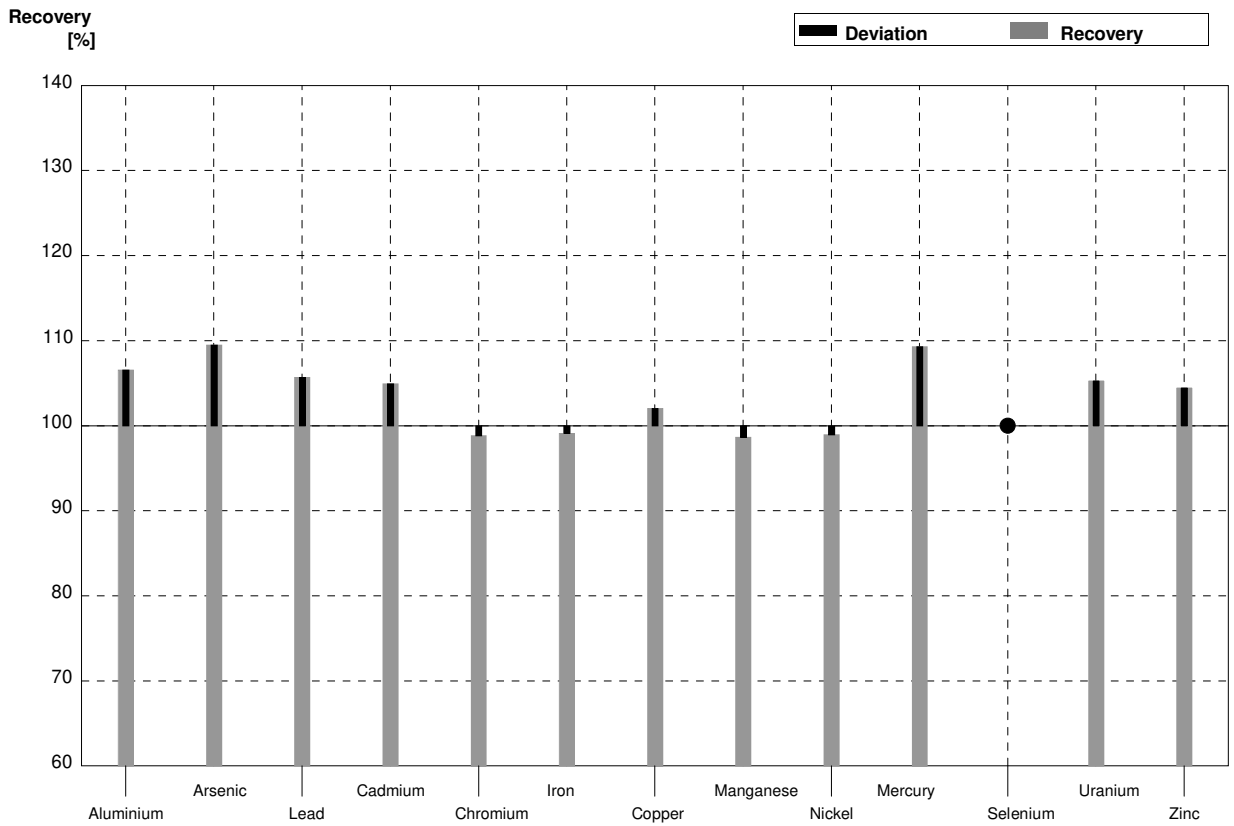
Sample M173A
Laboratory M

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	58,0	5,80	$\mu\text{g/l}$	99%
Arsenic	3,33	0,02	3,90	0,468	$\mu\text{g/l}$	117%
Lead	0,806	0,014	0,80	0,064	$\mu\text{g/l}$	99%
Cadmium	1,765	0,014	1,83	0,146	$\mu\text{g/l}$	104%
Chromium	3,79	0,03	3,80	0,456	$\mu\text{g/l}$	100%
Iron	17,92	0,19	18,0	4,68	$\mu\text{g/l}$	100%
Copper	3,43	0,03	3,50	0,280	$\mu\text{g/l}$	102%
Manganese	10,79	0,16	11,0	1,10	$\mu\text{g/l}$	102%
Nickel	5,50	0,04	5,60	0,560	$\mu\text{g/l}$	102%
Mercury	0,421	0,013	0,405	0,061	$\mu\text{g/l}$	96%
Selenium	2,83	0,02	3,00	0,450	$\mu\text{g/l}$	106%
Uranium	5,24	0,04	5,44	0,272	$\mu\text{g/l}$	104%
Zinc	10,5	0,7	11,0	1,10	$\mu\text{g/l}$	105%



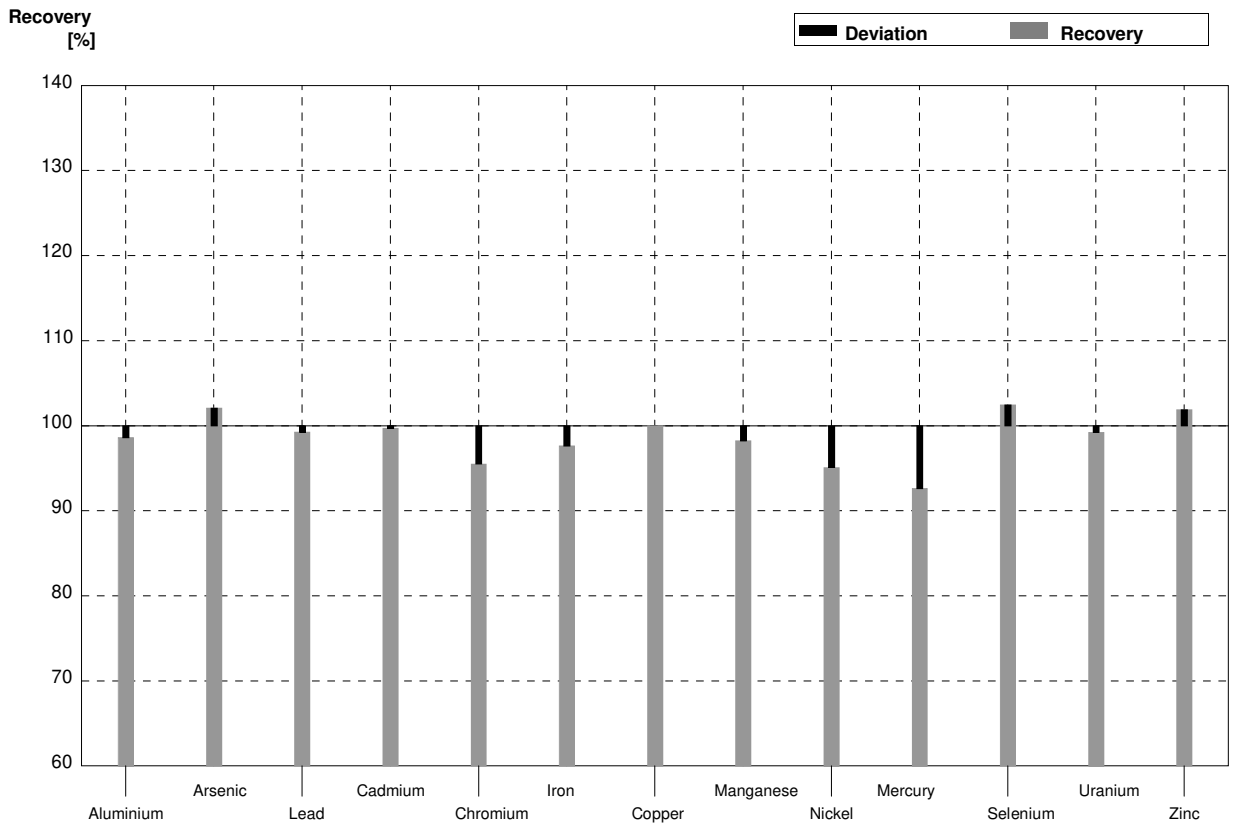
Sample M173B
Laboratory M

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	26,0	2,60	$\mu\text{g/l}$	107%
Arsenic	4,20	0,03	4,60	0,552	$\mu\text{g/l}$	110%
Lead	3,69	0,03	3,90	0,312	$\mu\text{g/l}$	106%
Cadmium	0,705	0,007	0,740	0,0592	$\mu\text{g/l}$	105%
Chromium	1,72	0,03	1,70	0,204	$\mu\text{g/l}$	99%
Iron	57,5	0,3	57,0	14,8	$\mu\text{g/l}$	99%
Copper	107,8	0,4	110	8,78	$\mu\text{g/l}$	102%
Manganese	44,6	0,2	44,0	4,40	$\mu\text{g/l}$	99%
Nickel	1,92	0,03	1,90	0,190	$\mu\text{g/l}$	99%
Mercury	1,588	0,017	1,736	0,260	$\mu\text{g/l}$	109%
Selenium	0,404	0,017	<0,50		$\mu\text{g/l}$	•
Uranium	2,64	0,02	2,78	0,139	$\mu\text{g/l}$	105%
Zinc	20,1	0,7	21,0	2,10	$\mu\text{g/l}$	104%



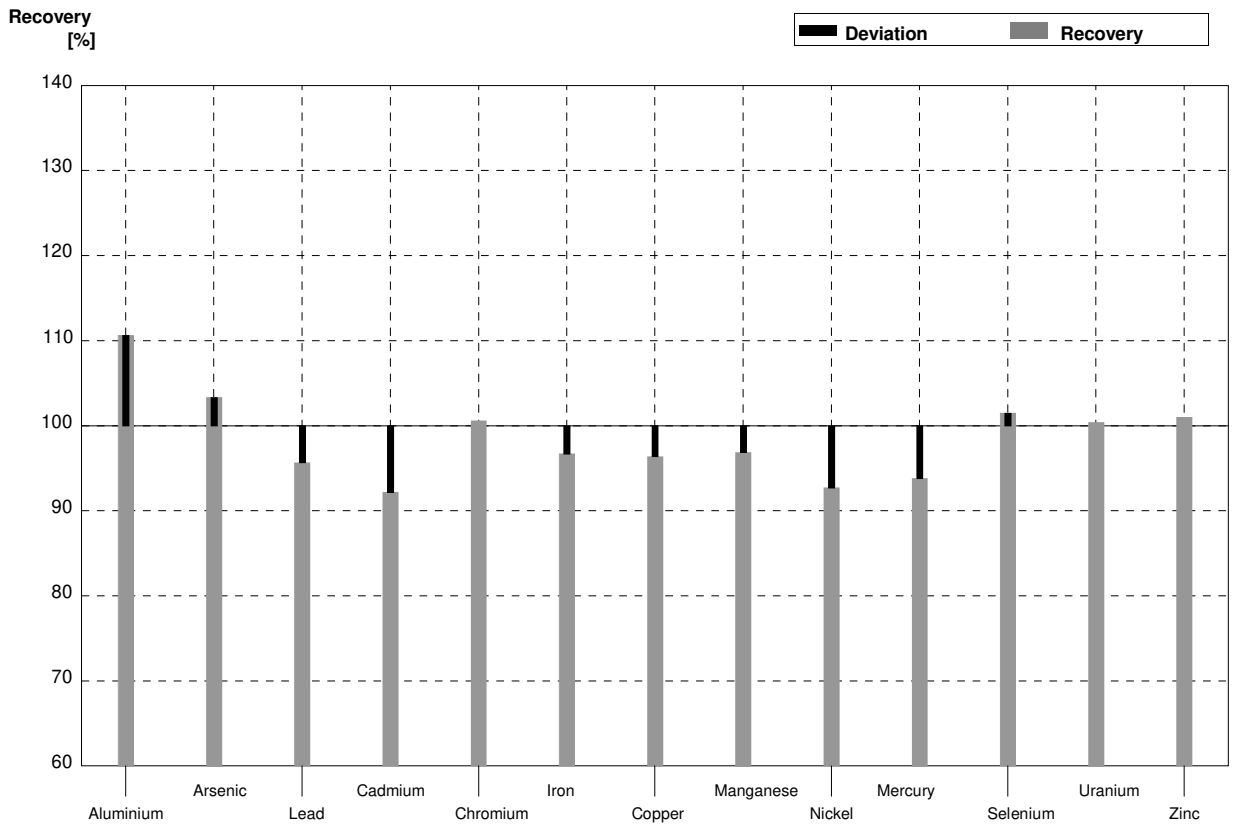
Sample M173A
Laboratory N

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	57,6	6,64	$\mu\text{g/l}$	99%
Arsenic	3,33	0,02	3,40	0,30	$\mu\text{g/l}$	102%
Lead	0,806	0,014	0,80		$\mu\text{g/l}$	99%
Cadmium	1,765	0,014	1,76	0,11	$\mu\text{g/l}$	100%
Chromium	3,79	0,03	3,62		$\mu\text{g/l}$	96%
Iron	17,92	0,19	17,5	1,21	$\mu\text{g/l}$	98%
Copper	3,43	0,03	3,43		$\mu\text{g/l}$	100%
Manganese	10,79	0,16	10,6	0,71	$\mu\text{g/l}$	98%
Nickel	5,50	0,04	5,23	0,58	$\mu\text{g/l}$	95%
Mercury	0,421	0,013	0,390	0,1	$\mu\text{g/l}$	93%
Selenium	2,83	0,02	2,90		$\mu\text{g/l}$	102%
Uranium	5,24	0,04	5,20	0,45	$\mu\text{g/l}$	99%
Zinc	10,5	0,7	10,7	2,68	$\mu\text{g/l}$	102%



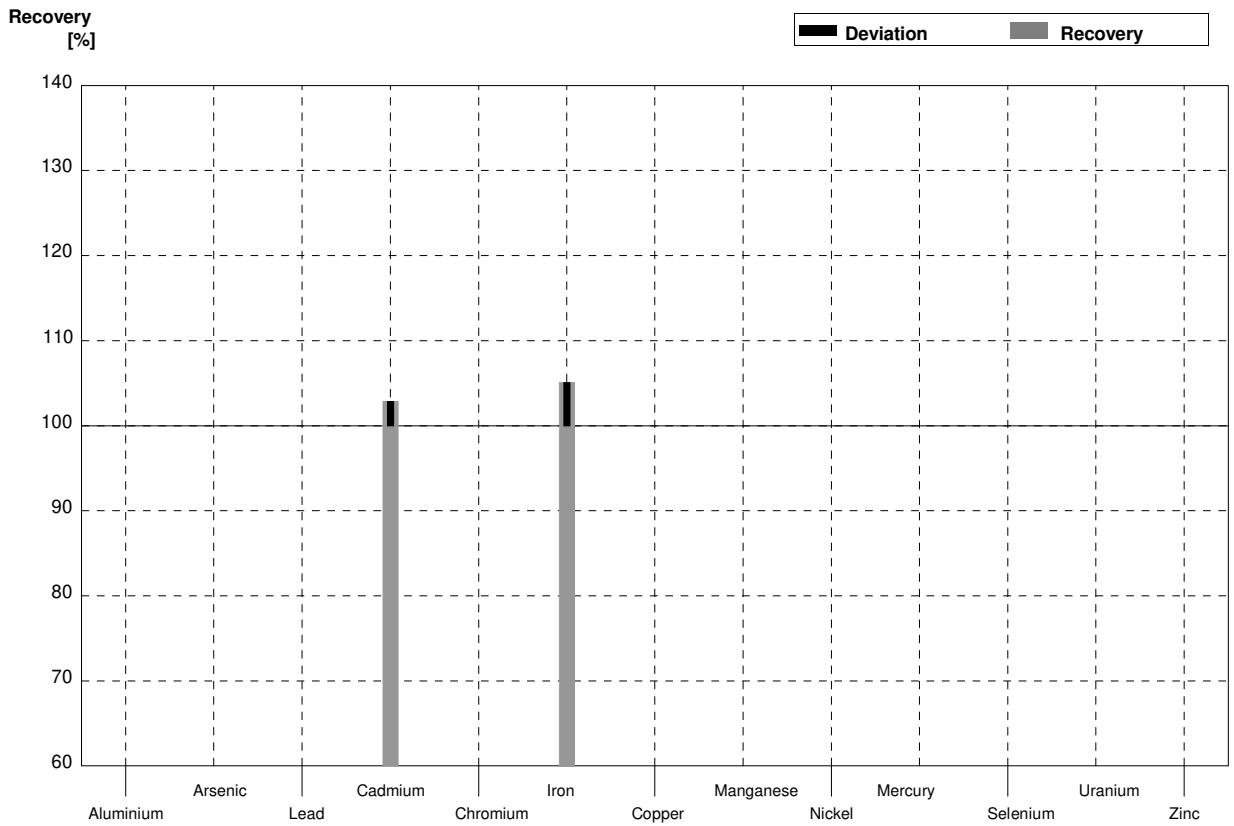
Sample M173B
Laboratory N

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	27,0	4,3	$\mu\text{g/l}$	111%
Arsenic	4,20	0,03	4,34	0,40	$\mu\text{g/l}$	103%
Lead	3,69	0,03	3,53	0,42	$\mu\text{g/l}$	96%
Cadmium	0,705	0,007	0,65	0,07	$\mu\text{g/l}$	92%
Chromium	1,72	0,03	1,73		$\mu\text{g/l}$	101%
Iron	57,5	0,3	55,6	3,76	$\mu\text{g/l}$	97%
Copper	107,8	0,4	103,9	12,4	$\mu\text{g/l}$	96%
Manganese	44,6	0,2	43,2	2,73	$\mu\text{g/l}$	97%
Nickel	1,92	0,03	1,78	0,16	$\mu\text{g/l}$	93%
Mercury	1,588	0,017	1,49	0,26	$\mu\text{g/l}$	94%
Selenium	0,404	0,017	0,410		$\mu\text{g/l}$	101%
Uranium	2,64	0,02	2,65	0,18	$\mu\text{g/l}$	100%
Zinc	20,1	0,7	20,3	3,11	$\mu\text{g/l}$	101%



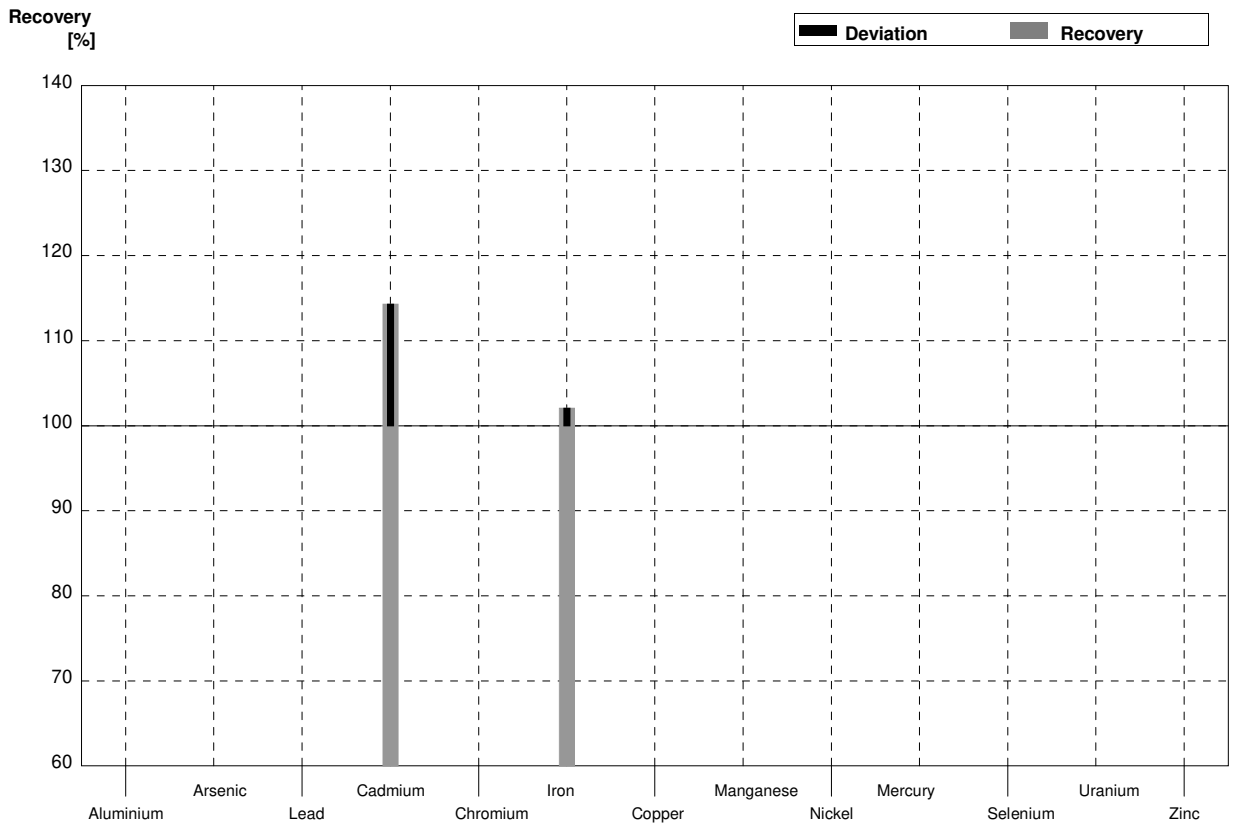
Sample M173A
Laboratory O

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5			$\mu\text{g/l}$	
Arsenic	3,33	0,02			$\mu\text{g/l}$	
Lead	0,806	0,014			$\mu\text{g/l}$	
Cadmium	1,765	0,014	1,816	0,18	$\mu\text{g/l}$	103%
Chromium	3,79	0,03			$\mu\text{g/l}$	
Iron	17,92	0,19	18,83	1,51	$\mu\text{g/l}$	105%
Copper	3,43	0,03			$\mu\text{g/l}$	
Manganese	10,79	0,16			$\mu\text{g/l}$	
Nickel	5,50	0,04			$\mu\text{g/l}$	
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02			$\mu\text{g/l}$	
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7			$\mu\text{g/l}$	



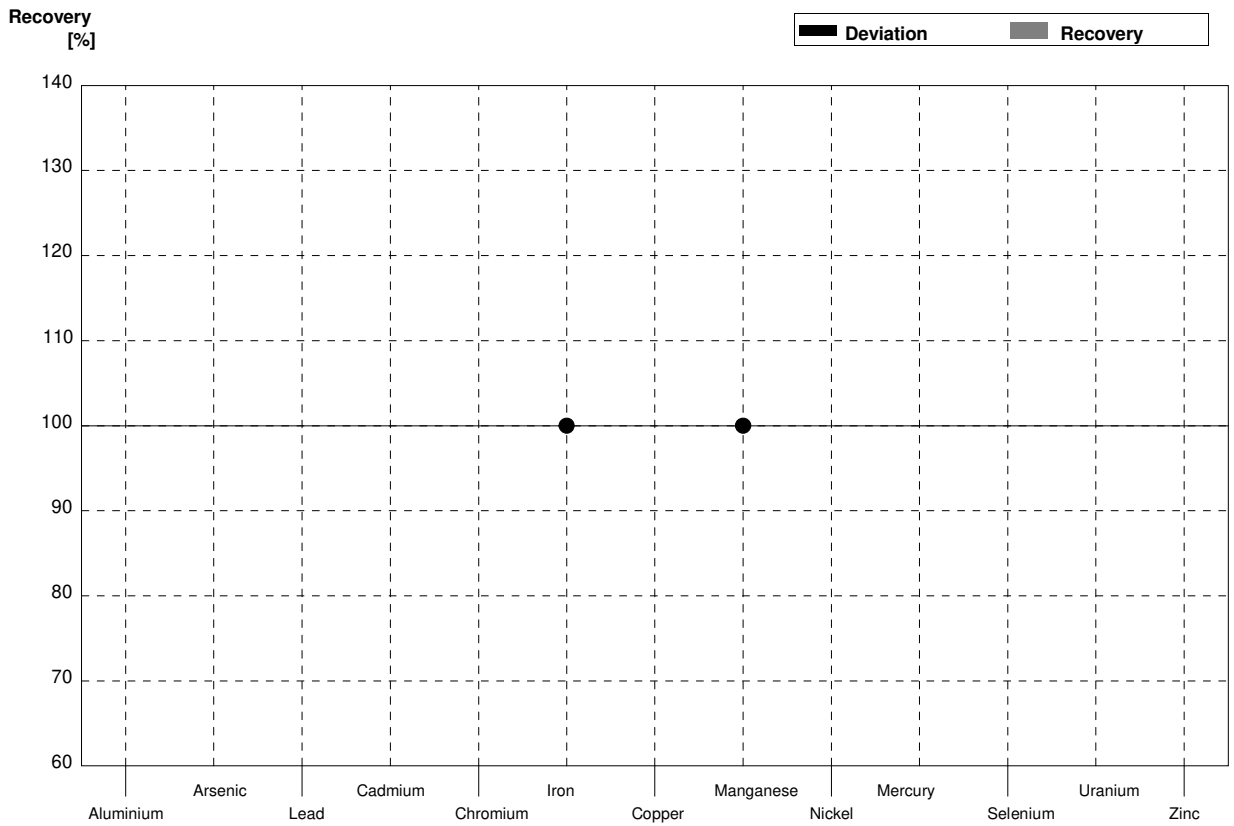
Sample M173B
Laboratory O

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	24,4	0,3			µg/l	
Arsenic	4,20	0,03			µg/l	
Lead	3,69	0,03			µg/l	
Cadmium	0,705	0,007	0,806	0,08	µg/l	114%
Chromium	1,72	0,03			µg/l	
Iron	57,5	0,3	58,71	4,70	µg/l	102%
Copper	107,8	0,4			µg/l	
Manganese	44,6	0,2			µg/l	
Nickel	1,92	0,03			µg/l	
Mercury	1,588	0,017			µg/l	
Selenium	0,404	0,017			µg/l	
Uranium	2,64	0,02			µg/l	
Zinc	20,1	0,7			µg/l	



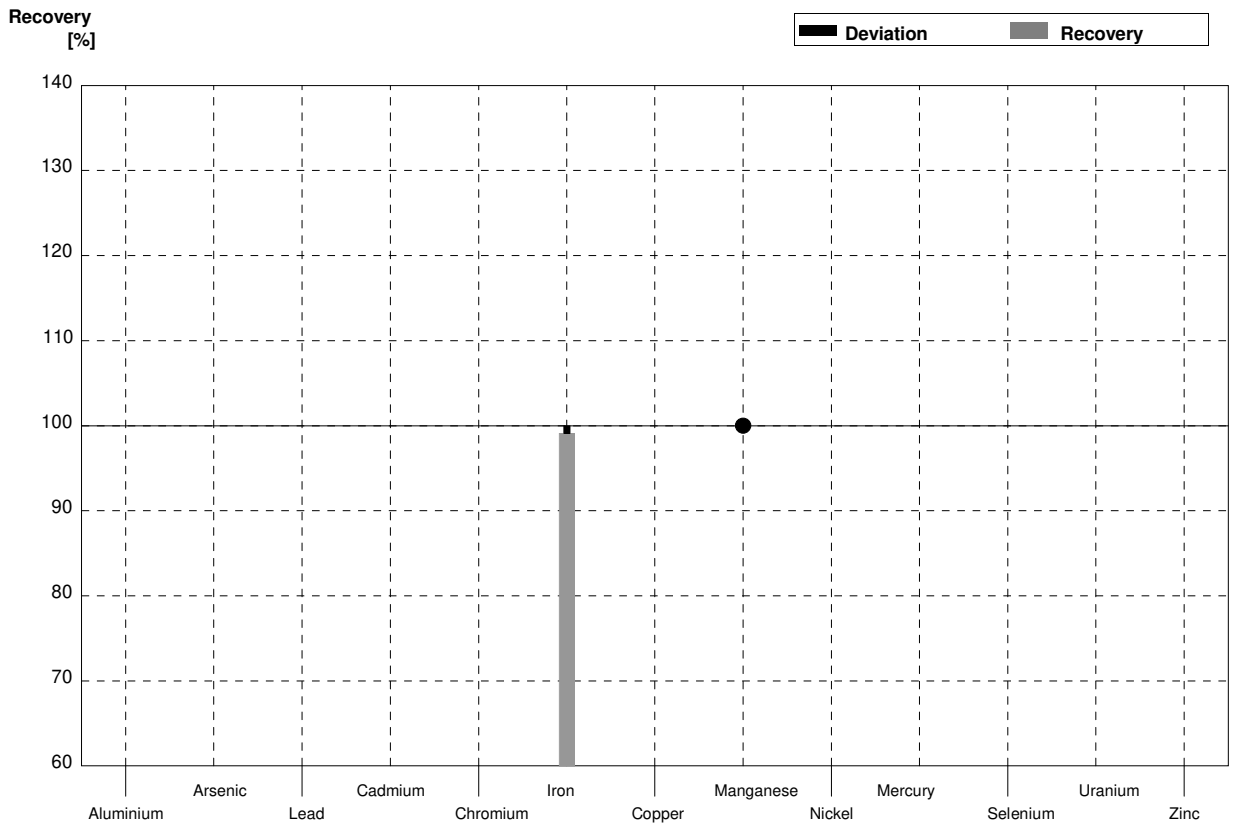
Sample M173A
Laboratory P

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5			$\mu\text{g/l}$	
Arsenic	3,33	0,02			$\mu\text{g/l}$	
Lead	0,806	0,014			$\mu\text{g/l}$	
Cadmium	1,765	0,014			$\mu\text{g/l}$	
Chromium	3,79	0,03			$\mu\text{g/l}$	
Iron	17,92	0,19	<50		$\mu\text{g/l}$	•
Copper	3,43	0,03			$\mu\text{g/l}$	
Manganese	10,79	0,16	<50		$\mu\text{g/l}$	•
Nickel	5,50	0,04			$\mu\text{g/l}$	
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02			$\mu\text{g/l}$	
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7			$\mu\text{g/l}$	



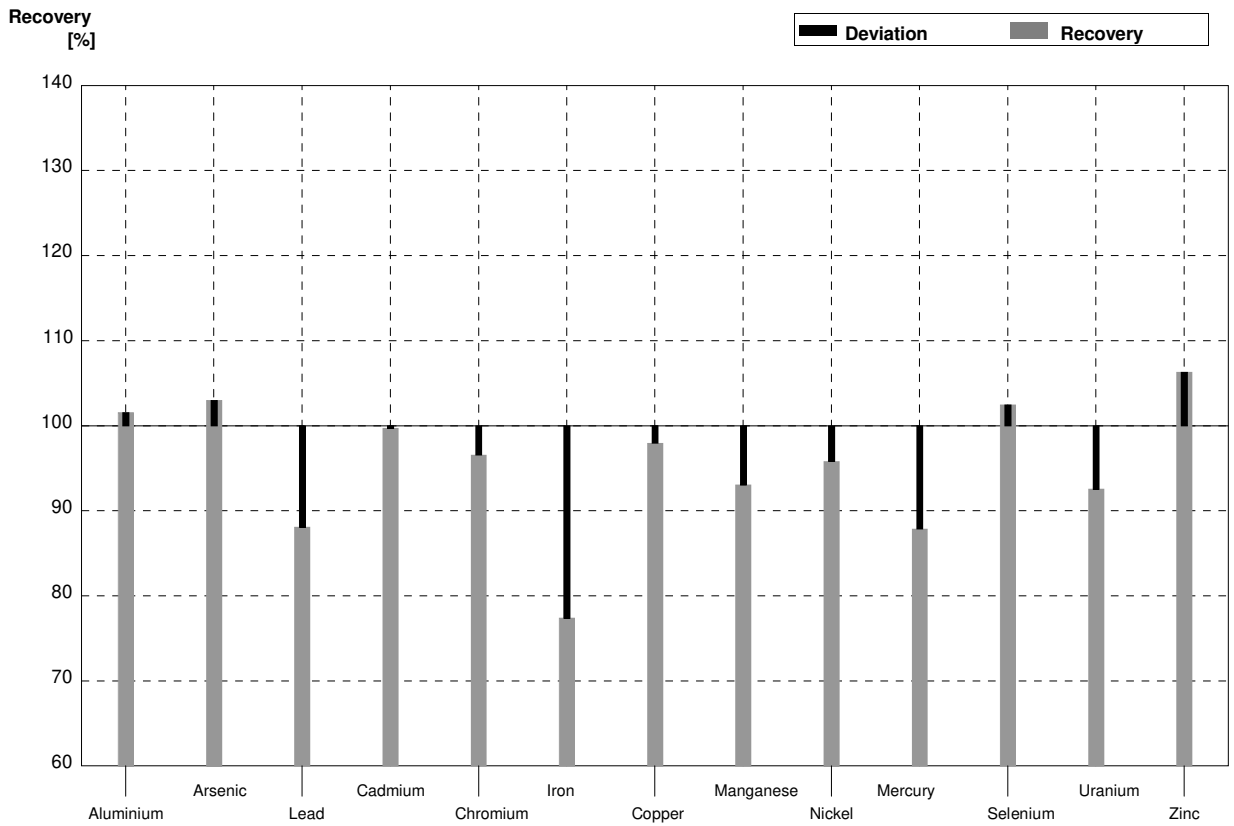
Sample M173B
Laboratory P

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3			$\mu\text{g/l}$	
Arsenic	4,20	0,03			$\mu\text{g/l}$	
Lead	3,69	0,03			$\mu\text{g/l}$	
Cadmium	0,705	0,007			$\mu\text{g/l}$	
Chromium	1,72	0,03			$\mu\text{g/l}$	
Iron	57,5	0,3	57	5	$\mu\text{g/l}$	99%
Copper	107,8	0,4			$\mu\text{g/l}$	
Manganese	44,6	0,2	<50		$\mu\text{g/l}$	•
Nickel	1,92	0,03			$\mu\text{g/l}$	
Mercury	1,588	0,017			$\mu\text{g/l}$	
Selenium	0,404	0,017			$\mu\text{g/l}$	
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7			$\mu\text{g/l}$	



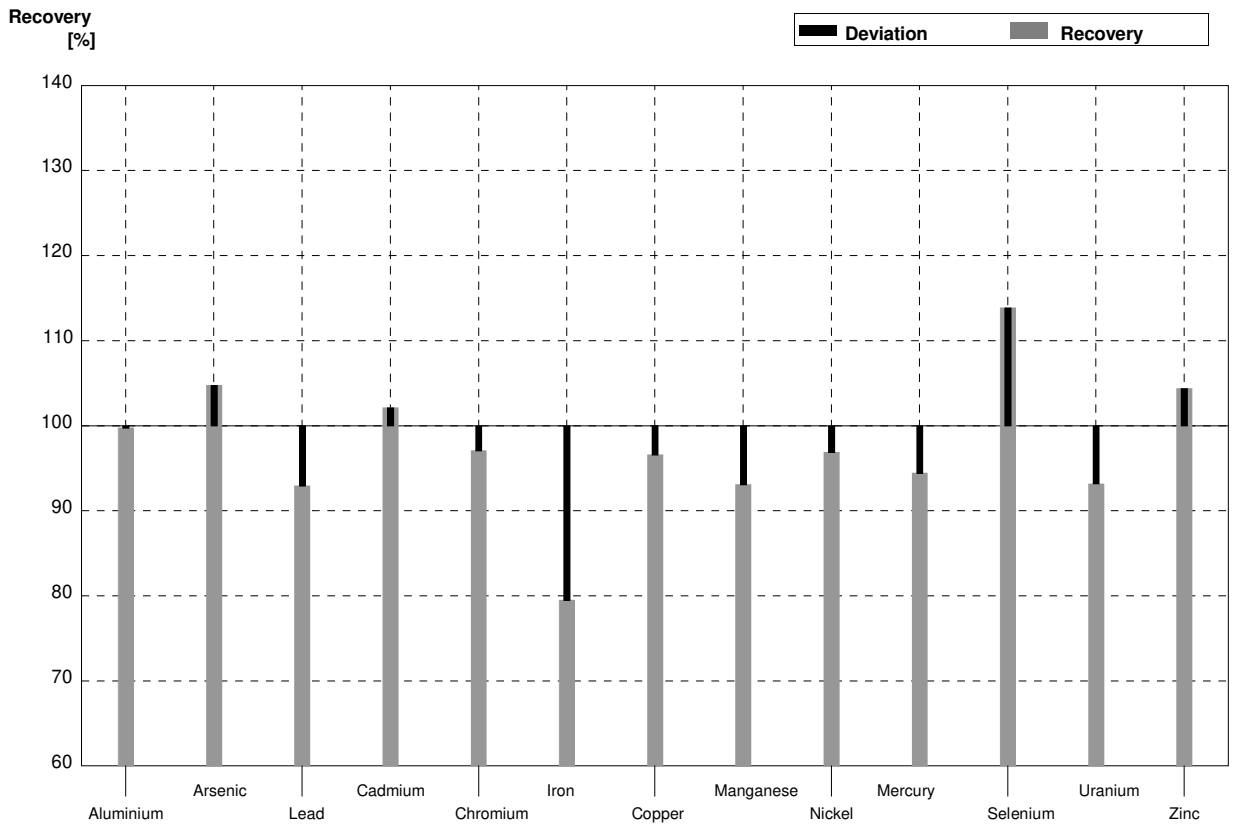
Sample M173A
Laboratory Q

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	59,31	10,86	$\mu\text{g/l}$	102%
Arsenic	3,33	0,02	3,43	0,75	$\mu\text{g/l}$	103%
Lead	0,806	0,014	0,71	0,06	$\mu\text{g/l}$	88%
Cadmium	1,765	0,014	1,76	0,12	$\mu\text{g/l}$	100%
Chromium	3,79	0,03	3,66	0,80	$\mu\text{g/l}$	97%
Iron	17,92	0,19	13,87	2,82	$\mu\text{g/l}$	77%
Copper	3,43	0,03	3,36	0,32	$\mu\text{g/l}$	98%
Manganese	10,79	0,16	10,04	1,84	$\mu\text{g/l}$	93%
Nickel	5,50	0,04	5,27	0,54	$\mu\text{g/l}$	96%
Mercury	0,421	0,013	0,370	0,00	$\mu\text{g/l}$	88%
Selenium	2,83	0,02	2,90	0,85	$\mu\text{g/l}$	102%
Uranium	5,24	0,04	4,85	0,69	$\mu\text{g/l}$	93%
Zinc	10,5	0,7	11,16	0,95	$\mu\text{g/l}$	106%



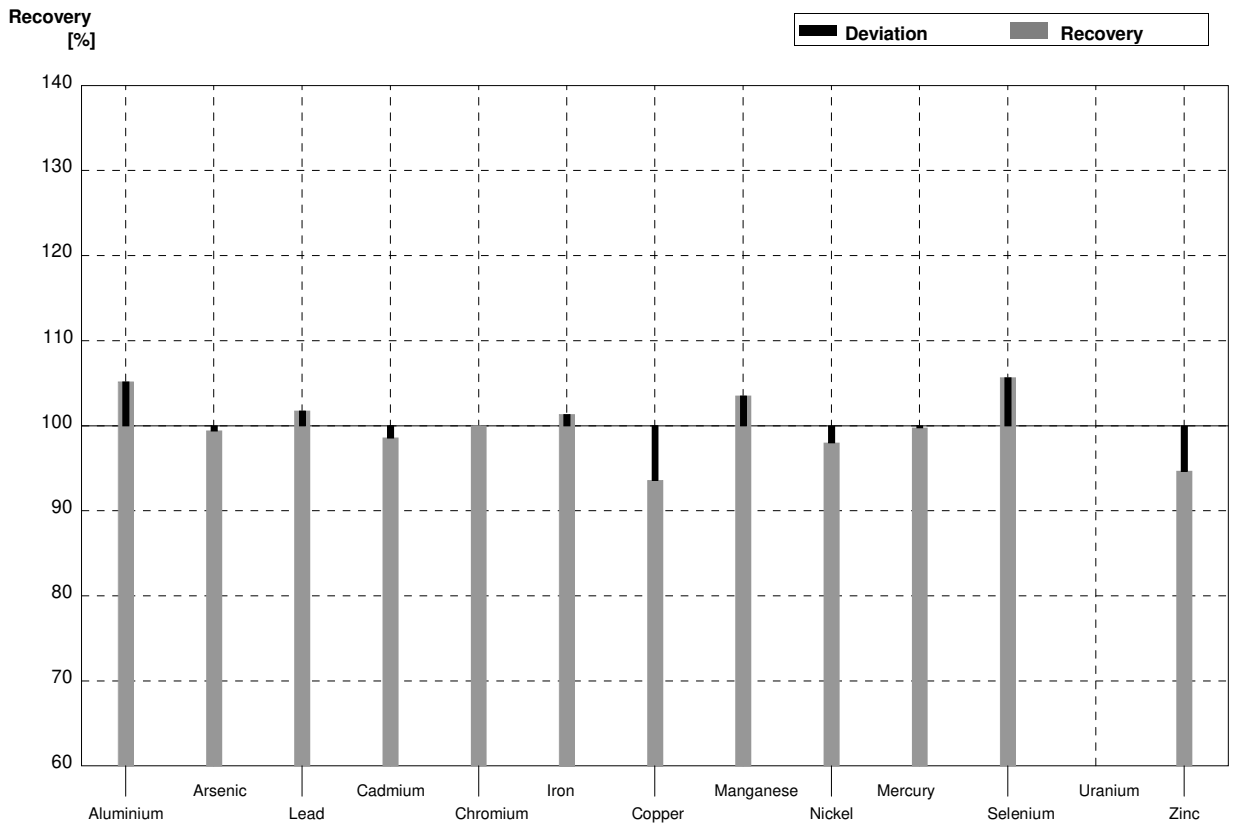
Sample M173B
Laboratory Q

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	24,34	4,46	$\mu\text{g/l}$	100%
Arsenic	4,20	0,03	4,40	0,96	$\mu\text{g/l}$	105%
Lead	3,69	0,03	3,43	0,28	$\mu\text{g/l}$	93%
Cadmium	0,705	0,007	0,72	0,05	$\mu\text{g/l}$	102%
Chromium	1,72	0,03	1,67	0,37	$\mu\text{g/l}$	97%
Iron	57,5	0,3	45,71	9,31	$\mu\text{g/l}$	79%
Copper	107,8	0,4	104,12	9,88	$\mu\text{g/l}$	97%
Manganese	44,6	0,2	41,52	7,63	$\mu\text{g/l}$	93%
Nickel	1,92	0,03	1,86	0,19	$\mu\text{g/l}$	97%
Mercury	1,588	0,017	1,50	0,00	$\mu\text{g/l}$	94%
Selenium	0,404	0,017	0,460	0,13	$\mu\text{g/l}$	114%
Uranium	2,64	0,02	2,46	0,35	$\mu\text{g/l}$	93%
Zinc	20,1	0,7	20,98	1,79	$\mu\text{g/l}$	104%



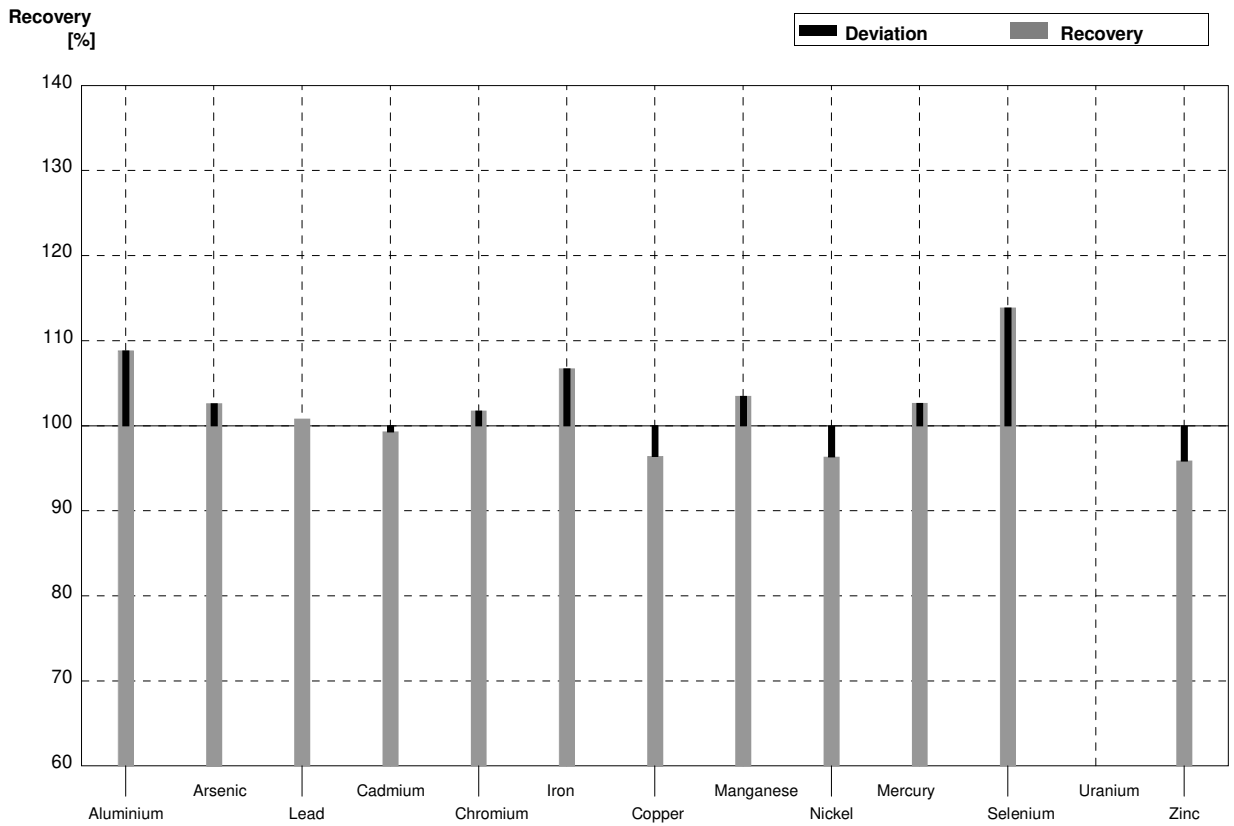
Sample M173A
Laboratory R

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	61,41	0,54	$\mu\text{g/l}$	105%
Arsenic	3,33	0,02	3,31	0,08	$\mu\text{g/l}$	99%
Lead	0,806	0,014	0,82	0,03	$\mu\text{g/l}$	102%
Cadmium	1,765	0,014	1,74	0,01	$\mu\text{g/l}$	99%
Chromium	3,79	0,03	3,79	0,04	$\mu\text{g/l}$	100%
Iron	17,92	0,19	18,16	0,09	$\mu\text{g/l}$	101%
Copper	3,43	0,03	3,21	0,01	$\mu\text{g/l}$	94%
Manganese	10,79	0,16	11,17	0,07	$\mu\text{g/l}$	104%
Nickel	5,50	0,04	5,39	0,11	$\mu\text{g/l}$	98%
Mercury	0,421	0,013	0,420	0,01	$\mu\text{g/l}$	100%
Selenium	2,83	0,02	2,99	0,09	$\mu\text{g/l}$	106%
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7	9,94	0,01	$\mu\text{g/l}$	95%



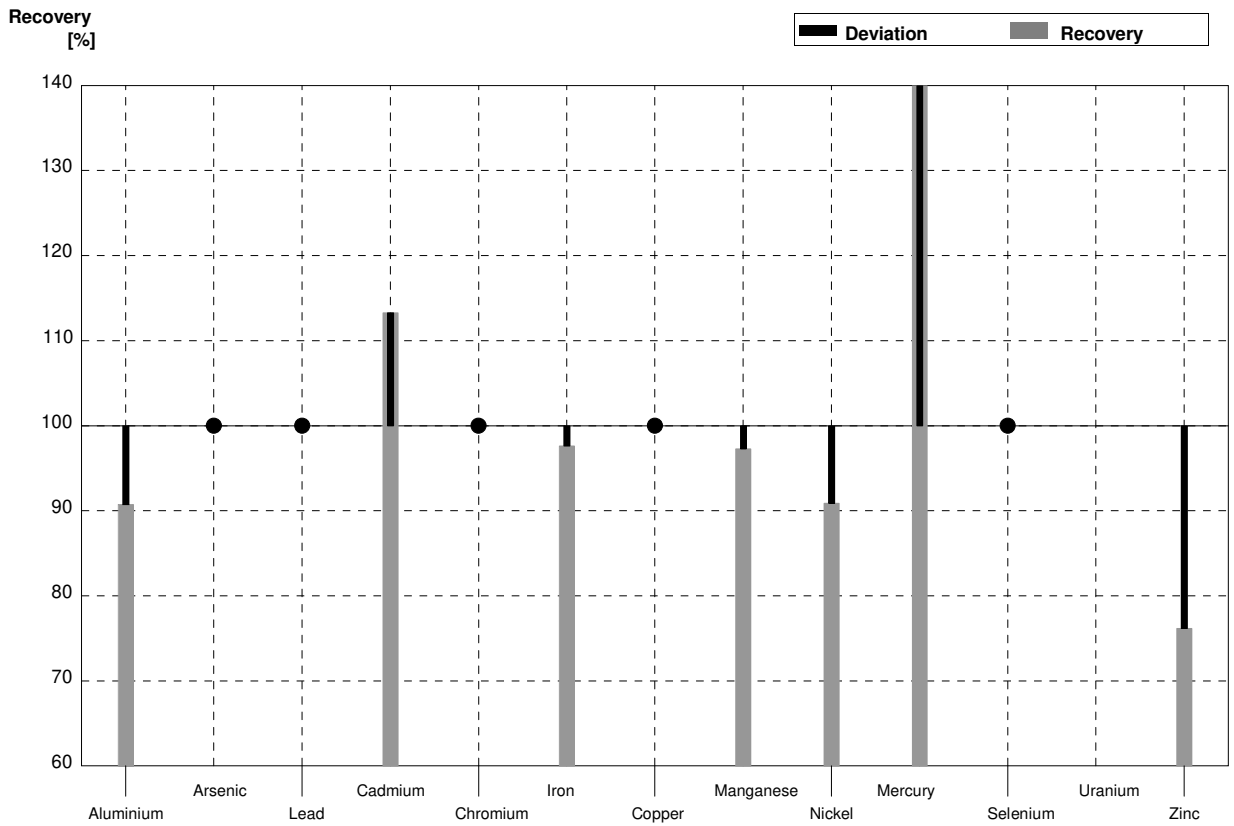
Sample M173B
Laboratory R

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	26,55	0,13	$\mu\text{g/l}$	109%
Arsenic	4,20	0,03	4,31	0,04	$\mu\text{g/l}$	103%
Lead	3,69	0,03	3,72	0,02	$\mu\text{g/l}$	101%
Cadmium	0,705	0,007	0,70	0,01	$\mu\text{g/l}$	99%
Chromium	1,72	0,03	1,75	0,01	$\mu\text{g/l}$	102%
Iron	57,5	0,3	61,37	0,33	$\mu\text{g/l}$	107%
Copper	107,8	0,4	103,93	0,69	$\mu\text{g/l}$	96%
Manganese	44,6	0,2	46,15	0,44	$\mu\text{g/l}$	103%
Nickel	1,92	0,03	1,85	0,01	$\mu\text{g/l}$	96%
Mercury	1,588	0,017	1,63	0,03	$\mu\text{g/l}$	103%
Selenium	0,404	0,017	0,460	0,03	$\mu\text{g/l}$	114%
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7	19,27	0,12	$\mu\text{g/l}$	96%



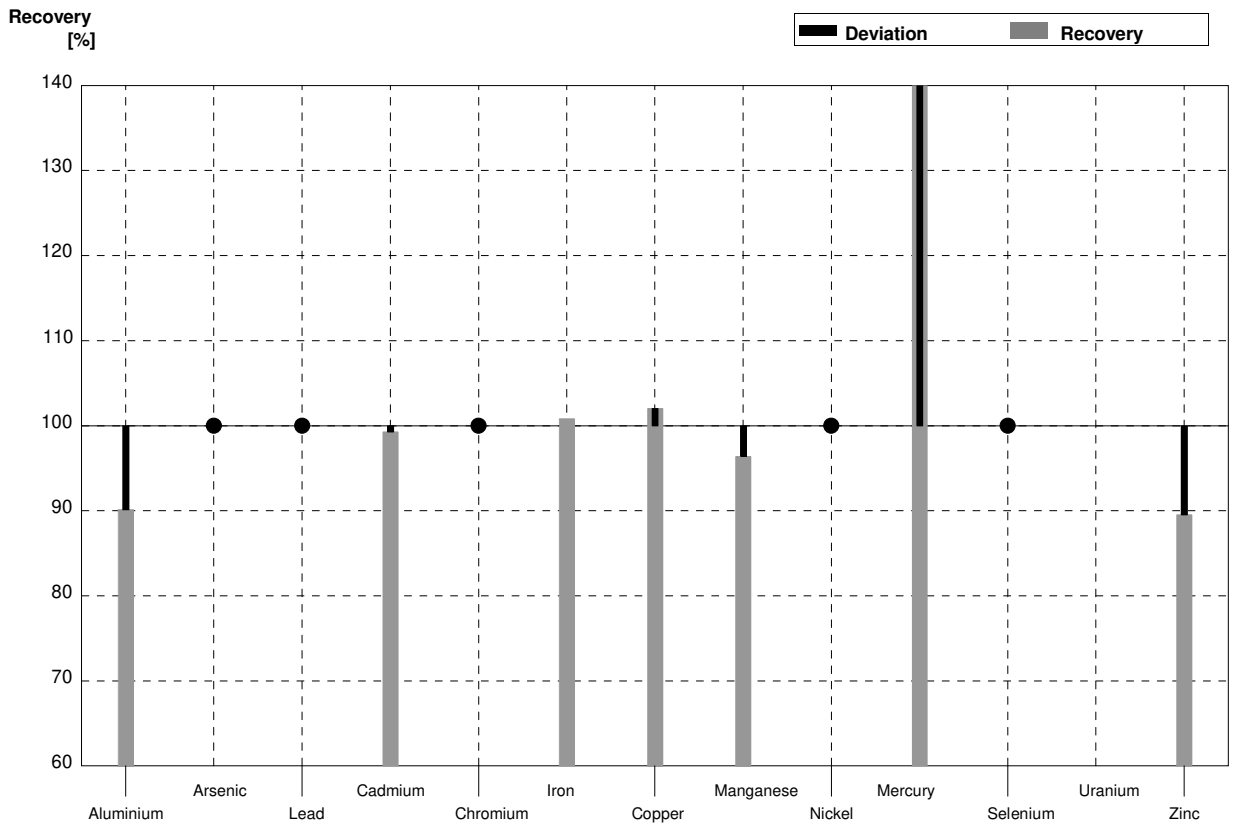
Sample M173A
Laboratory S

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	58,4	0,5	53,0	5,30	µg/l	91%
Arsenic	3,33	0,02	<5,00	0,500	µg/l	•
Lead	0,806	0,014	<5,00	0,500	µg/l	•
Cadmium	1,765	0,014	2,00	0,200	µg/l	113%
Chromium	3,79	0,03	<5,00	0,500	µg/l	•
Iron	17,92	0,19	17,5	1,75	µg/l	98%
Copper	3,43	0,03	<5,00	0,500	µg/l	•
Manganese	10,79	0,16	10,5	1,05	µg/l	97%
Nickel	5,50	0,04	5,00	0,500	µg/l	91%
Mercury	0,421	0,013	376	18,8	µg/l	89311%
Selenium	2,83	0,02	<5,00	0,500	µg/l	•
Uranium	5,24	0,04			µg/l	
Zinc	10,5	0,7	8,00	0,800	µg/l	76%



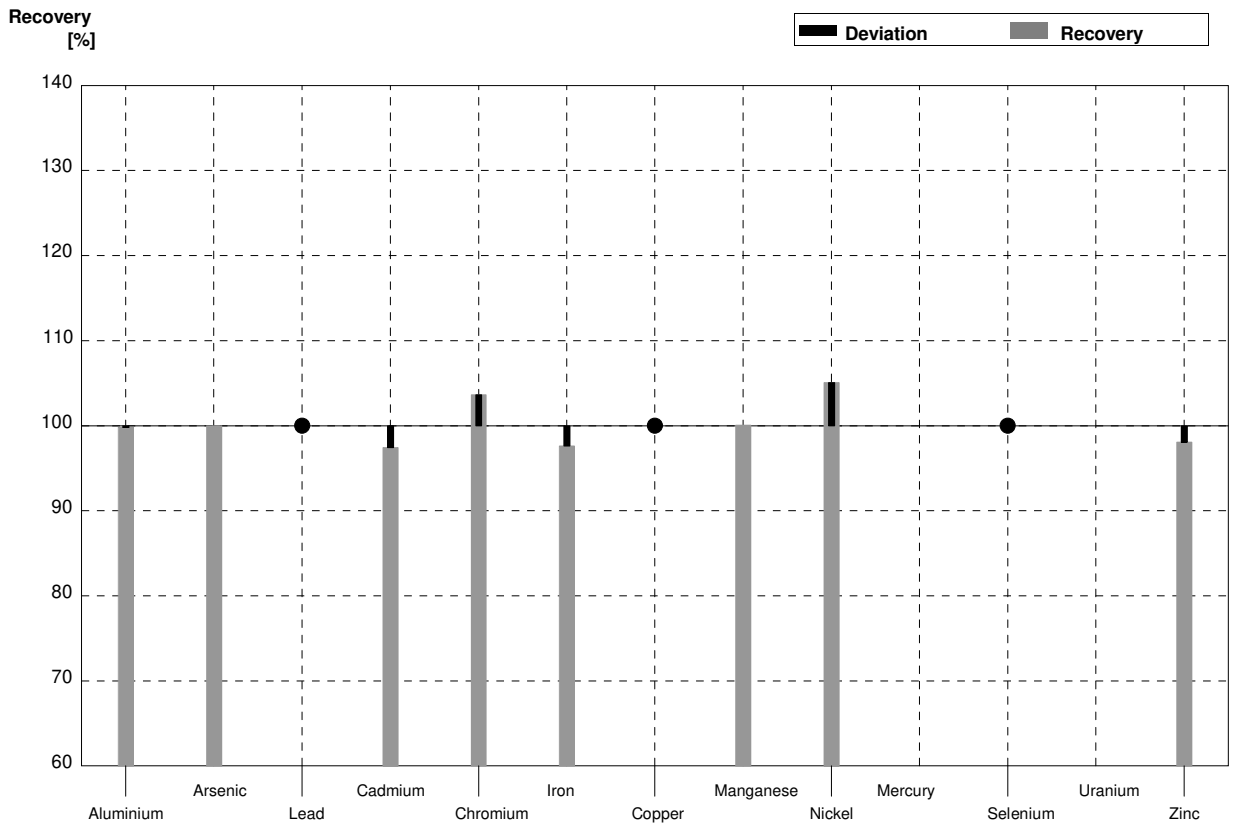
Sample M173B
Laboratory S

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	22,0	2,20	$\mu\text{g/l}$	90%
Arsenic	4,20	0,03	<5,00	0,500	$\mu\text{g/l}$	•
Lead	3,69	0,03	<5,00	0,500	$\mu\text{g/l}$	•
Cadmium	0,705	0,007	0,700	0,0700	$\mu\text{g/l}$	99%
Chromium	1,72	0,03	<5,00	0,500	$\mu\text{g/l}$	•
Iron	57,5	0,3	58,0	5,80	$\mu\text{g/l}$	101%
Copper	107,8	0,4	110	11,0	$\mu\text{g/l}$	102%
Manganese	44,6	0,2	43,0	4,30	$\mu\text{g/l}$	96%
Nickel	1,92	0,03	<5,00	0,500	$\mu\text{g/l}$	•
Mercury	1,588	0,017	1560	78,0	$\mu\text{g/l}$	98237%
Selenium	0,404	0,017	<5,00	0,500	$\mu\text{g/l}$	•
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7	18,0	1,80	$\mu\text{g/l}$	90%



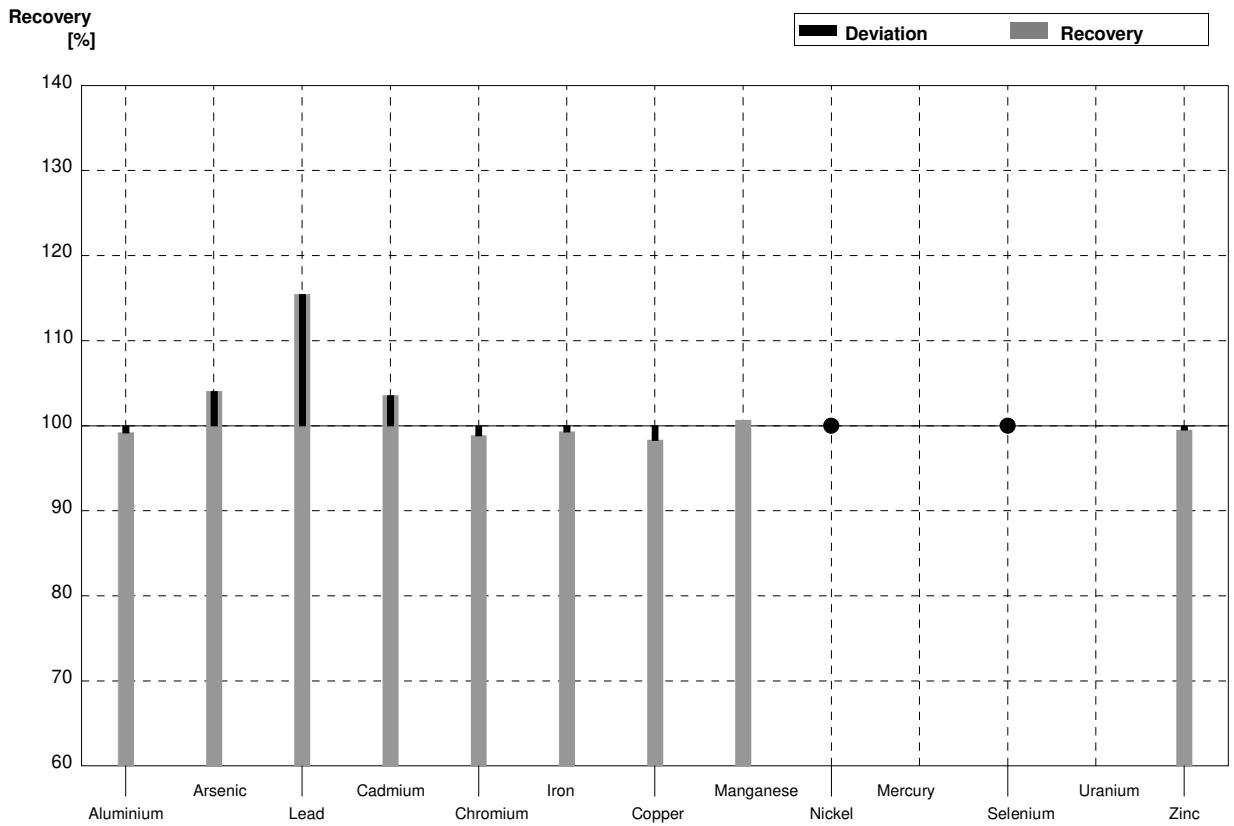
Sample M173A
Laboratory T

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	58,3	8,98	$\mu\text{g/l}$	100%
Arsenic	3,33	0,02	3,33	0,50	$\mu\text{g/l}$	100%
Lead	0,806	0,014	<3		$\mu\text{g/l}$	•
Cadmium	1,765	0,014	1,72	0,12	$\mu\text{g/l}$	97%
Chromium	3,79	0,03	3,93	0,33	$\mu\text{g/l}$	104%
Iron	17,92	0,19	17,5	1,47	$\mu\text{g/l}$	98%
Copper	3,43	0,03	<5		$\mu\text{g/l}$	•
Manganese	10,79	0,16	10,8	1,02	$\mu\text{g/l}$	100%
Nickel	5,50	0,04	5,78	0,71	$\mu\text{g/l}$	105%
Mercury	0,421	0,013			$\mu\text{g/l}$	
Selenium	2,83	0,02	<10		$\mu\text{g/l}$	•
Uranium	5,24	0,04			$\mu\text{g/l}$	
Zinc	10,5	0,7	10,3	1,44	$\mu\text{g/l}$	98%



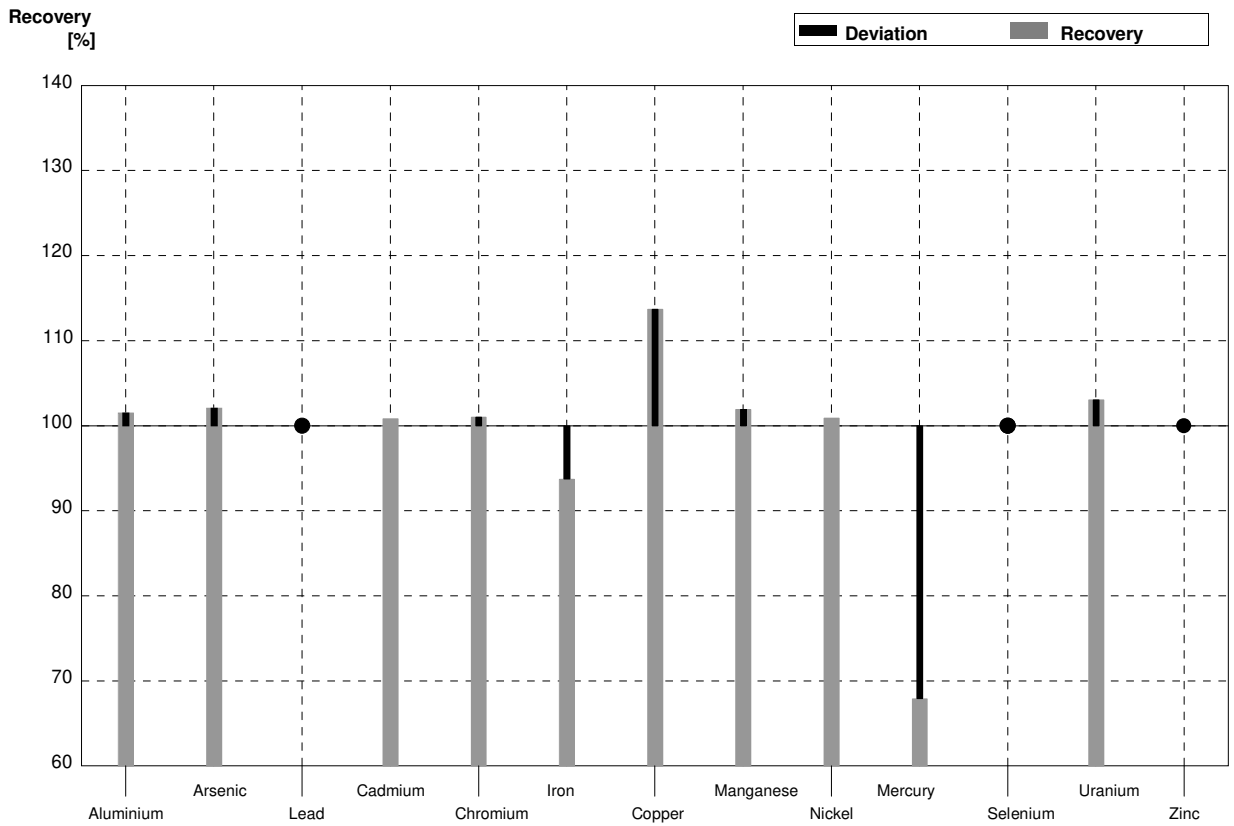
Sample M173B
Laboratory T

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	24,4	0,3	24,2	3,73	$\mu\text{g/l}$	99%
Arsenic	4,20	0,03	4,37	0,66	$\mu\text{g/l}$	104%
Lead	3,69	0,03	4,26	0,73	$\mu\text{g/l}$	115%
Cadmium	0,705	0,007	0,73	0,05	$\mu\text{g/l}$	104%
Chromium	1,72	0,03	1,70	0,14	$\mu\text{g/l}$	99%
Iron	57,5	0,3	57,1	4,80	$\mu\text{g/l}$	99%
Copper	107,8	0,4	106	38,2	$\mu\text{g/l}$	98%
Manganese	44,6	0,2	44,9	4,22	$\mu\text{g/l}$	101%
Nickel	1,92	0,03	<5		$\mu\text{g/l}$	•
Mercury	1,588	0,017			$\mu\text{g/l}$	
Selenium	0,404	0,017	<10		$\mu\text{g/l}$	•
Uranium	2,64	0,02			$\mu\text{g/l}$	
Zinc	20,1	0,7	20,0	2,79	$\mu\text{g/l}$	100%



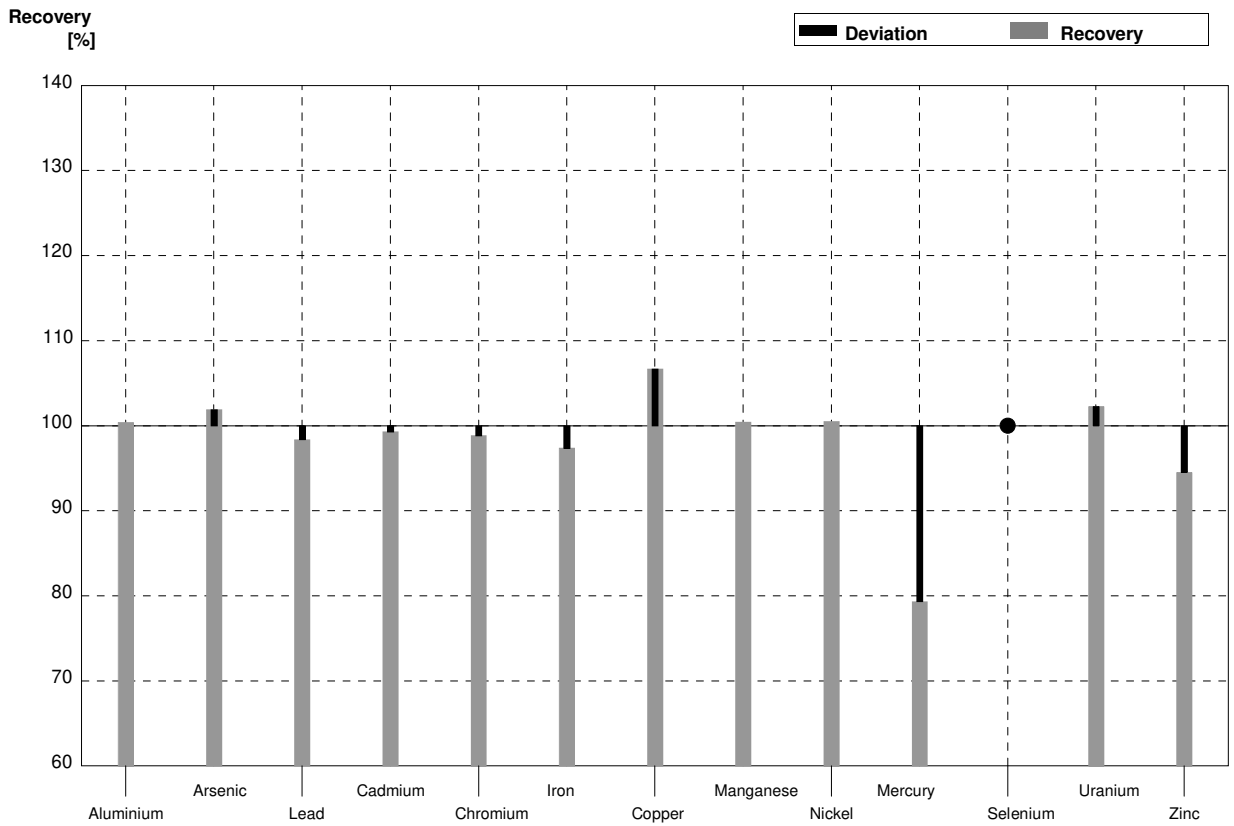
Sample M173A
Laboratory U

Parameter	Assigned value	$\pm U (k=2)$	Result	\pm	Unit	Recovery
Aluminium	58,4	0,5	59,3	12	$\mu\text{g/l}$	102%
Arsenic	3,33	0,02	3,40	0,68	$\mu\text{g/l}$	102%
Lead	0,806	0,014	<1		$\mu\text{g/l}$	•
Cadmium	1,765	0,014	1,78	0,36	$\mu\text{g/l}$	101%
Chromium	3,79	0,03	3,83	0,77	$\mu\text{g/l}$	101%
Iron	17,92	0,19	16,8	3,4	$\mu\text{g/l}$	94%
Copper	3,43	0,03	3,90	0,78	$\mu\text{g/l}$	114%
Manganese	10,79	0,16	11,0	2,2	$\mu\text{g/l}$	102%
Nickel	5,50	0,04	5,55	1,1	$\mu\text{g/l}$	101%
Mercury	0,421	0,013	0,286	0,057	$\mu\text{g/l}$	68%
Selenium	2,83	0,02	<5		$\mu\text{g/l}$	•
Uranium	5,24	0,04	5,40	1,1	$\mu\text{g/l}$	103%
Zinc	10,5	0,7	<10		$\mu\text{g/l}$	•



Sample M173B
Laboratory U

Parameter	Assigned value	± U (k=2)	Result	±	Unit	Recovery
Aluminium	24,4	0,3	24,5	4,9	µg/l	100%
Arsenic	4,20	0,03	4,28	0,86	µg/l	102%
Lead	3,69	0,03	3,63	0,73	µg/l	98%
Cadmium	0,705	0,007	0,700	0,14	µg/l	99%
Chromium	1,72	0,03	1,70	0,34	µg/l	99%
Iron	57,5	0,3	56,0	11	µg/l	97%
Copper	107,8	0,4	115	23	µg/l	107%
Manganese	44,6	0,2	44,8	9,0	µg/l	100%
Nickel	1,92	0,03	1,93	0,39	µg/l	101%
Mercury	1,588	0,017	1,26	0,25	µg/l	79%
Selenium	0,404	0,017	<5		µg/l	•
Uranium	2,64	0,02	2,70	0,54	µg/l	102%
Zinc	20,1	0,7	19,0	3,8	µg/l	95%



Methodenvergleich

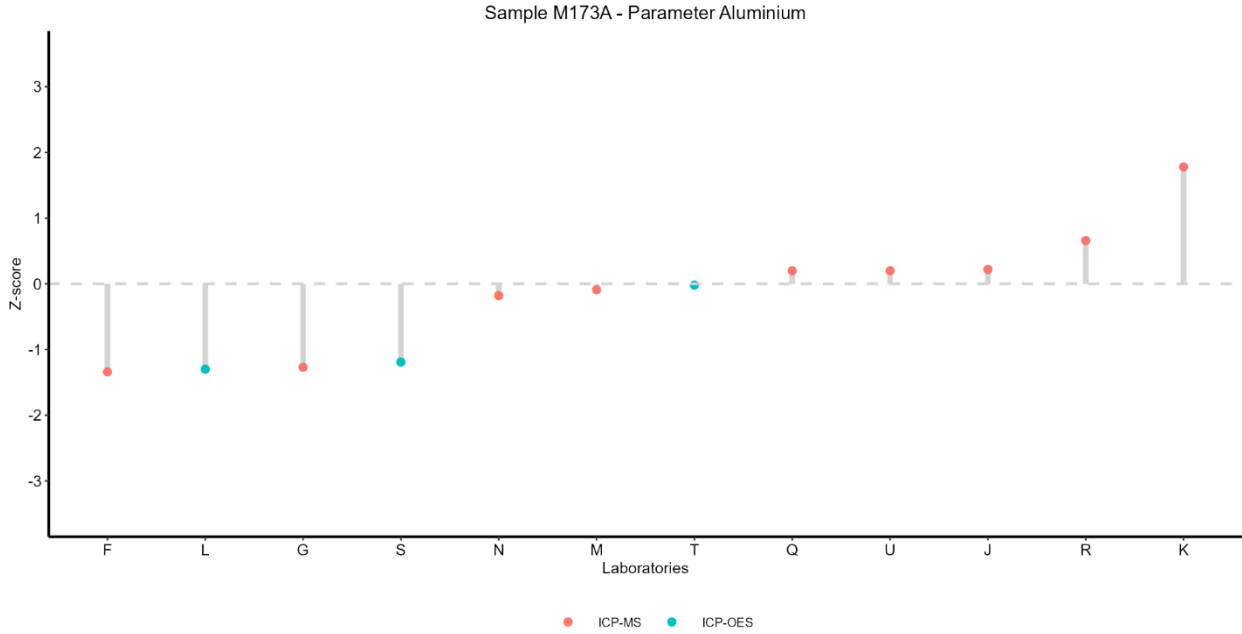
Method comparison

Eignungsprüfungsrunde / Proficiency testing round
M173

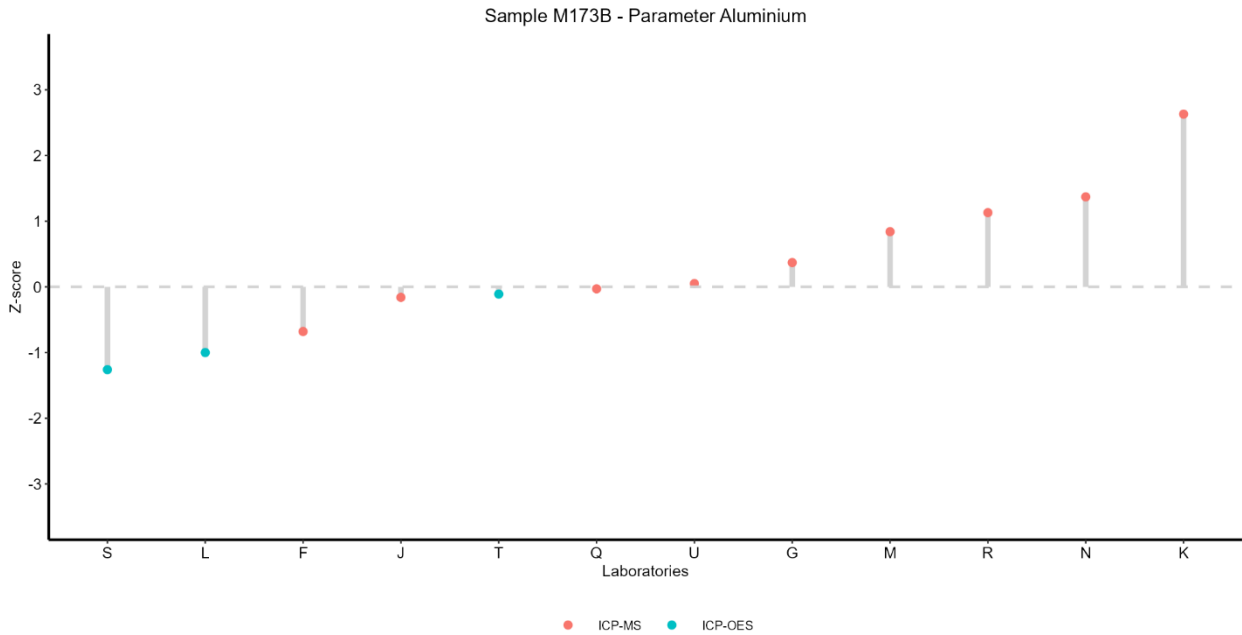
Metalle / Metals

Versand / Dispatch: 02.09.2024

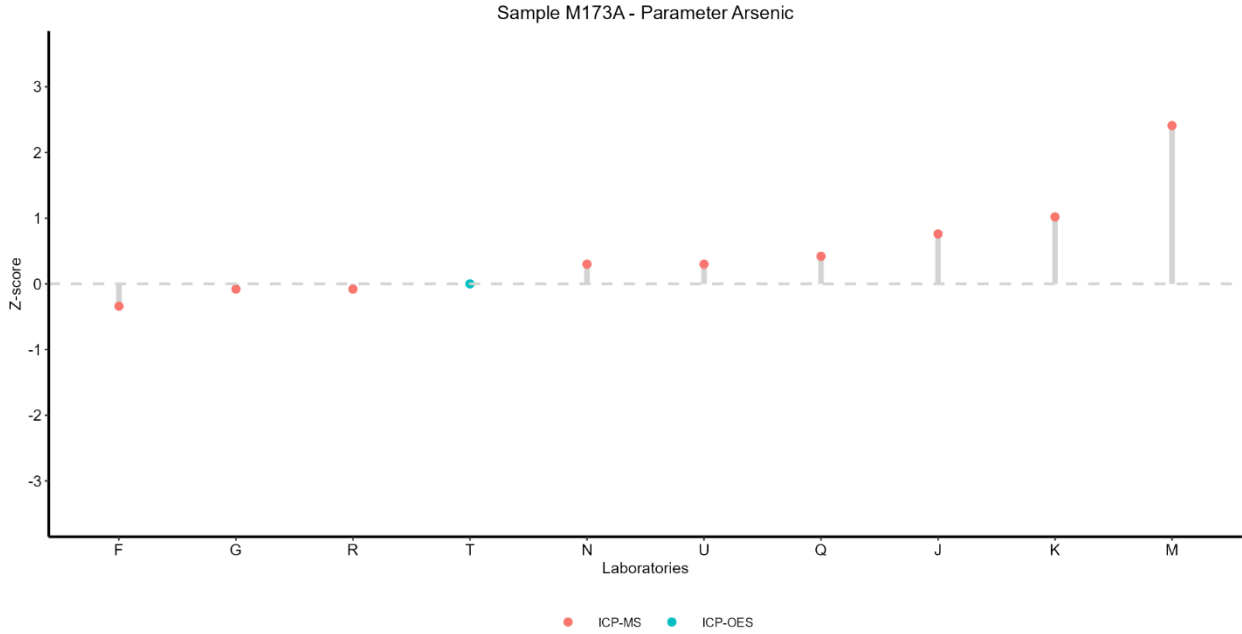
Sample M173A
Parameter Aluminium



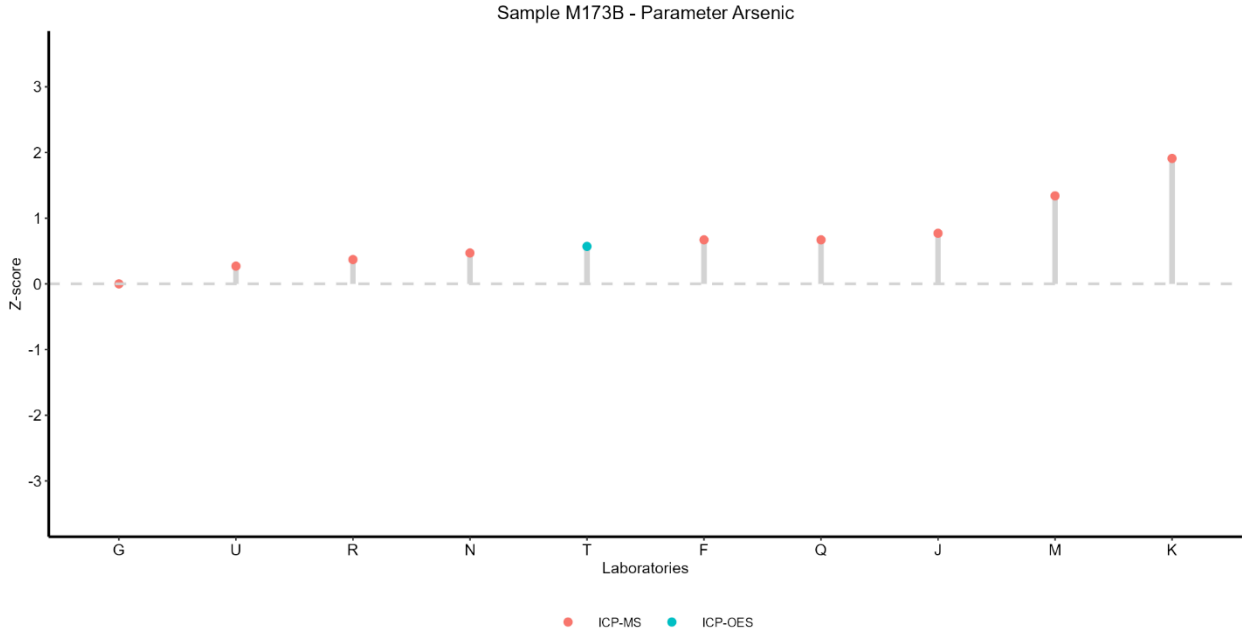
Sample M173B
Parameter Aluminium



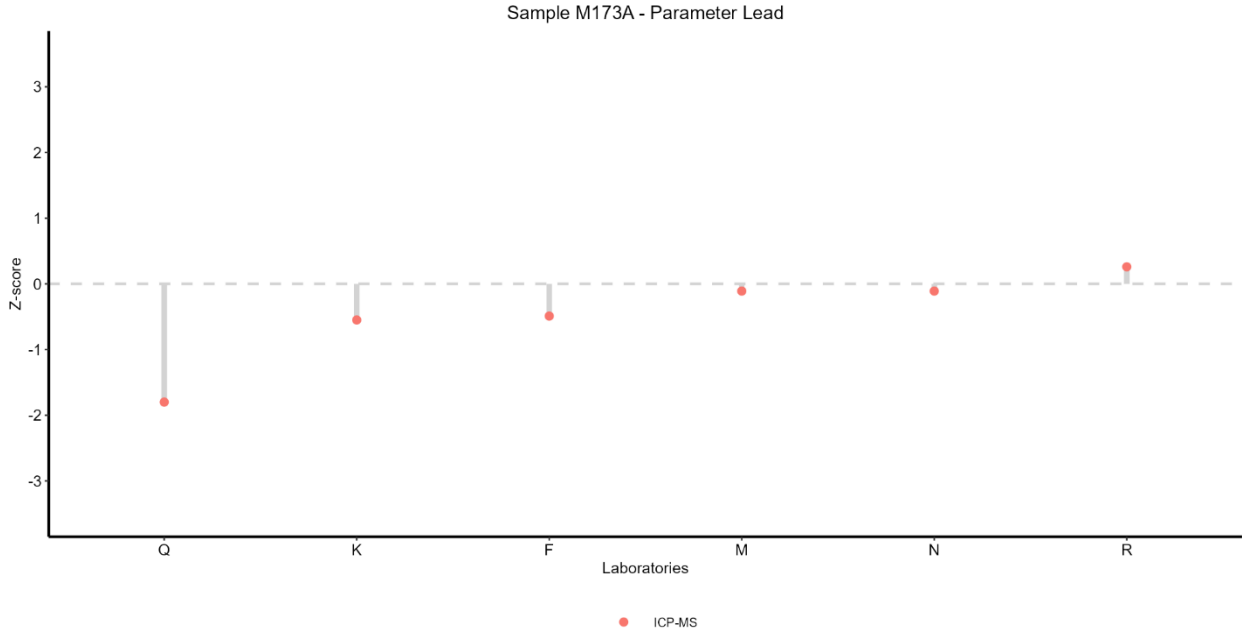
Sample M173A
Parameter Arsenic



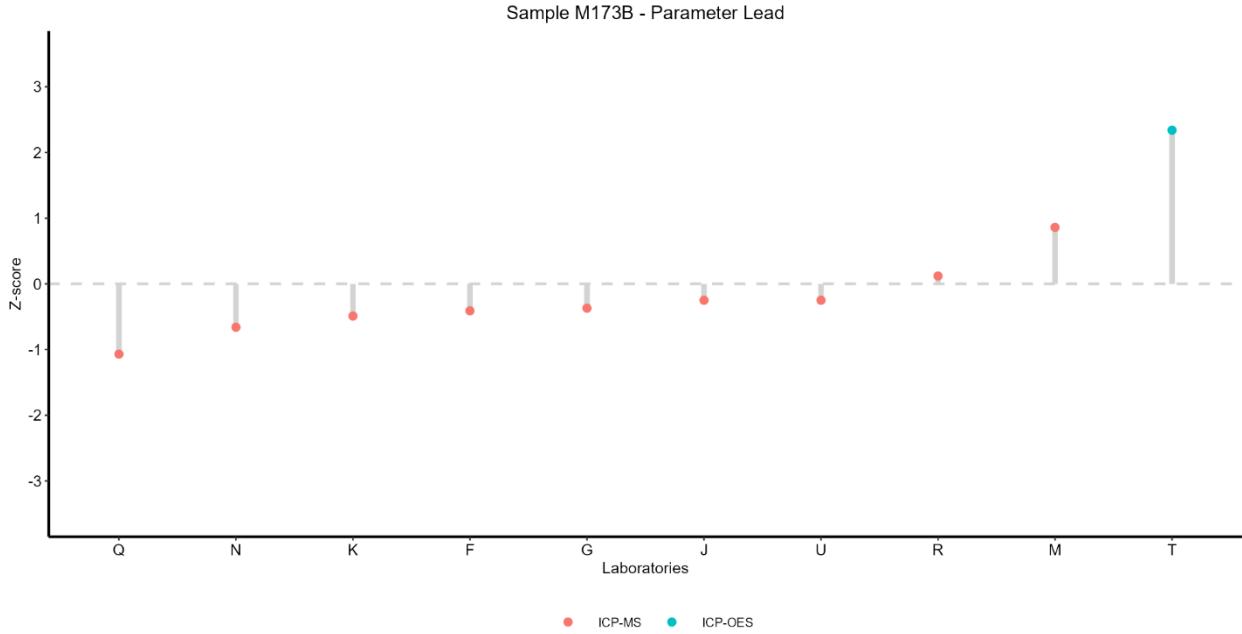
Sample M173B
Parameter Arsenic



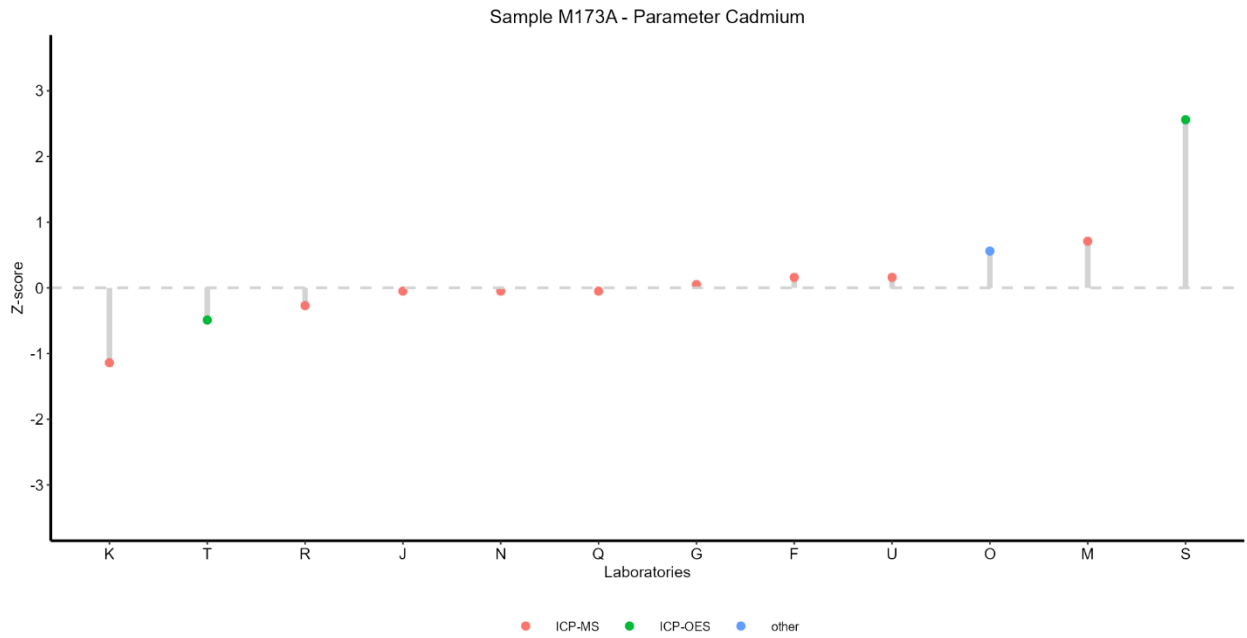
Sample M173A Parameter Lead



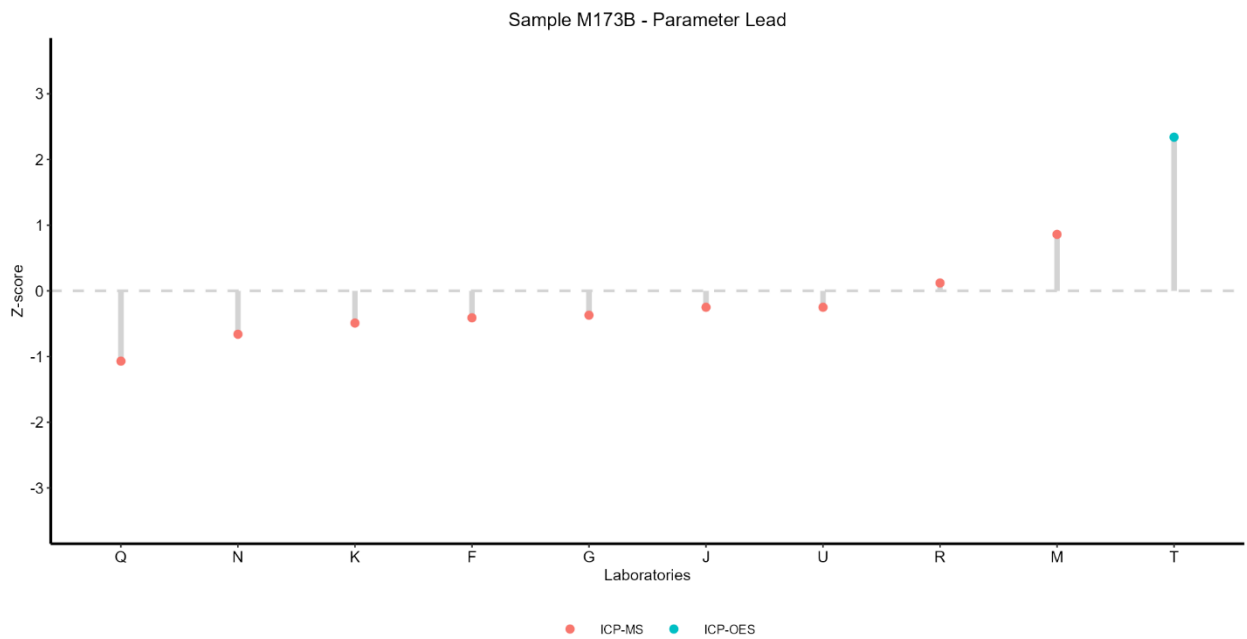
Sample M173B Parameter Lead



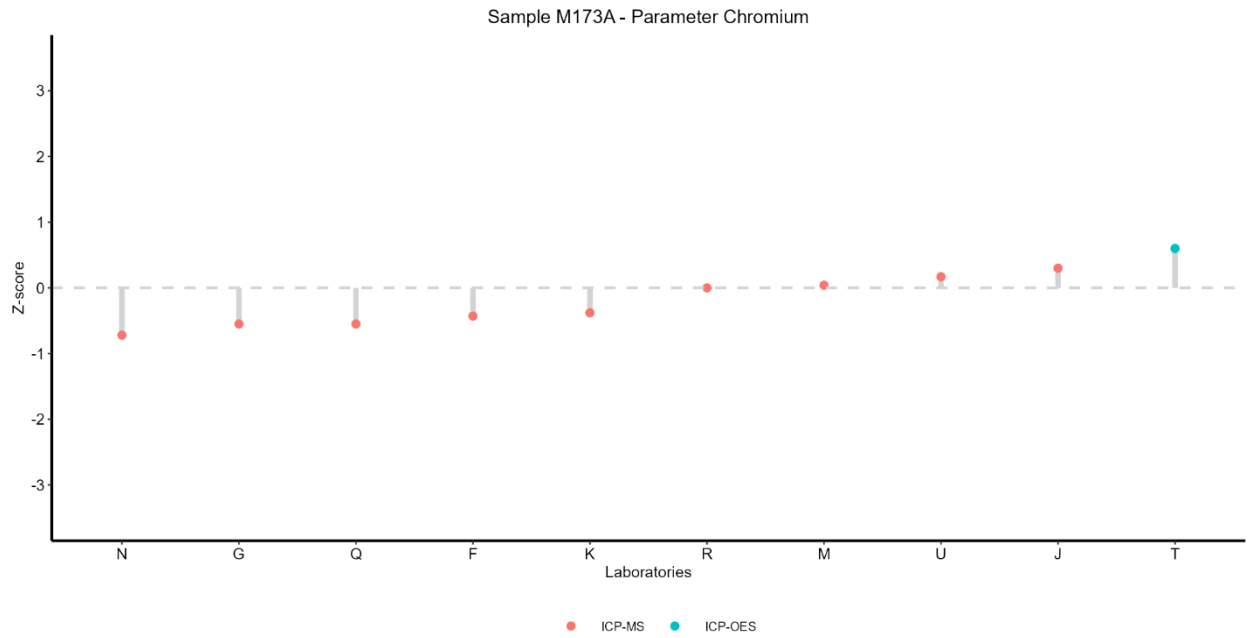
Sample M173A Parameter Cadmium



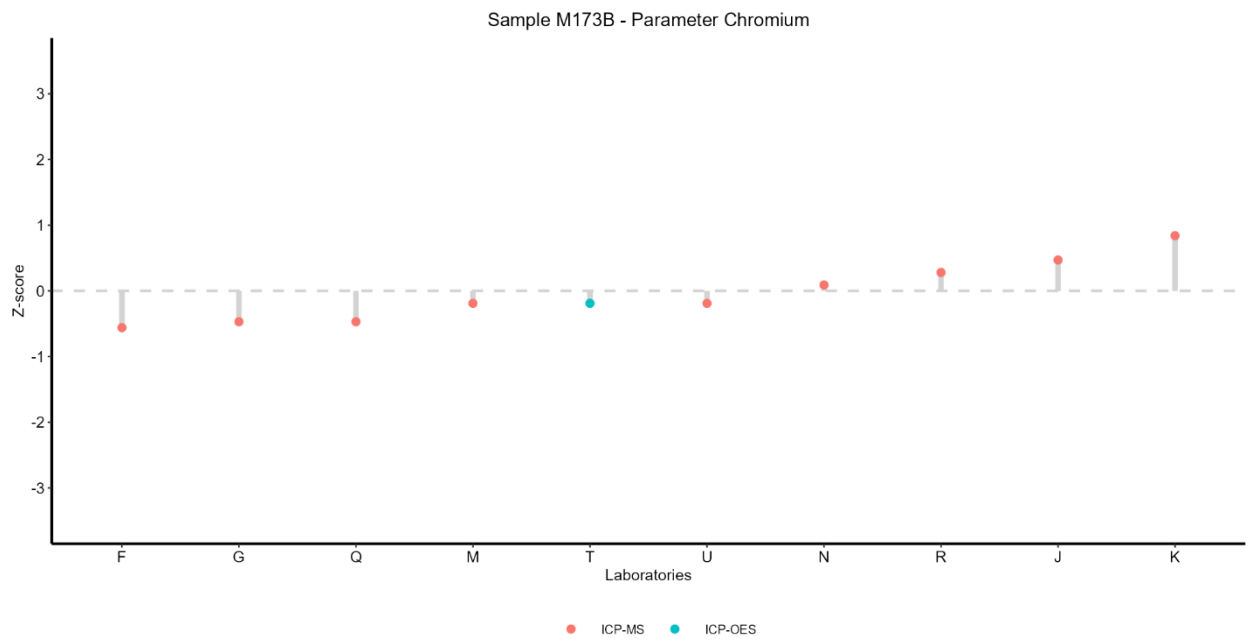
Sample M173B Parameter Cadmium



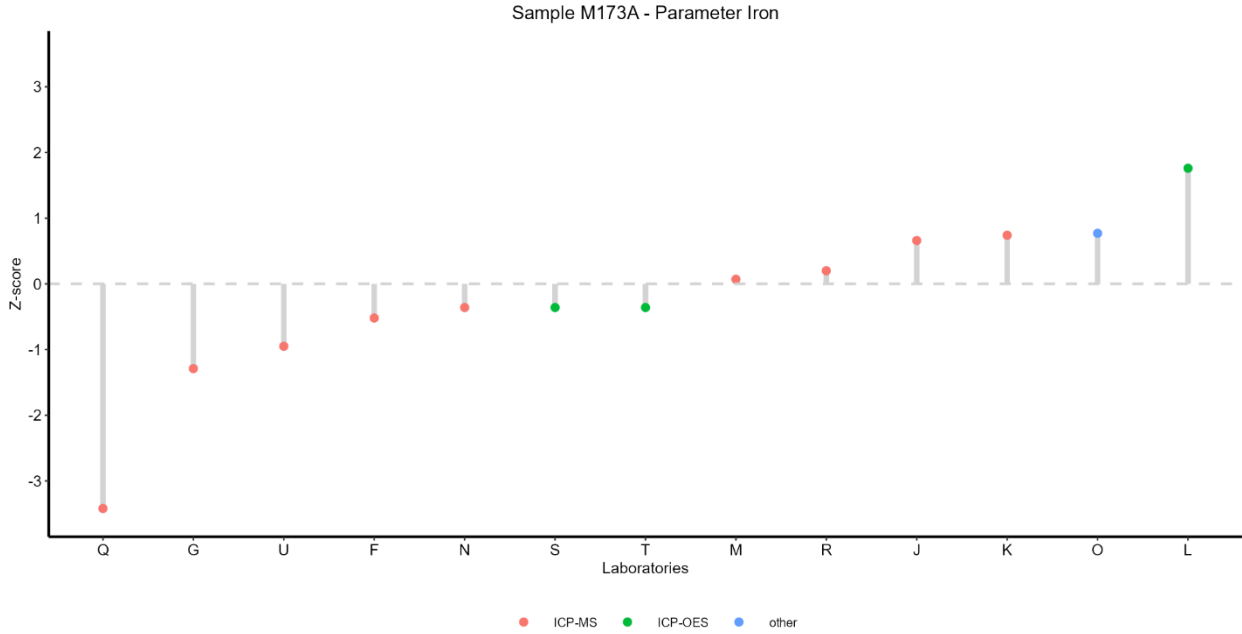
Sample M173A Parameter Chromium



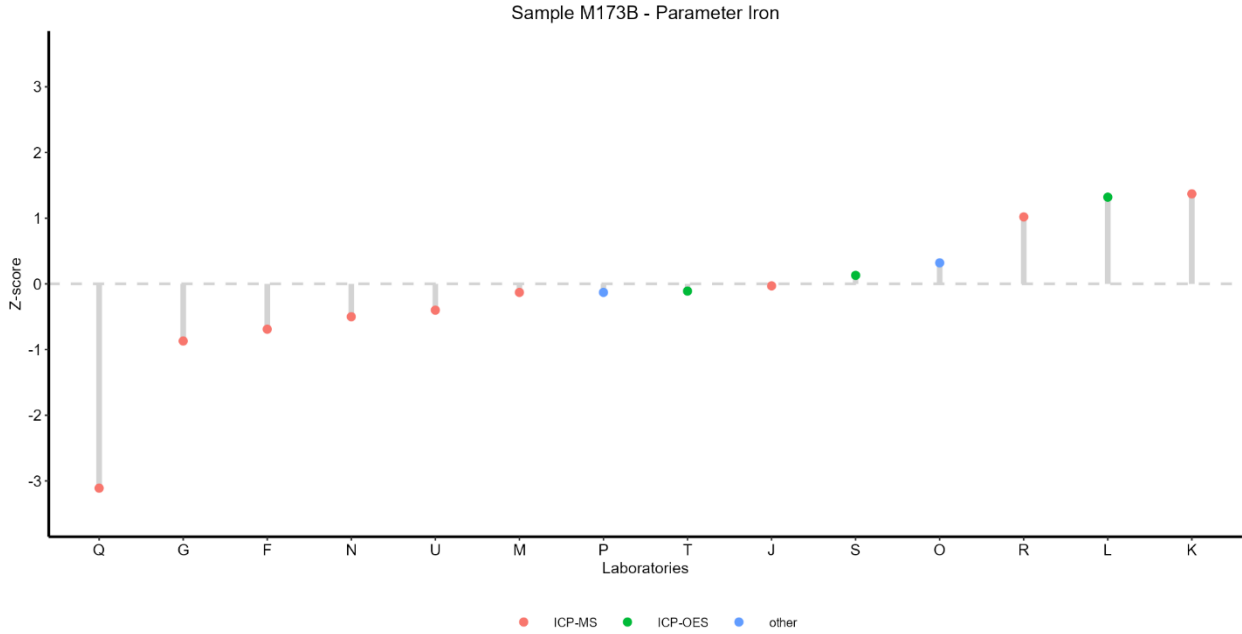
Sample M173B Parameter Chromium



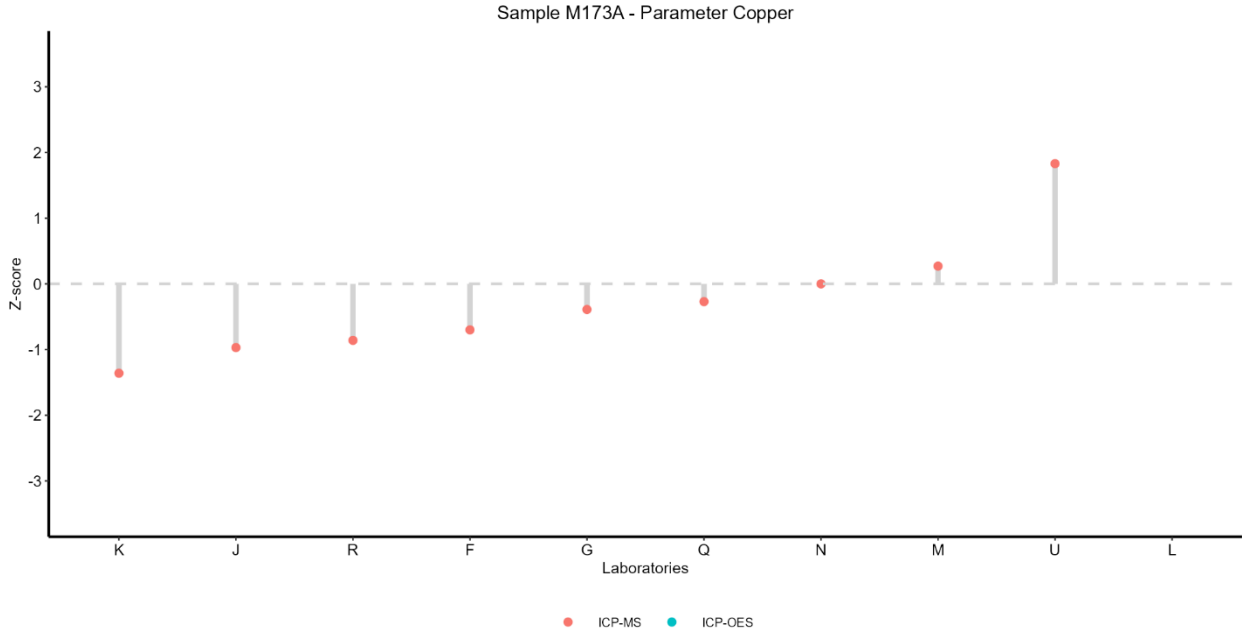
Sample M173A
Parameter Iron



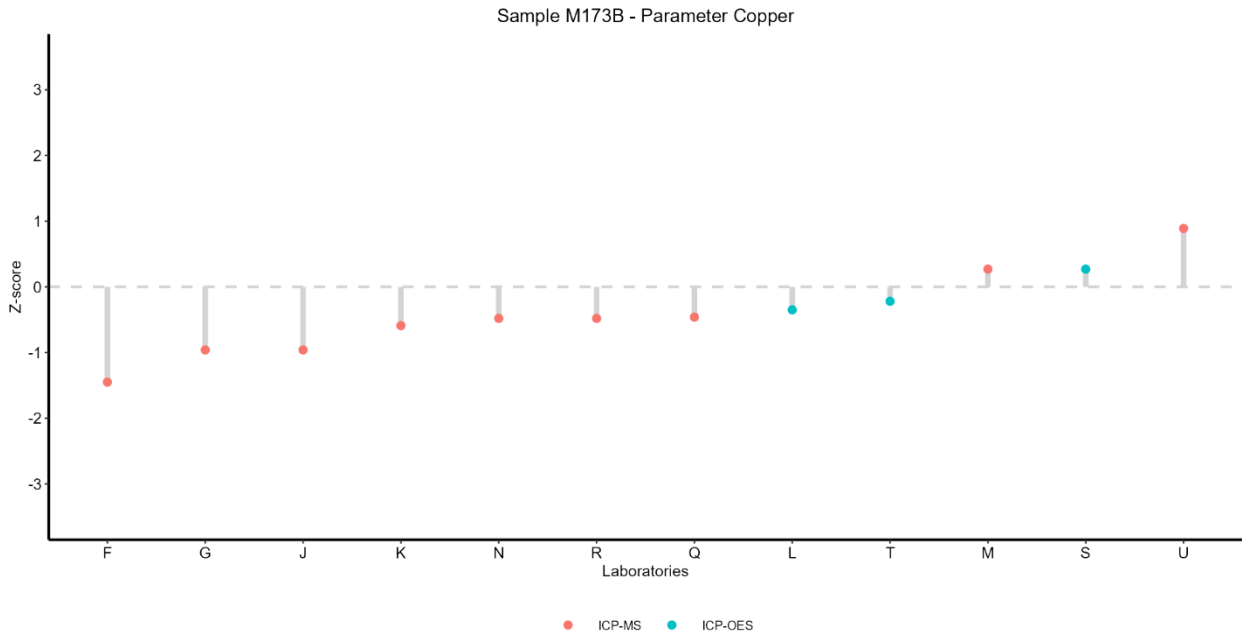
Sample M173B
Parameter Iron



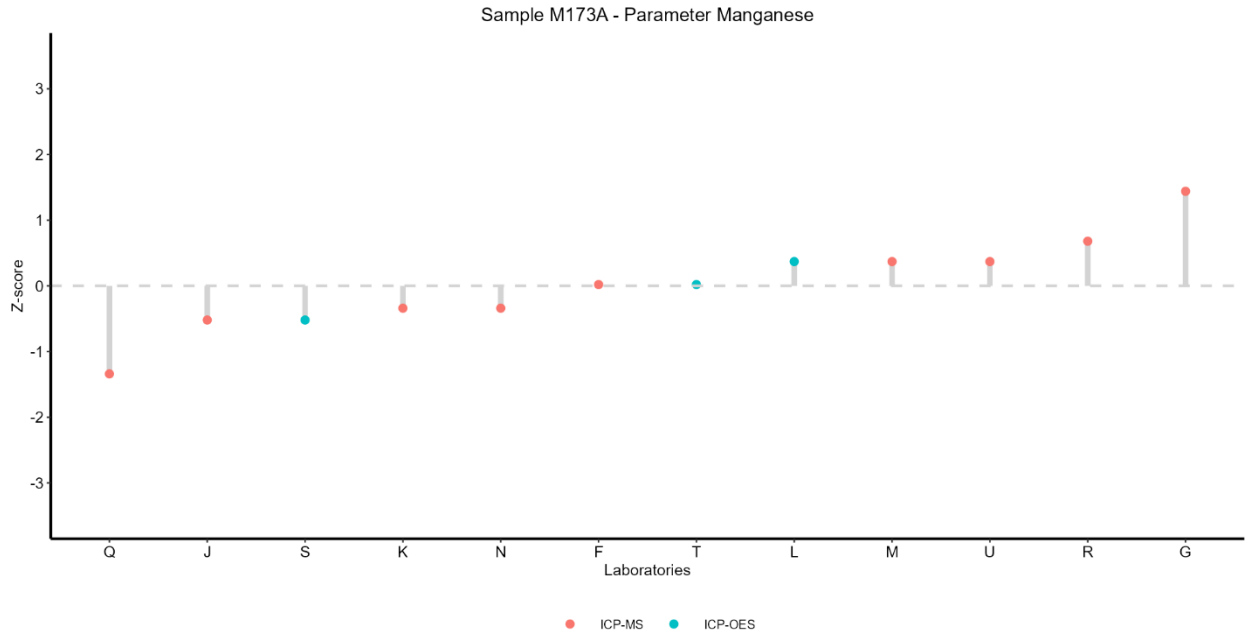
Sample M173A Parameter Copper



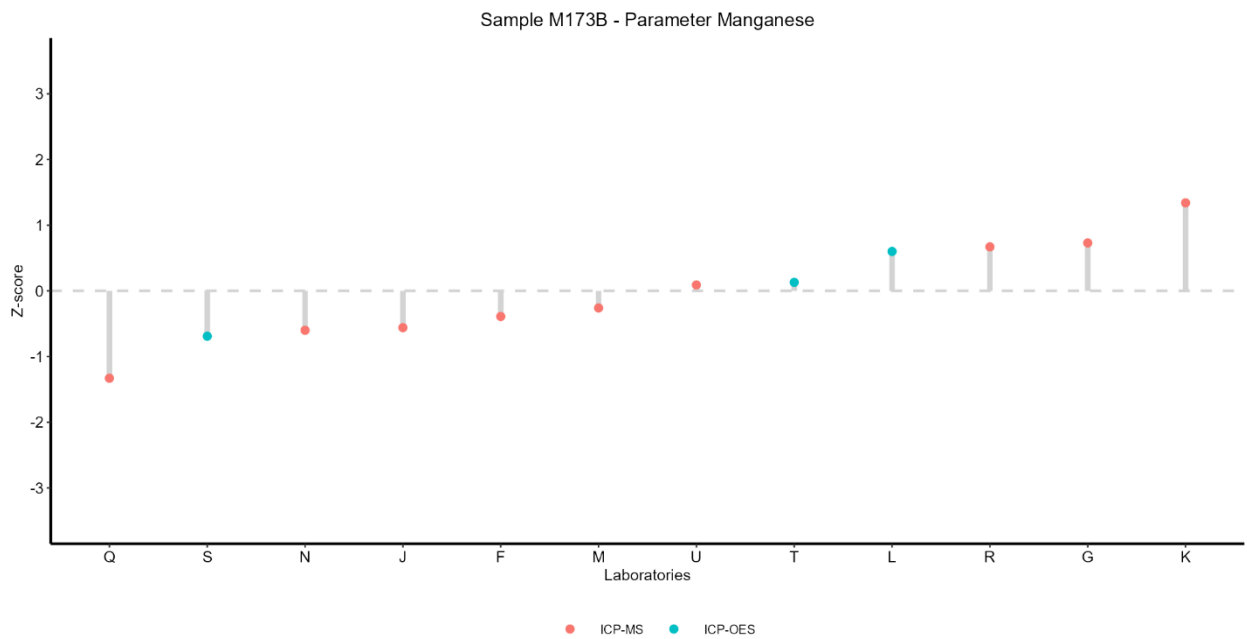
Sample M173B Parameter Copper



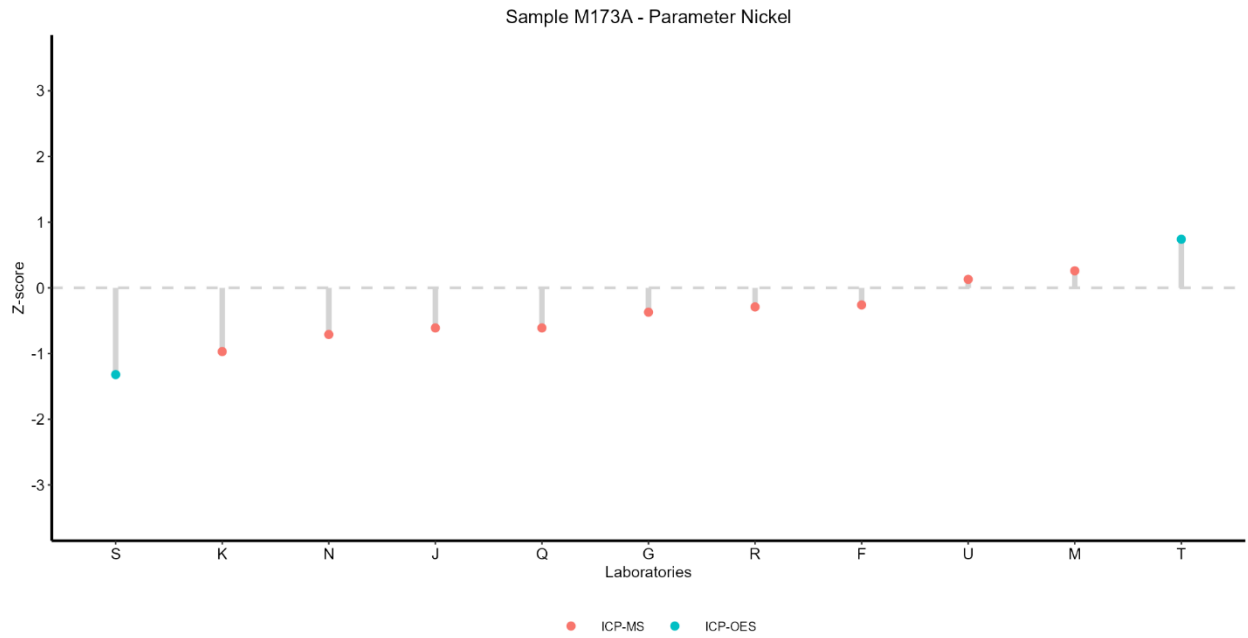
Sample M173A Parameter Manganese



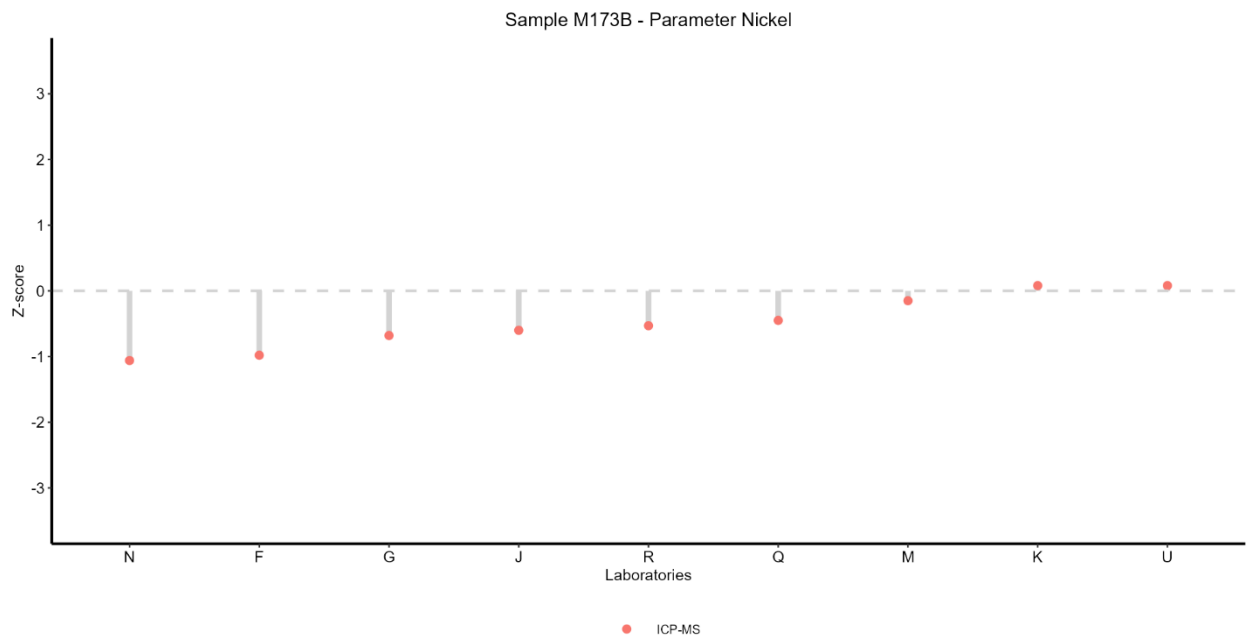
Sample M173B Parameter Manganese



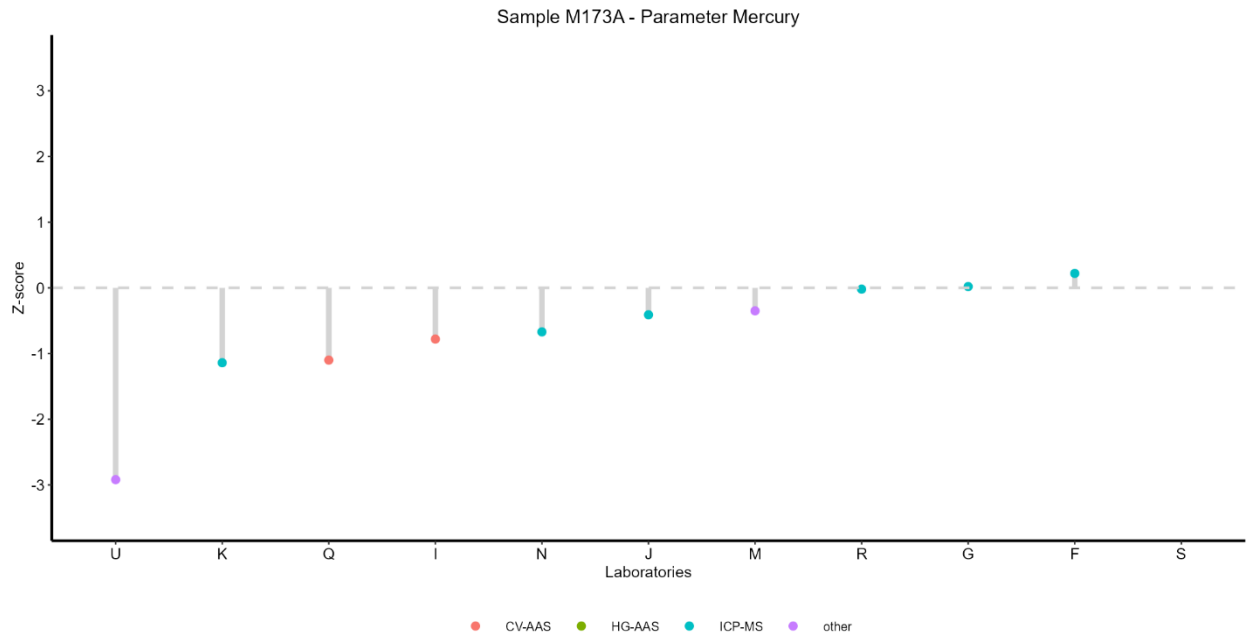
Sample M173A Parameter Nickel



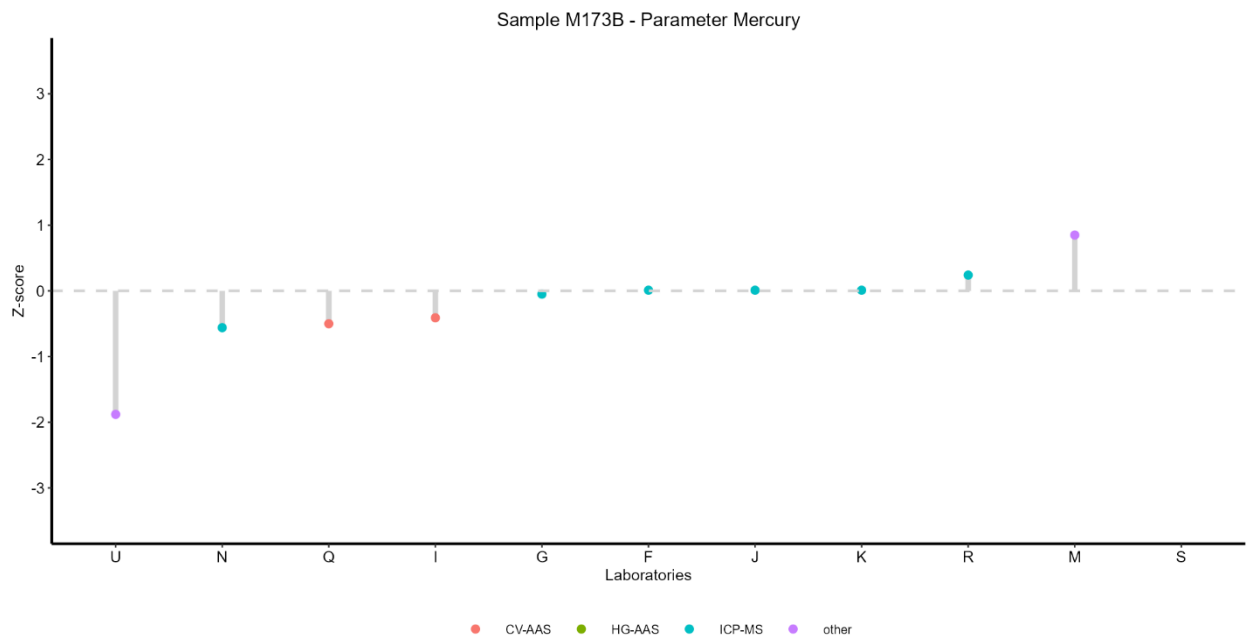
Sample M173B Parameter Nickel



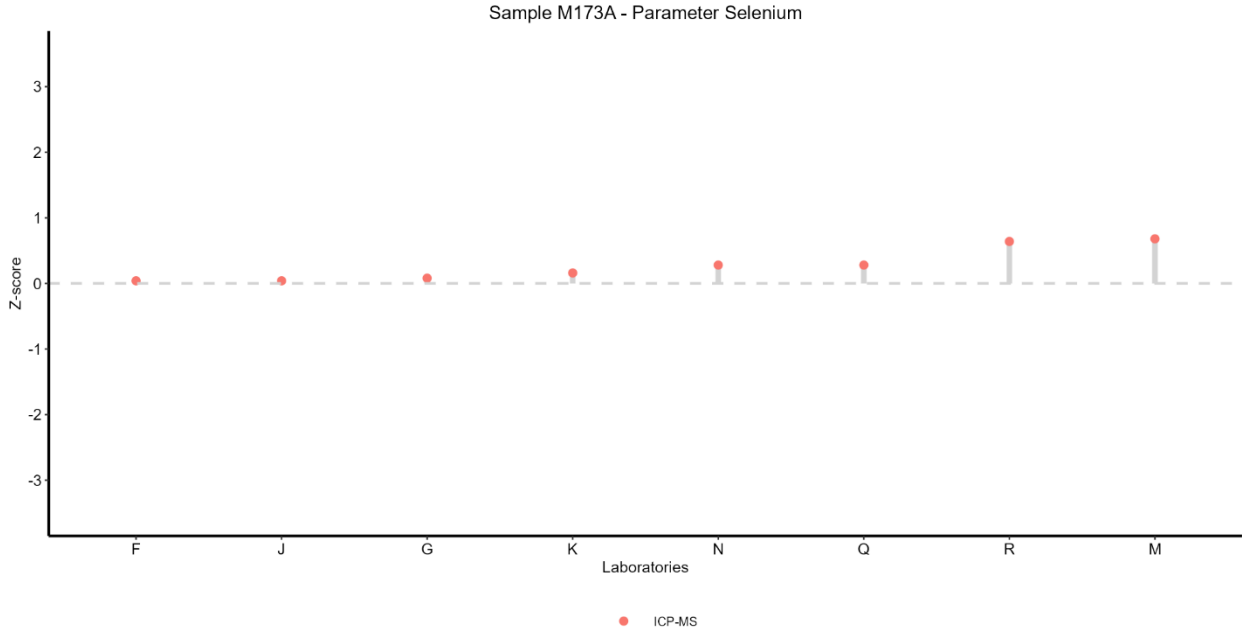
Sample M173A Parameter Mercury



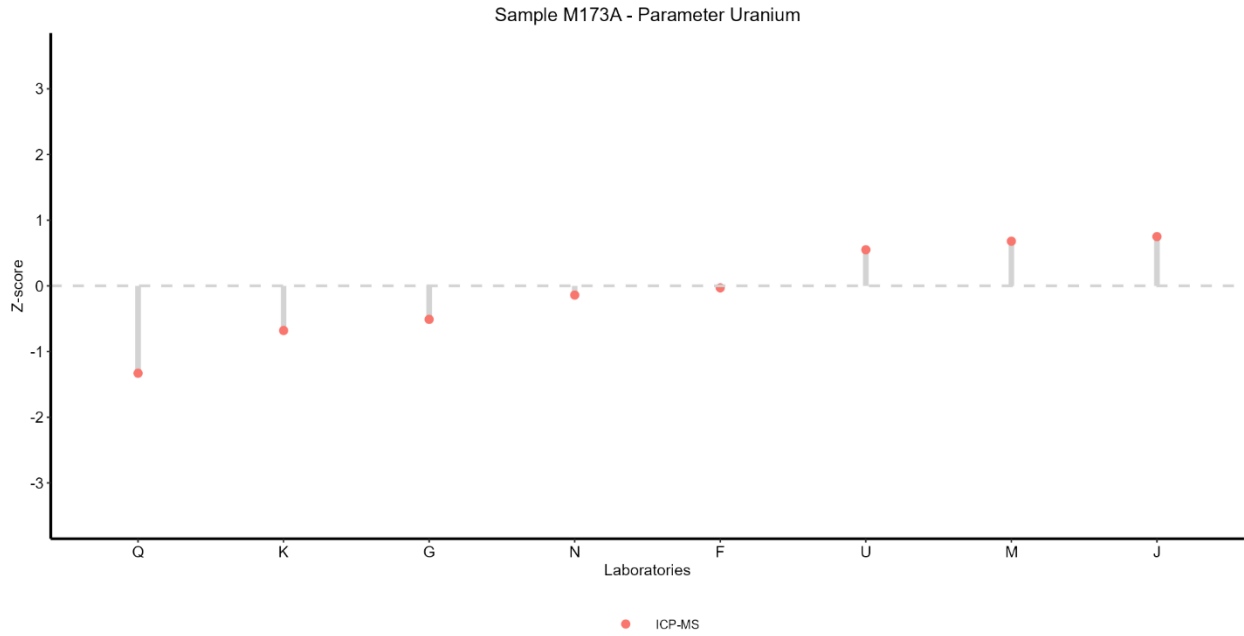
Sample M173B Parameter Mercury



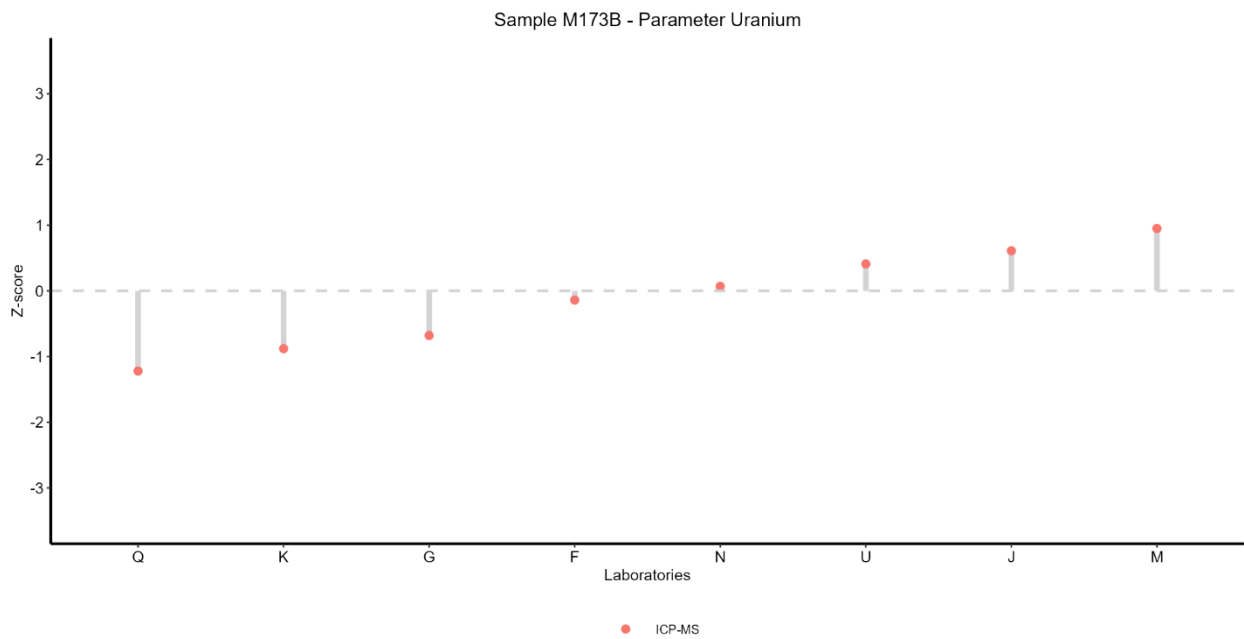
Sample M173A Parameter Selenium



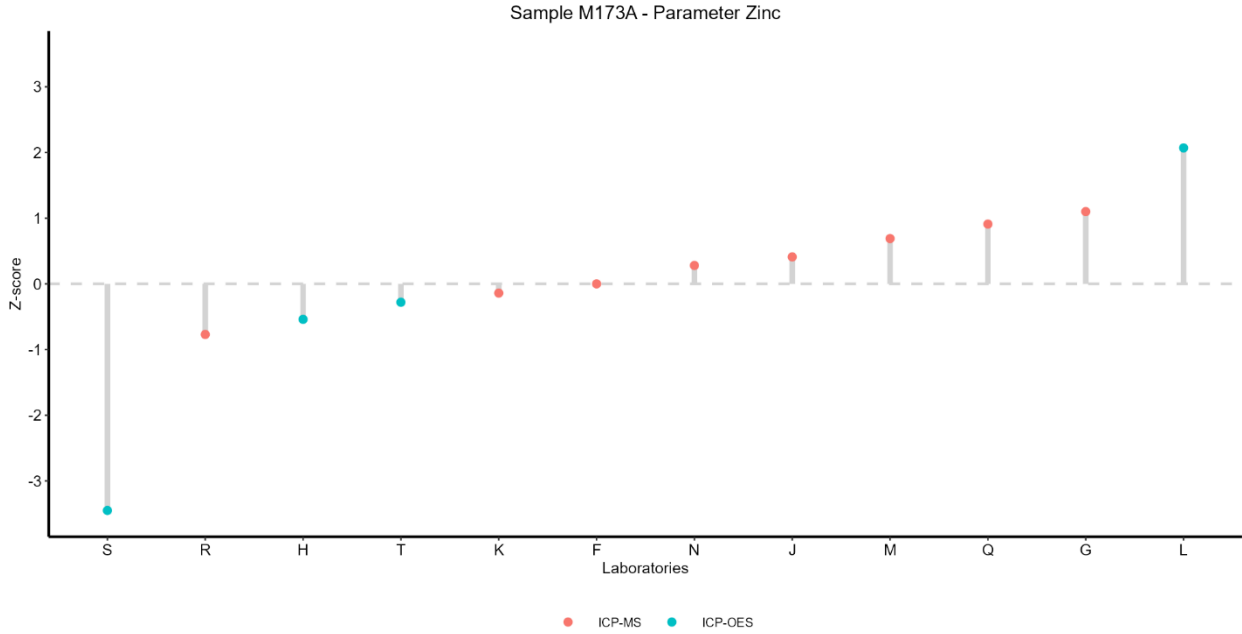
Sample M173A Parameter Uranium



Sample M173B Parameter Uranium



Sample M173A Parameter Zinc



Sample M173B Parameter Zinc

